Greening the Invisible Hand: How Environmental Non-Governmental Organizations (NGOs) Succeed and Fail in Technology Change

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SUBMITTED TO THE DEPARTMENT OF URBAN STUDIES AND PLANNING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY IN URBAN AND REGIONAL STUDIES
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 2003

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Submitted to the Department of Urban Studies and Planning
on May 5, 2003 in Partial Fulfillment of the Requirements for
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ABSTRACT

This dissertation examines how national environmental non-governmental organizations (NGOs) in Sweden and the United States (US) tried to diffuse cleaner production technologies in the pulp and paper industry from 1980-1998. The environmental organizations were: Greenpeace Sweden, Swedish Society for Nature Conservation, Environmental Defense, Greenpeace USA, and Natural Resources Defense Council. The technologies they tried to diffuse reduced dioxins and other organochlorines from mills that bleach pulp for making white paper products. Totally chlorine-free (TCF) bleaching emerged as the cleanest bleaching technology in commercial use: it eliminated organochlorine water pollution. The Swedish environmental organizations, with help from Greenpeace Germany, were more successful at diffusing TCF bleaching.

The success in Sweden emerged because the environmental organizations created market demand for TCF paper: they formed collaborative relations with major buyers of bleached paper, proved that TCF paper was a technically viable alternative, and connected environmentally-minded consumers with like-minded manufacturers. Supporting their success were: a longer history of market campaigns to transform paper bleaching, the lack of opposition to TCF paper in Germany (a major consumer of Swedish bleached pulp), and massive seal and fish die-offs in 1988. The failure in the US occurred because the environmental organizations did not create market demand: they disagreed on environmental goals, they did not succeed in forming collaborative alliances with major purchasers in favor of TCF paper, and they could not overcome a sophisticated counter-campaign from environmental laggards in the American pulp and paper industry.

This dissertation proposes that success in the face of strident industry opposition entails changing organizing strategy: national environmental groups need to engage in sectoral organizing. In *sectoral organizing* environmental groups work to create a more environmentally sustainable busies sector, rather than addressing a single problem within that sector. Sectoral organizing creates opportunities for achieving challenging goals by collaborating with consumers across multiple environmental problems, addressing the low hanging fruit first, then moving to more complex problems. By creating trust, credibility, and legitimacy with consumers, environmental organizations are more likely to succeed in the face of opposition from environmental laggards.

Thesis Supervisor: Lawrence Susskind
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Acknowledgements

Support for this dissertation came in many different forms. Funding from the V. Kann Rasmussen Foundation and German Institute for Economic Research made trips in the United States and Sweden possible. Dietmar Edler and Jurgen Blazejczak of the German Institute for Economic Research funded meetings with the people who shaped the bleaching of paper in the US. Torkel Wedin and Alexandra Waluszewski of Uppsala University and Per Rosander of Kemi & Miljö put me in contact with the key individuals in Sweden and made me feel at home there. Neil McCubbin of N. McCubbin Consultants was a reference guide to the North American paper industry, providing many contacts and insights into the industry.

This dissertation was made possible by the many individuals who agreed to be interviewed. Carol Van Strum shared her experiences in trying to reduce dioxin pollution as well as the "deep pulp" papers, which detailed the American paper industry's campaign to stop action on dioxin pollution in the 1980s. Mark Floegel, Jack Weinberg, and Rick Hind guided me through Greenpeace USA's attempts to transform bleaching in American pulp and paper mills. Jessica Landman shared her insights into the challenges the Natural Resources Defense Council and other environmental organizations faced in trying to influence decisions at the US Environmental Protection Agency. Lauren Blum and David Refkin shared their experiences with the Paper Task Force. Per Rosander, Håken Nordin, Margaret Rainey, and Rune Leithe-Eriksen provided the details of Greenpeace Sweden's pulp and paper campaign. Christoph Thies described the actions of Greenpeace Germany that led to the production of *Das Plagiat*. Göran Bryntse shared his experiences in running market campaigns at the Environmental Federation and the Swedish Society for Nature Conservation (SSNC), as well as the brochures he co-authored on pulp and paper pollution and cleaner paper products. Eva Eiderström and Helena Andersson described the evolution of the SSNC's market campaign for environmentally friendly paper.

From within the paper industry, many individuals generously shared their time in providing tours and describing the history of technological transformations at their mills, including: Sam Wiklund and Hans Fasten of Munksjö Aspa Bruk; Roland Lövblad of Södra Cell; Roine Morin of SCA Graphic; Michael Steltenkamp of Champion International; Ron Hise of Westvaco Corp.; and William Trice, Wells Nutt, and Christopher Matthews of Union Camp Corporation. Hans Hildorsson of IKEA and Per Baumann of KF described how environmentally preferable purchasing evolved in their organizations. Peter Axegård of the Swedish Pulp and Paper Research Institute, Nils Jirval of the Swedish Forest Industries Association, and Erik Nyström of the Swedish Environmental Protection Agency provided further insights into the transformation of the Swedish paper industry. Catherine Marshall and John Festa of the American Forest and Paper Association, and Douglas Pryke of the Alliance for Environmental Technology explained the role and position of their trade associations in the American bleaching debates.

I want to thank my advisor Lawrence Susskind of MIT for supporting my research and his insightful comments, which sharpened my writing and analysis. I appreciate Ken Geiser of the University of Massachusetts Lowell for commenting on the draft chapters, emphasizing the importance of historical context, and encouraging me to finish the dissertation when I drifted from writing. I also want to thank Martin Rein of MIT for helping to refine my ideas.

Family support was especially important to my pursuit and completion of the dissertation. John Rossi of Penn State Erie shared the insights of environmental historian Samuel Hays with me. Gerald Kurtz warmly supported this project from beginning to end. John and Laura Rossi and Beth Ann Conaghan have always supported my intellectual pursuits, no matter how economically unfruitful. Allegra Kurtz-Rossi inspired my last year of writing with her ceramic model of a finished dissertation. Carson Kurtz-Rossi animated the final days of writing with many a cheerful interruption. Finally, and most importantly, Sabrina Kurtz-Rossi created the space and time I needed for researching and writing. Without her support this dissertation would not be.

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1 Changing the course of production: leadership from environmental organizations

"Consumption is the sole end and purpose of all production; and the interest of the producer ought to be attended to, only in so far as it may be necessary for promoting that of the consumer. The maxim is so perfectly self-evident, that it would be absurd to attempt to prove it."
Adam Smith[1]

In 1991 the global retail furnishing giant IKEA entered into a collaborative project with Greenpeace Sweden to green its catalogue paper. A few months later IKEA decided to print its catalogues on totally chlorine-free or TCF paper -- paper bleached without using any chlorinated compounds. It was a major victory for European environmentalists promoting more environmentally friendly paper. IKEA's decision was one in a string of decisions that seemed to herald a dramatic global greening in the manufacture of white paper products. A few years later, however, the exciting greening trends in the paper industry came to a screeching halt. The 15th of April 1998 was a somber day for environmentalists who had spent over a decade wrangling with the paper industry to prevent water pollution. On that day the United States Environmental Protection Agency (US EPA) issued new water regulations for pulp and paper mills that make bleached paper. The regulations codified into law only what environmental laggards in the paper industry were willing to accept. The regulations had global significance. As a nation, the US is the world's largest manufacturer of bleached paper products.

Why did American environmentalists meet with such failure? Why did the European environmentalists meet with such success? What lessons can environmental organizations and scholars of them learn from the Swedish and American campaigns to transform one of the world's largest manufacturing sectors? In this research paper I examine how environmental organizations in Sweden and the United States attempted to change bleaching processes in the

[1] As cited by Hays, 1987, pp. 542-543.

paper industry from 1980-1998. I consider the strategic choices they made, the institutional barriers and opportunities they confronted, and the conditions conducive to success as well as failure. My research goals are two-fold:

- To inform the strategic thinking of environmental organizations engaged in trying to effect technology change.
- Building from theories of social movement organizations and interest groups, to develop a framework for understanding how environmental organizations try to affect technology change and when they are likely to succeed or fail.

Environmental organizations are the focus of my research because they are willing to be leaders, to promote the cleanest production technologies, in the face of opposition. In the contested terrain of technology politics it is often environmentalists who press for change amid resistance from environmental laggards. When pulp and paper manufacturers resisted demands for chlorine-free paper products, regulators and politicians in Sweden and the US only required incremental change, enough to state they had taken action; they were unwilling to press the entire industry to achieve the environmental performance levels possible with the cleanest production technologies in commercial use.

With government leaders unwilling to lead, environmentalists are turning to the market to try and diffuse the cleanest production technologies and their associated products. To succeed in market politics environmental groups need to develop solutions. They need to define environmentally preferable products, demonstrate that they are viable alternatives, and create demand for the products. Creating market demand will require that environmental organizations collaborate, develop working relationships, with institutional consumers with purchasing power. Alliances between environmentalists and corporate consumers, like the Greenpeace Sweden-IKEA alliance, will be necessary for greening industrial sectors in the face of opposition.

Opposition from environmental laggards whose markets are threatened by technological innovation, however, will complicate efforts to diffuse the cleanest production technologies and products on the market. With their comparatively vast financial resources, technical knowledge, relations with buyers, as well as with their failure to invest in the cleanest production technologies, laggards will work tirelessly to stop environmental progress.

Since the pulp and paper campaigns offer only limited guidance on how environmental organizations might succeed in the face of strident opposition, I speculate that environmentalists will need to engage in new forms of organizing to achieve their technology goals, what I call sectoral and lifecycle organizing. In *sectoral organizing* environmental organizations work to create a more environmentally sustainable business sector by simultaneously targeting multiple environmental problems within that sector (rather than a single environmental problem, such as dioxins in water pollution from pulp and paper mills). By working with consumers to address multiple environmental problems within their business sector, environmental groups create opportunities for developing the trust and legitimacy necessary for fostering change on the issues where opposition is the greatest. In *lifecycle organizing* environmental groups try to affect technology change by working with actors across the lifecycle of a product or material, thereby creating an opportunity to unite all those who have been adversely affected by the activities of environmental laggards. The combination of broad alliances and consumer collaborations across an entire industry sector will create new, more diffuse opportunities for change that will be harder for environmental laggards to defend against.

With environmental organizations greening business outside the domain of conventional government politics, I argue that we are witnessing the emergence of market politics, where production and consumption decisions, like government policy, are open to public input.

Political theory needs to adjust to the reality that politics is no longer solely the domain of government. The concept of interest group pluralism, where government decisions emerge from the competition of interest groups trying to influence legislators and regulators, needs to be extended to the market. I see the emergence of *production pluralism*, where non-governmental organizations (NGOs) press their demands for cleaner products and production processes directly with corporations. The campaigns of environmentalists to transform the pulp and paper industry indicate that production pluralism will develop more rapidly among corporate consumers, companies that sell directly to households and are concerned with maintaining a healthy brand name, rather than manufacturers of raw materials.

1.1 Rachel Carson starts the call for ecologically-designed technologies

Environmentalists are well-known as critics of technology. More obscure is their advocacy for cleaner and safer products and technologies. Yet the call for cleaner technologies started when Rachel Carson published *Silent Spring* in 1962. Along with revealing the potent toxicity of organochlorine and organophosphate pesticides, Carson called for replacing these chemicals with safer substitutes:

> A truly extraordinary variety of alternatives to the chemical control of insects is available. Some are already in use and have achieved brilliant success. Others are in the stage of laboratory testing. Still others are little more than ideas in the minds of imaginative scientists, waiting for the opportunity to put them to the test. All have this in common: they are biological solutions, based on understanding of the living organisms they seek to control, and of the whole fabric of life to which these organisms belong.[1]

Nine years later, Barry Commoner published *The Closing Circle: Nature, Man and Technology*, in which he too emphasized the role of technology in damaging ecosystems and called for redirecting technology development to be consistent with nature:

> In sum, present productive technologies need to be redesigned to conform as closely as possible to ecological requirements, and most of the present industrial, agricultural, and transportation enterprises reorganized in accordance with these new designs. In effect, a

[1] Carson, 1962, p. 278.

> major part of the new productive enterprises constructed on the basis of postwar, ecologically faulty technology simply has to be rebuilt along ecological sound lines.[1]

Beginning in the late 1960s environmental organizations moved to implement the ideas advocated by environmental pioneers like Rachel Carson and Barry Commoner. A notable early victory was when Environmental Defense[2] and other environmentalists succeeded through litigation in prompting the US Government to ban the use of DDT -- one of the organochlorine pesticides fingered by Carson in *Silent Spring* -- in 1972.[3] The use of the courts reflected the direction that environmental organizations took in trying to effect technology change: create leverage for technology change through government action, either in the courts, with legislatures, or through regulatory agencies.

In the 1970s, with landmark national environmental laws passed in the United States and in Europe, industries began to invest in environmental technologies. In most cases, however, the environmental technologies were "end-of-the-pipe" technologies, designed to capture pollution after it was created and before it was released to the air and water. Between 1972 and 1996 American taxpayers and businesses "spent at least $700 billion on water pollution control, mostly on construction grants for municipal sewage treatment facilities and end-of-pipe industrial controls."[4] The emphasis on pollution control technologies rather than on technologies that would conform as closely as possible to ecological requirements, as advocated for by Commoner and Carson, was a strategic choice made by business leaders. They did not want their prerogative to choose technologies interfered with, the environmental historian Samuel Hays found:

> In environmental affairs the central concern of corporate leaders was the threat of scrutiny of, or interference with, their technologies and processes of production. They

[1] Commoner, 1971, p. 283.
[2] Formerly Environmental Defense Fund (EDF). EDF shortened its name to Environmental Defense in 1998.
[3] Primack and von Hippel, 1974, pp. 132-139.
[4] Davies and Mazurek, 1998, p. 70.

> were willing to accept [pollution] controls such as ambient air water standards, but they were hostile to a more direct system of supervision such as ... direct evaluation of technologies.[1]

Yet when governments required changes in manufacturing processes or products, pollution from the targeted chemical declined dramatically. For example, the banning of lead as a gasoline additive in 1986 dramatically reduced lead in air emissions. They declined by 98% between 1970 and 1995; the most significant decline of the US' criteria air pollutants.[2] "The reason there is so much less lead in the environment -- and in children's blood -- is that lead has been almost entirely eliminated from the manufacture of gasoline."[3]

The elimination of lead in gasoline and the banning of DDT as a pesticide are examples of pollution prevention.[4] The environmental advantages of pollution prevention over pollution control have long been recognized. Over 20 years ago Dr. Joseph Ling (former vice president of environmental engineering and pollution control at 3M) described the limitations of pollution control technologies:

> conventional [end-of-pipe] controls, at some point, create more pollution than they remove and consume resources out of proportion to the benefits derived. What emerges is an environmental paradox. It takes resources to remove pollution; pollution removal generates residue; it takes more resources to dispose of this residue and disposal of residue also produces pollution.[5]

Since the emergence of the concept of pollution prevention in the 1980s, other similar concepts that emphasize upstream solutions to environmental problems have emerged, including cleaner production, sustainable production, and sustainable design. All of these concepts promote the

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[1] Hays, 1987, p. 324.
[2] Davies and Mazurek, 1998, see Figure 3, p. 63.
[3] Commoner, 1990, p. 42.
[4] The US EPA defines as *pollution prevention* as "any practice which (i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment ...; and (ii) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants" (Public Law 101-508--November 5, 1990). Really this is the definition for *source reduction* in the Pollution Prevention Act of 1990. But for the US EPA pollution prevention and source reduction are synonymous (Browner, 1993).
[5] Ling, 1979, p. xi.

development and use of technologies and products that use less material, are less toxic, and are more environmentally compatible.

Despite the environmental improvements and potential for financial benefits that accrue to businesses implementing pollution prevention technologies, the widespread movement to environmentally sustainable production technologies has not emerged as Rachel Carson and Barry Commoner advocated for over 30-40 years ago. For example, Rachel Carson highlighted the environmental hazards of organophosphate pesticides in *Silent Spring*. Today roughly 77 million pounds of organophosphate pesticides are used in the US and most Americans have a body burden, carry in their bodies, some of these chemicals.[1] Protecting the prerogative of businesses to decide where they invest their money, as noted by Hays above, is among the reasons why businesses are not adopting pollution prevention technologies.

1.2 Catalyzing change in the paper industry

My research begins from the point of view that environmental organizations played in the past and will continue to play in the future a lead role in promoting more environmentally friendly materials, products, and production processes. To learn how national environmental organizations try to promote the use of cleaner technologies and to understand when they are likely to succeed, I examine the campaigns of national environmental organizations to change the course of bleached pulp and paper production in Sweden and the US. My research centers on three questions:

- What factors affect the strategic choices of environmental organizations?
- How do national environmental organizations try to cultivate change in government and market institutions?
- When, under what conditions, are environmental organizations likely to succeed in effecting technology change?

[1] CDC, 2003.

The next chapter offers preliminary answers to these questions by reviewing social movement and interest group theories relevant to national environmental organizations. Chapter 3 defines how the causal conditions important to influencing decisions made by pulp and paper manufacturers, institutional and household consumers of paper, and regulatory agencies will be evaluated.

The next three chapters establish the historical context that environmental organizations would step into in Sweden and the US in the 1980s as well as the technological gains they had helped to achieve by 1998. Chapter 4 defines the rise of bleached paper products beginning in the 1800s and how fiber supply, consumer demand, and technology innovation shaped the development of these products. The main story line here is, white paper products have been produced and in demand for hundreds of years. Chapter 5 defines the technological state of bleached pulp and paper production at three points in time for both Sweden and the US: mid-1980s; mid-1990s; and 1998. The chapter introduces the technologies that environmentalists would promote and oppose and concludes with the levels of technology diffusion achieved in each nation. Chapter 6 presents the roots of the environmental movements from which the Swedish and American paper campaigns emerged and how they would shape the campaigns of the 1980s and 1990s.

The next four chapters detail the actions taken by environmental organizations in Sweden (Chapters 7 and 8) and the US (Chapters 9 and 10), their successes and failures, and the reasons for the outcomes. These chapters cover the period from 1986-1998 and the strategic actions of five environmental organizations: Greenpeace Sweden and the Swedish Society for Nature Conservation (SSNC) in Sweden; and Environmental Defense, Greenpeace USA, and the Natural Resources Defense Council (NRDC) in the US.

Chapter 11 assesses the factors that affect the strategic choices of environmental organizations, emphasizing the need to think more broadly than the most prominent explanatory variables -- sources of funding and organizational ideology/values -- invoked to explain the behavior of national environmental organizations. Chapter 12 begins by describing how environmental organizations tried to catalyze the development and diffusion of cleaner production technologies in the paper industry. It then examines why the national environmental organizations succeeded and failed in their attempts to green paper production through government and market politics. Within each institutional context I assess the level of responsiveness of targets to the goals of environmental organizations and the causal conditions affecting outcomes. In the analyses of the responsiveness of targets and causal conditions I examine all the cases together (not distinguishing between those in Sweden and those in the US) and comparatively (comparing different national outcomes). Chapter 13 concludes with a set of recommendations on how environmental organizations might succeed in promoting the cleanest production technologies in the face of strident opposition, akin to the opposition American environmentalists confronted in trying to change the paper industry.

2 The literature: marshalling resources and connecting values to catalyze change in the face of organized opposition

The literature on national environmental organizations encompasses an amalgam of scholars, with the greatest concentration of research emerging from political scientists,[1] although sociologists,[2] environmental historians,[3] and investigative journalists[4] have all performed research in this area. Often their unit of analysis is broader than "environmental organizations." Examples include: voluntary associations, public interest groups, citizen groups, non-governmental organizations (NGOs), advocacy networks, and social movement organizations.[5] Environmental organizations or groups, I use the terms interchangeably, are a subset of these broader units of analysis, although in some scholarship they are a prominent subset.[6] While the breadth of the research covers the affects of environmental group actions on a broad range of institutions, the depth of the research relates to institutions of government.

In this chapter I pose my three research questions to the literature. What I find is social movements theory is best prepared to answer the first question: what factors affect the strategic choices of environmental organizations? Concerned with the formation and maintenance of social movement organizations, social movement scholars have developed frameworks for assessing and predicting organizational behavior.

[1] For example, see: Berry, 1977; Berry, 1999; Bosso, 1994; Dalton, 1994; Keck and Sikkink, 1998; Mitchell, Mertig, and Dunlap, 1992; Shaiko, 1999; Wapner, 1996; and Vogel, 1978.
[2] For example, see: McCarthy and Zald, 1977; Schnaiberg and Gould, 1994; and Szasz, 1994.
[3] For example, see: Bartlett, 1995; Gottlieb, 1993; and Hays, 1987.
[4] For example, see: Dowie, 1995; Dowie, 2001; and Shabecoff, 2000.
[5] For examples of: voluntary associations see Wilson (1995); public interest groups see Berry (1977); citizen groups see Berry (1999); NGOs see Princen and Finger, eds. (1994); advocacy networks see Keck and Sikkink (1998); and social movement organizations see McCarthy and Zald (1977).
[6] For examples, see: Berry, 1977; Berry, 1999; Keck and Sikkink, 1998.

Since my empirical research centers on how environmental groups try to affect change in a specific issue campaign,[1] I am interested in the actions environmentalists take to try to persuade decision makers to make different choices. From this context the relevant literature begins to blend across scholars from social movement theory and interest group theory.

Finally I examine the elements scholars identify as necessary for success, for bringing about change in the world. Because the institutional boundaries of my empirical research is defined by the actions of environmental groups in their issue campaigns, my interest is in how these organizations succeed in catalyzing change across market as well as government institutions. The result is an array of necessary elements that vary across institutional actors. The literature on success overwhelmingly emerges from political scientists.

I decided not to build from a single theoretical domain for two reasons. First, I wanted to review scholarship that would be relevant to my empirical research. Since environmentalists that campaigned for change in the paper industry targeted both markets and the state, I include literature that covers initiatives of environmental organizations to change either state or non-state actors. Second, I included research that had no theoretical grounding -- for example, the research of the investigative journalist, Mark Dowie (1995) -- because he has valuable insights into the behavior of environmental organizations, despite lacking a consistent theoretical perspective.

2.1 Scholars miss technological affects of environmental organizations

In reviewing the literature on environmental organizations it became clear that "technology change" was not a topic of research interest. Instead the research on national environmental organizations[2] has overwhelmingly focused on policy change. The lack of

[1] I define an *environmental issue campaign* as an initiative that tries to bring about change in governmental institutions, corporations, communities, or individuals to solve an environmental problem.

[2] There are roughly a dozen major national environmental organizations in the US. The three that were most active in campaigning on the pulp and paper industry were: Environmental Defense, Greenpeace USA, and Natural

scholarship on the role of environmental organizations in trying to transform technological development stems in part from the approach of the organizations themselves. Attempts to change policy have been the most visible aspect of national environmental campaigns, with government institutions their primary target. Up through the 1980s it was rare for national environmental organizations to run campaigns directly targeted at changing corporate behavior, with the exception of legal challenges through the courts. Environmental Defense, for example, did not begin working collaboratively with corporations until 1990 when it began a project with McDonald's.[1]

But the lack of scholarship on technology also reflects, at least in political science, the typical perception that production and corporate decisions are outside the domain of "public" policy. As the political scientist David Vogel (1996) wrote:

> Political scientists have written extensively on the ideology and organizational structure of public interest organizations and their impacts on public policy. But largely because they have tended to reify politics by identifying it with government, they have neglected one of the movement's most important and original contributions to American politics: its efforts to challenge business directly. Acting on the assumption that business itself constitutes a system of power or 'private government' -- one whose power is comparable, if not greater than, that of the 'official' government -- activists have also frequently lobbied the corporation itself.[2]

The activists directly lobbying corporations that Vogel highlighted were the early initiatives of a few public interest organizations, including the Ralph Nader-inspired Project on Corporate Responsibility, to bring about changes in corporate accountability and governance in the 1970s.[1] The initiatives cited by Vogel did not encompass product or technology change to address environmental concerns. Yet with the emergence of the corporate accountability movement in the 1970s came more initiatives to pressure corporations directly; although, as noted above,

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Resources Defense Council. In Sweden, Greenpeace Sweden and the Swedish Society for Nature Conservation were most active on the pulp and paper industry.

[1] EDF, 1990.

[2] Vogel, 1996, p. 15.

national environmental groups were slow to become involved in corporate accountability campaigns.

At a more fundamental level is whether business decisions should only be considered private. Certainly most Americans consider corporations to be private institutions: the general conviction among Americans is that "decisions that determine what is produced and by what technological means ought to remain in private, generally corporate hands."[2] Yet corporate activities affect public goods like clean air and water and corporations benefit from many government actions such as building infrastructure. As the political scientist Robert Dahl wrote in 1970:

> Whatever may be the optimal way of governing the great corporation, surely it is a delusion to consider it a private enterprise. ... Why should people with shares be given the privileges of citizenship in the government of the firm when citizenship is denied to other people who also make vital contributions to the firm?[3]

A nuanced critique of this position by Vogel (1978) agrees that "the social impact of the corporation does resemble that of a government," but it is disingenuous to view corporations like governments because "the most important decisions made by any firm are out of the control of those who govern it; they are dictated by the imperatives of a market economy." The only way Vogel foresaw a company making "decisions not dominated by the logic of capital accumulation" was through the "direct intervention of the government."[4]

Given that corporate activities clearly affect public goods like clean air and water, I see efforts to change these actions as falling within the domain of public policy research. While no public interest or environmental organization has changed the logic of capital accumulation, there is wide latitude within that "logic" to reshape markets, technologies, and their

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[1] Vogel, 1978.
[2] Commoner, 1990, p. 170.
[3] Dahl, 1970, pp. 120, 123; as cited in Vogel, 1978, p. 6.
[4] Vogel, 1978, p. 225.

environmental impacts. As I will document later in my research on the pulp and paper industry, environmental organizations have tried with limited success to green markets and promote the development and diffusion of cleaner production technologies.

A result of political scientists emphasizing the policy affects of national environmental organizations is, they missed a goal of some environmentalists: to change the course of production. As the environmental historian Samuel Hays concluded, environmentalists were often "pioneers in advocating new technologies that, when they later became more widespread, few associated with them."[1]

2.2 Values and resources: the factors that shape strategic choices

The two prominent strands of social movement theory, new social movements theory and resource mobilization theory, impart two different perspectives on the attributes that most influence the behavior of social movement organizations. New social movements theory emphasizes the role of organizational values, beliefs, and ideology, while resource mobilization theory emphasizes the role of resources in shaping organizational behavior.[2] It is my position that the strategic choices made during an issue campaign will reflect the interaction of both organizational values and resources.

2.2.1 New social movement theory: the role of values in environmental organizations

New socials movements theory[3] emerged in the 1980s as social movement scholars sought explanations "for the rise of the social movements of the past two decades in the appearance of new grievances and aspirations."[4] Core elements of new social movements theory as identified by the sociologist Bert Klandermans (1990) include the following. A different set

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[1] Hays, 1987, p. 529.
[2] For example, see Klandermans, 1990; Morris and Mueller, eds., 1992.
[3] New social movement theory is also referred to as the "social constructionist" perspective (Mueller, 1992) and the "social construction of protest" (Klandermans, 1990).
[4] Klandermans, 1990, p. 26.

of values: "New social movements do not accept the premises of a society based on economic growth." An "extensive use of unconventional forms of action" and a preference for small-scale, decentralized, and democratic organizations. And explanations for participation in new social movements that emphasize new aspirations in the "change from materialist to post-materialist values;" as well as a loss of identity caused by the strains of industrialization and bureaucratization.[1]

Building from new social movements theory, Russell Dalton in his research on European environmental organizations concluded that it is from ideology[2] that organizational decisions emerge: The "ideological identity of an organization guides its choices of what goals to pursue, what tactics are appropriate to its position," "what resources are available for mobilization," and "what to expect from the government and other political actors."[3] The principal criterion Dalton used to identify ideology was the organization's view of the sociopolitical order: was it more accepting or challenging of the political structure? He named the more challenging groups "ecologically-oriented" and the more accepting groups "conservation-oriented."

Dalton concluded that ecologically-oriented groups are generally more critical "of the environmental records of major business and political institutions;" and that their tactics are more likely to involve direct action and less likely to involve direct lobbying of government officials than conservation groups.[1] Conservation-oriented groups "generally accept the existing sociopolitical order and the norms of this social system." Their tactics are less likely to involve direct action and more likely to involve direct lobbying of government officials. They also are more likely to receive funding from governments or corporations, and possess large endowments

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[1] Ibid., pp. 26-28.
[2] A group's *ideology* is its "'attachment to some particular set of beliefs'" (Dalton, 1994, p. 10; citing social movement scholar, Chris Tilly's definition of ideology).
[3] Ibid., pp. 15 and 250.

that generate investment income.[2] Both ecological- and conservation-oriented groups with mass memberships rely heavily on membership dues for revenues.[1] See Table 2.1 for a listing of the characteristics of the two orientations.

Table 2.1 Characteristics of conservation- and ecological-oriented ideologies (Dalton, 1994)

Characteristics	Conservation Orientation	Ecological Orientation
View of sociopolitical order	▪ Accepting: generally accept the existing sociopolitical order and the norms of this social system	▪ Challenging: criticize accumulation of wealth and unrestrained economic growth
Key resources	▪ Heavy reliance on mass membership ▪ More likely to receive government and corporate grants	▪ Heavy reliance on mass membership ▪ More likely to rely on sale of group merchandise
Campaign issues	▪ Species protection ▪ Habitat protection ▪ Preservation of natural resources	▪ Nuclear power ▪ Industrial pollution ▪ Toxic chemicals ▪ Acid rain
Tactics	▪ Greater emphasis on government lobbying	▪ Greater emphasis on direct action

Dalton's dichotomy of conservation- and ecological-orientations among environmental organizations does not, however, reflect important splits in the values of what he calls ecologically-oriented organizations. In their research on the American environmental movement the investigative journalist Mark Dowie (1995) and the environmental historian Robert Gottlieb (1993) both emphasize a split in Dalton's ecologically-oriented organizations. Gottlieb describes it as a split between mainstream and alternative or grassroots groups. The alternative ecological groups closely resemble Dalton's definition of ecological groups. The principal differences are alternative ecological groups are more likely to work at the grassroots level, do not have mass memberships, and therefore lack the professional staff. And the mainstream ecological groups closely resemble the conservation-oriented groups, with the primary difference being the

[1] Ibid., pp. 208-209; 174; and 96.
[2] Ibid., pp. 47, 96; and 208-209.

campaign issues are ecological- rather than conservation-oriented. To reflect this split, I have divided Dalton's ecological groups into mainstream and alternative ecological groups (see Table 2.2).

Table 2.2 The mainstream/alternative dichotomy among ecologically-oriented environmental organizations (Dowie, 1995; Gottlieb, 1993)

Characteristics	Ecological Orientation	
	Mainstream Groups	**Alternative Groups**
View of sociopolitical order	▪ Greater trust in government and corporations	▪ Distrust of government and corporations
Key resources	▪ Money from memberships, foundations, and corporations ▪ Expert staff	▪ Money from foundations ▪ Volunteer time from community members
Campaign Issues	Are similar: protect public and environmental health	
Goals	▪ More acceptable to government officials	▪ Challenging of the sociopolitical order
Alliances	▪ Other mainstream groups ▪ Corporations	▪ Grassroots groups ▪ Labor
Tactics	▪ Information (lobbying) ▪ Litigation	▪ Information ▪ Direct action
Targets	▪ Government institutions in a nation's capitol	▪ Government institutions at local/state level ▪ Corporations

2.2.2 A resources perspective: it is money that affects strategic choices

Those with a resource perspective see organizational choices influenced by gathering and using resources. Social movements, McCarthy and Zald (1977) emphasized in their pioneering article on resource mobilization theory, need resources to engage in social conflict and they must accumulate resources to achieve collective purposes. The accumulation of resources leads to "some minimal form of organization."[2] Since resources in a social movement organization are

[1] Ibid., p. 96.
[2] McCarthy and Zald, 1977, cited from reprint in McCarthy and Zald, 1987, p. 18.

limited, staff seek resources from outside the organization, including: "legitimacy, money, facilities, and labor."[1] In competing for resources organizations alter their goals and tactics to align with their sources of resources, e.g., foundations.[2]

Money and staff are the prime resources of national environmental organizations, with members and external networks among the secondary resources. But it is money that analysts of the environmental movement like Dowie (1995; 2001) and Gottlieb (1993) have identified as the principal factor affecting the strategic choices of national environmental groups.

The financial resources available to national environmental organizations blossomed starting in the 1970s. In the US membership in 11 national environmental groups increased from 3.5 million in 1970 to 8.5 million in 1990 (see Table 2.3). For most mass membership organizations members are "checkbook" participants -- their participation is limited to writing checks.[3] For example, leaders of Environmental Defense "look upon their support base as contributors rather than members. As a result, they do not attempt to mobilize their contributors as volunteers to sign petitions or write letters to members of Congress."[4] Greenpeace Sweden, like Greenpeace in other nations, is similar to Environmental Defense where "active involvement is limited to a few full-time professionals, while 'membership' is a matter of paying dues."[5]

With the growing memberships came larger budgets and staffs. The budget of Environmental Defense, for example, grew from $0.7 million in 1971to $16.9 million in 1990.[6] The organizations invested much of their increased revenue in professional staff: lawyers for initiating lawsuits, proposing legislation, and watchdogging the regulatory agencies; scientists

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[1] McCarthy and Zald, 1977, cited from reprint in McCarthy and Zald, 1987, pp. 18 and 22.
[2] McCarthy and Zald, 1977, cited from reprint in McCarthy and Zald, 1987, p. 19.
[3] For example, see Jamison et al., 1990; Shaiko, 1999.
[4] Shaiko, 1999, p. 81.
[5] Jamison et al., 1990, p. 58.
[6] EDF, 1971; EDF, 1990.

for defining problems and countering industry arguments; economists for showing the benefits of regulations; fundraisers and development officers; and administrators for managing the organization.[1] Today national environmental organizations receive money from membership dues, gifts and endowments from individuals, marketing group merchandise, grants from governments, foundations, and corporations, and income from investments.[2]

Table 2.3 Membership in American environmental groups, 1970-1990

Group	1970	1980	1990
Defenders of Wildlife	13,000	50,000	75,000
Environmental Defense Fund	11,000	46,000	150,000
Friends of the Earth	6,000	n.a.	9,000
Izaak Walton League	54,000	52,000	50,000
National Audubon Society	105,000	400,000	575,000
National Park and Conservation Association	50,000	31,000	100,000
National Wildlife Federation	3,100,000	4,000,000	5,800,000
Natural Resources Defense Council	non-member	42,000	125,000
Nature Conservancy	22,000	n.a.	600,000
Sierra Club	113,000	181,000	630,000
Wilderness Society	54,000	45,000	350,000
Total	3,528,000	4,847,000	8,464,000

Sources: [3]

A challenge movement organizations confront as they become established is avoiding cooptation by the sources of funding. The social movement scholar Doug McAdam defines "cooptation" as when the "establishment of external support linkages ... grants considerable control over movement affairs to the source from which the resources are obtained."[4] Dowie (1995) has been an articulate voice among many[5] on the cooptation of the American environmental movement. He concludes that for national environmental groups, it is money that

[1] Dowie, 1995; Gottlieb, 1993; Mitchell, Mertig, and Dunlap, 1992.
[2] Dalton, 1994, p. 95.
[3] Berry, 1999; Bosso, 1994.
[4] McAdam, 1982, p. 55.
[5] For others, see Bosso, 1994; Gottlieb, 1993.

"sets agenda, strategy, targets, and priorities. ... All four major sources of environmental philanthropy in the United States -- direct mail money, large donors, foundations, and corporations -- set the parameters within which organizations must function to survive."[1]

To fuel membership growth American environmental groups invested in direct mail solicitation, which contributed to the groups' skyrocketing membership. Yet direct mail solicitation increased the pressure to win: "The essence of their [direct mail consultants] counsel is that to succeed in the political direct mail business you have to win, look like you're winning, or look like you're going to win."[2] Dowie (1995) observes that many of the mainstream groups opted for "looking like they are winning" and compromised on goals so they would have "victories" to report in their mailings.[3]

Dowie (2001) has also emphasized the increasing role of foundations in affecting the agendas of environmental organizations:

> The clear, though rarely uttered message from the largest environmental grantmakers is this: be cautious reformers, challenge specific violators, take the worst of them to court, lobby for environmental regulations, educate the public, but don't rock (or knock) the industrial boat if you intend to rely on significant foundation funding.[4]

To receive "more and larger grants" from environmentally conservative foundations, many environmental organizations are setting less challenging goals, notes Dowie.[5]

Corporate donations also can affect organizational goals. The political scientist Christopher Bosso explains that corporate money can leave environmental groups vulnerable to threats of withdrawal if the corporation disagrees with any of the group's activities. For example, General Electric withdrew its funding for The National Audubon Society's popular

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[1] Dowie, 1995, p. 41.
[2] Ibid., p. 45.
[3] Ibid., p. 45.
[4] Dowie, 2001, p. 94.
[5] Ibid., p. 94.

"World of Audubon" public television documentary series after Audubon aired a program critical of federally subsidized cattle grazing practices.[1]

From the perspective of Dowie and Gottlieb, among others, it is money that defines mainstream ecological organizations. In this framework money defines organizational values and goals. And organizations with money do not pursue challenging goals.

2.2.3 Resources and values: an integrated perspective

The problem with the "money defines values" line of reasoning is, examples that undermine it are readily available. Greenpeace USA, for example, is a multi-million dollar organization based in Washington, DC. Yet it engages in direct action, forms alliances with grassroots groups, and pursues environmentally challenging goals.

The organizational behavior of Greenpeace reveals the difficulty of separating values from money. Are organizations accepting money for less environmentally challenging projects being co-opted by the money they receive or are they merely pursuing money that fits their organizational values? There are certainly examples of environmental organizations that forego money because it would compromise their goals. Dowie cites the Native Forest Council of the pacific northwest as such an example. When the Council held onto its position of zero-cut policy in public forests it did not receive money to participate in a forestry coalition for the region in the mid-1990s.[2]

The strength of the money argument is not that money affects the goals and tactics of individual organizations, but rather that money affects the goals and tactics of the entire environmental movement: corporate and environmentally conservative foundation money selects for organizations with values more accepting of the sociopolitical order. Those organizations

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[1] Bosso, 1994, pp. 38-39.
[2] Dowie, 2001, p. 100.

with values more challenging of the sociopolitical order will be selected against and marginalized in the long-term unless they can secure other sources of money. What the money argument implies is that the current trajectory of the environmental movement will be towards the more accepting, less environmentally demanding organizations because the sources of money tend to be conservative and system protective.[1]

It is my position that the strategic choices of environmental organizations flow from the interaction of organizational values, resources (staff as well as money), and the historical context of an organization's founding. I add the historical element because the context of an organization's founding -- its members, sources of funding, goals, and tactics -- can continue to reverberate throughout an organization over time. The political scientist Jeffrey Berry, in his research on public interest groups, referred to the historical element as an organization's "strategic disposition:"

> The initial goals of a group have important implications for what may be termed the 'strategic predispositions' of the organization. Many public interest groups are set up to perform their advocacy work in a particular manner ... Consequently, from the day of their inception, most organizations are inclined toward some strategies and tactics and away from others.[2]

An organization's founding conditions and values and will affect the resources -- money and staff -- it collects. The resources will in turn re-affirm or alter the organization's values. The resource environment will affect which organizations grow, stagnate, or die; with funding sources selecting for organizations with compatible values. Alternative ecological-oriented organizations will couple with foundations receptive to more fundamental challenges of the status quo and conversely, mainstream ecological organizations will couple with more environmentally conservative foundations and other similar funders.

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[1] Ibid.
[2] Berry, 1977, p. 264.

2.3 Connecting with "friends:" coalitions, alliances, and networks

Berry observed in his research on public interest organizations that "coalitions are extremely popular among public interest lobbies."[1] Coalitions come in many forms, varying in degree of organizational formality (ad hoc versus formal organization) and members (all from the same movement versus from a variety of interest groups).

At the formal end are coalitions. The political scientist James Wilson defines a *coalition* as "an ongoing mechanism for explicitly coordinating some or all of the actions of the members; it is an organization of organizations."[2] For example, the Clean Water Network is a coalition of 1,100 organizations that endorse a common platform.

A less formal grouping of organizations is what Wilson calls, an *ad hoc alliance*: "loose, cooperative relations between two or more associations with respect to the attainment of a particular end or the performance of a specific task. ... They represent temporary arrangements for sharing resources and especially for managing communications."[3] Ad hoc alliances often form to lobby on specific issues, then dissolve after Congress or a regulatory agency either kills or passes the measures.

At the most informal level are what the political scientists Margaret Keck and Kathryn Sikkink call *advocacy networks*: "forms of organization characterized by voluntary, reciprocal, and horizontal patterns of communication and exchange" that "plead the causes of other or defend a cause or proposition."[4] Participants in advocacy networks come from many institutions, including: local social movements, foundations, the media, intergovernmental

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[1] Ibid., p. 254.
[2] Wilson, 1995, p. 267.
[3] Ibid., p. 278.
[4] Keck and Sikkink, 1998, p. 8.

organizations, parts of governments, as well as NGOs. Common beliefs hold them together.[1] Sabatier and Jenkins-Smith (1993) developed a similar concept of "advocacy coalitions," where common beliefs (values) cause "people from various governmental and private organizations" to "act in concert."[2]

The principal explanation for why interest groups participate in coalitions, ad hoc alliances, or networks is sharing resources, especially information: "the prime currency of politics is timely and precise information, and to get information one must be prepared to give it," Wilson (1995) concluded. "To act alone when confronting an important issue is to risk acting without complete information or in ways that will unwittingly antagonize a prospective ally."[3] In a similar vein Dalton (1994) concluded that environmental organizations work together primarily to exchange information and coordinate activities.[4] And Keck and Sikkink (1998) found that while people participate in advocacy networks because they share common beliefs, it is the ability of advocacy networks to "generate information quickly and accurately, and deploy it effectively, [that] is their most valuable currency".[1]

The use of cross-interest alliances (e.g., environmental-labor alliances) to maximize political strength receives little attention in the literature on environmental organizations. The lack of attention is partially a factor of national environmental groups allying much less frequently with other causes and interests than among each other. For example, Gottlieb (1993) concluded that the "policies of the mainstream environmental groups" are "too often concerned with environmental management without regard to its employment effects." By not allying with labor, environmentalists have left themselves "open to the charge that they put the environment

[1] Ibid., p. 9.
[2] Sabatier, 1993, p. 18.
[3] Wilson, 1995, pp. 278-279.
[4] Dalton, 1994, pp. 171-173.

ahead of jobs."[2] But the lack of attention to cross-interest alliances is also a factor of not looking for them. David Vogel in his research on business in politics observed that environmental-labor alliances did impede the success of the business lobby and vice-versa: "when labor was either neutral or supported the environmentalist position, business did less well. By contrast, the environmentalists, like industry, triumphed only when organized labor did not oppose them."[3]

Based on his research of European environmental groups, Dalton (1994) observed, that ideological differences were not an impediment to intra-movement alliances. Although he acknowledged that environmentalists are "sensitive to the various shades of green within the movement and to the tensions that can result from these differences," Dalton saw "a broad pattern of cooperation among environmental interest groups." "In overall terms, the interpersonal and interorganization networks within the environmental movement are dense."[4]

Yet instances of conflicts among organizations with differing ideologies are common. For example in the US, Greenpeace USA decided not to participate in meetings of ten prominent environmental organizations (informally known as the Group of 10)[5] in the 1980s because the organizations would not allow Lois Gibbs, executive director of Citizens for Health, Environment and Justice, to attend. The Group of 10 disagreed with Gibbs' aggressive tactics in opposing the siting of hazardous waste facilities.[6] In another disagreement that turned public, the national groups "split along fundamental ideological and tactical lines" over whether to support or oppose the North American Free Trade Agreement (NAFTA). Supporting NAFTA were the

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[1] Keck and Sikkink, 1998, p. 10.
[2] Gottlieb, 1993, p. 306.
[3] Vogel, 1996, p. 382.
[4] Dalton, 1994, pp. 170 and 172.
[5] The *Group of 10* were: Environmental Defense, Environmental Policy Institute, Friends of the Earth, Izaak Walton League, National Audubon Society, National Wildlife Federation, NRDC, Sierra Club, Wilderness Society, and the Kendall Foundation (Dowie, 1995, p. 69).
[6] Ibid., p. 74. Citizens for Health, Environment and Justice was called the Citizens Clearinghouse for Hazardous Waste in the 1980s.

Washington, DC and New York based NGOs, including the National Wildlife Federation, Natural Resources Defense Council (NRDC) and the World Wildlife Fund, and opposing it were Friends of the Earth, Greenpeace, Sierra Club, and a host of grass-roots organizations.[1]

As these examples indicate, intra-movement conflict is more prevalent than scholars like Berry (1977) and Dalton (1994) acknowledge. The intra-movement conflict more closely reflects the theoretical perspective of resource mobilization theorists like McCarthy and Zald (1977), who concluded that: "Since SMOs [social movement organizations] within the same SMI [social movement industry] compete with one another for resources, they are led to differentiate themselves from one another."[2] It is my proposition that intra-environmental movement competition is more prevalent than scholars like Berry and Dalton acknowledge, and that this competition will impede environmental organizations, especially those with more challenging goals, from achieving their goals. This mirrors Dowie's (1995) conclusion that national environmental organizations are likely to intervene in campaigns initiated by grassroots groups and to undercut the goals of grassroots groups by offering a compromise solution. I amend Dowie's proposition to state that the undermining of goals can happen between national environmental groups as well as between national and grassroots groups.

2.4 Persuading others to change: tactics and strategic approaches

To bring about change environmental organizations use tactics: "specific actions taken to advocate certain policy positions."[3] This section highlights three types of tactics that are widely used in environmental and related organizations: information, litigation, and direct action. Another type of tactic that has implications for trying to catalyze technology is also highlighted.

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[1] Princen, 1994, p. 9.
[2] McCarthy and Zald, 1977.
[3] Berry, 1977, p. 212.

What I call *development tactics* are increasingly used in efforts to bring about change in communities and corporations.

2.4.1 Information

In his research on public interest groups who lobby government Berry (1977) concluded that organizations who rely primarily on the tactics of information[1] tend to be less challenging and more trusting of government:

> [They] base their efforts on the opinion that government operates the way it does, in part, because of imperfect information. The key to achieving influence is providing useful data to policy makers. This philosophy ... considers a good number of people in government to be open-minded and approving of the group's work. It is much more of an 'inside' strategy ... Sympathetic people in government are expected to fight for the 'right' policies in a conflictual, but reasonable, political arena.[2]

Embedded in information is an investment in professional staff. Having the capacity to translate general environmental values into technical details as well as to extract the environmental implications from technical data requires professional staff. When the values of an organization compel it towards certain types of tactics, those tactics in turn dictate a certain type of staff. The values of the staff in turn affect the financial resources collected by the organization, which affects the issues selected and the goals for the issue campaigns. Since it is through staff that organizational values are realized and defined, it is also through staff, especially the leaders of the organizations, that the values of an organization can shift.

The staff also affect an organization's alliances. Concerns have been raised that organizations that invest heavily in technical expertise have lost touch with the grassroots movement and the public outside of Washington, DC. For example, during the 1980s when the national environmental groups expanded rapidly, they invested their resources in more technical

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[1] Information-style tactics used by environmental lobbyists are: face-to-face meetings with legislators or regulators (personal lobbying), presenting testimony at a congressional hearing, and releasing research results (Ibid., p. 263).
[2] Ibid., p. 269.

expertise to fight on Capitol Hill rather than to work with the grassroots.[1] And Samuel Hays found that "Many environmental professionals felt uncomfortable in their association with popular movements and organizations. In response they sought to transfer action to areas in which popular influence was limited."[2] I will argue below that the ability or inability of environmental organizations to work with other environmentalists and other types of organizations will affect its success.

2.4.2 Litigation

For organizations that "rely primarily on legal advocacy, there is great faith in the fairness of the law," explains Berry (1977). He found that the "lobbyists for these organizations accord much greater legitimacy to the federal court system than they do to administrative agencies."[3] Having the capacity to translate general environmental values into legal arguments requires hiring lawyers. Litigation is only available on regular basis "to those groups that have made a conscious, organizational decision to allocate resources to legal work on an ongoing basis."[4]

When environmental organizations engage in legal action, they move the debate from the public sphere into the courtrooms, where it becomes a battle between lawyers. Hays (1987) concluded that the judges have become less receptive to the arguments of environmental groups in courts, especially when they contest regulatory decisions, because as "the agencies became more careful with respect to procedure, the court began to defer to their technical expertise."[5]

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[1] Dowie, 1995, chapter 3.
[2] Hays, 1987, p. 416.
[3] Berry, 1977, p. 267.
[4] Ibid., p. 225.
[5] Hays, 1987, p. 489.

2.4.3 Direct action

With alternative ecological organizations comes a more skeptical view of government and greater use of direct action as a tactic. Berry (1977) included direct action as part of what he calls the strategy of embarrassment and confrontation:

> The underlying premise of this strategy is that sufficient exposure of bad policy will act to stimulate governmental officials to change such policy. Lobbyists whose tactics are guided by this strategy strongly believe that if a minimum of publicity can reveal what people in government are doing, those same people will find themselves under a new set of circumstances for future actions in that their behavior will be critically scrutinized. ... The more a group sees itself, because of its policy views, in an adversary position toward governmental institutions, the more likely it is to adopt this strategy as its modus operandi. Groups imbued with this strategy have a rather hostile, untrusting view of government.[1]

While scholars have frequently remarked on how the tactics of information and litigation affect staff, they have not examined how the tactic of direct action affects staff. Yet to perform direct action on a regular basis, as Greenpeace does, requires investing in direct action teams that include climbers, divers, handlers of zodiac boats, etc. And once an organization has a direct action team, it will use them just as another organization will use its lawyers and scientists. Thus direct action becomes embedded in the organization.

Where the tactics of information and litigation are associated with targeting institutions of government, the tactic of direct actions is associated with the media. As Wapner (1996) wrote about Greenpeace:

> Through presenting alternative images of the environment, bearing witness, criticizing predominant modes of conduct, and exposing ecological atrocities, Greenpeace tries to express itself through communication technologies to joggle the minds of the world. It literally speaks through the air waves spanning the globe. Satellite dishes, fax machines, video cameras, and electronic mail services are the tools of Greenpeace's political action. And these are, essentially, entry ways into the world media network. Global communication systems are the sites for disseminating an ecological sensibility.[2]

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[1] Berry, 1977, pp. 268-269.
[2] Wapner, 1996, pp. 156-157.

While alternative ecologically oriented groups are more likely to use direct action to capture media attention, the media is a target of most environmental groups. In his survey research Dalton learned that media visibility is so vital to environmental groups that "86 percent of all groups say they are often in contact with the media."[1] "The populist base of environmentalism makes the relationship between these groups and the mass media especially important, because media coverage is vital to developing and mobilizing public support in order to tilt the political balance."[2] The media provide access to possibly the greatest power of environmentalism, the general public, who are often strong supporters of environmental protection. Polling data in the US reveals consistent support for environmental initiatives. For example, when asked whether growth should be sacrificed in order to preserve and protect the environment, respondents answering *yes* increased from 38% in 1976 to 64% in 1990; while those answering *no* dropped from 21% to 15%; and those answering *don't know* plummeted from 41% to 21%.[3]

Media alone, however, is seldom enough to catalyze change in any organization. Releasing research results, for example, is a method many environmental groups use to try to capture media attention: either through a press conference, press release, or direct contact with a reporter. Yet unless the research contains dramatic findings, "there will be little follow-up by the press after the initial denials and rebuttals by corporate or government officials."[4] Media-related actions need to be followed up with lobbying, litigation, or some other tactic.

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[1] Dalton, 1994, p. 253.
[2] Ibid., p. 175.
[3] Kempton, Boster, and Hartley, 1995, p. 4.
[4] Berry, 1977, p. 248.

2.4.4 Development

Development is a term I use to encompass projects that combine environmental progress with economic development. Development tactics are growing in use among environmental organizations as they expand their work to include targets outside of the institutions of government. Princen, et al. (1994) in their research on environmental groups in world politics found that "Instead of calling for action or mobilizing citizens to put pressure on governments, NGOs often just do the work themselves."[1]

An example of a development tactic is the "Greenfreeze" refrigerator. In the early 1990s Greenpeace Germany, two medical doctors, and a small refrigerator manufacturer from the former East Germany created a new refrigerator -- Greenfreeze -- that used a mixture of propane and butane instead of ozone depleting chemicals as the refrigerants. The successful marketing of Greenfreeze by Greenpeace Germany catalyzed the larger refrigerator producers in Europe to switch to non-ozone depleting refrigerants in their products.[2] Another development example is the World Wildlife Fund project in Zambia to halt poachers from slaughtering wildlife by involving residents in anti-poaching and conservation operations, and reinvesting revenues from tourists and safari hunting into local communities.[1] It is my proposition that development tactics will become increasingly important as environmental organizations seek to catalyze technological transformations outside of government action.

2.4.5 Issue framing through ideas

Issue framing is more of a strategic approach rather than a tactic. Typically environmental groups initiate issue campaigns by trying to create a crisis that decision makers need to address. The crisis approach to attracting attention, usually media attention, to an issue

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[1] Princen, Finger, and Manno, 1994, p. 227.
[2] Verheul and Vergragt, 1994, pp. 316-318.

involves defining the problem and identifying responsible actors. This is what Deborah Stone calls, *causal stories*, strategically crafted problems that assign consequences to the actions of specific individuals or institutions.

> [C]ausal theories, like other modes of problem definition, are efforts to control interpretations and images of difficulties. Political actors create causal stories to describe harms and difficulties, to attribute them to actions of other individuals and organizations, and thereby to invoke government power to stop the harm.[2]

Effective causal stories create outrage. As Stone observes, people "are far more likely to organize around a threatened or actual loss than around a potential gain. ... Taking away something a person already has will stimulate strong emotions: anger, resentment, and a sense of injustice.[3] A common theme in causal stories from anti-toxic activists is: companies knowingly poison our children, the environment, and us, and the government consciously allows this to happen. While causal stories are necessary for capturing the attention of decision makers in government, corporations, and households -- i.e., placing an environmental issue on the public agenda -- they are insufficient for success.

When environmentalists put forth ideas they become active in solving the problems. While environmental thinkers like Rachel Carson and to a lesser extent Barry Commoner are known for developing and promoting ideas that have influenced decision makers, environmental groups are less recognized for playing this role. Yet a few researchers, notably Princen, et al. (1994) and Gottlieb (1993), have identified examples of environmental organizations developing and using ideas to catalyze change.

As Princen, et al. (1994), explain, environmental "NGOs are increasingly prominent forces in framing environmental issues. They help establish a common language and,

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[1] Wapner, 1996, p. 86.
[2] Stone, 1988, p. 165.
[3] Ibid., p. 175.

sometimes, common world-views."[1] Princen, et al. observed in their research on environmental groups in international affairs that "new ideas have not come from governments or even designated international organizations, but from environmental lobbies and activist groups."[2] For example, it was "Greenpeace and the Sierra Club that introduced the concepts of zero discharge and pollution prevention in the Great Lakes area."[3]

And the environmental historian Robert Gottlieb learned that it was anti-toxic activists who developed the concept of *toxics use reduction*:[4] "Initially conceived at a retreat in New York State in the summer of 1987 attended by organizers from the National Toxics Campaign, the PIRGs [Public Interest Research Groups], Greenpeace, and Clean Water Action, a new campaign [toxics use reduction] was launched to advocate changes at the front end of the production system."[5] Gottlieb observed that the concept of toxics use reduction created a "major alternative environmental policy approach" and an "effective organizing strategy" for antitoxic activists, "inspired new legislation" (it became embedded in law in a few states, including Massachusetts' Toxics Use Reduction Act of 1989), and provided an "opportunity to redefine relations among constituent groups," especially labor and the environmental movement.[6]

There lurks within ideas a latent power that environmental organizations have not aggressively pursued. As John Maynard Keynes wrote in *The General Theory of Employment, Interest, and Money*, "The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the

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[1] Princen, Finger, and Manno, 1994, p. 226.
[2] Ibid., p. 226.
[3] Ibid., p. 227.
[4] *Toxics use reduction* is when manufacturers address environmental problems by preventing pollution through in-process changes rather than controlling pollution at the end-of-the-pipe (Gottlieb, 1993).
[5] Ibid., pp. 302-303.
[6] Ibid., p. 303.

world is ruled by little else. ... I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas."[1]

I agree with Princen, et. al., that the development and promotion of innovative ideas and, I add, challenging technology goals are areas where environmental organizations frequently exhibit leadership. It is environmental organizations who are willing to promote ideas like zero discharge and goals to diffuse the cleanest production technologies in the face of opposition.

2.4.6 The dynamics of tactics

Lacking in the analyses on the use of tactics is how target institutions can affect the tactics and other strategic choices of environmental groups. As Donald Schön emphasized in his research on the diffusion of ideas, the media:

> have their own thresholds and place their own criteria on the formulation of ideas to be diffused. These requirements are not merely technical. There are journalistic requirements that events fit the prevailing myths of news. There are semantic requirements for 'catchiness.' The very ability to express an idea in a phrase ... may be critical. Through such requirements, media transform the ideas themselves.[2]

To recognize that targets affect tactics and other strategic choices of environmental organizations is to recognize that change is a dynamic process. The affect of the feedback loops -- from target actors and opponents to environmental organizations -- is twofold. First, I would expect to see certain tactics associated more frequently with certain institutions (see next section for details). Second, I would expect that antagonists, those opposed to the goals of environmental organizations, would affect the ideas, causal stories, and goals of environmentalists. Environmental groups will need to change their framing of an issue to adjust to the responses from antagonists.

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[1] Keynes, 1936, p. 383.
[2] Schön, 1971, p. 135.

Another undeveloped dimension in the literature on tactics is how environmental organizations target multiple actors, often times simultaneously. The literature largely sees environmental organizations as targeting single institutional settings -- i.e., government institutions, civil society, and corporations -- one at a time.[1] Princen, et al. (1994) did emphasize the need for environmental groups to target local (i.e., communities) and global or regional bodies (e.g., the International Joint Commission) to succeed in international politics. Although they saw environmentalists being more effective if they operated outside the domain of national states (discussed in more detail in the next section). And Keck and Sikkink (1998) see advocacy networks targeting different institutions in a staged process that leads up to government actors (see Figure 2.1).

Figure 2.1 Stages of advocacy network influence: Keck & Sikkink[2]

As environmental groups seek to change the forces of production, it is my proposition that they will target multiple actors simultaneously, moving back and forth between state and non-state targets both to diffuse their goals and in their search for prominent vulnerable targets. The model of government as the center of where technology change begins is breaking down.

[1] For example, see Berry, 1977; Berry, 1999; Hays, 1987; Vogel, 1978; Wapner, 1996.
[2] Keck and Sikkink, 1998, p. 25.

2.5 When are environmental organizations likely to catalyze change?

Reflecting the institutional focus of the research, the elements identified by scholars of environmental (and related) organizations as necessary for environmental success vary with the institutional target: technical expertise and media for institutions of government; confrontation and passion for grassroots campaigns targeting corporations; alliances for transnational issue campaigns; and innovative strategies and tactics for civil society.

2.5.1 Technical expertise versus confrontation

The strategic use of information has been identified by Hays (1987), Berry (1977; 1999), Keck and Sikkink (1998), Mitchell, et al. (1992), among others, as important to the success of environmental organizations in creating change in government institutions. Berry (1999) concluded in *The New Liberalism* that:

> [The] watchword of these organizations [citizen groups] was not 'power to the people' but 'policy expertise.' The citizen lobbies were built around the most conventional of political assumptions: information is power. ... The mobilization of resources and their conversion into political assets by liberal citizen groups has had a profound effect on the political agenda. The clearest case is in environmental politics.[1]

Important to the success of technical expertise, Berry observed, is media attention: "These groups enjoy extraordinary media attention and respect. Their success with the media is surely tied to their success in influencing the Congress."[2] Success in congressional politics, according to Berry, results from the combination of: money plus technical expertise (which generates information) plus media attention.

Berry's positive assessment of the successes of national environmental organizations in congressional politics contrasts with, yet mirrors the conclusions of Dowie (1995) and Gottlieb (1993). They found alternative ecological organizations to be very successful at both stopping the siting of and shutting down waste disposal facilities -- i.e., incinerators and landfills.

> It can be argued (though it is difficult to prove) that grassroots environmental resistance during the past five to ten years has stopped more direct pollution than all the nationals' litigation combined. What is beyond dispute is that anti-toxics activism has been pivotal in turning industry toward genuine waste reduction.[3]

Dowie and Gottlieb attribute the successes of the grassroots (alternative) ecological groups to their persistence and unwillingness to back down from their goals. "Today, grassroots anti-toxic environmentalism is a far more serious threat to polluting industries than the mainstream environmental movement" because they "stubbornly refuse to surrender or compromise. They simply cannot afford to."[4] Living in communities suffering the consequences of pollution they have the incentive to fight. "Grassroots organizations use many of the same tactics as mainstream groups -- principally lobbying and negotiation -- but they come to the table with an indignation that only a victim can display."[5] Outrage, persistence, and unwavering support of a campaign's goals have led to success at the local level.

The similarities between Berry's analysis of mainstream groups and the Dowie/Gottlieb analysis of alternative groups are that both groups have succeeded in different institutional contexts using similar tactics. The differences are in terms of: goals, with more environmentally demanding goals set by the alternative groups; styles, confrontation versus collaboration; and effects, with the alternative groups having a greater effect in reducing pollution (at least according to Dowie). The strengths of these two types of environmental organizations -- the expertise of the mainstream groups and the passion and goals of the alternative groups -- have left many analysts of the environmental movement, including Dowie and Gottlieb, recommending better collaboration and cooperation between them.

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[1] Berry, 1999, p. 156.
[2] Ibid., pp. 156 and 159.
[3] Dowie, 1995, p. 133.
[4] Dowie, 1995, p. 133.
[5] Ibid., p. 132.

2.5.2 Alliances and networks

Keck and Sikkink's research on advocacy networks reinforces the argument for more collaboration and better cooperation within the environmental movement. While the theoretical influence on their research is new social movements theory -- their networks are connected by common beliefs rather than common resources -- the strength of networks are the people and organizations involved; i.e., the resources. Networks, Keck and Sikkink conclude, "are more effective where they are strong and dense. Network strength and density involves the total number and size of organizations in the network, and the regularity of their exchanges."[1]

An alliance of mainstream and alternative groups would combine the passion, knowledge, and environmentally aggressive goals of grassroots groups with the technical and financial resources of the nationals. To promote intra-movement alliances Dowie recommends that the mainstream ecological groups reach out to the "state, local, and regional grassroots organizations."[2]

A corollary to the value of a mainstream-alternative alliance is the value of environmentalists allying with other interest groups, especially labor. David Vogel's research into business and politics (mentioned above), for example, illuminates the value of environment-labor alliances. Schnaiberg and Gould (1994) conclude that "If environmentalists form new and enduring coalitions with labor, community, or social equity movement groups or organizations, they actually have a greater chance of dominating the agenda, through political veto power over economic elites and their government supporters."[1]

Environment-business alliances, however, are considered too vulnerable to cooptation by researchers who support the stronger intra-environmental movement alliance. Schnaiberg and

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[1] Keck and Sikkink, 1998, p. 206.
[2] Dowie, 1995, p. 73.

Gould, for example, note that the formation of alliances between environmental organizations and "interests of the treadmill" of production (i.e., business) have limited the expansion of ecological protection and created tensions with "the less powerful [who] are essentially marginalized in this alliance."[2]

I agree that strong alliances within the environmental movement and across other movements and interests will certainly increase opportunities for success in achieving the goals of issue campaigns. I disagree with the conclusion that alliances with business interests are always a bad idea for the environment. That perspective views businesses as a monolith and ignores the very real differences between manufacturers and users of materials. Since companies that purchase materials (call them "users") from other companies (call them "material manufacturers") to assemble a product usually have no financial interest in material production, they can switch to more environmentally preferable products with little to no adverse economic effect. The distinction between users and manufacturers creates tensions and opportunities for environmental change in the market that are not acknowledged by scholars like Schnaiberg and Gould.

Conversely, when environmental organizations compete rather than cooperate on the same issue campaign they will be less likely to achieve their goals. When environmental organizations cannot agree to common goals it becomes easy for antagonists to pit the competing groups against each, ultimately undermining the campaigns of both organizations. And when labor allies with business, it seriously weakens opportunities for environmental success, especially with government institutions.

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[1] Schnaiberg and Gould, 1994, p. 160.
[2] Ibid., p. 160.

2.5.3 Non-state actors and innovation in tactics

For Princen and Finger (1994) and Wapner (1996) success arises when environmental organizations target non-state actors[1] and use a variety of less conventional tactics, including ideas, symbols (i.e., capturing media attention), direct action, or development to catalyze change. Princen, et al. (1994), for example, concluded that:

> [NGO's are] effective agents of change to the extent that they operate independently of states and do what states tend not to do. By performing such functions, rather than lobbying others to perform them, NGOs can make a credible claim on legitimate environmental representation, and they can do so in ways governments and corporations cannot.[2]

When environmental organizations choose to operate outside of state institutions they expand their potential targets to include individuals, communities, and corporations. In this new type of organizing environment, environmentalists need to be selective and strategic when choosing targets. For example, in the context of trying to catalyze technology change in manufacturers, this would involve identifying and targeting key users of the manufacturer's products; users, who if they changed their purchasing specifications, could have major reverberations throughout a material's market. When environmentalists try to change markets they need to understand how markets operate and who the key players are.

In his research on international environmental NGOs, Wapner (1996) found that the use of unconventional tactics is an important element in persuading non-state actors to change behavior.

> The idea is to discover unconventional levers of power and employ nontraditional modes of action [i.e., tactics] that can affect, if only unevenly and imperfectly, the global community. This involves teasing out and utilizing nonformal channels and mechanisms of political engagement or, put differently, manipulating forms of power that are generally considered ineffectual in the larger context of so-called genuine politics.[3]

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[1] While "non-state actors" includes civil society and corporations, Wapner and Princen and Finger primarily mean civil society.
[2] Princen, Finger, and Manno, 1994, p. 230.
[3] Wapner, 1996, p. 159.

When environmentalists use unconventional tactics they politicize "the social, economic, and cultural spheres" of life; they are extending environmental politics to civil society.[1]

In Wapner's unconventional tactics I see the value of innovative tactics. The notion that innovation is important to success is not developed in the field of environmental organizations. Yet innovative tactics and ideas, especially those that catch antagonists by surprise, I argue are important to the success of issue campaigns. Innovation and surprise help to counter the massive resource deficit (in relation to antagonists in the business community) environmentalists often confront in technology campaigns. Vogel (1996), for example, in his research on business and politics observed that the successes of environmentalists in Congress were in part attributable to businesses being caught by surprise: The Clean Air Act of 1970 placed strong demands on the automobile companies, in part, because "they were largely caught unprepared in 1970; however, seven years later they were well organized for a major legislative struggle."[2]

Innovative tactics and new ideas can create new opportunities for change by: catching opponents off-guard; capturing new resources; and creating incentives, such as a price premium, for change. Tactical innovation includes using old tactics in new situations, creating new tactics, and using old tactics in new combinations.

2.5.4 Conditions for success: achieving technology diffusion with resources, alliances, and innovation

Missing from analyses of the elements important to success is the concept of diffusion: that success emerges when a campaign grows by having more and more actors adopt and implement the goals. An issue campaign is similar to the diffusion of ideas as described by Donald Schön, where ideas "gain widespread acceptance through the efforts of those who push

[1] Ibid., p. 159.
[2] Vogel, 1996, p. 383.

or ride them through the fields of force created by the interplay of interests and commitments. ... When the ideas are taken up by people already powerful in society this gives them a kind of legitimacy and completes their power to change public policy."[1]

For an environmental technology campaign to succeed key organizations need to adopt and implement the campaign's goal. Ideally the goal of diffusion is to reach the point of critical mass, where diffusion becomes self sustaining.[2] As part of the diffusion process, goals, causal stories, and tactics will need to evolve, especially in response to opponents. As Schön observed, when "ideas enter channels leading public consideration in such a way as to threaten a social system, they stir up conflict, formal or informal."[1] When an issue campaign stops adapting -- goals, problems, targets, and tactics remain the same -- to challenges from opponents the campaign is effectively dead, even if organizations continue to pour resources into it.

Successful technology campaigns will need a mix of elements: resources in the form of technical expertise, media, and alliances; innovative tactics and ideas; initiatives targeting actors in multiple institutional settings; and diffusion across a range of organizations. This is a challenging list of elements to pull together. But it is my contention that these elements are necessary when the opposition is organized, prepared, and willing to invest considerable resources to oppose change. Businesses, as discussed below, are becoming more savvy and aggressive in trying to achieve their goals.

2.6 Failure: the opposition element

When environmental organizations try to affect technology change they will confront opposition. As Dowie (1995) remarked, few movements "have stimulated such virulent

[1] Schön, 1971, p. 128.

[2] "A crucial concept in understanding the social nature of the diffusion process is the critical mass, a point in the process when diffusion becomes self-sustaining. The notion of the critical mass comes from scholars of social

antagonism against themselves as American environmentalism, which, by its very nature, threatens the most sacred institution of our culture -- private property."[2] The successes of environmental groups have "stimulated a well-organized, well-financed backlash."[3] Thus success will involve effectively countering the ideas and actions of the opposition.

The best analyses I have read on the success of the environmental opposition were written by the David Vogel (1996) and Samuel Hays (1987).

Vogel identified four key elements to business success in congressional politics:

1. Form a broad coalition (remain united rather than divided).
2. Run a well-organized campaign -- don't get caught by surprise.
3. Make convincing arguments (in the minds of the public and legislators).
4. Have wide geographic distribution.

Vogel identified coalition formation as the "most important factor" affecting the ability of business to meet its goals: "the broader a coalition it can form to support is policy goals, the more likely it is to achieve them."[4] Especially important for corporations (as well as environmental organizations) is having labor's support. When "labor was either neutral or supported the environmentalist position, business did less well. By contrast, the environmentalists, like industry, triumphed only when organized labor did not oppose them."[5]

Running a well-organized campaign is a vague concept in success. Vogel highlights two main points here. First, business must show up. They are unlikely to win unless they organize: "There is nothing automatic about business access to government." Like any interest group, business must communicate its positions to legislators and their staffs.[6] Second, "don't get

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movements, and in recent years the concept has become useful in studies of the diffusion of interactive innovations" (Rogers, 1995, p. 313).

[1] Schön, 1971, p. 136.
[2] Dowie, 1995, p. 83.
[3] Ibid., p. 83.
[4] Vogel, 1996, p. 381.
[5] Ibid., p. 382.
[6] Ibid., p. 383.

caught by surprise." For example, "The major industrial stationary sources of pollution fared relatively poorly on the PSD [prevention of significant deterioration] issue in 1977, in part because they were not prepared for the degree of political opposition to their efforts to weaken PSD requirements."[1] Today business knows the rules of the anti-environmental lobbying game and is much less likely to be caught by surprise in Washington, DC.

The third element, making convincing arguments, is a corollary to the first. Business arguments are more persuasive when their goals connect with employment goals: Congress is more likely to "respond to labor's concerns about employment" than it is to "industry's arguments about profits."[2] Lastly industry sectors with wide geographic distribution have an advantage in that they have more representatives and senators who are likely to be persuaded by their arguments. "The more a company or industry is an important factor in the economy of either a state or a congressional district, the more likely it is to find a particular congressman or senator response to its arguments."[3]

Businesses learned from the legislative battles of the 1970s. Today they pour resources (especially when compared to environmental organizations) into lobbying legislative bodies and regulatory agencies, and filing lawsuits. Hays, for example, observes that industries deflected regulatory demands for more stringent pollution control technology by "arguing that the case for harm had not been proved. They took up scientific issues as a major strategy of environmental opposition by demanding far higher levels of proof before regulation."[4] And he concludes that corporations have "had considerable success in neutralizing the force of positive administrative action. Despite the drama of events in which public agencies sought to convey the message of

[1] Ibid., p. 383.
[2] Ibid., p. 385.
[3] Ibid., p. 386.
[4] Hays, 1987, pp. 338-339.

persistent victories over the regulated, those very regulated, by the continuous weight of their demands, were able to shape much of the world of environmental affairs."[1] At a more general level, Vogel found that American "business community [has] become significantly more and better organized [i.e., politically organized] during the last three decades."[2]

With years of experience in fighting environmental laws and regulations, the business sector has become quite adept at opposing change. If environmentalists are going to achieve their goals of greening industry they will need to learn how to compete effectively with their antagonists. Vogel's research on business in politics identifies key areas where environmentalists will need to perform well: alliance formation (both inside and outside of the movement), surprise, and persuasiveness (develop compelling ideas and solutions).

2.7 From interest group pluralism to production pluralism?

In the theory of interest group pluralism public policies emerge from interest groups with competing demands interacting with decision makers in government, be they regulators or legislators.[3] Central to the concept of interest group pluralism is access: competing groups have access to politicians or regulators.[4] Implied is that the groups with access have the capacity to influence decision makers, even if they do not achieve their goal. Pluralists like Vogel (1996) contend that the "economic, ideological, and political resources available to business to shape public policy do not provide any unique advantages. They either do not automatically translate into political influence or they are counterbalanced by similar or equivalent resources available to other groups in society."[1] To the degree that environmental organizations are strong and effective, they lend support to the relevance of interest group theory. Berry's (1999) research on

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[1] Ibid., p. 315.
[2] Vogel, 1996, p. 318.
[3] Dahl, 1961; Truman, 1951.
[4] Truman, 1951.

citizen groups, for example, supports the continuing vitality of interest group theory: "Interest groups are a vehicle for articulating what we care the most intensely about. Citizen groups, with their ideological zeal and strong issue focus, offer members a loud, passionate, and aggressive voice in Washington politics."[2]

Vogel (1996) presents a nuanced perspective of pluralism, where pluralism alternates with elitism depending on the level of opposition: "there is no need to choose between the pluralist and elitist depictions of business power in America," he advises us.[3] Rather, whether a nation tends to pluralism or elitism depends on the level of political opposition: "students of business power need to pay as much attention to the political organization and influence of non-business constituencies as they do to that of business."[4]

As environmental and other NGOs diversify their institutional targets to include corporations, civil society, as well as the state, it raises the question of whether pluralism is spreading to other institutions. Wapner (1996) observed the widening political domain in his research on international environmental organizations. With the traditional view of politics as solely the domain of the state yielding to a much broader reality, he concluded that "it is imperative to expand our notion of politics itself ... to include nonstatist modes of governance."[1]

While Wapner saw politics expanding to civil society, I see a comparable need to expand politics to production; especially since (as noted at the outset of this chapter) production decisions affect the environment, public health, and occupational health. Interest group pluralism needs to be adapted to the changing world of what is "political." From this perspective we can begin to think about *production pluralism*, where competing interests and values,

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[1] Vogel, 1996, p. 300.
[2] Berry, 1999, p. 167.
[3] Vogel, 1996, p. 314.
[4] Ibid., p. 319.

including environmental organizations and the state, seek to change the forces of production. I define *production pluralism* as arising when NGOs have access to corporate executives and the capacity to influence their decisions.

Vogel (1978), however, is pessimistic about the capacity of public interest pressure to affect corporate change without government support. The public interest movement, he stated, will not succeed in its efforts to change corporate behavior because it cannot acquire the resources needed to counterbalance corporate resources independent of "decisions made either by some public agency, the courts, or the legislature."[2] The only way Vogel foresaw a company making "decisions not dominated by the logic of capital accumulation" was through the "direct intervention of the government."[3]

And the resource gap between public interest groups and business is wide. Just in terms of traditional interest group pluralism environmental groups confront a deep resource gap. For example, the political action committees of energy and natural resource-based corporations outspent all environmental political action committees by $20.7 million in 1992 ($22 million for corporations versus $1.3 million for environmental organizations).[4]

Another growing advantage for transnational corporations is they increasingly own the major media outlets and this affects what reporters cover.

> [The Founders] didn't count on huge private corporations that would own not only the means of journalism but also vast swaths of the territory that journalism should be covering. According to a recent study done by the Pew Research Center for the People and the Press for the *Columbia Journalism Review*, more than a quarter of journalists polled said they had avoided pursuing some newsworthy stories that might conflict with the financial interests of their news organizations or advertisers. And many thought that complexity or lack of audience appeal causes newsworthy stories not to be pursed in the first place.[5]

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[1] Wapner, 1996, p. 163.
[2] Vogel, 1980, p. 624.
[3] Vogel, 1978, p. 225.
[4] Dowie, 1995, p. 193.
[5] Moyers, 2001, p. 13.

Corporate control of the media means environmental groups will have an even more difficult time of building public opinion in their favor.

These barriers to state pluralism will hold, and even more so, in production pluralism, where environmental groups have fewer access points to corporate decision makers. There are good reasons to be skeptical about the emergence of production pluralism, where multiple actors attempt to make corporate decisions more publicly accountable. Yet, it is my contention that social movement organizations, including environmental organizations, are beginning to succeed in pressuring corporations to change production decisions to reflect demands for improved work place conditions, better environmental performance, and more equitable wages. Vogel did not foresee the emergence of sophisticated market campaigns to transform business behavior. Production pluralism, like interest group pluralism, will only emerge when political opposition forms to challenge business as usual.

3 Research design: a comparative historical analysis of environmental campaigns to transform the paper industry in Sweden and the US, 1980-1998

This is a comparative analysis of how national environmental organizations tried to affect technology change in the manufacture of bleached pulp and paper in Sweden and the US between 1980 and 1998. The emphasis of the research is on the issue campaigns run by national environmental organizations to change bleaching processes. The principal campaigns I examine are those of: Greenpeace Sweden and the Swedish Society for Nature Conservation (SSNC) in Sweden; and Environmental Defense and Greenpeace USA in the US. The campaign of another national environmental group in the US, the Natural Resources Defense Council (NRDC), is also examined, although with less detail because it was involved for a shorter period and did not try to affect change through the market.

3.1 Selecting the geographical context: Sweden and the US

National environmental groups are the center of my research because they typically take a leadership role in national-level environmental initiatives. They also have the resources relative to state and local groups to challenge major industry sectors like the paper industry at the national level. Yet by focusing on national groups I am vulnerable to criticisms from environmental movement researchers like Dowie (1995) and Gottlieb (1993) that these organizations represent the least effective part of the environmental movement; therefore any victories will represent at best incremental change. While it is beyond the scope of this research project to assess in detail the role of state and local groups, I note prominent examples of state and local initiatives, including the campaign of local environmental groups in North Carolina and Tennessee to dramatically reduce water pollution from the former Champion International mill in

Canton, North Carolina;[1] the lawsuit by the Surfriders Foundation to require the Louisiana-Pacific mill in Samoa, California to reduce its wastewater discharges to the Pacific Ocean; and the promotion of a bill in the Maine legislature to eliminate organochlorine pollution from paper mills by the Natural Resources Council of Maine and other environmental groups; These are all examples from the US because no similar cases of local activism emerged in Sweden. I will also assess the relevance of the Dowie/Gottlieb critique of national environmental groups as organizations compromised by money and professional staff.

I chose pulp and paper manufacturing because it is a major global industry sector with potentially large environmental impacts. Worldwide the pulp and paper industry accounts for about 2.5 percent of industrial production, employs 3.5 million people, and has $260 billion in sales.[2] The industry's potential environmental impacts mirror its size. The paper industry consumes 279 million tons of fiber each year, with 160 million tons coming from virgin wood fiber (i.e., trees).[3] Almost 30% of the virgin wood fiber is from plantation forests,[4] which displace species diverse forests. In the US,[5] the pulp and paper industry is the country's "largest industrial process water user" as well as the third largest source of toxic chemicals behind the chemical and primary metal industries, releasing 228 million pounds of toxic chemicals to the environment or for treatment at waste disposal facilities in 1996.[6]

I chose Sweden and the US because each nation is a major producer of bleached pulp and paper products and had active pulp and paper campaigns by at least two national environmental

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[1] International Paper now owns Champion International. Champion International sold the Canton mill before being purchased by International Paper.
[2] IIED, 1996, pp. 18-19.
[3] The remaining fiber is from recycled paper (107 million tons) and non-wood sources of fiber (12 million tons) (Ibid., p. 32).
[4] Ibid., p. 34.
[5] Lacking global pollution data, I use American data as an indicator of the industry's potential pollution impacts.
[6] US EPA, 1998, pp. 159, 172, and 177.

organizations. During the 1980-1998 period the US was the world's largest producer of both pulp and paper products, while Sweden was the fourth-fifth largest producer of pulp and sixth largest producer of paper.[1] As noted above, two national environmental organizations in Sweden and three in the US were very active in trying to affect change in the industry. Four of the five tried to affect change in the market (only NRDC did not) and all five tried to affect change in government or government-sponsored institutions. By government-sponsored institutions I mean international or regional bodies like the Helsinki Commission (established to protect the Baltic Sea) and the Nordic Swan (ecolabeling program of the Nordic countries).

The pulp and paper campaigns in Sweden and the US provide an opportunity to examine how environmental organizations tried to change the same manufacturing process (the bleaching of paper), at the same time, and over the same problem (chlorinated organics, especially dioxins, in water pollution). Initiatives to reduce water pollution from the paper industry blossomed in both nations when dioxins were discovered in mill effluent in 1987.

Technologically, the industry in both nations was quite similar. Kraft pulping was the dominant method for extracting cellulose from trees.[2] In kraft pulping chemicals dissolve the lignin-cellulose bond. Both nations used chlorine as the principal bleaching agent for whitening kraft pulp, which is dark brown.[3]

Yet there were slight technological differences between the industries that may have made Swedish manufacturers more receptive to demands for investing in pollution prevention technologies. By 1980, the majority of Swedish bleached kraft pulp mills had invested in the pollution prevention technology, oxygen delignification. The use of oxygen in bleaching reduces the amount of chlorine used in bleaching, thereby reducing the chlorinated organics in mill

[1] Bonifant and Ratcliffe, 1994. For more details on the industry in each nation see Chapter 5.
[2] Pulp is the intermediary product between trees and paper.
[3] For more details on pulping and bleaching see Chapter 5.

wastewater. In the US, bleached kraft pulp mills invested in the end-of-pipe technology of secondary wastewater treatment to control water pollution rather than pollution prevention technologies like oxygen delignification. The slight differences in technology mean the nations are not perfect comparisons: the paper industry in each nation would confront the problems of dioxin and other chlorinated organics in wastewater from slightly different technological orientations. Despite the practical challenge of finding two nations with nearly identical characteristics for comparative analysis, the campaigns in each nation are illustrative of how environmental groups try to change technology, the challenges they confront, and causal conditions affecting success and failure.

3.2 Using comparative historical analysis to define causal conditions

Comparative historical research is a method, as the sociologist Charles Ragin (1987) explained, for examining "specific historical sequences or outcomes and their causes across a set of similar cases."[1] The selection of outcome and specification of causal conditions relevant to that outcome, Ragin emphasized "are crucially important parts of a comparative investigation."[2] The outcomes I examined for are the technology goals the environmental organizations set for their pulp and paper campaigns. I ascertained the technology goals of the environmental organizations through published materials and interviews with staff. The desired goals of all the organizations involved, as it turns out, were clear and not a matter of debate. Similarly the technology changes made in the paper industry are well-documented in the industry's trade press.

In the previous chapter I specified causal conditions that researchers have identified as important to causing, as well as opposing, change in public and environmental policy. I

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[1] Ragin, 1987, p. 13.
[2] Ragin, 1994, p. 119.

examined whether these conditions were important in attempts to change pulp bleaching in Sweden and the US; and incorporated other conditions that arose in the course of the empirical research. As Ragin writes, comparative research is a combination of deductive and inductive reasoning: "deductive because initial theoretical notions serve as guides in the examination of causally relevant similarities and differences. ... It is inductive because the investigator determines which of the theoretically relevant similarities and differences are operative by examining empirical cases."[1]

The research on how environmental groups tried to affect technology change in Sweden (Chapters 7-8) and the US (Chapters 9-10) provided the data for defining the goals of the environmental groups, identifying the organizations they targeted, determining the level of success they achieved with each target actor, identifying and revising the causal conditions most relevant to change in the paper industry, and assessing the overall affect on technology change in each nation's industry. The comparative analysis will involve analyzing which causal conditions were most relevant to environmental organizations achieving, or not achieving, their goals and how they varied across types of organizations targeted -- i.e., buyers, manufacturers, and government institutions -- as well as nations. Since each environmental group's campaign targeted more than one organization, each campaign provides a set of cases for evaluating the relevant causal conditions. For example, the SSNC targeted buyers of paper, manufacturers of pulp and paper products, and the Nordic Swan (the ecolabeling program for the Nordic countries). Each of these targets becomes a case in its own right because it offers an opportunity to assess the relationship between outcome achieved and causal conditions.

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[1] Ragin, 1987, p. 45.

To assess the level of success achieved by environmental organizations I build from the work of sociologist William Gamson. In his path-breaking work on evaluating success in social movement organizations, *The Strategy of Protest* (1975, revised 1990), Gamson evaluated success based on new advantages and acceptance. *New advantages* is the extent to which the challenging group achieved its goal.[1] And *acceptance* is the degree to which an antagonist recognizes the challenging group as a valid representative for a set of interests. I will assess the acceptance, or what Burstein, et al. (1995) call *responsiveness*, of target actors at three levels: access, decision, and implementation.[2] Environmental groups achieve *access* when they are able to sit at the table with decision makers to define their view of the problem and solutions. While access is basic to success, it can be a difficult step to accomplish, especially when targeting a corporation directly. A *decision* is when the target organization announces -- either privately to the environmental organization or publicly, usually through a press release -- that it will adopt a new technology (or policy) or change its purchasing specifications. *Implementation* is the actual purchasing of the technology or product; or if a government policy, it is ensuring that others comply with the regulation.

Burstein, et al. (1995) emphasized two values in analyzing different levels of movement success. First, it "enables us to distinguish between movements that really produce social change and those that win only symbolic victories (such as gaining the passage of legislation that is not subsequently enforced)." Second, it allows us to assess "whether factors that affect success at one level" (e.g., access) are the "the same as those that influence success at another" level (e.g., implementation).[3] And by analyzing levels of responsiveness across institutions (e.g.,

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[1] Gamson, 1990, pp. 29 and 32.
[2] Burstein, Einwohner, and Hollander (1995) developed a more refined list of types of policy responsiveness: access, agenda, policy (decision), output (implementation), impact, and structural.
[3] Ibid., p. 283.

corporations and regulatory agencies) we can develop a better understanding of the challenges and opportunities environmentalists face when targeting different institutions.

To perform the comparative analysis -- where I assess the causal condition most relevant to success/failure for target actors in similar institutions (either government institutions, corporate purchasers of paper products, or manufacturers of bleached pulp) -- I built from the Boolean approach to qualitative comparison as developed by Ragin (1987). In the Boolean-based approach the presence or absence of causal conditions under which a certain outcome is obtained are measured on a nominal-scale; i.e., a condition is either present ("1") or absent ("0"). The "absence of a cause," writes Ragin (1987), "has the same logical status as the presence of a cause." The result is a "truth table" with all the cases as rows (although cases with exactly the same presence/absence of causal conditions are treated as a single row) and the causal conditions as columns.

For my research, the Boolean method of defining causal conditions as present or absent was useful because it illuminated patterns between outcomes and causal conditions. For simplicity and clarity I used "Yes" or "No" rather than "1" or "0." Also in some cases the conditions were on an ordinal-scale, i.e., they were present, but weakly present. In identifying causal conditions, I heeded sociologist Stanley Lieberson's warning against making categories of causal conditions too broad in order to reduce the number of variables to facilitate finding a clearly relevant independent variable: do not exclude plausible causal variables to simplify analysis because "the chances of an erroneous conclusion" rise when researchers do not "include all possible causal variables."[1] Lieberson's admonitions are important because, to create clear patterns of causality the tendency is to lump causal conditions together.

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[1] Lieberson, 1992, p. 116.

From the comparative analysis I identified the causal conditions most relevant to creating environmental change in different institutions. A caveat I recognize the need to highlight is that these causal conditions are illustrative of a few campaigns to change the pulp and paper industry as well as the data gleaned from existing literature. As Ragin noted, a downside to the comparative method is it provides only modest empirical generalizations because of the modest number of cases available to prove or disprove arguments.[1]

Finally I assessed the success of the environmental groups in catalyzing change in the paper industry of their nation as a whole. Ideally, as the diffusion theorist Everett Rogers (1995) emphasizes, agents of diffusion (he calls them "change agents") seek to create conditions at which the diffusion of a technology reaches "critical mass," where diffusion becomes self sustaining.[2] To evaluate the degree of diffusion I used Rogers' five-part division of adopters: innovators, early adopters, early majority, late majority, and laggards:

> *Innovators*: the first to develop and/or adopt a technology, representing the first 0-2.5% to adopt a technology.
> *Early adopters*: the next 13.5% to adopt the technology.
> *Early majority*: the next 34% to adopt the technology.
> *Late majority*: the next 34% to adopt the technology.
> *Laggards*: the late 16% to adopt the technology.[3]

When environmental groups try to diffuse technology through government action, the degree of technology diffusion is less of an issue: if a nation's regulatory agency enforces an environmental law or regulation, adoption is 100%. While implementation is not always a foregone conclusion, it has meant less need for a refined analysis of diffusion as developed by Rogers. Yet with the movement away from government regulation to market forces, it raises the need for more detailed technology diffusion analyses.

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[1] Ragin, 1987, p. 31.
[2] Rogers, 1995, p. 313.
[3] Ibid., p. 262.

3.3 The data sources: interviews, industry statistics, trade press, print media, and government publications

To define the causal conditions affecting implementation in corporations and regulatory agencies I relied upon data from personal interviews and a variety of primary and secondary literature sources. Interviews were conducted with key individuals in government institutions, corporations and their trade associations, pulp and paper research institutes, as well as the environmental organizations. The government institutions included the Swedish Environmental Protect Agency (SEPA), Swedish Licensing Board, and United States Environmental Protection Agency (US EPA). The corporations included Champion International, IKEA, Louisiana-Pacific, Munksjö Aspa Bruk, SCA Graphics, Södra Cell, Time Inc., Union Camp, Westvaco, and Weyerhaeuser. The trade associations were the Alliance for Environmental Technology, American Forest and Paper Association and Swedish Forest Industries Association. The pulp and paper research institutes were the Institute of Paper Science and Technology in Atlanta and the Swedish Pulp and Paper Research Institute in Stockholm. And I interviewed the lead organizers of the pulp and paper campaigns for each of the environmental groups: Environmental Defense, Greenpeace Sweden, Greenpeace USA, Greenpeace Germany, Greenpeace International, NRDC, and the SSNC. For the complete list of individuals interviewed see Appendix 1.

The interviewing technique was qualitative and open-ended since my goal was to develop a history of events, which as the sociologist Robert Weiss observes, "no one single person could have observed in its totality."[1] "[S]tandardized question won't work" when integrating multiple perspectives, Weiss explains, "because every respondent will have different observations to

[1] Weiss, 1994, p. 9.

contribute."[1] My goal was to understand how the actions of environmental organizations shaped events that affected, or attempted to affect, technology change. Questions asked varied with the institutional setting of interviewees. Questions for staff in environmental groups focused on their campaigns: how they developed, who they targeted and how, who they worked with, what was the outcome, and why. Through the questioning I sought to learn their goals, problem definitions, alliances, how they selected target organizations and tactics, and what they thought was effective/ineffective and why. Questions for staff in corporations and regulatory agencies focused on how and why they made specific decisions, and what influenced their decisions, including both internal and external factors. And questions for staff in the national trade associations focused on how they responded to demands from environmentalists to change production, what they thought were legitimate concerns, and how they explained the final outcomes in the industry as a whole.

Other primary data sources included annual reports from corporations and environmental organizations, conference proceedings, *Statistics of Paper, Paperboard, and Wood Pulp* (published annually by the American Forest and Paper Association), and internal documents from the American Forest and Paper Association.[2] Trade press and newsprint media databases were used to define trends in the rise (and fall) of environmental concerns in bleached paper production. The Paper Industry Research Association (PIRA) database, "Paperbase International," was used to track the emergence of environmental concerns with paper bleaching in the international trade press.[3] And Dow Jones Interactive, Lexis-Nexis, and ArtikelSök were

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[1] Ibid., p. 9.
[2] The internal AFPA documents were leaked to Greenpeace USA in 1987. Carol Van Strum gave me access to these documents.
[3] Paperbase includes references from over 260 journals from around the world beginning in 1970. It enables searches by keywords, such as totally chlorine free paper, by nation, and by publication (see www.paperbase.org).

used to track the emergence of concerns with paper bleaching in major newspapers in Sweden and the United States. Other prominent data sources on the industry included:

- the pulp and paper journals: *Pulp and Paper*, *Pulp and Paper International*, *Svensk Papperstidning*, and *TAPPI Journal*;[1]
- *Lockwood Post's Directory of the Pulp, Paper, and Allied Trades*; *North American Pulp and Paper Fact Book*; *International Fact and Price Book* and *International Pulp and Paper Directory* (all published annually by Miller Freeman, Inc.); and
- Stanford Research Institute, *Chemical Economic's Handbook* (which includes chemical use by the paper industry sector in Western Europe, Japan, and North America).

I used the combination of data sources to identify the causal conditions that were operational in each effort to persuade a target actor to adopt the technology goal of the environmental organizations. The most valuable and insightful resources were the personal interviews. And by interviewing actors across institutional contexts I developed a more balanced picture of the conditions important to change (or stasis). The data sources in the literature were used to confirm and fill-in details missing from the interviews.

[1] *Svensk Papperstidning* is the Swedish Pulp and Paper Journal. "TAPPI" stands for the Technical Association of the Pulp and Paper Industry.

4 Historic shifts in white paper production: the influence of consumer demand, fiber supply, and technology innovation, 1800-1969

The writing of this chapter began as a short introduction into the demand for white papers. Lacking a historical perspective, I hypothesized that demand for white papers was a phenomenon of the 1950s when advertisers popularized the need for bright, white products. Historical data, however, revealed my hypothesis to be woefully shortsighted. In fact, demand for white paper and the association of whiter paper with higher quality dates back at least until the early 1800s. Associating white paper with high quality was a constant among consumers from 1800 to 1969. The changes in the 20th century were papers became whiter and more types of white paper products were added to the market.

Between 1800 and 1969 white paper production under went many transformations: the number of products, the pounds manufactured, and the whiteness of the papers increased with product innovations and changes in consumer demand, fiber sources, production methods. To tell the history, I divide the 170 years of change in white paper production into four periods. Like interconnected lakes where water flows downstream from one to another, the periods contain the dominant activities and technologies of that time, yet activities and technologies flow across periods.

This chapter is a history of the technological development of bleached paper products in North America and Europe. Technological innovations in the pulp and paper industry flowed freely across the Atlantic. The development and evolution of the North American paper industry and markets tracked Europe with a slight difference, the US typically followed Europe in developing and adopting innovations in pulp and paper manufacturing. To understand the context in which the technologies and products developed, this chapter also examines the market and cultural factors that affected their emergence in the US.

The use of hypochlorite to increase rag fiber supply in the early 1800s marked the beginning of chemical bleaching in the paper industry. Hypochlorite bleaching expanded rag supply by whitening very dirty and colored rags. The next transformation arose in the second half of the 19th century when trees replaced rags as the dominant source of fiber for paper. The change from rag to trees made chemical bleaching essential to producing white printing and writing papers. The third transformation began in the late 19th century with innovations in printing technology and the demand from advertisers for whiter paper to better display their color ads. The final transformation began in the post World War II years when bleached kraft pulp became the dominant fiber source for bleached paper products. It was also in the 1950s when advertisers renewed the centuries old association of whiteness with purity and cleanliness to market disposable paper products.

4.1 White paper before chemical bleaching, 1100-1799

Today's common association of whiter paper with higher quality,[1] an association slightly damaged by the bleaching wars of the 1980s and 1990s, is not a phenomenon of the post-World War II era. It dates back to the early years of papermaking in the US Writing in the 1820s, American papermaker Zenas Crane identified whiteness as an important criterion of higher quality: "'higher quality paper meant, higher linen content, more uniform thickness of the sheets in a ream, few flaws or blemishes, greater smoothness, and **whiter color for white paper** [emphasis added]... Fine paper also was stronger and more durable.'"[2]

The whiter-higher quality association in paper products paralleled the historically high status bestowed upon white products in western nations, where "white came to symbolize

[1] Writing in 1992, Claudia Thompson noted that "[P]apers with the highest brightness [i.e., whiteness]" are mistakenly believed to be "superior to others" (p. 103).
[2] Crane as quoted in McGaw (1987), endnote #6, pp. 63-64.

goodness, purity and spiritual cleanliness."[1] The white toga symbolized citizenship in the Roman Empire, and could only be worn by Roman males 16 years or older.[2] White gloves were worn by bishops and cardinals, and no clergy of lower rank, as symbolic of purity from sin since the 11th century.[3]

The social preference for white textiles had a direct connection to paper. The rags of bleached linens or unbleached/undyed, cotton textiles (unbleached cotton is a light beige color) were the fiber source for papermakers dating back to the 12th century. And papers of the highest quality and cost-- fine writing and drawing papers, envelopes, and printing paper for books and journals[4] -- were manufactured from the whitest and cleanest of the rags.[5] Thus the elevated status attributed to white textiles extended to paper products.

Rags of cotton and flax[6] are excellent materials for papermaking because they contain high percentages of cellulose, the foundation ingredient in paper: cotton is 90% and flax is 80% cellulose.[7] Cellulose provides the tensile strength and flexibility we associate with paper. Cellulose fibers from cotton and flax are ideal for making strong papers because of their length. Longer fibers make stronger papers. Cottonseed fibers average 30 millimeters (mm) and linen fibers average 55 mm in length.[8] That is why Zenas Crane highlighted linen fiber content as an important criterion of higher quality paper.

Papermakers did not bleach the rags because textile producers had already bleached some of the rags and bleaching was a labor- and time-intensive process. Until the introduction of hypochlorite bleaching in the textile industry in the late 18th century, sunlight was the bleaching

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[1] Pratt, 1994, p. 21.
[2] Ibid.
[3] Herbermann, ed., 1909.
[4] The low end uses were newspapers and wrapping paper (e.g., for hardware and sugar) (McGaw, 1987, pp. 61-68).
[5] Ibid., p. 41.
[6] Flax is the fiber source for linen.
[7] Casey, 1952, p. 1.
[8] Smook, 1982, p. 4.

agent for textile manufacturers. Depending on the techniques of the master bleacher, bleaching involved up to 50 steps and took up to 12 months to complete.[1] "Most of the material bleached [by sunlight] was composed of linen fibers. Cotton was considered white enough without bleaching."[2]

Whiteness in paper is not merely a function of a cultural preference for white, it has an important technical function in printing and writing papers where it facilitates reading: "Ease of reading is determined in large part by the contrast between the ink and the paper surface. Black ink on white paper gives the greatest contrast because white paper reflects the greatest amount of light and black ink reflects the least amount."[3] Yet whiteness, technically referred to as "brightness" in the paper industry, is not the only factor that facilitates reading: "contrast is not only of brightness," it is "also one of hue and saturation."[4] "Printing on off-color or tinted papers gives less contrast than printing on pure white papers, but because the long and short light rays in ordinary light do not focus well on the retina of the eye, a slightly yellow background is sometimes preferred."[5] For these reasons off-white or cream-colored papers are more pleasing to the eye. The printing and writing papers made from rags were an off-white color. The bright, white papers of today were not common until the post-World War II era.

4.2 Increasing the rag supply with chlorinated bleaching powder, 1800-1865

When the Swedish pharmacist Carl Scheele discovered chlorine in 1774 he created opportunities for significant change in the centuries old practice of bleaching.[6] Textile manufacturers were the first to harness chlorine's bleaching power, followed quickly by paper

[1] Pratt, 1994.
[2] Libby, 1962, p. 16.
[3] Casey, 1952, p. 1150.
[4] Ibid.
[5] Ibid., pp. 1150-1151.
[6] Pratt, 1994, p. 22.

manufacturers. Making a whiter paper, however, was not the reason why paper manufacturers adopted chlorine bleaching: they used chlorine to increase fiber supply.

Chlorine gas and chlorine gas in water solution were first used commercially as textile bleaching agents in the 1780s in the United Kingdom. The use of chlorine gas quickly came to an end because it "attacked worker's lungs, eyes, and skin, nearly killing them."[1] Working like concentrated sunlight, chlorine gas in water quickly became an economical bleaching agent: it reduced bleaching time from months to a few hours. Chlorine bleaching of textiles grew rapidly after the Scottish bleacher, Charles Tennant, began manufacturing solid chlorinated bleaching powder -- called hypochlorite -- in 1799.[2] Easily shipped to market and handled by users, hypochlorite became the favored bleaching agent in the textile industry.[3]

Paper makers in Europe and North America rapidly adopted hypochlorite to expand their fiber supply. With increased paper demand and limited supply of clean rags, chlorinated bleaching powder enabled papermakers to incorporate previously unusable dirty and dyed rags into paper. The "introduction of chlorine bleaching in the last decade of the eighteenth century ... opened up the world of the non-white, soiled rag to the eager papermaker, leaving relatively few untapped sources of rag available."[4]

4.3 Trees, the new fiber source, make hypochlorite essential to white paper, 1866-1899

For the first half of the 19th century papermakers produced high quality, creamy white paper with little to no bleaching from rags. But the role of bleaching in papermaking changed when rags could no longer keep pace with paper demand. By the middle of the 19th century paper makers in Europe and North America confronted a fiber supply problem:

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[1] Ibid.
[2] To make bleaching powder manufacturers added chlorine to slaked lime (Pratt, 1994, p. 23).
[3] Ibid., p. 23.
[4] Magee, 1997, p. 110.

> One of the most pressing problems faced by all [western] nations in the nineteenth century was the failure of the supply of the traditional raw material for papermaking, rag, to keep up with the demand for paper. It was a problem most acutely felt from 1860 [onwards], and ... the search for its solution became one of the enduring themes [of the latter half of the 1800s].[1]

With rag costs rising rapidly,[2] paper manufacturers searched for alternative sources of cellulose, experimenting with straw, esparto, hemp, jute, and wood.[3] Trees emerged as the primary rag substitute because they contained enough cellulose to make a decent paper and were readily available in North America and Scandinavia.[4]

Trees in comparison to cotton and linen rags are a poor source of cellulose. Trees have four disadvantages. First, cellulose fibers from trees are much shorter than from cotton and linen, resulting in weaker papers (see Table 4.1). Second, on a per pound basis trees only contain on average 45% cellulose, much less than cotton and flax. The other matter in trees includes: lignin (21-25%), hemicellulose (25-35%),[5] and extractives (2-8%)[6] (see Table 4.1). Third, separating cellulose from the other matter in trees is complicated by the lignin which creates intricate bonds with the cellulose and hemicellulose, making it "exceedingly difficult to remove one constituent of the wood without removing or drastically altering some of the other constituents."[7] Fourth, the presence of lignin causes paper to yellow upon exposure to sunlight. Bleaching became a critical step in producing printing and writing papers because it addressed any of the problems: solubilizing and removing much of the non-cellulosic material and whitening residual contaminants left in the pulp.[8]

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[1] Ibid., p. 174.
[2] For example, prices increased by 348% from 1861 to 1864 for a Philadelphia rag merchant (Magee, 1997, p. 180).
[3] McGaw, 1987, p. 197.
[4] Ibid. and Magee, 1997.
[5] "Hemicellulose" is a polymer of five different sugars, whereas cellulose is a polymer only of glucose (Smook, 1982, p. 6).
[6] "Extractives" are the all other category for wood, and include terpenes, resin acids (softwoods), fatty acids, and phenols (Ibid., p. 6).
[7] Casey, 1952, p. 68.
[8] Ibid., p. 248.

Table 4.1. Comparison of rag- and tree-based cellulose fibers

Cellulose source	Fiber length (mm)	Cellulose content (% by weight)	Lignin content (% by weight)	Hemicellulose content (% by weight)	Extractives (% by weight)
Linen	55	80%	0%	0%	20%
Cottonseed	30	98%	0%	0%	2%
Hardwood	2	45%	21%	35%	2-8%
Softwood	4	45%	25%	25%	2-8%

Sources: [1]

At first, bleaching was not part of the technology developed to create paper from wood, and its absence contributed to the development of a vastly inferior product to rag-based printing and writing papers. Between 1866 and 1909 four different technologies for separating cellulose from trees (called "pulping") were commercialized in the US: groundwood (mechanical), soda, sulfite, and kraft (sulfate) pulping processes. With the exception of soda pulping, all were first commercialized in Europe (see Table 4.2).

Groundwood pulping, also called mechanical pulping, was the first technology developed to capture cellulose from trees. Friedrich Keller and Heinrich Voelter commercialized groundwood pulping in Germany in 1847. They used massive grindstones to scrape fibers from trees and used water to both cool the stones and to carry away the fibers. The Pagenstecher brothers were the first to introduce groundwood pulping in the US when they constructed the Curtisville mill in western Massachusetts in 1867.[2]

Groundwood pulping is an efficient use of trees because it captures 90-95% of the matter in trees.[3] Papers made from groundwood pulp, however, yellow upon exposure to sunlight because of their high lignin content:

> Lignin is particularly sensitive to light and undergoes a photochemical reaction in sunlight leading to a darkening of the lignin. It is this photochemical reactivity of lignin which is responsible for the rapid deterioration [yellowing] of groundwood papers. ...

[1] See Smook (1982) for data on "fiber length" column (p. 4) and material content of hardwood and softwood (p. 6). See Casey (1952, p. 364) for data on material content of linen. See Whistler and Teng (1970, p. 13) for data on cotton fiber content. In any case where data differs across sources, data from the most recent source is used.
[2] McGaw, 1987, p. 201.
[3] Smook, 1982, p. 42.

> Even a small amount of groundwood in a mixed furnish has a pronounced deleterious effect on the photochemical stability of the paper.[1]

Groundwood papers are weak because the grinding of the trees rips the cellulose into small strands.[2] In comparison to the rag papers on the market, which did not yellow and were strong because of the long flax and cotton fibers, groundwood papers were far inferior. Papermakers in the 1860s quickly discovered that the papers "became yellow after exposure to sunlight" and "tore easily."[3] Thus groundwood pulp found its way into low quality products where durability and long-term whiteness were not valued, such as newsprint and wrapping paper.[4] In retrospect, the rag papers were over-qualified for end-uses with a short shelf life, such as daily newspapers.

Table 4.2. Wood pulp commercialization timeline

Year	Pulping process	Country commercialized in
1847	Groundwood Pulping	Germany
1866	Soda Pulping	US
1867	Groundwood Pulping	US
1874	Sulfite Pulping	Sweden
1882	Sulfite Pulping	US
1885	Kraft Pulping	Sweden
1909	Kraft Pulping	US

Groundwood papers were usually unbleached. While some groundwood pulp made from hardwoods could be bleached with hypochlorite, it was not until the introduction of hydrogen peroxide as a bleaching agent in the 1941[5] that groundwood bleaching became widespread.[6] The combination of high lignin content and the complexity of the cellulose-lignin bonds made groundwood bleaching difficult.[7]

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[1] Casey, 1952, p. 946.
[2] Casey, 1952, p. 196.
[3] McGaw, 1987, pp. 202-203.
[4] Ibid.
[5] On the use of hydrogen peroxide as a bleaching agent see Section 4.5.1.
[6] Casey, 1952, pp. 250 and 296-297.
[7] Ibid., p. 295.

In 1853 Hugh Burgess and Charles Watt patented (in England) a process for breaking wood apart using chemicals rather than mechanical grinders.[1] Unable to garner interest in chemical pulping in England, Burgess immigrated to the US where he started the first chemical pulp mill in 1866 in eastern Pennsylvania.[2] Called "soda pulping," it used the alkaline chemical, sodium hydroxide, to dissolve lignin. In soda pulping the chemicals dissolve the bonds between cellulose, lignin, and hemicellulose. Ideally the chemicals selectively remove lignin and other impurities, while isolating and partially purifying the individual fibers.[3]

Soda pulping, however, had many downsides. It was an expensive process because of the cost of chemicals.[4] It could pulp hardwoods, but not softwoods. The resins[5] in softwoods make separating cellulose from lignin and hemicellulose without severe damage to the cellulose very difficult.[6] Even with the hardwoods, soda pulping degraded the cellulose fibers when dissolving the lignin-cellulose bond. The result was short, weak fibers that produced weak paper.[7]

The pulp from soda pulping is dark brown. With a brightness level of 25-45, unbleached soda pulp could not be used in printing and writing papers.[8] The technical term for paper whiteness is "brightness," which is a measure of the reflectivity of paper.[9] The whiteness of paper is measured on a scale of 1 to 100, where the reflective property of magnesium oxide is 100.[10] The use of brightness as a measure of whiteness emerged with the rise of tree-based papers where it was originally designed "as a test to measure the effectiveness of bleaching in

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[1] Clayton, 1969, p. 348.
[2] Ibid., p. 349.
[3] Ibid., p. 348; and Casey, 1952, p. 133.
[4] Clayton, 1969, pp. 348-351.
[5] Resins are categorized in the industry as "extractives."
[6] Clayton, 1969, p. 350.
[7] Casey, 1952, pp. 66 and 159.
[8] Casey, 1952, p. 895.
[9] Ibid, p. 888.
[10] The closer to 100, the brighter the paper is. On brightness, see Paper Task Force, 1995, p. 230.

removing the yellowness of pulps."[1] Unbleached groundwood pulp, for comparison purposes, has a brightness of 55-60.[2]

Because soda pulping creates a dark brown pulp, bleaching is necessary for use in printing and writing papers. In fact, Burgess and Watt patented the soda process with a bleaching step of hypochlorite.[3] Bleaching is necessary because soda pulp contains "significant amounts (1-8%) of non-cellulosic materials," which is mostly lignin. Bleaching dissolves and whitens the lignin remaining after pulping and increases the permanence of the whiteness.[4] Initially papermakers mixed soda pulp with straw and/or rag to manufacture newsprint.[5] But after the development of sulfite pulping, it found a market niche in combination with sulfite pulp to manufacture printing and writing papers.

Carl D. Ekman first commercialized sulfite bleaching at the Bergvik Mill in Sweden in 1874. Eight years later Charles S. Wheelwright began the first commercial production of sulfite pulp in the US at the East Providence mill in Rhode Island.[6] In contrast to the alkaline process of soda pulping, sulfite pulping is an acid-based process that uses sulfur dioxide, sulfurous acid, and calcium acid sulfite to separate cellulose from lignin and hemicellulose.[7]

The sulfite process produced a medium strength paper -- greater strength than soda and mechanical pulps, but less strength than rag -- at a price cheaper than soda and rag.[8] Unbleached sulfite pulp is much brighter than unbleached soda pulp, 50-65 brightness,[9] and is easily bleached

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[1] Casey, 1952, p. 891.
[2] Ibid, p. 895.
[3] Clayton, 1969, p. 348.
[4] Casey, 1952, p. 249.
[5] Magee, 1997, p. 177; and McGaw, 1987.
[6] Britt, 1970, p. 141.
[7] Casey, 1952, p. 74.
[8] Clayton, 1969, p. 349; and Casey, 1952, p. 117.
[9] Casey, 1952, p. 895.

to a brightness of 78-80 with hypochlorite.[1] Sulfite is relatively easy to bleach because the residual lignin in sulfite is rendered partially soluble by action of sulfite cooking liquor.[2]

The downsides to sulfite pulping resulted from the use of calcium acid sulfite, which could only pulp hardwoods and could not be recovered for reuse "because of scaling problems" -- the hardening of the calcium on pipes and equipment.[3] Unable to recover the chemicals, sulfite mills discharged them directly to rivers.[4]

Because sulfite pulp produced paper with medium strength, it enabled wood to become more competitive with rag outside of the low-end paper markets. At first, bleached sulfite pulp was combined with bleached soda pulp to produce medium grade papers. The soda pulp imparted a high degree of softness, smooth surface, and high opacity.[5] As rags became more scarce, demand for paper increased, and quality of paper from wood increased, bleached sulfite and soda pulp became the principal inputs into fine printing and writing paper grades.[6] For 40 years, from the 1890s-1930s, they were the dominant inputs into fine paper grades. By the 1930s the typical furnish for book paper was "20 to 30% sulfite, and 70 to 80% soda or deinked stock."[7]

Another chemical pulp came on line in 1885 when the Munksjö soda pulp mill in Jönkoping, Sweden accidentally produced kraft pulp:

> [O]wing to an error, a digester [the tank where chemicals breakdown, "cook", the wood chips] was blown [released] before the chips were fully cooked. Instead of discarding the

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[1] Casey, 1952, p. 292.
[2] Ibid., p. 250.
[3] In the post-World War II era sulfite pulp mills moved to magnesia-based systems to facilitate chemical recovery (Libby, 1962, pp. 12-13).
[4] Britt, 1970 p. 142.
[5] See Casey, 1952, p. 159; and Clayton, 1969, p. 350. "Opacity" refers to the amount of show through with inks (Casey, 1952, p. 903). "Paper for printing should have high opacity in order to prevent show through of printing on the back of the printed sheet" (Casey, 1952, p. 1157).
[6] Clayton, 1969, p. 350.
[7] Deinked stock is recycled, wood-based paper. "Rag or high-quality chemical pulp may be added if the printed paper must stand considerable handling or folding in use or if permanence is required. ... Up to 30% filler may be added" (Casey, 1952, p. 1148).

> chips, the mill manager ordered them to be passed through a kollergang to make an inferior grade of paper. The resulting pulp made a paper which, though dark in color, was far stronger than any paper hitherto known. It was given the name *kraft*, which Swedish and also German for *strength*.[1]

Twenty-four years later kraft pulping was first introduced in the US at the Halifax Paper Company mill in Roanoke Rapids, North Carolina.[2]

Kraft (also called "sulfate") pulping, like soda pulping, uses alkaline chemicals. Yet with slight differences in chemistry[3] kraft pulping is able to cook apart the complex resins of softwoods, making it capable of pulping both softwoods and hardwoods.[4] Kraft softwood pulps make the strongest tree-based papers because softwoods have longer cellulose fibers than hardwoods (see Table 4.1). Even with some hardwoods, the gentler kraft process "shows considerable advantage over the sulphite process," producing "pulps of considerably better strength."[5]

The initial downside to kraft pulp was it defied bleaching. "Freshly made sulfate [kraft] pulp has a light brown, grayish color, but upon contact with air, it becomes oxidized to a dark brown color which is difficult to decolorize."[6] Unable to be bleached, kraft pulp was limited to packaging and wrapping paper end uses.

By the end of the 19th century wood was the dominant source of fiber in Western Europe and North America. Wood had 67% of the US fiber market by the late 1880s, while rag's share of the market was only 10%. Other fiber sources were straw, 14%, and "other" (including recycled paper), 10%.[7] Paralleling the rise of wood was the rise of hypochlorite bleaching,

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[1] Clayton, 1969, p. 349.
[2] Libby, 1962, p. 13.
[3] Sodium hydroxide, an alkaline chemical, is used in both the soda and kraft processes. Unlike soda pulping, kraft pulping uses sodium sulfide (Casey, 1952, p. 133).
[4] Libby, 1962, p. 13.
[5] Clayton, 1969, p. 351.
[6] Casey, 1952, p. 267.
[7] Totals do not equal 100% due to rounding (Magee, 1997, p. 179).

which was critical for tree-based printing and writing papers. With rag fiber, bleaching only had a modest role: extend the fiber supply to soiled and dyed rags. However, with wood pulps destined for use in printing and writing papers, bleaching with hypochlorite was essential.[1] And hypochlorite use grew much more rapidly per pound of paper made from wood because the "amount of bleach [needed for rags] is much less than that used with wood pulps."[2]

Through the end of the 19th century rag "remained very much the preferred material for writing paper as well as for the finer grades of printing paper, although some of the medium grades of printing paper and the very finest grades of newsprint had begun to use rag in combination with various proportions of straw, wood, or waste paper."[3] In comparison to wood pulps, rag pulp was of the highest quality in terms of strength, brightness, and permanence of brightness (see Table 4.3). The permanence of paper as measured by yellowing results primarily from lignin content: the more lignin in paper the faster it yellows. "Rag papers have the highest degree of permanence of the common papers, and are specified when maximum permanence is required."[4]

Rag pulp, however, was the most expensive fiber source. Among the wood pulps, sulfite was the closest competitor with rag and the combination of sulfite and soda pulps produced an acceptable medium grade printing and writing papers. Kraft pulp, which would attain market dominance in bleached papers in the 20th century, was not introduced in the US until 1909. At first it was relegated to packaging because of its dark brown color and difficulty to bleach.

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[1] Unbleached groundwood pulp was not used for printing and writing papers.
[2] Casey, 1952, p. 228.
[3] Magee, 1997, p. 179.
[4] Casey, 1952, pp. 945-946.

By the end of the 19th century a handful of bleached paper products were on the market (see Table 4.4). With the exception of toilet paper, first introduced in 1871,[1] all the bleached paper products were either for printing or writing. The 20th century would witness a vast expansion in the number of bleached paper products.

Table 4.3. Comparison of rag and wood fiber sources at the end of the 19th century by properties important for printing and writing papers

Fiber source / pulping process	Strength	Brightness	Permanence	Yield	Cost	Markets
Rags (cotton and linen)	Highest	Medium	Highest, longest shelf-life		Most expensive	Fine and medium grade printing and writing papers
Trees / Groundwood (Mechanical)	Low	Low, acceptable for newsprint	Lowest, least stable paper	90-95%	Least expensive	Newsprint
Trees, Hardwood / Soda	Low	Medium with bleaching	Medium, more stable than groundwood, less stable than rag	45-55%	Most expensive wood fiber	Medium grade printing and writing papers in combination with sulfite pulp
Trees, Hardwood / Sulfite	Medium (stronger than soda, weaker than rag and sulfate)	Medium with bleaching	Medium, more stable than groundwood, less stable than rag	45-55%	Moderate expense -- cheaper than soda	Medium grade printing and writing papers in combination with soda pulp
Trees, Hardwood and Softwood / Kraft	High	Very Low, unusable for printing and writing papers (until 1930s)	not applicable	40-50%	Moderate expense -- cheaper than soda	Packing and wrapping papers

Sources: [2]

4.4 Advertising and innovation transform markets for white papers, 1900-1945

The decades preceding World War II witnessed the widespread growth in white papers. The number of bleached paper products on the market grew rapidly and the pulps used to manufacture them became whiter. Coated papers, first introduced in the late 19th century, became firmly established with demand from advertisers. Disposable products proliferated. And

[1] Magee, 1997, p. 202.
[2] For data on "strength" and "yield" columns see Smook (1982, p. 42); all other columns summarize material presented in the text of this chapter.

the introduction of elemental chlorine gas as a bleaching agent in the 1920s and multistage bleaching in the 1930s created whiter wood pulps.

Table 4.4. Bleached paper products, 1899

- book paper
- uncoated printing paper for use in magazines
- fine writing paper (rag paper)
- drawing paper (rag paper)
- envelopes (rag paper)
- posters
- coated paper (introduced in 1880s)
- toilet paper (introduced in 1871)

Sources: [1]

4.4.1 Advertisers Grow the Market for Coated Papers

Coated papers became a significant end use for bleached paper products. *Coated paper* is a sheet of paper with a thin layer of clay and other pigments applied to the surface to fill voids and cover fibers, "producing a surface more uniformly receptive to printing inks."[2] The development of sophisticated printing presses, the printing of black and white then color photography, and use of printed material for advertising increased demand for brighter, whiter pulps to be used as the base for coated paper.

When papermakers developed coated papers in the late 19th century they created a new grade of paper made from bleached wood pulps. Coated papers blossomed into one of the paper industry's largest end uses for bleached pulp in the 20th century.[3] And it was advertisers, through their demand for higher quality papers for ads, who spurred growth in coated paper production. Key to the demand of advertisers for coated paper was their increasing use of color in advertisements.

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[1] For historical data on paper products see: Ibid.; McGaw, 1987; and Ohanian, 1993.
[2] Bureau, 1989.
[3] Writing in the early 1950s, Casey noted that coated paper "has become one of the most important parts of the paper industry, due to the demand for better printing surfaces ..." (p. 1007).

Coated paper emerged in the 1880s in conjunction with a new printing technology, the halftone letterpress: "It is debatable which came first, the halftone printing process or coated paper, but it is certain that neither one could have been fully developed without the other. ... Coated paper ... made it possible to reproduce the finest halftone printings."[1] Superior optical and printing properties make coated paper the best medium for displaying drawings, photographs, and color images.[2]

The optical properties of brightness, gloss,[3] and opacity[4] are important to coated papers, which are primarily "printed or used for their decorative effect."[5] Brightness is a function of the pulp used to make the paper and the pigments in the coating.[6] In "most commercial papers, the layer of coating is thin enough that the raw stock determines in part the brightness of the coated paper. For this reason, it is desirable to use bright, clean [i.e., bleached] paper for coating raw stock. If light coatings are applied, the body stock should have a brightness as close as possible to that of the coating."[7] For much of the pre-World War II years, coated papers were made primarily from mixtures of bleached sulfite and soda pulps (see Table 4.5).

The printing properties of coated papers, especially ink receptivity and smoothness, make coated papers unique. The "greatest advantage of coated paper is that the coating layer furnishes a printing surface which is far more uniform in density and oil absorption than any uncoated

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[1] Ibid, p. 1007. Frederick Ives of Philadelphia and Georg Meisenbach of Munich independently, yet simultaneously, developed the earliest halftone plates for letterpress printing in the late 1870s and early 1880s. Halftone printing plates were developed to translate the tones of a photograph onto paper (Berry and Poole, 1966, pp. 253-254).
[2] Casey, 1952, p. 1007.
[3] High gloss creates one of the finest surfaces for printing. "Gloss is a measure of optical smoothness" (Ibid., p. 1117). The Champion paper mill in Hamilton, Ohio, first introduced high gloss, coated paper in the US in the late 1920s when "the mill developed the process known as cast coating which gives paper high gloss and smoothness like that of a glossy photo. The plant's Kromekote brand introduced in 1929 continues to be the market leader" (Boyer, 2001).
[4] Opacity insures the inks do not show through the paper (Casey, 1952, pp. 1117-1118). Also see footnote 5.
[5] Ibid, p. 1007.
[6] Clay and titanium dioxide were the most common pigments used to brighten coated paper throughout the 20th century (Casey, 1952, pp. 1117-1123; and Smook, 1982, p. 265).
[7] Casey, 1952, p. 1089.

paper surface."[1] Smoothness insures "better contact between the paper and the printing plate than is possible with uncoated papers."[2]

Table 4.5 Typical examples of coated paper raw stock formulas from the 1930s

Fiber	Example No. 1	Example No. 2
Bleached Sulfite	50%	25%
Bleached Soda	50%	65%
Bleached Sulfate	0%	10%

Source: [3]

At first coated papers were manufactured on a machine separate from the papermaking machine. This changed when Consolidated Papers introduced the first machine-coated, doubled-sided paper in the US in 1934.[4] "Machine-coated" means the paper is coated on the papermaking machine. "Off-machine coated printing papers" are made on a separate machine, usually at a different location.[5] Machine-coated, double-sided paper filled "the need for cheap mail-order catalogue paper which would reproduce illustrations better than standard uncoated papers."[6]

The primary end uses for coated papers in the pre-World War II era were magazines and printed advertising material,[7] including posters, in-store displays, and mail order catalogues. The demand for coated papers in magazines emerged primarily from advertisers who wanted to display their illustrations, especially their color illustrations, on the best paper. Although

[1] Ibid, p. 1160.
[2] Ibid, p. 1114.
[3] Ibid, p. 1087.
[4] Graphic Arts Monthly, 1999, p. CP15.
[5] Physically and functionally machine-coated papers are the same as off-machine-coated papers. "The only distinction between the two is the type of manufacturer that does the coating, the primary producer or the independent converter" (Noble, 1968, p. 69).
[6] Casey, 1952, p. 1008.
[7] Guthrie, 1950, p. 52.

scientific publications and book publishing houses also benefited from the introduction of coated paper, they lacked the economic clout of advertisers.

Advertisers influenced paper choices through payments for ad space. The development of low cost, high volume magazines subsidized by advertising revenues emerged in the 1870s and became firmly established by the turn of the century (see Table 4.6 for a list of prominent mass circulation magazines). Advertising revenues kept "prices down so circulation could stay up" and paid "the growing fees demanded by contributors."[1] "By 1904, magazines reaped $30 million in advertising revenues"[2] and thereafter mass circulation magazines "came to rely heavily on advertising revenues to subsidize their production."[3] A price that magazine publishers paid for advertising revenues was the use of higher cost coated paper for their ads. Eventually magazine publishers followed the lead of *Life* magazine and printed the entire magazine on coated paper. In 1937, *Life* became the first magazine to print its entire issue in full-color on machine-coated, double-sided paper.[4]

Table 4.6. Introduction of popular magazines

Year	Magazine
1857	*The Atlantic Monthly*
1867	*Harpers' Bazaar*
1868	*Vanity Fair*
1873	*McCall's*
1883	*Ladies Home Journal*
1883	*Life Magazine*
1885	*Good Housekeeping*
1886	*Cosmopolitan*
1892	*Vogue*
1893	*McClure's Magazine*
1923	*Time Magazine*
1933	*Newsweek*

Sources: [5]

[1] Waller-Zuckerman, 1989.
[2] Ibid.
[3] Ibid.
[4] Graphic Arts Monthly, 1999, p. CP15.
[5] Waller-Zuckerman, 1989; Duke University (2000); and home pages for *Time* and *Newsweek* magazines.

Advertisers were quick to use the latest printing technologies and best papers to present their ads, which increasingly used color.

> In the absence of the sales talk that had traditionally accompanied the act of buying and selling, commodities had to sell themselves. Print advertising was reformed by innovations such as enlarged size, catchwords, slogans, and even new printing techniques. Early department stores were among the first to use photogravure and chromolithography. Images transformed commodities into desirable items.[1]

And Procter & Gamble sent full color lithographic advertising prints of Ivory Soap directly from specialty printers to magazines for binding in 1896.[2]

Color images were at the top of advertisers' list of preferred images because they increased sales. Writing in 1913, Harry Hollingworth, a professor from Columbia, emphasized the economic value of color, which "is illustrated by comparative tests carried on by mail-order houses in Chicago. These tests show that a cut in color often sells as high as 15 times as much as does a plain black and white cut of the same article."[3] And coated papers provided the best reproduction of color images. By the 1940s offset printers using four-color printing presses obtained "Brilliant effects ... on coated papers, since the coating tends to keep ink on the surface of the paper where it has a greater brilliance."[4]

Innovations in color printing facilitated the introduction of color ads. Frederick E. Ives of Philadelphia commercialized the three-color half-tone letterpress[5] in 1890.[6] Three separate

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[1] This is a summary of Laermans, 1993 written by Goodwin, Ackerman, and Kiron, eds., 1997, p. 140.
[2] Duke University, 2000.
[3] Hollingworth, 1913, p. 102.
[4] Ibid, p. 1182.
[5] The half-tone process is "a photoengraving made from an image photographed through a screen having a lattice of horizontal and vertical lines and then etched so that the details of the image are reproduced in fine dots with the darker areas appearing as heavy and concentrated dots and the lighter areas as fine and diffused dots" (Merriam-Webster, 1976).
[6] Berry and Poole, 1966, p. 257.

printers simultaneously commercialized rotogravure printing in the 1890s[1] and by the 1910s rotogravure was "the process par excellence for illustrated magazines with big circulations."[2] Ira Rubel a printer in New Jersey developed offset lithography in 1904, this became the dominant printing process in the US by the 1960s.[3]

4.4.2 Disposables: product innovation increases demand for white papers

In the first three decades of the 20th century, manufacturers seeded the US with a wide range of disposable paper products made from bleached pulp, none of which were printing and writing grades. Instead they were single-use products that displaced reusable products made from different materials. Paper's competitive advantages were low cost and a material, cellulose, with the capacity to be formed into different shapes.

First came the disposable paper cup in 1908. Introduced by Lawrence Luellen through the American Water Supply Company of New England, the paper cup was designed to "dispense a pure drink of water in a new, clean, and individual drinking cup."[4] Luellen introduced the paper cup at a time when "Germ Theory, which became known to the public in the eighteen nineties ... set off a wave of public anxiety about contagion. Any public place or object was suspect."[5]

Then in rapid succession came a line of disposable sanitary and tissue products (see Table 4.7). Kimberly Clark introduced sanitary napkins under the brand name Kotex in 1920.[6] These

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[1] Rotogravure is a "photogravure process in which the impression is produced by a rotary press" (Merriam-Webster, 1976). The three printers were: Rembrandt Intaglio Printing Co. in the U.K., at C.W. Saalburg in the US, and at Angerer & Göschl in Vienna, Austria (Berry and Poole, 1966, p. 254).
[2] See Berry and Poole, 1966, p. 254; and Graphic Arts Monthly, 1999. Rotogravure was only "suitable for very long runs owing to the cost of plate-making" (Berry and Poole, 1966, pp. 263-264).
[3] Graphic Arts Monthly, 1999, p. CP28.
[4] Lafayette College Libraries, 1995.
[5] Ehrenreich and English, 1978, p. 142.
[6] Kimberly-Clark, 2002. Actually French nurses serving in World War I were the first to develop paper sanitary napkins. They used the paper wadding from bandages for the napkins (Winegar, 1993).

napkins competed with reusable flannel napkins.[1] Kimberly Clark also introduced facial tissues under the brand name Kleenex® in 1924. Invented as a "sanitary way to remove cold cream," Kleenex soon spread to many other uses,[2] most prominently nose blowing. Tissues competed with the traditional handkerchief.

Table 4.7. Introduction of disposable paper products in the US, 1870-1945

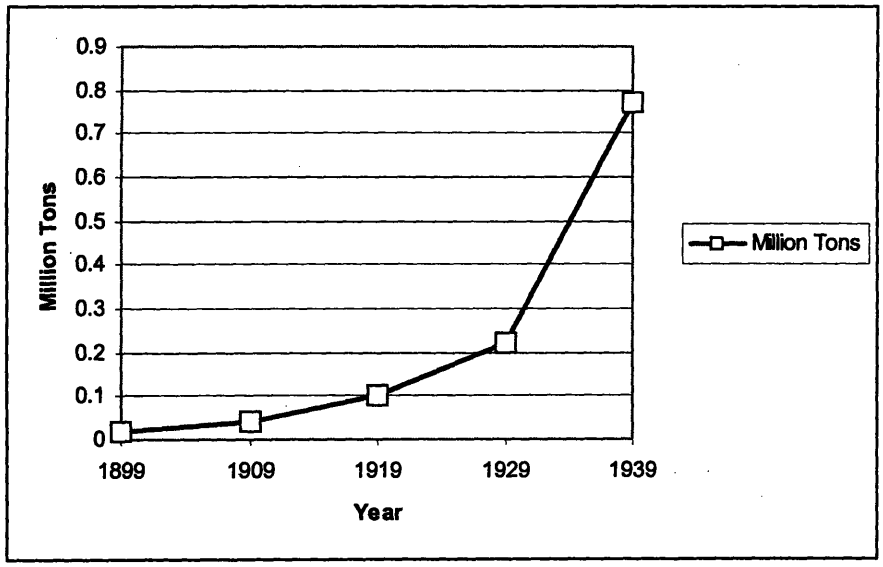
Year (introduced in US)	Disposable paper product
1871	Toilet paper
1908	Paper cups
1920	Sanitary napkins
1924	Facial tissues
1931	Kitchen towels
1933	Tampons
1930s	Ice cream cartons
1930s	Napkins
1936	Milk cartons

Disposable tissue and sanitary products spread to other reusable product lines in the 1930s. Scott Paper[3] introduced paper napkins in the 1930s and kitchen towels in 1931.[4] Tampax introduced tampons in 1933.[5] The last of the new disposable paper products introduced in the pre-World War II era were the milk carton in 1936 and ice cream cartons in the 1930s.[6] The sanitary and tissue segment of the paper industry grew the fastest of any paper segment between 1899 and 1939, growing "at an average annual rate of almost 9 percent"[7] (see Figure 4.1). Tissue and sanitary paper products were manufactured from a mix of pulps that included:

[1] Winegar, 1993.
[2] Kimberly-Clark, 2002.
[3] Kimberly-Clark acquired Scott Paper in 1995.
[4] Kimberly-Clark, 2001.
[5] Tambrands now owns Tampax Inc. (Houppert, 1995). On the year tampons were introduced, see Winegar (1993).
[6] Ennen, 1999.
[7] Ohanian, 1993, p. 15.

bleached and unbleached sulfite, groundwood pulp, and recycled papers.[1] Helping to create demand for these products were advertising campaigns that touted their convenience. For example, Tampax touted tampons with the promise of "'No belts. No pins. No pads. No chafing. No binding'"[2] (also see Section 4.5.2 for further discussion of the role of advertising in promoting disposable paper products).

Figure 4.1. Tissue and sanitary paper production, US, 1899-1939



Source: [3]

The food containers -- milk and ice cream cartons -- were initially manufactured from bleached sulfite lined manila (a type of paperboard), which entered the market in 1916.[4] In 1939, International Paper "supplied the first bleached kraft paper grades that were suitable for milk carton production."[5] The arrival of all of these products to the market increased demand for bleached pulps and, while not the subject of this paper, increased garbage because they displaced reusable products.

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[1] Guthrie, 1950, pp. 27-29.
[2] Houppert, 1995.
[3] US Bureau of the Census data as cited in Ohanian, 1993, pp. 21-22.
[4] Ennen, 1999.
[5] International Paper, 1998.

4.4.3 Producing whiter paper with elemental chlorine and multistage bleaching

With advertisers searching for brighter, whiter papers for their ads and emerging markets in sanitary products where whiteness could be associated with purity (see Section 4.5.2), pulp producers responded by tinkering with processes and chemicals to create brighter pulp. At the beginning of the 1920s, single stage hypochlorite bleaching produced sulfite pulp with 75-80 brightness and soda pulp with 78-80 brightness (see Table 4.8).

Multistage bleaching with hypochlorite was the first commercial breakthrough for increasing the whiteness of wood pulp. It was first used on sulfite pulp in 1920,[1] although paper mills first used multistage bleaching with rag stock at the beginning of the 20th century:.

> During this period of development, it was found that there were advantages in adding only part of the bleaching chemical [i.e., hypochlorite] at the beginning of the operation and the remainder later, perhaps in several portions. This led to the modern practice of multistage bleaching with intermediate washes to get rid of the products of the bleaching action. For many years this process was practiced only in the bleaching of rag pulps ...[2]

Owners of kraft pulp mills had a particular incentive for experimenting with bleaching processes. In the 1920s kraft pulp production burst upward with increasing demand for the strong boxes made from kraft pulp and expanding production in the southeast (see Figure 4.2).[3] Southeastern pulp producers turned to kraft to pulp the resinous southern pines. Initially kraft pulp mills were unable to compete in the markets for bleached papers because the preponderance of complex cellulose-lignin bonds after pulping defied bleaching to a level acceptable for printing and writing papers.[4]

The bleaching breakthrough for kraft mills was the simultaneous introduction of elemental chlorine and multistage bleaching in 1930: that year kraft pulp was first bleached to a

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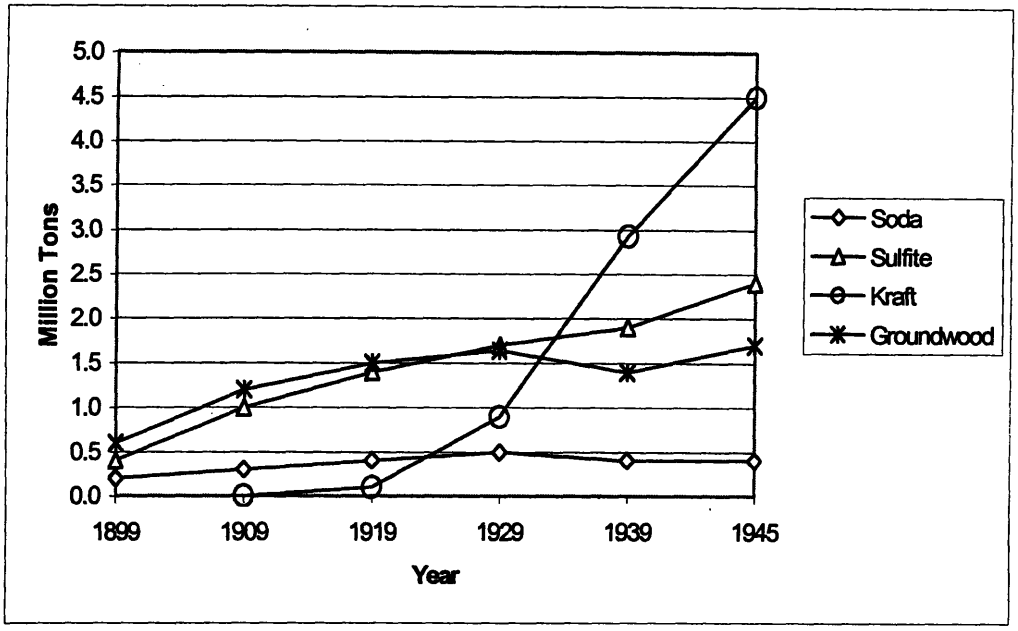
[1] Parsons, 1970, p. 266.
[2] Libby, 1962, p. 17.
[3] Ohanian, 1993.
[4] Casey, 1952, p. 288.

70 brightness, a level acceptable for medium grade printing and writing papers.[1] A few years later multistage bleaching of kraft pulps achieved 80-82 brightness. While these levels did not compare with the higher brightness achieved with sulfite pulp (see Table 4.8), the strength of kraft and the abundant sources of pine in the southeast ensured growing demand for bleached kraft pulps.

Figure 4.2. Bleached and unbleached pulp production, US, 1899-1945



Source: [2]

The typical three-stage multistage bleaching process involved: chlorine (C) bleaching, caustic soda extraction (E), and sodium hypochlorite (H) bleaching -- abbreviated CEH. The chlorine bleaching stage dissolved and discolored the residual lignin, and whitened the fiber. The caustic soda stage neutralized the pulp and enhanced the removal of dissolved lignin during washing, which occurs between each stage. And the hypochlorite stage further dissolved and

[1] Parsons, 1970, p. 266.
[2] Data 1899-1929 from US Bureau of the Census as cited in Ohanian (Ohanian, 1993, p. 21). Data 1939-1945 from US Department of Commerce, 1947.

bleached the residual lignin. "Bleaching this way is more efficient because the solubilized materials are removed before they can take up additional chlorine in side reactions."[1]

The three-stage bleaching process of CEH significantly increased the brightness of sulfite pulps, from 75-80 to 85-87 brightness (see Table 4.8). The brightness of soda pulps inched upward to 80 brightness with a two-stage process of CH. Kraft pulp gained the most from multistage bleaching. The five-stage process of CEHEH increased kraft pulp levels to 80-82 brightness. Multistage bleaching "made it possible to produce strong white papers from sulfate pulps which could not be bleached satisfactorily with straight hypochlorite."[2]

Table 4.8 Brightness of different pulps

Type of pulp	Brightness	
	Single stage hypochlorite bleaching (1920s)	Multistage bleaching with chlorine and hypochlorite (1930s-1945)
Bleached sulfite	75-80	85-87 -- 3-stage (CEH) or 4-stage (CEHH)
Bleached soda (hardwood)	78	78-80 -- 2-stage (CH)
Bleached kraft	50 (not used in printing and writing papers)	72-75 -- 3-stage (CEH) 80-82 -- 5-stage (CEHEH)
Brightness of unbleached pulps		
Unbleached sulfite	50-65 (not used in printing and writing papers)	
Unbleached kraft	25-45 (not used in printing and writing papers)	
Unbleached mechanical	55-60 (used primarily in newsprint)	

Sources: [3]

Soda pulp production in the US grew slowly but steadily before the introduction of multistage bleaching: increasing from 0.2 million tons in 1899 to 0.5 million tons in 1929 (see

[1] Casey, 1952, p. 279.
[2] Ibid.
[3] Ibid., pp. 278-294; Casey, 1952, p. 895; and Clayton, 1969, p. 352.

Figure 4.3). However, kraft pulping doomed soda pulping to obsolescence because it was vastly superior: captured more pulp per pound of tree input and produced stronger pulp at a lower cost.[1] After the introduction of multistage bleaching, soda pulping growth stopped. In the first year data are available for bleached kraft pulp production (1940), it already equaled soda production (see Figure 4.3). Bleached sulfite pulp maintained its competitive advantage over bleached kraft pulp until 1950, when another innovation in bleaching, the use of chlorine dioxide, propelled bleached kraft pulp into the leadership position (see Section 4.5.1).

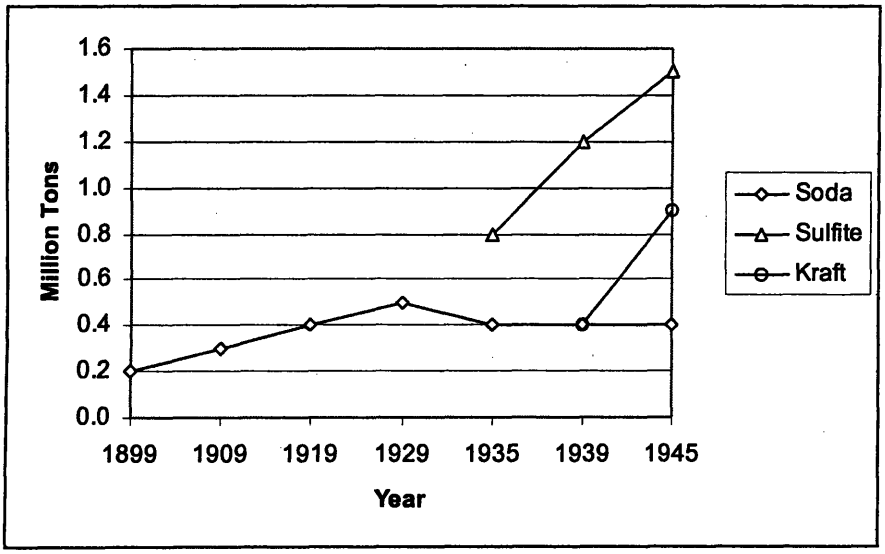
The pre-World War II era witnessed another bleaching innovation, the introduction of hydrogen peroxide as a pulp bleaching agent. While hydrogen peroxide had the greatest immediate impact upon mechanical (groundwood) pulps, it would become an important factor in the bleaching of chemical pulps at the end of the 20th century. Discovered in 1818 by Louis Thenard of France, hydrogen peroxide was first used as a bleaching agent by the textile industry in 1878 to bleach silk. It was soon applied to other fabrics and by 1926 "hydrogen peroxide became fully competitive in price to chlorine for bleaching cotton."[2] Hydrogen peroxide grew to become the dominant bleaching chemical for cotton, displacing chlorine: it accounted for 75% of cotton bleaching in 1955 and accounted for "close to 100%" by the 1990s in the US[3]

Hydrogen peroxide was slower to take root in the paper industry. The St. Regis Paper Co.'s Norfolk (Virginia) mill first used hydrogen peroxide to bleach groundwood pulp in the US in 1941.[4] Hydrogen peroxide is a more effective bleaching agent for groundwood pulps, which contain much of the lignin in trees, because it bleaches by a different mechanism. Rather than dissolving the cellulose-lignin bonds extractives it inactivates the color-producing groups (lignin

[1] Casey, 1952, p. 133
[2] Pratt, 1994, p. 24.
[3] Ibid., p. 26.
[4] O'Neil, Sarkanen, and Schuber, 1962, p. 357.

and extractives) attached to the cellulose. "For that reason" peroxide is "particularly suited for bleaching" groundwood pulp, which it brightens "without material weight reduction" (i.e., loss of pulp) and "without consuming much chemical."[1]

Figure 4.3. Bleached pulp production, US, 1899-1945



Source: [2]

4.5 White papers proliferate with advertising, disposable products, and chlorine dioxide, 1946-1969

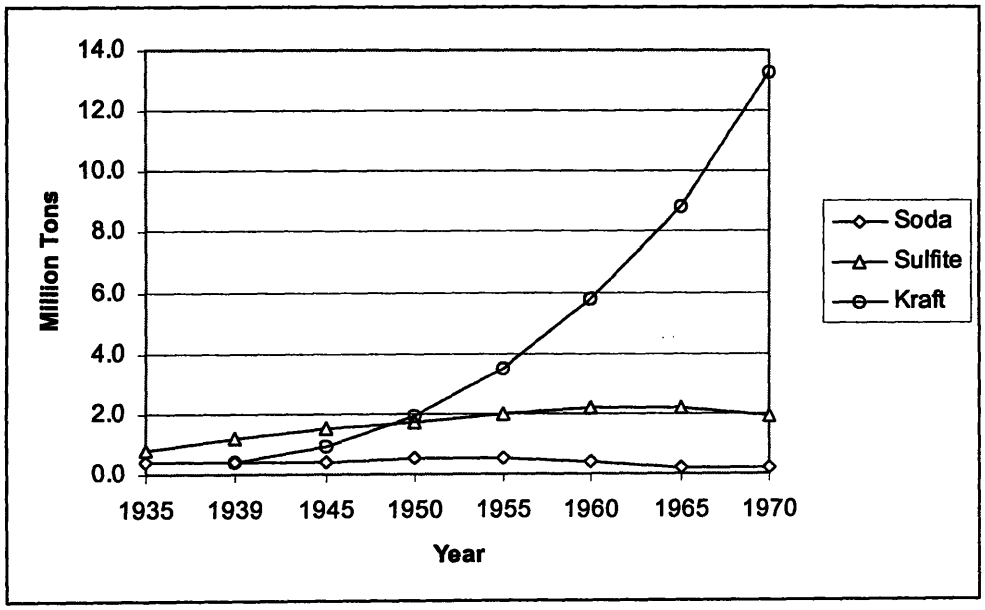
The brightness level of bleached papers sprouted upward again in the early 1950s in the US when mills started using chlorine dioxide as a bleaching agent. The increase in brightness levels of paper occurred simultaneous with growing demand for bleached papers in general and high brightness papers in particular. Advertisers again played a leading role in promoting white papers, especially for white disposable paper products; many of which were bleached only for marketing reasons.

[1] Kraft, 1969.
[2] Data for years 1899-1929 from US Bureau of the Census as cited in Ohanian (1993, p. 21). Data for years 1939-1945 from US Department of Commerce (1947).

4.5.1 Making even whiter paper with chlorine dioxide

Multistage bleaching positioned bleached kraft pulping to become the leading process in the US and across the globe. At the close of World War II bleached sulfite pulp held two slim advantages over bleached kraft pulp: it was bleached to higher brightness levels and yielded more pulp per ton of fiber input in comparison to kraft pulping. Despite these advantages, US mills continued to adopt kraft pulping because of its capacity to handle hard-to-pulp southern softwoods, superior strength, and lower production costs. The result, bleached kraft production quickly exceeded bleached sulfite production in the US During the 1940s bleached kraft production outpaced, and by the 1950s surpassed, bleached sulfite production (see Figure 4.4).

Figure 4.4. Bleached Kraft, Sulfite, and Soda Pulp Production, US, 1935-1970



Sources: [1]

In 1946 a "revolution in bleaching took place with the installation of chlorine dioxide bleaching plants ... in three mills -- one in Canada and two in Sweden."[2] Chlorine dioxide revolutionized bleaching because it significantly increased the brightness of pulp. As William H.

[1] US Department of Commerce, 1947; and American Paper Institute, 1981.
[2] Clayton, 1969, pp. 352-353.

Rapson, a leading designer of chlorine dioxide bleaching systems in North America, recalled: "In 1947 I discovered that in the last stage [of the CEH process], chlorine dioxide followed without washing by sodium hypochlorite [H] produced exceedingly white sulphite pulp. ... [The first test run] produced the whitest pulp anyone had ever seen!"[1]

Chlorine dioxide use had been hindered by its toxicity and explosiveness: it is "exploded by light, contact with mercury, contact with organic matter, or by electric spark."[2] Rapson experienced the combustibility of chlorine dioxide gas in 1946: "I stopped the air flow for one minute, hoping to improve the distribution of the concentrated sodium chlorate solution in the packing in the generating tower. When I restarted the air flow the plant exploded!"[3] Pulp mills solved the combustibility problem by manufacturing it directly from sodium chlorate onsite, in a closed system.[4] When International Paper's Natchez, Mississippi mill used chlorine dioxide in 1951, it became the first US mill to use chlorine dioxide as a bleaching agent.[5]

Chlorine dioxide produces brighter pulp than hypochlorite because it is more selective to lignin, i.e., it is more effective at removing the small amounts of lignin that remain after chlorination (the first bleaching stage) without damaging the fibers. Chlorine dioxide was not used in the first stage because it was (and still is) more expensive than chlorine (see Table 4.9). In comparing costs of bleaching agents it is important to account for the fact that bleaching power varies across chemicals, with chlorine dioxide and hydrogen peroxide being more efficient bleaching chemicals per pound of chemical than chlorine and the hypochlorites. For example, while chlorine dioxide is much more expensive than sodium hypochlorite per pound of chemical, it is cost competitive in terms of the amount of pulp bleached per pound of chemical

[1] Rapson, 1989, p. T244.
[2] Casey, 1952, p. 304.
[3] Rapson, 1989, p. T243.
[4] Ibid.
[5] Ibid., p. T244.

(see Table 4.9). Because chlorine dioxide is a more effective bleaching agent than chlorine, Douglas Andrews and William Rapson separately proposed the partial substitution[1] of chlorine dioxide for chlorine in the first bleaching stage in the 1960s.[2]

The higher cost for hydrogen peroxide limited its use largely to mechanical (groundwood) pulp mills. However, it developed a niche in the final stage of kraft bleaching because the "degree of brightness permanence obtained when peroxide is used in the final stage is better than that obtained when other bleaching agents are used in this stage."[3]

Table 4.9. Cost comparison of different bleaching agents, 1969

Bleaching agent	Cost per pound at plant ($)	Cost per pound of bleaching equivalent at plant ($)
Chlorine	3.00	1.07
Sodium hypochlorite	6.10 - 6.40	2.28
Calcium hypochlorite	2.10 - 3.80	1.34
Chlorine dioxide	15.00	2.03 - 2.54
Hydrogen peroxide	46.00	7.82

Source: [4]

In the paper industry's shorthand abbreviation of bleaching processes, "chlorine dioxide" is "D". The dominant bleaching sequences to emerge from the introduction of chlorine dioxide were CEHD in sulfite mills and CEDED in kraft mills. The CEDED process is:

1) chlorine bleaching (C)

2) alkali extraction with caustic soda (sodium hydroxide) (E)

3) chlorine dioxide bleaching (D)

4) alkali extraction with caustic soda (E)

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[1] Partial substitution means the first bleaching stage would consist of X% of chlorine and Y% of chlorine dioxide: e.g., 95% chlorine and 5% chlorine dioxide.
[2] Rapson, 1989, pp. T245-T246.
[3] Casey, 1952, p. 302.
[4] Kraft, 1969.

5) chlorine dioxide bleaching (D)

CEHD increased sulfite brightness to 90-92 and CEDED increased kraft brightness to 88-92 (see Table 4.10). CEDED became the dominant bleaching sequence for bleached kraft pulp mills in the US, Sweden, and across the globe by the 1960s.[1] After the rise of chlorine dioxide bleaching, sulfite pulp retained only one advantage over kraft pulp, better pulp yield per ton of fiber input.[2]

Table 4.10 Brightness of different pulps (US)

Type of pulp	Brightness	
	Chlorine and hypochlorite bleaching (1930s - 1949)	Chlorine and chlorine dioxide bleaching (1950-1969)
Bleached sulfite	85-87 -- CEH or CEHH	90-92 -- CEHD
Bleached kraft	72-75 -- CEH 80-82 -- CEHEH	85-87 -- CED 86-87 -- CEHD 88-92 -- CEDED

Sources: [3]

Production of bleached chemical pulps[4] grew rapidly in the post World War II economic boom: increasing from 3.1 million tons in 1946 to 14.6 million tons in 1969.[5] Bleached kraft pulp accounted for nearly the entire increase in chemical pulp production in the post World War II period. It increased from 0.9 to 12.4 million tons, while sulfite remained nearly constant, changing from 1.7 to 1.9 million tons, and soda pulp production declined from 0.5 to 0.2 million tons (see Figure 4.4). Along with the growing economy, other factors that contributed to bleached kraft pulp growth were: it displaced sulfite pulp, it continued to displace other materials

[1] In practice, bleached kraft pulp mills used many variations on this bleaching sequence, depending on the products manufactured and the history of the mill.
[2] Clayton, 1969, p. 431.
[3] Ibid., p. 352; Casey, 1952, pp. 302-306; and Casey, 1952, p. 895.
[4] The chemical pulps are kraft, sulfite, and soda pulps.
[5] US Department of Commerce, 1947; and American Paper Institute, 1981.

with the growth of white disposable products, and the rise of the photocopier contributed to greater use of paper in business and government.

4.5.2 Marketing not function demands the whitest products

In the post-World War II era marketing departments and advertising agencies in the US promoted disposable paper products by using white to symbolize purity and cleanliness. White was part of the ads. White was the color of the products themselves. And white was the color of the packaging used to contain and display the products. Producing bright, white sanitary napkins, cups, milk cartons, plates, napkins, and facial tissues required the use of bleached pulp. Yet the majority of this bleaching was unnecessary. The bleached white products resulted from the selling of the products as pure and clean rather than because the bleaching imparted unique functions to the products. Whiteness resulted from marketing not function.

The already existing association in western culture of white with cleanliness and purity[1] fit the emphasis advertisers and marketers placed on sanitary living in the post World War II era. Advertisers and marketers "hailed [women] as household engineers."[2] Product designers modeled kitchens on science laboratories to fit the message of sanitary living.[3] And advertisements sought to change the purchasing choices of middle class women:

> Consumer education had become consumer manipulation [by the 1950s]. Market researchers had discovered that the most purchase-oriented shopper is socially isolated, technologically uninformed, and insecure about her own domestic competence. It was these traits the new consumer 'educators' -- the manufacturers and admen -- sought to cultivate. The TV housewife is anxious about the brightness of her wash, the flavor of her coffee, or the luster of her floors.[4]

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[1] See section 4.1.
[2] Hine, 1986.
[3] Ibid.
[4] Ehrenreich and English, 1978, p. 164.

In this era of cleanliness and purity, white became a prominent element in advertisements. Examples abound. Sweetheart advertised its Blu-**White**[1] Flakes detergent in a daily newspaper (1953) as: "Dazzling **White**, Sparkling Bright!" (see Photograph 1.1). Woodbury advertised its soap emphasizing the purity of those who use it in *Life* magazine (1947): "'I see you in **white** satin [wedding dress] ... You'll be another Woodbury deb!'" (see Photograph 1.2). Modess, owned by Johnson & Johnson, advertised its sanitary napkins in *Good* Housekeeping (1947) with the headline: "Who would know better than the girls [nurses] in **white**?" (see Photograph 1.3).

Consistent with the image of purity and cleanliness portrayed in ads was the use of bright, white paper to manufacture and package disposable paper products. Manufacturers of disposable paper products used bleached pulps (kraft and sulfite) to whiten their tissue and sanitary products, cups, plates, and trays. Bleached kraft and sulfite were the primary pulps used in tissue and sanitary products -- toilet paper, sanitary pads, tampons,[2] diapers, towels, napkins, facial tissue -- in the 1960s, accounting for 65% of their pulp content: 36% bleached sulfite pulp and 29% bleached and semi-bleached kraft pulp.[3] Diapers were the only new tissue/sanitary paper product introduced in the post World War II era.[4] Bleached kraft pulp was also the principal

[1] The bolding and underlining of "white" here and elsewhere in this paragraph is my emphasis.
[2] "Although tampons have been marketed since the 1930s, the real gains in consumer acceptance occurred in the 1960s when many of the old prejudices against their use disappeared. they are now [early 1970s] enjoying particularly rapid acceptance among younger women. ... [T]ampons share [of the feminine hygiene market] only increased by 2.1 percentage points between 1955 and 1960 to 16.1%. By 1971, however, their share had more than doubled to 37.3% (Noble, 1973, p. 96).
[3] Waste paper accounted for the bulk (16%) of the remaining pulp (Noble, 1968, p. 67). "Wadding" is the absorbent material in sanitary pads, tampons, and diapers.
[4] The significant new product added to the tissue/sanitary paper product line that used bleached pulp was diapers. Proctor & Gamble first introduced its disposable paper diapers, Pampers, in 1964 in St. Louis. It was not until 1969 that Pampers were available across the US (Richer, 2000). Sales of disposable began their rapid growth in the late 1960s: increasing from $50 million in 1966 to $351 million in 1971 (Noble, 1973, p. 97).

Photograph 4.1. Blu-White Flakes Detergent: 'Dazzling White, Sparkling Bright!'

Photograph 4.2. Woodbury Soap: 'I see you in white satin …'

Photograph 4.3. Johnson & Johnson, Modess Sanitary Napkins: 'Who would know better than the girls [nurses] in white?'

Who would know better than the girls in white?

101 OUT OF 120 NURSES REPORT NO CHAFING WITH NEW FREE-STRIDE MODESS

Nurses, busy nurses... bending, lifting, pushing, stretching... WHO could better judge the chafe-free comfort of a sanitary napkin?

Nurses who had suffered chafe with their regular napkin tested a new, improved napkin, *Free-Stride* Modess. *Object:* To see if it gave freedom from chafe.

Nurses' verdict: 101 out of 120 reported *no chafing with Free-Stride Modess!*

The secret of the chafe-free comfort so many nurses found in Modess lies in the clever fashioning of *napkin edges.*

Free-Stride Modess has *extra* cotton on its edges—extra *softness*—right where the cause of chafe begins.

The extra cotton also acts to direct and retain moisture *inside* the napkin, keeping the edges dry and smooth longer. And dry, smooth edges *don't* chafe!

So safe, too! Each *Free-Stride* Modess has a triple safety shield to keep you confident—free of accident fears. On sale everywhere *now.* Product of Personal Products Corporation.

Walk with comfort! Try the new Free-Stride Modess!

August 1947 Good Housekeeping 169

input into the manufacture of cups, plates, and trays. These products are manufactured from bleached paperboard,[163] which by definition contains at least 80% virgin bleached kraft pulp.[164]

Production of bleached disposable paper products totaled over four million tons in 1969 (see Table 4.11). With bleach pulp content totaling 65% for tissue and sanitary products and 85% for cups, plates, and trays, the use of bleached pulps in disposable white products equaled almost three million tons (see Table 4.11). Thus disposable paper products, like the ads, promoted purity and cleanliness through whiteness.

Table 4.11. Tissue papers and bleached paperboard: estimated bleached chemical pulp consumption, 1969

Disposable paper product category	Production, 1969 (million tons)	Estimated bleached pulp in product category (%)	Estimated bleached pulp consumption (million tons)
Tissue and sanitary papers	3.61	65%	2.35
Cups, plates, and trays	0.70	85%	0.60
Bleached paperboard for packaging	2.86[a]	85%	2.43
Total	**7.17**		**5.38**

[a]Bleached paperboard production minus cups, plates, and tray (which are also manufactured from bleached paperboard).
Sources: [165]

According to manufacturers of sanitary and tissue products the key properties of their products are absorbency, softness, and brightness.[166] Yet the technical reality is, bleaching is relevant to only one of these properties, brightness.

Take sanitary products like diapers, sanitary napkins, and tampons. During the 1960s the absorbent material was made from bleached pulp, called wadding or fluff pulp. Could manufacturers of sanitary products have produced an absorbent layer from unbleached pulp of

[163] Bleached paperboard is also called solid bleached sulfate. "Sulfate" is another term for kraft pulp.
[164] DeKing, 1995.
[165] American Paper Institute, 1981; and US Department of Commerce, 1947.
[166] Moore, 1994.

equal performance to bleached pulp? Since the principal roles of bleaching are to remove lignin and whiten fiber, the key question is, does the presence of lignin in fluff pulp produce a less absorbent product?

The answer is "no," as the emergence of bleached chemi-thermomechanical pulping (BCTMP) indicates. In the late 1960s, a variation on groundwood (mechanical) pulping emerged, called thermomechanical pulping (TMP).[167] With the addition of a mild chemical pre-treatment process and bleaching came bleached chemi-thermomechanical pulping (BCTMP).[168] BCTMP is significantly more material efficient than bleached kraft pulping: incorporating 85-90% of a tree by weight into paper versus the 42-52% of a tree captured in bleached kraft pulping.[169]

Two manufacturers of sanitary and tissue papers, Scott Paper and Procter & Gamble, "were influential in developing grades of softwood BCTMP for absorbent products" because of it's superior absorbency capacity.[170] Since BCTMP includes most of the material in a tree including lignin,[171] lignin cannot be a barrier to absorbency. Or to state this in the negative, if the presence of lignin impeded absorbency, then BCTMP, which contains most of the lignin in the tree, would not have superior absorbency capacity.

The advantage of bleaching CTMP is it whitens the pulp. Unbleached softwood CTMP has a low brightness of 60, approximately the whiteness of newsprint, whereas softwood BCTMP has a medium brightness of 79.[172] On all other properties relevant to sanitary paper

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[167] TMP "consists of preheating wood chips in a steaming vessel" to "soften the wood's structure" (Bureau, 1989).
[168] Ibid.
[169] Cannell and Cockram, 2000.
[170] Ibid.
[171] Ibid.
[172] Ibid, Table 4.7.

products CTMP is competitive with BCTMP.[173] Yet, CTMP use is largely restricted to non-sanitary and tissue markets like newsprint and fiberboard.[174] because it lacks the brightness that manufacturers of sanitary and tissue products value.

Since the key property imparted by bleaching is brightness, the bleaching of disposable paper products serves the primary purpose of promoting sales through a false sense of cleanliness: there is no evidence that bleached white paper is any more sanitary than unbleached paper. Brown "sanitary" products would simply convey the wrong image: consumers would associate them with dirt and being unsanitary. Take the case of Johnson & Johnson, which test marketed a sanitary napkin that used peat moss as the absorbent material in the pad in the early 1990s (in Canada). "A manager at a company that makes private-label sanitary pads and napkins said consumers may spurn the product because of the dark middle layer. 'I wouldn't buy a brown sanitary napkin,' said Bonita Austin, a Wertheim Schroder & Co. analyst ... 'This is the kind of product women just don't want to take a risk on.'"[175] Ms. Austin would not buy the product because it was brown and assumed other women would not buy the brown pad because it conveyed a higher risk. The implied risk is from the brown pad, which by virtue of the color conveys images of dirt and germs. The product line, Sure & Natural Prima, is no longer on the market and to this day mainstream feminine hygiene products and diapers in the US are white.[176]

Brightness is also a critical property in the market for home tissue products: toilet paper, facial tissue, paper towels, and paper napkins. All of these products can be produced using

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[173] For example, the "bulk" of softwood CTMP is competitive with both softwood BCTMP and softwood bleached kraft pulp. Higher bulk "translates into lower fiber requirements for the same basis weight." Softwood CTMP has better bulk properties than softwood bleached kraft: 2.5 cm^3 for CTMP softwood versus 1.4 cm^3 for bleached kraft softwood. And softwood CTMP bulk competes with softwood BCTMP: 2.5 cm^3 for CTMP versus 1.9-3.0 cm^3 for BCTMP (Cannell and Cockram, 2000).

[174] Wenzel and Bradley, 1999, p. 226.1001P.

[175] Goad, 1991.

[176] The unbleached alternative for sanitary pads is reusable, unbleached cotton products. For example, a Swedish manufacturer sells "unbleached, additive-free, all-cotton tampons" under the brand Terrafemme in North America and Natracare in England (Winegar, 1993).

unbleached papers, and the preferred unbleached paper alternative that emerged in the 1990s was recycled paper:[177]

> [In] the value segment of the consumer market [i.e., institutional purchasing], most tissue companies use recycled fibre, many offering a 100% recycled fibre product. ... The so called 'away from home' tissue market, which services offices and manufacturing sites, governmental and healthcare facilities and food serving outlets, is primarily served by products manufactured from recycled fibre.[178]

Phil Fitzell, editor of New Jersey-based *Private Label* magazine, explained the reluctance of brand name producers to opt for brown, recycled pulp:

> makers of national brands have been reluctant to abandon their paper goods made with virgin pulp -- items that for years have been touted for their softness, strength or absorbency. Bringing out alternative lines could be perceived as an admission that the public was cheated with the previous brand-name goods. 'It's hard for them to switch gears,' Mr. Fitzell says.[179]

The result is the unnecessary, i.e., unnecessary from a functional standpoint, bleaching of tissue products. Between sanitary and tissue products, production of unnecessarily bleached products totaled 2.4 million tons in 1969 (see Table 4.11).

Manufacturers carried the purity-cleanliness-whiteness theme through to the packaging itself by using bleached paperboard to contain their products. Bleached white paperboard packages both conveyed a sense of purity and provided a bright, white background for displaying color graphics. With the rise of bleached kraft pulp production in the 1930s manufacturers of sanitary paper and other products increasingly used bleached paperboard to contain and display their products.

Bleached folding cartons for food products became a fast-growth market in the 1950s, especially for packaging milk, ice cream, and frozen foods. "In the fifties food cartons were

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[177] Reusable alternatives are also available for all tissue products excepting toilet paper: handkerchiefs, cloth towels or rags, and cloth napkins.
[178] Moore, 1994.
[179] Crown, 1991.

sharing in the supermarket boom and also capturing huge new markets such as milk cartons."[180] With its strength and high brightness, bleached and semi-bleached kraft became the dominant source of pulp for food cartons. By 1967 bleached and semi-bleached kraft accounted for 85% of the pulp consumed in the manufacture of bleached food cartons.[181]

Bleached paperboard, like bleached tissue papers and sanitary products, did not need to be bleached to impart strength and impermeability to liquids, the key characteristics of bleached foodboard. The strength of bleached paperboard is a function of the kraft pulping process. And the impermeability is a function of the coatings applied to the paperboard. Thus packaging milk and other food products in bleached paperboard conveyed an image of a sanitary, safe, and pure product. Important characteristics for a product that paper manufacturers and large diaries hoped would displace the clear, traditional, reusable glass milk bottle.

The strongest functional argument in favor of bleached paperboard is, it offers the best display for color graphics. Bleached folding boxboard supplied marketers with a "superior printing surface" that maximized the "visual effectiveness at the point of sale;" a property "particularly important in supermarket merchandising,"[182] where package design and shelf placement affect sales. The result, as an industry analyst wrote in the late 1960s, was folding boxboard producers increasingly upgraded "their product to whiter and brighter boards in order to meet demands for improved printing surfaces and to compete with other materials."[183]

Consumers of bleached paperboard could have used unbleached kraft paper coated with clay and a pigment such as titanium dioxide to provide a white background for printing. The challenge is producing a surface of comparable brightness that will display bright colors. No

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[180] Noble, 1968, p. 86.
[181] Ibid.
[182] Ibid., p. 92.
[183] Ibid., p. 86.

manufacturers of diary products (milk cartons, ice cream, and butter) chose this route until Ben & Jerry's began packaging its ice cream in unbleached kraft paperboard coated with clay in 1999. The clay-coated exterior provides a "smooth medium for high-resolution printing."[184] The result: "The printing process for the new cartons is the same as with the old cartons and they look identical."[185]

Even the paper bags used in retail stores like pharmacies and bakeries are often bleached. By 1969 production of bleached wrapping, bag and sack, and shipping sack papers totaled 0.556 million tons.[186] With plenty of functionally equivalent unbleached paper bags already on the market, the need for bleaching paper bags is also functionally unnecessary. Again it is used for symbolic reasons -- purity and cleanliness -- and displaying color graphics.

Similar to tissue and sanitary paper products, the bleaching of paperboard is not necessary for the functioning of the product. By 1969 production of bleached paperboard totaled 3.56 million tons.[187] With bleached paperboard containing 85% bleached/semi-bleached kraft, consumers purchased 3.03 million tons of unnecessarily bleached paperboard in 1969. Therefore between "bleached paperboard," "sanitary, tissue, and absorbent papers," and "packaging paper," 6.413 million tons of unnecessary bleaching occurred in 1969 (Table 4.12).

A common trait among many of the bleached paperboard and bleached fluff products that became firmly established in the 1950s was their disposability: they were designed as single-use, throwaway products. Paper milk cartons displaced reusable glass bottles. Paper diapers displaced reusable cotton diapers. Paper, as a low-cost, lightweight, and adaptable material, complemented the culture of disposability that emerged in the 1950s. "Convenience in

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[184] Abrams, 1998.
[185] Dairy Foods, 1999.
[186] American Paper Institute, 1981, p. 7.
[187] Ibid., p. 14.

disposability is a major service function of paper products. In the postwar period sanitary paper products have made major gains through increased use of such disposable products as towels, tissues, plates, and cups."[188]

Table 4.12. Estimated bleached chemical pulp consumption by paper and paperboard categories, 1969

Paper/Paperboard products (that contain bleached chemical pulps)	Production (million tons)	Bleached chemical pulp (%)	Bleached chemical pulp (million tons)
Total Paper + Paperboard	**25.356**		**13.463**
Total Papers	**21.796**		**10.433**
Newsprint	3.362	16	0.538
Printing and Writing Papers	5.112		3.911
Uncoated book	2.499	81	2.024
Fine writing papers	2.307	72	1.661
Cover and text papers	0.200	72	0.140
Bleached kraft envelopes	0.106	81	0.086
Sanitary, tissue, and absorbent papers	3.611	65	2.347
Bleached bristols (e.g., postcards)	1.124	72	0.809
Thin paper (e.g., cigarette papers)	0.289	72	0.208
Coated papers	3.349	56	1.340
Packaging paper (e.g., bags)	4.506	23	1.036
Special industrial papers	0.443	55	0.244
Total Bleached Paperboard	**3.560**	**85**	**3.030**
Milk Cartons	0.885		
Bleached folding cartons	1.346		
Bleached heavyweight cup	0.416		
Bleached plate, dish, and tray stock	0.282		
Bleached, other packaging uses	0.201		
Bleached linerboard	0.114		
Bleached paperboard, other uses	0.316		

Sources: [189]

The culture of disposability was neither inevitable nor a chance occurrence. Rather manufacturers, marketing departments, and advertisers cultivated disposability to increase consumption of low cost, mass-produced products. "The emerging philosophy [of a disposable

[188] Noble, 1968, p. 11.
[189] Production data: American Paper Institute, 1981. Bleached chemical pulp (%) data: Noble, 1968.

society] was most fervently and bluntly stated" by Victor Lebow "in two long articles in *The Journal of Retailing* during the mid-fifties:"[190]

> 'Our enormously productive economy ... demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfactions, our ego satisfactions, in consumption. ... We need things consumed, burned up, worn out, replaced, and discarded at an ever increasing rate.'[191]

Not only were disposable tissue/sanitary products and paperboard packaging unnecessarily bleached, many were unnecessary in the first place. Disposability and excessive bleaching grew side-by-side and were enhanced by heavy doses of advertising. Some of the products such as toilet paper are clearly necessary. The rest of the disposable paper products offer some convenience while creating consistent demand for consumption.

4.5.3 Photocopiers and offset printing stimulate demand for printing and writing papers

Printing and writing papers remained the primary end use for bleached chemical pulps in the post World War II era. By 1969, printing and writing papers consumed roughly 30% of all bleached chemical pulps, the most of any product area (see Table 4.12). The 1950s and 1960s brought a few changes that promoted increased rates of printing and writing paper consumption. When Xerox introduced the first plain paper copier in 1959,[192] it "quickly ushered in the era of convenience copying and a tremendous demand for cut-size papers."[193] Offset printing also began its period of rapid growth in the 1960s,[194] with production of uncoated offset papers increasing from 0.55 million tons in 1959 to 1.36 million tons in 1969.[195] The increasing demand for copier and printing papers gave the printing and writing paper segment "one of the highest rates of growth in the entire paper industry [in the 1950s and 1960s]. The major impetus

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[190] Packard, 1960, p. 24.
[191] Lebow as quoted by Packard, Ibid., p. 24.
[192] Graphic Arts Monthly, 1999, p. CP19.
[193] Bureau, 1990.
[194] Graphic Arts Monthly, 1999, p. CP20.
[195] American Paper Institute, 1981, pp. 6-7. Uncoated offset papers are a subset of uncoated book papers.

for this growth was the paper explosion occurring in business and industry. Office copying (15 copies or less) has grown to 60 billion copies a year and office duplicating (15 copies or more) is also rising substantially."[196]

Some degree of bleaching is necessary for wood-based printing and writing papers that have a use life of greater than a few days. An argument could be made that these papers are excessively bright and that brightness levels of 80 are sufficient for most end uses. This paper, for example, is bleached to a brightness level of 84, which is more than sufficient for its use. Yet to argue whether 80 or 84 brightness is necessary is quibbling about the edges when compared to the products that need no bleaching.

4.6 Early concerns over water use and pollution

From 1800 to 1969 the use of water in pulp and paper mills did not affect pulp bleaching. While prima facie this may seem like an odd statement, why emphasize a non-issue, I highlight it here because beginning in the 1970's water discharges did impact bleaching technology and because mills had taken limited actions to address water pollution prior to the 1970s.

Pulp and paper mills have always been concerned with having stable sources of clean water and, to a limited extent with water pollution. First, clean water is an essential resource for pulp and paper mills.

> Water is one of the most important raw materials for papermaking. It is used throughout the papermaking process to suspend or carry the fibers and to dissolve added materials. It is used as boiler feed water, for air conditioning, for cooling, for washing pulps, and for drinking purposes ... The quality of the water is particularly important in pulp washing, bleaching, sizing, and coloring of paper.[197]

[196] Noble, 1973, p. 75.
[197] Casey, 1952, p. 707.

Second, pulp and paper mills consume massive quantities of water. In 1959 US mills used an average of 57,000 gallons of water per ton of product.[198]

Concerns over water pollution, however, were slow to develop. It was not until the post World War II era, with government pressure, that mills became concerned with their pollution. Prior to then, mills freely discharged all of their wastewater directly into water bodies without any treatment. As the environmental historian, Richard Bartlett writes:

> [Downstream] communities simply endured the pollution. Not until 1924 did articles appear on the problem, 'and the evidence is that the industry at this stage spent almost all of its time in defeating antipollution legislation, rather than attempting to control it through research.' After World War II both state and federal antipollution legislation began to be passed in spite of powerful industry opposition.[199]

The paper industry responded to growing concerns over water pollution by forming the National Council for Air and Stream Improvement (NCASI) in 1943 and to regulation by moving to reduce wastewater discharges. By the 1950s most paper mills practiced "some degree of white water reuse"[200] and by the mid-1960s one-third of the industry's wastewater discharges were treated by sedimentation, aeration ponds and lagoons, or coagulation.[201] By 1969 water use had declined to 37,000 gallons per ton of product.[202]

However, waterways were still adversely affected. As a report from the Tennessee Valley Authority concluded on pollution from a North Carolina mill that flowed into Tennessee: "'before the Champion plant put any water pollution abatement equipment into operation, circa 1962, the river was a 'dead river.' Until 1970, the year the secondary water treatment equipment

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[198] NCASI, 1991, p. 5.
[199] Bartlett, 1995, p. 28.
[200] Casey, 1952, p. 436. "White water" is the water remaining from the papermaking process.
[201] Noble, 1968, p. 49.
[202] NCASI, 1991, p. 5.

was placed into operation, there were periods when, because of very low dissolved oxygen and large pH fluctuations, no life other than bacteria could have existed in the water.'"[203]

Water use, total suspended solids (TSS), and biochemical oxygen demand (BOD) were the widely acknowledged environmental problems posed by the pulp and paper industry by the late 1960s and early 1970s. In its report on pollution in the pulp and paper industry in 1973, the OECD (Organisation for Economic Co-operation and Development) emphasized these three areas of concern. Water use was of concern because the industry uses huge quantities of water. The OECD estimated that Swedish and American mills used 300 m^3/ton of paper (or 79,260 gallons/ton).[204] Depending on the available water supply a mill can seriously impact the rivers or groundwater it extracts water from. Mills located on low flow rivers have been among the first to adopt advanced water conservation and treatment technologies. For example, it was 1955 when Westvaco installed the first secondary wastewater treatment plant in the US at its Covington mill, located along the low flowing Jackson River in Virginia.[205]

TSS was of concern because "sedimented matter tends to change the nature of the bed of the water course, disturbing the bottom vegetation and reproduction of animal life."[206] Swedish and American mills averaged 13 kg of TSS/ton of paper manufactured in 1970.

BOD refers to the discharge of substances that consume oxygen when they breakdown in water. If oxygen consuming organic matter exceeds the natural purifying capacity of the water fish and plant life can die. In 1970 it was common for "the dissolved oxygen in water many miles down from a pulp or paper mill" to be "below the limits needed to maintain fish and

[203] As cited in Bartlett, 1995, p. 70.
[204] OECD, 1973.
[205] Council on Economic Priorities, 1972, p. 27.
[206] OECD, 1973, p. 15.

microscopic forms of life."[207] Laboratories calculate BOD levels based on how much oxygen the wastewater consumes over a period of five (BOD_5) to seven (BOD_7) days. BOD_5[(208)] levels for Swedish mills were 35 kg/ton of paper and for the US mills were 32 kg/ton in 1970.[209]

Another common water pollution problem from pulp mills is color. "Color" refers to the discoloration of water caused by lignin and suspended solids.[210] It is of "concern to both industry and regulatory agencies because it is a visible indicator, to the layman, of pollution."[211] Color typically is not uniformly regulated in either Sweden or the US because, as the US EPA states, it is "not of uniform national concern."[212]

Swedish mills entered the late 1960s having installed primary wastewater treatment systems to remove TSS.[213] A primary wastewater treatment system is any process, such as a settling pond, that removes suspended solids.[214] Since primary treatment systems reduce but do not eliminate TSS, the industry remained a major source of suspended solids. In 1969 Swedish mills discharged 210,000 tons of TSS,[215] as well as 630,000 metric tons of BOD_7.

Bleach plants, with their high water consumption and use of chlorine and chlorine dioxide, were major contributors to water pollution from pulp and paper mills. As an industry engineer concluded, "Bleach plant effluent frequently represents the biggest and most polluted effluent from a modern sulfate [kraft] mill."[216] Bleaching is water intensive because chemical pulps need to be thoroughly washed to remove the lignin and extractives. As early as the 1950s,

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[207] Ibid., p. 15.
[208] The "5" represents the number of days the that analysts wait before testing a sample to determine the amount of dissolved oxygen (Springer, 1986, p. 6).
[209] OECD, 1973.
[210] Springer, 1986, p.15.
[211] OECD, 1973, p. 11.
[212] US EPA, 1993, p. 7-3.
[213] Facht, 1976, p. 152.
[214] Jones, 1973, p. 304.
[215] Facht, 1976, p. 135.
[216] Edde, 1984, p. 23.

industry technicians knew that chlorine bleaching created pollution. A former professor of pulp and paper manufacturing observed in the 1950s that "Chlorine is extremely reactive and tends to combine with organic matter to form addition and substitution compounds. This means that chlorine is quickly dissipated by reaction with lignin and other materials in the paper mill system."[217] Thus, when the pulp was washed with water, the water would wash away the chlorinated lignins.

Water is central to bleaching because the pulp itself is moved through the bleaching stages in a water slurry. The concentration of pulp in water is called the "consistency" of pulp. In the chlorine bleaching stage ("C-stage") the pulp is at 3% consistency (3 parts pulp to 97 parts water).[218] The C-stage is a major source of water use because the pulp typically entered chlorination at 10% consistency, left at 10% consistency, but was chlorinated at 3% consistency. Thus "considerable process water must be both added and extracted during chlorination -- 21 m^3/ton (5,600 gal./ton)."[219] Additional uses of water during bleaching include: for washing the pulp between bleaching steps; as a solution for the bleaching chemicals, which are applied in water solutions; and for steam to heat the pulp.[220]

With pressures to address wastewater discharges, engineers first became interested in closing the water loop in bleach mills in the 1960s. With the goal of recycling bleach plant water effluent, William Rapson developed and promoted the "closed-cycle pulp mill" concept in the late 1960s and 1970s. In the closed-cycle concept Rapson sought to expand the closed water loop of pulping to including bleaching.

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[217] Casey, 1952, p. 684.
[218] Edde, 1984, p. 23.
[219] Springer, 1986, p. 160.
[220] See Edde, 1984 and Springer, 1986.

In the pulping process water enters at the last stage: pulp washing (also called brownstock washing). Pulp washing follows the "cooking" stage, where chemicals break wood apart into pulp. The cooked pulp (brownstock) is washed with water to remove the cooking chemicals (liquor) from the pulp. After washing the pulp continues on to the bleaching plant while the effluent (which includes water and pulping chemicals) is recycled (called "recovery" in the industry). Mills recover the spent liquor after pulp washing in a series of steps: 1) removing the water through evaporation; 2) regenerating the spent liquor in a chemical recovery boiler; 3) purifying what is now called "white liquor" in clarifiers and evaporators; and 4) returning the chemicals back to the cooking process.[221]

The evaporation of water from the spent liquor produces condensates, called "evaporator condensate." The evaporator condensate can be reused in pulp washing but creates odor problems from the smelly volatile compounds (such as mercaptans). The odor problems "can be solved by stripping the condensate before reuse."[222] Thus kraft mills lowered operating costs by conserving water and chemical use through recycling.

Chlorine and chlorine dioxide use, however, impeded the operation of a closed-cycle bleached kraft pulp mill. Bleaching with chlorine and chlorine dioxide forms salts, chlorides, which will damage equipment not designed to handle water flows with high salt content.[223] A particular concern with high chloride content is damage to the chemical recovery boiler, one of the most expensive pieces of equipment in a pulp mill at approximately $105 million.[224] In the closed-cycle mill chlorides would mix with the spent liquor during pulp washing, they would not be entirely removed during evaporation, and would then enter and damage the recovery boiler

[221] For descriptions of chemical recovery in kraft mills in the 1980s see Springer, 1986 or Edde, 1984.
[222] Springer, 1986, p. 124.
[223] Edde, 1984, p. 28.
[224] Albert, 1994, p. 88.

with the spent liquor. The "Accumulation of chlorides in the recovery cycle remains a serious concern because of their corrosive impact."[225]

Rapson introduced the closed-cycle bleached kraft pulp mill concept at the International Pulp Bleaching Conference in 1967. "The concept was so radical that I ... labelled it *The feasibility of recovery of bleach plant effluent to eliminate water pollution by kraft pulp mills.*"[226] Rapson and Douglas Reeve tested the closed cycle process at the Great Lakes Forest Products mill in Thunder Bay, Ontario in the 1970s. But that process quickly ended because of the difficulty of recycling the chlorination (first stage) filtrate.[227] Chlorine and chlorine dioxide are both corrosive gases. Their presence in the wastewater caused "severe corrosion" in the "recovery boiler superheater" at the Thunder Bay mill, ending the closed cycle operation.[228] An element of the closed-cycle mill did become common in the industry: "Complete countercurrent washing from the paper machine through the five-stages of bleaching, using the effluent from each stage as the wash water on the previous stage of the CEDED sequence" emerged in the 1960s.[229]

4.7 Summary

The history of bleached paper products from 1800-1969 in the US is one of constant demand for white paper. What separated the 19th and 20th centuries in terms of white paper was the 20th century demand for very white paper, as opposed to the mildly white paper used in the 19th century. The strong demand for bleaching chemicals in the pulp and paper industry began its ascendancy with the transition to wood as the industry's primary fiber source in the second half of the 19th century. The shift to wood transformed the role of hypochlorite bleaching in the

[225] Mannisto, 1995, p. 70.
[226] Rapson, 1989, p. T245.
[227] Ibid.
[228] Reeve et al., 1983, p. 58.
[229] Rapson, 1989, p. T245.

papermaking process from an add-on stage used to increase the fiber supply to an essential stage in the manufacture of white printing and writing papers: bleaching became necessary for even moderately white printing and writing papers.

With an abundance of readily available raw material, the use of printed material as an advertising medium, and growing concerns over hygiene and the concomitant rise of disposable paper products, demand for bleached paper products, especially tissue and sanitary paper products, grew rapidly in the years between the world wars. As color became important for advertising and as advertisers promoted paper products as clean, pure, and sanitary, demand for very white paper products grew. In the years prior to and after World War II the brightness levels of paper products jumped upwards on the backs of two new bleaching chemicals: chlorine gas (elemental chlorine) and chlorine dioxide (manufactured at the mills from sodium chlorate). The combination of expanding markets for bleached paper products and the manufacture of increasingly brighter papers increased demand for bleaching chemicals.

By the 1960s bleached kraft pulp, whitened primarily with chlorine and chlorine dioxide, was the most widely used bleached pulp. The dominance of chlorine as a bleaching agent, however, would come to an end in the 1980s, when the combining of chlorine with lignin compounds in the bleaching process would be revealed as a significant source of persistent, bioaccumulative toxic chemicals. And with growing environmental concerns, the cultural association of white with cleanliness and purity would be called into question.

5 An overview of the emergence and diffusion of cleaner bleaching technologies in the Swedish and American paper industries (1970-1998)

With the emergence of national environmental regulatory programs in Sweden in the late 1960s and the US in the early 1970s came greater government scrutiny of pollution from pulp and paper manufacturers and requirements to manage that pollution. Then in the 1980s and 1990s environmental organizations pressed for dramatic environmental improvements in the manufacture of bleached paper products. This chapter begins by introducing the barriers to technology innovation and diffusion in a mature industry sector stuck in the "specific phase" of technology development. These barriers to technological change would complicate the efforts of environmentalists to transform the environmental performance of bleached paper manufacturing.

Next the chapter assesses the similarities and differences between the Swedish and American pulp and paper industries as they entered the mid-1980s; defining the technological status of the industries prior to intensive pressure from environmentalists to adopt the cleanest production technologies. Highlighted in this section are the potential implications of regulatory decisions made in the 1970s for later technology diffusion.

The third section leaps forward a decade to present the spectrum of cleaner bleached kraft production technologies that were available to manufacturers in the mid-1990s. It summarizes the technological innovations and assesses the environmental performance of the different bleaching options.

Finally the chapter closes with an assessment of the levels of cleaner production technology diffusion achieved in both nations. Ultimately this chapter raises many questions about why certain technologies diffused, others did not, as well as why the differences between Sweden and the US. The answers to these questions will be address in later chapters.

5.1 Barriers to the diffusion of innovations in bleached kraft pulp mills

When environmentalists tried to effect change in pulp bleaching in the 1980s they confronted an industry with structural impediments to adopting technology innovations. High capital costs, long amortization period for equipment, and massive production capacity militated against the quick diffusion of new technologies in bleached kraft pulp production.

The pulp and paper industry is very capital-intensive.[1] For example, the construction of a greenfield (new) bleached kraft pulp mill in Alabama cost $700 million in the early 1990s.[2] The high capital costs result from the economies of scale owners seek from their mills. Since unit costs for both capital and operation decline with increased production (up to a certain point), the largest mills -- with the capacity to produce over 1,000 metric tons of pulp per day offer -- the best returns on investment: "The 'penalty' for smaller mills is severe, and given the importance of investment return to a potential investor, the financial motivation for annual capacities in the order of 400,000 plus tonnes per year is clear."[3] The economies of paper production mean mills are growing larger or closing down. For example, in Sweden the capacity of pulp mills increased 4.9% per year and paper mills increased 5.6% per year from 1960-1993.[4]

Since pulp is a commodity product, produced in large quantities with minimal differentiation across manufacturers, and capital costs are high, the fast amortization of equipment is economically infeasible.[5] The result, mills use their equipment for as long as possible, with a typical use-life of 20 to 25 years.[6]

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[1] IIED, 1996, p. 23.
[2] Ferguson, 1992.
[3] IIED, 1996, p. 23.
[4] Ibid., p. 23.
[5] Clayton, 1969.
[6] US EPA, 1993, p. 3-4.

Large-scale production also impedes the development and adoption of technology innovations because of the challenges of scaling up from laboratory testing to full-scale production.

> The scaling of laboratory or pilot-plant experiments to full-size commercial equipment, involving as it can a 'magnification factor' [because of the high throughput of materials in a pulp mill] of anything up to 1,000 times, often runs into difficulties. New mills may face a period of months or years during which many operating problems have to be solved before pulp of the required quality is produced.[1]

As Ron Hise, technical director at Westvaco Corp.'s Covington, Virginia mill remarked, "No one in the industry wants to be first to make process change."[2] Instead, most mills closely watch the innovators and lead adopters, then decide whether to adopt a new technology.

The history of technology diffusion in the industry is replete with examples of long periods of diffusion. Virgin wood fiber, first used in the mid-19th century, did not become the dominant fiber source until the late 19th century. Kraft pulping, first introduced in Sweden in 1885, was not used in the US until 1909. It then took 40 years before kraft pulping became the dominant pulping process. Chlorine dioxide, which spread quickly for a pulp and paper innovation, was widely diffused in 15 years. First introduced in Sweden and Canada in 1946, it was not until the early 1960s that it became a standard bleaching agent in pulp mills.

Gradual, incremental change, large-scale production, high capital costs, and commodity product, are all characteristics of an industry in what the technology innovation researchers, Abernathy and Utterback (1978), call the "specific phase" of technological development. For firms in the specific phase, change is incremental because capital costs are high and an "alteration in any one attribute or process has ramifications for many others."[3] Thus when environmentalists demanded chlorine-free paper in the 1980s they confronted an industry with

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[1] Clayton, 1969, p. 430.
[2] Hise, 1995.
[3] Abernathy and Utterback, 1978, p. 41.

structural impediments to change. The high cost and slow rate of change in the industry would require environmentalists to change their typical demand of immediate change from manufacturers.

It is important to note, as emphasized by Abernathy and Utterback, that external factors are often critical to change in firms in the specific phase of development: "New products which require reorientation of corporate goals or production facilities tend to originate outside organizations devoted to a 'specific' production system."[1] Locked into their modes of production, external agitation becomes critical to innovation. Environmentalists would play this role beginning in the 1980s.

5.2 Similar yet different: bleached kraft pulp mills in Sweden and the US, circa 1985

When environmentalists demanded that pulp and paper mills eliminate organochlorine pollution in the 1980s they confronted similar, yet slightly different, mills. Similar because Swedish and American mills had the same dominant pulping process -- kraft pulping -- and bleaching chemicals -- chlorine and chlorine dioxide. Similar because bleached kraft pulp mills in both nations were mammoth facilities, with high capital costs, whose owners were reluctant to innovate. Different because a greater percentage of Swedish mills used an intermediary technology between pulping and bleaching, called "delignification," to prevent water pollution, reduce chemical use, and increase water efficiency. Different because a greater percentage of American mills invested in secondary wastewater treatment systems to control water pollution. Another important difference that would shape the pulp and paper campaigns was, Swedish mills exported a far greater proportion of their production than American mills.

[1] Ibid., p. 41.

5.2.1 Operating from the same technology base: kraft pulp bleached with chlorine and chlorine dioxide

The Swedish and American pulp and paper industries entered the late 1980s with the same dominant technology for manufacturing bleached pulp: kraft pulping with chlorine and chlorine dioxide bleaching agents. In 1985 bleached kraft pulp was the most widely manufactured pulp in Sweden, the U.S., as well as the world. At 50.2 million metric tons, bleached kraft pulp represented 36% of global pulp production and was far greater than second place mechanical pulping at 29.8 million tons (see Table 5.1). Bleached kraft pulp production

Table 5.1 Global pulp production, 1985 (million metric tons)

Pulp	All Pulps	Bleached Kraft & Sulfite	Unbleached Kraft & Sulfite	Kraft & Sulfite, Not Specified	Percent of Total Production
Kraft	86.296				61.8%
bleached		50.209			35.9%
unbleached			31.025		22.2%
not specified				5.062	3.6%
Sulfite	10.321				7.4%
bleached		5.705			4.1%
unbleached			3.891		2.8%
not specified				0.725	0.5%
Mechanical pulp	29.770				21.3%
Semi-chemical and chemi-groundwood pulp	6.882				4.9%
Other pulp	6.492				4.7%
Totals	**139.761**	**55.914**	**34.916**	**5.787**	**100%[a]**

[a]Total may not equal 100% because of rounding.
Source: PPI, 1992

represented 40% of pulp production in Sweden at 3.7 million metric tons (see Table 5.2) and 42% of pulp production in the US at 20.5 million metric tons (see Table 5.3). Together Sweden and the US manufactured 48% of global bleached kraft pulp production, with the US first at 41% of global production and Sweden fourth at 7% of global production (see Table 5.4). The

dominance of bleached rather than unbleached pulp in world markets reflected the strong demand for white paper products in developed nations.

Table 5.2 Swedish pulp production, 1985 (million metric tons)

Pulp	All Pulps	Bleached Kraft & Sulfite	Unbleached Kraft & Sulfite	Percent of Total Production
Kraft	5.830			63.9%
bleached		3.674		40.3%
unbleached			2.156	23.6%
Sulfite	0.688			7.5%
bleached		0.538		5.9%
unbleached			0.150	1.6%
Mechanical pulp	2.298			25.2%
Semi-chemical and chemi-groundwood pulp	0.263			2.9%
Other pulp	0.044			0.5%
Totals	**9.123**	**4.212**	**2.306**	**100%[a]**

[a]Total may not equal 100% because of rounding.

Source: PPI, 1992

Table 5.3 American pulp production, 1985 (million metric tons)

Pulp	All Pulps	Bleached Kraft & Sulfite	Unbleached Kraft & Sulfite	Percent of Total Production
Kraft	38.226			77.8%
bleached		20.526		41.8%
unbleached			17.700	36.0%
Sulfite	1.416			2.9%
bleached		1.238		2.5%
unbleached			0.178	0.4%
Mechanical pulp	4.763			9.7%
Semi-chemical and chemi-groundwood pulp	3.674			7.5%
Other pulp	1.065			2.2%
Totals	**49.144**	**21.764**	**17.878**	**100%[a]**

[a]Total may not equal 100% because of rounding.

Source: PPI, 1992

Table 5.4 Top ten bleached chemical pulp producing nations, 1985 (million metric tons)

Country	Total Chemical Bleached Pulp (million tons)	Bleached Kraft Pulp (million tons)	Bleached Sulfite Pulp (million tons)
United States	**21.764**	**20.526**	**1.238**
Canada	8.547	8.218	0.329
Japan	4.930	4.894	0.036
Sweden	**4.212**	**3.674**	**0.538**
Finland	3.484	3.381	0.103
USSR	2.530	1.476	1.054
Brazil	2.260	2.243	0.017
Portugal	0.997	0.889	0.108
France	0.965	0.717	0.248
Spain	0.837	0.822	0.015
All Other Nations	5.388	3.369	2.019
Total	**55.914**	**50.209**	**5.705**

Source: PPI, 1992

To bleach kraft, as well as sulfite, pulp Swedish and American mills used chlorine and chlorine dioxide. The most widely used bleaching sequence at Swedish and American bleached kraft pulp mills beginning in the mid-1960s and extending to the 1980s was CEDED:[1] with chlorine ("C") and chlorine dioxide ("D") the bleaching chemicals ("E" is the extraction stage). The American mills used 1.45 million metric tons of chlorine and 0.4 million metric tons of sodium chlorate (the feedstock for onsite production of chlorine dioxide) in 1987. And Western European mills used 0.57 million metric tons of chlorine and 0.3 million metric tons of sodium chlorate in 1987 (see Table 5.5).[2] Other bleaching chemicals used less frequently in bleached

[1] Bonifant and Ratcliffe, 1994.

[2] Since Sweden produced 33% of bleached chemical (i.e., kraft and sulfite) pulp in Western Europe in 1987, and CEDED was the dominant bleaching sequence in Sweden, a rough estimate of Swedish chlorine and sodium chlorate consumption for paper bleaching is 33% of the Western European total. Data for 1987: Swedish bleached chemical pulp production was 4.345 million tons (kraft pulp - 3.778 million tons and sulfite pulp - 0.567 million tons); and Western Europe bleached chemical pulp production was 13.328 million tons (kraft pulp - 11.085 million tons and sulfite pulp - 2.243 million tons) (PPI, 1992).

kraft pulp mills included hypochlorite,[1] oxygen, and hydrogen peroxide, with peroxide use confined primarily to mechanical pulp.[2]

Table 5.5 Chemicals consumed in pulp bleaching, Western Europe and the US (1987)

Chemical	Western Europe (1000 metric tons)	US (1000 metric tons)
Chlorine	566	1,449
Sodium chlorate[a]	302[b]	407
Hydrogen peroxide	114	33.6

[a]Mills manufacture chlorine dioxide on-site from sodium chlorate

[b]Author's estimate: in 1987 W. European consumption (for all end uses) of sodium chlorate was 360,000 metric tons. In 1990 (the latest year data are available for), the pulp bleaching accounted for 84% of all peroxide consumption in W. Europe. Thus a rough estimate of W. Europe pulp mill peroxide consumption is 360,000 x 0.84. All data from Schumacher and others, 1999.

Sources: [3]

In the 1970s, Swedish and American bleached kraft pulp mills began to diverge slightly in their technologies as they chose different paths for addressing wastewater pollution. In Sweden the principal technology for addressing water pollution was oxygen delignification, whereas in the US it was secondary wastewater treatment.

5.2.2 Introducing oxygen delignification: a pollution prevention technology

Oxygen delignification is both an extension of the pulping process and an addition to the bleaching process. It is an extension of pulping because its wastewater is used in pulp washing. It is an addition to bleaching because it removes lignin (hence "delignification") that would otherwise be removed in the bleaching process. In oxygen delignification, the addition of

[1] Hypochlorite is manufactured from chlorine on-site (Smook, 1982, p. 156) and is included in chlorine consumption.

[2] Ibid., chapter 11, "bleaching".

[3] Leder et al., 1994, pp. 733.1002U and 733.1005K (chlorine); Schumacher et al., 1999, pp. 732.1001K and 732.1002I (sodium chlorate); and Lacson, Leder, and Sasano, 2000, pp. 741.5000V and 741.5002G (hydrogen peroxide).

oxygen to the pulp causes lignin to separate from cellulose.[1] The lignin content of pulp is measured on the basis of the pulp's "kappa number." For example, the kappa number for brownstock (unbleached kraft) softwood pulp is 30-35.[2] After oxygen delignification the kappa number declines by roughly 50 percent, to 16-17.[3]

Since the role of chlorine in bleaching is to remove lignin (as well as to whiten wood fibers), delignification reduces the amount of bleaching chemical needed in the first bleaching stage. With oxygen costing less than chlorine and chlorine dioxide, oxygen delignification can reduce operating costs.[4] Swedish mills, for example, found operating costs to decline by "21 to 56 SEK [Swedish crowns] ($3.40 to $9.08) per ton, depending on the wood species (hardwood or softwood) and consistency of the pulp."[5] In comparison to bleaching without oxygen delignification, the annualized capital and operating costs ranged from a "decrease of 16 to 23 SEK ($2.59 to $3.73) per ton for MC [medium consistency oxygen delignification] softwood pulping to an increase of 25 to 41 SEK ($4.05 to $6.65) per ton for HC [high consistency] hardwood pulping."[6] Savings are common with softwood pulp because softwoods contain more lignin: bleaching a ton of softwood requires more chlorine and chlorine dioxide than bleaching a ton of hardwood.

By using oxygen delignification mills are able to cycle the wastewater through the pulping process; not containing corrosive chlorides, the wastewater from oxygen delignification can be recycled in the mill. And by reducing the amount of lignin entering the bleach plant,,

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[1] US EPA, 1993.
[2] Ibid.
[3] Ibid.
[4] Ibid., p. 4-44.
[5] Ibid., p. 4-44.
[6] Ibid., p. 4-44. "Consistency" refers to the ratio of pulp to water. Mills convey pulp as a liquid slurry. High consistency pulp contains 25-28% pulp whereas medium consistency pulp has 10-12% pulp (US EPA, 1993, p. 4-33).

oxygen delignification use translates "directly into reduction in most pollutants of concern, i.e., BOD_5, color, and organochlorines."[1]

The first commercial use of oxygen delignification anywhere in the world was in 1970. Developed as a joint venture between Kamyr AB (Swedish pulp equipment supplier),[2] L'Air Liquide (French manufacturer of oxygen), and SAPPI (South Africa Pulp and Paper Industry), oxygen was first used at the SAPPI mill in Enstra, South Africa in 1970.[3] Another team -- Sunds Defibrator (Swedish pulp equipment supplier), MoDo (Swedish pulp and paper manufacturer), and Canadian Industries Limited (oxygen supplier) -- developed a slightly different oxygen delignification system. Their system was first installed at the Chesapeake mill in West Point, Virginia in 1972 and the Munksjö Aspa Bruk mill in Sweden in 1974.[4]

Today two delignification technologies are used in bleached kraft pulp mills: oxygen delignification and extended delignification. Extended delignification, first commercialized in 1983, extends the cooking time of pulp, enabling further delignification prior to the bleaching process.[5]

5.2.3 Sweden opts for pollution prevention with oxygen delignification

In Sweden, the regulatory authorities and industry executives decided to address water pollution from pulp and paper mills primarily through in-process changes (i.e., pollution prevention) rather than end-of-pipe treatment.[6] The Koncessionsnämnden för Miljöskydd

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[1] US EPA, 1993, p. 4-47.
[2] At the time Kamyr AB was headquartered in Sweden. The company split in 1989 to Kamyr AB (based in Karlstad, Sweden) and Kamyr Inc., owned by the Finnish company Ahlstrom (Bonifant and Ratcliffe, 1994, p. 26).
[3] Ibid., p. 70.
[4] Ibid., p. 70. Bonifant and Ratcliffe stated that the Munksjö mill installed the oxygen system in 1973. But Hans Fasten, former manager of the Munksjö mill, stated that the oxygen system came on line in 1974 (Fasten, 1993).
[5] Kamyr, a Scandinavian pulp and paper supplier, developed the first extended delignification systems -- Modified Continuous Cooking and Extended Modified Continuous Cooking -- in the mid-1980s. Kamyr's first installation was a retrofit of a Finnish mill in 1983. Similar extended delignification systems are marketed by other pulp and paper suppliers, principally Beloit and Sunds Difibrator. All extended delignification installations or retrofits, with the exception the Finnish mill occurred in or after 1987 (US EPA, 1993).
[6] Facht, 1976, p. 152.

(Licensing or Franchise Board)[1] was responsible for issuing and reviewing operating permits for major stationary sources of pollution, including pulp and paper mills.[2] Although designed to operate "like a court of law",[3] the Licensing Board acted more like a mediator, hearing arguments from the mill's management and consultants, and Statens Naturvårdsverket (Swedish Environmental Protection Agency), then issuing a ruling in the form of a production permit.[4] As Nils Jirval, vice president of environmental policy at the Swedish Forest Industries Association explained, "It is a game between acting parties. Industry wants to increase production and authorities say fine, 'you need to reduce pollution.' Whatever technique reduced COD was usually fine with the EPA. Although they preferred, and industry agreed, in-process changes over treatment."[5]

The pollutant of concern to Swedish regulatory authorities was chemical oxygen demand (COD). COD is a measure of the presence of all organic substances in wastewater, the persistent as well as the biological, thereby providing a better picture of pollution reduction in the mill as compared to biochemical oxygen demand (BOD); which only measures the biologically degradable organic substances in wastewater.[6] Laboratories calculate COD differently than BOD. They use chemical techniques to "measure the amount of oxidant consumed by a waste sample using strong oxidizing agents such as potassium permanganate or dichromate."[7] The COD level for the same water sample is typically higher than the BOD level because more compounds are oxidized chemically than biologically.[8] COD "can be used to measure organic

[1] The Licensing Board was eliminated with the passage of the Swedish Environmental Code in 1999.
[2] Swedish Ministry of the Environment, 1996.
[3] OECD, 1977, p. 12.
[4] Svedberg, 1998
[5] Jirval, 1998.
[6] Nyström, 1998.
[7] Springer, 1986, p. 9.
[8] Ibid., p. 9.

matter in waste that is toxic to biological life,"[1] whereas BOD only measures the oxygen-depleting capacity of the wastewater. Swedish regulators could afford to be less concerned with BOD because many of the mills discharged directly into the Baltic Sea. Sitting on the coast meant that the mills could "solve" BOD problems through dilution; mixing polluted water with clean sea water to increase the oxygen level in the water.

The focus on pollution prevention was not a strategy regulators applied to every industry. For example, the petrochemical industry addressed its water pollution with end-of-pipe treatment.[2] The pollution management approach varied across industries depending on the outcome of negotiations between regulators and industry executives.[3] But, as Staffan Lagergren of the Swedish Environmental Protection Agency (SEPA) recalled, paper industry executives supported in-process change over secondary wastewater treatment because it was "most cost-effective. They could get something back for their investment."[4]

Typically permit renewal was a consensual process among regulatory authorities and mill management. "We have a very friendly attitude with government," Nils Jirval emphasized. "The authorities have not used the judges and courts to solve problems, instead we solve problems through discussion."[5] While the public hearing was an open process, Statens Naturvårdsverket (Swedish Environmental Protection Agency) was often the only counterweight to the mill perspective. NGOs, neighbors, and fisheries were seldom involved in pubic hearings until the mid-1980s.[6]

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[1] Ibid., p. 9.
[2] Lagergren, 1998
[3] Ibid.
[4] Ibid.
[5] Jirval, 1998.
[6] Nyström, 1998.

The Swedish Environmental Protection Agency (SEPA) gathered scientific and technical data for, and made recommendations to, the Licensing Board. As Staffan Lagergren, Head of the Heavy Industry Section at SEPA explained: the EPA "should know the technological solutions, what is BAT [best available technology], and give advice in written statements to the Licensing Board."[1] The Licensing Board then issued the legally binding mill permit, it did not set national standards. While the discharge levels could vary across mills, reflecting local ecological conditions and mill-specific economics, in practice they were quite similar.[2]

The most significant pollution prevention measure technology adopted by Swedish mills was oxygen delignification.[3] By the end of 1986, 73% of Swedish bleached kraft pulp mills (11 of 15 mills) had installed oxygen delignification systems.[4] A smaller percentage, 40% (6 of 15), invested in secondary wastewater treatment. [5] These mills were located inland or discharged to shallow bays where water mixing was slower and BOD concerns were greater.[6]

The investments in oxygen would position the Swedish industry to address the future concerns raised by environmentalists over organochlorine pollution from the mills. As the US EPA wrote after dioxins were discovered in mill effluent: oxygen "puts the mill on the track towards 'zero effluent pulping and chlorine-free bleaching. Should regulations or market forces require further reductions or elimination of chlorine compounds, mills that have previously installed oxygen delignification will be able to respond more rapidly."[7]

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[1] Lagergren, 1998
[2] Nyström, 1998.
[3] Other prevention measures included: dry rather than wet debarking and improvements in pulp washing through better washing techniques and the installation of filter washers and washing presses (Facht, 1976, p. 153).
[4] Södergren, 1989, p. 11; and Lagergren, 1996.
[5] Södergren, 1989, p. 11.
[6] Lagergren, 1998
[7] US EPA, 1993, p. 4-47.

5.2.4 The US opts for pollution control with secondary wastewater treatment

Under authority of the Water Pollution Control Act Amendments of 1972 the US Environmental Protection Agency (EPA) promulgated guidelines for bleached kraft paper mills in 1977.[1] The US EPA writes "guidelines" because most states are responsible for implementing the Water Pollution Control Act. In states that decide not to take responsibility, the US EPA implements the law. The principal pollutants of concern in the 1977 regulations were the conventional pollutants: BOD_5 and TSS.[2] The US EPA does not regulate COD. In establishing effluent guidelines the US EPA does not mandate a technology. As the US EPA explains, "effluent limitations guidelines are based upon the performance of specific technologies, but do not require the use of any specific technology."[3] While mills can use whatever technology they want to meet the guidelines, they typically use the technologies that were the basis for developing the guidelines.

Reflecting the often adversarial nature of environmental regulations in the US, the pulp and paper industry challenged the guidelines in court. "The industry's reaction to the guidelines was adverse, and legal suits were brought against the EPA under the direction of the American Paper Institute (API). All cases have been unsuccessful, and the guidelines stand as proposed."[4]

US mills responded to the regulations by investing in secondary wastewater treatment. By the 1980s, the majority of bleached kraft mills, 76 of 88 mills (86%) had either invested in secondary wastewater treatment or discharged directly to a municipal sewage treatment system.[5] Yet it was clear to industry engineers in North America that in-process changes were the most efficient means for reducing pollution, especially from bleaching operations. Writing in 1982,

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[1] US EPA, 1993, pp. 2-6 and 7-3.
[2] For example, see Ibid., pp. 5-4, 7-2 and 7-4.
[3] Ibid., p. 9-2.
[4] Springer, 1986, p. 47.
[5] US EPA, 1993, see pp. 6-46 and 8-73.

Gary Smook, a pulp and paper engineer at the British Columbia Institute of Technology, concluded in his *Handbook for Pulp and Paper Technologists* (1982) that "The most effective means of reducing and controlling mill discharges is better in-plant utilization of raw materials. ... Ultimately, the final word on abatement of bleaching effluents may be embodied in either oxygen bleaching, the closed cycle system, or displacement bleaching."[1]

Oxygen delignification, however, diffused slowly into the US market. After the Chesapeake mill first adopted oxygen delignification in 1972, only five other mills had adopted the technology by the end of 1986: Champion International, Consolidated Papers, Union Camp (2 mills), and Weyerhaeuser.[2] The lack of American investments in oxygen meant environmentalists would confront an industry unaccustomed to using pollution prevention technologies.

5.2.5 Export markets in Sweden and the US

Export markets would play a critical role in how Swedish pulp mills responded to demand for chlorine-free paper. With a small domestic economy, Swedish mills turned to exports to expand their markets. In 1985 Sweden exported one-third of its pulp production and three-quarters of its paper production (see Table 5.6).

Western European nations bought the majority, 76%, of Swedish exports in 1985. Germany led all nations, importing one-fifth of Swedish pulp exports. Other major European markets for Swedish pulp were Italy, France, the UK, and the Netherlands (see Table 5.7). Demands for chlorine-free paper from German and English environmentalists and, more importantly, consumers, would affect the investment decisions of Swedish mills in the late 1980s and early 1990s.

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[1] Smook, 1982, pp. 352-353.
[2] US EPA, 1993, p. 4-41.

Table 5.6 Swedish and American population, consumption, and exports, 1985

Population, Consumption, Exports	Sweden	USA
Population (millions)	8.3	239
Consumption rate, per capita (kg)	239	283
Pulp production (million tons)	9.1	49.1
Pulp exports (million tons)	3.0	3.4
Pulp exports (% of total production)	33%	7%
Paper production (million tons)	7.0	60.9
Paper exports (million tons)	5.3	3.2
Paper exports (% of total production)	75%	5%

Source: PPI, 1992

The US pulp and paper industry with its vast domestic market exports relatively little of its production. With 239 million people consuming 283 kg of paper (1985), the US was (and still is) the world's largest consumer of paper products. In 1985 the US exported 7% of its pulp and 5% of its paper production (see Table 5.6). Because the US is by far the world's largest producer of pulp and paper these small percentages represent large amounts: the US ranked #2 in pulp exports (just in front of #3 Sweden) and #4 in paper exports in 1985 (just behind #3 Sweden).[1] With its huge domestic market the US industry would prove invulnerable to foreign demands for chlorine-free paper. For American environmentalists, this meant they were unable to draw any leverage from foreign consumers.

[1] PPI, 1992.

Table 5.7 Significant importers of Swedish pulp, 1985

Nation	Million metric tons	Percent of Swedish Pulp Exports
Germany	0.633	21%
Italy	0.355	12%
France	0.301	10%
United Kingdom	0.274	9%
Netherlands	0.199	7%
Other Western European nations	0.538	18%
subtotal	2.300	76%
Japan	0.100	3%
All other nations	0.607	20%
Total	3.007	100%
Totals may not add up due to rounding.		

Source: PPI, 1992

5.2.6 Comparing Sweden and the US

When environmentalists in Sweden and the US demanded that mills manufacture chlorine-free paper in the late 1980s they both confronted mill owners resistant to change because of the high costs of capital and the challenges of making significant technological changes in large-scale production facilities. Yet in Sweden there were a few factors that would make bleached kraft pulp mills more receptive to demands for technological change: a regulatory approach to pollution that emphasized prevention (in-process) over control, prior industry investments in oxygen delignification, and an export-oriented industry. None of these factors individually or combined, however, would prove sufficient to prompt bleached kraft pulp mills in Sweden to manufacture chlorine-free, i.e., free of chlorine and chlorine dioxide, pulp. Other factors, as discussed in the following chapters, would prove necessary to prompt mills to manufacture chlorine-free pulp.

Conversely in the US there were factors that supported the industry's resistance to innovation, including a regulatory approach to pollution that emphasized control over prevention, prior industry investments in secondary wastewater treatment systems, and a history of adversarial relations between the paper industry and government regulators. These factors would all reinforce the American industry's resistance to chlorine-free paper. But they, as discussed in the following chapters, would not be the only reasons why the American industry successfully resisted demands to manufacture chlorine-free paper.

Table 5.8 summarizes the key similarities and differences between the Swedish and American pulp and paper industries that would be relevant to future demands for changes in chemical bleached pulps and were present prior to 1986. The presence of the differences meant that environmentalists in Sweden would begin their campaigns for changing pulp and paper bleaching with historical advantages that were absent in the US.

5.3 Spectrum of cleaner production technologies in the manufacture of bleached kraft paper circa 1995

By the mid-1990s a spectrum of cleaner bleaching technologies were in use at kraft pulp mills in Sweden, the US, and elsewhere in the world. Between 1985 and 1995 the major technological advancement in bleached kraft pulping was the development and use of ozone as a bleaching technology. Incremental bleaching changes included the substitution of chlorine dioxide for chlorine in the first bleaching stage and the use of hydrogen peroxide as an alternative bleaching agent to chlorine dioxide. Another major development in the industry was the first ever bleached kraft pulp lines that completely eliminated the use of chlorine and chlorine dioxide, relying instead upon combinations of oxygen, ozone, and/or hydrogen peroxide. The abbreviations used in the paper industry for these technologies are listed in Table 5.9. The causes of these technology developments, which are detailed in Chapters 7-10, were demands on

mills to reduce their use of water and discharge of chlorinated organic compounds (i.e., organochlorines). What follows below is a brief chronological introduction to the cleaner bleached kraft pulping technologies as well as an assessment of their performance based on environmental and cost parameters.

Table 5.8 Summary of technological, regulatory, and market similarities/differences between Swedish and American pulp and paper industries circa 1985

Factors	Sweden	US
Capital intensity	High	
Dominant **pulping technology**	Bleached kraft	
Dominant **bleaching chemicals**	Chlorine and chlorine dioxide	
Pulp exports	33%	7%
Paper exports	75%	5%
Primary **ecological concern** regarding industry wastewater	Baltic Sea	Low flow rivers
Primary **regulated water pollutants**	TSS	
	COD	BOD
Regulatory approach to pollution	Pollution prevention	Pollution control
Primary **technological solution** to pollution from bleached kraft pulp mills	Oxygen delignification: 73% of all mills	Secondary wastewater treatment: 86% of all mills
Secondary **technological solution** to pollution from bleached kraft pulp mills	Secondary wastewater treatment: 40% of all mills	Oxygen delignification: 9% of all mills
Industry-government relationship	Cooperative	Adversarial

The first major innovation to hit bleached kraft pulp mills after 1985 was the substantial substitution of chlorine dioxide for chlorine in the first bleaching stage. This came to be known as "partial substitution." A 50% substitution was written as: 50C/50D-E-D-E-D. Partial substitution expanded rapidly in the industry after dioxins were publicly acknowledged to be in mill effluent in 1987.[1] In pulp bleaching operations, what the Swedes call "bleacheries," chlorine gas reacts with organic matter in trees to create a soup of chlorinated organic chemicals,

[1] US EPA, 1993, p. 5-11.

many of which have never been identified. In fact, 80% of organically bound chlorine in mill wastewater is "not amenable to compound specific analysis because of their relatively high molecular mass and heterogeneous nature."[1] Dioxins were first discovered in the soup of organochlorines discharged by mills in 1985 in the US, although this data did not become widely known until 1987.[2]

Table 5.9 Common bleaching abbreviations

C = Chlorine gas (elemental chlorine)
D = Chlorine dioxide
E = Alkali extraction stage
E_O = Alkali extraction with oxygen
E_P = Alkali extraction with peroxide
E_{OP} = Alkali extraction with oxygen and peroxide
O = Oxygen
P = Hydrogen peroxide
Z = Ozone

Next came the complete elimination of chlorine gas. Korsnäs AB's mill in Gävle, Sweden was the first to produce bleached kraft pulp without chlorine gas in December 1988.[3] The mill completely substituted chlorine dioxide for chlorine in the first bleaching stage. At first the mill produced limited quantities of what it called chlorine-free pulp. By 1990 the mill had

[1] Berry et al., 1991, p. 45.
[2] For details, see Chapter 9.
[3] Svensk Papperstidning, 1989.

eliminated all use of chlorine gas.[1] The elimination of chlorine gas would be called elemental chlorine-free (ECF) bleaching. A typical ECF bleaching sequence is: DEDED. In Sweden, the bleaching combination of oxygen delignification and ECF was called ECF-lite:[2] An example of an ECF-lite bleaching sequence is: ODEDED.

The third innovation also emerged in Sweden. The Munksjö Aspa Bruk AB mill in Aspa Bruk, Sweden was the first to manufacture bleached kraft pulp without using chlorine and chlorine dioxide. In 1990, Munksjö began producing limited quantities of what would become known as totally chlorine-free (TCF) pulp by using oxygen and hydrogen peroxide.[3] The first, and only, full-scale production of bleached kraft TCF pulp began in 1992 at the Louisiana-Pacific mill in Samoa, California.[4]

The next major innovation was the introduction of a completely new bleaching chemical, ozone. While ozone had been tested as a bleaching technology since the 1970s, it was not used in full-scale production until 1992, when it was simultaneously introduced in Sweden and the US. The two mills were Union Camp's Franklin, Virginia mill and Södra Cell's Mönsterås Bruk.[5] An advantage of an ozone-based TCF bleaching sequence over a non-ozone-based sequence is that ozone is cheaper than peroxide. Peroxide is typically used in an ozone-based TCF sequence (e.g., OZEP), but the amount of peroxide used is much lower than if no ozone is used. The combination of ECF-lite with ozone resulted in dramatic pollutant reductions.

As manufacturers eliminated the use of both chlorine and chlorine dioxide, they increased the capacity of the mills to reuse the water, coming closer to Rapson's ideal of the closed cycle or, to use modern parlance, the totally effluent-free (TEF) bleached kraft pulp mill. For example,

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[1] Fadum, 1994.
[2] Axegård, 1998.
[3] O'Brian, 1996.
[4] Young, 1993.
[5] US EPA, 1993, pp. 4-57--4-58.

the Metsä-Rauma mill in Finland opened in 1996 using a TCF process with the goal of becoming the first TEF bleached kraft pulp mill.[1]

Table 5.10 lists the prominent bleaching sequences that emerged from the development of these new technologies. Each of these technology developments produced major reductions in pollutants from bleached kraft pulp mills, including BOD, COD, and color. When dioxins and organochlorines became pollutants of concern from bleached kraft pulp mills in the 1980s, the regulatory agencies in Sweden and the US developed a variety of techniques for measuring the presence of organochlorines in wastewater. By 1990, a standard technique emerged for measuring a class of chemicals broader than organochlorines, called adsorbable organohalogens (AOX).[2] While the AOX technique measures more than just chlorinated substances,[3] "essentially all of the halogenated organic substances measured as AOX are chlorinated compounds."[4] The new bleaching technologies were also effective at reducing AOX.

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[1] Grant, 1996.

[2] AOX is the broadest measure of organohalogens -- i.e., it captures the highest percent of these substances -- and became the standard measure for quantifying organochlorines and other halogens in Sweden in 1990 (Marine Pollution '90, p. 30). Prior to 1990, the Swedish EPA used the "total organically bound chlorine" (TOCl) technique to measure organochlorine pollution. Developed in 1981 at the Skogsindustrins Tekniska Forskningsinstitut (Swedish Pulp and Paper Research Institute), the TOCl technique was "too time consuming and complex" for routine effluent analysis (Odendahl, Weishar, and Reeve, 1990, p. 61). It was replaced by AOX, which is a simpler and cheaper technique. Other advantages of AOX over TOCl include better reproducibility, lower detection limit, and higher percentage recovery (Odendahl, Weishar, and Reeve, 1990).

[3] AOX measures organic halogenated compounds that contain chlorine, bromine, and iodine (but not fluorine) in wastewater effluent.

[4] US EPA, 1993, p. 7-11.

Table 5.10 Bleaching kraft pulps: chemicals and bleaching sequences

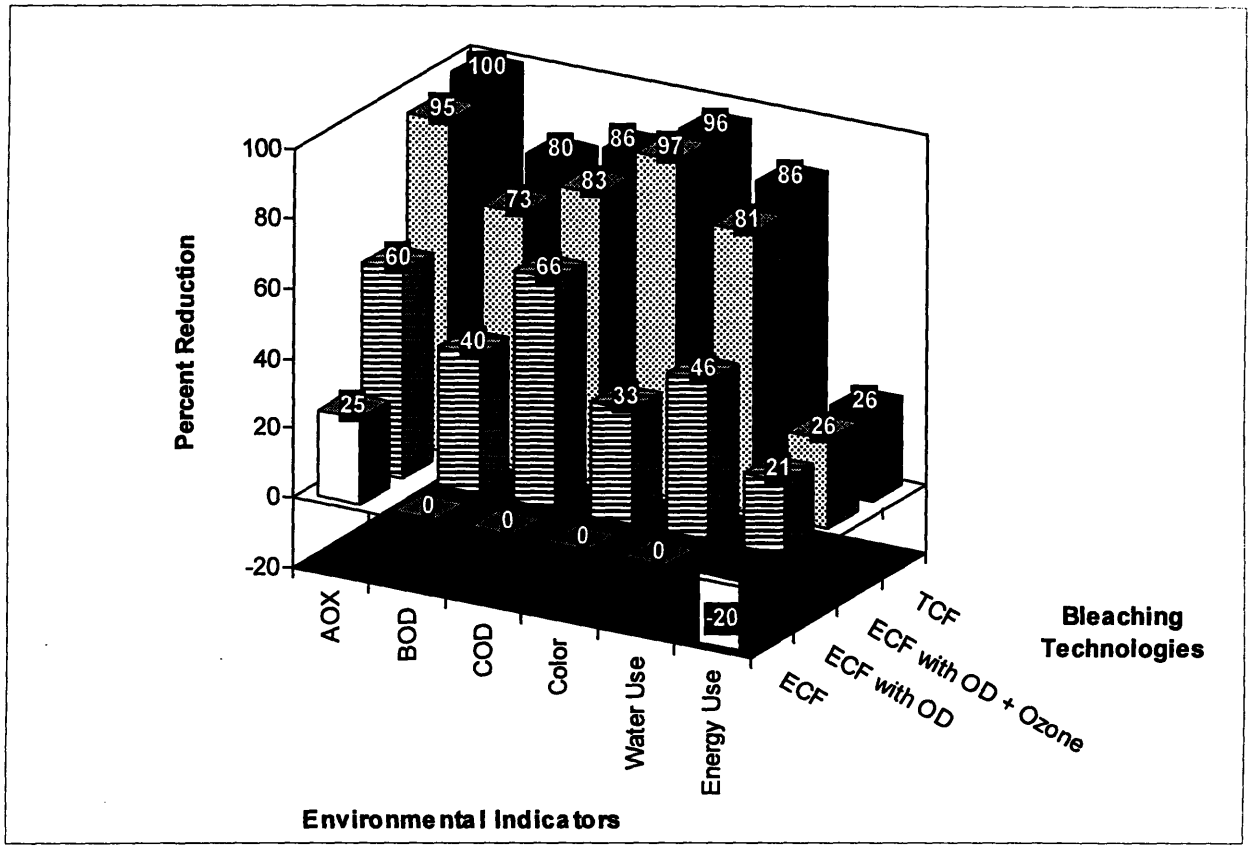
Bleaching processes	Bleaching sequences
Traditional chlorine bleaching	C-E-D-E-D
Partial substitution	50C/50D-E-D-E-D
Elemental chlorine-free (ECF) bleaching	D-E_{OP}-D-E-D
ECF with oxygen delignification (ECF-lite)	O-D-E_O-D-E-D
ECF-lite bleaching with ozone	O-Z-E_O-D
TCF bleaching	O-Z-E_{OP}-P

A report written by the Paper Task Force in 1995 documented the environmental benefits of the major new bleaching technologies and their associated bleaching sequences. The Paper Task Force, as detailed in Chapter 10, was an initiative of the environmental organization, Environmental Defense, and included the following members: Time Inc., McDonald's, Prudential Insurance, Johnson & Johnson, and Duke University. Figure 5.1 summarizes the environmental performance data compiled by the Paper Task Force for each of the different bleaching sequences in comparison to partial substitution. The columns in Figure 5.1 represent percent reductions in pollutants (AOX, BOD, COD, and color), water use, and energy use.

The dominant bleaching sequence that American pulp and paper manufacturers would adopt, ECF, was the worst environmental performer of the cleaner production technology options. It reduced AOX by 25% but increased energy use by 20% because of the greater electricity demand for chlorine dioxide. ECF-lite (oxygen delignification and ECF), the dominant technology adopted by Swedish mills, performed much better than ECF across all the environmental indicators, including reducing water use by 46% and energy use by 21%. Overall, TCF was the best environmental performer, although ECF-lite with ozone was a hair better than TCF in reducing color and comparable to TCF in terms of reduced energy use. The Paper Task Force concluded that "TCF processes may provide the most efficient route to minimum bleach

plant effluent flow by avoiding the generation of chlorides [that impede water recycling] throughout the bleaching process."[1] The data reveal a clear trajectory from dirtier to cleaner technologies as pulp mills move away from chlorine and chlorine dioxide to greater reliance on oxygen, ozone, and hydrogen peroxide.

Figure 5.1 Percent reduction of environmental indicators for four softwood bleached kraft pulp technologies (in comparison to partial substitution bleaching) (1995)



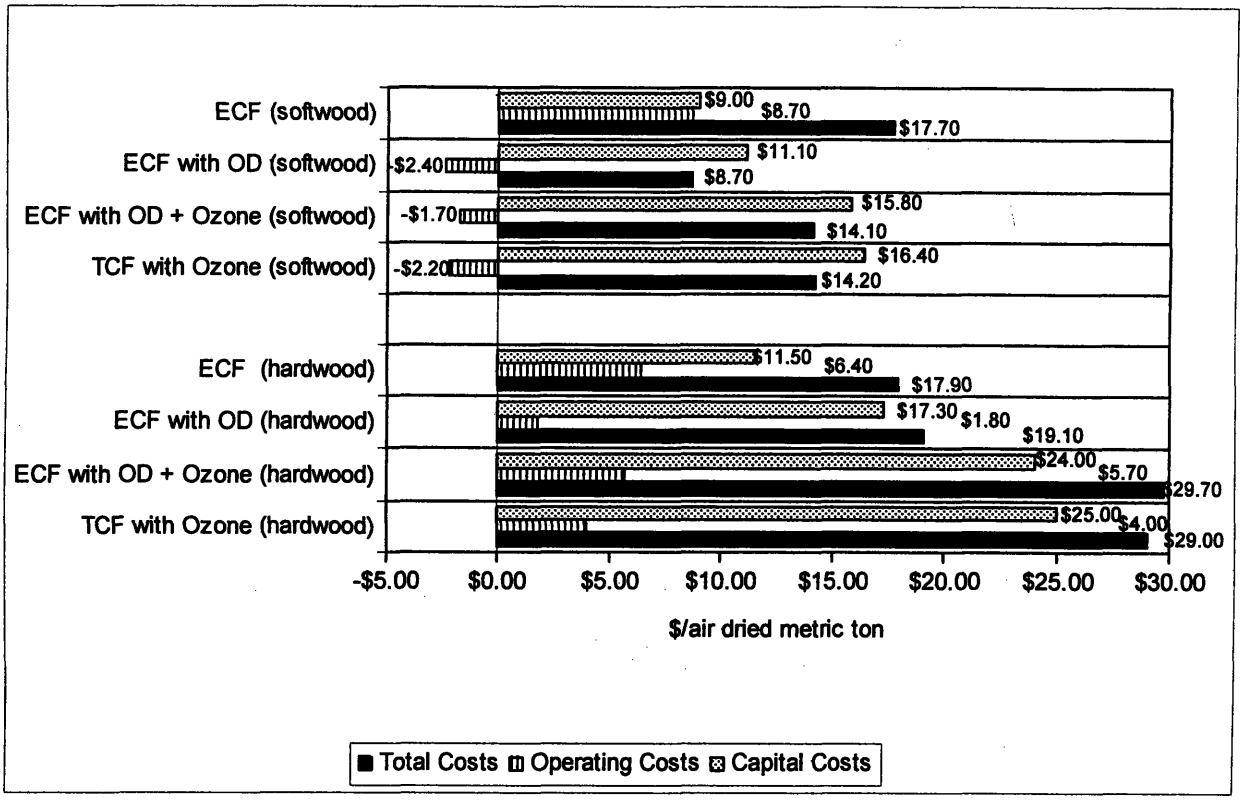
Source: Paper Task Force, 1995[2]

The Paper Task Force report also calculated the capital, operating, and total costs for each of the major kraft bleaching technologies. The task force distinguished between softwood and hardwood mills because hardwoods, which have less lignin, are easier to bleach than softwoods:

[1] Paper Task Force, 1995, p. 206.
[2] Summary of data presented on pages 194 and 195.

they require fewer bleaching chemicals to reach the same level of brightness. The most expensive technology option in terms of total costs (capital and operating costs) for softwoods was ECF, although it was the least expensive for hardwoods (see Figure 5.2).

Figure 5.2 Incremental costs for four bleaching technologies: annualized capital costs, operating costs, and total year one costs (1995)

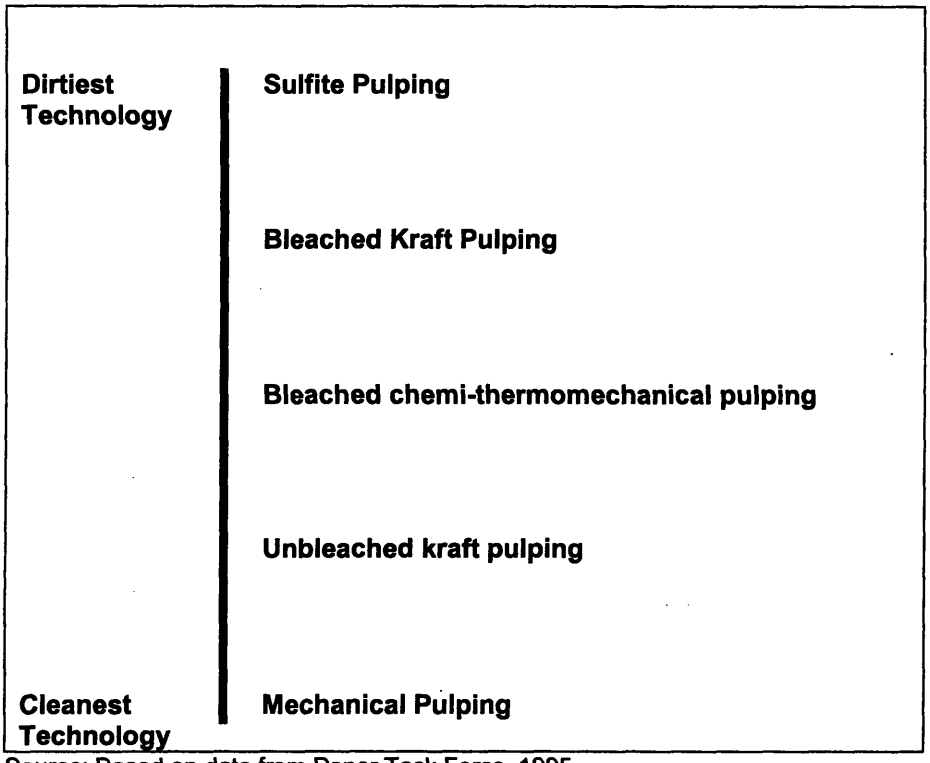


Source: Paper Task Force, 1995[1]

Even the cleanest bleached kraft pulping technologies, however, are dirtier than other pulping technologies because of the bleaching process. Figure 5.3 illustrates the spectrum of pulping technologies based on their releases of pollution to the environment and efficiency of wood use. Figure 5.3 is based upon data from the Paper Task Force report, but the report did not present the technologies in this form.

[1] Summary of data presented on page 210. It was assumed the hardwood mill would produce 500 air dried metric tons per day of pulp and the softwood mill would produce 1,000 air dried metric tons per day of pulp.

Figure 5.3 Spectrum: dirtiest-cleanest pulping technologies (1995)



Source: Based on data from Paper Task Force, 1995.

The mechanical pulping and unbleached kraft pulping processes had the least environmental impacts. Mechanical pulping had "lower releases to the environment" and used "wood resources more efficiently" than the unbleached and bleached kraft pulping processes. But mechanical pulping consumed more purchased electricity than unbleached or bleached kraft pulping.[1] Mechanical pulps are typically lightly bleached with hydrogen peroxide. Unbleached kraft pulping had "lower energy consumption and environmental releases" than bleached kraft pulps production, used "wood more efficiently than bleached kraft pulp," and produced a stronger paper.[2]

Among the bleached pulping processes, a mechanical-chemical pulp hybrid technology known as bleached chemi-thermomechanical pulp (BCTMP) had the best environmental profile.

[1] Paper Task Force, 1995, p. 197.
[2] Ibid., p. 197.

BCTMP was followed by bleached kraft pulping, with sulfite pulping having the worst environmental profile. BCTMP generated "low releases to the environment and use wood resources efficiently compared to bleached kraft pulp." The price of BCTMP was also about 13% lower than that bleached hardwood. However, BCTMP processes consumed more purchased energy.[1] "On average, sulfite pulp mills in the United States have higher air and water emissions than bleached kraft pulp mills per ton of production."[2]

5.4 Diffusion of cleaner bleached kraft pulp production technologies in Sweden and the US, circa 1998

By the late 1990s the Swedish industry had traveled further down the path of cleaner production technologies, with a far greater percentage of mills producing TCF pulp than in the US. The influence of the environmental organizations in technology diffusion varied across the two countries. In Sweden, the national environmental organizations were the principal catalysts to technology diffusion, but not in the US.

To assess the level of diffusion achieved, I used Rogers' (1995) five-part classification of innovation adopter categories: innovators, early adopters, early majority, late majority, and laggards.[3] From 1986 to 1998 the national environmental organizations in Sweden and the US worked to develop and diffuse three different types of cleaner production technologies for bleached pulp and paper products.

What follows in this section is the overall level of technology diffusion achieved in each nation, divided by the goals of the national environmental organizations. This section does not evaluate the role of environmental organizations in achieving the diffusion of the technologies; nor does it detail the organizations and their campaigns. That data is in the chapters that follow.

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[1] Ibid., p. 198.
[2] Ibid., p. 198.
[3] See Chapter 3 for details on the levels.

First, from 1986 to 1989 the Swedish Society for Nature Conservation (SSNC) promoted "environmentally friendly chlorine-reduced" paper: paper made with pulp that released 1.0 kg AOX or less per ton of pulp. Mills achieved the production of chlorine-reduced papers by decreasing elemental chlorine use and increasing the use of chlorine dioxide, oxygen, and hydrogen peroxide. By the end of 1992 the entire Swedish industry met this criterion, which was more stringent than the national regulation of 1.5 kg AOX/ton of pulp. For a listing of the innovators and early adopters see Table 5.11, column "SSNC: chlorine-reduced pulp and paper." Driven by consumer demand, which was catalyzed by the SSNC, Greenpeace Sweden, and Greenpeace Germany (Germany was the largest consumer of Swedish pulp outside of Sweden), the entire industry advanced far beyond the regulatory requirements. Also by the end of 1992, all Swedish mills had eliminated their use of chlorine gas. They were all ECF mills.

Second, the Natural Resources Defense Council (NRDC) and Environmental Defense promoted ECF-lite technology. By the mid-1990s a handful of American corporations had mills with ECF-lite capacities, including Union Camp, Champion International, and Weyerhaeuser (see Table 5.11, column "NRDC and Environmental Defense: ECF-lite"). Yet only Consolidated Papers' decision to purchase ozone bleaching technology (the combination of ECF, oxygen, and ozone was the most advanced ECF-lite technology) can be attributed to the work of Environmental Defense and Greenpeace USA. The remaining corporations purchased oxygen delignification for their mills because they saw the economic and environmental benefits of the technology. All American mills became ECF in 2001, as required by the regulation.

Third, Greenpeace Sweden, Greenpeace USA, and later the SSNC promoted TCF pulp. By 1997, 35% of Swedish bleached kraft pulp was TCF. Of the nine corporations manufacturing bleached kraft pulp in Sweden, only two did not manufacture any TCF pulp: Iggesunds Bruk and

Korsnäs. Of the remaining seven corporations, most produced a combination of TCF and ECF pulp (see Table 5.11, column "Greenpeace Sweden (and later SSNC): TCF pulp"). All ECF production in Sweden was ECF-lite by 1992.

In the US, only Louisiana Pacific produced and marketed TCF bleached kraft pulp. Louisiana Pacific made the transition to TCF as part of a consent decree with the Surfriders Foundation.

Table 5.11 The diffusion of more environmentally friendly kraft pulp bleaching technologies in Sweden and the US (1980-1998)

Levels of technology diffusion	Technology goals of national environmental organizations			
	Sweden		United States	
	SSNC	Greenpeace Sweden (and later SSNC)	Environmental Defense and NRDC	Greenpeace USA
	Goal: Chlorine-reduced pulp and paper (1.0 kg AOX/ton of pulp)	**Goal:** TCF pulp (0.0 kg AOX/ton pulp)	**Goal:** ECF-lite pulp (~0.27 kg AOX/ton of pulp)	**Goal:** TCF pulp (0.0 kg AOX/ton pulp)
Innovators	▪ Munkedals (1986) ▪ Stora (1987)	▪ Munksjö Aspa Bruk (1990) ▪ Södra Cell (1991)	▪ Union Camp (1992) ▪ Alabama Pine and Pulp (1992)	▪ Louisiana Pacific (1992)
Early adopters	▪ MoDo (1988) ▪ SCA (1988)	▪ Vallvik (1991) ▪ MoDo (1992)	▪ Pope and Talbot (1993) ▪ Champion International (1994) ▪ Weyerhaeuser (1994)	
Early majority	▪ By 1992, entire industry averages 1.0 kg AOX /ton of pulp	▪ Stora (1993) ▪ SCA (1995) ▪ AssiDoman (1995)	▪ Consolidated Papers (1996) ▪ Westvaco (1996)	
		▪ By 1997, 35% of Swedish bleached kraft pulp is TCF		
Late majority	▪ All Swedish mills are ECF-lite by end of 1993			
Laggards				

6 Roots of the pulp and paper campaigns: organochlorines in Sweden, dioxins in the US (1970-1985)

The campaigns of the Swedish and American environmental groups to change pulp bleaching in the second half of the 1980s had different roots. The Swedish campaigns of the late 1980s would grow from Göran Bryntse's campaign for unbleached paper at Miljöförbundet (Environmental Federation). In the US they would grow from campaigns to eliminate dioxin pollution, most notably from the work of Citizens Against Toxic Sprays to eliminate the spraying of dioxin-contaminated herbicides in western Oregon and from a lawsuit by the Environmental Defense Fund and National Wildlife Federation demanding that the US Environmental Protection Agency (EPA) regulate dioxins. The different roots of the bleaching campaigns would later affect the target pollutants, solutions pursued, and tactics used by environmental groups in each nation.

6.1 Swedish roots: campaigning for unbleached paper, Göran Bryntse and the Environmental Federation (1980-1985)

Svenska Naturskyddsföreningen (Swedish Society for Nature Conservation) and Greenpeace Sweden both ran pulp and paper campaigns in Sweden between 1986 and 1998. And both campaigns benefited from Göran Bryntse's early work at the Environmental Federation on behalf of unbleached paper in the early 1980s. Bryntse would in fact start the Swedish Society for Nature Conservation's (SSNC's) pulp and paper work when he moved to that organization in 1986. The information collected, the arguments developed, as well as the tactical approach employed by Bryntse at the Environmental Federation would be adopted in somewhat different forms by Greenpeace Sweden. The significant elements of Bryntse's work at the Environmental Federation were to: 1) identify water pollutants, including organochlorines, as the principal problem posed by the Swedish pulp and paper industry; 2) identify pulp mills with bleaching operations ("bleacheries") as the primary source of water pollutants in the industry; 3)

define unbleached paper as the solution to water pollution from bleacheries; 4) see consumers, as opposed to government regulators, as the primary agents that would move the industry to change; and 5) develop brochures to educate consumers on the problems and solutions to bleached paper.

6.1.1 Introducing Bryntse and the Environmental Federation

The seed for Miljöförbundet's (Environmental Federation's)[1] unbleached paper campaign was planted in the late 1970s when environmentalists campaigned for the 1980 referendum against nuclear power in Sweden.[2] In doing research on the paper industry's energy consumption, Göran Bryntse, discovered that pulp mills with bleacheries were a major source of water pollution.

> In 1977, I was appointed to a governmental commission on energy savings, which was related to the nuclear power industry in Sweden. We calculated energy use in the pulp and paper industry. In doing the research, we noticed that the bleaching of pulp used tremendous amounts of energy and had environmental problems. We presented our findings to the government commission in 1977, but they did not like our findings. They chose to consider the findings of two groups of professors who presented findings more compatible to the perspectives of the commission. We were more of an alternative group that was closer to the environmental community.[3]

Concerned with the wastewater pollution from the bleaching process and suspecting that regulatory authorities and mills would do little to reduce this pollution, Bryntse approached the Environmental Federation about starting a campaign for unbleached paper in 1980. Familiar with Bryntse through his work opposing nuclear power, members of the Federation agreed to Bryntse's idea.[1]

Established in 1976, the Environmental Federation had its roots in organizing opposition to nuclear power in the late 1970s. The Federation was established as a democratic alternative to

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[1] Earlier translations refer to "Miljöförbundet" as the "Environmental Union" (see Jamison et al., 1990, p. 46), while later translations refer to it as the "Environmental Federation" (see Lundqvist, 1997, p. 55).
[2] The referendum did not pass.
[3] Bryntse, 1998.

another union of local groups, called Miljövårdsgruppernas Riksförbund (the National Organization of Environmental Groups).[2] At the height of its popularity in the late 1970s the Environmental Federation represented 75 local groups, had 10,000 members, and was the second largest environmental NGO in Sweden.[3] However, after the defeat of the national nuclear power referendum in 1980, environmental organizations in Sweden struggled to "recover the vitality that they had displayed in the 1970s"[4] and membership in the Environmental Federation declined to a few thousand.[5] By the mid-1980s, the Federation's main issue areas were the paper industry, acid rain, toxic chemicals, and energy.[6] The Federation advanced the agenda of its member organizations through volunteers at the grassroots level, information dissemination, and protest actions.[7]

Within the Environmental Federation, Bryntse formed Pappersgruppen (Paper Group) with colleagues from Skogsindustrins Tekniksa Forskningsinstitut (STFI; translated as Swedish Pulp and Paper Research Institute).[8] All of the members of the Paper Group, including Bryntse, were volunteers. By affiliating with the Environmental Federation, Bryntse gained access to the environmental movement through the Federation's local groups and an organizational home through which he could solicit funding. And the Federation gained a campaign that required few financial and staff resources.

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[1] Bryntse et al., 1983.
[2] The National Organization of Environmental Groups was run and dominated by Björn Gillberg, which "his critics would later refer to as Gillberg's 'empire'" (Jamison et al., 1990, p. 28).
[3] The largest environmental NGO in Sweden was the Swedish Society for Nature Conservation.
[4] Jamison et al., 1990, p. 56.
[5] Membership remained in the few thousands until the mid-1990s (Lundqvist, 1997, p. 55) when the Environmental Federation merged with Friends of the Earth Sweden to become Miljöförbundet Jordens Vänner. The literal translation of Miljöförbundet Jordens Vänner is Environmental Federation / Friends of the Earth. But the organization translates it simply as Friends of the Earth Sweden (see www.mjv.se).
[6] Bryntse, 1998.
[7] Jamison et al., 1990, pp. 46-47; Lundqvist, 1997, pp. 54-56.
[8] Bryntse received his Ph.D. in paper engineering from STFI (Bryntse, 1998).

The argument that bleaching operations were a major source of organochlorine pollution was groundbreaking. No other environmental group in Sweden, or the world for that matter, advocated for reducing organochlorine pollution from bleaching operations in the early 1980s. At the time, only the pulp and paper industry, regulatory authorities, and a few research scientists were aware of the organochlorines released by the industry.

Evidence began to emerge in the late 1970s that pulp and paper mills were a major source of chlorinated organic pollutants. Questions of potential ecosystem damage from pulp and paper wastewater discharges led both the industry and the Swedish EPA (SEPA) to launch research projects. The research arm of the Swedish Forest Industries Association -- the Swedish Forest Industry Water and Air Pollution Research Foundation (SSVL) -- funded two major studies on organochlorine pollution in the late 1970s and early 1980s: SSVL-82 (1977-1981) and SSVL-85 (1980-1985).[1] The SSVL found that the least polluting bleaching sequence was oxygen delignification followed by the partial substitution (15%) of chlorine dioxide for chorine in the first bleaching stage, with secondary wastewater treatment using an aerated lagoon at the end-of-the-pipe.[2] Yet the SSVL-82 report concluded that "spent bleaching liquors posed little danger to marine life" and the SSVL-85 report supported that conclusion.[3]

SEPA began its own five-year study in 1982, called the Environment/Cellulose project, into potential environmental impacts from the pulp and paper industry.[4] Environment/Cellulose was the second of two precedent-setting projects where SEPA collected and analyzed data on potential ecological damage from industrial pollution. The first, started in 1978, was the Fish

[1] Reeve and Earl, 1989.
[2] Ibid., p. 66.
[3] Auer, 1996, p. 98.
[4] Södergren, 1989.

and Metal Pollution project on wastewater discharges from the iron and steel industry.[1] Prior to these research projects the government relied on industry-funded data of potential harm from pollution; research that seldom yielded adverse effects. As Bengt Erik Bengtsson, then staff scientist for SEPA's Laboratory for Aquatic Toxicology, highlighted: "For many years, public hearing after public hearing, industry had all the information. They had consultants that provided them with the information. These consultants did not bite the hand that fed them"[2]; i.e., they did not find evidence of adverse ecological impacts.

Along with organochlorines Bryntse highlighted other bleachery pollutants, including BOD, color, and contributing to mercury pollution through the use of chlorine manufactured using the mercury cell process.[3] The problems Bryntse, et al., associated with organochlorines were vaguely stated in the 1983 brochure: "They [organochlorines from pulp mills] do not form naturally in the environment. Some of them can cause genetic damage. Bleacheries are the source of most chlorine pollution in pulp and paper manufacturing."[4]

Bryntse sought to bring about change through consumer demand rather than government regulation because he distrusted politicians and regulatory authorities. Embarking on a campaign to educate consumers, even in a small country like Sweden, is a monumental task. Although there was a precedent for environmental consumerism:

> [T]here was a particular technical focus in the environmental movement -- a focus on chemical risks -- and thus an early interest, as well, in 'natural' products, such as 'health food' or more natural kinds of food products. Indeed it seems fair to say that the environmental movement in Sweden [during the 1970s], has been as much a consumers' movement for more natural quality consumer products as a movement out to save the environment.[5]

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[1] Bengtsson, 1985; and Bengtsson, 1998.
[2] Bengtsson, 1998.
[3] Bryntse et al., 1983.
[4] Ibid., p. 15.
[5] Jamison et al., 1990, p. 37.

Targeting consumers had two significant implications for the campaign: they needed to organize consumers to change their buying habits based on environmental concerns and to identify unbleached paper products for consumers to purchase. To organize consumers they developed educational materials (brochures) and persuaded municipalities to incorporate environmental criteria into their paper purchasing decisions.

6.1.2 Bryntse's brochures: information dissemination

Educational materials were Bryntse's campaigning trademark and fit nicely with the Environmental Federation's focus on local action. In 1980, the Paper Group wrote its first brochure, *Oblekt Papper för Miljöns Skull!* (*Unbleached Paper for the Environment's Sake*).[1] "That brochure," Bryntse recalled, "was spread within the environmental movement and we succeeded in raising awareness to the issue within the environmental movement." In 1981, we started to make our argument more extensive and expanded the four-page report of 1980 to eight pages in 1981."[2] In 1983 the Paper Group again expanded the brochure, this time to 16 pages.

> Our first big break came in 1983 when the state decided that it was the Year of the Forest Industry. The state and industry spread information about the industry throughout schools in Sweden. We argued that if the state supported spreading information developed by the forestry industry about itself, then a balanced perspective was needed and that we should have money to spread our perspective of the industry. The Department of Agriculture gave 25,000 crowns to the environmental movement to distribute its view of the industry. We doubled the size of the brochure to 16 pages and distributed 10,000 copies to an audience much broader than just the environmental movement.
>
> We spread it among friends and most importantly to local politicians in Swedish communities. Within many communities, we found friends who proposed to the local government that they use environmentally friendly paper. The issue was not one of any particular political party; we contacted people across the political spectrum, basically anyone who would listen to us.[3]

[1] Bryntse, 1980.
[2] Bryntse, 1998.
[3] Ibid.

By 1988 the original four-page brochure distributed by the Environmental Federation had become a 50-page booklet produced by the SSNC (Swedish Society for Nature Conservation, where Bryntse moved in 1986). The 1988 booklet would also serve as the foundation for Greenpeace International's, *The Greenpeace Guide to Paper* in 1990.[1] Between 1980 and 1988 three other versions of the brochure were printed (see Table 6.1).

Table 6.1. Pulp and paper brochures and booklets produced by Bryntse, et al.

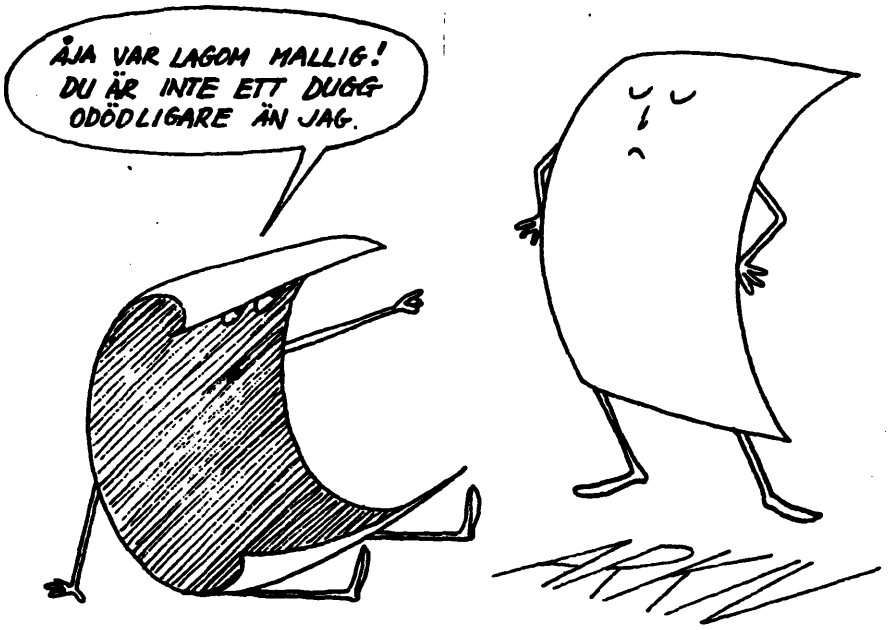
Year	Title	Number Printed	Pages	Publisher	Authors
1980	Unbleached for the Environment's Sake	not available	4	Environmental Federation	Göran Bryntse, Birgitta Johansson, Gunilla Ladberg, and Astrid Söderbergh Widding[1]
1981	Unbleached for the Environment's Sake	not available	8		
1983	Unbleached for the Environment's Sake	10,000[a]	16		
1986	Unbleached for the Environment's Sake	not available	30	Swedish Society for Nature Conservation (SSNC)	Göran Bryntse, Birgitta Johansson, and Gunilla Ladberg[2]
1988	Paper and the Environment	55,000[b]	50		

[a]Source: Bryntse, 1998.
[b]Source: Eiderström, 1998
[1]The authors were the same for these three publications and listed in the same order.
[2]The authors were the same for these two publications and listed in the same order.

In the brochures Bryntse, et al., sought to create a preference for brown rather than white paper by emphasizing how pollution results from bleaching paper and most unbleached products on the market perform just as well as bleached products. Promoting unbleached paper products meant confronting the (mis)perception that brown paper is dirty and ugly and white paper is clean and beautiful. They sought to turn the "white is better" notion on its head, explaining that the environmental reality was just the opposite, brown paper was "cleaner" than white paper. Along with information on pollutants from bleacheries the brochure included illustrations such as Figure 6.1, where the brown paper says to the white paper, "Now then, enough of your superiority! You will not live any longer than I."

[1] See the forward of *The Greenpeace Guide*: "Greenpeace gratefully acknowledges the invaluable assistance of Dr. Goeran Bryntse of Falun, Sweden. ... this booklet would not have been possible without his immense knowledge of the subject."

Figure 6.1 Cartoon from *Unbleached Paper for the Environment's Sake*



Translation: "Now then, enough of your superiority! You will not live any longer than I"

Source: Bryntse and others, 1983, p. 10

In raising the question of, "Why do we need white paper products?" the Environmental Federation challenged the right of paper manufacturers to unilaterally define the criteria for better products and challenged consumers to be more thoughtful in purchasing products. This suggested that production decisions are public rather than private decisions because they affect a public good, in this case, water quality.

6.1.3 Defining the solution: unbleached paper

The solution of Bryntse, et al., to water pollution from bleaching was simple: eliminate the bleaching step altogether and buy unbleached paper. From an environmental perspective, the logic was sound:[1] prevent water pollution from bleaching by eliminating the bleaching process altogether; thereby making paper production a two-step process -- pulping and papermaking. As a pulp and paper engineer, eliminating bleaching made sense to Bryntse because he knew that many paper products were or could be produced without bleaching and without compromising product quality. Unbleached paper towels, napkins, diapers, newsprint, toilet paper, and cardboard boxes are among the products that can perform as well as their bleached counterparts.

The brochures promoted the purchase of unbleached and low bleached paper products by listing companies manufacturing such products. For some products, including toilet paper and photocopier paper it was difficult to find 100% unbleached products. For their 1983 brochure they only identified one brand of 100% unbleached toilet paper: "MoDo's 'Spare' made with recycled paper." Whereas "'Edet Kräpp' [was] made with 60% recycled paper and 40% mixture of [virgin] sulfate and sulfite pulp, both bleached and unbleached" and KF's LENI toilet paper was "made with 80% recycled paper and 20% bleached sulfite pulp."[2]

And copy paper was the most difficult paper to find an unbleached alternative for because bleaching plays a critical role in its manufacture. Most manufacturers produced copy paper from bleached kraft pulp paper because it produced the strongest paper. Unbleached kraft paper, the color of a brown grocery sack or cardboard box, is too dark for copy paper. The combination of

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[1] And from a history of technology innovation perspective, eliminating steps in the production process is the route to dramatic efficiency gains. For example, "Each of the several production methods for making plate glass, from those of the seventeenth-century workshops at Versailles to those of the latest float glass factory, involved a combination or elimination of earlier steps, each resulting in dramatic productivity gains and lower unit costs" (Utterback, 1994, p. 116). However, as Utterback (1994) cautions, such changes do not come easily: "these giant leaps in productivity ... involve tremendous investments in research and new plant and equipment" (p. 118).

[2] Bryntse et al., 1983, p. 7.

strength and whiteness made copy paper difficult to replace with an unbleached product. In the 1983 brochure, Bryntse, et al., did their best to locate a paper that could be used in copiers, but they encountered problems:

> Designed for offset printing, Holmen Econo Book and Holmen Blade Matt can also be used for copying. However, they can cause problems in copy machines where paper heats up to a high temperature. Then the surface of coated paper changes so that print quality becomes worse. For that reason, test it before using for copying.[1]

6.1.4 Moving the market: trying to capture the purchasing power of municipalities

Bryntse's first major initiative to move the market was, asking politicians at the local level to purchase unbleached paper products.[2] While some municipalities asked their suppliers for unbleached paper, they confronted two major barriers: 1) individually their purchasing power was weak; and 2) there was no alternative for the paper products they purchased the most of: copy and writing papers.

To address the first barrier Bryntse changed his request to municipalities, asking them to write a statement to their national association -- Kommunförbundet (Swedish Association of Local Authorities) -- rather than suppliers to identify and promote the manufacture of environmentally friendly paper.

> By 1984, we had statements from 40 communities [to Kommunförbundet] asking for environmentally friendly paper. In the summer of 1985, Kommunförbundet formed an action group for communities with statements to purchase environmentally friendly paper.
> ...
> Kommunförbundet hired one-person full time to search for environmentally safe paper products for the communities. This work started in 1985 and we developed criteria [in 1986] for purchasing environmentally safe products. We called it miljövänligt, which translates as environmentally friendly.[1]

Having municipalities sign a statement to the Association of Local Authorities was a clever move. It made municipalities unofficial members of the unbleached paper campaign,

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[1] Ibid., p. 10.
[2] Bryntse, 1998.

provided the campaign with its second source of legitimacy (the first was funding from the Department of Agriculture for printing brochures[2]), increased the purchasing power of municipalities, and generated a staff position dedicated to the project. Representing 289 municipalities,[1] the Swedish Association of Local Authorities commanded much greater purchasing power than any one municipality.

The second barrier created a critical choice for the Federation and Bryntse: whether to continue advocating for unbleached paper for all products (despite the difficulty of finding alternatives for copy paper) or to accept bleached products that met certain environmental criteria (accepting the demand for strong, white paper). Environmental advocates frequently confront this type of decision: how high should they set the bar for environmental performance? If Bryntse continued to advocate for only unbleached paper it would limit the campaign's acceptance among consumers because it meant purchasing lower quality paper in the short-term (with no viable technological solution in sight in the long-term), but would maintain the environmentally superior position of promoting brown (and less polluting) paper over white paper. Bryntse opted to abandon the position of unbleached paper products for copy and writing papers (maintaining it for most other paper products) and began working on a definition of environmentally friendly paper with the Swedish Association of Local Authorities.

That decision complicated the campaign's message and its work. It changed the message from the simple "buy unbleached paper" to the vaguer, "buy environmentally friendly paper," which in turn had to be defined. It also required more detailed data on different bleaching processes, including the technologies and chemicals used, and their wastewater discharges. And it required making a decision typically associated with governmental regulatory agencies:

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[1] Ibid.
[2] See section 6.1.2 above.

deciding how to define environmentally preferable. Is environmentally friendly to be based on the technology used (such as oxygen delignification), the level of pollutants released per ton of product (e.g., 25 kg COD/ton of pulp), or is it a combination of the two?

Bryntse would address these issues after he moved to the SSNC in 1986. With Bryntse's departure the Environmental Federation lost its technical expertise and connections because the other members of the Paper Group left with him. While the Environmental Federation remained connected to the paper campaign after Bryntse's departure, it had no significant role: "Miljöförbundet," Bryntse recalled, "was still part of the campaign [in 1986], but was no longer important."[2]

6.2 American roots: grassroots and nationals groups target dioxin (1975-1985)

In the early 1970s a small environmental and consumer research group, the Council on Economic Priorities (CEP),[3] released a report that condemned the paper industry for its pollution: *Paper profits: pollution in the pulp and paper industry* (1972).[4] The research of CEP prompted one industry analyst to conclude that, "In the realm of pollution control, one of the prime targets -- perhaps the No. 1 target -- is the paper industry."[5] CEP's spotlight on the industry faded with the passage of the Federal Water Pollution Control Act Amendments in 1972 and the mills installing secondary wastewater treatment systems.

Thereafter, from the mid-1970s to 1986, no national environmental group ran a prominent campaign against pulp and paper pollution. Thus the pulp and paper initiatives of American environmental groups that emerged in the late 1980s would not have their roots in a

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[1] For more on the Association see its webpage: http://www.svekom.se/skvad/indexeng.htm.
[2] Bryntse, 1998.
[3] Formed in 1969, the Council on Economic Priorities is a small "nonprofit public service research organization dedicated to accurate and impartial analysis of the social and environmental records of corporations" (Institute for Policy Studies, 2002).
[4] Council on Economic Priorities, 1972.
[5] Jones, 1973, p. 1.

sectoral campaign targeted at the pulp and paper industry. Instead the American initiatives sprouted from chemical campaigns against dioxin pollution. The Greenpeace USA and Environmental Defense initiatives both started when they learned of dioxin pollution from pulp and paper mills in 1987. These two environmental groups would run the most prominent national campaigns targeting water pollution from American pulp and paper mills between 1987 and 1998. Two other national environmental groups -- the National Wildlife Federation (NWF) and Natural Resources Defense Council (NRDC) -- as well as a handful of state and local groups were also active in trying to effect change in the industry.

The catalyst to all the initiatives was the same: dioxins. While dioxins were common to all the initiatives, there were differences in campaigning philosophy, tactics, and goals among the organizations. Greenpeace USA would have a closer affinity to the grassroots groups campaigning against toxic pollution at the local level. Carol Van Strum, the lead author of the report that would launch Greenpeace's pulp and paper campaign (both internationally and in the US), founded a grassroots anti-toxics group in western Oregon in the 1970s. Environmental Defense, NWF, and later NRDC all entered the arena of pulp and paper pollution through legal actions against the US EPA. Their focus, at least initially, would be on attempting to reduce industry pollution through regulatory change. Environmental Defense would alter its strategic approach in the 1990s when it attempted to effect change through collaboration with major purchasers of paper products.

6.2.1 Citizens Against Toxics Sprays (CATS) launch grassroots campaign against dioxin-contaminated herbicides (1975-1981)

Carol Van Strum started the first American environmental campaign against dioxin pollution in the mid-1970s. In her words, this is how the campaign began:

> We moved here [Five Rivers, Oregon] in 1974. In the spring of 1975 the county sprayed the roadside with 2,4,5-T [2,4,5-trichlorophenoxyacetic acid]. My kids were fishing

when two guys drove by, sprayed the roadside, and doused the river and my kids as well with 2,4,5-T. My kids got really sick. I called the road department. They said, 'the chemical is perfectly safe, safe as table salt. The kids must have got the flu.' I went back to the river and saw dead fish, ducklings, and crayfish. That's when I realized I was being lied to. Then the Forest Service helicopters started spraying the ridge above our home with 2,4,5-T. That summer there were a rash of birth defects among our geese and chicken, including crossed beaks and stumpy wings.

In the fall of 1975 an article appeared in the local newspaper. The reporter, who was also a professor at Oregon State University, thought 2,4,5-T was most wonderful and praised it to no end. I got mad and wrote a letter to the editor describing how my kids got sick, the birth defects among the poultry, and the death along the river. We had just moved here and I knew only a few people. Suddenly, my phone was ringing non-stop from people with similar stories.

We had a community meeting. People wrote down what happened. We presented the information to the Forest Service and asked them to stop spraying within a mile of our homes. They responded with the same story as the county: 'it is safe as table salt.' We had several meetings with the Forest Service. But they had no plans of stopping the use of 2,4,5-T.

We formed Citizens Against Toxic Sprays, CATS, and decided to hire a lawyer. We raised money through bakesales and concerts. People in Eugene [Oregon] jumped on the issue and helped us to raise money. We found a lawyer and filed a lawsuit against forest service. In the lawsuit we asked that the Forest Service not spray within a mile of where people lived. We won a lawsuit against the Forest Service in 1977 [Citizens Against Toxic Sprays v. Bergland], which resulted in a ban on the use of 2,4,5-T in the Siuslaw [National Forest]. Two years later, the EPA issued an emergency suspension of the registrations of 2,4,5-T for forestry and rights-of-way uses.[1]

CATS challenged the US Forest Service's spraying of 2,4,5-T under authority of the National Environmental Protection Act (NEPA) of 1970. NEPA requires federal agencies to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on -- (i) the environmental impact of the proposed action, (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) alternatives to the proposed action ..."[2] For the US Forest Service this would include logging and the spraying of herbicides. Citizen groups can only contest the EIS process not decisions

[1] Van Strum, 2001. For a published account see C. Van Strum, *A Bitter Fog*, 1983.
[2] National Environmental Policy Act of 1969, Public Law 91-190 91st Congress, S.1075, January 1, 1970.

made based on the EIS.[1] Therefore CATS argued that the Forest Service failed to complete a proper EIS, which must include an analysis of alternatives to the spraying of herbicides. In CATS v Bergland the federal judge, Otto Skopil, ruled that the Forest Service's EIS was insufficient because it did not adequately present information on the health effects of herbicides or discuss alternatives.[2] Judge Skopil concluded that:

> The 1976-77 E.I.S. fails to acknowledge the extreme toxicity of TCDD [shorthand for 2,3,7,8-tetrachloro-p-dibenzodioxin] or the opinions of scientists about its hazards, to discuss E.P.A. administrative proceedings against 2,4,5-T or the ongoing TCDD residue monitoring program being conducted by E.P.A., to report on TCDD levels found in animal specimens taken from the Siuslaw National Forest, or to mention the controversy over the effects of Agent Orange in Vietnam. These are the major, but by no means the only, shortcomings of the E.I.S. in its discussion of the potential effects of phenoxy herbicides upon human and animal health.[3]

Scientists discovered the TCDD-2,4,5-T connection in the late 1960s and early 1970s when they assessed the toxicological effects of Agent Orange. A defoliant used in the Vietnam War, Agent Orange was a 50-50 mixture of 2,4,5-T and 2,4-dichlorophenoxyacetic acid (2,4-D).[4] Laboratory studies started in the late 1960s and published in 1971 found extremely low levels of 2,3,7,8-TCDD to be the primary cause of birth defects in the offspring of mice and rats exposed to 2,4,5-T.[5]

When the unpublished laboratory results were leaked to the press in 1969 they created a wave of protest against the use of Agent Orange in Vietnam, including Congressional hearings in 1970.[6] The combination of Congressional hearings, press coverage, and scientific evidence of potential harm prompted the Department of Defense's (DOD) to stop using Agent Orange in

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[1] Caldwell, 1998, p. 49.
[2] Van Strum, 1983, p. 104.
[3] Ibid., p. 101.
[4] Ibid., p. 12.
[5] Courtney, 1971; and Sparschu, 1971.
[6] Moore, Kimbrough, and Gough, 1993.

1970.[1] Soldiers exposed to Agent Orange later (1978) filed class action lawsuits against the US Government and the manufacturers of Agent Orange, which included Dow Chemical.[2]

"TCDD" is the most toxic member of a family of 75 compounds with similar molecular structure known as dioxins. Dioxins are never produced intentionally. They are an unintentional byproduct of production or incineration processes that include chlorine, carbon (organic matter), and heat. TCDD was unintentionally formed in the manufacture of the chlorinated herbicide 2,4,5-T and remained in the final product.

Further evidence of the toxicity of dioxins emerged in 1975 when Carter, et al., published a study that documented adverse health effects to horses exposed to TCDD-contaminated waste oil.[3] The horses were exposed when the town of Times Beach (Missouri) spread waste oil on arenas and roads to keep dust down. The US Government would later (in 1983) order the evacuation of Times Beach because of dioxin contamination. Despite the emerging science on the toxicity of dioxin, its contamination of 2,4,5-T, and the decision of the DOD to halt the use of Agent Orange in Vietnam, the US Forest Service opted to use the Agent Orange ingredients -- 2,4,5-T and 2,4-D -- as herbicides in the 1970s.

When Judge Skopil ruled in CATS favor in 1977, his ruling was limited by the authority of NEPA. He could only prohibit the spraying of herbicides until the Siuslaw National Forest finalized its EIS for the use of herbicides. After Judge Skopil declared the Forest Service's EIS legally acceptable in April 1978 the Forest Service resumed spraying 2,4,5-T and 2,4-D.[4]

The Forest Service's decision to resume spraying came at a time when research studies provided further evidence of TCDD being extremely toxic at very low doses. In 1978 and 1979

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[1] Ibid., p. 235; and Schuck, 1986, pp. 16-23.
[2] Schuck, 1986.
[3] Carter et al., 1975.
[4] Van Strum, 1983, p. 104.

two landmark studies were published on the toxicity of TCDD. Kociba, et al. (1978) found TCDD to be a carcinogen in rats[1] and Murray, et al. (1979) found multi-generational reproductive effects at chronic doses of a single part per trillion in the diet per day.[2] The US EPA added to the growing concerns surrounding dioxin when it found a correlation between the spraying of 2,4,5-T in the national forests of western Oregon and human miscarriages in 1979.[3] Known as the Alsea Study, it was "widely reported on television" and "brought the issue of aerial spraying 'home' in that it was U.S. forests that were sprayed, domestic watersheds that were possibly contaminated with TCDD, and American women who feared that their miscarriages resulted from the spraying."[4]

Based "on the laboratory data as well as new epidemiology data that purported to correlate herbicide use in Oregon with a seasonal increase of human miscarriages," the US EPA suspended, on an emergency basis, "essentially all remaining uses of 2,4,5-T and related herbicides" in the spring of 1979.[5] The EPA's emergency suspension of 2,4,5-T use ended the debate over 2,4,5-T use by the Forest Service. However, the Forest Service merely substituted 2,4-D for 2,4,5-T. The Forest Service continued to use 2,4-D until 1984, when a federal judge in the Ninth US Circuit Court of Appeals (northwestern US) "banned federal use of all herbicides in the Alsea Study area until they are adequately tested for human health effects."[6]

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[1] Kociba et al., 1978.
[2] Murray et al., 1979.
[3] Smith, 1979. The Alsea study was not released publicly due to a combination of politics and questions of methodological errors (Van Strum and Merrell, 1987; and Moore, Kimbrough, and Gough, 1993).
[4] Moore, Kimbrough, and Gough, 1993, p. 234.
[5] Ibid., p. 231.
[6] Van Strum and Merrell, 1987, p. IV-23.

Heavily in debt and exhausted from its court battle, CATS handed off its scientific, medical, and legal work to the Northwest Coalition for Alternatives to Pesticides (Eugene, Oregon; established in 1978). With debts unpaid, CATS "quietly dissolved" in 1981.[1]

6.2.2 The CATS' legacy

The CATS' campaign against 2,4,5-T/dioxin would have important implications for future dioxin-related campaigns. First, it represented the emergence of grassroots groups as an important force in shaping (anti-)toxics environmental initiatives, a force that would challenge the hegemony of national environmental groups to define the environmental movement's toxics agenda. Greenpeace USA would be a notable exception among national environmental groups with multi-million dollar budgets in deciding to align itself closely with the grassroots groups. As Robert Gottlieb writes in his history of the American environmental movement, "As a staff-based organization, Greenpeace [USA] lacked the rootedness of the community-based movements, although its decision to elevate the toxics issue as a primary focal point for action often placed it in alliance with community organizations."[2]

Greenpeace USA became active on dioxin-related issues in 1985, opposing the burning of toxic waste in the Gulf of Mexico[3] and demanding the clean-up of dioxin-contaminated waste sites.[4] Reinforcing Greenpeace USA's connection to the grassroots groups, Carol Van Strum would be the lead author of the report that launched Greenpeace's pulp and paper campaign.

The willingness of the grassroots anti-toxics groups to fight aggressively for their goals created friction between themselves and the national environmental groups. Mark Dowie in his book on the environmental movement emphasized that "Grassroots organizations and the

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[1] Van Strum, 1983, p. 110.
[2] Gottlieb, 1993, p. 195.
[3] Reinhold, 1985.
[4] For example, in Chicago Heights, Illinois (Shipp, 1985).

nationals remain at odds ... over what Gibbs and others perceive as the nationals' excessive accommodations with industry ..."[1] This source of friction between the nationals and grassroots groups/Greenpeace USA would emerge among the organizations that would try to reduce pollution from the pulp and paper industry in the late 1980s and 1990s.

Second, CATS revealed the power of dioxin to capture the attention of decision makers and the media. The scientific research showing TCDD to be very toxic at extremely low levels provided environmentalists with persuasive evidence of the need for action. TCDD's toxicity led Judge Skopil to rule that the Siuslaw Forest Service's EIS was inadequate in 1977. It also, in combination with the 2,4,5-T-associated miscarriages in Alsea, led the US EPA to issue its emergency suspension of the use of 2,4,5-T.[2] Suddenly environmentalists had a powerful problem to require action on.

Judge Skopil in his approval of the Forest Service's EIS in 1978 went as far to state, while acknowledging it was outside the legal authority of NEPA, that:

> The E.I.S. discloses that there are unanswered questions about the potential harm from a chemical that is acknowledged to be one of the most toxic substances known to mankind. If I were the person responsible for making the decision of whether herbicides containing this substance should be broadcast sprayed from helicopters over our national forests, I would be extremely reluctant to allow it. There are simply too many unanswered questions, and too few benefits compared to other methods of vegetation management, to justify the unknown risk. .... I am sincerely concerned about the effect of the use of herbicides upon the health of human beings and our environment.[3]

The 2,4,5-T-dioxin association of the mid-1970s also caught the national media's attention, especially when the US EPA began to consider an emergency suspension of 2,4,5-T. In November 1977, Steve Kanigher of the Wall Street Journal wrote that "Environmentalists cite mounting evidence that phenoxy herbicides [e.g., 2,4,5-T] used by Forest Service and forest

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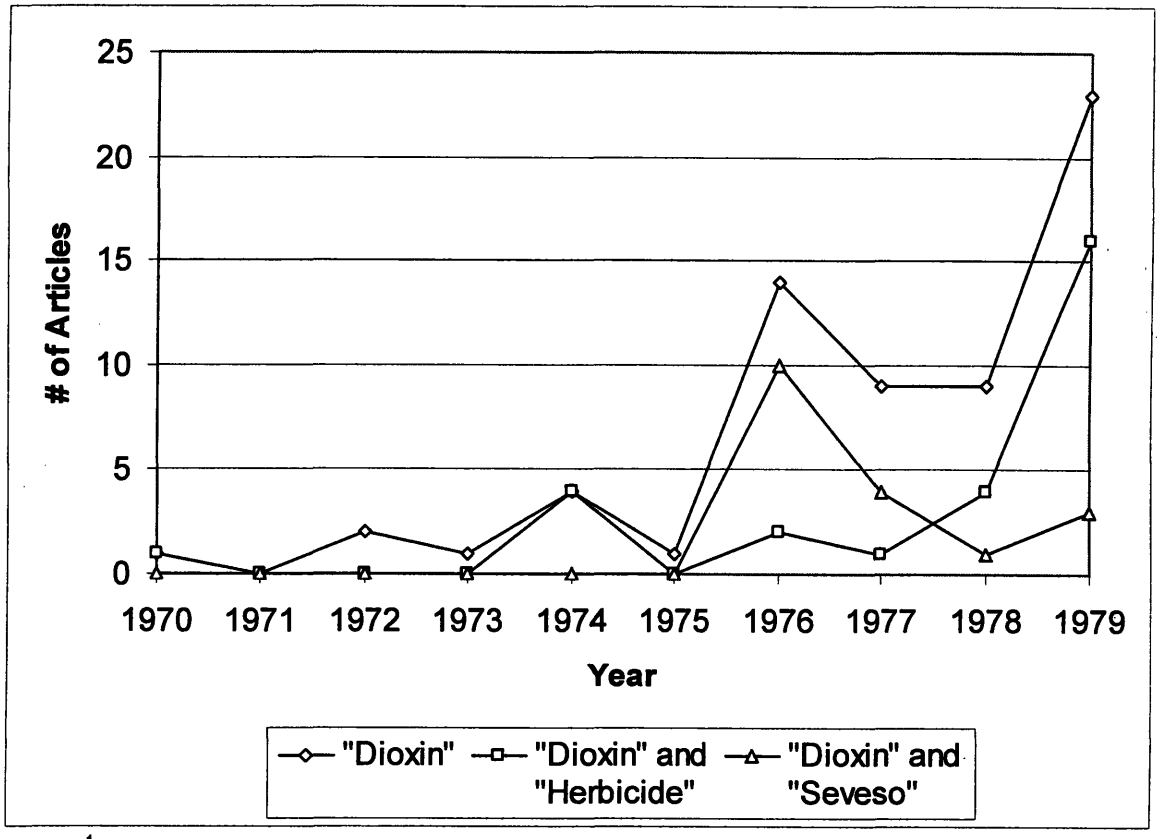
[1] Dowie, 1995, pp. 136-137. While Dowie was writing specifically about the friction over Clean Air Act negotiations and the Delaney Clause, he was highlighting a more general problem.
[2] McFadden, 1979.
[3] As cited in Van Strum, 1983, pp. 105-106.

product cos [companies] to defoliate unwanted vegetation are highly toxic to human and animal life and may cause cancer and birth defects."[1] By 1979 the dioxin-herbicide connection had become a national story with 16 articles published on the topic in major American newspapers (see Figure 6.2). This represented the most intensive coverage on dioxin to date, with previous

Figure 6.2 Newsprint articles with "dioxin," "dioxin" and "herbicide," or "dioxin" and "Seveso" in major American newspapers (1970-1979)



Source: [1]

newsprint coverage peaking in 1974 (when the US EPA opted against issuing an emergency ban on 2,4,5-T) and 1976 (when the explosion of Hoffman-LaRoche's trichlorophenol plant in Seveso, Italy dusted the surrounding communities with dioxin). Dioxin became a household

[1] Kanigher, 1977, as cited from Lexis-Nexis abstracts.

word in 1983 when the US Government evacuated Times Beach, Missouri because of contamination with TCDD: 175 articles in major US newspapers contained "dioxin," with 112 of them including Missouri, in 1983 (see Figure 6.3). Other significant sources of dioxin coverage from 1977 to 1985 were the lawsuits of Vietnam veterans concerning adverse health effects from Agent Orange exposure and Love Canal (which was evacuated because of chemical contamination from hazardous waste sites that included dioxin).

Third, the CATS' campaign prompted regulatory action, which in turn provoked a corporate backlash from Dow Chemical. Dow worked hard to revoke the suspension. Over the next four years Dow spent millions trying to overturn the suspension. "Dow said it had spent more than $10 million to defend the product in hearings before the environmental agency and in discussions with officials."[2] To try to overturn the emergency ban Dow lobbied the Reagan administration and US EPA officials and supported research that would exonerate 2,4,5-T.

Dow developed cordial relations with political appointees in the US EPA, Washington, DC office after Ronald Reagan who campaigned against environmental regulation became president in 1980.[3] For example, when a draft US EPA report on dioxin pollution from Dow's

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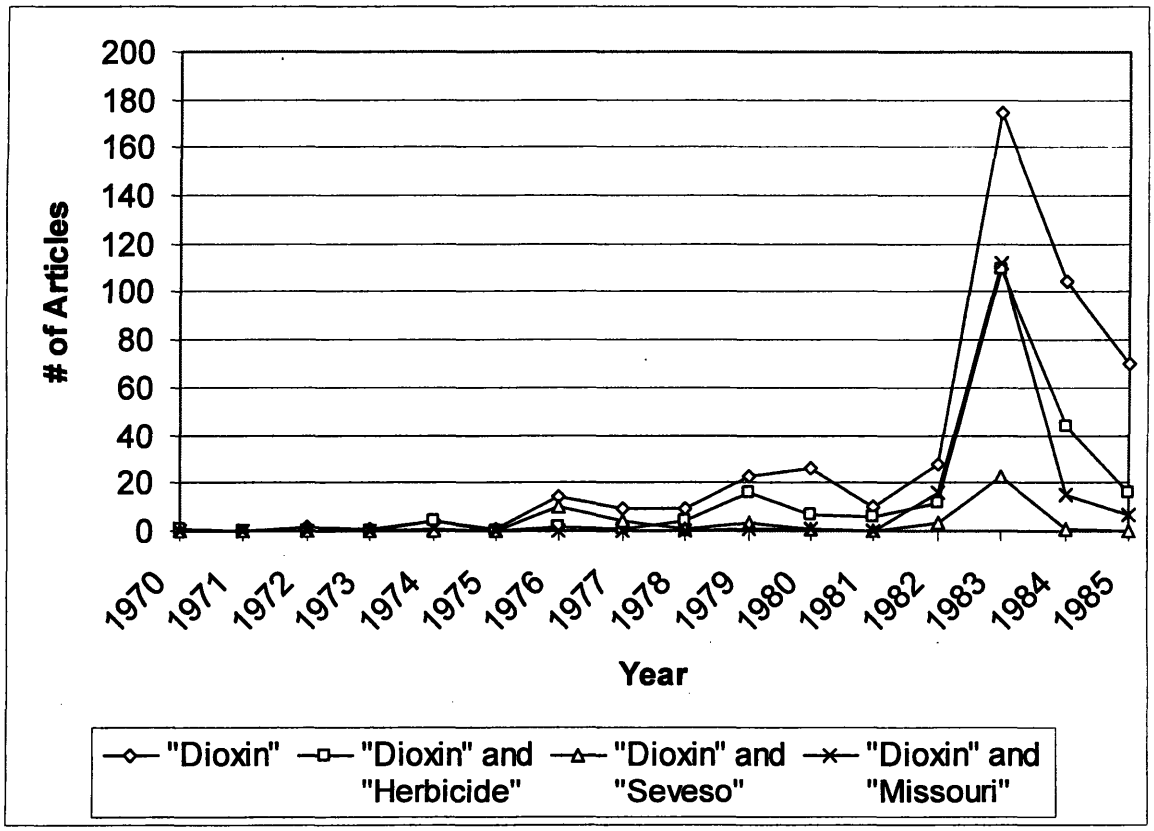
[1] Search of Lexis-Nexis database (July 2002) under: "academic universe," "general news," with international newspapers excluded.

[2] Holusha, 1983.

[3] To fulfill his anti-environmental agenda President Reagan appointed high-profile environmental opponents, including Anne Gorsuch as Administrator of the US EPA and James Watt as Secretary of Interior. As an editorial in the normally staid *New York Times* remarked after a few years into the tenure of these Reagan officials: "Mr. Watt and Mrs. Gorsuch are zealots, bent on hacking down environmental laws that seem to infringe on industrial activity" (New York Times, 1983). Gorsuch and her team of political appointees did their best to make the EPA an ineffective agency: "The administration made deep cuts in the agency budget in fiscal years 1982 and 1983. Gorsuch declared that regulatory rule making must wait for adequate scientific research; at the same time, the EPA cut back its research effort. Enforcement was decentralized to the various states; at the same time, the EPA decreased the grants that supported state enforcement activities" (Szasz, 1994, p. 121). The degree to which Reagan appointees went to support industrial interests was simply scandalous. Rita Lavelle, chief of the toxic waste programs, was sentenced to six months in prison and fined $10,000 in 1984 for lying to Congress (Shabecoff, 1984). Anne Gorsuch became the highest-ranking federal official cited for contempt of Congress when she refused to turn over documents sought by two House panels (Congressional Quarterly Almanac, 1982). Amid the scandals Anne Burford (Anne Gorsuch, before marrying in 1983) was forced to resign in March 1983 (Congressional Quarterly Almanac, 1983).

Midland (Michigan) plant included information that Dow objected to, they "were deleted from the EPA final draft report, as were references linking dioxin with cancer, reduced fertility, and birth defects, and information on animal studies linking dioxin with such health effects."[1] This

Figure 6.3 Newsprint articles with "dioxin," "dioxin" and "herbicide," "dioxin" and "Seveso," or "dioxin" and "Missouri" in major American newspapers (1970-1985)



Source: [2]

action led Congressional Representative Scheur (Democrat from New York) to remark that "'Corporate polluters ... know they can expect friendly treatment from the loyal soldiers at the Environmental Protection Agency and they have acted on it, even to the point where strong

[1] Bureau of National Affairs, 1983, p. 2078.

[2] Search of Lexis-Nexis database (July 2002) under: "academic universe," "general news," with international newspapers excluded. Note: some articles may have both "herbicide" and "Missouri" in them, therefore the subcategories -- e.g., "'dioxin' + 'herbicide'" and "'dioxin' + 'Missouri'" will overlap to some extent.

scientific evidence developed by regional officials showing serious environmental contamination can be routinely expurgated in Washington.'"[1]

On the scientific front Dow sought to remove the spotlight on 2,4,5-T as a major source of dioxins. One Dow-funded report concluded that fires (i.e., natural sources) were the dominant source of dioxin emissions.[2] While the argument that fires are the dominant source of dioxins would be proven false,[3] Dow helped to establish that "TCDD pollution was a far broader and more serious problem than previously believed."[4] Dow dropped its initiative to reverse the 2,4,5-T ban in 1983.[5] That decision occurred amid the release of data by the US EPA that documented high levels of TCDD in drinking water in Alsea, Oregon. Research by the US EPA found TCDD in drinking water in Alsea at levels as high as 5800 parts-per-trillion.[6]

Fourth, the CATS campaign highlighted the strengths and challenges of a dioxin campaign. The strengths -- mobilizing citizens to oppose pollution and capturing the attention of decision makers and the media -- have already been highlighted above. The challenges include mobilizing the general public in the face of complex scientific information (a corollary of mobilizing the lay public is developing and maintaining a clear message in the face of counterattacks from vested economic interests), countering the backlash of well-funded and highly motivated vested economic interests, changing the underlying behavior that caused the pollution in the first place, and maintaining momentum after victories.

Engaging regulators, judges, and manufacturers on the causes and effects of toxic chemicals on humans and the environment leads to complex and subtle arguments that can easily

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[1] Ibid., p. 2078.
[2] Bumb and al, 1980; Rawls, 1979.
[3] For example, see US EPA, 2000 for the dominant sources of dioxins.
[4] Van Strum and Merrell, 1987, p. III-15.
[5] Holusha, 1983.
[6] Van Strum and Merrell, 1987, pp. IV-20-IV-21; and Appendix 1, which includes a photocopy of the EPA lab results, titled: "Analysis of TCDD in biological and environmental samples ('Alsea, Oregon Phase II Project')."

lose the attention of the press and the lay public. The need for simple messages in any environmental campaign meant to capture widespread public attention is important. In the case of 2,4,5-T the message was: 2,4,5-T is contaminated with dioxin. Dioxin is one of the most substances known to humans. Therefore we must stop using 2,4,5-T.

To oppose toxic campaigns, manufacturers try to undermine the environmental message by highlighting uncertainties in the data and emphasizing factors that obscure the role of their product in causing harm. For example, Dow argued that forest fires, not 2,4,5-T, were the primary source of dioxins.

Dow seems to have been caught off-guard by how quickly demands for action on 2,4,5-T emerged and the US EPA acted. The element of surprise and quick action usually works in favor of environmentalists. Surprise is a factor that would differentiate the pulp and paper campaigns of Greenpeace Sweden and Greenpeace USA.

The emergency suspension put Dow in the much harder position of overturning an existing decision. An effort that was doomed to fail once Dow itself was ensnared in a fight between the Democratic-controlled Congress and the Republican-led Reagan Administration over environmental policy. While environmentalists were able to maintain a clear message in the face of Dow's opposition, we will see in the pulp and paper case to follow that the US industry was very effective in undermining the message of environmentalists.

The capacity of environmentalists to use dioxin to create a crisis for government officials and industry executives has a serious downside: it can obscure the broader goals of environmentalists. For example, the members of CATS focused on 2,4,5-T because of 2,4,5-T's known contamination with TCDD, despite their goal of stopping the spraying of both 2,4,5-T and 2,4-D. This approach meant forgoing the historical precedent of lumping 2,4,5-T and 2,4-D

together, as the US DOD did when it stopped spraying Agent Orange, which contained both 2,4,5-T and 2,4-D. The short-term result was the US Forest Service simply replaced 2,4,5-T with 2,4-D. The emergency suspension of 2,4,5-T did not change how the Forest Service viewed its use of herbicides. Thus the Northwest Coalition for Alternatives to Pesticides and other environmental groups worked to have the US EPA ban 2,4-D, which occurred in 1984.

On the positive side a dioxin campaign served as a stepping stone to other chemicals. On the negative side, it may have proven difficult to move to other chemicals as regulators and reporters come to think the most serious problem -- dioxin pollution -- has already been addressed. As the political scientist, John Kingdon emphasized, once a policy window closes it is difficult to re-open it.[1] This would happen in the US on pulp bleaching where environmentalists would succeed in dramatically reducing dioxin emissions but could not expand the campaign beyond dioxins to all organochlorines.

6.2.3 Environmental Defense and NWF file dioxin lawsuit against the US EPA

In 1985 Environmental Defense and NWF filed a lawsuit against the US EPA that would become the basis for a consent decree between the plaintiffs and the Agency on dioxin pollution from the pulp and paper industry. Yet, when the lawsuit was filed, Environmental Defense and NWF did not know nor suspect that it would lead them to the pulp and paper industry. At the time the known sources of dioxin were chlorinated pesticides and pesticide production, incineration, pentachlorophenol and tetrachlorophenol (used as a wood preservative).[2] Incineration was identified as a significant source of dioxins in the early 1980s, with Barry

[1] Kingdon, 1984.
[2] Keating, 1983.

Commoner at the Center for the Biology of Natural Systems recommending shutting down waste incinerators as "soon as possible."[1]

Environmental Defense and NWF planted the seed for the lawsuit in 1984 when they filed a petition under the Toxics Substances Control Act (TSCA) of 1977 with the US EPA. The broad purpose of the petition was "to force EPA to control all sources of highly toxic dioxins in the environment."[2] Specifically, the petition demanded that the agency, under authority of TSCA, limit the concentration of dioxins and furans to 0.1 parts per billion in products, require labeling of all products contaminated with dioxins and furans, ban land and ocean disposal and underground injection of isomer-containing wastes, and issue water effluent prohibitions for the chemicals.[3] A year later the US EPA rejected "the petition's request for immediate regulatory action under Section 6, saying there is insufficient information at this time on which to base such an action."[4] Environmental Defense and NWF responded by suing the agency, demanding that it regulate dioxins and furans.[5] The lawsuit would become the entry point for Environmental Defense's and NWF's future work on the pulp and paper industry.

Using lawsuits to prompt government action was the principal tactic used by Environmental Defense from its inception in 1967 to the mid-1980s. Established by scientists and lawyers in 1967 to oppose DDT spraying on Long Island (New York), Environmental Defense "was the first group organized solely for the purpose of bringing environmental lawsuits."[6] In its early years Environmental Defense relied upon scientists to identify problems

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[1] Bureau of National Affairs, 1985.
[2] EDF, 1984.
[3] See: Bureau of National Affairs, 1984, p. 1064; and Environmental Defense Fund v. Environmental Protection Agency, 657 F. Supp. 302 (DC DC, No. 85-0973, 1987).
[4] Bureau of National Affairs, 1985, p. 1862.
[5] Bureau of National Affairs, 1988.
[6] Carter, 1979.

and lawyers to negotiate legal solutions.[1] By the mid-1970s Environmental Defense had "a strong reputation as an independent, adversarial organization, particularly in such areas as toxics policy, where regulatory activities provided a continuous arena for challenge and litigation."[2] Writing in 1977, then executive director Arlie Schadt emphasized that "EDF's basic strategy remains unchanged: the intense pursuit of a limited number of carefully selected cases, aiming to set national precedents in environmental law while solving specific environmental problems."[3]

Over the years Environmental Defense would grow into one of the nation's largest environmental groups. By the 1980s Environmental Defense was a multi-million dollar organization with offices in New York City (headquarters), Washington, D.C., and California. It had revenues of $3.4 million in 1985, with 60% of revenues ($2.035 million) from memberships, contributions, and bequests and 31% of revenues ($1.065 million) from foundations.[4] As Environmental Defense grew and evolved, it retained a concern for addressing problems caused by toxic chemicals. As highlighted in the 1984 Annual Report: "Ever since EDF's birth in the ultimately successful battle to ban DDT, EDF has been in the forefront of efforts to reduce human and environmental exposure to toxic chemicals. EDF has repeatedly shown that effective regulation is both technically and economically feasible."[1]

In the mid-1980s Environmental Defense began an evolution from an adversarial, litigation-focused organization to a more collaborative, market-focused organization under the guidance of its new executive director, Fred Krupp. Krupp defined this as the "third stage" of environmentalism. According to Krupp, the first stage was the conservation movement that

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[1] EDF, 1987.
[2] Gottlieb, 1993, p. 139. Along with toxic chemicals, the other principal program areas over the first two decades were energy, wildlife, and water resources. See Environmental Defense annual reports 1971-1987, available at www.edf.org.
[3] EDF, 1977.
[4] The remaining nine percent ($0.307 million) was from government grants, investment income, awarded attorneys' fees, and miscellaneous revenue (EDF, 1985).

began at the beginning of the 20th century with the formation of the Sierra Club. The second stage began with Rachel Carson's *Silent Spring* and tried to "halt abusive pollution." The third stage is about solutions. It moves "beyond reactive opposition" and "demands a high level of economic and scientific expertise";[2] skills possessed by Environmental Defense.[3]

> When third-stage environmentalists worry about a proposed dam, for example, they don't only document the damage it will cause. They also search for other ways to address the need for new water or power supplies that the dam is supposed to address. Growth, jobs, taxpayer and stockholder interests, agricultural productivity, adequate water and power for industry and consumers -- all these are part of the third-stage agenda.[4]

While this strategic shift did not end Environmental Defense's use of lawsuits, it did result in a shift away from lawsuits to collaborative efforts with business as the primary tactic for leveraging change. "This focus on a potential economic common ground between industry and environmentalists, encouraged by the growing numbers of staff economists within the organization, evolved during the Reagan and Bush years into an overarching Environmental Defense strategy to promote market incentives, replacing regulation as a primary tool for reshaping environmental policy."[5] For Krupp and Environmental Defense the vision was that "EDF solves environmental problems. These four words capture for me EDF's special role in the environmental community."[1]

Environmental Defense's initiatives to reduce water pollution from the pulp and paper industry would mirror this transformation. While Environmental Defense originally engaged the pulp and paper industry through its lawsuit with NWF, it would later cede the litigation work to NRDC and focus its resources on a collaborative initiative with large purchasers of paper products.

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[1] EDF, 1984.
[2] Krupp, 1986.
[3] Loy and Krupp, 1986.
[4] Krupp, 1986.
[5] Gottlieb, 1993, p. 140.

The NWF would play a much more limited role than Environmental Defense in trying to reduce pulp and paper water pollution, working solely on the lawsuit. Established in 1936 to conserve land and wildlife for hunting, NWF emerged to become the nation's largest environmental group in both members and revenues.[2] For example, by 1990 it had 5.8 million members,[3] over twice as many as the next largest group, Greenpeace USA (2.3 million members)[4] and a budget of $87 million.[5]

NWF's primary focus was, and remains, education: "We educate America's lawmakers, political leaders, business leaders and grass-roots activists about environmental problems and wok with them to find effective, common-sense solutions."[6] Formed to protect the environment for hunting it has always been one of the more conservative environmental organizations. "More than other mainstream [national environmental] groups, the NWF actively solicited relations with industry interests while decrying the 'extremists and kooks' and 'screamers and yellers' within the environmental movement."[7] The NWF took a leadership position in developing collaborative relations with the business community when it formed the Corporate Conservation Council in 1982. The "council consists of 20 senior executives who consult with each other and the NWF on matters of mutual interest concerning the use of natural resources."[8] Yet, NWF also hired lawyers beginning in the 1970s to initiate lawsuits in a select number of cases.[9] To pool limited resources environmental groups often joined in litigation,[10] as was the case with NWF

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[1] Krupp, 1986.
[2] Mitchell, Mertig, and Dunlap, 1992, pp. 13-15.
[3] Bosso, 1994, p. 36.
[4] Mitchell, Mertig, and Dunlap, 1992, p. 18.
[5] Ibid., p. 13.
[6] NWF, 1996.
[7] Gottlieb, 1993, p. 158.
[8] Thomas, 1992.
[9] Hays, 1987, p. 480.
[10] Ibid., pp. 480-481.

and Environmental Defense. While NWF is known as a conservation, non-confrontational environmental group, its role in pulp and paper was more adversarial.

6.3 Implications for the pulp and paper campaigns

The pulp and paper campaigns that would emerge in Sweden and the US in the second half of the 1980s had their roots in very different environmental initiatives. The Swedish campaigns were rooted in Bryntse's/Environmental Federation's pulp and paper sector work, whereas the US campaigns were rooted in dioxin. The differences in goals, pollutants of concern, solutions, and tactics, which are summarized in Table 6.2, would have three important implications for the future bleaching campaigns.

Table 6.2 Comparing roots of the Swedish and American bleaching campaigns (1970-1985)

Key Factors	Sweden	USA
Leading organization(s)	Environmental Federation	Grassroots groups Environmental Defense NWF
Goals	Reduce pulp and paper pollution, especially organochlorines	Eliminate all sources of dioxin and furan pollution
Focus	Industry sector: pulp and paper industry	Chemicals: dioxins and furans
Pollutants of concern	Organochlorines as a class of chemicals and other water pollutants	Dioxins and furans
Solution	Unbleached paper	Eliminate sources of dioxin pollution, including dioxin-contaminated herbicides and waste incineration
Tactics	Educational materials Market campaign	Lawsuits Protest actions

First, Swedish environmentalists would start by defining the problem as organochlorines whereas the Americans would define it as dioxins. Organochlorines represent a broad class of chemicals, of which dioxins are a part. To eliminate organochlorine pollution bleached kraft pulp mills would need to make more significant changes in technology and chemistry than if

they just eliminated dioxins. The decision of a bleached kraft pulp mill choosing to eliminate all organochlorines or just dioxins would be similar to the US Forest Service deciding whether to switch from 2,4,5-T to 2,4-D or developing another approach for managing weeds.

Second, by 1985 Göran Bryntse had already spent five years cultivating a market for unbleached paper products in Sweden, whereas in the US the dioxin tactics had centered on regulatory change and lawsuits. Even CATS relied on a lawsuit to halt 2,4,5-T spraying. Thus the campaign tactic that would prove most effective in moving the pulp and paper industry to the cleanest production technologies, using a market campaign, was undeveloped in the US. Finally, Bryntse understood the technological capacity of the industry, whereas such knowledge was completely absent in the US environmental movement in 1985.

In a manner similar to the decision of Swedish mills and regulators to invest in oxygen delignification, the Bryntse/Environmental Federation unbleached paper campaign made the Swedish environmental groups better prepared to promote a more ambitious environmental agenda in the pulp and paper industry than in the US. The focus on an industry sector provided them with a much better understanding of the industry and its markets. The focus on a class of chemicals made the campaign broader than just dioxins. The focus on consumers gave them a route to changing the industry outside of the government. Each of these factors, knowledge of the industry, organochlorines as a class, and consumer action, would become critical to moving the industry. All of these factors were absent in the US.

In the US, environmentalists entered the pulp and paper campaigns focused on eliminating dioxin. They had no knowledge of the pulp and paper pollution, markets, technologies, or environmentally preferable papers already on the market. A result was that

market campaigns were slower to develop in the US and the problem definition centered on dioxins rather than organochlorines.

7 Creating markets and flamboyant actions: the SSNC and Greenpeace Sweden (1986-1988)

In 1986, consumers in Sweden could not purchase environmentally friendly copy and writing papers because no manufacturer produced or marketed such a product. However, by the end of 1988 the three largest Swedish paper companies produced and marketed environmentally friendly copy and writing papers. The reason for these new products: the market campaign of the Swedish Society for Nature Conservation (SSNC). By the end of 1988 there were many other environmentally friendly paper products on the Swedish market as well, including unbleached coffee filters and tissues, and chlorine-reduced diapers. The emergence of these products resulted from the SSNC's market campaign, media coverage of the ecological disasters of 1988, government research, and Greenpeace Sweden's pulp and paper campaign.

From 1986-1988, the SSNC and Greenpeace Sweden worked to green Swedish pulp and paper manufacturing. While a short period, these three years heralded the beginning of major shifts in how Swedish manufacturers bleached pulp and the forces that caused them to make environmental investments, as well as how environmentalists succeeded in diffusing the cleanest production technologies. The first part of this chapter examines how the SSNC created a market for environmentally preferable paper. The second part examines how Greenpeace Sweden attempted to create change through direct action and lobbying.

7.1 The SSNC: greening the Swedish paper market by connecting consumers and manufacturers

The SSNC is Sweden's oldest and largest environmental group. An "elite group" concerned with "the increasing degradation of Sweden's nature and wildlife due to rapid industrialisation" formed the SSNC in 1909 to promote the protection of wildlife and

wilderness.[1] Since its founding, the "main task of the SSNC has been nature protection, including protecting endangered species, such as the white-tailed eagle and the peregrine, rivers from dams, and threatened forests.[2]

To disseminate the message of nature conservation in the early decades, the conservation society relied on education, through conferences, meetings, and publications. A chapter organization similar to the Sierra Club of the US, it has over 270 local chapters spread throughout the country.[3] Representatives from the local chapters meet biannually to elect a governing board and set the major elements of the organization's agenda.[4]

In the 1960s the SSNC's focus expanded from nature conservation to broader ecological concerns after Rachel Carson published *Silent Spring* (1962). "[T]ranslated into Swedish almost immediately," *Silent Spring* spawned the modern environmental movement in Sweden.[5] The SSNC responded by hosting conferences on pesticides in 1963 and air pollution in 1964. Rising Swedish interest in the environment caused membership to blossom, increasing from 5,000 in 1955 to 55,000 in 1970.[6] With the additional financial resources from the growing membership, the SSNC invested in professional staff to lobby government officials in Stockholm for policy change.[7] The SSNC entered the 1970s with an expanded agenda, professional staff, and headquarters in Stockholm.

By 1987, its membership had reached 150,000 members. The majority of the members, as the political scientist Lennart Lundqvist explained, were "'checkbook members;'" they did not

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[1] SSNC, 2003.
[2] Ibid.
[3] SSNC, 2000.
[4] See www.snf.se.
[5] Jamison et al., 1990, p. 20.
[6] Ibid., pp. 20-21.
[7] Ibid.

participate in the work of the organization.[1] The principal sources of income for the SSNC, from highest to lowest percentage, have been: membership fees, government grants, funding drive, and book sales.[2]

Prior to Göran Bryntse's arrival, the SSNC had not run a market campaign. It lobbied for more effective legislation, argued for more research, and generally directed its activity towards political decision-makers in Stockholm.[3] When Bryntse arrived from the Environmental Federation he brought to the SSNC a market campaign for environmentally friendly paper. The primary focus of this campaign was: reduce organochlorine pollution from pulp mill bleacheries. At first, the key strategic elements of the campaign were, to organize environmentally sensitive municipalities to use their collective demand for paper (see previous chapter) to bring about change in the manufacture of paper. Later the SSNC expanded the program to directly target household consumers through an ecolabeling program.

Unlike the organization he worked for, Bryntse did not engage in lobbying for regulating the pulp and paper industry because he thought this was a futile exercise. As he recalled, "Naturvårdsverket [SEPA] and the politicians were slow to address the issue, and when they did, they favored industry."[4] Bryntse's skepticism towards the regulatory authorities was not without merit. It was commonly acknowledged within industry and among regulatory authorities that they had a close relationship. In a strikingly candid comment, Erik Nyström of SEPA acknowledged that his close relationship with industry could result in agency capture:

> Is there a downside to our working closely with industry? It might be that we are not as strict as we should be. Maybe industry would be doing more if we did not have a close relationship. Three weeks ago someone from industry asked me to attend a hearing because without the agency there, no one would counter the perspective of environmental

[1] Lundquist, 1996, p. 55.
[2] SSNC, 2000, p. 50.
[3] Jamison et al., 1990, p. 31.
[4] Bryntse, 1998.

> groups. I know people in all the mills and I work closely with them. It could color my thinking in ways that I am not aware of.[1]

Thus the SSNC turned to the market to try to affect change in pulp and production.

7.1.1 Defining environmentally friendly paper: the SSNC and Swedish Association of Local Authorities

The SSNC catalyzed change in the course of paper production in Sweden by defining criteria for environmentally friendly paper and persuading key actors in the paper supply chain to use its criteria in their purchasing and production decisions. Central to the SSNC's success was the working relationship Bryntse had developed with the Association of Local Authorities while at the Environmental Federation. In 1986 no manufacturer produced copy and writing papers that met the SSNC's criteria for environmentally friendly chlorine-reduced paper. Three years later all the major manufacturers had paper products on the market that met the SSNC's criteria.

While at the Environmental Federation, Bryntse promoted unbleached paper products as the solution to organochlorine pollution. But unbleached paper was not an option for copy and writing papers. To use mechanical pulp for printing and writing papers would result in weak paper, unsuitable for printing presses and photocopiers, that would yellow over time. For printing and writing papers the SSNC and the Association of Local Authorities decided that, since organochlorine pollution was the primary pollution problem from the industry, organochlorine pollution -- AOX -- would be the criterion for defining environmentally preferable paper. They defined *environmentally friendly chlorine-reduced paper* as paper made with pulp that resulted in 75% less AOX pollution than normally discharged.[2] But, since Bryntse considered the average discharge to be 4.0 kg AOX/ton of pulp, in practice the performance

[1] Nyström, 1998.
[2] Bryntse, Johansson, and Ladberg, 1988, p. 49.

standard was 1.0 kg AOX/ton of pulp.[1] And they defined *environmentally friendly chlorine-free paper* as paper made with pulp that released 0.2 kg AOX or less per ton of pulp.[2]

The decision to define two types of environmentally friendly paper enabled the SSNC and Association for Local Authorities to define short- and long-term goals for the industry. Defining chlorine-free as a long-term goal sent a signal to the industry on future environmental performance expectations. A signal important in an industry where capital investments are high and production equipment has a life of 20-30 years.

At the time, even the goal of 1.0 kg AOX/ton of bleached kraft pulp was ambitious. To put these discharge levels in perspective, the average discharges hovered around 4.0 kg AOX/ton of bleached kraft pulp,[3] with some Swedish bleached kraft pulp mills discharging up to 7-8 kg AOX/ton of pulp. For example, the Korsnäs mill released 7.0 kg AOX/ton of pulp in 1988.[4] And two years later, the Swedish Parliament later passed a bill limiting organochlorine discharges to 1.5 AOX per ton of pulp.[5] No bleached kraft pulp mill in the world discharged 1.0 kg AOX or less/ton of pulp in 1986.

Defining criteria for environmentally friendly paper was a unique aspect of the campaign. As Per Baumann, environmental director of KF (second largest supermarket chain in Sweden) recalled,[6] the booklet "had a tremendous impact" because it "was the first time" anyone had suggested "criteria for deciding whether a [paper] product was more environmentally adopted [i.e., friendly] than other products."[7] In defining criteria for environmental performance the

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[1] Bryntse, 1998.
[2] Bryntse, Johansson, and Ladberg, 1988, p. 49.
[3] In 1988, Bryntse, et al. (Ibid.) estimated discharges at 4.0 kg AOX per ton of pulp and SEPA estimated average discharge levels of AOX at 3.5 kg/ton of pulp in 1988 (SEPA, 1990).
[4] Granvik, 1991, p. 17.
[5] Lagergren, 1996, p. 673.
[6] Sweden's second largest grocery retail chain at the time.
[7] Baumann, 1998.

SSNC moved to use the market as the regulator of industry discharges rather than the government.

Bryntse tried to persuade in 1986, to no avail, the major paper manufacturers, including Stora, MoDo, and SCA, that they should produce *chlorine-reduced* paper.[1] These manufacturers were not swayed by the purchasing power of the Association of Local Authorities. Nor were they swayed by studies from their own research institute, the SSVL, that documented substantial reductions in organochlorines through the combination of oxygen delignification followed by the partial substitution of chlorine dioxide in the first bleaching stage.[2] A challenge the SSNC confronted in catalyzing change in production was persuading a technologically conservative industry that it should innovate for environmental reasons. As Per Bauman, who worked on environmentally friendly purchasing at the grocery retailer KF observed, "How could the paper industry know that the customers really wanted to have this [environmentally friendly] product? How could they know they [customers] were interested [in the long-term]?"[3] Environmental demand from the market was a new and unknown phenomenon for manufacturers.

Yet one manufacturer would decide to break with industry opposition to *chlorine-reduced paper* in 1986. That manufacturer made the move to environmentally friendly paper before dioxins were discovered in Swedish mill effluent, before findings SEPA released the major findings from its Environment/Cellulose research project, and before the ecological crises of 1988.

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[1] Bryntse, 1998.
[2] Reeve and Earl, 1989, p. 66. Also see Chapter 6, section 1.1.
[3] Baumann, 1998.

7.1.2 Munkedals AB joins the environmentally friendly paper campaign

Sensing an opportunity to differentiate itself from other papermakers, Munkedals AB agreed in late 1986 to manufacture chlorine-reduced copy paper under one condition: the Association of Local Authorities agrees to carry some of the project's risks by purchasing at least 3,000 metric tons of paper. Reflecting the purchasing power of its members, the Association of Local Authorities agreed.[1]

An unintegrated paper mill,[2] Munkedals was in a better position to meet the requirements for chlorine-reduced paper than an integrated pulp and paper mill. Without a pulp mill, it did not have to invest in costly equipment to reduce effluent and could purchase pulp from anywhere.[3] Munkedals met the 75% reduction in AOX by using 75% mechanical pulp bleached with hydrogen peroxide (which resulted in zero AOX discharge) and 25% chlorine bleached kraft pulp.[4] Copy paper is usually manufactured with bleached kraft pulp because mechanical pulp produces a weak, off-white paper that yellows over time. Newspapers, for example, are made from mechanical pulp. Since Munkedals' paper only contained 25% bleached kraft pulp, the SSNC and Association of Local Authorities assumed that it resulted in 75% less AOX discharges than typical copy paper.

A small, independently owned mill[5] Munkedals used the environment to create market differentiation and capture a price premium. As Porter and van der Linde (1995 write, first movers -- "the companies that can see the opportunity first and embrace innovation-based

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[1] Bryntse, 1998.
[2] An "integrated" mill manufactures both pulp and paper. An "unintegrated" mill manufactures only pulp or paper.
[3] Bryntse, 1998.
[4] Ibid.
[5] Munkedals only manufactured a couple hundred tons of paper/day, whereas the largest mills manufactured over 1,000 tons/day. For example, in 1996, Munkedals manufactured 387 tons of paper/day, whereas the largest paper mill, Korsnäs, manufactured 1,468 tons of paper/day (Swedish Environmental Protection Agency, 1996).

solutions -- will reap major competitive benefits."[1] Creating a niche market for a small mill like Munkedals was important to its survival. As a report on the Swedish industry in *Pulp and Paper* concluded, the survival of smaller companies "will depend on finding niche markets" because they "do not have the same advantages of economy of scale" of the largest manufacturers like Korsnäs, Stora, MoDo, and SCA.[2]

To differentiate its new environmentally friendly paper Munkedals searched for a symbol, finally buying the right to use the World Wildlife Fund (WWF) panda.[3] Displaying the WWF panda, by Munkedals (or any other company) on a product does not mean the product meets higher standards for environmental performance. When a company buys the right to use the panda it means the company supports the work of the WWF, but the panda symbol "says nothing at all about the product's environmental characteristics."[4]

Munkedals decision to produce chlorine-reduced paper was an important turning point for the SSNC's environmentally friendly paper campaign: it connected environmentally conscious consumers with a manufacturer, sent a signal to pulp producers of emerging demand for AOX-reduced pulp, and created a crack in industry solidarity against environmentally motivated investments. As Eva Eiderström, department head of ecolabeling for the SSNC explained, "Munkedals broke from the informal paper industry 'federation'" when it "decided to produce paper according to our standard."[5] Eiderström defined "federation" as an informal association among pulp and paper manufacturers against environmental change:

> The informal association in the industry exists because it limits what they as a whole must do. Each company is better off doing as all are doing, because it slows the pace of change and removes any competition on environmental issues. It is an informal

[1] Porter and Linde, 1995, p. 130.
[2] Wold, 1990.
[3] Bryntse, 1998.
[4] SSNC, 1998, p. 8.
[5] Eiderström, 1998.

agreement. If someone goes further, then they all must go further, and they resist this approach. Their goal is to minimize their environmental competence.[1]

Stora publicly opposed the production of environmentally friendly paper,[2] publishing a counter brochure to Bryntse et al.'s, titled, *All Paper is Environmentally-Friendly*, which emphasized the industry is environmentally because it is based upon renewable resources.[3] And the corporations berated the municipalities. The political backlash for the local authorities was intense and caught them by surprise. As Eva Eiderström of the SSNC observed: "The municipalities were way out in front on this [the paper] issue. I think it will be the last time. Some of the municipalities had paper mills and the mills said, 'what are you doing? We will lose jobs if we have to make these investments.'"[4] Additionally the Stora-owned distributor, Pappersgruppen,[5] which distributed Munkedals' paper, refused to advertise Munkedals' paper as environmentally friendly.[6]

Finally they attacked the quality of Munkedals paper. It was, said Nils Jirval, "a very lousy copy paper."[7] While Bryntse defended the paper then, he later conceded that "Munkedals produced poor quality paper: it jammed in the copiers and created all kinds of dust."[8] Despite the reaction of the industry mainstream, Munkedals continued to produce environmentally friendly paper and the local authorities continued to purchase it. Capturing a price premium, Munkedals had an economic incentive to continue on the environmental path. The local

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[1] Ibid.
[2] For example, see Schröder, 1987.
[3] Auer, 1996.
[4] Eiderström, 1998.
[5] Now called Papyrus (see: www.papyrus.com).
[6] Bryntse, 1998; and Auer, 1996, p. 146.
[7] Jirval, 1998.
[8] Bryntse, 1998.

authorities, committed to making an environmental difference through purchasing, continued to buy the paper.[1]

7.1.3 The scientific evidence begins to weigh heavily in favor of environmentalists

The scientific weight-of-evidence shifted strongly in favor of the SSNC almost simultaneous with Munkedals decision to manufacture chlorine-reduced paper. Organochlorines, which Bryntse had emphasized as a problem since 1980, and dioxins became pollutants of concern in the late 1980s.

By the mid-1980s dioxin pollution unrelated to pulp and paper mills was a prominent public issue in Sweden. Swedish reporters began focusing on dioxins in 1985 and 1986 when Sweden emerged as a global leader in addressing dioxin pollution.[2] "In 1984, Sweden was the first country in the world to report the general background of PCDDs [dioxins] and PCDFs [furans] in the human population. The same year background levels of PCDDs and PCDFs were reported in human milk in Sweden."[3] And in 1985 Sweden temporarily closed its municipal solid waste incinerators so they could be retrofitted to drastically reduce dioxin emissions.[4]

Dioxins first became associated with pulp and paper mills in 1986 when they were found by researchers in crabs downstream of the wastewater discharge from Södra Cell's, Värö mill, on the west coast of Sweden.[5] Shortly after the crab finding, SEPA released a study in 1987 that revealed levels of 2,3,7,8-TCDD (the most potent member of the dioxin family) as high as 100 picograms per gram (pg/g) in lobster and 20 pg/g in finfish downstream from mill discharges.[6]

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[1] Baumann, 1998.
[2] A search of ArtikelSök for "dioxin*" identified 11 articles: six articles in 1985 and five articles in 1986.
[3] Integrated Waste Management, 1988, p. 7.
[4] Ibid., p. 7.
[5] Nyström, 1998.
[6] From Swedish Environmental Protection Agency (SEPA, 1988, p. 190), as cited in Auer (1996, p. 93).

And SEPA identified the pulp and paper industry as the third largest source of dioxins (after waste incinerators and iron and steel works) in 1987.[1]

After the dioxin discovery, the Swedish National Chemicals Inspectorate (KemI)[2] examined the use of chlorine in the manufacture of diapers and recommended banning chlorine use because it pollutes the environment and contaminates diapers with dioxins. "Some studies, the inspectorate says, reveal that dioxins can be found in disposable diaper fluff. The inspectorate says that the consumers -- babies -- do not care whether the diaper is white or grey, and that this makes the product suitable for a ban. The inspectorate adds that it could later consider recommending the ban to include household paper, toilet tissue and packaging paper."[3] While KemI's recommendation was never implemented, it created, with the help of Greenpeace Sweden, concern over dioxins in paper products (see section 7.2.1).

In 1987 and 1988 research findings poured out from SEPA's Environment/Cellulose I[4] project: 43 papers were presented at conferences or published in journals in these two years (see Figure 7.1).[5] Scientists involved with Environment/Cellulose documented a host of problems associated with water pollution from both unbleached and bleached pulp mill, including impaired fish reproduction, liver damage, abnormal metabolism rates, malformed fish eggs, and skeletal deformities.[6] Most dramatic, the Environment/Cellulose researchers documented skeletal deformities to fish: including the "pug-headed" pike with upturned rather than straight head (see

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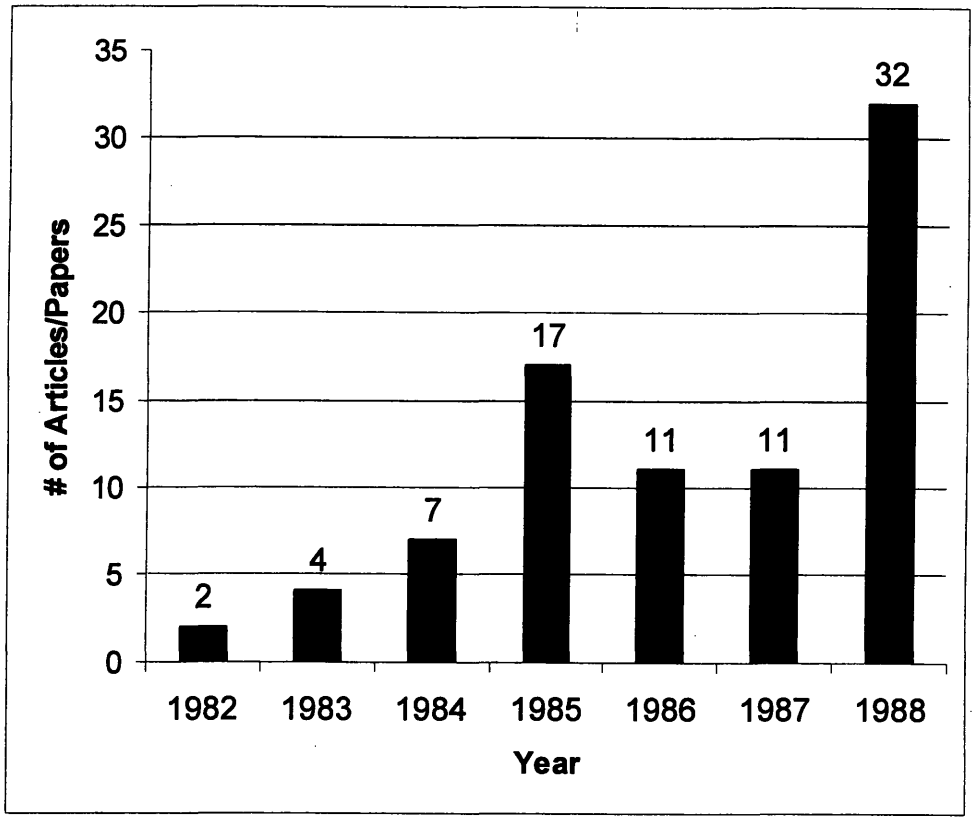
[1] SEPA, 1990, p. 45.
[2] "KemI's task is to ensure that manufacturers and importers fulfil [sic] their obligations, but also to monitor developments in the chemicals field, increase knowledge and, where necessary, to issue regulations" (KemI, undated, p. 2).
[3] Chemical Week, 1987, p. 28; and Chemical Week, 1988.
[4] As noted in Chapter 6, Environment/Cellulose I was a research project by SEPA into potential ecological damage from pulp and paper mills.
[5] See bibliography in Södergren (Södergren, 1989).
[6] Ibid.

Figure 7.2) and the sculpin with vertebrate damage (see the wavy, rather than straight spinal column in Figure 7.3).

Figure 7.1 Environment/Cellulose I Research: Number of Conference Papers Presented and Journal Articles Published by Year (1982-1988)



Source: [1]

These fish became symbols of the damage caused by pulp mill effluent. They became the poster fish for the SSNC, Greenpeace Sweden,[2] and the media of the harm caused by pulp and paper mill pollution.[3] The pike was prominently featured in a color photograph on the back cover of the SSNC's 1988 booklet, *Paper and the Environment*, under the title, "Bleached Paper -- At What Price?" (see Figure 7.2). Below the photograph the text read:

[1] Ibid.
[2] See *The Greenpeace Guide to Paper* (Greenpeace International, 1990) pages 12 and 13.
[3] Bengtsson, 1998; Fallenius, 1998; Lagergren, 1998; and Jirval, 1998.

> Here is the pike caught outside the Norrsundets mill that manufactures chlorine bleached sulfate pulp. It has a starkly deformed jaw, a so-called "pug-head," and fin rot. Also other species caught where chlorine bleacheries discharge have fin deformation, skeletal damage, and impaired reproduction. It is becoming increasingly obvious that pulp mills with chlorine bleacheries harm fish. In fact, the whole Baltic Sea ecosystem is disturbed.[1]

The images of deformed fish became media sensations in 1988 when the seas surrounding Sweden were beset with ecological crises in 1988 (discussed in section 7.1.5). As Dr. Bengt-Erik Bengtsson, a scientist on the Environment/Cellulose project recalled: "My results with sculpins were shown on TV. Any person on the streets could understand and say this is not right."[2]

The deformities in the fish were never directly correlated with organochlorine pollution from bleaching operations. For the pug-headed pike it was "not established whether or not the cause could be looked for in the discharge which solely originates from the bleaching processes."[3] This was also the case with the damaged spine of the sculpins: "It has also been shown that the effects are not related only to chlorinated organic material but also that unbleached pulp effluents cause measurable changes."[4]

Yet Environment/Cellulose I and its follow-up project, Environment/Cellulose II,[5] did associate organochlorine pollution with adverse ecological impacts. As Environment/Cellulose II concluded:

> The less pronounced biochemical/physiological responses in fish exposed to effluents from unbleached processes in the laboratory supported results from the field, where a reduction of discharged chlorinated material from a bleached pulp mill also reduced the impact on the fish population. Thus, reductions in the amount of chlorinated organic material will obviously result in improved conditions for the fish populations and presumably also for the plant and animal communities as a whole.[6]

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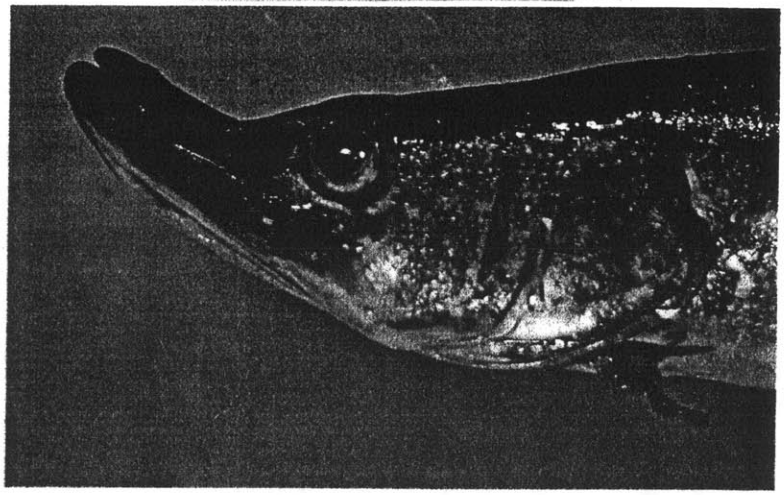
[1] Bryntse, Johansson, and Ladberg, 1988.
[2] Bengtsson, 1998.
[3] Södergren, 1989, p. 81.
[4] Ibid., p. 103.
[5] Environment / Cellulose II (1988-1991) evaluated the environmental impact of bleached pulp mill effluents from mills located along the coast of the Baltic Sea and in Lake Vättern (Södergren, ed., 1993, p. 9).
[6] Ibid., p. 101.

Figure 7.2 The "Pug-headed" pike from the back cover of *Paper and the Environment* (Bryntse, et al., 1988)

KLORBLEKT PAPPER — TILL VILKET PRIS?



Den här gäddan är fångad utanför Norrsundets pappersmassefabrik som tillverkar klorblekt sulfatmassa. Den har starkt deformerade käkar, s k mopsskalle, och fenorna är förkrympta. Också hos andra arter, som fångats i närheten av klorblekeriernas utsläpp, har man konstaterat fendeformationer, skelettskador och störd fortplantning. Att massafabrikernas klorblekeriutsläpp skadar fisken blir alltmer uppenbart. På sikt kan hela Östersjöns ekosystem rubbas.

Klorblekning av pappersmassa medför både giftutsläpp och ett stort slöseri med ved och energi. Nu finns det i många fall bra alternativ till klorblekt papper och tekniken utvecklas hela tiden. **Papperet och miljön** beskriver olika metoder för papperstillverkning och blekning och deras konsekvenser för miljön. Här får du också hjälp med att hitta miljövänligare alternativ i pappersdjungeln.

För texten svarar **Göran Bryntse,** tekn dr i pappersteknik, **Birgitta Johansson,** tekn lic i cellulosateknik och **Gunilla Ladberg,** författare och fil dr i pedagogik.

Utgiven av **Naturskyddsföreningen** i samarbete med **Miljöförbundet.**

Naturskyddsföreningen varunr 0174 ISBN 91-558-3503-1

Figure 7.3. Deformed vertebrate of the sculpin fish

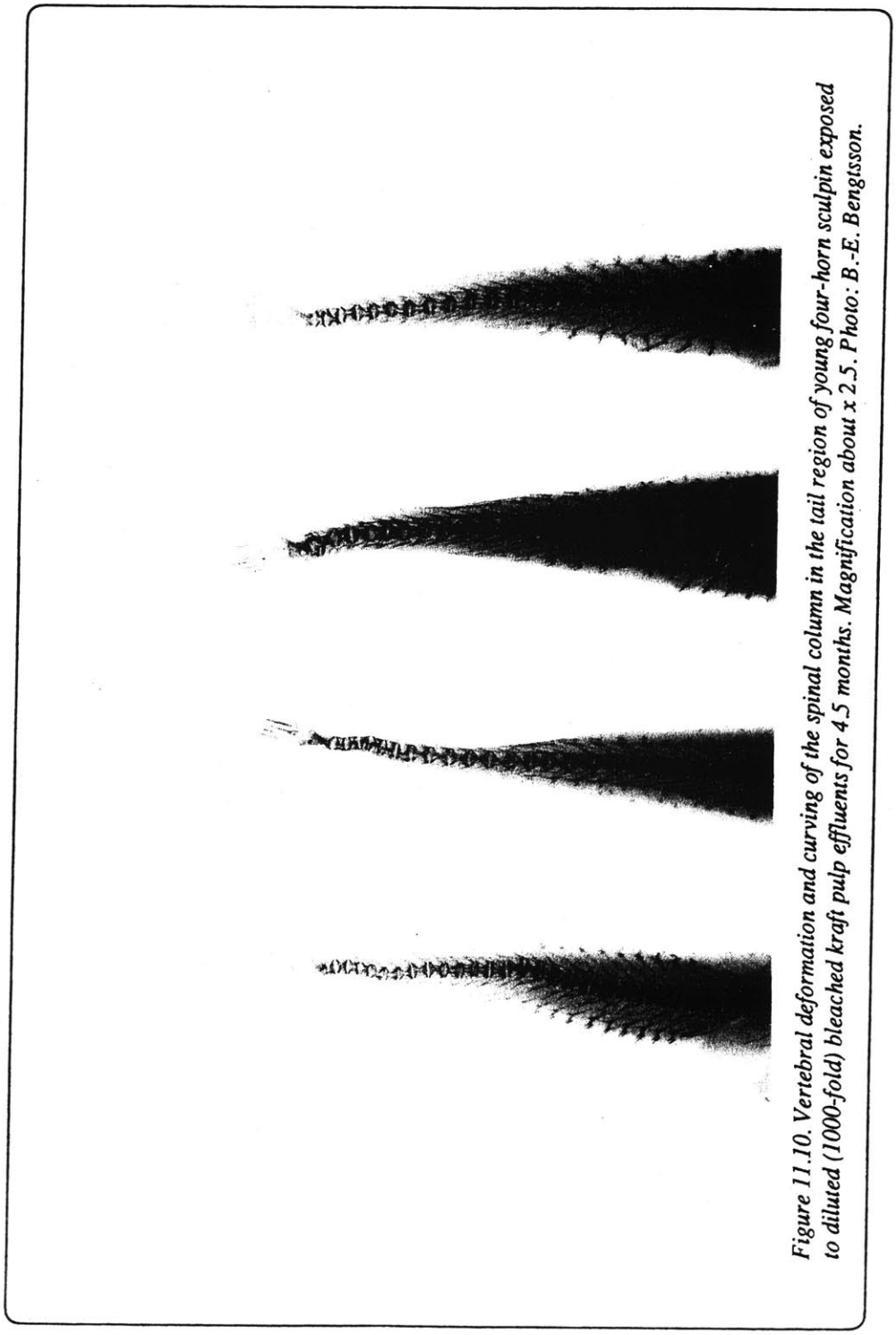


Figure 11.10. Vertebral deformation and curving of the spinal column in the tail region of young four-horn sculpin exposed to diluted (1000-fold) bleached kraft pulp effluents for 4.5 months. Magnification about x 2.5. Photo: B.-E. Bengtsson.

In addition to the deformed fish, Environment/Cellulose estimated the paper industry discharged 15,000 tons of organochlorines into the water every year and that organochlorines were detected as far as 1,400 kilometers downstream. The Environment/Cellulose scientists concluded that "the results thus show that discharges from mills producing bleached kraft pulp may be of regional extent as regards biological effects; nonetheless, the chemical monitoring suggests that there is a problem of large-scale character" because pollutants from pulp mills are dispersed throughout the Baltic Sea.[1]

Media coverage of dioxins in pulp mill effluent (1986-1988), SEPA's findings of ecological degradation from pulp mill effluent (1987 and 1988), and the ecological disasters of 1988 (discussed below), all legitimized the SSNC's problem definition. All the major daily newspapers, *Dagens Nyheter*, *Svenska Dagbladet*, *Aftonbladet*, and *Expressen*,[2] as well as the smaller regional newspapers, published articles between 1986 and 1988 confirming the SSNC's argument that pulp mills were a major source of pollution. Titles from the major dailies included: "Dioxin in Wastewater Discharges Is a Serious Problem"[3] and "EPA Sounds Alarm: High Levels of Dioxin in Fish"[4] (*Dagens Nyheter*); "Injured Fish Intensifies Demand: Bet for the Environment?" (*Svenska Dagbladet*);[5] "The Great Paper War" (*Aftonbladet*);[6] and "Death by Bleaching: We Sacrifice Forests and Fish for White Paper" (*Expressen*).[7] Articles from smaller

[1] Södergren, 1989, p. 109.
[2] The two major quality newspapers were the morning papers: the more liberal *Dagens Nyheter* and the more conservative *Svenska Dagbladet*. The two major tabloids were afternoon papers: *Aftonbladet* and *Expressen*.
[3] Karlsson, 1988.
[4] Sjöblom, 1987.
[5] Ekman, 1986.
[6] Schröder, 1987.
[7] Hammarström, 1987.

regional papers included: "White Paper -- At What Price?" (*Vestmanlands Läns Tidning*)[1] and "Pick the Right Paper for the Ocean's Sake" (*Helsingborgs Dagblad*).[2]

Industry responded to dioxins in paper products by arguing they posed no risk to humans. Nils Jirval of the Swedish Forest Industries Federation claimed that "'Swedish paper products, which contained dioxins in a few parts per trillion were safe.'"[3] Given that any adverse effect from low levels of dioxin exposure will be seen years (possibly decades) after exposure or in the next generation -- and most adverse effects would be obscured in a sea of confounding factors -- it was easy for industry to claim its products were safe because environmentalists lacked evidence of adverse effects.

After the dioxin discovery Swedish pulp and paper manufacturers took organochlorine pollution seriously. When dioxins were discovered in mill effluent, all companies with bleacheries quickly began mill trials of chlorine dioxide substitution, experimenting with different levels of substitution to ascertain how much substitution was necessary to eliminate dioxin formation.[4] They responded by identifying the sources of dioxin formation and methods for reducing organochlorine discharges. "When the dioxin issue came out we immediately started research projects at SSVL. We found the reasons why dioxins and furans were formed in chlorine bleaching process and learned how to reduce them."[5]

Industry responded to the deformed fish by focusing on scientific uncertainty. As Peter Axegård of the Swedish Pulp and Paper Research Institute recalled, the deformed pike found outside of the Stora Norrsundet mill was "linked, but with no proof, to chlorine bleaching."[6]

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[1] Arby, 1987.
[2] Carlsson, 1988.
[3] Ardill, 1989.
[4] Axegård, 1998.
[5] Jirval, 1998.
[6] Axegård, 1998.

Concerned with its rapidly declining public image, Lennart Ahlgren from the Korsnäs pulp and paper company published an article in the newspaper *Svenska Dagbladet* -- "The Swedish Forest Industry Solves Its Environmental Problems" in May 1988. Ahlgren explained the measures taken by the industry to address pollution: identifying the sources of dioxins in pulp and paper mills and reducing dioxin discharges by reducing chlorine use through partial substitution.[1] Yet with massive seal deaths on the horizon (see below), industry had little opportunity to claim innocence in the fish deformities.

7.1.4 Stora breaks with the industry "federation" and shifts an entire market

The industry's campaign against chlorine-reduced paper collapsed in late 1987 when Stora broke from the industry "federation" ranks and began marketing chlorine-reduced copy paper.[2] Then the largest pulp and paper manufacturer in Europe,[3] Stora's decision to manufacture chlorine reduced paper, together with the press coverage of the seal deaths in the summer of 1988, shifted the entire Swedish paper market. Here is how Nils Jirval of the Swedish Forest Industries Association summarized the events:

> A company [Munkedals] jumped on the wagon that was not an integrated paper mill and it produced a very lousy copy paper; its paper had some special sign on it [panda]. Then another company [Stora] joined in this business, and suddenly environmentally friendly paper became a safe issue. That's how the NGOs and customers came in as a pressure group for the development of a new [production] technique.[4]

Stora made its decision to produce chlorine-reduced paper amid the revelations of dioxins in paper mill effluent and the release of SEPA results, showing high quantities of organochlorine discharges from the industry and adverse ecological effects. Bryntse claims that personal connections were instrumental in persuading the plant manager at Stora's Nymölla mill to invest in chlorine-reduced bleaching:

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[1] Ahlgren, 1988.
[2] Auer, 1996; Bryntse, 1998; and Jirval, 1998.
[3] Globe and Mail, 1987.
[4] Jirval, 1998.

> Because my wife and I had worked at STFI [Swedish Pulp and Paper Research Institute] we have many contacts in the paper industry. That is where we met, while working at STFI. Some of our friends were working at the Nymölla mill, and they were instrumental in convincing the plant manager to invest two million crowns [~$300,000] to reduce AOX levels below 1 kg per ton of pulp.[1]

Since the Nymölla mill was a bleached sulfite pulp mill, it was easier in comparison to a kraft mill to reduce AOX discharges. Sulfite pulping produces brighter unbleached pulp, which requires less bleaching chemicals to reach medium brightness levels.[2] With the use of hydrogen peroxide and no chlorine or chlorine dioxide, a sulfite mill can achieve ISO 85-87 brightness.[3] To provide a sense of paper brightness levels, you are reading from paper that is ISO 84 brightness. The brightest papers are ISO 88 or greater. Most paper mills, however, manufacture copy and writing papers from kraft rather than sulfite pulp because of its superior strength and brightness. For these mills the costs of reducing AOX discharges would be much higher than sulfite mills. Sulfite mills also represented only 12% of bleached chemical pulp in Sweden in the mid-1980s.[4]

Because Stora manufactured a quality environmentally friendly paper, its decision deflated the industry's arguments that you could not have high quality, chlorine-reduced paper. That Stora recognized AOX pollution as an opportunity rather than a problem illustrates the power of market campaigns to create competition among firms on environmental performance; contrasting sharply with government regulation that creates cooperation among firms to resist increasing environmental performance.

When the largest pulp and paper company in Europe added chlorine-reduced paper to its product portfolio it put tremendous pressure on the rest of the industry to follow, lest they lose market share. MoDo began marketing chlorine-reduced paper in 1988 and SCA followed

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[1] Bryntse, 1998.
[2] See Chapter 4.
[3] Pulp and Paper, 1991, p. 33.
[4] See Chapter 5.

quickly thereafter.[1] The bleached kraft pulp mills reduced their AOX levels to 1.0 kg or less per ton of pulp "by adapting existing technology", including oxygen delignification, extended delignification, and chlorine dioxide substitution.[2] By 1991 nearly all grades of printing and writing papers sold in Sweden were chlorine-reduced as defined by the SSNC.[3] Nationwide AOX discharges averaged 1.7 kg/ton of pulp in 1990 and first averaged less than 1.0 kg/ton of pulp in 1992 (0.6 kg/ton).[4] Chlorine use ended in Sweden in 1992, making all the mills ECF. And by the end of 1993 all Swedish bleached kraft pulp mills were ECF-lite, because all had installed oxygen delignification systems.[5]

Mills that manufactured chlorine-reduced paper were certified by the SSNC and placed in its book on environmentally friendly paper products. Verification was made through telephone calls and occasional mill visits.[6] A task that became quite burdensome in 1989 when the number of paper manufacturers increased and included Finnish as well as Swedish companies. "SNF [SSNC] could not certify every mill as being environmentally friendly," Bryntse explained. "We did not have the resources. It was my job and I could not certify every mill. For example, one paper mill alone had 40 suppliers of pulp. How could I guarantee each of these companies supplied environmentally friendly pulp?"[7] The need for SSNC verification declined dramatically when the Nordic Swan -- an ecolabeling system established by the Nordic countries in 1989 -- became the dominant environmentally friendly paper certification program in Sweden in the early 1990s. The emergence of the Nordic Swan and its competition with the SSNC is discussed in the next chapter.

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[1] Bryntse, 1998; Jirval, 1998.
[2] Jirval, 1998.
[3] Holm and Lothigius, 1991.
[4] Lagergren, 1996.
[5] Ibid.
[6] Bryntse, 1998.
[7] Ibid.

Because the mills continued to bleach and to use chlorine in the late 1980s, the industry's trade association continued to defend the status quo. Bo Wergens, then director general of the Swedish Forest Industries Federation, argued that bleaching:

> gives a bright paper which is not easily discoloured during storage, and does not yellow when exposed to sunlight; a white but strong paper; improved absorbtion capacity; elimination of bark and wood residues from the pulp; and elimination of fatty acids and other substances which can give rise to an unpleasant or disagreeable smell. As yet chlorine is usually needed in order to get the bleaching process to function effectively.[1]

It remains true to this day that bleached kraft pulp mills produce the strongest and brightest paper. But the other arguments for chlorine being unique -- improved absorbtion capacity, elimination of bark and wood residues from the pulp, and elimination of fatty acids and other substances -- were later proven false. For example, Göran Eriksson, production manager of Korsnäs admitted in 1991 that "'Chlorine gas isn't needed to get rid of impurities.'"[2] Eriksson's admission reflects a common attribute of environmental technology change: industry arguments opposing change on technological grounds prove false (and are forgotten) as the new technologies become widely diffused and performance attains the same level as previous technologies.

7.1.5 The ecological catastrophes of '88

Two ecological catastrophes struck the west coast of Sweden in the summer of 1988 and cemented the legitimacy of the SSNC's problem definition in the public's eyes. First, toxic algal blooms erupted on the west coast of Sweden in May and June of 1988. "The algal toxin had drastic effects on the marine ecosystem, killing large numbers of macroalgae, invertebrates, and

[1] Rusbridger, 1988.
[2] Granvik, 1991, p. 17.

fish."[1] The primary cause of the algal bloom, eutrophication, was fueled by higher than normal nutrient loadings from land runoff.[2]

Second, massive deaths of harbor seals, also off the west coast of Sweden,[3] followed quickly thereafter. By the end of 1988, an estimated 60% of the population of harbor seals in Western Europe had died.[4] The outcome from these two events, as a reporter for *The Guardian* (London) on assignment in Stockholm described, was catastrophic:

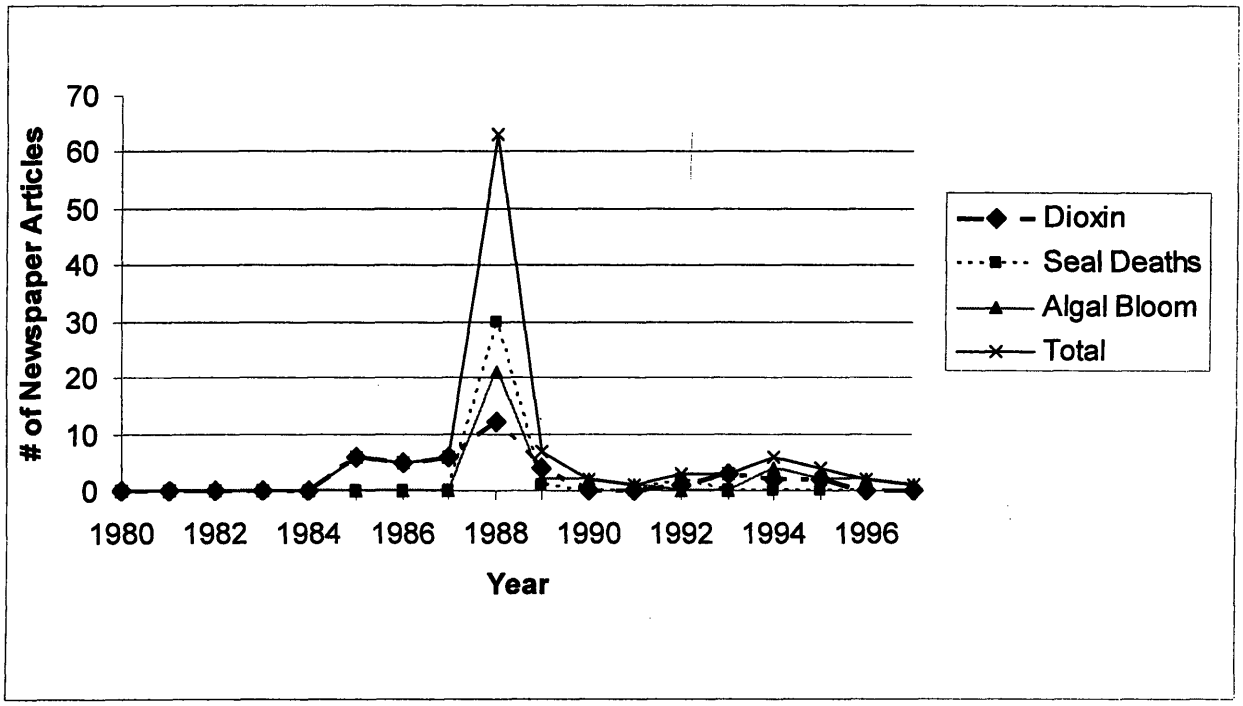
> Some of the beaches along the Swedish riviera have been littered, not only with dead seals, but with dead dolphins, dead and deformed fish, gulls and ducklings; with eels covered in mouth ulcers and seals covered in boils and lesions. Beneath the surface there drift entire shoals of lifeless mussels and starfish. In some places the seabed is carpeted in dead worms.[5]

The seal deaths disturbed the Swedes and received intensive media coverage. Titles such as these burst up from the pages of newspapers: "People are at Fault for Fish and Seal Deaths;"[6] "Seal Deaths Challenge our Lifestyle;"[7] "Seal Deaths are the Tip of the Iceberg."[8] Figure 7.4 illustrates the incredible spike in articles printed on seal deaths, algal bloom, and dioxins in 1988. Over 60 articles were written on these topics[9] in 1988, many published in the month of August. The profusion of articles reflects the degree of public attention placed on pollution during this period. The result, "'It has scared everyone in Sweden,'" stated Arno Rosemarin, then editor of *Ambio* (the journal of the Royal Swedish Academy of Sciences).[10]

---

[1] Rosenberg, Lindahl, and Blanck, 1988, p. 289.
[2] Ibid.
[3] As well as along the Atlantic coast of many European nations.
[4] Johnels, 1992, p. 493.
[5] Rusbridger, 1988.
[6] Bäcklin, 1988.
[7] Edman, 1988.
[8] Johansson, 1988.
[9] As identified using ArtikelSök.
[10] Rusbridger, 1988.

Figure 7.4 Swedish press: number of newspaper articles on dioxins, algal bloom, and seal deaths (1980-1997)



Source: [1]

At first, when scientists did not know the cause of the seal deaths, Swedes focused on pollution from the paper industry and their lifestyle as the causes of the seal and fish deaths. The media coverage of seal and fish deaths, and associations with dioxin made Swedes keenly aware of the pollution from the pulp and paper industry. "Every time you watched television or opened the newspaper you saw small seals dying or dead on the coasts. That made a tremendous impact on people as a whole and business."[2]

With the press and scientists connecting lifestyle with pollution, household consumers questioned the purchasing of bleached paper products, and quickly turned to the unbleached paper products listed in the SSNC's brochure, *Paper and the Environment* (1988). "Many communities and local authorities they started using this booklet and said, 'we want

[1] Search of ArtikelSök for "dioxin," "seal deaths," and "algal bloom;" performed in 1998.
[2] Baumann, 1998.

environmentally adopted [friendly] paper when we are buying paper products for our community.'"[1] The SSNC's booklet, with its lists of environmentally friendly producers by paper product category, perfectly complemented this desire for action. It became a bestseller in a rapidly expanding environmental movement: "We initially printed 15,000 copies of *Paper and the Environment*," recalled Eiderström. "These quickly sold-out and we printed 40,000 more copies."[2] The booklet and the market campaign fit with the SSNC's organizational structure. With local chapters spread throughout the country, members used the booklet to promote environmentally friendly purchasing among individuals and local authorities. "The demand for environmentally friendly products came from the bottom of the organization [SSNC]. Our local groups picked up the issue and members campaigned on their own. People wanted to do something about the polluted seas."[3]

Citizens acted by purchasing unbleached (rather than bleached) consumer goods -- including coffee filters, bathroom tissue, paper towels, and tampons -- and chlorine-reduced bleached products like copy paper and diapers.[4] For example, after the summer of 1988 the sale of unbleached coffee filters went from 17% of the Swedish market to 90% by 1990; and for the leading manufacturer of bleached paper bags, Swedish orders dropped from 90% of the market to 10% within a few months in 1988.[5] These significant and quick shifts in product market illustrate the combined power of media coverage, consumer action, and the SSNC providing information on alternative products. The media united diverse consumers across the nation and the SSNC identified environmentally friendly paper products for consumers to purchase.

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[1] Ibid.
[2] Eiderström, 1998.
[3] Ibid.
[4] Rusbridger, 1988.
[5] Holm and Lothigius, 1991, p. 19.

Substitution came quickly for many household paper products because manufacturing them without bleaching had no effect on product performance, despite the protestations of a few manufacturers. For example, Melitta "had put a lot of time and effort into proving the technical impossibility of producing an unbleached product [coffee filter]." However, after Melitta began to lose market share to the Swedish manufacturer Finess, whose market share jumped from 17 to 35 percent in 1988, it was forced "to do an about-turn" and produce unbleached coffee filters.[1]

Industry executives thought they were unjustly attacked. As Nils Jirval, director of environmental policy at the Swedish Forest Industries Association, explained the industry position:

> Seals died in large numbers on the west coast and washed up onshore, and there were huge fish kills. All of that was blamed on the pulp and paper industry. We were really the scapegoats at the time ...
>
> There was no connection between the seal deaths and the paper industry. The truth came out a half-year later, and then it was too late. In the public eye the damage was already done.
>
> We defended ourselves as much as possible, but we did not know what was causing the seal deaths. Eventually it was identified as a virus that killed the seals, which came from the far north. We could not be absolutely sure that the resistance to that virus was not affected by our discharge. To defend ourselves we must be 100% sure. When NGOs make a claim they do not need any proof: saying 'we fear that is the case' is enough. We cannot say 'we fear that is not the case.' We are playing in different leagues.
>
> It is an upper and underdog situation. We can never win a debate in the public's eyes unless they environmentalists are really foolish; they always have the sympathy of the public. All the media jumped on to this issue and wrote stupid things. They blew up all the threats and disasters on page one.[2]

By mid-August a distemper virus was identified as the direct cause of the deaths.[3] Even after a distemper virus was identified as the cause, Swedish scientists and reporters remained convinced that pollution, especially the widespread diffusion of persistent and bioaccumulative toxicants (PBTs) in the seas and paper industry pollution lowered the immunity of the seals.

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[1] Ibid., p. 19.
[2] Jirval, 1998.
[3] Rusbridger, 1988.

Some scientists, especially those outside of Sweden, doubted this connection. Scientists "like British Environment Secretary Nicholas Ridley, [have] been cautious about linking the virus with the polluted state of the seas that the animals inhabit."[1] Swedish scientists, however, vigorously disagreed:

> Olof Linden, associate professor at the University of Stockholm, is scornful of such an attitude: 'I find it rather stupid and strange. We know that these seals are absolutely loaded with persistent and poisonous substances which human society produces. ... The virus may be natural, but it is working on an eco-system in stress. It's odd that anyone should dispute the connection.'[2]

Furthermore Swedish scientists viewed the seal deaths as an indicator of potential harm to humans. "'When you see dead seals it is an indicator that we have got all the way up to the top of the food chain. That means we're next. That means dioxins turning up in human breast milk. It's a time bomb that we've got here,'" explained Arno Rosemarin (editor of *Ambio*).[3]

7.1.6 Institutionalizing retail demand for environmentally friendly paper: the SSNC-ICA alliance

Helping to expand the SSNC's presence into retail purchasing was an informal alliance with Sweden's largest supermarket chain, ICA. Amidst the seal deaths in 1988, the SSNC worked with ICA, helping the supermarket retailer develop its own criteria for environmentally friendly paper.[4] The result, not surprisingly, was criteria almost identical to that developed by the SSNC:

Grade A:	chlorine free (0.1 kg AOX/ton)
Grade B:	low AOX (less than or equal to 1 kg AOX/ton)
Grade C:	not environmentally friendly, chlorine-based papers (greater than 1 kg AOX/ton)[5]

[1] Ibid.
[2] Ibid.
[3] Ibid.
[4] Bryntse, 1998; Eiderström, 1998.
[5] Bryntse, 1998.

The only difference between the two sets of criteria was ICA's chlorine-free criterion (Grade A) was somewhat more stringent: 0.1 kg AOX/ton of pulp for ICA vs. 0.2 kg AOX/ton of pulp for SSNC. ICA implemented its grading scheme by asking manufacturers for data on AOX discharges and placing labels on its store shelves with the grade level.[1] KF, the second largest supermarket chain, quickly followed ICA in instituting its own shelf-based ecolabeling scheme based on similar criteria.[2]

ICA's decision to grade the environmental performance of paper products coupled with the seal deaths and KemI's recommendation to ban chlorine use in the manufacture of diapers changed the diaper market. Mölnlycke, a Swedish diaper brand name owned by SCA introduced chlorine-reduced diapers in 1988, gaining a Grade B classification from ICA, and quickly increased market share on its main competitor, Procter and Gamble (P&G). Bryntse, who worked as consultant for P&G in the late 1990s, recalled that P&G "was furious when ICA said that it would classify its diapers as Grade C. Since the Swedish diaper company Mölnlycke had changed to Grade B, P&G knew to sell in Sweden it would need to get at least a Grade B rating." P&G immediately began working with its pulp supplier, Stora's Sköghall mill to produce Grade B pulp."[3] This marked the beginning of a war across western European between SCA and P&G over the environmental performance of their diapers:

> A marketing battle has been raging between Europe's two leading diaper producers, Peaudouce, headquartered in France but Swedish owned, and Procter & Gamble, over claims that their products are made from non-chlorine pulp. Peaudouce uses pulp made from a peroxide-bleached chemi-thermomechanical pulp (CTMP) plant at Östrand, owned by its parent company Svenska Cellulose Aktiebolaget (SCA), while P&G's main supplier of non-chlorine pulp is Stora of Sweden.[4]

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[1] Baumann, 1998; Eiderström, 1998.
[2] Baumann, 1998.
[3] Bryntse, 1998.
[4] Milmo, 1989.

The diaper battle is illustrative of how Sweden was at the forefront of the struggles to address pulp and paper pollution. The whole issue of dioxins in consumer products, for example, did not become a major issue in Great Britain until 1989.[1] In February 1989, *The Guardian* reported that researchers "found traces of the highly toxic chemical" dioxin in bleached white milk cartons and "sanitary products such as tampons and disposable nappies [diapers]. Other disposable goods like tissues, tea bags and coffee filters which had been bleached white were found to contain dioxin."[2] That dioxins became an issue in England and elsewhere in Europe mattered for Swedish manufacturers because it created pressure to change for the export market as well. As in Sweden, environmentalists were critical in bringing attention to pollution from the industry. In Great Britain it was the Women's Environmental Network and in Austria and the Germany it was Greenpeace.[3]

The demand for environmentally friendly products grew in Sweden and western Europe beyond paper to include detergents, organic food, and other retail products. By 1989, the Associated Press reported that European "Consumers increasingly are demanding products that don't 'cost the earth,' and companies are seizing the new opportunity."[4]

By 1990, the Swedish pulp and paper industry began using its environmental investments to its advantage. It took public credit for the investments in environmentally friendly paper products and as being the most green of the industry. As reported in the *Financial Times* (London), Bengt Lof, president and chief executive of MoDo (then Sweden's third biggest pulp and paper company), stated: "'It is natural for us to seek to further improve the production

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[1] A search of Lexis-Nexis for articles in London newspapers on dioxin in the pulp and paper industry only revealed articles beginning 1989. There were articles from 1987 and 1988 but they reported on activities in Canada and Sweden.
[2] Tirbutt, 1989.
[3] Peerla, 1997.
[4] Timberlake, 1989.

process from an environmental point of view since this will give us competitive advantages in the future.'"[1]

7.2 Greenpeace Sweden: trying to create momentum for change through direct action

The origins of Greenpeace date back to the early 1970s when Canadians in Vancouver formed the organization in 1971 to protest nuclear testing. At first they tried to halt nuclear tests by sailing ships into nuclear test zones. Ben Metcalfe of the Canadian Broadcasting Corporation reported the formation of Greenpeace while aboard the *Phyllis Cormack*: "'We Canadians started the Greenpeacing of America last night, represented by 12 men in an 80-foot halibut boat on our way to the United States nuclear test island of Amchitka in the far Aleutians. Our goal is a very simple, clear, and direct one -- to bring about a confrontation between the people of death and the people of life.'"[2] The presence of the media aboard the *Phyllis Cormack* shaped the future of the organization. In the words of Robert Hunter, first president of Greenpeace: "Mass media is a way of making millions bear witness at a time."[3]

In its early years Greenpeace was a loose-knit organization opposed to whaling, sealing, as well as nuclear testing, with offices in Canada, North America, and Europe: "by 1976 many of the 'offices' were simply an interested individual who lent a telephone and a room for occasional meetings. In reality, Greenpeace was still a fledgling organization, with only 30 workers at its core."[4] Yet the character of the organization was already set: international in scope and tactically oriented to using direct action to capture media attention. Direct actions, as Paul Watson (an early member of Greenpeace) explained, go "'through the camera and into the minds of people.

[1] Burton, 1990, p. 6.
[2] Brown and May, 1991, p. 12.
[3] Hunter, 1979, p. 252.
[4] Brown and May, 1991, p. 40.

The things that were previously out of sight and out of mind now become commonplace. Therefore you use the media as a weapon.'"[1]

Zodiac boats confronting whaling ships. Climbers hanging banners from smokestacks. Divers plugging discharge pipes. The effect, political scientist Paul Wapner writes, is that by

> presenting alternative images of the environment, bearing witness, criticizing predominant modes of conduct, and exposing ecological atrocities, Greenpeace tries to express itself through communication technologies to joggle the minds of the world. It literally speaks through the air waves spanning the globe. Satellite dishes, fax machines, video cameras, and electronic mail services are the tools of Greenpeace's political action. And these are, essentially, entry ways into the world media network.[2]

In 1977 the US, Canadian, and European Greenpeace groups formed an international umbrella organization, Greenpeace International and registered it as a charity in the Netherlands. "Under the new plan, each national group would maintain its autonomy to a large extent and devise its own local campaigns. An overseeing council with representatives from each of the member countries[3] would meet to make the major decisions. ... Eventually, each voting country would contribute about a quarter of its income to Greenpeace International."[4]

By 1986 Greenpeace International ran three campaigns: toxics, nuclear, and wildlife and ocean ecology.[5] Each campaign had: an international coordinator, a national coordinator in each country with an office, international project directors, and national campaigners.[6] The pulp and paper campaign was a project of the toxics campaign.

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[1] As quoted in Wapner (1996, pp. 53-54).
[2] Ibid., pp. 156-157.
[3] The member countries in 1977 were: Canada, Australia, the United Kingdom, France, the Netherlands, New Zealand, and the United States, with nine regional offices (Brown and May, 1991, p. 68).
[4] Ibid., p. 68.
[5] Dykstra, 1986, p. 45.
[6] Wapner, 1996, p. 49.

The guiding ideas of the toxics campaign in the 1980s were the precautionary principle[1] and pollution prevention.[2] Greenpeace interpreted the precautionary principle to require "that all waste generators apply the most advanced techniques, even if dangers or disturbances in the environment have not yet been demonstrated."[3] And halogenated hydrocarbons, with chlorine being the most prominent halogen, were the target toxics. "Most halogenated hydrocarbons exhibit one or more of the properties of persistence, bioaccumulation, carcinogenicity, mutagenicity, teratogenicity or acute toxicity."[4] The toxics campaign sought to challenge the existence of halogenated hydrocarbons "from three different angles: the product, the manufacturing process and the waste disposal process method."[5]

During the late 1980s, Greenpeace International grew rapidly, with worldwide revenues increasing from $63 million in 1987 to $167 million in 1990.[6] The constant need for Greenpeace to raise money and to capture media attention has brought about critics. Paul Watson, who broke from the group in 1977 to found the more radical Sea Shepherd Conservation Society, views Greenpeace as a "corporation bent on growth and profit. He likens it to Starbucks and Barnes & Noble, saying Greenpeace takes money and publicity away from smaller grassroots groups and inadvertently discourages activism."[7] Greenpeace members are "checkbook" members, providing financial support to the organization but not engaged in activism through the organization.[8]

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[1] Germany, which was a leader in developing the principle of precaution, called *Vorsorgeprinzip*, defined it as policy that is "preventive instead of reactive, employing avoidance and reduction of emissions technology at their source. The essence of *Vorsorgeprinzip* is that "environmental dangers [harm to the environment] and damages shall be avoided as far as is possible'" (Cameron and Abouchar, 1991, pp. 6-7).
[2] Bellion and Bunin, 1988, p. 7; and Dykstra, 1986.
[3] Bellion and Bunin, 1988, p. 6.
[4] Ibid., p. 8.
[5] Ibid., p. 9.
[6] Peerla, 1997, p. 20.
[7] Kerlin, 2001.
[8] Jamison et al., 1990.

The pulp and paper campaign exemplified, wrote Uta Bellion and Lisa Bunin of Greenpeace International, "Greenpeace's efforts to eliminate the generation of halogenated hydrocarbon byproducts [like organochlorines] at the manufacturing process level."[1] The Greenpeace strategy on pulp and paper was consumer education and public pressure.

> Consumer education is aimed at forcing selective buying habits i.e., choosing unbleached or recycled paper versus bleached paper products. Public pressure, supported by scientific arguments, will undoubtly [sic] lead to new legislative and enforcement initiatives and ultimately to better environmental performance.[2]

While Greenpeace International officially launched the pulp and paper campaign in 1987, pulp and paper mills had been targets of national toxics campaigners prior to that year. Major sources of water pollution, pulp and paper mills made an easy target for Greenpeace. The first direct action of Greenpeace Sweden, for example, was at a pulp and paper mill in 1986.[3]

Greenpeace International launched the pulp and paper campaign in 1987[4] with the release of the report, *No Margin of Safety*,[5] by Greenpeace USA and Greenpeace Canada. The report, which is discussed in Chapter 9, focused on dioxin pollution from the pulp and paper industry. By 1989 Greenpeace International's pulp and paper campaign encompassed 17 countries across the globe, with a concentration of activities in Europe (including Austria, Finland, Germany, Norway, and Sweden), North America (Canada and the US), New Zealand, and Australia.[6]

The international campaign funded the gathering, publication, and dissemination of technical information, such as *The Greenpeace Guide to Paper*[7] and the translation of a Greenpeace Germany report on the paper industry.[8] The most powerful aspect of the

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[1] Bellion and Bunin, 1988, p. 10.
[2] Ibid., p. 11.
[3] Brown and May, 1991, p. 132.
[4] Ibid., p. 142.
[5] Van Strum and Merrell, 1987.
[6] Kroesa, 1999; Brown and May, 1991, p. 177.
[7] Greenpeace International, 1990.
[8] Greenpeace International, 1990.

international campaign in Europe was it enabled Greenpeace to link actions targeting the major producers (Finland and Sweden) and consumers (Germany, Great Britain, and The Netherlands) of paper products. Thus Greenpeace could create consumer demand in Germany for environmentally friendly pulp produced in Sweden.

In addition to the work of the national offices, regional Greenpeace campaigns lobbied for more stringent regulation of AOX discharges from the pulp and paper industry through the regional commissions with authority over pollution in the Baltic Sea and North Atlantic, including: the Helsinki Commission (HELCOM), with responsibility for pollution into the Baltic Sea and the Paris Commission (PARCOM), with responsibility for the North Atlantic.[1]

In the early years, from 1986-1988, Greenpeace Sweden proved to be quite effective at moving its problem definition onto the public agenda by capturing media attention through cleverly designed direct actions. In particular, Greenpeace brought to media attention the issue of dioxin pollution from pulp mills. While Greenpeace also presented scientific arguments at public hearings on pulp mill environmental permits, it made little progress in its goal of eliminating chlorine discharges through the regulatory process.

7.2.1 Creating the problem: dioxins or AOX?

The Greenpeace pulp and paper campaign in Sweden (as well as internationally) had a love-hate relationship with dioxin. As organizers Greenpeace staff worldwide embraced dioxin because the media interpreted it as an extremely toxic substance that people should not be exposed to. As agents of change in pulp and paper production, however, Greenpeace

[1] While both commissions established recommended AOX effluent standards, they were irrelevant because Swedish mills were below the standards. In 1990 HELCOM established a discharge level of 1.4 kg AOX/ton of pulp to be achieved by 1995 (Auer, 1997, p. 359). And two years PARCOM established a much more stringent discharge level of 1.0 kg AOX/ton of pulp to be achieved by 1993 (PARCOM, 1992).

campaigners despised dioxin because it distracted from the broader goal of eliminating all organochlorine (AOX) discharges.

> Swedish Greenpeace tends to show signs of irritation at the mention of dioxins. 'Dioxins are very fashionable,' says Margaret Rainey [pulp and paper campaigner for Greenpeace Sweden], 'but they're only one of thousands of really nasty [chlorinated] substances floating around, many of which could be worse but which aren't necessarily known to us yet.'[1]

While Greenpeace wanted to focus on chlorinated organics as a class of chemicals, it focused on dioxins because that was the interest of the media. The media can shape the message of environmental groups, as the sociologist William Gamson (1993) finds, by "deciding which frame sponsors [spokespeople] will be granted standing and selecting what to quote or emphasize" (p. 119). In the case of dioxin versus AOX, this is what happened according to former Greenpeace Sweden campaigner, Rune Leithe-Ericksen:

> Greenpeace in Sweden focused on all chlorinated compounds as measured by AOX. We recognized the need to address compounds as a group rather than compound by compound. And the authorities now see that as the case ... The EPA followed AOX, but the media liked dioxins. 'Dioxin' sounds toxic and is toxic.
>
> The media wants simple messages. Today it is difficult to communicate environmental issues because of their complexity. AOX is more complicated than dioxin and no one wants to read about it. The public wants something easy and the media wants something to focus on.[2]

Swedish reporters were receptive to covering the dioxin in paper pollution story in 1987 because they had covered other dioxin stories, including dioxin in breast milk, in 1985 and 1986.

Greenpeace willingly accepted the dioxin channel to the media. In fact, Greenpeace promoted the whole issue of dioxin content in products. Shortly after the release of *No Margin of Safety* in August 1987, documents were leaked to the Greenpeace USA revealing that "dioxin had been found in virtually all household paper products including diapers, sanitary products,

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[1] Rusbridger, 1988.
[2] Ibid.

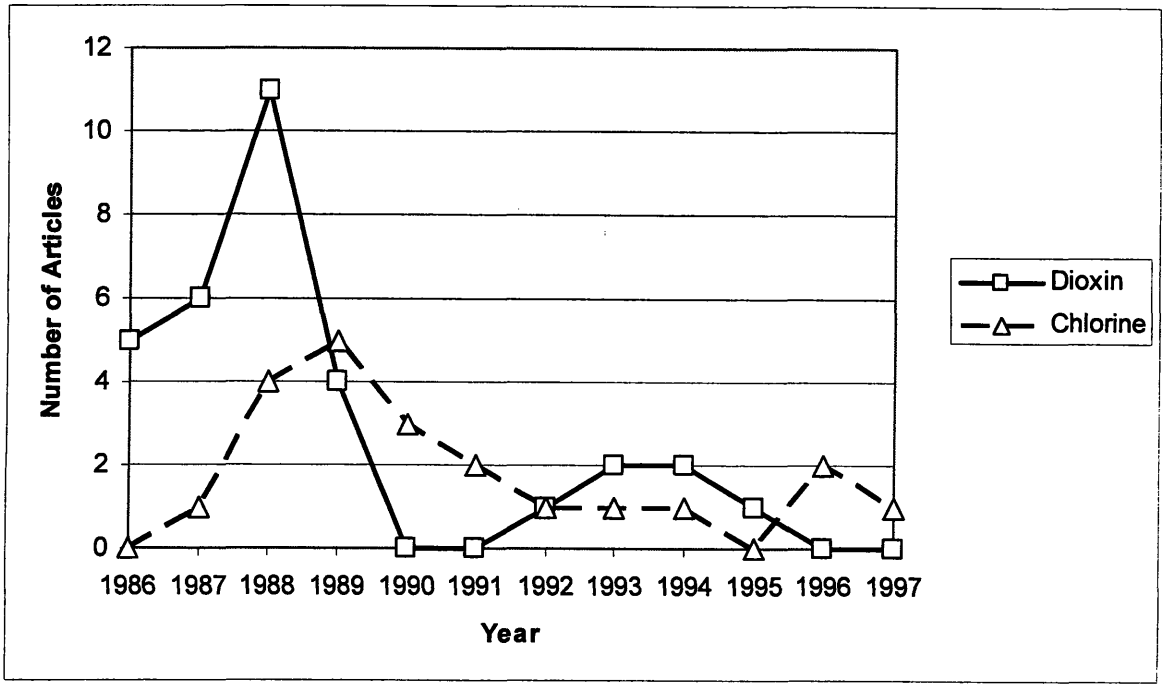
facial tissue, toilet paper, kitchen towels, copying paper, and coffee filters."[1] Through its internal electronic mail system, the news of dioxins in paper products quickly spread among toxics campaigners working on pulp and paper. Greenpeace Sweden quickly disseminated that news in Sweden. As Bryntse recalled:

> Greenpeace made that argument, that coffee filters were unsafe. In 1987 some person in the US discovered dioxins in diapers. That was big news and Greenpeace distributed that news in Sweden. And some German compared unbleached and bleached coffee filters and found that the bleached coffee filters leached dioxins. That was big news too. Within half a year all you could find on store shelves were unbleached filters.

Despite the lament of Greenpeace Sweden campaigners that the media was only interested in dioxin, over time Swedish reporters did write stories related to the problems of chlorine. Figure 7.5 illustrates the degree of general newspaper coverage of dioxin versus chlorine-related stories between 1986 and 1997. "General coverage" means any story where dioxin or a chlorine-related issue is a central feature (i.e., listed as keyword) of the article. "Chlorine-related issues" covers chlorine compounds, chlorine discharges, and chlorine bleaching. Figure 7.5 highlights two important findings.[2] First, and not surprising, dioxin received much more press than chlorine-related issues from 1986-1988: 22 articles on dioxin versus 5 articles on chlorine issues. Second, and this is the interesting part, chlorine issues became somewhat more popular between 1989 and 1997: 14 articles on chlorine versus 10 articles on dioxin. Environmental issues addressed under "chlorine," along with pulp and paper, were the chlorinated plastic, polyvinyl chloride (PVC) and ozone depleting chemicals.

[1] Greenpeace International, 1990, p. 17.
[2] This was a general search, not just for dioxin or chlorine issues related to the pulp and paper industry, in order to understand general media coverage of these chemicals.

Figure 7.5 "Dioxin" and "chlorine" in Swedish newspapers (1986-1997)

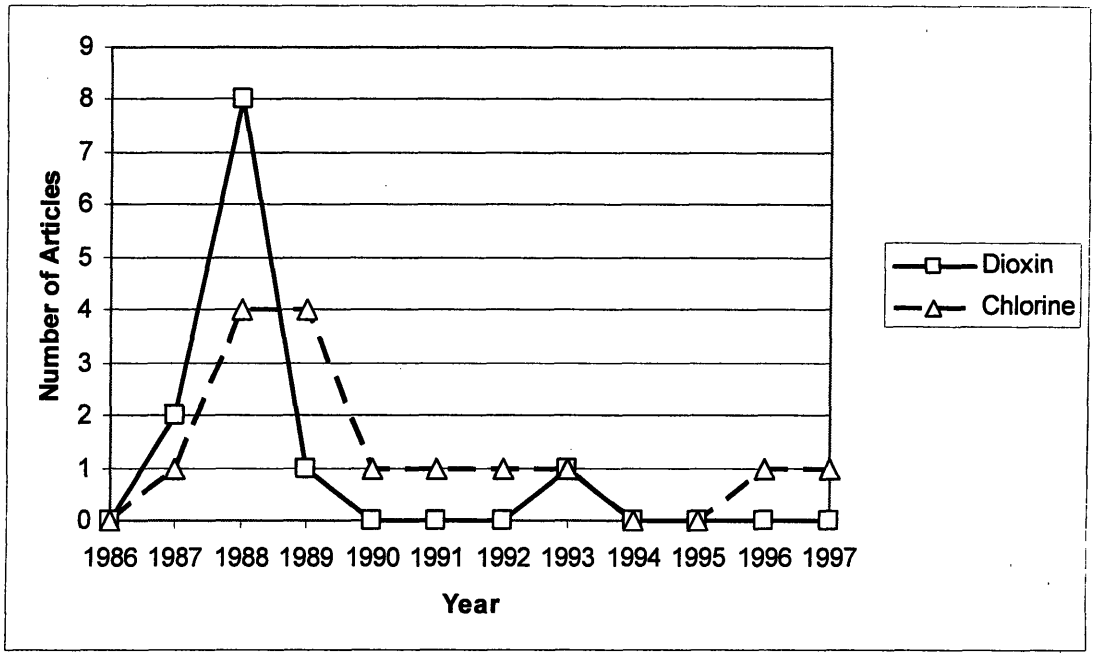


Source: [1]

Figure 7.6 illustrates similar coverage related to the pulp and paper industry. From 1986-1988 dioxin articles dominated: 10 dioxin versus 5 chlorine-related articles. Thereafter, 1989-1997, only two articles addressed dioxin versus eight articles that addressed chlorine-related issues.[2] The sharp decline in both dioxin and chlorine articles after 1989 reflects the view of reporters that the story was no longer worthy of attention. The decline in dioxin articles also reflects the shifting of Greenpeace Sweden's focus to organochlorines. The shift of media attention from dioxin to chlorine does indicate the capacity of environmental NGOs to alter the media discourse over time

[1] ArtikelSök database, search for "dioxin*" and "chlorine*" performed in 1998.
[2] Two articles overlapped, one in 1988 (Bendroth, 1988) and another in 1993 (Hardell, 1993).

Figure 7.6. "Dioxin" and "chlorine" in paper pollution stories: Swedish newspapers (1986-1997)



Source: [1]

7.2.2 Focusing government and public attention: direct actions at Södra Cell's, Värö Bruk Mill (1986 and 1987)

Greenpeace Sweden's pulp and paper campaign began in typical Greenpeace fashion, with direct action. The scene was the gate to the Värö Bruk bleached kraft pulp mill owned by Södra Cell. Located on the west coast of Sweden, the Värö mill was convenient to Greenpeace's main office, which at the time was located in the west coast city of Göteborg. Håken Nordin, the Greenpeace toxics campaigner at the time, described the event:

> On the 15th of May 1986 our first action in Sweden, received national attention. We dumped a half of ton of rotten fish at the front of the mill's gate. This created a huge backup of logging trucks in front of the mill and created a great, visible image. Trucks were backed up for kilometers from the entrance to the mill and the media were there reporting the whole event. It was a great action.[2]

[1] ArtikelSök database, search for "dioxin*" and "chlorine*" performed in 1998.
[2] Nordin, 1998. For published accounts of the action see Brown and May (1991, p. 132) and Lövblad (1996).

The dumping of dead fish was a clever visual image because it surfaced the underwater harm that was caused, according to Greenpeace, by the mill's water pollution. The Värö mill action, Greenpeace Sweden's first, illustrated the capacity of Greenpeace as an organization to bring attention to itself and environmental issues through cleverly designed direct actions. Nearly a year later, Greenpeace returned in March 1987 for another action at the Värö Bruk mill. The stage this time was a public hearing.

To expand production, Swedish pulp and paper mills renewed their operating permit through the Koncessionsnämnden för Miljöskydd (translated as the Licensing or Franchise Board).[1]

> Mill's have production permits that are valid for eternity. But the Licensing Board has the authority to review permits every 10 years. Since few mills have standstill conditions, most have their permits reviewed more frequently. Any time a mill undergoes an expansion in production it needs a new permit. At this time the EPA increases their [environmental] demand. It is almost a prerequisite that a mill reduces overall pollution even as it increases production.
> ...
> The Licensing Board is an open procedure. The mill submits an application and then the Licensing Board gets opinions from the EPA, county administration, local administration, fisheries, neighbors, NGOs, whoever has an interest. Then a public hearing is held to discuss the permit.[2]

In theory the public hearings were an opportunity for input from citizens and NGOs into the activities of pulp and paper mills. In practice, however, Swedish NGOs and citizens seldom participated in the hearings. The result, permit renewal was a consensual process among government authorities and mill management.[3]

In 1986 Södra Cell decided to expand production at its Värö mill. In preparing data for its application to the Licensing Board, Södra Cell discovered dioxin in crabs downstream from

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[1] The Licensing Board was eliminated with the passage of the Swedish Environmental Code in 1999.
[2] Jirval, 1998.
[3] See Chapter 5 for further details.

the mill in late 1986.[1] The presence of dioxins in crabs downstream from the mill set the stage for Greenpeace Sweden to change the dynamic of Licensing Board public hearings.

For the public hearing in March 1987, Greenpeace Sweden organized local citizens to attend the hearing and advocate for more stringent regulations on organochlorine discharge from the mill. It also developed yet another clever hook to capture media attention and broaden public awareness of the problems posed by industry pollution. In the words of Håken Nordin:

> We raised local opinions on pollution from the mill and many people attended the meeting. TV stations were there, we dressed up as waiters, and served a crab salad sandwich to management on TV. It was a win-win situation for us. If he did not eat the sandwich we would say, 'see, dioxins are bad for you.' If he ate the sandwich we would say, 'look he's exposing himself and the rest of us to dioxins.' He ate the sandwich. That was awfully good coverage.[2]

The actions on the Värö mill certainly made an impression on Södra Cell staff, as Roland Lövblad (environmental manager), candidly admitted years later when the company had committed to chlorine-free bleaching:

> In 1986 we also got the first "Dioxin-alarm' connected with pulp production in Sweden, when results were published regarding the analysis of dioxins in crabs caught outside our Värö mill. The reaction from the environmental authorities, the newspapers and the environmentalists was immediate: The Värö mill was polluting crabs -- an important foodstuff -- with the deadly poisonous dioxins, and chlorine bleaching was to blame![3]

Greenpeace Sweden demanded the Licensing Board restrict discharges to less than 1 kg AOX per ton of pulp,[4] the same discharge level recommended by the SSNC in its criteria for chlorine-reduced environmentally friendly paper. In its final decision, the Licensing Board required the Värö mill to reduce discharges from 5.0 to 1.5 kg AOX per/ton of pulp: less than what Södra Cell wanted, more than what Greenpeace advocated for.[5] It is impossible to

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[1] Lövblad, 1998. Christoph Rappe did the analysis that identified the dioxin contamination in the crabs and became the leading Swedish researcher on dioxin contamination downstream of pulp mills (for example, see Rappe et al., 1989).
[2] Nordin, 1998.
[3] Lövblad, 1996.
[4] Nordin, 1998.
[5] Auer, 1996, p. 148.

ascertain the extent to which the Licensing Board's final decision was more restrictive because of Greenpeace Sweden's action and organization. But the presence of Greenpeace Sweden at the public hearings created a political counterweight to industry and created a middle ground for the Licensing Board to operate in.

The action revealed the potential for environmentalists to change the dynamic of public hearings, raised the issue of exposure to seafood contaminated with dioxin through the media, and challenged the Licensing Board and Swedish EPA to be more aggressive in their demands upon industry. "In the months to follow, Greenpeace Sweden attended permitting hearings of other sulfate pulp mills, gaining similar results."[1]

While direct action helped to capture media attention, Greenpeace Sweden used scientific evidence to capture the Licensing Board's attention. To support demands for change, Håken Nordin met with scientists working on Environment/Cellulose I to both gather information and recruit them to support the position of Greenpeace Sweden:

> The scientists I worked with included Professor Anders Södergren at Lund; he=s an ecologist. I had good meetings with Ake Larson and Bengt Erik Bengtsson at the Brackish Water Institute, which is south of Stockholm. The brackish water lab was very important to my work. I met with Staffan Lagergren at the Swedish EPA. They were cooperative and gave me a lot of information. I came in as a polite and interested individual in their work: 'can you help and train me?' They helped me a lot. I also remember meeting with Peter Axegård to get an industry perspective. I got information from the experts and personally met with all of them.[2]

Anders Södergren, Bengt Erik Bengtsson and Staffan Lagergren were researchers on the Environment/Cellulose I project.[3]

Nordin translated the technical data into information to mobilize politicians and regulatory authorities to action:[4]

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[1] Ibid., p. 148.
[2] Nordin, 1998.
[3] See Södergren (1989).
[4] See Hays, Chapter 14, The Politics of Legislation, Administration, and Litigation.

> Then we [Greenpeace Sweden] packaged the information in a different way to get publicity and to get action. I could go further and say more than they [scientists] could. ... The data were widespread [on the hazards associated with chlorinated organics from pulp mills], including the skeletal deformations of fish. Bengt Erik Bengtsson did those studies and the scientists were quite worried, but they could not do anything. Suddenly Greenpeace became a way for them to get the information out. They had a lot of information and we put it out.[1]

Greenpeace Sweden went further than the scientists by arguing that AOX discharges from the mills were the cause of skeletal deformities in fish and that dioxin-contaminated seafood posed serious hazards to human health. The difference between the positions of Greenpeace Sweden and the Environment/Cellulose scientists on AOX discharges was slight: the scientists acknowledged an association between AOX discharges and adverse ecological effects, but not a direct correlation, as argued by Greenpeace Sweden.

On dioxin exposure from seafood, Greenpeace Sweden took a more precautionary approach than SEPA. SEPA'S position on dioxin exposure from seafood, while ambiguous, tilted to qualifying existing exposure levels as safe. In 1988 SEPA assured consumers of seafood that occasionally exceeding the weekly dioxin exposure limit of 35 pg/kg would not pose significant health risks, despite warning that exposure levels higher than this level over an extended period was undesirable.[2] Greenpeace Sweden, however, argued that exposure to dioxin in general was a problem and that exposure from seafood, especially in combination with other sources of exposure, was unacceptable. Dioxin exposure is a serious public health threat because "2,3,7,8-TCDD is the most hazardous chemical toxin known," "it is carcinogenic," and worst of all, causes "genetic and reproductive damage." In particular, "The consumption of 30 grammes of Baltic salmon a day (the average amount for Scandinavia) may result in an ingestion of dioxins", making seafood consumption the largest nutritional source of dioxin exposure: "10 to

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[1] Nordin, 1998.

[2] From Swedish Environmental Protection Agency (SEPA, 1988, pp. 190-192), as cited in Auer (Auer, 1996, pp. 92-93).

60 times greater than that via dairy fats (average daily consumption around 100 grammes), the second largest nutritional source of dioxins."[1]

On both dioxins and AOX discharges the position of Greenpeace Sweden was aligned with prevailing science, but Greenpeace Sweden was willing to make definitive statements of causal relationships that scientific evidence could not support. A scientific challenge environmentalists confront is overcoming the difficulty of proving correlation between pollution and specific adverse human or ecological effects. As Ehrlich and Ehrlich (1996) conclude:

> With most environmental problems, the analysis is considerably more difficult [than with smoking tobacco]. Neat experiments and simple statistical tests usually are not adequate or feasible and attempts to find statistical correlations (as in the case of smoking and health) between possible causes and effects seldom yield clear-cut results (pp. 28-29).

Given the frequent lack of statistically significant correlations between pollution and adverse effects, i.e., scientific uncertainty, a question environmentalists confront is how far to push available data. A prudent course of action for environmentalists is to both acknowledge the uncertainty and to argue for action in the face of uncertainty rather than make unsubstantiated claims of damage that can weaken their credibility while strengthening the credibility of opponents. As the American anti-toxics activist and executive director of the Center for Health, Environment and Justice, Lois Gibbs writes in a chapter on organizing, "Never lie" and "Never tell half-truths."[2]

Taking action in the face of scientific uncertainty is an element of the precautionary principle, the premise of which Sweden adopted in its Environment Protection Act of 1969 and re-affirmed when it signed the Second North Sea Conference Ministerial Declaration (London Declaration) of 1987. *Precaution* is a guiding principle of Swedish environmental law, as stated in the Environment Protection Act:

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[1] Greenpeace International, 1990, pp. 14-15.
[2] Gibbs, 1995, p. 186.

> Anyone performing or intending to perform environmentally hazardous activity shall take such protective action, tolerate such restriction of the activity and take such other **precautionary measures** as may reasonably be demanded for **preventing** or remedying detriment. ... [emphasis added][1]

And the London Declaration of 1987 reaffirmed the need for precautionary action:

> ... [I]n order to protect the North Sea from possible damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence.[2]

Yet the Swedish government and environmentalists still have the burden of proof of showing harm. As Greenpeace International stated in its paper guide, the paper "industry makes assurances that it will eliminate organochlorine discharges if these are ever proven to cause environmental destruction. This means that before any negotiations over a clean-up can begin, irreversible damage to the environment must first be scientifically documented."[3] That industry demands a high level of proof of harm for action is not surprising. As Nils Jirval, environmental director of the Swedish Forest Industries Association explained:

> The main focus for my job and colleagues is to keep an eye on politicians. Sometimes politicians make stupid decisions that are not based on science. They would drive us crazy if we had to meet all the proposed regulations. We respond because we can't invest all kinds of money just to satisfy politicians. Regulations must be based on environmental fact.[4]

7.2.3 Touring the Munksjö Aspa Bruk mill: Greenpeace Sweden brings in the media and government (1987)

A few months later, Greenpeace Sweden again was on the direct action trail, this time using the Greenpeace International ship, the *Beluga*. The toxics campaigners launched a 45-day tour from May to June 1987 along the southern Swedish coast and into the great lakes (Lakes Vättern and Vänern) to "highlight the problems caused by the untreated discharge of synthetic

[1] Swedish Ministry of the Environment, 1996, Section 5.
[2] As quoted in Cameron and Abouchar (1991, p. 5).
[3] Greenpeace International, 1990, p. 19.
[4] Jirval, 1998.

chemicals."[1] The main targets of the tour "were chemical industries, municipal sewage treatment plants, and pulp and paper factories."[2] The pulp and paper highlight of this trip was a stop at the Munksjö mill in Aspa Bruk on Lake Vättern, where Nordin led a tour of environmentalists, journalists, and government officials through the mill.

> Yes, that was a nice action. We sent mail to the local and national government, to management, and journalists that we tour the Aspa Bruk mill. We ended up having an open day at the mill. We took the Beluga up to the mill=s dock -- we had environmentalists, journalists, and staff from the environmental department and the ministry of environment onboard-- and I led this group on a tour of the mill: >I am going to show you the industry.' Greenpeace had high status then and very few people dared to stop us from doing anything.[3]

Greenpeace Sweden coordinated this event with the local environmental group, Save Vättern Committee (Rädda Vättern Kommittén), which turned out a fleet of 200 small boats to protest pollution from the mill.[4]

The Munksjö mill in Aspa Bruk was a good target for Greenpeace Sweden because of its location and pending permit renewal. Located on Lake Vättern, the Aspa Bruk mill discharges into a lake "highly valued for recreation, fisheries, and as a drinking water reservoir."[5] Because of its location, the mill has always been under tight regulatory scrutiny for wastewater discharges. For example, in 1974 it the first mill to install oxygen delignification in Sweden.

In 1985 the mill applied to the Licensing Board for a new permit to expand production.[6] At the time the mill discharged 5 kg AOX/ton of pulp and was the principal source of organochlorine pollution into the lake, including dioxins.[7] Analyses performed as part of the permitting process discovered dioxins in Aspa Bruk's effluent and elevated dioxin levels in fish

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[1] Brown and May, 1991, pp. 138-139.
[2] Ibid., pp. 138-139.
[3] Nordin, 1998.
[4] Fasten, 1998.
[5] Persson et al., 1989, p. 208.
[6] O'Brian, 1996, p. 19.
[7] Fasten, 1993.

downstream of the mill. "In L. Vättern, sediment contamination by chlorinated organic compounds shows a distinct gradient from the main point source [the Aspa Bruk mill]" and "fairly high concentrations of dioxins were detected in some arctic chars from the lake." The mean total concentration of dioxins in eight arctic char was 45 or 60 pg dioxin equivalents/g whole weight of the fish:[1] "which is about three to four times as high as in salmon from nearby L. Vänern or from the Baltic."[2]

Despite the high dioxin levels in fish, the Licensing Board issued a permit in late 1987 that required the mill to reduce AOX discharges to 3 kg/ton of pulp by installing secondary (biological) wastewater treatment.[3] This was much more lenient than the 1.5 kg AOX/ton of pulp required of the Värö mill. Concerned the permit was too lenient, that wastewater treatment would not reduce discharges of persistent pollutants, SEPA appealed the Licensing Board's decision to the Ministry of Environment. "We appealed most decisions at that time if they were not 1.5 [kg AOX/ton of pulp] or equal because we wanted to set a precedent" and ensure that mills introduced in-process changes, like chlorine dioxide substitution, that prevented the formation of persistent pollutants, recalled Erik Nyström of SEPA.[4]

To what extent Greenpeace Sweden's action at the mill influenced SEPA's decision to appeal the 1987 permit was impossible to ascertain. According to SEPA staff, it was scientific evidence not Greenpeace Sweden's action that prompted the appeal.[5] At a minimum, Greenpeace Sweden illuminated for the SEPA that the Aspa Bruk mill should be of particular concern given its central role as a source of pollution into the beautiful and popular Lake Vättern.

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[1] The mean had two values, 45 or 60 picograms, depending on the measurement technique.
[2] Persson et al., 1989, pp. 214-215.
[3] Nyström, 1998.
[4] Ibid.
[5] Ibid.

In 1988, the Ministry of Environment ruled in SEPA's favor and required the Licensing Board to develop more stringent regulations.[1] When the Licensing Board re-negotiated the permit in the midst of seal deaths and a national election that turned into a referendum on the environment, the permit became a centerpiece in the political debate, with the Minister of Environment, Birgitta Dahl announcing the new permit at the mill during the election campaign.[2] The state of political affairs was, recalled Hans Fastén, mill manager of Aspa Bruk, "where environmental questions were first and economic issues like employment were lower."[3]

According to Fastén, the result was "hard demands to reduce AOX, instead of the 3-5 kg AOX per ton originally promised, it was lowered to 1.5."[4] But the mill did not have to meet the 1.5 kg AOX/ton of pulp until 1992. The final permit allowed the mill to discharge 3 kg AOX/ton of pulp from 1988 to 1991, with a reduction to 1.5 kg AOX/ton of pulp from 1992 to 1994, and finally achieving 0.5 kg AOX/ton of pulp beginning in 1995.[5] The mill actually met these targets years ahead of the regulatory requirements because of market demand (see next chapter). For example, by 1992 mill discharge was 0.4 kg AOX/ton of pulp, well below the 1.5 kg AOX required by the Licensing Board.[6]

For Greenpeace Sweden, the *Beluga* tour was a media success. It included a well publicized meeting with the Minister of Environment, Birgitta Dahl, aboard the *Beluga* to discuss water pollution.[7] And during the tour months of May and June, "Greenpeace" was a central topic (i.e., listed as a keyword) in seven newspaper articles related to the tour.[8] One

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[1] Ibid.
[2] Dahl, 1998.
[3] Fasten, 1998.
[4] Ibid.
[5] Forsström, 1992
[6] Fasten, 1993.
[7] Granehed, 1987
[8] Search of ArtikelSök database in 1998.

reporter even wrote a column, subtitled "Diary from Beluga."[1] In fact the entire year of 1987 was a huge media success for Greenpeace Sweden in general and its toxics campaign in particular. "Greenpeace" was identified as a central feature in 15 articles, 13 of which were related to toxics issues,[2] including two related to pollution from the Aspa Bruk mill.[3]

Increasing Swedish interest in environmental issues and media coverage promoted rapid growth in Greenpeace Sweden. The title of one article aptly reflected Greenpeace Sweden's growth: "Sweden Crosses Over to Greenpeace."[4] And Sweden did crossover to Greenpeace, joining the organization in droves:

> We hit our peak in Sweden in 1987 and 1988, and were able to do almost as we wished. We grew exponentially in the 1980s: from 3,000 in 1985, to 30,000 in 1986, to 90,000 in 1987, to 160,000 1988. With such a large membership and working in such a small country, of only 8 million people, it was quite easy to get national coverage when we did an action.[5]

The rapid growth in Greenpeace Sweden increased the resources available to the pulp and paper campaign.

7.2.4 Pressuring the Riksdag: the Vallviks action (1988)

In 1988, in the midst of a national election that witnessed Green Party politicians becoming members of the Riksdag for the first time, Greenpeace Sweden directed its attention to parliament. To influence government policy Greenpeace Sweden held a direct action at a plant partially owned by the Swedish government and lobbied the Ministry of Environment.

In the spring of 1988 Greenpeace Sweden held an action at the Vallviks Bruk mill[6] in conjunction with the Nordic Council Meeting of environmental ministers in Stockholm. Because

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[1] Hagelin, 1987; Hagelin, 1987.
[2] Search of ArtikelSök database in 1998.
[3] See Danielzon, 1987; Granehed, 1987.
[4] Hultman, 1987.
[5] Nordin, 1998. Also see Brown and May (1991, p. 131) for a published account of the rise in Greenpeace membership.
[6] The mill is located in Vallvik, approximately 250 kilometers north of Stockholm

the government was a partial owner of the mill, Greenpeace Sweden wanted to hold it responsible and expose it as a direct contributor to pollution in the Baltic Sea.

> The most substantial effort by Greenpeace to push parliament was the action at the Vallviks mill. We saw a direct link to the state at the mill because the state had an ownership stake in the mill. We said, 'this is a mill the state can do something about because it owns part of it.' We plugged the pipe at Valviks and would not leave until the mill promised to do something. But nothing ever came of this action.[1]

In addition Greenpeace Sweden campaigners "met with the environmental minister at the time, Birgitta Dahl, wrote a paper to her, and held a press release and some activities."[2]

More in response to the ecological crisis of seal deaths and algae blooms confronting the nation and the rising influence of the Green Party than in response to Greenpeace Sweden the Riksdag passed a bill in the summer of 1988 recommending that mills limit their discharge to 1.5 kg AOX/ton of pulp. While the industry lobbied members of parliament to keep the discharge levels as high as possible,[3] the industry was willing to accept limits on AOX discharges despite the lack of a direct correlation between AOX discharges and adverse environmental impacts. This is because the industry and government had a history of developing regulations based on general parameters of pollution rather than specific environmental endpoints. Nils Jirval of the Swedish Forest Industries Association explained the industry-government position:

> We never regulate any specific chemical. We have overall compounds that we measure: COD, AOX, and BOD, which are indicators of pollution. In the dioxin debate we discussed technologies that could reduce dioxin. We knew if we avoided chlorine in bleaching the formation of polychlorinated compounds would be almost zero. Instead the discharge only included monochlorinated compounds and no chlorinated phenols, dioxins, and furans. That was enough for the authorities: they accepted this and understood that since no harmful substances were formed, there was no need to regulate them.[4]

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[1] Rosander, 1998.
[2] Nordin, 1998.
[3] Rosander, 1998.
[4] Jirval, 1998.

Thus regulating AOX was not contested and the level of 1.5 kg AOX/ton of pulp was accepted as a reasonable level for the industry to attain.

For Greenpeace Sweden and the SSNC the bill was unacceptable. "The parliament was quite weak on TCF," remarked Nordin. "The bill from 1988 set a floor to stand on. It pointed to zero AOX and set a progressive timetable, but it was way behind the technology."[1] Mills were already producing pulp that met the SSNC's criteria for chlorine-reduced paper of less than or equal to 1.0 kg AOX/ton of pulp. Although the Riksdag was behind the technology it was ahead of other governments. Sweden was the first nation to set a national standard for organochlorine pollution. It would be a decade later before the United States set a national standard for organochlorine pollution.

It was at this point, when Swedish consumers moved en masse to unbleached and chlorine-reduced papers, that Greenpeace Sweden followed in the footsteps of the SSNC and turned to the market.

> Then Håken started a consumer campaign. This was a big success. Consumers started to demand unbleached coffee filters, copy paper, and diapers. The consumer campaign gave people a way to act on their concerns. They read about and saw the degradation of the oceans, now they could act. In the Greenpeace Sweden magazine we identified unbleached consumer products and advocated for people to buy them. We tried to find TCF paper at the time, but found none.[2]

7.3 Conclusion

By the end of 1988, the market for paper products in Sweden had changed significantly from 1986. The major producers of printing and writing papers sold chlorine-reduced products. Mölnlycke sold chlorine-reduced diapers. Proctor & Gamble would offer chlorine-reduced diapers in 1989. And many manufacturers of household products -- coffee filters, tissues, toilet papers, tampons, etc. -- introduced unbleached or chlorine-reduced products.

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[1] Nordin, 1998.
[2] Rosander, 1998.

At the center of these changes was the SSNC. Between 1986 and 1988 the SSNC produced the widely disseminated booklet, *Paper and the Environment*, developed criteria that became the dominant definition of environmentally friendly paper products, and persuaded major manufacturers to produce paper to its specifications. Media coverage of the ecological disasters of 1988 brought the SSNC's market campaign to the retail level, to household consumers. Scientific research by SEPA legitimized the causal stories of the SSNC and Greenpeace Sweden. And Greenpeace Sweden helped to diffuse the science and bring media attention to the industry's pollution.

The SSNC achieved its successes by effectively wielding technical information, establishing credibility and legitimacy among both individual and institutional consumers, catalyzing the development of other change agents, and increasing resources available to the campaign. Indicators of the effective use of technical information include people request your materials and services, and act upon the recommendations included in your materials and advice. Central to the effective use of technical information is the development of materials and content that people use for education and guidance. *Paper and the Environment*, the SSNC's booklet, with its problem definition, criteria for environmentally friendly paper products, and listing of environmentally friendly products and producers was a resource guide to all environmentalists and consumer activists. Members of the SSNC used the booklet to organize at the local level. Greenpeace International translated it into English, using it as the foundation for its paper guide. Members and citizens demanded it. Important to the success of the booklet and the entire campaign was its focus on solutions. The SSNC with its criteria and list of alternative products was the first to define environmentally appropriate solutions, and because it created a market for

chlorine-reduced paper, its criteria became the dominant definition of environmentally preferable copy papers until 1990.

In market campaigns credibility with consumers is important to success. Consumers, many who have never been involved in a political campaign (i.e., filled with conflict), must trust environmentalists before they act upon their advice, and Göran Bryntse, a paper engineer by training, became a trusted advisor. That ICA, the nation's largest grocery retailer, approached the SSNC and Bryntse for guidance in developing its paper grading scheme illustrates the level of credibility they had achieved by 1988.

To succeed in market campaigns environmental organizations must catalyze other individuals and organizations to adopt and advocate for their goals. *Change agents*, as Rogers 1995) defined them, diffuse innovations to other individuals and organizations. The SSNC catalyzed the development of change agents up and down the paper supply chain: from individual consumers to manufacturers of paper products. The Association of Local Authorities helped define the criteria and negotiated with manufacturers to produce the paper. Munkedals publicly promoted environmentally friendly paper by using the WWF panda and requested AOX-reduced pulp from its suppliers; which in turn prompted Stora then MoDo and SCA to offer chlorine-reduced papers. Reporters focused the entire nation on the plight of the seals and seas, and the plausible role of paper industry pollution in their demise. ICA tried to influence consumer decisions at the retail level by grading household paper products on their environmental performance through a shelf-labeling scheme. Individual members of the SSNC worked at the local level to persuade friends and local authorities to change their purchasing habits. When a campaign has many different voices advocating for change, the odds for success rise dramatically.

In conjunction with the media coverage of the seal deaths, the paper campaign helped to increase dues paying members within the SSNC, making the printing of 55,000 copies of a 50 page booklet with color photographs front and back a possibility. Campaigns need financial and human resources to operate and grow, and these were available.

The SSNC did not develop a tight coalition to advance environmentally friendly paper with the other environmental NGO active on pulp and paper between 1986 and 1988, Greenpeace Sweden. As discussed in the following chapter, an intense rivalry and competition over ownership of the paper campaign emerged between Bryntse and Greenpeace Sweden. Despite the inability of Greenpeace Sweden and the SSNC to coordinate their actions, they accidentally worked in a complementary fashion. Greenpeace Sweden took the lead in promoting the problem and capturing media attention, and the SSNC took the lead in promoting the solution.

Finally, the campaign had more good fortune: the course of events completely overwhelmed industry opposition to change. Plagued by an onslaught of successive problems -- dioxins in wastewater, seafood, and paper products; deformed fish; massive seal and fish deaths; and national media attention to all of these problems -- the industry was on constant defense between 1986 and 1988. Compounding the difficulty of defending its operations over pollution, Stora broke the informal agreement among major manufacturers to not produce chlorine-reduced paper. Manufacturers attempting to maintain the pre-1986 status quo had no time to develop a coherent and organized defense. They were constantly fighting new crises. The result was disequilibria in the industry as their common ground on limiting environmental competence fractured. Thus the SSNC's campaign moved forward against a disoriented opposition.

The SSNC's environmentally friendly paper campaign is one of those rare campaigns where problems are few and successes are contagious. But, as we shall see in the next chapter, the success was short-lived.

8 Wholesale and retail campaigns to shift the Swedish market: Greenpeace Sweden, Greenpeace Germany, and the SSNC (1989-1998)

Trying to effect change through product innovation and business collaboration were not strategies used by Greenpeace organizations prior to the pulp and paper campaign. Yet these were the strategies Greenpeace offices in Sweden and Germany used to create a market for totally chlorine-free (TCF) pulp and paper products. When Greenpeace International launched the pulp and paper campaign in 1987 no bleached kraft pulp mill in the world made pulp without using chlorine and chlorine dioxide. By the time Greenpeace International ended the pulp and paper campaign in 1992, however, a TCF market flourished in northern Europe. Greenpeace was the primary cause of this change.

This chapter is divided into five primary sections. The first section examines the evolution of Greenpeace International's technology goal for the pulp and paper industry. The second section describes how Greenpeace's competition with the SSNC temporarily undermined the diffusion of TCF technologies. The third section explores the successful Greenpeace campaigns to persuade major consumers of bleached kraft paper in Sweden and Germany to buy TCF paper. The fourth section details the major arguments of the ECF-TCF debate, which would prove relevant for the US as well. Finally the chapter briefly touches upon the SSNC's initiative to resurrect its paper campaign in the late 1990s.

8.1 The Greenpeace solution evolves: from 1.0 kg AOX to chlorine-free to TCF to TEF

The initial environmental goal of Greenpeace Sweden in the permit hearings at Värö Bruk and Munksjö Aspa Bruk was 1.0 kg AOX per ton of pulp. With the discovery of dioxins in mill effluent it was immediately apparent to toxics campaigners within Greenpeace that the use of chlorine gas in bleaching operations was the principal source of dioxin in mills and had to be

eliminated. Carol Van Strum and Paul Merrell (1987), co-authors of the report (*No Margin of Safety*) that launched Greenpeace International's pulp and paper campaign, conjectured in that report that: "The bleaching stage is the probable source of most pulp and paper mill dioxins. The first-stage bleaching, to remove most residual lignin, is commonly performed with chlorine gas. It is at this stage that dioxin precursors are mostly likely to form."[1] Van Strum and Merrell's educated guess, that use of chlorine gas in the first bleaching stage was the primary source of dioxin, was later confirmed by reams of analysis in Sweden, the US, Canada, and elsewhere.[2] They concluded that, "To reduce dioxin pollution from the pulp and paper industry, the major goal should be the greatest possible elimination of chlorine and [sic] from all paper production cycles, from the forest to the finished product."[3]

In 1988 Greenpeace International, in consultation with the national organizations, decided that Greenpeace should advocate for chlorine-free paper under the slogan, "chlorine-free by '93."[4] However, Greenpeace campaigners had not settled upon their definition of "chlorine-free." When Greenpeace campaigners said "chlorine-free" in 1988, some meant only the elimination of chlorine gas while others meant the elimination of all chlorine-containing chemicals. How Greenpeace would define "chlorine-free" was a significant campaign decision. It would affect the degree of change campaigners would try to impose upon industry, their ability to claim success, and the perception among staffers of Greenpeace as a radical environmental organization. Greenpeace campaigners were aware of these issues in 1987. An issue they did not foresee was how their decision to focus on campaign chlorine-free paper would be turned against them.

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[1] Van Strum and Merrell, 1987, p. VIII-6.
[2] For example, see US EPA, 1993.
[3] Van Strum and Merrell, 1987, p. IX-1.
[4] Kroesa, 1999; Nordin, 1998.

Some in Greenpeace argued the term was perfectly clear: *chlorine-free* means no use of a chlorine-containing chemical.[1] Others were less certain. "Renate [Kroesa]," the international coordinator of the pulp and paper campaign, "was ambiguous at first concerning [the elimination of] chlorine dioxide," recalled Jack Weinberg, former Great Lakes campaigner for Greenpeace International.[2] This debate reflected a broader internal debate within Greenpeace about how far to push industry.

> There are fundamentalist and pragmatist streaks in Greenpeace. The fundamentalists view clean production as a sliding scale, where there is always another level of improvement. They don't believe in proposing solutions and accepting technologies. The pragmatists, and they dominated the pulp and paper campaign, promote technological solutions.[3]

If Greenpeace had defined chlorine-free as only the elimination of chlorine gas, it would have achieved a quick and relatively easy victory because the primary substitute chemical, chlorine dioxide was already in use at mills. As Van Strum and Merrell predicted, mills would rapidly move to chlorine dioxide.[4] Chlorine dioxide in fact became the dominant substitute for chlorine in Sweden, the US, and the world.[5]

For Greenpeace there were a handful of compelling reasons to define chlorine-free as the absence of any chlorinated substance. First, the continued use of chlorinated substances in bleaching would create organochlorine pollution, including dioxins. Håken Nordin recognized that mills "could reduce organochlorines by 80 percent with chlorine dioxide," but he saw chlorine dioxide "as a dead end road. It was hard to see how a mill could achieve zero AOX

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[1] Nordin, 1998.
[2] Weinberg, 1999.
[3] Ibid.
[4] Van Strum and Merrell, 1987, p. IX-8).
[5] Rooks, 2001.

with chlorine dioxide."[1] Among the organochlorines would be, argued Van Strum and Merrell, dioxin:

> In both hypochlorite and chlorine dioxide oxidation, chlorine atoms are freed, however, and both processes involve some degree of chlorination of residual lignins; any subsequent hot caustic extractions should result in further dioxin formation, although far lower amounts would be involved than in the chlorination [i.e., chlorine gas] phase. [2]

Van Strum and Merrill foresaw two other problems with chlorine dioxide. First, because capital investments in the industry are long-term, expensive cosmetic solutions such as substituting chlorine dioxide for chlorine should be avoided.[3] As Jack Weinberg explained:

> The debate on chlorine dioxide came down to, where will industry put its investment money and what technology will it lock itself into for the next investment cycle. We recognized that industry operates with a long-term [20-30 year] investment cycle. We were willing to contemplate a longer time frame for industry to move away from chlorine dioxide.[4]

Second, the recycling of chlorine dioxide effluents into the recovery boiler could "end up generating as much or more dioxin through combustion in the recovery furnace."[5] This did not become an issue because of the problems caused by sending chlorine dioxide effluents into the recovery boiler.

Another compelling reason to oppose chlorine dioxide substitution was it supported the self-perception of Greenpeace campaigners as radicals. "This was in late 1986, when I started asking, 'Is chlorine-free bleaching possible?'", recalled Nordin. "The most radical answer was 7 years and the most conservative was 15 years. If the most radical person from industry could say 7 years, then Greenpeace could say five years. Our slogan became, 'chlorine-free by '93.'"[6]

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[1] Nordin, 1998.
[2] Van Strum and Merrell, 1987, pp. VIII-6--VIII-7.
[3] Ibid., p. IX-7.
[4] Weinberg, 1999.
[5] Van Strum and Merrell, 1987, p. IX-9.
[6] Nordin, 1998.

While all these factors inclined Greenpeace to oppose chlorine dioxide substitution, it was the rapidly changing market in Europe that prompted Greenpeace to define chlorine-free broadly -- absence of any chlorinated substance -- rather than narrowly -- absence of chlorine gas.

On the technology side three important changes occurred in the industry between by 1990. First, bleached kraft pulp mills began to run individual bleaching lines without the use of chlorine gas.[1] Second, in 1989 a few sulfite pulp mills in Austria and Germany ended their use of all chlorinated bleaching agents. And by "August 1990 there were already a dozen factories in Sweden, Norway, (west) Germany, Portugal and Austria which were bleaching either all or some of their output with hydrogen peroxide -- alone or combined with oxygen -- instead of chlorinated chemicals."[2] Suddenly Greenpeace had an example of the best prevention technology on the market, mills that eliminated the use of chlorine gas and chorine dioxide. Third, some paper products, such as coffee filters, once made with bleached paper were now made with unbleached paper, thereby eliminating the use of all bleaching chemicals.

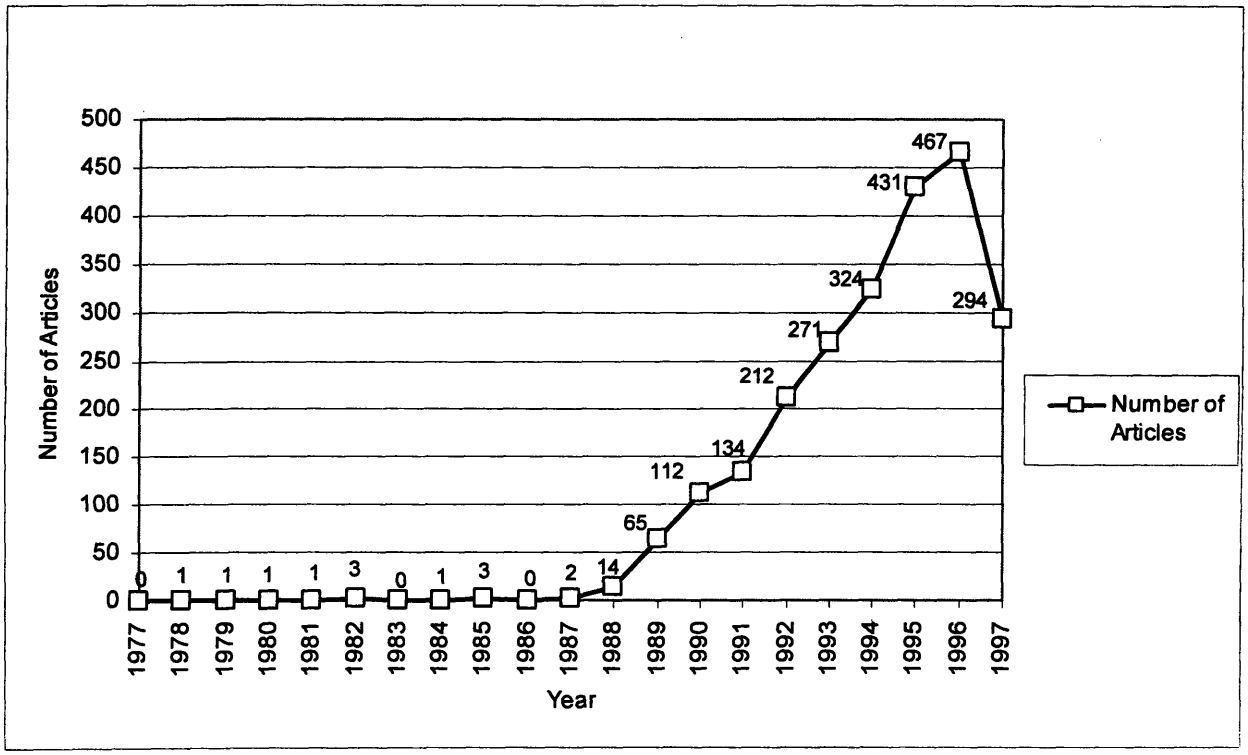
Following the changes in production, marketing managers in Europe began touting their products as *chlorine-free*, with chlorine-free encompassing any of the technologies noted above: kraft pulp bleached without chlorine gas but with chlorine dioxide; completely chlorine-free (no chlorine gas nor chlorine dioxide) bleached sulfite pulp; and unbleached pulp. For example, *The Times* of London reported in 1989 that "Manufacturers are now promising to produce a much wider range of products with chlorine-free pulp, including sanitary towels and nappies [diapers].

[1] For example, seeSvensk Papperstidning, 1989; and Swan, 1989.
[2] Greenpeace International, 1990, p. 17.

Sainsbury is considering other paper products, such as toilet paper, tea bags and coffee filters, as a longer term goal."[1]

The rapid ascent of the paper industry's interest in chlorine-free bleaching is illustrated in Figure 8.1, which depicts the number of articles with "chlorine-free" (as a keyword) in the trade press from 1977-1997. The promotion of paper products containing chlorine dioxide-bleached pulp as *chlorine-free*, as well as the SSNC's definition of *chlorine-free* (which allowed some AOX discharge), offended Greenpeace campaigners.[2] Mills that eliminate the use of all chlorine containing bleaching agents have virtually zero AOX discharge. They still have a small fraction of AOX because organohalogens in the trees.

Figure 8.1 Chlorine-free articles in the trade literature (1977-1997)



Source: [3]

[1] McKee, 1989.
[2] Rosander, 1998.
[3] Search of *Paperbase* database for "chlorine-free" in 1998.

By 1990 the Greenpeace campaigners had aligned themselves behind the broader definition of chlorine-free: i.e., no use of any chlorine-containing bleaching agent, namely chlorine gas and chlorine dioxide. In its paper guide, Greenpeace International defined the solution of the pulp and paper campaign as: "the elimination of all organochlorine discharges by putting an end to chlorine-based bleaching."[1]

Given the controversy that erupted over the definition of chlorine-free, I was surprised to learn that the technical literature in the trade journals supported Greenpeace's broad definition of chlorine-free. A search for the term "chlorine-free" in the Paperbase database (which includes journal articles and conference proceedings worldwide) from 1970-1997 uncovered the first reference related to chlorine-free bleaching in 1978.[2] From 1978 to 1986, eleven articles/conference papers were published in the trade literature on chlorine-free bleaching (see and almost two-thirds (seven) of the articles raised the environmental benefits of chlorine-free bleaching. None of the articles defined chlorine-free as only the elimination of chlorine gas; or to frame it in the positive, all the articles defined chlorine-free as the absence of any chlorinated bleaching agent, including chlorine dioxide and hypochlorite. For example, the conference paper by Chen, et al. (1982) examined the "Economic and environmental reasons for the interest in ... the use of the chlorine-free bleaching agents, hydrogen peroxide and sodium hydrosulphite ..." Another paper defined a "chlorine-free bleaching process" as involving four stages -- oxygen, ozone, extraction, and hydrogen peroxide -- again, no use of any chlorine-containing chemical.[3] Thus historically, industry defined chlorine-free as no chlorine-containing bleaching agents. Even after the chlorine-free definition became politicized, some in industry still supported the broader definition:

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[1] Greenpeace International, 1990, p. 19.
[2] The first reference in 1976 addressed chlorine-free pigments.
[3] Schleinkofer, 1981.

> Several Swedish pulp and paper manufacturers claim to produce chlorine-free products while bleaching with chlorine dioxide. This is dishonest and should not continue since it misleads the public who wish to purchase chlorine-free products. Chlorine dioxide, hypochlorate, and other chlorine containing agents may produce chlorine organic compounds.[1]

When paper companies began promoting chlorine dioxide-bleached paper as chlorine-free, there was a struggle to define these papers. Greenpeace vigorously defended chlorine-free as meaning no chlorine-containing compounds and the many companies using only chlorine dioxide countered their product was chlorine-free as well. The whole issue was further complicated by the SSNC's definition of chlorine-free (see next section), which had become the "Euronorm" by the late 1980s.[2] Out of this struggle emerged two terms: elemental chlorine-free and totally chlorine-free. Elemental chlorine-free or ECF means the bleaching process uses no chlorine gas (elemental chlorine), but uses chlorine dioxide. Totally chlorine-free or TCF means the bleaching process uses no chlorine gas and no chlorine-containing chemicals such as chlorine dioxide and hypochlorite.

A search of Paperbase for "ECF" and "TCF" indicates that these terms first emerged in the early 1990s. Articles using the terms trickled out in 1990 (one TCF article) and 1991 (three TCF and four ECF articles), but began to pour out in 1992 (see Figure 8.2). By 1993 the two terms were firmly embedded in the industry. The advocates for TCF paper were environmental NGOs, with Greenpeace the most prominent, and a few producers of TCF pulp and paper products. The advocates for ECF were most pulp and paper manufacturers, their trade associations, and producers of sodium chlorate (the feedstock for manufacturing chlorine dioxide).

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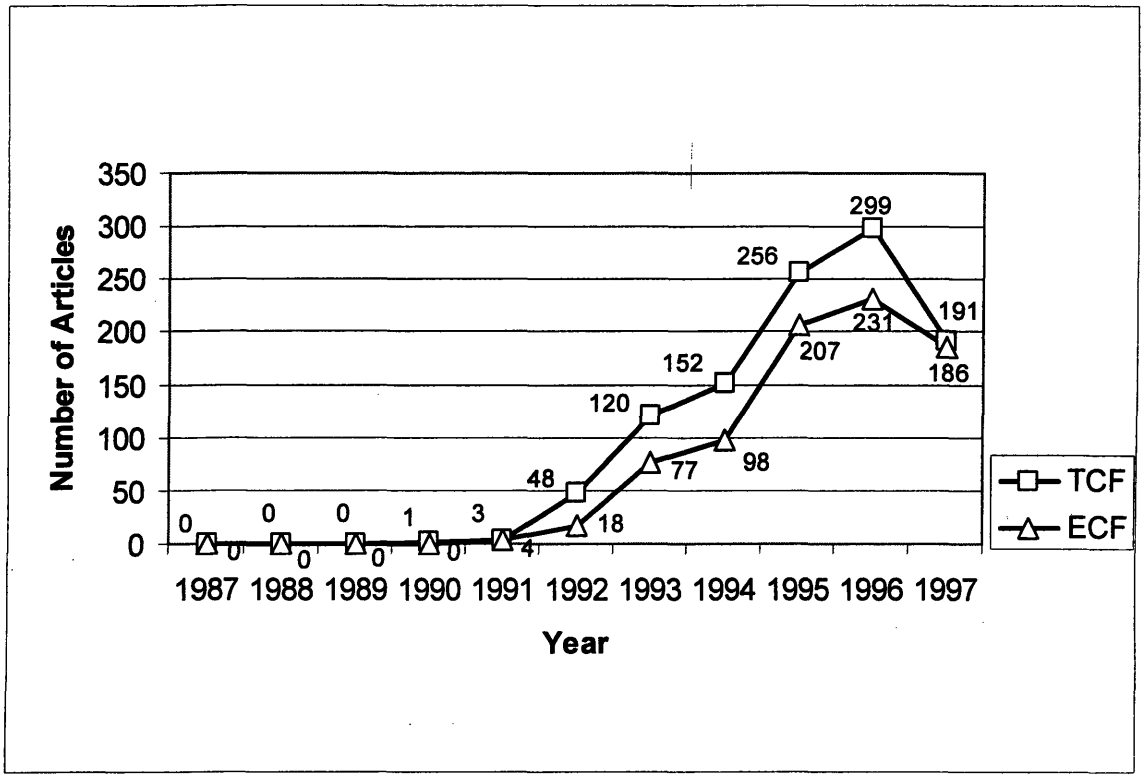
[1] Krantz, 1991, p. 11.
[2] Södra Cell, 1992.

Figure 8.2. TCF and ECF in the trade literature (1987-1997)



Source: [1]

The ECF-TCF distinction worked to the disadvantage of environmentalists. As Mark Floegel of Greenpeace USA recalled, "ECF versus TCF put us in the position of being the hair splitter. You never want to be in the position of the hair splitter."[2] Because, as Christoph Thies of Greenpeace Germany explained, "The need to completely eliminate all chlorine compounds and the slight distinctions between ECF and TCF was far more than Joe Average could understand. This was a very clever move on the part of industry: 'elemental chlorine-free' sounds very much like 'chlorine-free.'"[3] It may be that industry coined the term ECF, but the debate over how to define chlorine-free was fought fiercely between Greenpeace Sweden and the SSNC (see next section).

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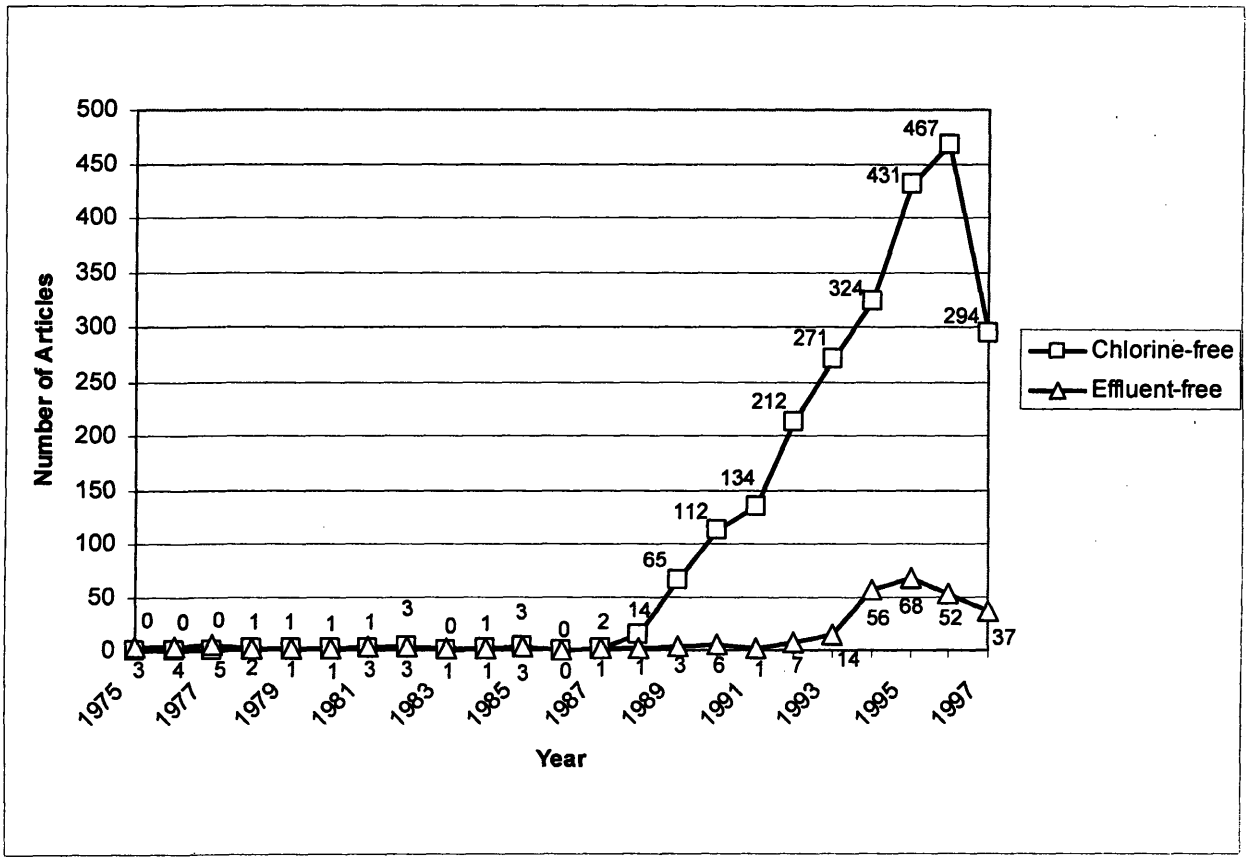
[1] Search of *Paperbase* database for "chlorine-free" in 1998.
[2] Floegel, 1999.
[3] Thies, 1999.

By the 1990s Greenpeace was advocating for TCF as a means to achieving the totally effluent-free (TEF) mill.[1] Reflecting industry resistance to moving beyond ECF and Greenpeace's limited ability to create demand for TEF, "effluent-free" never achieved the prominence these terms and the relevant technologies never received the same attention as chlorine-free. For example, there were far more papers on "chlorine-free" than "effluent-free"[2] in the worldwide trade literature for every year beginning in 1988 (see Figure 8.3). Figure 8.3

Figure 8.3. Chlorine-free and Effluent-free in the Trade Literature (1975-1997)



Source: [3]

[1] Floegel, 1999.
[2] Between 1975 and 1997 there were far more papers on "effluent-free" (273 articles) than "zero discharge" (50 articles).
[3] Search of *Paperbase* database for "chlorine-free" in 1998.

indicates that Greenpeace's campaigning for effluent-free processes may indeed have had an effect on the industry. Articles on effluent-free technologies started a sustained ascent in 1992, the first year that the ECF/TCF distinction had taken hold in the industry.

8.2 Fighting over the technology goal: Greenpeace Sweden and the SSNC

The decision of Greenpeace International to define *chlorine-free* as no chlorine-containing compounds, i.e., zero AOX, put it in conflict with Göran Bryntse and the SSNC. By the end of 1988 the SSNC's criteria for chlorine-reduced paper was the standard for acceptable environmental performance among concerned Swedish consumers, in both institutions and households. As the demand for environmentally friendly papers spread to other western European nations, the SSNC's criteria became informally known as the "Euronorm."[1] And Göran Bryntse, who had created, nurtured, and cultivated the campaign for environmentally friendly paper and was the first environmentalist to raise the problem of organochlorine pollution from pulp and paper mills, had developed a sense of ownership over the issue.[2]

Despite his successes, Bryntse harbored resentment towards Greenpeace Sweden: "Media hungry Greenpeace entered into this campaign and then dominated the media."[3] This bitterness erupted into a major dispute with Greenpeace Sweden on the question of how to define *chlorine-free* paper.

In the late 1980s Greenpeace Sweden tried to persuade Bryntse to change the SSNC's definition of chlorine-free to 0.0 kg AOX/ton of pulp.[4] Bryntse refused. He even refused to have his name listed as a co-author on *The Greenpeace Guide to Paper* (*The Greenpeace Guide*

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[1] Södra Cell, 1993, p. 2.
[2] Bryntse had even received an award from a Swedish television network for outstanding environmental work in 1988 and was featured in ICA's product guide as Sweden's "Doctor of Environmental Paper" (Auer, 1996, p. 147, footnote 5).
[3] Bryntse, 1998.
[4] Rosander, 1998

to Paper, 1990), which was based on a translation of the booklet (*Paper and the Environment*)[1] he co-authored, because he disagreed with Greenpeace's position on chlorine-free paper.[2]

Bryntse made his disagreement clear when the SSNC (i.e., Bryntse) revised the criteria for environmentally friendly paper in 1990. *Environmentally friendly chlorine-reduced paper* was tightened from 1.0 kg AOX/ton of pulp to less than or equal to 0.5 kg AOX/ton of pulp. But most importantly, *environmentally friendly chlorine-free paper* was reduced from less than or equal to 0.2 kg AOX/ton of pulp to less than or equal to 0.125 kg AOX/ton of pulp.[3] Bryntse explained the disagreement in these terms: "I disagreed with Greenpeace's decision to focus solely on TCF [i.e., zero AOX]. I have never found any environmental arguments against ECF paper. 'Chlorine-free' paper for me means, no negative environmental impacts. No one can show any environmental difference between ECF and TCF wastewater discharge."[4] In addition, Bryntse opposed TCF because he thought, "it was an oversimplification of the issue. No pulp will ever be TCF because of contaminants in the wood."[5] While the scientific evidence of harm between ECF and TCF was a matter of debate (see section 8.4 below), the fight between Göran Bryntse and Greenpeace was really over control rather than science.

Reflecting a longstanding unwritten agreement among environmentalists, the fight between the SSNC and Greenpeace Sweden was kept out of the media. "Environmental groups never fight publicly," stated Per Rosander, Greenpeace Sweden toxics campaigner. "We don't

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[1] Bryntse, Johansson, and Ladberg, 1988.
[2] Bryntse's name is prominently feature in the foreward of *The Greenpeace Guide to Paper*: "Greenpeace gratefully acknowledges the invaluable assistance of Dr. Goeran Bryntse of Falun, Sweden. Dr. Bryntse is an expert in paper technology, and this booklet would not have been possible without his immense knowledge of the subject" (Greenpeace International, 1990).
[3] Andersson, 1998.
[4] Bryntse, 1998.
[5] Eiderström, 1998.

want to show our disagreements to the public. It is bad for environmental change and confuses the public."[1]

In 1992 Bryntse's refusal to adopt zero AOX discharge as the definition of chlorine-free created a public relations disaster for the SSNC. Sweden's largest manufacturer of bleached kraft pulp, Södra Cell publicly attacked the SSNC for being weak on the environment. *Svenska Dagbladet*, Sweden's second largest daily morning newspaper, published an opinion editorial ("op ed") article by Roland Lövblad (environmental director of Södra Cell) titled: "SSNC Misleads Consumers: Södra's Environmental Director Criticizes the Society's Definition of Chlorine-free Paper."[2] Lövblad publicly stated what Greenpeace would only say in private when he questioned the SSNC's definition of chlorine-free.

While Södra Cell had resisted demands for dramatic change from Greenpeace Sweden, in 1992 it changed direction (see section 8.3.3 below). Lövblad's attack on the SSNC was, in the words of Per Rosander, "an amazing sight; seeing a corporation ahead of an environmental group on an environmental issue."[3] For Södra Cell, which was producing and marketing TCF pulp, the definition of chlorine-free mattered. It wanted chlorine-free defined to be 0.0 kg AOX/ton of pulp. "Many leading paper producers even within Europe took the 0.1 norm of the Society for the Conservation of Nature [SSNC] as a seal of approval to use chlorine chemical bleached pulp in their paper products. In this way paper based on chlorine chemical bleached pulp could be called 'chlorine-free' with reference to SNF [i.e., SSNC]."[4] A Södra Cell publication explained that the SSNC's definition of chlorine-free "created immense confusion among consumers."[5]

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[1] Rosander, 1998.
[2] Lövblad, 1992.
[3] Rosander, 1998.
[4] Södra Cell, 1993, p. 2.
[5] Södra Cell, 1996, p. 66.

While this dispute was not the sole cause of the distinction -- paper companies claimed their chlorine gas-free products as chlorine-free in the early stages of the SSNC-Greenpeace Sweden dispute -- it did contribute to confusion in Sweden as evidenced by Lövblad's article and it did support a goal of technology laggards to delay change through confusion.

While no one at the SSNC would state it, Södra Cell's blast was the likely reason for the SSNC to change its chlorine-free definition in 1993 to 0.0 kg AOX/ton of pulp.[1] That decision caused Bryntse to leave the organization. His departure was, as Eva Eiderström remembered, painful:

> There was quite a bit of debate within the organization about how far we should go. Göran is a strong person in himself and had quite a bit of ownership with the criteria. Göran left kicking and screaming. Our decision to adopt TCF as a criterion for our products was delayed because of Göran. ... In 1993, we decided we want zero chlorine and chlorine dioxide. In the process of redeveloping the criteria he left.[2]

When the SSNC adopted zero AOX discharge for its definition of chlorine-free paper in 1993, Bryntse felt betrayed:

> I have found no reasons for more stringent regulation, labeling beyond ECF. This led to a falling out between me and SNF. In 1993, Greenpeace had influenced SNF to adopt TCF as the labeling criterion for paper products. I was on the board at the time and vehemently disagreed with this decision. After the decision I could not justify continued work with SNF, and resigned from the board. If you play like children I do not want to be a part of your work.[3]

The SSNC's competition with Greenpeace and Bryntse's strong ego, combined with competition from the Nordic Swan, ended the SSNC's efforts to change bleaching technology. While it is easy to understand how Bryntse would resent Greenpeace -- for years he toils at the campaign, grows it from the grassroots, and when it becomes attractive, Greenpeace jumps in and steals the spotlight -- he allowed his ego to block change, and thereby opportunities for growth and innovation at the SSNC. By refusing to adopt TCF in 1990, meant the SSNC was no

[1] Andersson, 1998.
[2] Eiderström, 1998.
[3] Bryntse, 1998.

longer at the cutting edge of change and would focus its resources on institutionalizing incremental change and promoting technologies that were slightly behind best practices. However, the Nordic Swan, with a much more business friendly approach to ecolabeling, moved quickly to control the position of institutionalizing incremental change. When the SSNC finally decided to promote the cutting edge of bleaching technology in 1993, it found this position dominated by Greenpeace. And the cost to the SSNC of moving to zero AOX discharge was the loss of its pulp and paper expert.

8.3 Innovations in campaigning: Greenpeace Sweden and Greenpeace Germany move the market

From 1989-1992 Greenpeace offices in Sweden and Germany catalyzed sweeping technological change in the bleaching of pulp. The strong green consumer movement in western Europe and its international presence facilitated Greenpeace's promotion and diffusion of TCF pulp. To catalyze change through the market Greenpeace relied on product innovation, business collaboration, and direct action. The four keys for opening the market to TCF were *Das Plagiat*, Munksjö Aspa Bruk, IKEA, and Södra Cell.

8.3.1 Product Innovation by Greenpeace Germany: *Das Plagiat*

By the late 1980s Germany and Sweden were the European nations with the most environmentally conscious consumers. According to a *U.S. News and World Report* article on Europe, the "socially responsible Swedes" were running "a close second to Germany" in terms of green purchasing.[1] Their citizens were leading a European "green consumer" movement that had gained momentum in the late 1980s.[2] West Germany had a head start on the rest of Europe with the establishment of a national ecolabeling program, the Blue Angel, in 1977.[3] By 1990 its

[1] Knight and Dimmier, 1989.
[2] Timberlake, 1989.
[3] Rosen and Sloane, 1995.

consumers were the most environmentally aware among western European nations. A survey at the time of consumers from a handful of western European nations found 82 percent of West Germans claimed to incorporate environmental concerns into their shopping decisions, as compared to 67 percent in the Netherlands and 50 percent in France and the UK.[1] West Germany was also one of the first European nations to have members of parliament from the Green Party.

Greenpeace benefited from the widespread concern for the environment in Germany, helping to make it a powerful force within the country as well as within Greenpeace internationally. Its solid membership base, financial resources, and scientific expertise made Greenpeace a credible environmental NGO in Germany.[2] As a briefing note to a forests minister from Canada noted, "'Greenpeace Germany is a very credible organization and buyers have indicated that if forest managment [sic] practices become an issue they will simply not buy our products.'"[3]

In 1989 Greenpeace Germany established its pulp and paper campaign. A leading producer and consumer of paper products, Germany purchases its virgin pulp from other nations. For example, in 1989 (West) Germany produced 10.6 million tons of paper and paperboard products, making it the European Community's biggest paper producer.[4] But it produced only 10% of Europe's pulp, importing pulp from Scandinavia -- which produced 60 percent of Europe's pulp and from Canada.[5]

Among the German pulp mills were a few bleached sulfite mills, but no bleached kraft pulp mills. Producing a weaker paper than kraft mills, sulfite mills had been losing market share

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[1] Ibid.
[2] Hamilton, 1994; Peerla, 1997.
[3] Hamilton, 1994.
[4] Sutton, Pearson, and O'Brian, 1989.
[5] Roberts, 1993.

to bleached kraft pulp mills for years. The sulfite mills in Europe moved quickly to TCF bleaching to gain a market advantage: "European suppliers have already found that end products incorporating this [chlorine-free sulfite] pulp have a selling edge among environmentally conscious consumers."[1] For Greenpeace Germany, the lack of any bleached kraft pulp producers was an incredible opportunity because it meant the absence of any organized opposition to TCF pulp. As Jack Weinberg of Greenpeace International explained: "Germany and Austria had no bleached kraft pulp mills; they just had sulfite mills, which are easier to make TCF. TCF demand created economic benefits in Germany, so there was no strong, well-financed opposition to TCF. The German mills were not threatened by TCF."[2]

With German sulfite mills switching to TCF bleaching, Greenpeace Germany moved to pressure paper mills to demand TCF bleached kraft pulp from their suppliers in other nations. Christoph Thies, former Greenpeace Germany pulp and paper campaigner tried to persuade paper mills to change their operation: "When I started as a paper campaigner I traveled around the country, visited paper factories, and raised the problems of health and ecological dangers associated with chlorine bleaching." The paper industry made it clear to Thies that they would change not "unless threatened by customers or required by law."[3] While West Germany began taxing AOX discharges from pulp mills in 1989,[4] the tax had no effect on the unintegrated paper mills that purchased their pulp from overseas because they had no bleaching operations. Thies concluded that "The main threat, the main reason to change, had to come through their customers: publishers, advertising designers, advertising agencies, and mail order catalogues."[5]

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[1] Pulp and Paper, 1991, p. 33.
[2] Weinberg, 1999.
[3] Thies, 1999.
[4] Milmo, 1989, p. 12.
[5] Thies, 1999.

A challenge Thies confronted was convincing customers of paper mills to request a product not on the market: TCF bleached kraft pulp. The lack of TCF bleached kraft pulp prompted campaigners to search for a mill producing it. Finally campaigners in Germany and Sweden found one such company: "In 1990, we found a company that could make TCF kraft pulp with only a little loss in brightness."[1]

The mill manufacturing TCF pulp just happened to be the very mill Greenpeace Sweden held an action at in 1987: Munksjö Aspa Bruk. While assessing methods for reducing AOX discharges, Munksjö ran a small batch of TCF pulp. Marketing director, Sam Wiklund saw an opportunity:

> The issue for the Ehrenreich and English, tea bag company was not the question of different levels of AOX, it just wanted zero; to say, we have no chlorine. They were using unbleached and chlorine free sulfite pulps, but couldn't get the right qualities. The company was willing to pay more for less bright TCF pulp, we couldn't believe it!"[2]

This led Munksjö Aspa to rethink its marketing strategy. "Instead of going for high brightness, low AOX grades, it decided to see what market opportunities existed for lower brightness, zero AOX grades."[3] The mill ran its first TCF pulp trials in 1989, achieving 70% ISO brightness that retained the necessary strength properties.[4] A year later it began commercial production of 70% ISO brightness TCF pulp,[5] making it the first bleached kraft pulp mill to commercially manufacture TCF pulp.[6] The market environmentalists had catalyzed for less bright, less polluting paper products conditions in western Europe created the demand for TCF pulp.

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[1] Ibid.
[2] Wiklund, 1998.
[3] O'Brian, 1996, p. 19.
[4] Ibid.
[5] Fasten, 1993.
[6] O'Brian, 1996, p. 19.

Munksjö Aspa Bruk is a small mill by industry standards. Among the bleached kraft pulp mills in Sweden, it was the smallest in terms of annual production capacity, with roughly three percent of the nation's bleached kraft pulp mills.[1] Its bleaching capacity of 140,000 tons per year was significantly smaller than, for example, Södra Cell's largest mill (Mönsterås mill) with its capacity of 395,000 tons per year.[2] In 1990, Aspa Bruk produced 9,600 tons of TCF pulp, expanding to 54,000 tons in 1991 and 79,000 tons in 1992.[3] A niche player in a huge market, Aspa Bruk's production of TCF pulp would have had minimal impact on the market, if no other bleached kraft pulp mill changed production processes.

Thies tried to convince paper manufacturers and publishers in Germany to demand TCF paper, but to no avail. The reply from paper manufacturers was, "there is no demand for less bright, TCF paper."[4] Then "We told publishers, 'the demand for TCF paper must come from you.'"[5] But "They blamed advertisers and marketing departments, 'they demand very bright paper. We cannot change without losing advertisers;'" which represented roughly 70% of the budget for newsweekly *Der Spiegel*.[6] According to Rune Leithe-Ericksen of Greenpeace Sweden, *Der Spiegel* claimed it would have used TCF paper "'if quality TCF paper was available. But it is not. We cannot print a quality magazine on the available TCF paper. The colors and ink don't appear the way our consumers want it. We would be unable to sell it.'"[7] "Everyone in the product chain had an excuse for why they were not responsible for changing."[8] In the end, "There was no pressure on them to change."[9]

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[1] SEPA, 1998, pp. 17-18.
[2] Ibid., p. 18.
[3] Fasten, 1993.
[4] Thies, 1999.
[5] Ibid.
[6] Ibid.
[7] Leithe-Ericksen, 1998.
[8] Thies, 1999.
[9] Ibid.

Frustrated by their inability to persuade any part of the product chain in Germany to demand TCF pulp, Thies and Greenpeace Germany decided to produce magazine-grade paper: if "the industry will not voluntarily push for and develop TCF magazine paper, we must make it ourselves."[1] Greenpeace Germany set out to prove that the industry was wrong by producing a quality magazine-grade paper made with TCF pulp.

> We estimated the loss in brightness in final product would be small, less than 2%. But nobody knew exactly how much loss in brightness would occur. Magazine paper in Germany traditionally contains only 20% chemical pulp, mainly kraft pulp bleached with chlorine compounds. The mechanical pulp was never bleached with chlorine. The magazine paper also included coatings and fillers. Only 20% of the final paper product would suffer from a moderate loss in brightness. And I knew that kraft pulp is not at the surface of the paper; it is in the middle of the paper to give it strength. The surface of the paper is a fine mineral coating and mechanical pulp. ... The theory we operated from was that kraft pulp only imparted roughly 10% of the brightness to the final paper. If the brightness of the kraft pulp itself only declined by 10%, then we estimated overall brightness for magazine paper would decline by 1 to 2%. We knew customers would not recognize such a marginal drop in brightness.[2]

Greenpeace purchased the bleached kraft pulp from Munksjö Aspa Bruk, hired Haindl (a German paper manufacturer) to produce the paper, hired designers to professionally lay-out the 36-page magazine, and printed 200,000 copies of a mock version of *Der Spiegel* (the number one selling newsweekly magazine in Germany), called *Das Plagiat* (*The Plagiarizer*).[3] *Das Plagiat* was complete with articles detailing environmental damage caused by bleached kraft pulp mills, logging damage in British Columbia, and a four-page spread on the TCF pulp manufactured at Munksjö Aspa Bruk.[4] Included in *Das Plagiat* was a postcard to mail to *Der Spiegel*'s parent company, Axel Springer Verlag, requesting that the magazine be printed on chlorine-free paper.

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[1] Ibid.
[2] Ibid.
[3] Ibid.
[4] Greenpeace Germany, 1991.

"The campaign is reported to have resulted in mailbags full of reply coupons on the desk of Der Spiegel's editor."[1]

The production of Das Plagiat was a gold-plated environmental initiative that only a resource-rich organization like Greenpeace Germany could afford.

> Its total cost was in excess of $175,000 dollars (US). ... The Plagiat created a sensation among the Greenpeace pulp and paper campaigners. Who could imagine risking $175,000 on one action? In campaign mythology, the Plagiat became the million-dollar action.[2]

Greenpeace released *Das Plagiat* in January 1991 at an action at the headquarters of Axel Springer Verlag. As Thies recalled, "we dumped a reel of two tons of paper at the entrance, handed out copies of *Das Plagiat*, and spoke to the local press. We forced management into interviews and received quite good local news and TV coverage."[3] But Greenpeace shied away from an aggressive media event for fear of backlash from a media giant like Axel Springer Verlag:

> We could have created a brilliant story on the national TV, but we were a bit afraid of taking on the media. Most Greenpeace actions rely on media coverage. We were insecure in attacking the media because we depend on the media. In March 1991, a few months later, we received the strongest attack on Greenpeace in *Der Spiegel*, accusing Greenpeace of being nothing but a money making machine: this was a revenge for our earlier action against *Der Spiegel*.[4]

The impact of *Das Plagiat* was not on the citizens of Germany, but on the pulp and paper industry. It soundly refuted the position that a quality product could not be produced with TCF pulp. An editorial by the publishers of *Pulp and Paper International* attested to the quality and effect of *Das Plagiat*:

> [The] publication by Greenpeace of *Das Plagiat*, a plagiarized version of the major German magazine *Der Spiegel*, printed on a specially-commissioned chlorine-free lightweight-coated [LWC] paper, has had a profound effect on Germany's publishers. ...

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[1] Södra Cell, 1996.
[2] Peerla, 1997, p. 181.
[3] Thies, 1999.
[4] Ibid.

> For those of you have not seen the end result, we can tell you that the paper was not as bright as regular LWC, but perfectly acceptable to magazine readers. In fact, we would doubt that many buyers of the magazine even noticed the lower brightness. Its publication made it clear that lower brightness could be acceptable to readers, while the loss of strength resulting from the elimination of chlorine need not necessarily cause too many technical problems during printing.[1]

Stung by *Das Plagiat*, publishing houses and paper producers in Germany agreed to purchase TCF pulp. At first the market moved immediately away from pulp bleached with chlorine gas. For example, Haindl, the paper manufacturer used by Greenpeace, stopped purchasing pulp bleached with chlorine gas.[2] The movement was so rapid away from chlorine gas bleaching that prices for market pulp in Germany, "which had been bleached by processes using elemental chlorine, were being penalized for that reason. According to one source, there were sales where the price was reduced by around $20/ton solely because of this."[3]

Axel Springer Verlag began purchasing TCF pulp in the autumn of 1992. When Axel Springer Verlag decided it wanted TCF paper, the mills in Sweden, Finland, and Canada complied. For example, the SCA Graphic, Sundsvall mill, switched to TCF pulp production processes to keep its business with Axel Springer Verlag.[4] The "great majority of other German periodicals followed suit.[5] Following the German lead, demand for TCF rose quickly in northern Europe. "Austria, Switzerland and the Netherlands, as well as the Nordic countries are all now leading consumers of TCF pulp, helping TCF's share of Europe's graphic papers market to more than double from seven per cent to 15 per cent in the past year."[6]

Christopher Brown-Humes writing in the *Financial Times* of London remarked that *Das Plagiat* "must rank as one of German Greenpeace's most successful campaigns:"

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[1] Pulp and Paper International, 1991, p. 54.
[2] Ibid.
[3] Ibid.
[4] Morin, 1998.
[5] Södra Cell, 1996, p. 6.
[6] Brown-Humes, 1993.

> By common consent, the environmental organisation did much to create the consumer pressure which has forced many German publishers, paper manufacturers and merchants to go 'totally chlorine-free' in the last two years. This in turn has forced a number of pulp mills which supply the German market to find substitute bleaching agents for the chlorine compounds they use. 'German Greenpeace took the initiative against chlorine and it has succeeded,' says Pertti Laine, director of the Finnish Forest Industries Federation's industrial and environmental unit. 'We have had to invest billions of markka to change our bleaching methods.' The latest in a long line of such investments will come on stream next month when Metsa-Botnia's Kaskinen mill in western Finland inaugurates a new ozone bleaching plant as part of its commitment to TCF production.[1]

The cost to Axel Springer Verlag was a higher price for paper because TCF pulp sold at a price premium. For Munksjö Aspa Bruk, Södra Cell, and a few other non-Swedish mills,[2] the price premium was an incredible benefit, coming in the midst of a downturn in pulp and paper production. Prices for market pulp plummeted from $830/ton in October 1990 to $500/ton by November 1991. In 1991 the TCF mills received a price premium of $65/metric ton for their pulp and ECF pulp had a price premium of $20/metric ton.[3] The price premium per ton of pulp lasted until 1995.[4]

8.3.2 IKEA -- A Whole New Campaign: Greenpeace Discovers Collaboration

In 1991 the international furniture products store, IKEA, agreed to use TCF pulp in its product catalogues. The reason was Greenpeace Sweden. Hans Hildorsson, Catalog Group Head at InterIKEA, was quite clear about the cause of IKEA's decision: "The initiative for TCF came from Greenpeace. We would not have gone TCF without Greenpeace."[5] Greenpeace succeeded by targeting a company sensitive to its environmental image and developing the trust and confidence of the company's staff.

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[1] Ibid.
[2] The other mills were Empresa Nacional de Celulosas (Portugal), Metsti-Botnia (Finland), and Howe Sound Pulp and Paper (Canada).
[3] Pulp and Paper, 1992.
[4] Wiklund, 1998.
[5] Hildorsson, 1998.

An international corporation that uses large quantities of paper for its catalogues, IKEA was a good target for Greenpeace. In 1992, for example, IKEA produced 100 million catalogues that consumed 45,000 tons of paper.[1] This was part of an image problem IKEA had in northern Europe: it was perceived as a large, wasteful corporation. "IKEA is a high profile company," explained Margaret Rainey, pulp and paper campaigner for Greenpeace Sweden.[2] "Environmentalists often target IKEA because of its reputation as a cheap store that uses resources inefficiently and requires a car to reach. IKEA is also big, profitable corporation, making it a target for showing environmental results."[3]

Hans Hildorsson of IKEA corroborated the image problem:

> In the late 1980s, IKEA became a prominent public company and the economic press started to write about us. We had two environmental issues that received a lot of negative press: formaldehyde and PVC plastic. A company in the public eye, we were selected by the green movement as a target. It didn't matter if we were generally doing a lot of good work. We have a hot name and are selected as a target because we are vulnerable.[4]

Consumer campaigns and negative press hit IKEA in the pocketbook. For example, when formaldehyde was found in IKEA particleboard bookshelves (on the lacquer) in the early 1990s, after IKEA had stated it would use no more formaldehyde, sales of the bookshelves declined temporarily by roughly 25 % in northern Europe.[5]

Greenpeace Sweden and IKEA started their collaborative project in 1991. "In the early 1990s," according Hans Hildorsson, "it was very clear that Greenpeace knew much more about paper and pollution than we did. Also, Margaret was a results-oriented, rather than a confrontation-oriented, person. Her approach fitted us well. We relied upon her figures and

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[1] Hildorsson, 1993.
[2] Rainey, 1999.
[3] Ibid.
[4] Hildorsson, 1998.
[5] Ibid.

facts to a great extent in making our decisions."[1] That Greenpeace produced *Das Plagiat* also gave it legitimacy and credibility in the eyes of IKEA staff. "We had Das Plagiat and this helped: having Das Plagiat in my hand, showing the technical feasibility of that TCF magazine paper was very powerful.[2]

In the mid-1980s managers in IKEA's catalogue division decided they wanted more control over the production side of their catalogues to lower costs. Their first step was to purchase their own paper: "The benefits are you buy directly from the source, get better prices because you assume a lot of risks, and open up a lot of knowledge."[3] When IKEA went to its suppliers, the paper manufacturers, requesting TCF paper they were treated like foolish children: "We were subjected to intense criticism from some parts of the pulp and paper industry and from some companies selling chlorine bleaching chemicals. We were told that we did not know what we were doing. Some even refused to meet our demand for TCF paper."[4] Margaret Rainey recalled the interactions between IKEA and its customers a bit more bluntly:

> The paper manufacturers would tell customers that they didn't know what they were talking about. Customers would say, 'we want chlorine-free paper.' The suppliers would treat them without respect and say, 'chlorine-free paper is not technically feasible.' Then when it became possible, they would say, 'chlorine-free paper is of inferior quality.' The catalogue staff at IKEA said, 'we want chlorine-free paper. If you won't sell it, we will buy from another company.' IKEA dropped one of its suppliers because it refused to supply chlorine free paper. The supplier had made a pact with other mills and clients not to produce TCF paper.[5]

That suppliers treated IKEA's request for TCF with such disdain played to Greenpeace's advantage, it enhanced the credibility of the Greenpeace campaigners because they treated IKEA staff with respect. That any paper manufacturer was willing to lose a contract with an organization that purchases 45,000 tons of paper a year reflected the arrogance of paper

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[1] Ibid.
[2] Rainey, 1999.
[3] Hildorsson, 1998.
[4] Johnson, 1996.
[5] Rainey, 1999.

manufacturers and their view of customers. IKEA's efforts to purchase TCF paper revealed the myth of producers' mantra that "the consumer always knows best."

IKEA staff were so frustrated by the paper industry's arrogance, that they lashed backed. For example, at a paper conference in May 1993, Hans Hildorsson scolded the industry:

> This is what I see when I look at the paper industry: a conservative industry dominated by technicians who can see no other product benefit than the ones that could be meassured [sic] by your instruments. I have a sneaking suspicion that all of you represent nothing but different profit centers in the same company. A company that you have chosen to give the generic name THE INDUSTRY."[1]

Furthermore Hildorsson stressed that the industry was willing to meet the properties desired by art directors, advertisers, and printers of "runability," "printability," and "whiteness," but not the desire of IKEA and the general public for environmental properties.[2] IKEA chose TCF because "From a consumer and a communication point of view it was very hard to communicate that you are almost chlorine free. It is a degree and numbers game that we wanted to avoid. We wanted to be clearly without chlorine."[3]

The notion of working closely with industry to achieve its goal was a questioned tactic within Greenpeace Sweden. While Greenpeace Sweden may agree with a company on one issue, it is likely to disagree on others. Greenpeace thrives on eco-crises and media generating actions. Collaboration operates behind closed doors and out of the limelight. For example, when IKEA refused to hold a press conference announcing its decision to buy TCF pulp, it posed problems for Greenpeace's efforts to promote TCF:

> Unfortunately for us, IKEA never wanted publicity when they made the transition to TCF. They never made it public. IKEA merely added, 'paper published on TCF paper' in small letters at the back of the catalogue. We wanted them to publicize their decision, but they refused. We ended up doing the publicity for them. IKEA has a policy of never talking about environmental issues; it just addresses them quietly.[4]

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[1] Hildorsson, 1993.
[2] Ibid.
[3] Hildorsson, 1998.
[4] Rosander, 1998.

The IKEA campaign conflicted with Greenpeace's need for publicity and its in-your-face approach to industry. Margaret Rainey felt ostracized by members of Greenpeace Sweden because she collaborated with IKEA. "I met with resistance within Greenpeace in Sweden, but I had support within Greenpeace International. The International executive director said, 'sure, try and make it happen.' I was not willing to start a project without International behind me." ... " Greenpeace staff always wanted to confront industry and was unwilling to think about how we could work industry. I wanted to meet with industry, retailers, and talk with them. Others just wanted to do an action."

8.3.3 Södra Cell: The Rise of a Pro-Environment Corporate Change Agent

To move TCF pulp from the fringe to the mainstream of the industry Greenpeace needed more defectors, more producers of TCF pulp, than little Munksjö Aspa Bruk. IKEA, and paper manufacturers and publishers in Germany could request TCF pulp, but until producers manufactured it, there would be no TCF paper products. A major breakthrough for the campaign occurred when Södra Cell, Sweden's largest producer of bleached kraft market pulp decided to invest in TCF pulp. Södra Cell's three bleached kraft pulp mills (Mönsterås Bruk, Mörrums Bruk, and Värö Bruk) manufactured 995,000 tons of pulp in 1996, accounting for 20% of Swedish bleached kraft pulp production.[1]

In 1991, Greenpeace Sweden again Södra Cell, this time it was the Mönsterås mill in southeastern Sweden. Again the unintended invitation was Södra Cell's request for a new permit to expand production. Concerned that Södra Cell planned to expand without investing in TCF pulp Greenpeace targeted the MonsterΔs mill, using its standard recipe: direct action, media attention, and science.

[1] SEPA, 1998.

In 1989, Södra proposed to increase production at its Mönsterås mill from 335,000 to 800,000 tons per year.[1] As part of the permitting process, the Swedish EPA requested a complete environmental study of the mill's receiving water: the Kalmar Straight in the Baltic Sea. When the results were released to the public Greenpeace Sweden released them in Swedish and translated them into English. Greenpeace concluded, "This study proves once again that there is no such thing as dilution for persistent toxic substances, and that the only way to be rid of them is end to their production."[2]

Greenpeace grabbed the public process associated with permit renewal to literally spotlight pollution from the Mönsterås mill. To visualize the impossible to see pollution from the Mönsterås mill, the discharge pipe is under the sea, Greenpeace divers piped the discharge to the surface, creating a huge pollution fountain (see Photograph 8.1).

While Greenpeace pressured Södra Cell for TCF pulp at its Mönsterås mill, Södra Cell researchers quietly experimented with TCF bleaching. The company first experimented with TCF bleaching at its Värö mill in the spring of 1990. But it was not until "A year later, in April 1991, we succeeded, after further trials and tribulations, in producing hardwood pulp entirely without the use of chlorine-based chemicals at our Mönsterås mill. The brightness of this pulp was 80 per cent."[3] When the full-scale trial production was in progress, "our technicians were conducting secret tests in our research laboratory" on the use of ozone as a bleaching agent.[4] By the end of 1991 Södra Cell was, unknown to Greenpeace, producing TCF pulp.

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[1] Pulp and Paper Europe, 1996.
[2] Rainey and Kroesa, 1991, p. 5.
[3] Södra Cell, 1996, p. 44.
[4] Ibid., p. 45.

Photograph 8.1 Greenpeace Makes Fountain of Mönsterås Mill's Water Effluent (1991)

Greenpeace protesterar mot utbyggnaden av Mönsterås bruk, som tillverkar pappersmassa. Utsläppen därifrån går rakt ut i ett område med ett rikt fågelliv. Där häckar häger, skarv och havsörn, som alla lever på fisk. Området norr om avloppet, vid Ölands norra udde, är dessutom av riksintresse för yrkesfisket. FOTO: MATS SAMUELSSON/GREENPEACE

"Mönsterås Future Dreams"

Södra Cell began its research into TCF bleaching, as Roland Lövblad (environmental manager) recalled, due to "a combination of reasons: NGOs, regulations, and markets." An experience of its president, Helge Eklund, was especially critical to approving investments in TCF pulp. Initially reluctant, Eklund became a TCF convert in 1991 when, "In discussions with customers over TCF pulp," he "sold [TCF] pulp before it was even produced."[1]

Suddenly the head of research and development, Steve Moldenius, had the president's support and Södra Cell embarked upon developing a process to commercialize ozone bleaching,

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[1] Lövblad, 1998.

something no mill had done to that date.[1] The result, in September 1992 Södra Cell became the first company in the world to manufacture commercially ozone bleached pulp (beating out Union Camp in the US mill by one week).[2]

What Eklund and others at Södra Cell saw in TCF pulp was a means to differentiate their product. Södra Cell only manufactures pulp. It is not an integrated company, meaning it does not manufacture both pulp and paper. Economically pulp is a commodity product. Hence it is hard to create a brand name and market differentiation around the product. By moving to TCF Södra Cell created an opportunity to distinguish its product in the market. As Lövblad would later say, "We have a niche product, where there are few competitors."[3]

Like the Munksjö Aspa Bruk mill, Södra Cell received a price premium for its TCF product. Hans Burmeister, marketing director of Södra Cell, said in October 1993 his company received a price premium of $58-$87/ton for TCF pulp.[4] "'Thanks to TCF we have higher utilization rates,'" said Hans Ola Wallnaes, purchasing manager at Södra Cell: "Last year the group averaged 93%, while the industry average was below 87%."[5] Södra Cell staff argued the price premium was justified because TCF kraft pulp "is more expensive to produce than ECF kraft."[6]

Södra Cell never acknowledged that it changed because of Greenpeace. Although it did acknowledge that *Das Plagiat* catalyzed the market for TCF paper: "there is no denying that few environmental campaigns have achieved an impact to compare with that of Das Plagiat. When the definitive history of TCF comes to be written, this single-issue magazine will without any

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[1] Ibid.
[2] Pulp and Paper Europe, 1996, p. 13.
[3] Lövblad, 1998.
[4] Brown-Humes, 1993.
[5] Roberts, 1993.
[6] Lövblad, 1998.

doubt be seen as a milestone."[1] But the decision to manufacture TCF was its decision: "In 1991 we decided to choose a new strategy: Instead of opposing the signals from society and the market, we started to listen to them. Our first mission was to develop the technology necessary to stop the discharges of the controversial organochlorines, i.e. the development of Totally Chlorine Free bleaching."[2] When Södra Cell decided to go TCF, Steve Moldenius met with Greenpeace, "but," as Margaret Rainey recalled, "it was not the same as with IKEA where we had a project together. When they decided to turn to TCF they were good about it. They presented their TCF strategy to us and welcomed own opinions."[3]

Simultaneous with its technological development, Södra Cell developed an aggressive marketing campaign for its TCF pulp, which it called "Z pulp": "Z as in Zero, or 0% chlorine chemicals."[4] The marketing campaign included advertisements, staff advocating for TCF paper products, and supporting publications. "What was incredible," Per Rosander recalled, "about Södra was once it started down the TCF path it acted like an NGO. It launched a campaign for TCF paper and developed aggressive materials in favor of TCF. Södra saw a business opportunity and thought international markets were changing: they saw the environment as the wave of future commerce."[5] The advertising campaign first featured a print ad titled, "Are your hands full of chlorine?", which was "published in leading newspapers throughout Europe in the late spring of 1992."[6] A continuous stream of advertising in specialist journals, trade magazines and daily newspapers followed the first ad. Then came a direct mail advertisement to 7,000 people -- including paper manufacturers and merchants, printers, major users and environmental

[1] Södra Cell, 1996, p. 7.
[2] Lövblad, 1996.
[3] Rainey, 1999.
[4] Södra Cell, 1996, p. 1.
[5] Rosander, 1998.
[6] Södra Cell, 1996, pp. 82-83.

officers -- that included an alarm clock and a message "Wake up!"[1] Södra Cell wanted to create the "Z brand name" for its pulp. "We had a unique product and we wanted to tell the market about it, and not just our traditional customers, the paper manufacturers. We also wanted to reach their customers -- the merchants, printers, publishers, large buyers of paper and so on."[2]

Södra Cell's marketing of TCF left few stones unturned. Among the more notable moments included Roland Lövblad's op ed in the newspaper *Svenska Dagbladet* critiquing the SSNC's definition of chlorine-free and Helge Eklund lecturing the US paper industry to see the light on the environment at the 1995 Non-Chlorine Bleaching Conference held in the U.S.

> Many of you in the audience will hope that ECF bleaching is enough. It's not. My conviction is that ECF is not enough as long as competitors are prepared to further and as long as chloro-organics leave the mills with the effluent. Then you will argue that there will be ways of closing the loop also using chlorine chemicals for bleaching. Not so. Let me ask you one question. How will you avoid creating dioxin when burning the chloro-organics in the recovery boiler or the incinerator. You won't.[3]

Södra Cell also launched its own environmental magazine, *Responze*, that included an article title "Killing 4 Myths about TCF."[4] A few years later it printed a booklet, *The Book About Z*, on the history of its TCF development.[5]

Along with trying to create a brand name, Södra Cell wanted to increase general (i.e., beyond itself) demand for and production of TCF pulp. Having multiple producers of TCF had a few advantages for the company. First, large consumers of pulp and paper want multiple suppliers in different countries to insure a steady supply of product. They want to avoid being stuck without paper because its sole supplier is on strike or a natural disaster disrupts production and delivery.[6] Second, Södra Cell also wanted to level the playing field to its advantage by

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[1] Ibid., pp. 82-83.
[2] Ibid., p. 81.
[3] Eklund, 1995, p. 87.
[4] Södra Cell, 1995.
[5] Södra Cell, 1996.
[6] Refkin, 1997.

having all mills invest in ozone. If all Swedish mills adopted ozone bleaching, Södra Cell would have had a first mover advantage in terms of experience working with the technology.

Attracted by the price premium for TCF, a few mills followed Södra Cell to TCF. Swedish mills that joined Södra Cell in producing TCF pulp were SCA Graphic (Sundsvall mill), MoDo Paper AB (Husum mill), Stora (Skutskär and Norrsundet mills), and Vallviks. By 1996, 34% of bleached kraft pulp production in Sweden was TCF.[1] The TCF innovations of Södra Cell and Munksjö Aspa Bruk also catalyzed interest in effluent-free pulp mills.

Beginning in 1992, industry consultants and researchers, and a few pulp mills began aggressively seeking reductions in all their wastewater discharges, not just AOX.

> The environmental improvements have brought closer the day of the effluent-free mill -- one in which internal water systems are enclosed and liquid discharge is virtually non-existent. Eliminating chlorine is an important part of this process because it is so corrosive. A pulp mill being built at Rauma in western Finland will be virtually closed while MoDo and Sodra Cell are among the Swedish companies working to close water systems at some of their mills.[2]

Södra Cell's aggressive campaign tactics won it many enemies in the industry. *Pulp and Paper Europe* captured this displeasure in a muted form when it wrote: "The company attracts considerable attention through its innovative promotional campaign aimed at paper users as well as producers."[3] Södra Cell's response to critics within the industry was blunt and included a tripartite division: reactionaries, the shortsighted, and the skeptics. The reactionaries "have old production facilities which have not been modernised in step with technological developments." The shortsighted have "rather modern production facilities but who in the present recession simply do not consider that they can afford to make the investments which TCF demands." The skeptics "live in the hope that TCF will not be successful. They simply let others work with technical development and wait to see if all the problems that crop up along the way are

[1] SEPA, 1998, pp. 17-18.
[2] Brown-Humes, 1995, p. IV.
[3] Pulp and Paper Europe, 1996.

solved."[1] Södra Cell's decision to manufacture TCF pulp broke the industry's informal pact to produce only ECF pulp. It was significant because Södra Cell is a major producer of pulp in Sweden. Without Södra Cell the TCF market would have died.

8.3.4 Ending the Pulp and Paper Campaign Prematurely (1992)

Greenpeace International ended the pulp and paper campaign in December 1992 because staff in powerful Greenpeace Germany had won, or at least thought they had won, the battle over TCF paper. With International folding the pulp and paper campaign into a broader chlorine campaign, Margaret Rainey decided it was time to leave Greenpeace Sweden. Her position was never filled, ending Greenpeace's work on pulp pollution in Sweden.[2]

When Greenpeace International made the decision to end the pulp and paper campaign, on the surface it seemed like the right decision. By the end of 1992 there were many indicators pointing to TCF becoming the industry standard in Europe. With demand outpacing supply in northern Europe, TCF pulp received a price premium and mills were converting to TCF. In 1993 a vice president of the chemical manufacturer Kemira predicted that "'within three to four years all the pulp in Scandinavia will be TCF.'"[3] By 1994 over 50 chemical (kraft and sulfite) pulp mills worldwide were producing TCF pulp, with 55% (28 mills) of them in Scandinavia and nearly 75% (37 mills) of them in the Germanic speaking countries (Austria, Germany, and Switzerland) and Scandinavia. There was only one TCF mill in the U.S., the world's leading producer of paper, and seven in Canada (see Table 8.1).

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[1] Eklund, 1994, pp. 1-2.
[2] Rainey, 1999.
[3] Roberts, 1993.

Table 8.1. Mills manufacturing TCF pulp by nation (1994)

Country / CONTINENT	Number of TCF Mills		
	Kraft (sulfate)	Sulfite	CTMP
Sweden	12[1]	5	2
Finland	7	0	
Norway	1	1	
Germany		4	
Austria		3	
Switzerland		2	
France		1	
Portugal	1	1	
Spain	1	0	
Czech Republic		1	
EUROPE	**22**	**18**	**2**
USA	1		
Canada	4	2	1
NORTH AMERICA	**5**	**2**	**1**
Brazil / **SOUTH AMERICA**	1		
TOTAL	**28**	**20**	**3**

Source: Albert, 1994

Yet if Greenpeace had looked below the surface it would have seen many other indicators that suggested the international battle for TCF was not won, even within Europe. Of the 42 mills producing TCF pulp in Europe, almost 90% of them were in Scandinavia and the Germanic-speaking countries. This meant that France and southern Europe were well behind the Northern European countries in the transition to TCF pulp. Furthermore the US, the world's leading paper producer, lagged far behind the Northern Europeans and Canada.

Greenpeace International ended the pulp and paper campaign because it was no longer a campaign issue in Germany and because Greenpeace was caught in a financial crisis. After Das Plagiat, demand for TCF pulp in German paper manufacturers, publishing houses, and paper distributors skyrocketed. For example, TCF paper represented 35-40% of photocopying paper in Germany in 1992.[2] Christoph Thies proclaimed the campaign a success by 1993. Thies, reporter Brown-Humes wrote, "is confident the trend towards TCF is irreversible." Thies gave two

[1] Three of the Swedish mills Albert lists as having TCF capacity -- Assi Domän (Karlsborg), Korsnäs, and Stora Cell (Skoghall) -- did not produce TCF pulp in 1996 (SEPA, 1998, pp. 17-18).
[2] Södra Cell, 1992, p. 3.

reasons for his view. "First, increased recycling will create pressure for cleaner input of raw material. Second, he says that chlorine has to be eliminated if pulp mills are to achieve their wider ambition of totally enclosing their water systems so that they discharge no liquid effluent at all. 'TCF is only a step on the way to an effluent-free mill,' he states."[1] Thus Greenpeace Germany was moving onto other campaign issues, including fiber supply and logging of old growth forests. As Christoph Thies and Martin Kaiser of Greenpeace wrote, in 1993 "Greenpeace saluted the victory and turned its attention to the world's last remaining ancient and old growth forests, which are mostly threatened by logging."[2]

It was also during this time that national Greenpeace offices were rapidly losing members, which in turn meant less money for both national offices and the international office. Membership in Greenpeace Sweden, for example, which had peaked at 162,000 members in 1988,[3] had declined by one-third to 110,000 members in 1994.[4] And internationally, membership and revenues were declining as well. For the 1990-1994 period, income for Greenpeace International peaked at $179 million in 1991. It then declined rapidly dropping 27% to $131 million by 1994 (see Table 8.2).

National offices interested in campaigning on chlorine-free paper were allowed to as part of the broader chlorine campaign (part of the toxics campaign), but far fewer resources were available to national campaigners. The implications of folding the international pulp and paper campaign were significant for Greenpeace USA (see next chapter) and for campaigns in southern Europe. As Per Rosander, who was working for Greenpeace International at the time, recalled, "To get change in southern Europe meant changing France, but the campaign never got off the

[1] Brown-Humes, 1993.
[2] Thies and Kaiser, 2000, p. 3.
[3] Brown and May, 1991, p. 131.
[4] Lundqvist, 1997, p. 55.

ground. Our campaigner for southern Europe never made much happen and the public was less receptive to environmental issues in general and environmental purchasing in particular."[1] In Germany, the work started on forestry issues and recycled paper became part of a new forests campaign, which was established in 1993.[2]

Table 8.2. Greenpeace Across the Globe: Members and Income

Year	Members (millions)	Income (million US dollars)
1979	0.030	2.4 (Canadian dollars)
1985	1.0	$ 40
1990	4.8	$161
1991	4.3	$179
1992	3.7	$149
1993	3.5	$153
1994	3.1	$131
1995	3.1	$142

Source: Thomas, 1996

The organizational division of materials -- trees and recycled paper -- in the forests campaign and chemicals in the toxics campaign reflects a failure of Greenpeace to integrally link forests and paper products into one campaign. Yes in their vision statements of the industry Greenpeace did link fiber sources and production. For example, in an op ed article in *Pulp and Paper International* Kroesa, et al.,[3] argued that the pulp and paper industry had to address four key environmental issues: paper consumption, forestry practices, pollution from pulp production, and recycled content. Yet organizationally Greenpeace divided the work into two campaigns rather than establishing one campaign on forests and paper. Had Greenpeace created a forests and paper campaign it could have simultaneously supported both work on pulp mills and forests. Since Greenpeace was contracting in the early 1990s, the trade-off would have been the end of some other campaign that others within Greenpeace thought was critical.

[1] Rosander, 1998.
[2] Peerla, 1997, pp. 242-244.
[3] Kroesa, Floegel, and Thies, 1991.

In retrospect, Christoph Thies lamented the decision to end the TCF campaign:

> It was a strategic mistake was to stop a winning campaign. While PVC, chlorinated solvents, and forestry practices were important issues to pursue in northern Europe after we created demand for TCF paper, we should have continued funding for international work on TCF paper: we could have sped up this process.[1]

Ironically, the withdrawal of Greenpeace from the TCF meant that the leading organization campaigning for TCF pulp in Europe became the pulp manufacturer, Södra Cell. In Sweden, the SSNC tried to revive interest in TCF paper in 1996 to little avail.

8.4 Opposing forces: ECF v. TCF

Just as Greenpeace folded up its pulp and paper campaign, claiming victory and moving on, much of the pulp and paper industry and its chemical suppliers began to re-group around chlorine dioxide and ECF bleaching. For example, the manufacturers of sodium chlorate and pulp and paper formed the North American-based Alliance for Environmental Technology (AET) in 1993 to promote chlorine dioxide bleaching.[2] In Europe, the chemical manufacturer Eka Nobel, producer of both sodium chlorate and hydrogen peroxide,[3] became a major supporter of chlorine dioxide production.[4]

Eka Nobel's interest in promoting ECF stemmed from its position as Europe's leading manufacturer of sodium chlorate with 37 percent (224,000 metric tons) of production capacity in 1994.[5] Eka was also the leading sodium chlorate manufacturer in North America, with 30 percent (477,000 metric tons) of production capacity in 1994.[6] It had smaller investment in

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[1] Thies, 1999.
[2] Pryke, 2001.
[3] Eka Nobel merged with Akzo in 1994 to become Akzo Nobel.
[4] Roberts, 1993.
[5] The next largest producer was Finnish ChemicalsOy with 33 percent of sodium chlorate capacity (SRI International, 1995, p. 732.1001Z).
[6] Ibid., p. 732.1000T.

hydrogen peroxide production, with 13 percent (98,000 metric tons) of European production capacity.[1]

Eka's *The White Book on White Paper* (1993) presented six principal arguments in favor of ECF bleaching. First, "Neither ECF nor TCF produce the kind of chlor-organics which are harmful to the environment."[2] As mills ended their use of chlorine gas, use of chlorine gas ended in Swedish mills in 1993, the generation of persistent and bioaccumulative toxics like dioxins and furans dropped dramatically, often to non-detect levels. Eka concluded that "Toxic, highly chlorinated compounds are not present in the effluent stream if the AOX value is lower that 1 kg ptp [per ton of pulp]."[3]

Environmentalists contend that chlorine dioxide use still results in the formation of detectable levels of dioxins and furans. Studies "suggest that formation of bioaccumulative dioxins and furans, while indeed greatly reduced in mills using ECF processes, continues to occur."[4] This is especially true of furans. For example, Stinchfield and Woods found detectable (as well as non-detectable) levels of furans in effluent from an ECF mill.[5] Dioxins and furans can form in ECF mills because "Gaseous chlorine is inevitably evolved either in the production of chlorine dioxide or in the pulp mixture to which it is applied."[6] While environmentalists make much of these findings, regulatory agencies in Sweden and the U.S. have brushed them off. Erik Nyström of the Swedish EPA quickly explained away this problem: if furans are found "it might be because some chlorine dioxide generators still produce chlorine, and these could react with the organics to produce furans. This is why washing the pulp well is important."[7]

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[1] SRI International, 1996.
[2] Eka Nobel, 1993, p. 3.
[3] Ibid., p. 52.
[4] Ritchlin and Johnston, 1998, p. 11.
[5] Stinchfield and Woods, 1995, p. 120.
[6] Johnston et al., 1996, p. 21.
[7] Nyström, 1998.

Chlorate is another environmental problem associated only with ECF bleaching. Chlorate, "a potent herbicide to which marine brown algae are particularly sensitive,"[1] forms when bleaching with chlorine dioxide. This "problem appears to have largely been solved through modified effluent treatment," Greenpeace scientists acknowledged, although "the situation outside of Scandinavia is unclear."[2]

The most compelling scientific argument environmentalists had in favor of TCF over ECF related to problems common to both bleaching processes as well as unbleached kraft pulp mills: sub-lethal toxic effects on fish. Sub-lethal toxic effects alter the normal physiology of fish but do not result in immediate death. Sub-lethal toxic effects from both unbleached and bleached kraft mill effluents include endocrine disruption, activation of enzymes associated with exposure to toxic compounds, gill and liver abnormalities, impaired reproduction and genotoxicity. The causes are largely attributed to chemicals present in the wood itself.[3]

The toxicity of any mill effluent has led environmentalists and a small segment of industry researchers and producers to favor technologies that move mills to closing the water loop in bleach plants. Greenpeace, and others within industry agree, that mill closure is easier to achieve with TCF technology because it generates far fewer chlorides. "Conventional bleaching with 100% ClO_2 [chlorine dioxide] substitution (ECF) will result in unacceptably high chloride levels" for mills trying to close the water loop, concluded researchers with the pulp and paper consulting firm EKONO, Inc.[4] Chlorides, which damage the recovery boiler, must be removed prior to entering the recovery boiler.

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[1] Johnston et al., 1996, p. 18.
[2] Ibid., p. 18.
[3] Ibid., p. 24.
[4] Mannisto, 1995, p. 70.

A much less compelling science-based argument, though frequently invoked by environmentalists, was TCF "is a true application of the precautionary principle: to avoid harm from the beginning. It is near impossible to investigate what happens with the discharge under real conditions and in different environments."[1] Precaution is invoked here because ECF bleaching results in discharges of AOX,[2] the effects of which we do not know. And since TCF bleaching results in zero AOX discharge, precautionary action directs us away from ECF to TCF. The problem with this approach was, as acknowledged by Greenpeace scientists, "There appears to be no correlation between AOX discharge levels and environmental impact."[3]

Second, and the next strongest argument against TCF was its cost: "TCF costs up to US $100 more per tonne than ECF."[4] Furthermore, as Lennart Ahlgren of Korsnäs AB argued, "'It's questionable whether we should continue to focus on reducing AOX levels'" below 0.5 kg/ton pulp because it "'would mean heavy capital investments and high operating costs -- and the additional environmental benefits are uncertain.'"[5] In the Paper Task Force cost estimates, the greatest difference between ECF and TCF was $12, not $100 (see Chapter 5).

Third, Eka supported the goal of minimal effluent but saw no advantage with TCF: "The best solution is closing the wash-water loop in the bleach plant. A development which is making good progress, with both the ECF and TCF bleaching methods."[6] While Eka and Greenpeace

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[1] Thies, 1999.
[2] ECF mills still produce AOX discharges, though at significantly lower levels than mills using chlorine gas. The level of AOX discharge depends on the kappa number of the pulp prior to bleaching. The kappa number refers to the level of lignin in the pulp. Mills using oxygen delignification and extended cooking, which reduce the kappa number of the pulp, can reach AOX levels of 0.1 kg/ton of pulp, whereas mills not using these technologies can produce 1.0 kg AOX/ton of pulp (Johnston et al., 1996, pp. 16-17). As Johnston, et al., in their report for Greenpeace conclude, "The term ECF can embrace a wide range of process technologies. ... Hence, the term ECF is often applied both to pulp with a high kappa number likely to generate large quantities of AOX and that produced with a low kappa number, implying that much less AOX would be formed" (Johnston et al., 1996, p. 16).
[3] Johnston et al., 1996, p. 22.
[4] Eka Nobel, 1993.
[5] Granvik, 1991, p. 18.
[6] Eka Nobel, 1993.

agreed upon the goal of closing the water loop in mills, the evidence as presented above indicates that closing the loop will be easier with TCF technology.

The remaining three arguments Eka presented were much less compelling and seem directed at its supporters in industry rather than being effective in swaying any agnostics on the ECF v. TCF question. Fourth, "TCF bleaching, for full brightness, is based on a new technology", ozone, for which "there is limited experience."[1] This argument implies that ozone bleaching cannot produce full brightness (89% ISO or greater) pulps. It is true that when Södra Cell first introduced TCF pulp in 1991, it was only at 75% ISO brightness for softwood and 80% ISO for hardwood; levels well-below full brightness (equal to or greater than 89% ISO brightness). However, Södra Cell achieved 89% ISO brightness for hardwood in 1992 and for softwood in 1994.[2] For manufacturers of bleached kraft pulp the most compelling argument not to invest in TCF was the added cost of using ozone bleaching.

Fifth, the "Judgement [sic] of modern bleaching must be done on a scientific basis, rather than an emotional basis."[3] Eka Nobel echoed a common theme of manufacturers that environmentalists do not play by the same rules as industry. For example, the chief of research at SCA, in an op ed in the business newspaper, *Dagens Industri*, attacked Greenpeace in 1991: "Greenpeace will never say anything truthful or objective. ... Chlorine-free is merely a media idea with no factual basis in the forest industry."[4] De Ruvo's comment is particularly ironic, since a few years later SCA was the second largest (after Södra Cell) producer of TCF pulp (320,000 metric tons in 1996) in Sweden.[5]

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[1] Ibid.
[2] Södra Cell, 1995, p. 6.
[3] Eka Nobel, 1993, p. 7.
[4] de Ruvo, 1991, p. 6.
[5] SEPA, 1998, pp. 17-18.

Finally, no pulp is totally chlorine-free because chlorinated organics "occur naturally in wood and are produced by living organisms in the oceans, soil and ordinary water. Chlorine and chlorine compounds, like salt in the oceans, are as essential in the biosphere as oxygen is in the air."[1] Here Eka attempts to undermine the term TCF by stating it is scientifically invalid: all pulp contains organochlorines therefore TCF cannot exist. It is effective for ECF advocates to the extent it moves the discussion away from human-made organochlorines to natural organochlorines and to a discussion of when is TCF "TCF." In both cases it helps to obscure the goal of Greenpeace: eliminating discharges of human-made organochlorines.

The entire set of arguments for ECF proved to be effective in the US. They raised questions for institutional consumers like Time Inc. And the scientific arguments proved effective with US EPA. ECF moved environmentalists into a murky scientific position with no clear toxic villains such as dioxins. Without government requirements for TCF and with the absence of Greenpeace market pressure, the result was ECF dominance of the market. By 2000, ECF bleached pulp production worldwide was 53.1 million metric tons as compared to a mere 5.2 million metric tons for TCF.[2] The strength of the industry backlash on chlorine dioxide revealed a weakness in the market campaign:

> The market is especially important when there is inaction at the legal and political levels: then we can try to bring about change through a voluntary approach. Eventually results must be secured by political and legal action. With the market we can get quick results. But the market strategy is volatile, and if the work stops it can rollback.[3]

8.5 Retail campaigning: the SSNC

Simultaneous with establishing its ecolabeling program, Good Environmental Choice, the SSNC's monopoly over defining environmentally friendly paper came to an end. The Nordic

[1] Eka Nobel, 1993, p. 10.
[2] Rooks, 2001, p. 44.
[3] Thies, 1999.

governments established an ecolabel, the Nordic Swan, which defined a performance standard weaker than the SSNC and Greenpeace Sweden pressed for criteria more stringent than the SSNC. Squeezed between the Nordic Swan and Greenpeace Sweden, the SSNC became a peripheral player in shaping the market for environmentally friendly paper from 1993-1996. Göran Bryntse's fight with Greenpeace was a primary cause of the SSNC's movement to the periphery. Lacking an agenda that distinguished itself from the Swan and coping with an internal battle over its criteria for environmentally friendly paper the SSNC lost its leadership position. It was not until 1997, with the SSNC recovered from Bryntse's departure, when the SSNC tried again to influence the market for environmentally friendly paper products.

8.5.1 Bra Miljöval (Good Environmental Choice)

In 1990, the SSNC and the supermarket chains created Good Environmental Choice, an ecolabeling program that provides consumers with environmental information at the point of purchase.[1] The principal product areas targeted by these initiatives were batteries and laundry detergents, as well as paper products.[2] The SSNC could undertake such expansive actions because it was in the midst of rapid growth. The combination of the ecological disaster of 1988 and the SSNC's visibility at the grassroots resulted in a massive increase in the SSNC's membership, doubling from 100,000 in 1985 to 200,000 in 1991.[3]

The strategy behind Good Environmental Choice was to leverage the purchasing power of retailers to promote the production of environmentally friendly products by manufacturers and

[1] The SSNC translates Bra Miljöval as either "Good Environmental Choice" (SSNC, 1998) or "Good Green Buy" (Eiderström, 1998). Good Environmental Choice is used here because it is the term commonly used in translations. For example, reports by the U.S. EPA (US EPA, 1998) and OECD (OECD, 1997) refer to it as the "Swedish Environmental Choice" ecolabel.
[2] Eiderström, 1998.
[3] Eiderström, 1998.

to foster demand among individual consumers by offering the products for sale and labeling them as environmentally preferable.

> Retailers play an important part in promoting labeled products through their suppliers. Retailers are the real consumers in the market: what they choose is what their customers can choose from. At the same time, retailers have the best contacts with consumers and know first-hand what their preferences are. When they chose to forward these environmental demands to their suppliers it resulted in labelled products on the shop shelves.[1]

The SSNC defined the criteria for each product and identified products that met the criteria and retailers "identified the approved products by placing a yellow label and the text Good Environmental Choice on the shelves in their stores."[2]

The SSNC persuaded Sweden's three largest grocery retailers, with roughly 75 percent of total grocery sales,[3] to participate in Good Environmental Choice: ICA (#1), KF (#2), and Dagab (#2, tied with KF).[4] The retailers participated in Good Environmental Choice because it removed the burdens of developing an in-house program and provided a means for addressing individual consumer demand for environmentally preferable products. As Per Baumann of KF recalled, "It was a very clever [idea] from the SNF [SSNC]. Everybody [in KF] thought it was a very good idea."[5]

The capacity of Good Environmental Choice (as designed in 1990) to effect bleached pulp production was limited because many of the products made from bleached pulp, especially fine printing papers, were not sold in grocery stores. From 1990-1991 Good Environmental Choice promoted the purchasing of chlorine-reduced paper products commonly found in grocery stores, such as diapers.

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[1] Eiderström, 1998, pp. 20-21.
[2] SSNC, 1998, p. 2.
[3] OECD, 1997, p. 17.
[4] According to Per Baumann of KF (1998), ICA had 33%, KF 20%, and Dagab 20% of the grocery sales market.
[5] Ibid.

Good Environmental Choice greatly expanded its labeling opportunities when it unveiled the Falcon ecolabel in 1992. Then any manufacturer that applied for and received certification could display the Falcon on its product, wherever the product was sold. For example, the paper manufacturer Munkedals AB could and did put the Falcon on packaging boxes that contain Environmental Choice certified copy paper. To display the Falcon on its product, manufacturers submit an application that certifies its product meets the SSNC's criteria and pay an application fee. The SSNC verifies compliance by carrying out "inspections by random sampling" or when it suspects non-compliance.[1] Yet just when (1992) the SSNC was positioned to institutionalize its stamp of approval for environmentally friendly bleached paper products through Good Environmental Choice, its criteria were no longer relevant to effecting change in bleached pulp production.

The guiding philosophy at the SSNC is to promote the most environmentally advanced products feasible with existing technology,[2] recognizing that at least one manufacturer must have the capacity and willingness to meet the criteria. "As an NGO," Eva Eiderström explained, "we cannot have a consensus process because there is no way industry [as a whole] will agree to the criteria we develop [because they are too stringent]. Industry gives comments, yes, and theoretically they have a strong position because if we develop criteria they can't meet, then we won't have any participants. But, we don't want to give up the market to industry."[3]

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[1] SSNC, 1998, p. 4.
[2] Although Bryntse challenged this philosophy when he refused to make zero AOX discharge a criterion for environmentally friendly bleached paper (see next section for details).
[3] Eiderström, 1998.

8.5.2 Swan v. Falcon: The SSNC Loses Ground to the Nordic Ecolabel

In 1989 the Nordic Council of Ministers (Ministers of Consumer Affairs) introduced a common Nordic -- Finland, Iceland, Norway, and Sweden[1] -- environmental labeling program, called the Nordic Swan.[2] In its first few years the Nordic Swan struggled to gain acceptance in the Swedish market. Ironically the SSNC helped the Nordic Swan's ascendancy in setting the Swedish standard for ecolabels. According to Magnus Hedenmark of SIS Ecolabeling (the organization responsible for implementing the Nordic Swan in Sweden),[3] "The SNF [SSNC] started ecolabeling in Sweden. Without them we would not have grown as fast as we did."[4] The two major events that promoted the Swan in Sweden were paper campaign and the VIA boycott.[5]

In 1991 the SSNC launched a boycott against VIA laundry detergent, a product of Unilever. The SSNC initiated the boycott after failing to persuade Unilever to introduce an environmentally friendly detergent. Unilever, in Eva Eiderström's (1998) words, "replied that there was no consumer demand for other types of detergents than the ones they already supplied, and that they were extremely hard to manufacture without sacrificing product performance" (p. 18). "The SNF [SSNC] boycott was so successful," Magnus Hedenmark recalled, "that Lever lost roughly 15 to 20 percent of its market share in Sweden."[6] When Unilever decided to reformulate in 1992, it refused to use the SSNC's ecolabel, opting instead for the Nordic Swan.[7]

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[1] Denmark joined the Nordic Swan in 1997 (US EPA, 1998, p. B-24).
[2] SIS Miljömärkning, 1998, p. 1.
[3] The Swedish name of the organization is Standardiseringen I Sverige (SIS) Miljömärkning; which literally translates as the Swedish Standards Institution Ecolabeling. However, the common translation is SIS Ecolabelling, a combination of the Swedish acronym and the English translation of Miljömärkning.
[4] Hedenmark, 1998.
[5] Ibid.
[6] Ibid.
[7] Eiderström, 1998; Hedenmark, 1998.

After Unilever received the Nordic Swan ecolabel, "the other multinationals, Colgate-Palmolive and Proctor and Gamble, soon followed suit."[1]

The SSNC's boycott of Unilever's detergent and Unilever's choice of the Swan as its ecolabel was illustrative of the dynamic between manufacturers, Nordic Swan, and the SSNC. The majority of corporations, according to Hedenmark, "choose the Nordic Swan rather than the SNF [SSNC] because they understand you get more influence here" at the Swan. "If they don't join us, then there is SNF who doesn't listen to business. If you don't have Nordic Swan than NGOs take over [ecolabeling in Sweden]."[2] For bleached paper products in particular and ecolabeled products in general the result is Nordic Swan dominance over the Falcon.

Businesses have greater influence over criteria development at the Nordic Swan than at Good Environmental Choice because they participate in writing the ecolabeling criteria at the Swan,[3] the consensus process of the Swan's Ecolabelling Board tends to the lowest common denominator when conflicts arise among the participating nations,[4] licensee fees pay a greater proportion of the Swan's operating budget,[5] and the Swan lacks the SSNC's commitment to promoting the most environmentally advanced products feasible with existing technology.[6]

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[1] Eiderström, 1998, p. 19.
[2] Hedenmark, 1998.
[3] The expert panels that develop draft criteria for products tends to favor business interests because, as Magnus Hedenmark (1998) of SIS Ecolabelling explained, environmentalists often lack the resources to participate" "NGOs are not always willing to be on the expert panel." But "Companies are interested in being involved. The result, expert panels are seldom balanced," he concluded.
[4] The need for all of the Ecolabelling Board's decisions to be unanimous creates a tendency to move to the lowest common denominator when disagreements arise over criteria. For example, in developing criteria for fine paper products Finnish companies wanted less stringent AOX levels than Swedish companies because the Finnish companies were not prepared to meet the same AOX discharge levels. The resulting compromise was weaker on AOX discharges than was acceptable to environmental NGOs and even many Swedish companies (Eiderström, 1998).
[5] The Nordic Swan's receives half of its funding from license fees and the other half from participating governments (US EPA, 1998, p. B-25). The Good Environmental Choice program receives one-fifth of its funding from licensees, with the remaining four-fifths of funding from retailers (30%) and the SSNC (50%) (Eiderström, 1998).
[6] Eiderström, 1998.

For printing and writing papers the Swan had become the de facto regulatory standard because the majority of consumers will not buy paper without the Swan label in Sweden. As Anne Marie Vass of SIS Ecolabeling said, "The Swan does not have 100 percent market share [in Sweden], but it is hard to sell paper products without the Swan. Companies selling paper feel the impact. 'If we have the Nordic Swan,' they tell us, 'it's easier to sell.'"[1] While this statement could be dismissed as propaganda on the part of the Swan, Eva Eiderström confirmed it:

> In 1992 the Nordic Swan released their criteria. The difference between theirs and ours is that the Nordic Swan still accepts ECF [elemental chlorine-free] and we do not. The paper industry then chose the Nordic Swan for most of its paper products and this has made it difficult for us to eco-label fine paper products.[2]

For fine paper products over the period 1992-1995 the primary difference between the criteria of the Swan and Good Environmental Choice was their allowable AOX discharge. The Swan allowed 0.5 kg AOX/ton of pulp,[3] whereas Good Environmental Choice required zero AOX/ton of pulp (beginning in 1993).

The Swan became the dominant ecolabel for printing papers because with its less stringent criteria for AOX most paper manufacturers, like laundry detergent manufacturers before them, adopted the Swan. Thus ending sometime between 1992 and 1993 the SSNC's dominance over criteria setting, which it had held since 1986. In a nation where almost all printing papers carry the Swan ecolabel and since the Swan's criteria for paper products are more stringent than Swedish regulations, it, in effect, sets the baseline for technology laggards selling paper products in Sweden. While conceivable that Swedish mills could release more AOX for export products, demand for low AOX pollution from Western European consumers prevented that from happening. Given the importance buyers attach to the Swan ecolabel, by choosing not

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[1] Vass, 1998.
[2] Eiderström, 1998.
[3] SIS Miljömärkning, 1996.

to include a zero AOX discharge criterion the Swan provided no impetus to the further diffusion of TCF bleaching (which is necessary to reach zero AOX) in Sweden in particular and Scandinavia in general.

8.5.3 Falcon as phoenix: the SSNC resurrects its work on bleached paper products (1997-1998)

From 1993 to 1996 the SSNC's efforts to promote environmentally friendly paper languished while the organization recovered from the stress of Bryntse's departure. In 1997 the SSNC revitalized its work on environmentally friendly paper by expanding its criteria beyond AOX discharges and positioning itself as taking the environmental highground in contrast to the Nordic Swan. To revitalize work on paper products the SSNC developed new criteria for paper products in 1997 that included criteria for forest management practices and energy use (see Table 8.3). For example, to receive the Good Environmental Choice Rank B classification total fiber content must include 30 percent Forest Stewardship Council (FSC) certified fiber and/or post-consumer recycled fiber. FSC is an international "labeling scheme for forest products, which provides a credible guarantee that the product comes from a well-managed forest."[1] Another requirement of Rank B classification is 30 percent of supplied electrical energy must carry the Environmental Choice ecolabel. Requirements for receiving the Environmental Choice ecolabel for energy include no nuclear power and no power from hydroelectric dams constructed after 1996.[2]

[1] See http://www.fscoax.org/principal.htm.
[2] Eiderström, 1998.

Table 8.3. Summary of Good Environmental Choice criteria for printing paper (1997)

Requirements	Rank A	Rank B
Raw materials ▪ Total of FSC labeled fiber and/or recycled fiber (post-consumer)	80%	30%
Energy Use ▪ Total gross supply of fossil fuel to pulp mill ▪ Gross percentage of supplied electrical energy carrying Environmental Choice ecolabel	0.2 MWh/ton of pulp 60%	0.6 MWh/ton of pulp 30%
Chemicals ▪ Substances not allowed to be added during manufacture of pulp or paper	Chlorinated bleaching chemicals (including chlorine and chlorine dioxide) and 11 other chemicals	Chlorinated bleaching chemicals (including chlorine and chlorine dioxide) and 7 other chemicals
Water Pollutants (bleached kraft pulp; kg/ton of pulp) ▪ Chemical Oxygen Demand (COD) ▪ Phosphorous	 18.0 0.04	 35.0 0.06
Air Pollutants (bleached kraft pulp; kg/ton of pulp) ▪ Sulphur ▪ Nitrogen Oxides (NOx)	 0.4 1.5	 0.7 2.0

Source: SSNC, 1997

The SSNC needed to expand the scope of its criteria beyond AOX to address the absence of public interest in bleachery pollution and growing interest in forestry practices and energy use. By 1997 bleachery pollution was no longer of interest to consumers:

> If I am a consumer, I believe the pulp and paper companies took care of the bleaching problem in the early 1990s. Then if informed that everything is back where it was, I would become frustrated and confused, and would lose interest. I would not have the stamina to check every five years to see what is happening. It is hard to get people interested and involved with an issue that should be resolved. They can say, 'look what happened the last time. We took care of the problem, now it is back again. When are these issues finished?'[1]

The SSNC revitalized consumer interest in the paper industry by focusing on forestry practices and energy use: "Forestry and energy are part of our strategy of going further. Forestry

[1] Ibid.

is helped by our strategy of certifying 100% of the forests.[1] Thus the SSNC's criteria for environmentally friendly paper in 1997 were much broader than in 1993.

8.6 Analysis

By defining criteria for chlorine reduced paper and producing a consumer guide of paper products the SSNC played a significant role in promoting the elimination of chlorine gas from Swedish bleacheries. That the SSNC's criteria for environmentally friendly paper were eclipsed by the business friendly Nordic Swan ecolabel was not a surprising outcome. The surprising outcome was how Bryntse's stubborn desire to maintain a course of action independent of Greenpeace Sweden resulted in an extremely embarrassing public event for the SSNC: accused of being environmentally inadequate by a pulp corporation in a major newspaper. Equally surprising was how Bryntse's decisions to promote incremental rather than bold change quickly choked off opportunities for growing the SSNC's work on paper products. A year after the attack by Södra Cell the SSNC's capacity to promote change in bleachery pollution had been destroyed. It was not until four years later that the SSNC tried to revitalize its work on bleachery pollution by incorporating it into a broader agenda for sustainable forestry practices and energy use.

While evaluating the effectiveness and effects of the SSNC's broader environmentally friendly paper work is beyond the scope and period of my research, it seems like a strategy that will create opportunities for growth. It creates many different angles to organize on, rather than closing them off as Bryntse did in 1990. It also creates opportunities to organize different constituencies of people to become involved based on their interests, from water pollution to energy to forestry practices. The challenge remains persuading manufacturers it is in their interest to be an environmental leader beyond the Swan.

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[1] Ibid.

It was the Greenpeace organizations that were effective at market change in the early 1990s. Greenpeace campaigners in Sweden and Germany affected change in pulp bleaching through direct action and collaboration with business. *Das Plagiat* was by far the most successful, creative, and costly direct action of the pulp and paper campaign, in Europe or North America. Through *Das Plagiat* Greenpeace usurped the power of production from industry, the power to decide what is and what is not technologically viable. Environmentalists often lack the capacity to prove that their technological optimism is pragmatic rather than utopian. In environmental conflicts manufacturers hold the power to say what is and what is not technologically viable. It is easy for manufacturers to say, "No we cannot produce a quality TCF paper." While environmentalists can reply, "Yes it is possible to produce quality TCF paper," their statement usually has no credibility. *Das Plagiat* created credibility for Greenpeace to state that TCF paper is technologically viable. The power of manufacturers to determine what is (and is not) technologically viable seems to breed arrogance among manufacturers towards consumers requesting environmental changes in production and products.

The "silent collaboration" with IKEA created a paradox for media obsessed Greenpeace. The collaboration created an incredible success story -- a leading consumer of paper products chose TCF paper and had to dump one of its previous suppliers to get the paper -- yet IKEA refused to do any publicity around its decision. From the perspective of the pulp and paper campaign the collaboration with IKEA made perfect sense: it clearly moved the TCF agenda forward. From the perspective of Greenpeace as an organization whose growth depends upon successful media images, the collaboration with IKEA was a waste of time and resources. Because market campaigns aim to transform industrial practices they will invariably involve "inside-outside" strategies for environmentalists. An inside strategy is when environmentalists

collaborate with business or government. An outside strategy is when environmentalists use pressure tactics like direct actions.

An inside strategy is necessary because change requires technical knowledge, purchasing power, and corporate action. Developing relationships based on trust was an important factor in the success of Greenpeace's market campaign. Staff at Munksjö Aspa Bruk[1] and IKEA worked closely with Greenpeace to help advance the TCF agenda. The market campaign facilitated the development of trust between likely and -- in the case of Munksjö and Södra Cell -- once adversaries because it created economic incentives for the mills: price premium and higher than average utilization of production capacity during a recession. For IKEA the economic incentive was to avoid lost sales because of a negative environmental image.

Important to the successes of Greenpeace in Europe were general consumer demand for green products, running an international campaign, and the transformation of Södra Cell. By the early 1990s Germany and Sweden were the two European countries with the most environmentally conscious consumers. This meant making the pollution connection between paper consumption and production much easier. Public awareness of the connection between products and the environment is something that environmentalists along with the media, at least in Sweden, played central roles in creating.

Jack Weinberg (1999; formerly of Greenpeace) argues that Swedish mills were more receptive to TCF because they had already invested in pollution prevention technologies, mainly oxygen delignification. While the oxygen delignification investments made the transition to TCF easier from a financial perspective, the awareness of the market opportunity is what captured the interest of Aspa Bruk and Södra Cell. Some mills with oxygen did not opt for TCF.

[1] Aspa Bruk supplied Greenpeace with the TCF pulp for Das Plagiat.

The capacity of Greenpeace to simultaneously pressure German paper manufacturers and publishing houses and Swedish pulp producers created organizing opportunities unavailable to the SSNC. Being international enabled Greenpeace to search out susceptible links in the paper supply chain outside of Sweden. And the Swedish industry with its dependence on exports, in particular to Germany, was vulnerable to demands from German consumers.

Critical to the diffusion of TCF technology was Södra Cell. Prior to its announcement to produce TCF pulp, there was only one small company producing TCF bleached kraft pulp: Aspa Bruk. Alone Aspa Bruk did not have the production capacity to move the market. Had it been the only TCF bleached kraft pulp producer the TCF market would have quickly died. When Södra Cell jumped into the TCF market it made a huge splash because it is one of the leading suppliers of market pulp in Europe. Surprisingly Södra Cell itself became a change agent, launching a major marketing initiative to create a brand name for a commodity product.

The actions of Greenpeace and the cultivation of a green market helped to surface individuals within the paper supply chain interested in technology innovation and environmental issues. Suppressed by a technologically conservative industry, Greenpeace provided cover for these innovators to experiment and speak out. For example, Södra Cell and its equipment suppliers developed and installed a technology -- ozone bleaching -- used nowhere else at the time commercially.

The speed and extent of change Greenpeace leveraged through the market was incredible, especially when compared to the sliver of change it leveraged through the regulatory process. While the regulatory arena created a forum for bringing publicity to the problem of pulp pollution and having government scientists and reports confirm these problems, it failed because the regulatory process favors industry's proclivity to incremental rather than radical change, fails

to create incentives for change, and curbs creativity. The regulatory process favors business at a variety of levels. The burden of proof rests with environmentalists who must prove harm rather than industry proving safety.[1] The inclination of government is to promote economic development over environmental protection.[2] Regulators as Erik Nyström of the Swedish EPA noted, tend over time to view the world like those they regulate. Manufacturers have the right to pollute as defined in their permits and changing this right is an arduous task. All of these factors make regulatory change difficult and likely to be incremental rather than radical, and radical is too strong of a descriptor for what is often best practice in the industry. Regulations have become static mechanisms for trying to effect change in production. And they have been ineffective, especially in comparison to the market, in creating incentives for change.

Greenpeace thought it had achieved critical mass in Europe by the end of 1992. That it had not highlights a problem with market campaigns as compared to creating change through law and regulation: the vulnerability to roll back is greater. In reality Greenpeace had picked the low hanging fruit in Europe. To institutionalize TCF in Europe, Greenpeace needed to move beyond northern Europe and to adjust its campaign to the backlash of industry against TCF. A broader coalition of organizations and an assertive effort to connect fiber supply (recycling and logging of old growth forests) with pulp bleaching would have created greater opportunities for alliances with other organizations, building a broader-based movement for more environmentally friendly practices across the entire lifecycle chain.

[1] For example, see Ehrlich and Ehrlich, 1996.
[2] For example, see Lindblom, 1977.

9 Moving dioxin pollution from pulp mills onto the national agenda: Greenpeace USA and Environmental Defense (1986-1989)

This chapter introduces the initiatives of Greenpeace USA and Environmental Defense to move dioxin pollution from pulp and paper pollution onto the national agenda of regulators and the general public. Taking different tactical approaches and targeting different institutions, both organizations helped to place dioxin pollution from the paper industry high on the agenda of the press, the US EPA, pulp and paper corporations, a handful of politicians, and concerned citizens. The story begins in the mid-1980s when evidence of dioxins in pulp mill effluent trickled into offices of state and federal environmental protection agencies. Dioxin pollution from pulp mills grew into a national issue when Greenpeace USA released the report, *No Margin of Safety*, in 1987. The issue blossomed a few weeks later when the improbable happened: someone from the paper industry's trade association leaked hundreds of pages of internal documents to Greenpeace USA. For the next two years Greenpeace USA and Environmental Defense staff tried to create the pressure necessary to catalyze change in an industry known for slow, plodding technological transformations. Table 9.1 provides a chronology of significant events in the early years of dioxin pollution from American pulp and paper mills.

9.1 Dioxin pollution from pulp mills leaks into the public domain in Maine and the Great Lakes region (1985-1987)

From 1985 to 1987 evidence of the dioxin-paper industry connection trickled into the public domain as officials in Maine and Minnesota grappled with emerging evidence of dioxin pollution from pulp and paper mills. When collecting data for its National Dioxin Study, the US EPA discovered dioxins in fish downstream of pulp and paper mills and in paper mill sludge. The EPA began the National Dioxin Study on command from the US Congress. Frustrated by the Reagan Administration's lack of progress in regulating dioxins, the Democrat-controlled

Table 9.1 Chronology of significant events in the early years of dioxin pollution from American pulp and paper mills (1983-1989)

Year	Event
1983	US EPA begins National Dioxin Study
1984	US EPA sets water quality level for TCDD at 0.013 ppq
	October: EDF and NWF file petition with US EPA to regulate dioxins under the Toxic Substances Control Act (TSCA)
1985	March: EDF and NWF file lawsuit with US EPA to regulate dioxins under TSCA
	July: Maine issues fish advisory downstream from pulp mill due to dioxin contamination
	September: Dioxins found in sludge at Maine pulp mill, chlorine the suspected cause
	October: Minnesota issues fish advisory downstream from pulp mill due to dioxin contamination downstream
1986	Chlorine consumption per ton of product peaks in the US
	March: Dioxins found in sludge at Minnesota pulp mill
	June: The Five-Mill Study begins: cooperative study between US EPA and pulp and paper industry
1987	August: Greenpeace USA releases *No Margin of Safety*
	September: Greenpeace USA releases Deep Pulp papers
	September: New York Times puts dioxins in paper products on front page
	September: US EPA admits that paper products contain dioxins
	October: US EPA releases results from preliminary risk assessment on dioxins in paper products
	December: US EPA study recommends downgrading its cancer-risk for dioxin
1988	May-November: Greenpeace, North American Inland Waters Expedition
	July: EDF and NWF sign consent decree with US EPA on dioxin pollution from pulp and paper mills
	July: US Congress holds hearing on water pollution from Champion International's mill in Canton, NC
1989	February: Greenpeace USA petitions USDA to use milk cartons with no dioxins
	March: findings from EPA studies released in New York Times show excessive levels of dioxins in fish downstream from pulp mills and in pulp mill effluent
	July: Melitta North America introduces unbleached coffee filters
	September: US FDA finds low levels of dioxins in paper products do not pose a threat to human health

Congress insisted that the US EPA undertake a National Dioxin Study to determine the sources of dioxin exposure and background levels of dioxin in the environment.[1] Congress appropriated $4 million in 1983 for the US EPA to complete the research.[1]

As part of the National Dioxin Study, US EPA scientists analyzed dioxin contamination in soil and fish in pristine areas of the country to identify background levels of dioxin in the

[1] US EPA, 1987.

environment. In what US EPA scientists thought were pristine rivers, researchers found surprisingly high levels of dioxin in fish. When they looked upstream for potential sources of dioxin, they found massive pulp and paper mills. In 1985 samples of pulp mill sludge were tested for dioxins: "The data revealed that, within the paper industry, bleached kraft pulp mills contained the highest levels of dioxin."[2]

The first press account[3] of the dioxin-paper industry connection came in September 1985 when the Associated Press reported a press conference held by Governor Joseph Brennan of Maine. The governor announced that: "Low levels of the toxic chemical dioxin that were found in fish taken from the Androscoggin River have been tentatively matched to sludge from kraft paper mills in Maine."[4] The Commissioner of the Maine Department of Environmental Protection (DEP) explained that "the dioxin in the sludge may be a byproduct of a chemical reaction in the **kraft bleaching process, in which chlorine is used** [emphasis added]."[5] A few months earlier the DEP had issued a fish advisory for the Androscoggin River because of dioxin contamination, recommending that no more than two to three fish be eaten per month.[6]

A month later the Minnesota Health Department issued a fish advisory recommending "against eating any fish" from the 40 mile portion of the Rainy River[7] downstream of the Boise Cascade pulp and paper mill in International Falls because of high dioxin levels, which were thought to be from the mill.[1] Then in March 1986 the *Star-Tribune* newspaper of the Twin Cities (Minneapolis and St. Paul) reported that "traces of the toxic substance dioxin" have been found by state and federal regulators "in waste sludge produced by the Boise Cascade Corp. paper mill

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[1] Van Strum and Merrell, 1987.
[2] US EPA, 1993, p. 66092.
[3] Based on a search of the Lexis-Nexis and Dow Jones Interactive databases.
[4] Associated Press, 1985.
[5] Ibid.
[6] Ibid.
[7] The Rainy River runs along the US-Canadian border in northern Minnesota.

in International Falls."[2] Howard Zar of the US EPA sought to allay public concerns by emphasizing the level of contamination: "'The level of dioxin (in the sludge) [414 parts per trillion] is less than half' of the EPA's level of concern (1,000 parts per trillion). Therefore he concluded, "it's not a worrisome number."[3]

Dioxin-contaminated fish became a regional issue in May 1986 when the US EPA Region V office (Great Lakes region) issued the report, *Dioxin in Great Lakes Fish*. The Associated Press, *Chicago Sun-Times*, and *Star-Tribune* (of the Twin Cities), as well as the environmental newsweekly, *Environment Reporter*, all covered the story, highlighting that "Great Lakes fish contain potentially dangerous levels of the suspected carcinogen dioxin."[4] Again the US EPA, this time Peter Wise, director of the Great Lakes National Program, sought to allay public concerns: "consumers still can safely eat fish from the Great Lakes." But he qualified the term "safely:" "'If you consume great amounts of fish (from the lakes) over a period of time, then it would be of great concern.'"[5]

Paper mills were listed among the potential sources of dioxin: "Researchers presume the dioxin in Great Lakes fish originated at nearby pesticide manufacturing plants, paper mills and incinerators."[6] And Dean Rebuffoni of the *Star-Tribune* emphasized the potential dioxin-paper mill connection:

> In several cases outside the Great Lakes Basin, elevated levels of dioxin in fish appear to be associated with certain discharges from paper mills. The EPA, several states and the wood-products industry are analyzing additional samples of fish from waters below paper mills and from the mills themselves. The EPA said those studies "will enable controls to be placed on paper mill effluents where needed."[7]

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[1] Rebuffoni, 1986.
[2] Ibid.
[3] Ibid.
[4] Tanner, 1986.
[5] Ibid.
[6] Ibid.
[7] Rebuffoni, 1986.

Two weeks later Rebuffoni reported that "Low levels of the toxic substance dioxin have been found in sludge generated by Duluth's sewage-treatment plant and by the Potlatch Corp. paper mill in nearby Cloquet, the Minnesota Pollution Control Agency (MPCA) said Wednesday."[1] He explained that "The dioxin tests reported by the MPCA stem from analyses of sludge samples done at the Duluth laboratory of the U.S. Environmental Protection Agency (EPA), and are part of the EPA's national study of dioxin contamination."[2]

In August 1986 the *Environment Reporter* published the most detailed public account of the status of the dioxin-paper industry research:

> The EPA draft [National Dioxin] study found dioxin in fish and river sediments downstream from a number of pulp and paper mills located in various parts of the country, prompting the agency to initiate a 'follow-on' study of dioxin generation at these facilities, according to Cummings [research analyst on the EPA's Dioxin Management Task Force].
> He said that there is evidence that dioxin is present in sewage sludge from pulp and paper mills and that EPA, states, and the paper industry are attempting cooperatively to discover at which stages in the milling processes the pollutant is generated.[3]

This article represented a very quiet announcement of the "The Five-Mill Study:" a cooperative study between the US EPA, American Paper Institute (API was the paper industry's trade association), and National Council for Air and Stream Improvement (the paper industry's technical research arm).

9.2 Greenpeace USA creates a national environmental problem

An unmarked envelope brought the pulp and paper industry to the attention of Greenpeace USA. In December 1986 the Chicago office of Greenpeace received an envelope: it "contained leaked EPA documents, revealing that a major secret research program on pulp and paper mill dioxin sources was underway ..."[4] This envelope marked the beginning of

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[1] Rebuffoni, 1986.
[2] Ibid.
[3] Bureau of National Affairs, 1986.
[4] Van Strum and Merrell, 1987, p. VI-1.

Greenpeace International's "pulp and paper campaign."

Using direct action as its primary strategy, setting ambitious environmental goals, and allying with grassroots groups set Greenpeace USA apart from the other national environmental groups with their strategy on lobbying and litigating.[1] For example, Greenpeace USA's alignment with grassroots, anti-toxics groups led its executive director to decline an invitation to participate in the Group of Ten -- an effort of the national environmental groups to coordinate at the executive director level actions to oppose the Reagan Administration's attack on environmental regulation. Invited to participate, then executive director Peter Bahouth provisionally agreed: if Lois Gibbs, director of Citizens Clearinghouse for Hazardous Waste was invited to participate, then he would participate. Gibbs was not invited, so Bahouth declined.[2] The distance of Greenpeace USA from other national environmental groups and its proximity to grassroots groups created tensions between Greenpeace and Environmental Defense, and to a lesser extent NRDC, in their future work against pulp and paper pollution.

Like the other national environmental groups Greenpeace invested significant resources into fundraising, especially direct mail solicitation.[3] In the late 1980s Greenpeace USA spent $0.23 of every dollar it raised on direct mail fundraising and canvassing.[4] A problem that emerged in the process of trying to transform US bleached kraft pulp mills was the need to stamp an organizational identity on reducing water pollution from pulp mills, in particular for raising money, rather than creating and coordinating a movement that opposed (together) water pollution from pulp and paper mills. And this was a problem shared by both Greenpeace USA and Environmental Defense.

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[1] Mitchell, Mertig, and Dunlap, 1992, p. 17. For a description of Greenpeace International see Chapter 7.
[2] Dowie, 1995, p. 74.
[3] Gottlieb, 1993, p. 194.
[4] Shaiko, 1993, p. 96.

9.2.1 *No Margin of Safety:* a preliminary report on dioxin pollution and the need for emergency action in the pulp and paper industry

On 21 August 1987 Greenpeace USA released *No Margin of Safety*. At 10 chapters and 130 pages, *No Margin of Safety* is a detailed report. It covers: the toxicity and regulatory history of dioxin; EPA's complicity with herbicide manufacturers during the Reagan administration to minimize dioxin-related regulation; results from the National Dioxin Study; EPA's collaboration with the paper industry; pulp and paper manufacturing processes; dioxin formation during pulp manufacturing; and recommendations for dioxin-free paper production. At the core of *No Margin of Safety* were three messages: 1) pulp and paper mills poison the environment with dioxins, 2) chlorine and chlorinated bleaching chemicals are the primary source of dioxins in paper mills; and 3) the US EPA colluded with the paper industry to keep information of dioxin pollution from the public.

Leaked documents from the EPA were the genesis of *No Margin of Safety*. As Carol Van Strum[1] recalled:

> Greenpeace's Chicago office received leaked documents [in 1986] from EPA suggesting the EPA and the pulp and paper industry were involved in negotiations over the National Dioxin Study and involved in a joint study. Greenpeace asked us [Paul Merrell and I] to write the report.
> The National Dioxin Study was not published by 1986 because of pulp and paper corporations, they were a major source of dioxins. We filed a FOIA [Freedom of Information Act] request to EPA for all documents related to the National Dioxin Study and the pulp and paper industry.
> What happened was a scandal. The EPA agreed with industry how to respond to my FOIA request and what they will give us and not give us. I had data from the EPA that showed dioxin in paper products, but I could not use it in *No Margin of Safety* because the EPA said they were preliminary, not final results.[1]

Dioxins, Van Strum and Merrell explained, were of particular concern because "Every dose tested in laboratory animals has resulted in increased levels of cancer, birth defects and other reproductive problems, and in damage to the body's immune system." They labeled

[1] See Chapter 6 for a description of Carol Van Strum's anti-toxics work.

2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD or "TCDD" for short) the "most toxic ... molecule made by humans"[2] because it is very toxic at very small doses. The positions articulated by Van Strum and Merrell would later be affirmed by numerous scientific studies. Today the US National Toxicology Program lists TCDD as a known human carcinogen in its *Report on Carcinogens*.[3] TCDD is carcinogenic in rodents at the nanogram per kilogram level (a nanogram is one billionth of a gram) and daily human exposures are measured in picograms (a picogram is one trillionth of a gram).[4] Because of its toxicity at very low doses Van Strum and Merrell took the position, as did Greenpeace, that "There are no 'safe' levels of TCDD."[5] Quite worrisome to Van Strum and Merrell were dioxins from pulp mills: "The levels of dioxin being found near pulp mills suggest a public health emergency in North America."[6]

Van Strum and Merrell forecasted, correctly, that the US EPA "would merely suggest 'levels of concern' as advisories to individual states, relieving EPA from responsibility for dioxin regulation and enforcement."[7] The US EPA, they emphasized, chose to:

> forego regulatory action to investigate, control, or eliminate dioxin emissions from pulp and paper mills. Instead, EPA would do nothing pending further study and also gave industry control over study design, sampling plans, and pace of the study. Without public participation or oversight, EPA signed an agreement with an industry trade association [American Paper Institute] substituting secret studies for regulatory action, notwithstanding that the agency already had sufficient information to take strong regulatory action as well as a string of precedents to support such action."[1]

The US EPA signed an agreement in June 1986 with the API and National Council on Air and Stream Improvement to study sources of dioxin and dioxin in water effluent at five pulp mills: International Paper, Jay, Maine; Champion International, Lufkin, Texas; Mead Paper,

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[1] Van Strum, 2001.
[2] Van Strum and Merrell, 1987, p. II-1.
[3] National Toxicology Program, 2002.
[4] For example, see Agency for Toxic Substances and Disease Registry, 1998.
[5] Van Strum and Merrell, 1987, p. I-1.
[6] Ibid., p. I-1.
[7] Ibid., p. IV-3.

Chillicothe, Ohio; Boise Cascade, International Falls, Minnesota; and James River, Wauna, Oregon. Formally called the "US EPA/Paper Industry Cooperative Dioxin Screening Study," this later became known as "The Five-Mill Study."[2]

Reflecting their distrust of the US EPA, Van Strum and Merrell's policy recommendations were weak on government action and strong on mobilizing the public. First:

> The most important first step toward a dioxin-free pulp and paper industry in North America is to force full disclosure of dioxin studies from industry and government. A fully informed public will be the most effective instrument for necessary political and economic changes in this vital industry.[3]

Second:

> Consumer education to encourage acceptance of less-bleached materials is a particularly attractive option for some products [such as unbleached tissue papers] that could open new market opportunities. ... Indeed, it seems likely that many consumers would respond to a 'chlorine and dioxin free paper' marketing appeal with the same fervor now bestowed on recycled papers.[4]

No Margin of Safety was a seminal report for Greenpeace USA. It helped Greenpeace USA staff move dioxin pollution into the national spotlight and created the context for a press conference that caught national press attention and prompted an industry insider to leak documents to Greenpeace, which in turn generated further press attention.

9.2.2 *No Margin of Safety* spotlights dioxin pollution from pulp and paper mills

Greenpeace USA and Greenpeace Canada simultaneously released *No Margin of Safety* on 21 August in Chicago and Toronto. Two newspapers,[5] the *Star-Tribune* in the Twin Cities and *The Globe and Mail* in Toronto,[6] picked up the story, publishing short articles in the middle

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[1] Ibid., p. VI-2.
[2] US EPA, 1988.
[3] Van Strum and Merrell, 1987, p. IX-13.
[4] Ibid., p. IX-5.
[5] According to searches of Lexis-Nexis and Dow Jones Interactive.
[6] See Associated Press, 1987; and Downey, 1987. The *Star-Tribune* picked the story up from the Associated Press wire service.

of their papers.[1] The *Star-Tribune* emphasized the US EPA's collusion with the paper industry with a quote from report co-author Paul Merrell: "'The records show the pulp and paper mill industry got them (Environmental Protection Agency) to suppress it [the National Dioxin Study] because of the levels of dioxin.'"[2] Countering Merrell was an EPA spokesperson who denied any malfeasance: "'Most of the data in the report has already been released,' said David Ryan, an EPA spokesman in Washington, D.C."[3]

Ryan's portrayal of the dioxin data as old news was the same spin Carol Raulston, vice president government affairs, API, advocated for in a memo to John Thorner, director, communications and staff counsel, API: let's make "the paper industry findings appear as 'old news.' Specifically, we should note that the study has been out in draft form for over a year; that we (as well as everyone else) have been aware of the paper industry findings ..."[4]

The first significant media breakthrough for Greenpeace USA came on 1 September when Laurent Belsie of *The Christian Science Monitor* wrote an 1138-word, page one story -- "EPA links dioxins to paper mills" -- with a map locating the five paper mills under investigation for dioxin emissions.[5] Belsie highlighted Greenpeace USA's contention of industry collusion. And this time the US EPA, through Alexander McBride, chief of water quality analysis, conceded that the industry's involvement was unusual: "'Obviously, it's not the usual EPA process,' McBride says. But 'in terms of having the data collected ... I think it was an enormous plus to have the industry involved. It did enable us to move a lot farther a lot faster.'"[6]

McBride's interpretation of the benefits of cooperation contrasted sharply with the view

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[1] Star-Tribune, page A13; Globe and Mail, page A14.
[2] Associated Press, 1987.
[3] Ibid.
[4] Raulston, 1987.
[5] Belsie, 1987, p. 1.
[6] Ibid.

held by Red Cavaney, president, API, who explained the benefits of cooperation in a memo to his Executive Committee on 30 December 1986:

> A year ago, we received reports that, as part of its National Dioxin Study, the Environmental Protection Agency (EPA) had found trace levels of dioxin in sludges from some pulp and paper mills. Although this created some activity at the state regulatory level, the industry was able to **forestall major regulatory and public relations difficulties by, among other things, agreeing to cooperate in a joint study with EPA** to determine the source of dioxin if, in fact, it proved to be present [emphasis added].[1]

Using research to stall regulation is an effective strategy industry often employs under the guise of making decisions on the basis of sound science.

9.2.3 The "Deep Pulp" papers

A huge breakthrough for Greenpeace USA came when it received yet another set of leaked documents, this time from an anonymous source -- dubbed "Deep Pulp" by Greenpeace staff[2] -- within the paper industry's trade association, the American Paper Institute (API). Deep Pulp sent hundreds of pages of API memos and reports to Greenpeace USA.[3] The papers included: evidence of dioxins in paper products and industry effluent, industry-EPA communications, industry strategy to delay/stop regulatory action on dioxin emissions, and industry public opinion polling data.

Important to Greenpeace USA's goal of capturing press attention, the Deep Pulp papers included information on dioxins in paper products. The paper industry knew by at least February 1987 that its products contained dioxins. As Robert Hayes (director of corporate communication, Boise Cascade Corp.) and Carol Raulston (API) stated in a memo to Michael Farrar (vice president, environmental and health program, API) and Ely Gonick (senior vice president, technology, International Paper): "The [Five Mill] study results do indicate that we

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[1] Cavaney, 1986.
[2] Floegel, 1999.
[3] Author's note: Carol Van Strum provided me with a complete set of the Deep Pulp papers.

have dioxin in our products in untested, but presumed, trace amounts in the parts per trillion range."[1]

The Deep Pulp papers also revealed the initial strategic thinking and actions of what became a very successful campaign by the US paper industry, led by API, to delay and impede initiatives to reduce the industry's water pollution in general and dioxins in particular. Key ingredients in the API's strategy were: bend the US EPA to its will, work to keep the agency and paper industry members on message, undermine the science supporting stringent dioxin regulation, and mobilize resources.

From the early findings of dioxin in paper products to the final water pollution regulations promulgated in 1998, the actions and decisions of the US EPA were largely consistent with the objectives of API. In the early years the API used joint research projects to help bend the US EPA to its will. The API's Dioxin Public Affairs Plan of 1987 framed its regulatory/legislative strategy in these simple terms:

Who (1) Work through EPA as lead federal agency
- -- EPA makes initial contacts with FDA/CPSC/OSHA
- -- Message: Avoid undue concern/alarm on the part of the public as well as state and local jurisdictions

How (2) Cooperate on joint activities
- -- Provide information they need and/or ask for
- -- Share industry data/studies <u>if</u>:
  - (a) public health concern is raised
  - (b) serves objectives of getting appropriate regulations[1]

The first joint research project, the Five-Mill Study, helped API to delay regulations and to gain access to and cooperation from agency staff as well as.

The US EPA also agreed with the industry's position that evidence of dioxin contamination of paper products should be withheld from the public. John Festa (director, chemical control program, API) highlighted this agreement in his memo to Patricia Hill (director,

[1] Hayes and Raulston, 1987.

water quality program, API) after meeting with the US EPA in May 1987: "A.D. Little [consulting company] is doing product risk assessment -- hypothesizing contamination [of paper products] at 10 ppt. Work to be completed by end of July. No formal document to be prepared. Information for internal use [at the EPA]."[2]

By July 1987 the API had access to the highest level of the agency, US EPA Administrator Lee Thomas. Red Cavaney gave this favorable report back to API member companies in July 1987:

> In response to an industry request, EPA Administrator Lee Thomas and members of his staff met with Dioxin Task Group Chairman and Glatfelter Company CEO Tom Norris and API staff on July 31. The industry asked for the meeting to discuss how the Agency might characterize to the public the significance of the levels of dioxin thus far detected, to share the industry's views on future activities and to emphasize the importance of EPA's ongoing re-evaluation of its views of the potency of dioxins.[3] ... Administrator Thomas indicated a willingness to cooperate with the industry to ensure that **the public not be unduly alarmed about this issue**. He felt the cooperative efforts should continue and **gave no indication that the Agency felt that the current situation was a crisis warranting immediate regulations** [emphasis added].[4]

After leaving the US EPA in 1988, Lee Thomas joined Georgia-Pacific Corp. -- the second largest manufacturer of bleached pulp and paper products in the US -- as director of its environmental department.

API staff knew they had a difficult task of selling Americans that a little dioxin was okay. First, polling data revealed that over 50% of Americans would avoid paper products if they learned the products contained dioxins.[1] Second, Americans were be skeptical of industry spokespeople on dioxin contamination. Polling data indicated that paper industry staff had the least credibility on the dioxin issue: only 10% of those polled viewed a paper company scientist as "very believable" on dioxin and less than that, 7%, viewed a paper company president as very

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[1] American Paper Institute, 1987.
[2] Festa, 1987.
[3] Cavaney, 1987.
[4] Ibid.

believable.[2] Therefore having a US EPA official -- with 31% polled viewing someone from the agency as "very believable" -- state the industry's message was clearly preferred.

Reflecting a combination of high level access and arrogance, API staff defined the message they wanted US EPA officials to present to the media:

> Get EPA to approach the significance of exposure to trace levels of dioxin in a balanced manner.
> -- not 'seek' publicity
> -- remain low key
> -- characterize as 'not a real threat to environment or public health' if possible[3]

As revealed below, US EPA officials generally spoke in terms consistent with API's message.

The message the paper industry defined for the US EPA mirrored its own message, which Cavaney defined in his memo to API members in August 1987:

> -- The dioxin detected at some pulp and paper mills is in extremely low quantities -- levels not even measurable as recently as two years ago.
> -- All evidence to date suggests no real hazard is associated with these levels.
> -- To resolve any possible uncertainties about the significance of these detections, the industry is moving quickly to complete a joint study with the U.S. Environmental Protection Agency.[4]

The slight difference was the paper industry hid behind its cooperation with the EPA to gain credibility with the general public. To help spokespeople for member companies stay on message and hone their media skills, API organized with the help of the public relations firm Burson-Marsteller, a three-day training in April 1987.[1]

Another objective of API was to have the US EPA re-evaluate the toxicity of dioxin. "Get EPA to 'rethink' dioxin risk assessment" was an objective listed in the API's Dioxin Public Affairs Plan.[2] The benefits of a lowered risk assessment for dioxin were clear to the industry, as the API's Dioxin Coordinating Committee recognized in its summary paper from meetings held

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[1] Cambridge Reports Inc., 1987.
[2] Ibid.
[3] American Paper Institute, 1987.
[4] Cavaney, 1987.

in June 1987: "If the [dioxin risk] assessment were to be changed, the basis for questioning the industry's dioxin levels, could cease to exist."[3] The paper industry, with the help of the chemical industry, later succeeded in persuading the US EPA to review its dioxin risk assessment.

Recognizing the importance of having "independent" scientists supporting the industry's position of, no action on dioxins, the Deep Pulp papers revealed the early initiatives of API staff to mobilize scientists sympathetic to their position. John Festa of API began exploring the formation of an external Independent Science Advisory Board and an internal in-house advisory panel in May 1987 to achieve the following actions:

> We must aggressively advance the legitimate views held by many experts within the scientific community that the U.S. government takes an unduly conservative view with respect to the health effects of dioxin.
> Our objectives in involving these two groups would be to: a) possibly delay any 'rush to judgment' on the part of federal or state agencies and, in turn the consuming public, based upon health impact assumptions that may be scientifically questionable; to b) possibly change the assumptions on which current federal government policies are based; and c) provide the industry with the best available advice and expertise.[4]

The anticipated cost for an "independent" Science Advisory Panel: $150,000.[5] API later decided to fund an "$8 million research project by the Chemical Industry Institute of Technology to determine how dioxin causes cancer and whether it causes cancer in humans."[6]

Despite Deep Pulp revealing API's political strategy, the US paper industry's campaign against regulation and market change proved very effective. It delayed federal regulations for 13 years. It limited the standards set in the final federal regulations to levels consistent with the industry's objectives. It prompted a dioxin reassessment by the US EPA in 1991. It blocked the formation of a market for totally chlorine-free (TCF) paper in the US.

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[1] Raulston, 1987.
[2] American Paper Institute, 1987.
[3] American Paper Institute, 1987.
[4] Festa, 1987.
[5] Ibid.
[6] Herubin, 1989.

9.2.4 The Deep Pulp papers capture national press attention

When Greenpeace USA released the Deep Pulp papers at a press conference in Green Bay on Wednesday, 23 September, the Associated Press picked up two stories from Joyce McLean, director, Great Lakes campaign, Greenpeace International: 1) dioxin contaminates paper products "ranging from facial tissue to disposable diapers and office copying paper," and 2) "government and industry officials have conspired to conceal a risk of toxic dioxin in paper products." Dioxin in paper products was a story likely to attract media attention because of the widespread use of bleached paper products. However, by emphasizing dioxin in paper products it placed Greenpeace USA in the impossible position of showing any harm from the products.

The day after Greenpeace USA released the Deep Pulp papers, dioxin in paper products was front page news in *The New York Times*: "Traces of dioxin found in range of paper goods." Two days later, the story had spread across the country: "Dioxin found in some paper products: concentrations reported in EPA study seen as no threat to health" (*The Washington Post*, page A4);[1] "EPA says many paper products contain dioxin" (*Los Angeles Times*, page 4);[2] "Contaminant traces: sizing up the risk of dioxin in paper" (*Christian Science Monitor*, front page);[3] and "Paper industry moves to back its claims that dioxin-tainted goods pose no risk" (*The Wall Street Journal*, page 5).[4]

A month after releasing *No Margin of Safety* Greenpeace USA had created, with the help of an anonymous person inside the API, a national story. Yet the messages and actions from US EPA officials continued to support the objectives of the paper industry as defined by API. Over the last four months of 1987 officials of the US EPA: stated that dioxins in paper products are

[1] Weisskopf, 1987.
[2] Associated Press, 1987.
[3] Belsie, 1987.
[4] Taylor, Freedman, and Koenig, 1987.

not of concern, despite indications from US EPA data that dioxins could be of concern; delayed decision-making until completing further studies; and recommended downgrading the cancer-risk level for dioxins.

When reporters asked, do the "traces" of dioxin found in paper products pose a threat to human health, US EPA and industry representatives replied, there is little to worry about. And that was the leading sentence in David Weisskopf's article in *The Washington Post*: "Some everyday paper products are contaminated by tiny amounts of the cancer-causing chemical dioxin, but concentrations of the pollutant are too low to warrant public health concern, government and industry officials said yesterday."[1]

Dr. John A. Moore, assistant administrator, US EPA, concluded that "'There's no basis to be concerned at this time that any of these products are unsafe.'" The risks posed by such low levels, Moore added, "'get down to negligible.'"[2] In reaching these conclusions Moore seemed to go out of his way to declare paper products safe. Especially since preliminary data from the US EPA indicated excess cancer risks from dioxin in coffee filters were 1 in 1,000 to 1 in 10,000,[3] levels that usually prompt regulatory action. Excess cancers of 1 in 100,000 to 1 in 1,000,000 are acceptable to the EPA, not 1 in 1,000 or 1 in 10,000.

The US EPA's response to dioxins in paper products and dioxins in pulp mill effluent was further research. Moore explained that "the E.P.A. will now look at some 90 paper mills around the country to determine to what extent each mill's paper [and water effluent] is contaminated by dioxin and to 'find out how we can reduce the levels'" of dioxin from paper mills.[4] Deciding to perform further research served industry's objective of delaying regulatory

[1] Weisskopf, 1987.
[2] Ibid.
[3] Ibid.
[4] Shabecoff, 1987.

action through study.

In early October the US EPA publicly released its preliminary report on risks from dioxin exposure in paper products. Bill Waugh, Office of Toxic Substances, US EPA, concluded that the finding "'does not warrant any immediate action,'"[1] despite the data showing that "five of seven items sampled pose a slightly higher risk of cancer than the Environmental Protection Agency considers acceptable."[2] For coffee filters, "the increased risk of cancer would be one additional case for every 10,000 people ... At risk levels this high, the Government frequently takes regulatory action to protect the public."[3] Bill Waugh was unconcerned because conservative assumptions "may have overstated the extent of exposure to the toxic chemical."[4] The US EPA, along with the other regulatory agencies responsible for the safety of paper products -- Food and Drug Administration (FDA) and Consumer Product Safety Commission -- responded to the data on dioxins in paper products by committing to perform further research on the problem: "Answers may start emerging some 18 months from now."[5]

The US EPA further enhanced the paper industry's efforts to avoid dioxin regulation when an internal committee recommended in December 1987 that the agency reduce its estimate of the cancer-causing potential of dioxin from 0.006 to 0.1 picogram per kilogram body weight per day.[6] The 0.1 picogram/kilogram level is the amount of dioxin needed to cause a 1 in 1,000,000 risk of cancer from dioxin.[7] While the US EPA never implemented this recommendation, it signaled to sources of dioxin emissions that the agency was open to reconsidering its assessment of the toxicity of dioxin. The API, as noted in the previous section,

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[1] Weisskopf, 1987.
[2] Ibid.
[3] Shabecoff, 1987.
[4] Weisskopf, 1987.
[5] Shabecoff, 1987.
[6] Darst, 1987.
[7] Shabecoff, 1987.

wanted the agency to downgrade its dioxin risk assessment.

While no evidence ever emerged of US EPA officials making policy decisions in collusion with paper industry officials, US EPA communications and decisions in 1987 remained consistent with the objectives of API: see Table 9.2 for a side-by-side comparison. As Michael Weisskopf reported in *The Washington Post* in October, when he wrote an in-depth article on the Deep Pulp papers, "The EPA generally appeared to fall in line with industry objectives, although its spokesman, Dave Cohen, insisted that the agency 'was on its own track. If they [paper industry officials] were attempting to be manipulative, it never entered our thinking.'"[1] If API officials never coordinated with EPA officials on how to reply to questions on dioxins in the paper industry, then agency officials simply had the same thoughts as paper industry officials.

Journalists also framed their initial stories in terms that favored the objectives of industry. The articles immediately after the release of the Deep Pulp papers emphasized the levels of dioxins in paper products and downplayed the issue of whether any dioxin should be in a paper product or effluent from a paper mill. The de facto assumption was a little dioxin is okay. David Weisskopf's article in *The Washington Post* is illustrative of how American reporters portrayed dioxin. Weisskopf implied that dioxin is only slightly toxic when he wrote: "TCDD is classified by the EPA as a probable human carcinogen, although its only proven danger to humans is a disfiguring skin disease called chloracne."[2] Weisskopf wrote this despite extensive evidence at the time that TCDD was the most potent human-created carcinogen, was a reproductive toxicant in animal studies relevant to humans, and is a persistent and bioaccumulative chemical.

To present the position critical of industry and government, journalists turned primarily to Ellen Silbergeld, PhD, toxicologist, with Environmental Defense. Weisskopf, for example,

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[1] Weisskopf, 1987.
[2] Weisskopf, 1987.

Table 9.2 Comparison of US EPA communications and decisions in 1987 to API objectives

US EPA -- Statements and Decisions	API -- Statements and Objectives
David Ryan, spokesman, US EPA, 22 August 1987 ▪ "Most of the data in the report has already been released"	Carol Raulston, vice president government affairs, API, 31 August 1987 ▪ let's make "the paper industry findings appear as 'old news.' ... we should note that the study has been out in draft form for over a year ..."
David Cohen, spokesman, US EPA, 23 September 1987 ▪ **"new techniques** only recently have been developed enabling researchers **to measure the much smaller concentrations** found in the pulp mills" ▪ "there is **no evidence to suggest that such minute quantities pose a health hazard."**[1]	API - Dioxin Public Affairs Plan, March 1987 ▪ "The dioxin detected at some pulp and paper mills is in extremely low quantities -- **levels not even measurable** as recently as **two years ago.**" ▪ **"All evidence to date suggests no real hazard is associated with these levels."**
Dr. John A. Moore, assistant administrator, US EPA, 24 September 1987 ▪ the E.P.A. will **now look at some 90 paper mills around the country** to determine to what extent each mill's paper [and water effluent] is contaminated by dioxin[2]	Red Cavaney, president, API, 30 December 1986 ▪ **"forestall major regulatory ... difficulties** by, among other things, agreeing to **cooperate in a joint study** with EPA"[5]
Dr. John A. Moore, assistant administrator, US EPA, 25 September 1987 ▪ "'There's **no basis to be concerned** at this time **that any of these products are unsafe,'** he said, adding that the **risks posed by such low levels** 'get down to **negligible.'"**[3]	API - Dioxin Public Affairs Plan, March 1987 ▪ Get EPA to **"characterize as 'not a real threat to environment or public health'"** ▪ **"All evidence to date suggests no real hazard is associated with these levels."**
US EPA, Internal study recommends lowering cancer risk from dioxin, 8 December 1987 ▪ **the US EPA** "in a new draft study ... has **sharply reduced its estimate of the cancer-causing potential of dioxin"**[4]	API, Dioxin Coordinating Committee, 16-17 June 1987 ▪ **"If the [dioxin risk] assessment were** to be **changed, the basis for questioning the industry's dioxin levels, could cease to exist."**[6]

quoted Silbergeld emphasizing that "despite the low levels of TCDD, the industry findings 'can't be dismissed as trivial' because the chemicals accumulate in the body and persist for long

[1] Associated Press, 1987.
[2] Shabecoff, 1987.
[3] Weisskopf, 1987.
[4] Shabecoff, 1987.
[5] Cavaney, 1986.
[6] American Paper Institute, 1987.

periods. ... [Therefore] she called on the EPA to ban the bleaching process at paper mills to eliminate the risk."[1] But Silbergeld was framed as a lone voice in a sea of unanimity.

Over the following months *The New York Times*, in particular, emphasized opportunities for downplaying the risks from dioxin exposure. Most striking was the title to Shabecoff's article on the preliminary risk assessment results on dioxins in paper products, released by the US EPA in October: "Risks from dioxin called fairly low." This was the title to an article that stated: "At risk levels this high [for exposure to dioxins from coffee filters], the Government frequently takes regulatory action to protect the public."[2] The title for *The Washington Post's* article on the same topic was quite different: "Dioxin in paper products raises concerns at EPA: levels of cancer-causing agent slightly higher than agency consider acceptable." And when an internal study within the US EPA recommended that the agency reduce its estimate of dioxin's carcinogenicity in December 1987, *The New York Times* placed it on the front page: "Estimate of risk of dioxin is cut in cancer study." Yet when the US EPA's science advisory board concluded a year later that there was no scientific basis for changing the cancer risk dose for dioxin, *The New York Times* did not report that decision. In the upcoming years *The New York Times* continued to play a leadership role in featuring articles that downplayed the risks associated with dioxin.[1]

Reporters also devoted little space to assessing how people could avoid exposure to dioxins in paper products or how mills could reduce dioxin formation. And when they delved into the solution side, they accepted industry claims that there were no known solutions for reducing dioxins. For example, Philip Shabecoff of *The New York Times* quoted Red Cavaney of API claiming "that if it proves necessary, the industry would take steps to reduce the levels of

[1] Weisskopf, 1987.
[2] Shabecoff, 1987.

dioxin produced in the papermaking process. But he added, 'there is no readily apparent solution to the problem.'"[2] That statement is an outright lie.

First, industry officials knew by that time that chlorine was the primary source of dioxins. In the same article Shabecoff quotes Michael Farrar of API stating that "dioxin contamination occurs when paper is bleached with chlorinated compounds."[3] Second, it was widely known within the industry that mills: reduced chlorine use with oxygen delignification, reduced organochlorine pollution by using oxygen and/or chlorine dioxide,[4] and could partially substitute chlorine dioxide for chlorine in the first bleaching stage.[5] .

Another solution known at the time was to avoid bleached paper products in the first place. In an article run by the Associated Press about a man who ate toilet paper, the man wrote the US EPA asking if he was at risk. David Cohen, US EPA spokesman, replied: "'it might be advisable if you avoided eating paper products from bleached kraft pulp.'"[6] This was one of the rare moments in 1987 when the American press and the US EPA implied that buying unbleached products was a method for reducing dioxin exposure. Certainly Greenpeace USA staff deserve part of the blame for the poor reporting on solutions: they had little knowledge of the solutions available on the market in the US.

From the perspective of Greenpeace USA's nascent efforts to change pulp bleaching processes, the reporting on dioxin in paper products was mixed. At one level the attention made

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[1] For example, see Schneider, 1991.
[2] Shabecoff, 1987.
[3] Ibid.
[4] For example, pulp and paper researchers in Canada reported in 1987: "Oxygen delignification of unbleached pulp has been shown to be a cost effective method of reducing pollution. It reduces the lignin content of unbleached pulp by about 50%, resulting in corresponding reductions in chlorine use and dissolved chlorinated organics [which include dioxins] in the bleach plant effluent" (Galloway, Schmid, and Lebidoff, 1987, p. 27).
[5] For example, *Chemical Week* reported on 7 October 1987 that sodium chlorate (the feedstock for making chlorine dioxide) "is replacing chlorine in producing bright pulp" and in Europe "there are environmental reasons behind the growth as pulp mills require more chlorate" (Rivoire, 1987, p. 26).
[6] Darst, 1987.

dioxins in the paper industry a national issue: thirty two articles on "dioxin" and "paper" and "mills" appeared in the US press between September and December.[1] The content of the articles, however, largely favored the positions of the US EPA and API.[2] The American press was unwilling to raise the problems of very low level exposures to dioxin, as Jock Ferguson did in *The Globe and Mail* of Toronto: "There are no immediate identifiable health effects from low levels [of dioxin exposure], but no safe level of the substance has ever been determined."[3]

The paper industry, led by the American Paper Institute staff, did an incredible job of damage control in the midst of a serious crisis. When reporters framed the story as "trace" levels of dioxins in paper products and EPA officials said the levels are safe, they scored a victory. When *The New York Times* began to take a skeptical position on the toxicity of dioxin, they scored a victory. And for its part, the staff of the American Paper Institute kept on message as did most of the spokespeople for individual companies. In a rare candid statement from the industry, William Trice, executive vice president, research and development, at Union Camp Corp.[4] admitted that: "'The (paper industry) has to be justifiably concerned'" with the detection of cancer-causing dioxin in paper products.[5] Over the next few years the paper industry continued to be on the defensive. The question was, how many dollars would be invested in less polluting bleaching technologies to satisfy regulators and consumers and by when?

9.3 Greenpeace USA: the early years of the pulp and paper campaign

The US pulp and paper campaign "grew organically," as pulp and paper campaigner Mark Floegel described it: "it was not thought out, it grew out of action."[6] Eventually the

[1] Based on a search using Dow Jones Interactive.
[2] Weisskopf did write an extensive article on the Deep Pulp papers a month after their release in October 1987 (Weisskopf, 1987).
[3] Ferguson, 1987.
[4] Union Camp Corp. is now owned by International Paper.
[5] Taylor, Freedman, and Koenig, 1987.
[6] Floegel, 1999.

campaign grew into a "multi-front campaign that included public education, media attention, regulators, local campaigns like the one against the Pigeon River mill [owned by Champion International], and Congress."[1] From 1987-1989 the organic approach worked. Greenpeace USA staff followed their intuition, pursued approaches that seemed promising, and kept pressure on the industry to eliminate dioxins.

9.3.1 North American Inlands Water Expedition

The North American Inland Waters Expedition was the first major follow-up to *No Margin of Safety*. Using Greenpeace International's 78-foot river boat *Beluga*, Greenpeace USA, Greenpeace Canada, and the Greenpeace Great Lakes campaign (which International funded) launched a six-month toxics tour in 1988. Starting in Montreal in May the *Beluga* traveled up the St. Lawrence River, through the Great Lakes, and down the Mississippi River, ending in New Orleans in November.[2] The purpose of the tour, said Joyce McLean, Great Lakes campaign director, was to "raise public awareness of pollution around the Great Lakes [and along the Mississippi River] and try to increase public pressure for cleanup."[3]

From the perspective of the pulp and paper campaign, the North American Inland Waters Expedition raised local awareness of dioxins from pulp and paper mills when newspapers reported Greenpeace actions.[4] Newspapers in Canada covered actions at two Canadian mills, when Greenpeace climbers tagged the banner, "Dioxin Kills" to the Domtar Fine Paper Mill in Cornwall, Ontario[5] and Canadian Pacific Forest Products Ltd. mill in Thunder Bay, Ontario.[6] A few months later, Baton Rouge newspapers covered the action at International Paper's mill in

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[1] Ibid.
[2] Temple, 1988.
[3] Barkholz, 1988.
[4] A search of Dow Jones Interactive for "Greenpeace" and "Beluga" and "paper" in 1988 revealed seven articles covering pulp and paper mills: four in Canadian and three in American newspapers.
[5] Toronto Star, 1988
[6] Canadian Press, 1988.

Natchez, Mississippi, when climbers tagged that mill's water tower with the banner, "Take the poison out of the pulp."[1]

9.3.2 The International Joint Commission (IJC)

The first segment of the Inland Waters Expedition was part of a broader campaign -- the Great Lakes campaign -- to reduce toxics pollution in the region. Started in 1983, the Great Lakes campaign was one of a handful of regional ecosystem campaigns funded by Greenpeace International to improve the health of large water ecosystems.[2] Within the Great Lakes campaign, the International Joint Commission (IJC) became a focal point for action.

Established by the Boundary Waters Treaty of 1909 between Canada and the United States, the role of the IJC is to help manage and protect the waters of the Great Lakes. Much of the IJC's current work involves helping governments clean up the Great Lakes and prevent further pollution.[3] Canada and the United States agreed to control water pollution and to clean up waste waters from industries and communities when they signed the Great Lakes Water Quality Agreement of 1972. When the two nations signed a new Great Lakes Water Quality Agreement in 1978, they committed to trying to prevent persistent toxic substances from entering the Great Lakes.[4] The 1978 agreement includes Annex 12 - Persistent Toxics Substances, which commits the nations to developing:

> "Regulatory strategies for controlling or **preventing the input of persistent toxic substances** to the Great Lakes System ...:
> (i) The intent of programs specified in this Annex is to **virtually eliminate** the input of **persistent toxic substances** ...
> (ii) The philosophy adopted for control of inputs of persistent toxic substances shall be **zero discharge** ... [emphasis added][5]

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[1] Associated Press, 1988.
[2] Other ecosystem campaigns were: the Baltic Sea, North Sea, and Mediterranean campaigns (Peerla, 1997, p. 154).
[3] See the IJC's webpage at: www.ijc.org.
[4] See the IJC's webpage at: www.ijc.org.
[5] International Joint Commission, 1987.

The 1989 biennial meeting of the IJC marked the beginning of chlorine becoming a major issue for the IJC.[1] In the late 1980s Greenpeace International and some of its national members began campaigning against chlorine because "chlorine poses a severe threat to the ecosystem and must be phased out."[2] The argument for targeting chlorine was, it is the chemical common to a range of persistent, toxic, and/or bioaccumulative chemicals: notably DDT, PCBs, CFCs, and dioxins. Joe Thornton defined Greenpeace USA's argument against chlorine and organochlorines in the report, *The product is the poison: the case for a chlorine phase-out*:

> Enough is known about the persistence and toxicity of organochlorines as a class to justify an outright ban. Only a tiny portion of the many organochlorines in commerce have been subjected to even preliminary hazard assessments, and many more organochlorine by-products and breakdown products remain unidentified and thus unassessed. Regulating organochlorines one-by-one is doomed to failure. A shift of regulatory focus from individual chemicals to the class of organochlorines is necessary.
>
> The banning of individual organochlorines over the last two decades has resulted in drastic reductions in inputs of these chemicals to the environment. Now, that strategy must be applied to the entire class of organochlorines. To prevent further cont9inually increasing levels of organochlorine contamination, the manufacture and use of all organochlorines must be phased out. Because all uses of chlorine also produce organochlorines, all uses of chlorine must be phased out as well.[3]

In 1991, after lobbying by Greenpeace and other environmental organizations, the IJC called for the virtual elimination of chlorine in the Great Lakes region (see Chapter 10 for details).

9.3.3 Working at the grassroots: Pigeon River mill in North Carolina

Fights by local citizens to cleanup water pollution from mills were a driving force for innovation at the old Champion International mill in Canton, North Carolina and the Louisiana Pacific mill in Samoa, California.[1] Despite Greenpeace only being involved in the Canton mill fight, these cases illustrate the important and sometimes effective environmental work that happens at the grassroots.

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[1] Botts and Muldoon, 1996.
[2] Thornton, 1991, p. 1.
[3] Ibid., p. 4.

Two citizen groups began prodding Champion International[2] to cleanup water pollution from its Canton mill in North Carolina in the early 1980s: the Dead Pigeon River Council of Tennessee and Pigeon River Action Group of North Carolina. The Canton mill discharged its wastewater effluent into the Pigeon River, which flows west from the mill into Tennessee. Upstream from the Canton mill, the Pigeon was a pristine mountain river supporting sport fish like trout. Downstream from the mill, residents in neighboring Tennessee received a river that included no viable populations of sport fish, fish contaminated with high levels of dioxin, highly discolored water, and water unacceptable for drinking.[3] The local activists eventually forced a substantial modernization of the Canton mill in the 1990s that included oxygen delignification and a new technology developed by Champion called "bleached filtrate recycling," which enabled the mill to recycle its chlorine dioxide wastewater, after filtering chlorides out, through the recovery boiler.[4] Greenpeace USA and Environmental Defense provided technical support and Greenpeace USA performed an action near the mill.[5]

9.3.4 Reaching consumers through milk

Greenpeace USA entered consumer campaigning with milk cartons. Renate Kroesa, pulp and paper coordinator, Greenpeace International, catalyzed the milk carton controversy. Attending an international dioxin conference in Umea, Sweden in the summer of 1988 she heard John Ryan from Health and Welfare Canada present finding dioxins in milk packaged in paper products, but not in milk packaged in containers made from plastic or glass.[6] Kroesa alerted

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[1] At the Louisiana Pacific mill it was a lawsuit by the Surfriders Foundation that catalyzed the development and adoption of innovative bleaching technology. The innovations at these mills will be discussed in Chapter 10.
[2] Now owned by International Paper.
[3] Bartlett, 1995.
[4] Ibid.
[5] Ibid.
[6] Kroesa, 1999 and Turner, 1988.

reporters in Canada on the research.[1] Janice Turner picked up the story in August and reported in *The Toronto Star* that a "federal scientist had found traces of dioxin and related toxic compounds in milk products sold in plasticized containers."[2]

A few months later the story crossed the border. In November *The Seattle Times* ran the first story on dioxins from milk cartons[3] when Bill Dietrich reported that the US FDA "is beginning similar checks" as completed in Canada on dioxin in milk from bleached cardboard milk cartons.[4] The story attained a slightly higher level of prominence in the press when the US Congress, House Energy and Commerce Committee, subcommittee on Health and Environment, heard testimony on dioxins in paper products on 8 December. Officials from the regulatory agencies -- EPA, FDA and Consumer Products Safety Commission -- responsible for assessing the risks of dioxins in paper products reported that they could not answer questions on the risks posed by dioxin in bleached paper products until they gathered more information.[5] Yet, Richard Ronk, acting director of FDA's Center for Food Safety and Applied Nutrition reported: "'Based on the information available, we do not believe that the very low levels of dioxins and furans that have been reported in paper products represents a significant health risk.'"[6] Janet Hieber of Greenpeace USA and Ellen Silbergeld of Environmental Defense testified at the hearing in support of eliminating dioxin pollution from paper mills.[7] With Representative Henry Waxman of Los Angeles chairing the subcommittee hearing, the *Los Angeles Times* picked up the story, titling it: "Milk cartons to be studied for any dioxin traces."[8]

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[1] Kroesa, 1999.
[2] Turner, 1988.
[3] Based on search for "dioxin" and "milk" in Dow Jones Interactive.
[4] Dietrich, 1988.
[5] Bureau of National Affairs, 1988.
[6] Ibid.
[7] Ibid.
[8] Rosenblatt, 1988.

Despite what seemed to be a major story, dioxins in milk from paper products and Congressional hearings, the story received little additional press. Then Greenpeace USA captured regional press attention in February 1989 when it petitioned the US Department of Agriculture (USDA), which subsidizes the national School Lunch Program, "to ensure that milk provided to children is not contaminated with dioxin that migrated out of the milk carton"[1] by requiring the use of containers that do not leach dioxin. With three wire services -- The Associated Press,[2] State News Service,[3] and Reuters News Service[4] -- picking up the story, it spread across the country. The *Los Angeles Times*, *Houston Chronicle*, *The Evening News Harrisburg*, *St. Petersburg Times*, and *Tulsa World* all carried the story.[5]

A challenge Greenpeace USA faced was the lack of unbleached milk cartons on the market in the US. Janet Hieber conceded at Greenpeace's press conference that "The products [unbleached milk cartons] are not on the marketplace today," although they are available in Sweden.[6] When reporters asked, how should consumers respond in the absence of alternatives, Hieber acknowledged that the purpose of the petition was to create change through market demand:

> Q Could we go back for a minute to the question about a plastic containers ... I've known in the past Greenpeace has been very active in saying "We don't want these things washing up." Environmental impact statements aside, or report requests aside, you know, that's the first thing that people are going to do if people take this seriously -- buy more plastic, buy less paper.
> MS. HIEBER: I would suspect that there would be a very short period of that, because I think that will drive the paper industry to switch to unbleached paper rather than anything else.
> Q So are you hoping then that market forces will resolve this? Or do you expect that market forces will resolve this faster than your legal avenues?

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[1] US Newswire, 1989.
[2] Darst, 1989.
[3] Hackel, 1989.
[4] Reuters News Service, 1989.
[5] See Dow Jones Interactive, search for "Greenpeace," "dioxin," and "milk."
[6] Federal News Service, 1989.

> MS. HIEBER: We think this is probably one of the first opportunities for the market to work its will. The consumer had no idea that it was in the product, and if nothing else this will serve to help the market to actually serve as a free market with an informed consumer.

While the USDA petition would be denied when the FDA found that dioxins in paper products held no appreciable risk to consumers, Greenpeace USA had, through the press, begun to tap into consumer concerns with dioxin contamination in particular and green buying in general. In the late 1980s American consumers were beginning to buy green. For example, *USA Today* published an article in August 1989 titled: "Going for the 'green:' marketers target environment; companies make products nice to nature."[1] Bleached coffee filters became the first dioxin-related paper product casualty in the US. Shortly after Greenpeace USA petitioned the USDA, Rockline Inc. of Sheboygan, Wisconsin introduced "Natural Brew" coffee filters made from unbleached filter paper.[2] Then in July, Melitta, the world's largest manufacturer of coffee filters, introduced unbleached filters in the US: "H. Helmut Radtke, the president of Melitta North America, said the filter was a response to consumer demand for environmentally safe nature products."[3]

The milk carton crisis, along with the Congressional hearings and further data on dioxin contamination, did capture the attention of the paper industry. Writing in the journal *Dairy Foods*, in June 1989 Alan Levitt reported that "new dioxin-free cartons could be available as soon as this month, or as late as next year, depending on the availability of the [chlorine dioxide] generators and how quickly plants can adjust their piping," which must be replaced because of the corrosivity of chlorine dioxide.[4]

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[1] Maney, 1989.
[2] Scripps Howard News Service, 1989.
[3] Fabricant, 1989.
[4] Levitt, 1989.

When the FDA released the findings from the report in September 1989, it re-ignited press interest in the story, this time capturing attention in many of the nation's major daily newspapers, including the *Los Angeles Times* ("Traces of Dioxin Leaching from Paper Cartons into Milk"), *New York Times* ("Cartons Found Leaching Dioxin to Milk"), and *Houston Chronicle* ("FDA Confirms Low Dioxin Levels in Milk"). The FDA found dioxins in "very low levels that do not pose a threat" to human health. The FDA Commissioner Frank Young stated that since "'The paper industry committed itself last year to modifying the production of bleached paper and paperboard so they contribute essentially no dioxin to the milk'", it would "'closely monitor these efforts to be sure they are accomplished expeditiously.'"[1]

9.3.5 The weak solution element

In trying to catalyze change in the paper industry Greenpeace USA staff consistently invoked Sweden as the model for the American paper industry. "Greenpeace ... is hoping consumers will put pressure on the paper industry by demanding unbleached paper products similar to those available in Sweden," wrote Seattle Times reporter Dietrich in 1988.[2] And at a news conference in Portland in 1989, "Greenpeace spokesman William Rostov said the U.S. paper industry should adopt technologies that Sweden has used [oxygen delignification and hydrogen peroxide] to cut chlorinated organics by 80 percent in two years."[1]

While Greenpeace USA staff longed for Swedish style change, they did not invest the resources to identify the unbleached paper products on the US market that competed with bleached paper products nor did they identify the mills using oxygen delignification. For example, Greenpeace magazine published a four-page article in 1989 on dioxin in the paper industry. Only the last two paragraphs in the article discussed unbleached paper products:

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[1] PR Newswire, 1989.
[2] Dietrich, 1988.

> the economic weight brought by changing consumer demand for bleached paper products may be needed to force government and industry in North America to deal with the problem [of dioxins in the paper industry]. Greenpeace has asked for the immediate introduction of chlorine-free and/or unbleached paper products, as well as a higher recycling rate of paper products.[2]

The article includes a photograph of Renate Kroesa displaying unbleached products available in Sweden, but does not list or show any products available in the US.

When Göran Bryntse began promoting unbleached products in Sweden in 1980 he scoured the market for unbleached paper products, like unbleached paper bags, that could compete with bleached paper bags. Greenpeace USA never produced a list of alternatives to bleached paper products; a list that would have helped to substantiate the claim that paper products do not have to be bleached to be competitive.

Greenpeace USA also demanded that US mills adopt oxygen delignification technology. For example, after the Greenpeace action at the International Paper mill in Natchez, Mississippi, Shelly Stewart, US pulp and paper campaign director, said: "Greenpeace wants International Paper to stop using the chlorine bleaching process" and replace it with "an oxygen bleaching system [that] has proved to be safer and economically feasible."[3]

Yet at that time 11 pulp mills had oxygen delignification systems in place in the US (see Table 9.3). Had Greenpeace campaigners known, Shelly Stewart could have said, "International Paper should install an oxygen system just like Champion's in Pensacola, Florida." Greenpeace USA did not have the data because they did not invest in collecting it. Having data on alternative technologies and products would have strengthened their claims for change.

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[1] Goetze, 1989.
[2] von Stackelberg, 1989, p. 11.
[3] Associated Press, 1988.

Table 9.3 Pulp mills with oxygen delignification systems as of 31 December 1988

Mill Name	Location	Production (metric tpd)		Production (1000 metric tpy)		Start-up Date
Champion International		1,400		490		
	Pensacola, FL		800		280	1986
	Pensacola, FL		600		210	1986
Chesapeake	West Point, VA	300		105		1972
Consolidated Papers	Wisconsin Rapids, WI	500		175		1986
Louisiana Pacific	Samoa, CA	705		247		1988
Pentair (Cross Pointe)	Park Falls, WI	101		35		1987
Union Camp		1,380		823		
	Franklin, VA		720		252	1981
	Eastover, SC		660		231	1983
Wausau Paper	Brokaw, WI	290		102		1988
Weyerhaeuser	Ogelthorpe, GA	970		340		1981
Willamette Industries	Bennettsville, SC	840		294		1988

Source: US EPA, 1993

9.4 Environmental Defense: merging science and law

In the early years of its work to address pollution from pulp and paper mills, Environmental Defense relied upon its two-pronged strategy of using science to define environmental problems and legal expertise to negotiate a solution. When the story broke on dioxins in paper products, reporters called Environmental Defense's toxicologist, Ellen K. Silbergeld, PhD. Silbergeld began working with Environmental Defense in 1982 on eliminating lead in gasoline.[1] Shortly thereafter, with growing concerns over dioxin emissions from garbage incinerators, Environmental Defense and Silbergeld started working for dioxin reduction.[2] In 1984 Environmental Defense and the National Wildlife Federation filed their petition with the US EPA to regulate dioxins under authority of TSCA (see Chapter 6).

When reporters called after Greenpeace USA released the Deep Pulp papers, Silbergeld emphasized the toxicity of dioxin and need to eliminate then from pulp and paper mills. Philip

[1] EDF, 1982.
[2] EDF, 1984.

Shabecoff of *The New York Times* quoted Dr. Silbergeld contesting the "trace" levels argument of industry and the EPA:

> Dr. Ellen K. Silbergeld ... pointed out that the agency required chemical makers to report the presence of dioxin in their products at levels of 100 parts per trillion. Therefore the amount found in paper pulp, which is formed into paper products, is not negligible, she said.
>
> ...
>
> She also said that while there may be a continuing debate on whether dioxin is a cause of cancer in humans, the weight of evidence shows that it has effects on the human immune system and causes birth defects and damage to fetuses. "I think we are facing a national health problem," she said.[1]

That a scientist with an environmental organization had to make points on the toxicity of TCDD that were well known at the time -- is a known reproductive toxicant in relevant animal studies, is toxic at low doses, is persistent, bioaccumulates in the body, and very small exposures matter -- reflects the extent to which US EPA officials in the Reagan administration sought to temper concerns over dioxins in the paper industry. It was only years later, once the US EPA decided to regulate dioxin, that it emphasized many of the points Silbergeld made in 1987: "Dioxin is a highly toxic chemical and is a probable human carcinogen. Dioxin persists in the environment and can accumulate in the tissue of fish, other wildlife and humans. It has caused cancer, liver dysfunction and toxic effects in laboratory animals."[2]

The prominence reporters in premier national newspapers gave Silbergeld and Environmental Defense contrasted with the silent treatment given to Greenpeace USA. In the lead articles that followed the release of the Deep Pulp papers, Shabecoff of *The New York Times* and Weisskopf of *The Washington Post* both quoted Silbergeld and named Environmental Defense, but neither mentioned Greenpeace. The lack of media attention no doubt irritated Greenpeace USA staff, especially since they broke the dioxin story and have penchant for media attention.

Mark Floegel of Greenpeace stated in general that "We [Greenpeace staff] had a distrust of Environmental Defense and NRDC [Natural Resources Defense Council]." This distrust stemmed from the view within Greenpeace that Environmental Defense compromised with industry and government too often and quickly. Floegel explained that "There is a split within the environmental community, with the reasonable ones more likely to agree to compromises."[3] The distrust of Environmental Defense was held more broadly than just Greenpeace staff, extending to grassroots toxics activists as well. For example, the investigative journalist Mark Dowie found that Environmental Defense stepped into a "nationwide consumer campaign against McDonald's led by Penny Newman of Concerned Neighbors in Action (Los Angeles) and Lois Gibbs at the Citizens' Clearing House for Hazardous Waste" to negotiate an agreement that "fell far short of the expectations of Gibbs, Newman, and other grassroots activists."[4]

Environmental Defense staff, on the other hand, saw Greenpeace and other environmental organizations taking unattainable positions and losing opportunities for greater gain by refusing to compromise. For example, Lauren Blum, senior scientist with Environmental Defense, later lamented that environmentalists lost the chance for the US EPA to require oxygen bleaching because Greenpeace and the grassroots activists only accepted TCF paper as the solution to bleach mill pollution.[5]

On the legal side, Environmental Defense and the National Wildlife Federation (NWF) filed a lawsuit with the US EPA to force the agency to regulate dioxins in 1985 (see Chapter 6). Initially the US EPA sought to have the case dismissed in its entirety, but the court ruled in favor

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[1] Shabecoff, 1987.
[2] US EPA, 1990.
[3] Floegel, 1999.
[4] Dowie, 1995, p. 139.
[5] Blum, 1997.

of the plaintiffs and denied the defendant's motion to dismiss March 1987.[1] API staff recognized early in 1987, prior to national media attention, that the lawsuit could have serious implications for the paper industry. John Festa (API) highlighted in a memo to Mike Farrar (API) provisions of concern to paper manufacturers:

> The outcome of this case could have significant implications for our industry considering that the long list of petitioner's requests include:
> 1. That EPA use the authority of Section 307(a)(1) of the Clean Water Act to promulgate an effluent prohibition for the discharge of dioxins and furans ...
> 2. Ban the distribution ... of products containing dioxins and furans in concentrations greater than 100 ppt.
> 3. Require a warning label for any product which still contains ... concentrations greater than 10 ppt.[2]

Under pressure of coming to trial at a time when dioxins in the paper industry were a national issue, the US EPA negotiated a consent decree with Environmental Defense and NWF in 1988. The consent decree (*Environmental Defense Fund v. EPA*, DC DC, No. 85-0973, 7/27/88) required the US EPA to:

1. conduct a risk assessment for dioxins in effluent from pulp mills by 30 April 1989
2. within a year after beginning risk assessment the agency must take one of four actions
   a. begin rulemaking under the Clean Water Act to control dioxins in paper mill discharges
   b. refer the matter to another federal regulatory agency
   c. decide not to propose regulations nor make a referral, and explain why
   d. determine that the agency needs more information to take any of the three above options.
3. prepare guidance on issuing pollutant discharge permits for pulp mills to address dioxin in effluent by 30 April 1990.[3]

At the time the consent decree looked like a major victory for Environmental Defense. As Karen Florini, attorney for Environmental Defense, remarked: "'The consent decree is a critical means of ensuring that action will happen [in the paper industry] ... with this remarkably potent class of

[1] Environmental Defense Fund v. Environmental Protection Agency, 657 F. Supp. 302 (DC DC, No. 85-0973, 1987).
[2] Festa, 1987.
[3] Bureau of National Affairs, 1988.

toxics.'"[1] The consent decree placed the US EPA on a timeline for completing research and making decisions; regulations banning dioxin from pulp mills seemed imminent.

The US EPA's next steps implied a quickening of pace towards regulatory action. In August 1988 the US EPA's acting administrator for water, Rebecca Hanmer, issued an interim strategy document that called for regulators in the states to develop water quality standards for dioxin. In the US, states have the option of deciding whether they want to implement federal water pollution laws and regulations. States that accept this responsibility issue permits to pollute, called National Pollutant Discharge Elimination System (NPDES) permits. All pulp mills, because of the scale of their wastewater discharges have NPDES permits unless they discharge directly to a publicly owned sewage treatment facility. Thirty nine states had the authority to issue NPDES permits in 1988.

The US EPA's interim strategy document recommended that NPDES permits "be reissued or reopened for pulp and paper mills to include monitoring requirements for dioxin and stricter effluent limits if the contaminant is found."[2] The interim strategy was not required by the consent decree[3] nor was it legally binding.[4] But it did, as Florini explained, "put permit writers across the country on notice to take a look at dioxin discharges.'"[5]

Then in March 1989 *The New York Times* broke the story (although not on the front page) on preliminary findings from two studies by the US EPA:

- *U.S. EPA/Paper Industry Cooperative Dioxin Screening Study, "The 104-Mill Study:" statistical findings and analyses*[6]

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[1] Ibid.
[2] Bureau of National Affairs, 1988.
[3] Ibid.
[4] For example, when the API contested EPA Region IV's policy statement to southeastern states that they control dioxin in wastewater discharges from pulp mills, the US District Court for the Southern District of Alabama ruled: "'The policy statement issued by Region IV is not binding upon anyone at this stage, and states are under no obligation to comply'" (Bureau of National Affairs, 1989).
[5] Bureau of National Affairs, 1988.
[6] US EPA, 1990.

- *National study of chemical residues in fish*[1]

These "Two federal studies have confirmed fears that many paper mills are discharging dioxin into rivers and that the toxic chemical is accumulating in fish downstream."[2] The 104-Mill Study revealed excessive levels of dioxin discharges from chlorine using pulp mills."[3] The dioxin findings included: 1,390 ppt in sludge at Weyerhaeuser plant in Plymouth, NC and 157 ppt in fish caught near the same plant; and 0.36 ppt in wastewater effluent at Boise Cascade Corp. plant in Wallula, WA.[4]

Despite clear evidence of excessive dioxin releases from mills and the consent decree, Jeff Grubbs in the EPA's Office of Water Regulations and Standards announced in July 1989 that "Guidelines regulating dioxin and other toxic and non-conventional pollutants will be issued in October 1993."[1] This was six years since the dioxin-paper industry issue reached the national press (September 1987) and eight years since the agency knew mills were a source of dioxin pollution (September 1985). In reality, the US EPA would miss its 1993 goal by five years. Surprisingly the consent decree had no discernible effect on the rate and content of the EPA's final regulation on pulp and paper mills. As Van Strum and Merrell presciently stated in 1987 in *No Margin of Safety*, the US EPA "would merely suggest 'levels of concern' as advisories to individual states, relieving EPA from responsibility for dioxin regulation and enforcement."[2]

9.5 Analysis

The issue of dioxins in the paper industry expanded rapidly after Greenpeace USA released *No Margin of Safety* and the Deep Pulp papers. By the end of 1989 the pulp and paper industry was on the defensive. Dioxins in paper products and effluent were a national issue. The

[1] US EPA, 1992.
[2] New York Times, 1989.
[3] Bureau of National Affairs, 1989.
[4] Ibid.

US Congress had held hearings on dioxin contamination of paper products and rivers. Newspapers across the country, including premier newspapers like *The New York Times*, *The Wall Street Journal*, and *The Washington Post* had reported on the issue. A few companies were marketing unbleached paper products because they did not contain dioxins. And chlorine use was on the decline.

At the center of this issue expansion was Greenpeace USA. Greenpeace staff made dioxin pollution from pulp mills a national issue by capturing media attention and by operating at multiple levels simultaneously. Consistent with the organizational philosophy, Greenpeace USA staff displayed an impressive capacity to generate media attention: first with *No Margin of Safety* and the Deep Pulp papers, then with direct actions and milk cartons. The chance occurrences of leaked papers from individuals within the US EPA and API catalyzed the start of the campaign.

They captured media attention by framing the issue in terms that reporters identified with: dioxins in paper products. The media, with help from US EPA and API officials, then re-framed the issue as: are these levels safe? A question that played into the expertise of US EPA officials, who supported the API's message that these are "trace" levels of little worry. They re-ignited the dangers of dioxin in paper products by spotlighting dioxins in milk -- a product associated with purity, wholesomeness, and children. The dioxins in milk message caught the attention of smaller newspapers across the country, thereby raising the level of individual consumer awareness. They created events to capture media attention, including: issuing a report -- *No Margin of Safety* --, releasing the entire set of Deep Pulp papers to reporters, petitioning the USDA, as well as hanging banners from tall buildings at pulp mills and posting signs along the Pigeon River.

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[1] Ibid.
[2] Van Strum and Merrell, 1987, p. IV-3.

Greenpeace USA operated at multiple geographic, institutional, and tactical levels simultaneously. Internationally they coordinated with the Greenpeace Great Lakes campaign, which targeted activists in the region and the International Joint Commission. Federally they targeted the USDA and testified at Congressional hearings. Locally they worked with activists in Tennessee and North Carolina targeting the Canton mill as well as raising awareness through direct actions at pulp mills during the Inland Waters Expedition. And through the media they created consumer awareness of paper products contaminated with dioxins. As change agents Greenpeace staff planted seeds in places they thought fertile.

Strategically the strength of Greenpeace USA's pulp and paper campaign resided in the attack on dioxins. Reporters were aware of dioxin's toxicity. The majority of the general public, as indicated in the API polling data, were fearful of dioxin exposure and would avoid it where possible, i.e., buy products that did not contain dioxin. And there was a history of grassroots activism against dioxin contamination from pesticides and hazardous waste sites.

Yet there were significant weaknesses in building from the US anti-dioxin movement. Absent were campaigns against classes of chemicals, such as organochlorines. When Greenpeace USA, Greenpeace Canada, and the Greenpeace International Great Lakes campaign targeted organochlorines, they started from scratch. Absent were previous toxic campaigns targeted at consumers and consumer products. The anti-dioxin movement had targeted pesticides used by the US Forest Service and called for cleaning-up hazardous waste sites. Absent were technical experts who promoted safer alternatives. There was no Göran Bryntse who had been running a consumer campaign for the past seven years for unbleached paper products because of concerns with the class of organochlorines released from pulp mill effluent.

Complementing the chaos of Greenpeace USA's pulp and paper campaign was Environmental Defense's focus on the US EPA. Building from the organization's strengths in science -- with Ellen Silbergeld -- and lawyers -- with their lawsuit against the US EPA -- Environmental Defense sought a regulatory decision from the US EPA. Given the mass of evidence of dioxins from US pulp mills using chlorine and the consent decree, quick regulatory action from the agency seemed entirely plausible in 1989.

If the agency had quickly promulgated regulations to eliminate dioxins from pulp and paper mills that would have been a victory. Yet this did not happen. And herein lay the problem with activist work that focuses on a single institution to create change. It creates an all-or-nothing situation. Especially with a regulatory agency like the US EPA, whose decision would be imposed across the entire paper industry, a ruling in favor of Environmental Defense would create a lasting effect (if enforced). If that institution does not take the desired action, however, then all is lost, or at least delayed until the institution can be cajoled into revisiting the decision.

The US EPA from 1987-1989 was very deferential to the wishes of the pulp and paper industry and reluctant to set and implement regulations. Given the Reagan Administration's aversion to regulation it should not be surprising that senior US EPA officials thought and acted like officials of pulp and paper corporations. Greenpeace USA dealt with the difficulties of catalyzing regulatory change through the US EPA by operating on the periphery of the agency and trying to mobilize the media, citizens, and consumers to prod regulatory action. And Environmental Defense distanced itself from the consent decree with the US EPA in the 1990s as the organization shifted resources to a market campaign. But the difficulty in moving the US EPA highlights the importance to environmental campaigns of trying to effect change through multiple institutions rather than just one.

Environmental Defense and Greenpeace USA, the two national environmental organizations attempting to eliminate dioxins from the pulp and paper from 1987-1989, found cooperation difficult, although the tension remained private. As will unfold in the following chapters, Environmental Defense, Greenpeace USA, and other environmental groups cooperated in a loose fashion to try to effect change through the US EPA in the 1990s. Yet it proved to be a problem that the environmental community could not develop a better coordinated approach that maximized the efficient use of very scare resources in a battle against a multi-billion dollar industry. The efforts to change pulp bleaching processes in the US would reveal the pitfalls of an environmental movement that emphasizes narrow change that benefits individual organizations over broad-based change that requires truly working together.

10 Failed attempts at trying to move markets and regulations to cleaner bleaching technologies

From 1990 to1998 the two most important activities of the national environmental organizations to change pulp bleaching in the United States centered on Time Inc and the US EPA. Time Inc. was critical because it was at the center of the market campaigns of Greenpeace USA and Environmental Defense. While Time Inc. eventually decided to implement recommendations developed with the Environmental Defense-led Paper Task Force, they were too late and too quiet to have any ripple effects on the market. And the efforts of the Natural Resources Defense Council (NRDC) and Greenpeace USA to promote more stringent regulations were overwhelmed by a well-coordinated, counter-campaign by the environmental laggards in the paper industry. The national environmental NGOs did have a few successes, but none of them catalyzed markets shifts to the cleanest production technologies of ECF-lite and TCF.

Attempts by national environmental NGOs to catalyze change in US bleached kraft pulp mills were largely a failure. The reasons for the lack of success are four-fold. Competition among environmental groups rather than collaboration undermined efforts to create momentum for change. The paper industry, led by its trade association, outplayed the environmental community: they strong-armed elements of the supply-chain into silence; mobilized politicians and regulators to support their goals; manufactured scientific uncertainty on dioxin's toxicity; and after conceding the need to eliminate chlorine gas, rallied behind chlorine dioxide. In the face of a sophisticated backlash from the paper industry, environmentalists failed to broaden the campaign to other groups trying to effect change in the paper industry, notably the recycling community.

10.1 Trying to move the market: Greenpeace USA and Environmental Defense target Time Inc.

The efforts of environmentalists to change Time Inc.'s paper procurement specifications reflected two different strategic approaches to market campaigns and revealed the pitfalls of a splintered environmental movement. Greenpeace USA sought market success by defining a challenging goal, then working to persuade corporate buyers to adopt its goal of TCF paper for their purchasing specifications. Environmental Defense pursued a different model, what it called "advocacy organization-business partnerships," where environmental organizations develop voluntary, cooperative projects with corporations.[1] In the Environmental Defense model, goals emerge from joint research between Environmental Defense (or its spin-off organization, the Alliance for Environmental Innovation) and the collaborating corporation. In both the Environmental Defense and Greenpeace USA models of market change the environmental groups worked independently of other environmental groups in their corporate collaborations.

10.1.1 Greenpeace USA's market campaign: TCF through confrontation

Greenpeace USA's market campaign centered on Time Inc. On the periphery were other, smaller corporate consumers -- Kinko's copy shops and Jossey Bass book publisher -- as well as manufacturers of bleached kraft pulp and paper products. In the spring of 1990 Greenpeace USA decided to target Time Inc., owner of *Time* magazine.[2] Time Inc. made an apt target because it was a market leader and vulnerable on the environmental issue. In the early 1990s Time Inc.

[1] Fastiggi, 1999.
[2] Floegel, 1999.

was the largest magazine publisher in the United States, purchasing 220,000 tons of paper per year.[1] When Time Inc. changed its specifications, papermakers took notice:

> Until recently, there was not a large supply of recycled coated stock available. However, several mills have been waiting for a clear signal that investments in deinking facilities and capital spent revamping paper machines will result in a competitive advantage. With our decision to use recycled coated stock on an ongoing basis, we believe that a clear signal has now been sent.[2]

Time Inc. was vulnerable on environmental issues because it had made earth, "Planet of the Year," replacing the magazine's usual "Man or Woman of the Year" for the year 1988. The lead article in that issue challenged Americans to take action:

> Let there be no illusions. Taking effective action to halt the massive injury to the earth's environment will require a mobilization of political will, international cooperation and sacrifice unknown except in wartime. ... Our wasteful, careless ways must become a thing of the past. We must recycle more, procreate less, turn off lights, use mass transit, do a thousand things differently in our everyday lives. We owe this not to ourselves and our children but also to the unborn generations who will one day inherit the earth.[3]

Did this call for change hold for the magazine itself?

Mark Floegel, pulp and paper campaigner for Greenpeace USA, first tried to gain the attention of Time Inc. in 1990 when he wrote a letter to the editor of *Time* magazine: "'Congratulations on the planet of year, calling attention to important issues, you have the chance to be a leader on chlorine-free. We'd love to sit down to talk with you.'" The editor declined.[4] Then in May 1991 Time publisher Robert Miller highlighted environmental actions taken at *Time*: "When we at TIME registered our environmental concern by naming the endangered earth as Planet of the Year for 1988, we began to look in our own backyard" and started recycling office paper and soda cans.[5] Again Floegel tried to gain the attention of Time

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[1] Refkin, 1993, p. 143.
[2] Refkin, 1994.
[3] Sancton, 1989, p. 30.
[4] Floegel, 1999.
[5] Miller, 1991, p. 4.

Inc. staff. This time he had Greenpeace USA's executive director, Peter Bahouth, write Miller to repeat the offer of assistance. Again Time rejected Greenpeace's offer.[1]

In the fall of 1991 Greenpeace USA turned to direct action. Mark Floegel recalled the chain of events:

> Greenpeace development says, pick a target, send a postcard to company, and send check to Greenpeace. We selected *Time* as the target for the postcard campaign. Mailing sent out to 200,000 supporters. Dear *Time*, Go TCF. Usually get 4% response rate, we got an 11% response rate.[2]

Now Greenpeace USA had the attention of Time Inc. staff: "Time Inc. Magazine Co. chairman, president and CEO Reginald K. Brack has Greenpeace to thank for all those postcards he's been getting lately urging him to use his flagship magazine, Time, to help create a market for chlorine-free paper."[3]

Mark Floegel and Mike Affleck (Greenpeace International pulp and paper coordinator) met with *Time's* executive vice president, Don Barr in November 1991 and asked Barr to purchase TCF paper. Barr promised to raise the issue with procurement and publishing staff. Floegel and Affleck were skeptical that Time Inc. would do anything, at least in the near-term. "We thought nothing will happen. It's the holidays. After Christmas, we see the January issue. There at the end of the letters section of the January 6th issue, 1992, *Time* magazine is going TCF!"[4] The editors of *Time* framed their commitment, under the title, "Improving Magazine Paper," in these terms:

> TIME's publishing company has received more than 22,000 cards and letters protesting the use of chlorinated paper by Time, Inc. Magazines. This mail was part of a campaign launched by the environmental group Greenpeace, urging magazine publishers to switch to paper bleached by other methods. Greenpeace believes chemical by-products from chlorine bleaching are a major source of US water pollution. We at TIME take this

[1] Floegel, 1994, p. 7.
[2] Floegel, 1999.
[3] Folio, 1991.
[4] Floegel, 1999.

> problem seriously, but we are limited by the availability of paper produced without the use of dangerous pollutants. Most of our paper suppliers are far along with the plans to eliminate chlorine-bleached pulp. We will use this alternative paper as soon as it is practical to do so.[1]

Mark Floegel immediately called Don Barr: "Thank you this is wonderful. You've done it. This is great. I'd love to talk with your nuts and bolts people about what to say to mills."[2] Yet, by the time Floegel followed up with *Time* staff to help them buy TCF paper, the opportunity for persuading *Time* to purchase TCF paper was quickly fading. As Floegel recalled: "The big pulp and paper companies freaked out. *Time* bought paper from Champion [International] and Consolidated Papers. They called *Time* and read the riot act. 'How dare you go behind our backs to Greenpeace!'"

Lacking specifics from the principals at Time Inc. or the paper manufacturers it is impossible to ascertain what the papermakers said to Time staff.[3] Some of the statements papermakers probably made to *Time* are contained in a letter Georgia-Pacific's president and chief operating officer, A.D. Correll, sent to all of its customers shortly after Time Inc.'s declaration to "eliminate chlorine-bleached pulp." In that letter Correll denied any problem with the use of chlorine: "Despite many claims by environmental groups to the contrary, the scientific evidence indicates that our level of use of chlorine is environmentally safe."[4] Yet, Correll continued, Georgia-Pacific planned to reduce dioxin emissions by partially replacing chlorine with chlorine dioxide: "Our operating strategy has been to increase use of chlorine dioxide, and

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[1] Time, 1992.
[2] Floegel, 1999.
[3] In interviews with David Refkin of Time Inc. and Gerard Closset of Champion International, neither provided information on what the papermakers said at the time.
[4] Correll, 1992.

decrease amounts of elemental chlorine."[1] Therefore, he concluded, no more action was needed beyond the substitution of chlorine with chlorine dioxide:

> The cost of seeking nonchlorine compounds for the bleaching process would be enormous without any corresponding health benefit offset and would force Georgia-Pacific from our position as the largest and most competitive market pulp supplier. We find no scientific rationale for such an ill-conceived move and have rejected the idea.[2]

Finally, Correll stated, if you are a customer of Georgia-Pacific's and want TCF paper, go to another company: "If you feel you must have 'chlorine-free' bleached pulps which cannot have used even chlorine dioxide and your markets will accept the differences in quality and performance, then G-P [Georgia-Pacific] can no longer be a supply source."[3]

The final statement reveals the supposed market truisms, "customers are king" and "manufacturers produce what customers want," for what they are: myths. Instead Correll stated the reality of the American paper market: it is papermakers who determine what is available for paper buyers to purchase.

The caveat to this statement is the lack of a choice. If paper buyers have a choice, somewhere else to purchase TCF paper, then Georgia-Pacific could lose market share. Georgia-Pacific's strength was the absence of choice for large paper buyers in the US: no North American mill manufactured TCF bleached kraft pulp in early 1992. Louisiana-Pacific began manufacturing TCF bleached kraft pulp in September 1992 (for more details see section 10.1.4). Thus Georgia-Pacific and other US pulp and paper corporations had a huge incentive to ensure that a market for TCF-paper did not emerge in the US.

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[1] Ibid.
[2] Ibid.
[3] Ibid.

Large firms like Georgia-Pacific controlled markets by controlling the ability to supply large quantities of paper.[1] If Time Inc. needed to purchase large quantities of paper on short notice, it needed to work with a large supplier like Georgia-Pacific or International Paper. Correll's statement also revealed the arrogance and paternalism of American papermakers to their buyers. The underlying theme in his message to customers was: "if you disagree with me you are foolish. Environmentalists have fooled you into believing that dioxins, chlorine, and chlorine dioxide are a problem. They have fooled you into believing high-quality paper can be made without chlorine dioxide."

Time immediately came into line with the position of papermakers like A.D. Correll at Georgia-Pacific. Floegel recalled his conversations with Time Inc. staff in these terms:

> [The] Procurement person [at *Time*] told me, "it ain't going to happen, it won't happen and go to hell." Called Don [Barr], no call back. David Refkin replied, "that announcement was a mistake. Editorial department wrote it. That is wrong. It was a mistake. Does not reflect view of publishing department." I said, "If mistake, then print a retraction. If no intention [to change, then] print retraction." He refused.[2]

Ironically Greenpeace USA was a victim of sudden success. Because *Time* made the announcement quickly, Floegel did not have the opportunity to "inoculate" *Time* on the impending backlash from the paper industry. Inoculation is when organizers inform consumers of expected negative reactions to an action. The objectives of inoculation are to: "1) frame the issue; 2) neutralize the impact of adversarial communications; and 3) ensure that key audiences are not caught off guard by the attack."[3] Inoculation prepares allies for the backlash, reducing

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[1] Blum, 1997.
[2] Floegel, 1999. A separate interview with David Refkin (director of paper and environmental affairs, Time Inc) confirmed Floegel's recollection: "Greenpeace always brings up comment in the January 1992 issue. It was the editors who said it, not publishers. The editors did not clear that comment with publishing" (Refkin, 1997).
[3] Nichols, 2001, pp. 136-137. Note that inoculation is a tool of both environmentalists and their opponents. Nick Nichols writes about inoculation from the perspective of corporations fighting back against demands from activist groups, like environmental NGOs.

the embarrassment of being caught by surprise and creates legitimacy for environmentalists when they accurately forecast the response of opponents.

Unable to inoculate *Time* executives, Greenpeace USA lost the trust of Time:

> *Time* thought they were printing something meaningless. The announcement freaked out the paper industry. The impression in [the paper] industry was: this is a marriage, dealing with suppliers for 25 years, then in bed with Greenpeace. Hurt feelings, you [Time] have betrayed us [paper manufacturers] with these hippies. *Time* was abashed for dealing with the other side [Greenpeace]. Refkin's attitude was, "you fooled and tricked us. We [Time] became bad guys [within the paper industry]."[1]

The ferocious backlash from papermakers took them by surprise and intimidated them.

To regain momentum Greenpeace USA needed to move quickly. They needed to disprove the arguments of American paper executives, create public pressure on Time to revisit its January 6th commitment to move away from chlorine-bleached pulp, and show that TCF paper was technologically and economically viable. Two years passed before Greenpeace USA took the actions that may have had much different consequences in 1992.

In the summer of 1994 Greenpeace USA pressed Time Inc. to purchase TCF paper. At the center of a multi-pronged effort was a daring action on the 47-story Time-Life building in Manhattan. On the morning of 11 July three members of Greenpeace scaled half-way up the 587 foot Time-Life building, unfurling a banner of a mock *Time* magazine cover with the title: "Chlorine Kills -- Take the poison out of paper." "The spectacle snarled morning rush-hour traffic. Passers-by, some with binoculars, stood and watched."[2] Twenty two newspapers and four wire services across the country picked up the story and photograph.[3]

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[1] Floegel, 1999.
[2] Aig, 1994.
[3] Dow Jones Interactive, search for "Greenpeace" and "Time magazine."

Simultaneous with the Time-Life building stunt, Greenpeace released a mock *Time* magazine printed on American-made TCF paper.[1] *It's about TIME* included articles on the effect of pulp mills on communities of color, dioxins and organochlorines from pulp mills, Time's failure to change, and the need for action. "Floegel said the parody's most important feature is that it proves beyond doubt -- despite TIME's claims to the contrary -- that it is technically and economically possible to publish a glossy, four-color magazine using totally chlorine-free methods, without sacrificing quality or style."[2] *It's about TIME* and the stunt were designed to hold Time accountable to its commitment to moving away from chlorine-based bleaching. "To date, TIME has neither taken any action to purchase chlorine-free paper, nor admitted to TIME readers that its promise to convert was a hollow one."[3]

Despite four years of lobbying and pressuring by Greenpeace, Time Inc. did not agree to purchase TCF paper. Jack Weinberg, former director of Greenpeace International's Great Lakes campaign, saw the main shortcoming of Greenpeace's efforts to persuade Time to purchase TCF paper as resources.

> When the International campaign withdrew resources [from the pulp and paper campaign after 1992], we [Greenpeace USA] didn't have the resources, the technical people. We couldn't bring authoritative people to the table [with Time]. Direct action and pressure create inclination to change, then have to convince them [Time] what we were saying was valid. We were up against serious resources and science. Time said yes, then no. Pressure from back channel dialogue [with paper manufacturers] changed their commitment. We couldn't deliver right people [scientists] to them, couldn't show our staff had [scientific] credibility. We no longer had the resources.[4]

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[1] Greenpeace also released two technical reports and brought the Rainbow Warrior to New York City. The two technical reports were: *The medium is the message: water pollution, Time magazine, and opportunities for clean production* (Floegel, 1994) printed by Greenpeace USA and *Just a matter of TIME: corporate pollution and the Great Lakes* (Palter and Weinberg, 1994) printed by Greenpeace International.
[2] U.S. Newswire, 1994.
[3] Floegel, 1994, p. 1.
[4] Weinberg, 1999.

While additional resources and scientific capacity are always helpful, a major impediment to Greenpeace USA succeeding with Time Inc. was a separate initiative of another environmental organization, Environmental Defense. By waiting until 1994, Greenpeace had lost its opportunity to catalyze purchasing change within Time Inc. Then Time Inc. was collaborating with Environmental Defense on a separate purchasing project. Time Inc. responded to the press after Greenpeace USA's 1994 stunt by stating: "*Time* plans to use only chlorine-free paper [i.e., ECF] within two years as their suppliers change their production process, the company said in a statement. Additionally, the company is part of a task force [with Environmental Defense] to develop 'an environmentally compatible approach to paper purchasing.'"[1]

The Paper Task Force was a joint project initiated by Environmental Defense with large corporations to increase demand for environmentally preferable purchasing. The details of the task force are discussed in the next section. The implication of the task force for Greenpeace USA was, it created a respectable avenue for Time Inc. to opt out of its commitment "to eliminate chlorine-bleached pulp." Time Inc. agreed to participate in the Paper Task Force in the summer of 1992. The outcome of Greenpeace USA's July 1994 actions was to drive Time Inc. further into Environmental Defense's corner. As David Refkin of Time Inc. lamented, "I receive letters [inspired by Greenpeace actions] from nuns and kids asking, 'why are you still using chlorine and polluting the environment.' Personally, I'm sick of this."[2] Had Greenpeace USA performed its 1994 actions two years earlier -- when Time Inc. was not collaborating with Environmental Defense -- then Time Inc. might have been more likely to negotiate.

[1] Aig, 1994.
[2] Refkin, 1997.

10.1.2 A few TCF successes

Greenpeace USA extended its efforts at promoting TCF purchasing to other smaller corporations, including Kinko's copy shops and Jossey Bass book publishers. Kinko's with hundreds of copy shops sprinkled across the US[1] was a potentially significant target when it agreed to purchase TCF paper in 1992.[2]

Tim Martin, Greenpeace USA pulp and paper campaigner approached Kinko's to purchase TCF paper in the early 1990s, but could not get the company's attention. Then he organized a picket of a Kinko's store. "That got a swift reaction," Mark Floegel recalled:

> Paul [Orfalea] is an old hippie and was horrified to learn one of his stores was being picketed by GP [Greenpeace]. ... I talked to their tech and marketing folks and we found a sheet that would work in their copiers, was available in quantities they needed and was TCF. The HQ folks wrote up a decree that every store was to carry the TCF paper and I attended a "Kinko's conclave" in Houston where the policy was rolled out to the partners. Many of the partners were not happy about it (and manage to keep the TCF well hidden at their stores - they think it's a drag on profits) but Kinko's [i.e., Paul Orfalea] the boss, he owns 51 percent.[3]

While the Kinko's' partners carry TCF paper they offer it at a cost of 3-5 cents more, recalled former Greenpeace pulp and paper campaigner, Billy Stern. "That mark up is ridiculous given what Kinko's probably pays for the paper. It probably costs Kinko's about 0.2 cents per sheet of paper more, and here they are marking it up 3-5 cents. That means few people will buy it. I tried to get them to sell it at a markup of 1 cent per page," but failed[4]

Greenpeace USA also persuaded book publisher Jossey Bass to purchase TCF paper in 1995.[5] With its core purpose of "Developing healthy and responsible leaders, communities, and

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[1] http://www.kinkos.com/about_us/history/history_timeline.php
[2] "In 1992, Kinko's made the commitment to offer totally chlorine free and a wide range of recycled content paper" (Orfalea, 1997).
[3] Floegel, 2003.
[4] Stern, 2001.
[5] Publishing and Production Executive, 1995.

organizations,"[1] Jossey Bass was receptive to environmental issues and Greenpeace USA's message. *Greenpeace* magazine went TCF in 1991 when it began using TCF bleached sulfite pulp from Lyons Falls Pulp and Paper in New York state.[2]

Many other organizations moved to TCF papers without being targeted by Greenpeace USA. Seventh Generation started purchasing chlorine-free paper products in the late 1980s.[3] Celestial Seasonings switched to TCF for its tea bags in 1990.[4] And David Garth, publisher of *Scuba Times*, decided to take his publication TCF after "diving in Pensacola Bay [Florida] and seeing firsthand the effects of pulp mill effluent on a marine ecosystem."[5] Greenpeace USA helped to find him TCF paper. In 1992 *Scuba Times* began using TCF paper for black and white segments of its magazine and in 1995 went completely TCF.[6] For *Scuba Times* to purchase TCF paper in 1992 was significant because it was the first general circulation magazine to purchase TCF. An environmental publication, *Worldwatch* magazine switched to TCF in 1994[7] and Patagonia used 50% TCF pulp in its catalogue by 1997.[8] Ben & Jerry's pioneered the development of an unbleached paperboard carton for its ice cream, replacing bleached kraft paperboard. But that change did not happen until 1999,[9] years after Greenpeace USA had dropped its hope of transforming the US bleached kraft pulp market.

In the early 1990s grassroots groups became more active in the campaign for TCF paper. These campaigns blossomed after Greenpeace International ended the pulp and paper campaign (end of 1992). The Washington Toxics Coalition, New York Public Interest Research Group,

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[1] Jossey-Bass, 2003.
[2] Hovey, 1991.
[3] Hollender, 1997.
[4] Manning, 1990.
[5] Floegel, 2003.
[6] Kaczor, 1997.
[7] Beaton, 1994.
[8] Judge, 1997
[9] Abrams, 1998; and Dairy Foods, 1999.

Reach for Unbleached (a coalition of Northwest groups, including Washington Toxics Coalition, Washington Citizens for Recycling, People for Puget Sound), Native Forest Network, Women's Voices for the Earth, Natural Resources Council of Maine, all campaigned for TCF paper starting in the early to mid-1990s .[1]

The grassroots groups persuaded a number of government institutions to specify purchasing preferences for TCF paper, including: State of Oregon (1990); City of Bellevue, WA (1994); City of Chicago (1994); City of Seattle (1994); State of Minnesota (1994); EPA region 10 (1994); Vermont (1998); and a handful of other cities others including San Francisco, Palo Alto, and Ann Arbor.[2]

The questioning of bleached paper products did reach into American consumer culture. For example, a small city newspaper in Oklahoma published a newspaper article in 1992 on green purchasing. It included tips on paper products to avoid:

> **Look for paper that is unbleached** or lightly bleached rather than pure white. **White paper products are processed with chlorine, which creates highly toxic dioxins.** These dioxins, even though processed through a sewage plant, can show up in ground water, fish, fruits and vegetables.
> Use cloth or metal [coffee] filters that can be washed or reused. Or choose **unbleached filters** that will not expose you to dioxin contamination.
> Use tea bags that have **not been treated with chlorine bleach**, such as Celestial Seasonings [emphases added].[3]

No longer were white, bright paper products unquestionably the best products. Yet as this article indicates, the terms "chlorine-free" or "TCF" did not reach the American mainstream. And that's what vendors of TCF paper found. Cross Pointe, which introduced TCF paper in 1993, still found in 1995 that "'Consumers are not really aware of chlorine-free paper yet.'" And the ECF/TCF distinction confused the issue. As Linda Beech, marketing coordinator at Cross

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[1] Valeriano, 2001.
[2] Valeriano, 2001.
[3] Shoup, 1992.

Pointe explained: "'There is confusion about chlorine-free in general, as well as TCF versus ECF. The definitions are becoming as vague as the recycled paper terms commonly bandied about.'"[1]

While the ECF/TCF distinction made selling TCF more complicated, environmental organizations will often confront these types of challenges as they try to move a resistant industry to the most advanced cleaner production technologies. More damaging to the environmental movement was the internal dissension and competition between ECF-lite (e.g., Environmental Defense and NRDC) and TCF (e.g., Greenpeace USA) advocates. For corporations that lacked deep environmental convictions, the environmental split made TCF a harder sell.

10.1.3 Trying to catalyze market change through collaborative research: Environmental Defense and its Paper Task Force

When Environmental Defense moved down the path of what executive director Fred Krupp called the "third stage" of environmentalism, it began collaborating with corporations to achieve environmental change. Environmental Defense's first collaborative project was with McDonald's. In 1990, Environmental Defense and McDonald's established a joint waste reduction task force to "investigate new materials, reusable items, recycling, composting, and other ways to eliminate McDonald's waste."[2] When McDonald's announced its decision to stop using polystyrene clamshell packages in late 1990, Environmental Defense claimed it as "the first fruit of a joint task force between EDF[3] and McDonald's" and as a "major victory for all environmentalists working to reduce fast food restaurant waste."[4]

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[1] Jeffrey, 1995.
[2] Krupp, 1990.
[3] "EDF" is the acronym for Environmental Defense Fund. The EDF later shortened its name to Environmental Defense.
[4] EDF, 1990.

The Paper Task Force was next. Officially launched in the summer of 1993 with funding from the Heinz Family Foundation,[1] EDF initially approached organizations in the summer of 1992.[2] Duke University and five corporate consumers of paper initially agreed to participate in the Paper Task Force: Johnson & Johnson, McDonald's Corporation, NationsBank, The Prudential Insurance Company of America, and Time Inc.[3]

Time Inc. participated in the Paper Task Force, Refkin said, because it was consistent with the "Philosophy from the top of the corporation," which emphasized the need to work with the public, need for continuous environmental improvement, and need for the paper industry to move to the minimum impact mill. He added that "Companies don't want to be embarrassed,"[4] implying that Time Inc. preferred working with the more reasonable EDF, which would not hang a banner from its office tower. The Paper Task Force became a safe haven for Time Inc., away from the badgering Greenpeace USA. As Stafford and Hartman (1996) highlight in their article on corporate-environmental alliances: green "alliances [can] represent an active strategy that repels attacks from environmental groups and the government."[5] While Time Inc.'s participation in the Paper Task Force did not "repel" attacks from Greenpeace, it provided a shield to deflect the attacks.

The purpose of the Paper Task Force was to develop recommendations that would serve as a model for paper purchasing in participating and other companies: the goals of the task force were "to expand its members' use of environmentally preferable paper products and to design a

[1] PR Newswire, 1993.
[2] Lober, 1995.
[3] Ibid..
[4] Refkin, 1997.
[5] Stafford and Hartman, 1996.

purchasing model applicable to a broad range of institutions."[1] And Environmental Defense emphasized, the Paper Task Force would have "no policy making implications."[2] Yet the motivations behind the formation of the Paper Task Force were called into question, even by *Folio* (a magazine for magazine managers): "A decidedly modest proposal by some of the nation's biggest paper purchasers -- including Time Inc. -- to study ways of spurring demand for Earth-friendly products has split the publishing industry."[3] Skeptics (not identified in the article) "note that the final report, by the task force's own admission, will be non-binding on members" and "suggest that some Task Force participants hope to blunt regulatory action ..."[4]

Despite the Paper Task Force being a collaborative project of modest goals, the environmental laggards in the pulp and paper industry were not assuaged. They were determined to make sure that the task force's recommendations mirrored the outcome they were willing to accept: ECF bleached pulp. Refkin diplomatically explained the response of pulp and paper manufacturers: "The paper companies were clear. They wanted a well-balanced book [report]." To achieve their "well-balanced" report, the pulp and paper industry intensely lobbied the members of the task force; so intensely that "In September 1995, NationsBank pulled out under pressure from the paper industry."[5] With its headquarters in Charlotte, North Carolina, NationsBank was located in the heart of the paper industry. An anonymous source involved with the Paper Task Force explained what happened: "They [NationsBank] have loans to a lot of southern mills. Companies put pressure on NationsBank to buy the corporate line" of ECF only,

[1] PR Newswire, 1993.
[2] Blum, 1995.
[3] McDougall and Newman, 1993.
[4] Ibid..
[5] Refkin, 1997.

or we pull our business from your bank. Tired of handling industry pressure for the "right" recommendations, NationsBank exited from the Paper Task Force.

The direct product of the task force was a monumental report: *Paper Task Force Recommendations for Purchasing Using Environmentally Preferable Paper.* The final report was 250 pages long and supported by 16 supplemental technical reports totaling 1,200 pages. Lauren Blum, PhD, senior scientist, at Environmental Defense coordinated the writing and research for the report.[1]

The report included recommendations for three types of paper -- printing and writing papers, corrugated boxes, and folding cartons -- across their entire lifecycle: forest management, pulp and paper manufacturing, and recycling. The lifecycle approach enabled the task force to identify opportunities for improving the environmental profile of products across their entire life. For example, if the Paper Task Force had only focused on the environmental impacts of pulp and paper manufacturing, it would have ignored the benefits of using recycled rather than virgin paper: "compared to virgin paper production and disposal, recycled paper production and recovery generally result in significantly lower environmental releases of numerous air and water pollutants, less solid waste and lower consumption of energy and forest resources."[2]

For pulp and paper manufacturing, the Paper Task Force developed eight recommendations (see Appendix 2) that defined an environmental spectrum for pulping technologies from least to greatest environmental impacts (see Chapter 5), ranging from the dirtiest of ECF to ECF-lite to TCF. The data revealed a clear trajectory from dirtier to cleaner technologies as pulp mills moved away from chlorine and chlorine dioxide to greater reliance on oxygen, ozone, and hydrogen peroxide.

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[1] Paper Task Force, 1995, p. 226.
[2] Ibid., p. 17.

TCF, despite having the best environmental profile and identified as probably the most efficient route to minimizing bleach plant effluent, was excluded from the Paper Task Force's recommendations. Instead the task force recommendations stated that "Mills that recirculate the filtrates from the first bleaching and extraction stages of the bleach plant make additional progress toward the minimum-impact mill." This obscure statement, understood by only the cognoscenti of bleached kraft pulping, referred to two technologies: TCF bleaching and enhanced ECF with chloride removal. And "enhanced ECF with chloride removal" was an experimental technology that never became economically viable,[1] whereas TCF was in commercial use in Sweden, the US, and other nations. The decision to exclude TCF from the recommendations, despite what the data showed, indicates how effective pulp and paper manufacturers were in intimidating Time Inc., Environmental Defense, and the other members of the task force.

The majority of American pulp and paper manufacturers did not invest in oxygen delignification, despite its cost savings, because they could capture a higher return on investment by investing in faster paper machines. As the technical director for a bleached kraft pulp manufacturer remarked: the expected "ROI [return on investment] for non-environmental projects is 20%. The ROI on OD is only 2-3%."[2] Joel Hirschhorn, author of articles and a book on pollution prevention (P2), saw this trend more broadly in the manufacturing sector: "The more significant competition [for P2 projects] takes place completely outside the P2 sphere, where established and more familiar and trusted opportunities compete for investment money."[3]

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[1] Enhanced ECF with chlorine removal was developed by the former Champion International mill on the Pigeon River in North Carolina; but was never used in another mill.
[2] Hise, 1995.
[3] Hirschhorn, 1997, p. 24.

The Paper Task Force released its report in December 1995 with little press attention. Even the trade press was largely silent.[1] The only significant discussion of the report to appear in the pulp and paper press was in a side-bar column by Lauren Blum in an article on trends in the industry.[2] The low-key trade press attention reflected the impact of the report in the world. At best the report had a marginal impact on a few companies. David Refkin of Time Inc. lamented the outcome: "There was no follow-up for implementation planned on the report other than what the companies [members of the task force] have done."[3] The most significant outcomes from the Paper Task Force related to bleaching technology emerged from Time Inc.

After the release of the Paper Task Force report Time Inc. moved quietly to purchase ECF-lite from American mills and later purchased TCF paper from SCA in Sweden in 1998.[4] Time Inc. also persuaded one of its suppliers, Consolidated Papers, to invest in ozone bleaching.[5] But Time Inc.'s quiet changes had no ripple effects on the market.

The model of the Paper Task Force and its spin-off, the Alliance for Environmental Innovation,[6] was that the best practices of corporate environmental leaders would be adopted by other corporations. But outside of Time Inc., there is no evidence that the Paper Task Force catalyzed market demand for ECF-lite papers, which in turn might have affected technology investments in American bleached kraft pulp mills. To have had any chance of success in shifting to the cleanest kraft bleaching technologies (i.e., ECF-lite with ozone and TCF),

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[1] The first mention of the "Paper Task Force" to appear in any paper industry journal was when an author in *Pulp and Paper* cited David Refkin in an article on closing the water loop (Bihani, July 1996).
[2] Blum, *Pulp and Paper*, September 1996.
[3] Blum, 1997.
[4] Ruston, O'Brien, and Tsang, 1999.
[5] As Blum recalled, "Consolidated Papers implemented ozone because of pressure from Time" (Blum, 1997).
[6] The Alliance for Environmental Innovation is a joint project of Environmental Defense and the Pew Charitable Trusts.

Environmental Defense needed to organize corporate consumers to implement the Paper Task Force recommendations.

Environmental Defense could have extended the lifecycle approach (used to developed recommendations for purchasing environmentally preferable paper) to organizing and aligned with recycling advocates to promote both higher recycled content and more environmentally friendly bleaching processes. Advocacy for reducing solid waste was at its height in the US from the late 1980s to the mid-1990s, with waste management officials in cities and towns, local recycling groups, and national environmental groups like the now defunct Environmental Action promoting greater post-consumer recycled content in paper and catalyzing laws mandating recycled content in newspapers.[1]

The demand for environmentally preferable paper did reach magazine publishers, but it focused almost entirely on recycled content: chlorine remained a secondary or non-issue. For example, writing in 1995 for *Folio*, Tim Bogardus reported:

> A short two years ago, recycled paper was an option considered seriously only by highly committed eco-pioneers. For the rest of the magazine industry, its use was out of the question because of inconsistent quality, higher price and erratic availability. Now, however, it looks like recycled paper use in magazines may outstrip virgin-fiber paper within the next two or three years.
>
> Why is recycled paper suddenly hot? Magazine publishers are attracted by significant improvements in its quality and functionality; are lured by prices that approximate those of virgin-fiber paper; and, in some cases, are spurred by reader demand. Magazine-industry executives are discovering that recycled paper makes public-relations and environmental sense, and--even more important--economic sense.[2]

As for chlorine bleaching, Tom Wolf, vice president and general manager Rodale Press, speculated that: "I think the next issue is chlorine bleaching. … It's been on the back burner."[3]

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[1] Paper Recycler, 1994.
[2] Bogardus, 1995.
[3] Ibid.

Neither Environmental Defense nor Greenpeace USA tried to unite the anti-toxics activists targeting paper bleaching with the solid waste activists working to reduce garbage creation. And Environmental Defense, like Greenpeace USA, sought to change corporate purchasing initiatives alone, with no help from other environmental or solid waste activists.

The competition between Environmental Defense and Greenpeace USA over Time Inc. and their different goals -- the ECF-lite of Environmental Defense v. the TCF of Greenpeace USA -- fractured the American environmental movement in the midst of intense opposition from paper industry laggards. When Environmental Defense inserted itself between Time Inc. and Greenpeace USA, it mitigated the need for Time Inc. to quickly change purchasing specifications and moved Time Inc. out of the public spotlight. In icing the need for action until after finishing the Paper Task Force report, from 1993 to 1995, Environmental Defense froze the momentum for change.

10.1.4 Manufacturers

Over the course of the pulp and paper campaign, Greenpeace USA targeted many of the major producers of bleached kraft pulp and paper products, including: International Paper, Georgia-Pacific, Champion International, and Weyerhaeuser. Greenpeace USA hung banners from International Paper's mill in Natchez, Mississippi (1988); Weyerhaeuser's mill in Everett, Washington (1989);[1] and Georgia-Pacific's headquarters in downtown Atlanta (1990).[2] Downstream of Champion International's mill in Canton, North Carolina, Greenpeace USA posted signs warning people not to eat the fish because of dioxin contamination (1989).[3]

[1] Seattle Times, 1989.
[2] Smith, 1990.
[3] Herndon, 1989.

The outcomes from the actions were primarily local media attention. The Baton Rouge papers -- *The Baton Rouge State Times* and *The Baton Rouge Morning Advocate* --covered the Natchez mill action. The *Atlanta Journal* covered the Georgia-Pacific action. *The Seattle Times* covered the Weyerhaeuser action. The Champion International action received national press attention because the Canton mill's water pollution flowed from North Carolina into Tennessee, sparking a dispute between the two states, involving politicians, community groups, workers, as well as the corporations. Press coverage included: *U.S. News and World Report,*[1] the Associated Press,[2] *Los Angeles Times,*[3] and *The Christian Science Monitor.*[4]

Beyond media attention and raising public awareness to the pollution from the mills, the direct actions only led to serious dialogue with one of the pulp and paper corporations: Weyerhaeuser. The perception of environmentalists within pulp and paper manufacturers was overwhelmingly negative, even among the corporations that were the best environmental performers in bleaching. In my interviews with senior executives and mill managers at Champion International, Union Camp, and Westvaco, the common response was, "we meet with community groups, but not the national groups." As then executive vice president for Union Camp, William Trice remarked: "We speak with environmental groups at the local level, and some of the national groups around natural resource [i.e., forestry] issues. ... In general, we are more attuned to market demand than to the demands of environmental groups."[5] When Robert Galin, news editor for *Pulp and Paper* titled in op-ed article, "Environmentalists no longer fringe lunatics," he confronted widely held shibboleths within the industry. Galin concluded that:

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[1] Satchell, 1989.
[2] Douthat, 1989.
[3] Treadwell, 1989.
[4] Herndon, 1989.
[5] Trice, 1995.

"Perhaps it is too much to ask for both sides to work together for compromise. Yet, it remains for the industry to realize that environmentals (and the public) are becoming more sophsiticated in their knowledge and tactics."[1]

Reflecting the more environmentally enlightened philosophy of Weyerhaeuser, senior executives agreed to meet with staff from Greenpeace USA. As Floegel recalled Weyerhaeuser's CEO, Jack Creighton and vice president of manufacturing and technology, Richard Erickson stating that:

> "with the minimum impact mill we will get to TCF and TEF. But Wall Street gets all over our backs for making these investments. You don't need to spend money on this. Wall Street loves Georgia-Pacific and International Paper because they don't spend money where they don't need to. We think TCF and TEF are inevitable. And when forced to make these investments we will."[2]

Neil McCubbin, a long-time consultant to the pulp and paper industry on environmental issues, corroborated Floegel in that Weyerhaeuser was positioning its mills to be TEF: "Weyco's [short for, "Weyerhaeuser Company"] vision is that all plants of the future will be TEF. Therefore all technologies are being examined to see how they can move the company to TEF production."[3] Yet Weyerhaeuser refused to produce TCF paper.

Only one bleached kraft pulp manufacturer in the US produced commercial quantities of TCF pulp: Louisiana-Pacific at its Samoa, California mill. Louisiana-Pacific had avoided installing a secondary wastewater treatment system because of its location (discharging into a very large body of water, the Pacific Ocean) and good politicking. The corporation had a variance inserted into the Clean Water Act Amendments of 1983 that allowed it to continue operating without a secondary treatment system.[4] While Louisiana-Pacific succeeded in not

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[1] Galin, 1992.
[2] Floegel, 1999.
[3] McCubbin, 1995.
[4] See Section 301(m) of the Clean Water Act amendments of 1983.

installing a secondary treatment system, it failed to comply with its permit; creating leverage for surfers to contest pollution from the mill. Tired of surfing in polluted waters, surfers filed a lawsuit against water pollution from the mill through their association, the Surfrider Foundation.[1] In its consent decree with the Surfrider Foundation, Louisiana-Pacific agreed to reduce water pollution by switching to a TCF bleaching process. In agreeing to TCF, Louisian-Pacific saw itself leapfrogging over old pollution control technology to prevention technology that would help it to capture market share in what it foresaw as an emerging market for TCF pulp.[2]

Another mill in the US produced TCF pulp, but it was sulfite, not kraft pulp. The Lyons Falls Pulp and Paper mill had been producing TCF pulp since its inception in 1969.[3] With sulfite mills representing a small slice of bleached pulp production, generally producing lower quality papers, and Lyons Falls being a small producer, it was not a competitor with the bleached kraft pulp mills. Environmentalists did have access to the TCF converts like Lyons Falls and Louisiana Pacific. As Mark Floegel explained, "we worked with companies like Lyons Falls P&P, Louisiana-Pacific, etc. who were making TCF pulp."[4]

Two other manufacturers, Weyerhaeuser and Union Camp, ran mill scale trials on TCF pulp, but never marketed TCF pulp.[5] Union Camp was best positioned to produce TCF pulp because it had a bleaching line of oxygen, ozone, and chlorine dioxide at its Franklin, VA mill. To produce TCF on this bleaching line, all Union Camp needed to do was replace chlorine

[1] Massara, 1992.
[2] Young, 1993.
[3] Coin, 1993.
[4] Floegel, 2003.
[5] Beaton, 2001; Floegel, 1999.

dioxide with hydrogen peroxide in its last bleaching stage.[1] But demand never became strong enough in the US to inspire Union Camp to produce TCF paper.[2]

And the industry environmental laggards did their best to keep a market from emerging for TCF products. In 1993 there were 104 mills with bleaching operations in the US. These mills operated 176 physical bleach lines (some mills had more than one bleach line). Of the 104 mills with bleaching operations, 87 manufactured bleached kraft pulp.[3] The industry laggards in installing oxygen or extended delignification facilities were International Paper, Georgia Pacific, James River, Bosie Cascade Mead, and SD Warren. These six corporations owned 34 bleached kraft pulp mills, yet had only installed six extended and zero oxygen delignification systems by 1993 (see Table 10.1).

Table 10.1 Cleaner bleaching technology laggards (based on number of bleached kraft pulp mills and installations of oxygen and extended delignification systems, 1993)

	Number of bleached kraft pulp mills	Number of oxygen and extended delignification installations	Number of oxygen delignification installations	Number of extended delignification installations
International Paper	12	2	0	2
Georgia Pacific	7	2	0	2
James River	5	1	0	1
Boise Cascade	4	0	0	0
Mead	3	0	0	0
SD Warren	3	1	0	1
Total	34	6	0	6
Total number of installations in the US		57	27	30

Source: [4]

[1] Nutt, 1995.
[2] Greiner, 1995
[3] US EPA, 1993, p. 8-24.
[4] US EPA, 1993.

The environmental leaders in bleached kraft pulping technologies were Union Camp, Champion International, Westvaco Corp, Weyerhaeuser, and Consolidated Papers,[1] with Louisiana-Pacific joining this group after signing the consent decree with the Surfriders Foundation. These six corporations, with only 17 bleached kraft pulp mills, had installed 32 oxygen or extended delignification facilities (see Table 10.2), over 50% of total installations in the US by 1994.

Table 10.2 Cleaner bleaching technology leaders (based on number of bleached kraft pulp mills and installations of oxygen and extended delignification systems, 1993)

	Number of bleached kraft pulp mills	Number of oxygen and extended delignification installations	Number of oxygen delignification installations	Number of extended delignification installations
Champion International	5	10	7	3
Weyerhaeuser	5	8	4	4
Westvaco	3	4	1	3
Union Camp	2	7	4	3
Consolidated Papers	1	2	1	1
Louisiana-Pacific	1	1	1	0
Total	17	32	18	14
Total number of installations in the US		57	27	30

Source: [2]

Within the environmental community there were many anecdotal stories of pulp and paper laggards intimidating other pulp and paper manufacturers from producing TCF paper. As Jessica Landman of NRDC remarked:

> I cannot prove to you that industry engaged in such heavy-handed tactics because there is no paper trail. It came close to the edge of monopolistic practices. We asked the Federal Trade Commission to examine practices of the industry, but nothing ever came of that. To evoke anti-trust action need to show price fixing, and we had no evidence of that. Collusion is legal when it concerns regulation.[3]

[1] McCubbin, 1995.
[2] US EPA, 1993.
[3] Landman, 2001.

The laggards certainly had an interest in keeping demand and production of TCF paper from emerging because they could not have produced TCF paper without sizable investments. As Bob Simpson, Louisiana-Pacific's western division manager explained: "'If TCF becomes the standard, companies integrated into both pulp and paper production would face substantial expenditures to convert their own pulp mills to chlorine-free bleaching. As a result, they are reluctant to make chlorine-free paper products and have an interest in keeping us from succeeding.'"[1] Because Louisiana-Pacific only manufactured pulp, it had to find papermakers to purchase its TCF pulp. And since papermakers would never rely on a single pulp supplier, the papermakers were vulnerable to threats from the laggards supplying them with their pulp. Rumors swirled around the environmental community of laggards threatening papermakers who purchased Louisiana-Pacific TCF pulp: "If you buy LP [Louisiana-Pacific] TCF pulp to make paper, we won't supply you with pulp."[2] In 1993, Georgia-Pacific and International Paper were the first and third largest producers of bleached kraft market pulp (with Weyerhaeuser the second largest producer).[3]

For integrated pulp and paper producers like Weyerhaeuser and Union Camp, the threat was roughly, if you market TCF paper, we will sell our paper at a loss to buyers of your paper.[4] Union Camp was the fourth largest manufacturer of uncoated freesheet (which includes copy paper), while Weyerhaeuser was the eighth largest producer. So it is conceivable if the big three manufacturers of uncoated freesheet allied together, International Paper (#1), Georgia-Pacific (#2), and Champion International (#3), they could have intimidated Union Camp. Such an

[1] Pulp and Paper, 1994.
[2] Hind, 2001.
[3] Miller Freeman, 1994.
[4] Floegel, 1999.

alliance was conceivable because Champion International, which supported ECF-lite, opposed TCF.[1]

The US industry even threatened Södra Cell with market sanctions if it testified in support of TCF regulations in the US. When the Natural Resources Council of Maine invited Roland Lövblad of Södra Cell to Maine to testify on behalf of its bill for TCF bleaching, he initially said "yes." But "American companies in Europe buy Södra Cell's pulp. They threatened to stop buying Södra Cell's TCF pulp if they testified in Maine.[2]

Whether it was the threats that prevented other environmental leaders from joining Louisiana-Pacific in manufacturing TCF paper, the lack of a market demand from emerging (which the laggards helped to dampen), or a combination of both cannot be ascertained. But the paper industry is renowned for being a technologically conservative industry, and a reluctance to take chances in an uncertain market is not surprising. I speculate that if Time Inc. had demanded TCF paper and been willing to pay a price premium for it, manufacturers like Union Camp or Weyerhaeuser might have stepped forward.

10.2 Pursuing chlorine bans through government politics: lobbying the International Joint Commission (IJC) and US Congress

In the early 1990s the International Joint Commission (IJC) and US Congress became hosts to debates over whether to ban the use of chlorine and chlorine-containing substances, especially in the pulp and paper industry. The IJC proved to be one of the few bright spots for American campaigners, while the US Congress was the sight of yet another failed attempt at trying to achieve broad change in American bleaching practices.

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[1] Bennett, 1997; Floegel, 1999.
[2] Bennett, 1997.

10.2.1 International Joint Commission (IJC)

In 1992 the International Joint Commission (IJC) recommended that Canada and the United States: "in consultation with industry and the other affected interests, develop timetables to sunset the use of chlorine and chlorine-containing compounds as industrial feedstocks and that the means of reducing or eliminating other uses be examined."[1] With this recommendation the IJC became the first government-authorized body to call for the sunsetting, the phasing-out, of chlorine and chorine-containing chemicals. It was a major victory for Greenpeace and other environmental organizations campaigning against chlorine and organochlorine pollution.

In the mid-1980s Greenpeace International established its Great Lakes campaign with the purpose of improving the ecological health of the region and unifying the work of Greenpeace USA and Greenpeace Canada. To advance its regional agenda Greenpeace focused on the International Joint Commission (IJC). In targeting the IJC, Greenpeace joined other environmental organizations active with the Commission, including: Great Lakes United, National Wildlife Federation, Sierra Club, and the Canadian Institute for Environmental Law and Policy.

An early highlight for Greenpeace came in 1989 when Joyce McLean, director of the Great Lakes campaign, gave the keynote address at the biennial meeting of the IJC in Hamilton, Ontario. "About a dozen Greenpeace members kicked off McLean's luncheon speech with a colorful demonstration. Carrying a coffin and wearing masks of diseased fish and deformed birds, the activists paraded to the strains of a funeral march. They unfurled a banner, which read 'The Great Lakes: No Time to Waste!'"[2] Nearly a thousand people attended the meeting,

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[1] International Joint Commission, 1992, p. 30.
[2] Israelson, 1989.

including many concerned citizens. The business community was largely absent from the 1989 meeting.[1]

Environmentalists centered their work on achieving the Great Lakes Water Quality Agreement goal of zero discharge of persistent toxic substances. In the late 1980s environmentalists in the region formed the "Zero Discharge Alliance," which included hundreds of groups.[2] The Zero Discharge Alliance had a number of quick successes prior to the 1991 biennial meeting that was held in Traverse City, Michigan, including persuading the IJC to: host a Zero Discharge Roundtable in Hanover, New Hampshire and establish a Virtual Elimination Task Force.[3]

In the months preceding the September 1991 biennial meeting in Traverse City, Michigan, Greenpeace worked to create public support for strong water protection action in the Great Lakes through its "Great Lakes Zero Discharge" boat tour. The Zero Discharge tour centered around three goals:

> 1) End chlorine-based bleaching by the paper industry. Chlorine and chlorine compounds, which are used by the paper industry to bleach paper white, result in the discharge of hundreds of millions of pounds of deadly poisons into the lakes each year.
>
> 2) Ban new incinerators in or near the Great Lakes basin. As much as half of all persistent toxic inputs into the Great Lakes comes from airborne sources, and garbage and hazardous waste incineration is the fastest growing new source.
>
> 3) Establish a system of sunset permits for industrial processes that use or produce persistent toxic substances. These permits would set an end date by which they processes must be changed. Strict interim goals would also be established.[4]

The pulp and paper mills were a prime target for the *Moby Dick* boat tour. Greenpeace held actions at Canadian and American pulp and paper mills, including: Domtar's Cornwall,

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[1] Botts and Muldoon, 1996.
[2] Muldoon and Jackson, 1994.
[3] Ibid.
[4] PR Newswire, 1992.

Ontario mill; Great Lakes Forest Products, Thunder Bay, Ontrario mill; and SD Warren's Muskegon, Michigan mill.[1] "The Thunder Bay action made it onto national TV news in Canada, and the image of the blockade at the Thunder Bay mill became a wire photo in the major Canadian newspapers."[2]

With Greenpeace and the other organizations generating public concern, citizens in the Great Lakes region turned out in large numbers for the Traverse City meeting. The 1991 biennial meeting had the greatest number of participants to date, with 1,600 attendees, including for the first time "a significant number of industry representatives."[3] Caught off-guard by the success of the environmentalists, the pulp and paper industry learned that the IJC was about to recommend banning the use of chlorine and chlorine-containing chemicals in pulp and paper mills. Realizing they could not persuade IJC commissioners to not issue a chlorine ban, the paper "Industry convinced the IJC," Jack Weinberg recalled, "to expand the ban to include all uses of chlorine and chlorine containing chemicals. 'Why pick on us,' they asked."[4] It was a clever ploy to create outrage among other users of chlorine and chlorine-containing products. As Weinberg noted, "When the IJC expanded the ban to not target pulp and paper, it created a political backlash."[5]

When the IJC released its Sixth Biennial report in 1992 with the call for a chlorine phase-out, it "became the most controversial" report for the IJC.[6] As Lee Botts and Paul Muldoon wrote in their report on *The Great Lakes Water Quality Agreement*: the recommendation "galvanized industry to lobby against the recommendation inside and outside the IJC. From

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[1] See Peerla, 1997; and PR Newswire, 1991.
[2] Peerla, 1997, pp. 163-164.
[3] Botts and Muldoon, 1996.
[4] Weinberg, 1999.
[5] Ibid.
[6] Botts and Muldoon, 1996.

1992 on, industry and particularly through the Chlorine Institute, took notice of the work of the Commission and devoted considerable financial resources (reportedly over $10 million per year) to discrediting the recommendation. About 300 representatives of industry attended the 1993 biennial meeting in Windsor, Ontario."[1] Neither the Canadian or American government implemented the recommendation.[2]

10.2.2 Chlorine Zero Discharge Act dies quickly death in Congress

Following the success with the IJC, Greenpeace USA allied with other national environmental organizations, including NRDC , and World Wildlife Fund to promote a chlorine ban in the US Congress. In August 1993 Representative Bill Richardson (D-NM) introduced House Resolution 2898, the "Chlorine Zero Discharge Act of 1993."[3] The bill targeted pulp and paper mills: "Effective within 5 years of the enactment of this section, it shall be unlawful to discharge into water or other media a waste stream containing any organochlorine compounds, byproducts, or metabolites formulated as a result of the use of chlorine or any other chlorinated oxidizing agents in the pulp and paper manufacturing process."[4]

Then in January 1994 the US EPA made a surprising recommendation as part of its proposed language for reauthorizing the Clean Water Act: it recommended developing a "'national strategy for substituting, reducing, or prohibiting the use of chlorine and chlorinated compounds.'"[5] The recommendations were included in S.1114, the major Clean Water Act reauthorization bill.[6]

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[1] Ibid.
[2] Caruso, 1993.
[3] Floegel, 1994, p. 21.
[4] 103rd Congress, 1st Session, H.R. 2898.
[5] Bergeson, 1994, p. 326.
[6] Ibid., p. 326.

The anti-chlorine bills mobilized the chemical and pulp and paper industries. The Chemical Manufacturers Association (CMA), with an annual operating budget of $26 million per year, was joined by the American Plastics Council, with a budget of $50 million per year, and the American Forest and Paper Association in opposing the chlorine bans in both the Senate and House of Representatives.[1] The Chlorine Chemistry Council (CCC), a division of the CMA, replied: "'We're aggressively asking our members and their employees to fight this,'" said Deborah Schwartz, spokesperson for CCC.[2] The CCC mobilized the mailing of "more than a million letters" to Congress "by employees of companies that make or use chlorinated products."[3] Joining the chemical and paper industries in opposing the chlorine language in the Clean Water Act reauthorization bill was "Senate Majority Leader George J. Mitchell, Maine Democrat, whose state is home to numerous chlorine-using paper mills."[4]

While the IJC recommendation created momentum for change, the environmental organizations and the US EPA were not prepared for the ferocity of the industry backlash the chlorine proposals generated in the US Congress. The Chlorine Zero Water Discharge bill, the chlorine language in the Clean Water Act reauthorization, as well as the entire Clean Water reauthorization failed to pass in the 1994 Congress.[5] And the ascendancy of the Republican Party to the leadership of the House and Senate in 1995 effectively stopped further legislation targeted at chlorine.

Greenpeace USA, NRDC, World Wildlife Fund, and a few other organizations were not going to succeed against the entire chlorine and chlorine-related industry without a huge

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[1] See Ibid.; and Plastic News, 1994.
[2] Begley, 1994.
[3] Silber, 1994.
[4] Ibid.
[5] Begley, 1994.

groundswell of public opinion in their favor. In trying to target a broad class of chemicals, a strategy that makes sense from the perspective of trying to avoid the slow process of addressing one toxic chemical at a time as well as the substitution of a toxic chemical with another toxic chemical, Greenpeace USA and its allies created a swarm of resource-rich opponents.

A footnote to the legislative work to change bleaching practices in the pulp and paper industry was an effort by environmental groups in Maine, including the Natural Resources Council of Maine (NRCM), to pass a bill that would have required Maine's mills to use TCF bleaching processes. The TCF bill came before the Maine legislature in 1997 and was defeated amidst intensive lobbying by the pulp and paper industry. As Nick Bennett, staff scientist for NRCM recalled, "Maine mills gambled that they could win it all [and they did]. ... Pulp and paper mills have a lot of power in Maine. Labor came down hard against environmentalists. The paper industry is extremely powerful in Maine."[1]

10.3 The US EPA and its "Cluster Rules"

Having lost at market and Congressional politics, regulation was the last significant chance for environmentalists to create national change in the industry. The Natural Resources Defense Council (NRDC) and Greenpeace USA were the national leaders in lobbying for stronger environmental regulation. The goal of NRDC was ECF-lite, while the goal of Greenpeace USA was TCF. They ended up playing an "insider game" with the US EPA, where they tried to win with minimal media attention to the pollution from pulp and paper mills; relying instead on trying to mobilize broad support and develop persuasive arguments. It was a game in which the paper industry routed environmentalists. When the US EPA promulgated its final regulations on water discharges from bleached kraft pulp mills in 1998, environmentalists were

[1] Bennett, 1997.

handed a defeat and the paper industry laggards a victory. Environmentalists lost because of a combination of factors: delay (which dimmed the media spotlight); effective counter-campaign by the paper industry; Congressional politics (the Republican-led Congress opposed to any environmental regulation); and disagreement within the environmental movement over goals.

10.3.1 Natural Resources Defense Council (NRDC): a quick introduction

Joined by the incentive of a Ford Foundation grant, two senior attorneys from a New York law firm and a group of recent law school graduates from Yale University formed the Natural Resources Defense Council (NRDC) in 1970. Stephen Duggan and Whitney Seymour -- senior attorneys in the Wall Street law firm of Simpson, Thatcher, and Bartlett -- became interested in forming an environmental law firm after they successfully represented citizens in the Hudson River Valley opposed to the construction of a power plant and associated water storage facility (known as the Storm King case). The recent graduates from Yale were in search of funding to establish an environmental law practice when the Ford Foundation suggested they unite with the Wall Street lawyers.[1] The lawyers hired John Adams, a former lawyer with the U.S. Attorney's office in New York, to be the executive director.[2] Thus began the non-profit environmental law firm, NRDC.

By the end of the 1970s the NRDC was known for initiating lawsuits to pressure government agencies to implement laws. For example, the NRDC "filed thirty-five of the first forty Clean Air Act-related lawsuits."[3] In 1976 the NRDC's administrative petition to the US EPA helped to win a phase-out in the use of chlorofluorocarbons (CFCs) as aerosol propellants.[4] And in a legal settlement with the US EPA in the 1970s, known as the "NRDC consent decree,"

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[1] Gottlieb, 1993, pp. 140-141.
[2] Borrelli, 1987.
[3] Gottlieb, 1993, p. 142.
[4] Maclin, 1988.

the Agency agreed to write "water pollution controls covering 24 major industries and 126 toxic 'priority' pollutants."[1]

As the NRDC grew, it added scientists and lobbyists to its professional staff. "Over time, the NRDC became the environmental organization most identified with the technical expertise needed to draft legislation, issue reports, and use litigation as a tool in the policy process."[2] With its principal focus on litigation, the NRDC developed an eclectic agenda, addressing: pollution control (Clean Air and Clean Water acts), nuclear energy and weapons, toxic chemicals, international environmental issues, and urban environmental issues.[3] By the 1990s the NRDC was a multi-million dollar organization with offices in New York City (headquarters), Washington, D.C., and San Francisco. In 1990 the NRDC had revenues of $16 million and 125,000 members.[4]

The NRDC took a leadership role on pulp and paper lobbying in the early 1990s when Environmental Defense shifted its pulp and paper work from litigation to the Paper Task Force. The NRDC chose to target pulp and paper regulations because, as Jessica Landman, senior attorney at NRDC recalled: "The paper industry water effluent guidelines were worth battling for. The industry is a major polluter of water and prevention technologies were available for the paper industry. It was a ripe industry for prevention because manufacturers could leapfrog to a new technology."[5]

10.3.2 The US EPA and the proposed Cluster Rules of 1993 and 1996

[1] Chemical Marketing Reporter, 1989, p. 3.
[2] Gottlieb, 1993, p. 143.
[3] Ibid., pp. 142-143; and Garland, 1990.
[4] Bosso, 1994, p. 13.
[5] Landman, 2001.

By order of a consent decree with Environmental Defense and National Wildlife Federation (NWF)), the US EPA was legally bound to propose regulations addressing dioxin discharges from pulp and paper mills by 31 October 1993.[1] To minimize cross-media (air, water, and soil) impacts,[2] the US EPA decided in 1990 to write simultaneously air and water regulations for the pulp and paper industry. These became known as the "Cluster Rules."[3]

When writing regulations under authority of the Clean Water Act the US EPA typically does not set technology standards: e.g., all bleached kraft pulp mills must use ECF technology by 2001. Instead the US EPA sets a performance standard, e.g., all bleached kraft pulp mills must limit their discharges of AOX to a monthly average of 0.623 kg AOX per ton of bleached kraft. But the Agency determines the performance standard based on specific technologies. While manufacturers can legally meet the performance standard using any technology they choose, they usually choose the technology used by the US EPA to set the performance standard.

The three principal technologies that were under consideration in the 1990s were ECF, ECF-lite, and TCF. ECF technology would achieve roughly 0.6 kg AOX/ton of pulp.[4] ECF-lite would achieve 0.16 kg AOX/ton of pulp.[5] And TCF would achieve 0.0 kg AOX/ton of pulp.[6]

In the proposed 1993 Cluster Rules the Agency considered five technology options for establishing the performance standards for bleached kraft pulp mills:

Option 1: Split addition of chlorine -- increase efficiency of elemental chlorine use in the first bleaching stage by adding chlorine in two steps rather than one step

Option 2: Substitution of chlorine dioxide for chlorine (ECF)

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[1] US EPA, 1993, p. 2-9.
[2] A "cross-media" impact is when an effort to solve an environmental problem in one medium, such as air pollution, results in greater pollution to another medium, such as water.
[3] Prothro, 1993, p. 231.
[4] For example, see the final US EPA regulations for the paper industry: US EPA, 1998.
[5] For example, see the proposed US EPA regulations for the paper industry: US EPA, 1993.
[6] For example, see the final US EPA regulations for the paper industry: US EPA, 1998.

Option 3: Oxygen delignification or extended delignification with partial substitution of chlorine dioxide for chlorine

Option 4: Oxygen or extended delignification with complete substitution of chlorine dioxide for chlorine (ECF-lite)

Option 5: Oxygen and extended delignification with complete substitution of chlorine dioxide for chlorine[1]

The Agency did not develop a TCF option because it did not consider TCF bleaching to be an available technology. This was because, in the US EPA's words, "of the limited worldwide experience with and data for TCF bleaching of softwood in papergrade kraft and soda mills"[2]

Option 4 (ECF-lite) was the US EPA's preferred option "because no other option that was both technically feasible and economically achievable resulted in greater effluent reductions" of dioxins, furans, and AOX.[3] The performance standards proposed by the US EPA based on ECF-lite were:

TCDD (dioxin) = non-detect at end of bleach plant

TCDF (furan) = 359 nanograms (ng) per metric ton (kkg) at end of bleach plant

AOX (adsorbable organic halides) = 0.156 kg/kkg at end of pipe for entire mill[4]

"The Agency estimated that Option 4 would result in a range of one to three plant closures and an estimated employment effect in the range of 500 to 4,400 lost jobs."[5] The total capital investments for implementing the Cluster Rules overall, both air and water regulations, were estimated by the US EPA to cost $4.0 billion and annual operations and maintenance costs would be $0.4 billion.

When the proposed regulations were released in December 1993, the industry pounced. Leading the attack on the US EPA was the industry's trade association, the American Forest and

[1] US EPA, 1993, p. 66110.
[2] Ibid., p. 66109.
[3] Ibid., p. 66110.
[4] Ibid., p. 66196.
[5] Ibid., p. 66111.

Paper Association (AFPA); formerly the API. Lending significant support to the AFPA was the industry "laggards:" the corporations with the fewest investments in environmentally advanced bleaching technologies (i.e., oxygen delignification, extended delignification, and ozone).[1] The paper "Industry was led by Georgia-Pacific and International Paper," recalled Rick Hind, legislative director with Greenpeace USA. These were "the laggards with the least amount of investments in oxygen delignification. International Paper hired Tom Jorling [former commissioner of Department of Environmental Conservation in New York State]. Georgia-Pacific hired Lee Thomas [former EPA Administrator]. They did heavy duty arm twisting [at the EPA]."[2]

International Paper and Georgia-Pacific would have borne the largest burden in implementing an ECF-lite regulation. The estimated costs of installing extended and oxygen delignification systems varied depending on the state of technological investments within a mill. Retrofitting a mill with an extended delignification system was estimated to cost $1 to $40 million[3] and an oxygen delignification system was estimated to cost $8 to $25 million.[4] Despite the opportunities for operations and maintenance (O&M) savings, the upfront capital costs investment implications for industry laggards of ECF-lite, however, were large. Assuming for illustration purposes that compliance with Option 4 (ECF-lite) for International Paper would have entailed installing only one extended or oxygen delignification system per mill that had neither (which was 10 mills) and the cost was $20 million per mill, complying with the water

[1] McCubbin, 1995.
[2] Hind, 2001.
[3] US EPA, 1993, p. 4-20.
[4] Ibid., p. 4-42.

regulation would have cost International Paper $200 million;[1] and for Georgia-Pacific the cost would have been $100 million. Because these corporations were operating mills that were not using the most advanced bleaching technologies, they were at an environmental disadvantage. Thus they had a huge incentive to invest millions of dollars in studies, lobbyists, and lawyers to avoid investments in the tens or hundreds of million dollars.

The strategy of the industry laggards and the AFPA was four-fold. First, concede elemental chlorine. Second, intimidate the US EPA by publicly rebuking it for betrayal and technical incompetence. Third, contest every technical detail in the Cluster Rules that supported ECF. Fourth, leverage Congressional muscle to pressure the Agency.

Recognizing that they had a public relations problem with dioxin pollution, the paper industry laggards conceded the elimination of elemental chlorine. By eliminating elemental chlorine mills were able to reach non-detect levels of dioxin. And by committing to ECF ahead of required regulations, they were in essence defining the acceptable regulation for the industry. International Paper, for example, set a goal in 1993 of converting all of its bleached mills to ECF by 1996.[2]

In an article in *Pulp and Paper*, reporter Ken Patrick portrayed the outrage of Tom Jorling, International Paper's vice president of environmental affairs:

> The industry was caught by surprise, having heavily supported the initiative, and then seeing the final product, Jorling explains. Since then it has been actively sending out the message that the 'Cluster Rule did not work.'
>
> This message, that 'something has gone awry with the Cluster Rule,' has reportedly found a receptive audience in several influential politicians and lawmakers, and indications are that the 'Cluster,' as proposed, will not be what is finally promulgated.[3]

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[1] International Paper estimated compliance costs for the entire Cluster Rules in 1994 at $0.7-1.4 billion (Patrick, 1994); although it is important to note that it is standard practice for industry's to overestimate the costs of compliance with regulations.
[2] Pulp and Paper, 1995.
[3] Patrick, 1994.

Another article in *Pulp and Paper* emphasized how the conclusions reached by the US EPA illustrated the Agency's incompetence: the data differences between the paper industry and US EPA "can be summarized as a lack of understanding from those outside the paper industry [i.e., US EPA staff]."[1]

Yet the environmental leaders had a much different response. Champion International was alone among paper manufacturer to publicly proclaim support for ECF-lite. In a press release the company stated: "'Champion recognizes the environmental benefits of OD100 [i.e., ECF-lite][2] and has pledged to make the necessary steps to bring us to full compliance in 1996."[3]

Weyerhaeuser, while it did not publicly support the Cluster Rules, emphasized that "'With all of these [public] pressures, we feel like mills must drive toward closure through time,'" said Richard Erickson, vice president of manufacturing and technology. "'The minimum-impact mill, for Weyerhaeuser, is a vision that during the next 15 to 20 years we will install technologies that will take us toward closing our mills.'"[4] And Union Camp's corporate vice president, William Trice believed the "EPA's Cluster concept to be valid, because if done right, it will lead to a set of regulations that are compatible and will help industries make cost-efficient changes." Also he thought the "EPA had a good database and a good understanding of what the they [the data] were about."

Determined to beat the US EPA back to ECF, the paper industry laggards "began flooding the EPA with new data."[5] On the scientific side the paper industry contested the US EPA's use of AOX as a measure of pollution. Operating from the perspective that it is the

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[1] Pulp and Paper, 1994.
[2] "OD100" is shorthand for oxygen delignification ("OD") and 100% substitution of chlorine with chlorine dioxide ("100"), i.e., ECF-lite.
[3] Business Wire, 1993.
[4] Ferguson, 1994.
[5] Ferguson and Finchem, 1997.

government's responsibility to show harm from the pollution -- i.e., industry has the right to pollute until it is shown to be harmful -- John Festa, director of chemical control and health programs, for AFPA argued that "The agency was unable to show correlation between toxicity and AOX contaminants."[1]

On the economic side the industry roundly disagreed with the Agency, asserting it under-estimated costs. The industry estimated that the Cluster Rules "would shut down 30 mills, cost an additional $10 billion in capital expenditures, and could eliminate 275,000 jobs, including 19,000 on the mill level."[2] Catherine Marshall, director of environmental affairs had an apocalyptic perspective on the consequences of ECF-lite: "The EPA severely underestimated economic impacts. .. If the EPA had required OD there would have been job loss and mill closure, and killed international competition."[3]

The paper industry laggards demanded that the US EPA sit down and meet with them, to hear their perspective on the data, and naturally to adopt their view. The laggards' pressure had its desired effect on the Agency. As Catherine Marshall recalled, after the proposed regulations "We had loads of technical meetings with the EPA. We had an on-going dialogue." And "Bob Perciasepe [assistant administrator for the Office of Water] at the EPA was the leader behind us."[4] After the US EPA finalized the Cluster Rules in industry's favor, Perciasepe made a presentation to the executive directors of the Environmental Defense and NRDC saying their rule was good for the environment and business.[5]

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[1] Festa, 1987.
[2] Pulp and Paper, 1994.
[3] Marshall, 1997.
[4] Ibid.
[5] Landman, 2001.

In 1995 the political environment in Washington, DC changed when the Democratic Party lost control of both the House of Representatives and Senate to the Republican Party. Taking power with an anti-government, anti-regulation, anti-environmental agenda, the Republicans had "plans for sweeping regulatory reform" that would "change federal environmental rules and regulations."[1] The pulp and paper industry quickly became "intimately involved with the rewriting of the Clean Water Act," wrote the editors for *Pulp and Paper International*.[2] For the US EPA and its Administrator, Carol Browner, this meant "unrelenting attacks by Republican lawmakers," reported Gary Lee of *The Washington Post*.[3]

With the pulp and paper industry's access to the new Congressional leadership, the result, as Catherine Marshall emphasized, was "Congressional members came down hard on EPA. Our members have a mill in every state, almost a mill in every Congressional district."[4] Rick Hind, legislative director for Greenpeace USA attested to the new found Congressional power of the industry: the "EPA received Congressional letters [in support of the industry] from [Senator] Jesse Helms and [Representative] Rick White. That didn't help."[5]

By the mid-1990s media attention to water pollution from pulp and paper mills had reverted back to the pre-dioxin days of the early 1980s. The bulk of articles were in newspapers in communities with pulp and paper mills, with the major dailies only covering the proposed regulatory changes.

Confronting a politically mobilized and connected industry in the face of high compliance costs (even though there was a return on investment for the delignification

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[1] Pulp and Paper International, 1995.
[2] Ibid.
[3] Lee, 1995.
[4] Marshall, 1997.
[5] Hind, 2001.

technologies) and Congressional leadership opposed to regulation in the absence of media attention to a salient environmental problem, the US EPA stepped back from its support for ECF-lite.

In 1996 the US EPA published another set of proposed regulations. This time the Agency indicated that it was leaning to ECF: "Although the final detailed analysis and decisions are not yet complete, the post [1993]-proposal analysis to date has demonstrated to the Agency that the first option" -- ECF -- "should be given equal weight [as ECF-lite] as a possible technology basis for the BAT [best available technology] effluent limitations" because "both options appear to reduce dioxins and furans in wastewaters to concentrations at or below the current analytical minimum levels."[1] Note that the purpose of the water regulations are now directly solely at the reducing dioxin and furan emissions, the industry position, while the other benefits of delignification technologies were minimized as "incremental benefits." "The incremental environmental benefits that the Agency can attribute to" ECF-lite included: "reduced chronic toxicity to some aquatic life species," which resulted from reducing COD and AOX discharges.[2] The US EPA also noted that "Even though dioxin and furan are no longer measurable at the end-of-pipe at many mills [with ECF], the potential for formation of these pollutants continues to exist at pulp and paper mills as long as any chlorine-containing compounds (including chlorine dioxide) are used in the bleaching process."[3]

In the 1996 update the US EPA estimated that in terms of cost, ECF and ECF-lite were nearly identical. While ECF-lite cost would require much greater capital investments, it saved mills money in operations and maintenance costs because of reduced chemical and energy use

[1] US EPA, 1996, p. 36837-36838.
[2] Ibid., p. 36838.
[3] Ibid., p. 36839.

(see Table 10.3). "When the costs of Options A [ECF] and B [ECF-lite] are compared on a pre-tax annualized basis, Option B is slightly less expensive that Option A for the sum of all direct dischargers" because "oxygen delignification reduces operating costs at certain mills. At some of these mills, the operation and maintenance cost savings of Option B are sufficiently large that they outweigh that option's higher capital costs."[1] The Agency estimated that ECF would result in one mill closure and ECF-lite would result in three mill closures. [2]

Table 10.3 US EPA cost estimates for ECF and ECF-lite in 1996

Costs	ECF (Option A)	ECF-lite (Option B)
Capital ($ million)	998	2,036
Operations and maintenance ($ million)	109	-7

TCF was still not an option because "The limited range of papergrade TCF products currently produced and sold in the U.S. market indicates that TCF technology is not yet available to make the full range of products produced by ECF or similar chlorine-based processes."[3] European TCF mills did not count because "EPA consistently requested but obtained only limited process and pollutant removal performance data for TCF mills in Europe."[4] The success of the paper industry laggards in keeping a TCF market from developing in the US, which prevented incentives from emerging for manufacturers to produce TCF paper, had a feedback loop to the regulatory process: with TCF bleaching barely in use in the US, the Agency would not consider it a viable technology. This illustrates how regulators follow rather than lead the market. And the lesson for environmentalists that want to diffuse the most advanced environmental technologies into an industry sector is they must first succeed in the market before

[1] Ibid., p. 36844.
[2] Ibid., p. 36843.
[3] Ibid., p. 36839.
[4] Ibid., p. 36839.

trying to persuade a regulatory agency, or at least the US EPA, to require the best performing technology.

To silence the environmental leaders in the industry, the AFPA worked with the US EPA in developing incentives for further environmental improvements. The incentives provided regulatory relief for mills that went beyond compliance.[1] In reality, they were for the mills already beyond compliance. "The chief attraction of the incentives," Catherine Marshall of the AFPA explained, was "that the government will go away and not bother" the manufacturers.[2] Jessica Landman of NRDC saw the incentive program as effective in silencing the support of environmental leaders for ECF-lite: "Within the membership of the AF&PA there were some companies that could have lived with OD regulation. Those firms agreed not to support OD regulation if the others agreed to support voluntary incentives for companies that invested in OD. A deal was cut internally to lobby in this manner: no OD regulations, but voluntary incentives for OD."[3]

10.3.3 Strategy of environmentalists

When the US EPA revealed its intent to only require ECF bleaching in 1996, the environmental community had only a tiny window of opportunity for increasing pressure on the Agency to change its position. Given the unified position of the industry (or at least the silenced environmental leaders), the political leadership of the US Congress, the lack of national media attention to water pollution from the industry, and Robert Perciasepe's (head of US EPA's Office of Water) support for the industry position, the environmental community confronted a major challenge.

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[1] See US EPA, 1996; and US EPA, 1998.
[2] Marshall, 1997.
[3] Landman, 2001.

They started this challenge divided. The goals of the two leading environmental groups were at odds. There was a private split in the environmental movement with the NRDC and Environmental Defense willing to accept ECF-lite, while Greenpeace USA and the grassroots groups wanted TCF. As Jessica Landman, senior attorney with NRDC recalled:

> Lauren [Blum of Environmental Defense] and I advocated for OD [oxygen delignification] as standard operating practice because it is the first step to TCF. Support for OD was viewed by some as a sell out. While our technology rationale was sound, a mill must have OD to have TCF, it was not welcomed. I'm a lawyer and was involved with developing legal standards for best available technology and new source performance standards. Lauren is technical expert. We were advocating for OD because it was, and still may be, legally attainable. We can make a solid legal case for OD, but not for TCF. The environmental community was not happy with our focus on OD.[1]

In public the NRDC supported TCF. For example, in a press release following the US EPA's proposed 1993 regulations, the NRDC criticized the Agency for not proposing "the use of chlorine-free technologies in any kraft mills." Landman emphasized that chlorine-free (i.e., TCF) technology was necessary to eliminate "'the discharge of dioxin and other toxic organochlorines in wastewater from this industry.'"[2]

The split in goals for the environmental community, while a technologically minor distraction -- oxygen delignification is necessary for TCF bleaching -- reflected the distrust and competition among the environmental organizations. Environmental Defense had already intervened with Time Inc., undermining Greenpeace USA's TCF initiative. And there were the deeper resentments among grassroots anti-toxic activists that national groups like NRDC and Environmental Defense were willing to "sell-out" to achieve access and "victories." Writing in his weekly newsletter, *Rachel's Environment and Health Weekly*, Peter Montague explained:

> Currying favor with this President led the environmental community into several deep traps. For example, Natural Resources Defense Council (NRDC) blundered into a terrible dilemma. To support President Clinton, NRDC caved in on Delaney. Instead of

[1] Ibid.
[2] U.S. Newswire, 1993.

> supporting prevention, NRDC is now pushing the "one-in-a-million" risk standard that the food chemical industry favors; NRDC is calling for elaborate "risk assessments" to be completed for every pesticide used on our food.[1]

Despite the differences in goals, Rick Hind of Greenpeace USA and Jessica Landman of NRDC were able to work together. As Hind concluded, "We always had a strong ally in NRDC" on the Cluster Rules.[2] The conflict over ECF-lite versus TCF illustrated the larger problem environmentalists faced, they had not defined and agreed upon a clear message of the problem and the solution.

The tactics environmentalists used with the US EPA were: technical information, coalitions, litigation, and direct action. The arguments for oxygen delignification were easy to make and were already supported by US EPA data as well as data collected by the Paper Task Force. To foster scientific legitimacy for its goal of zero AOX discharges (i.e., TCF bleaching) Greenpeace USA emphasized the disproportionate impact of water pollution on communities of color. "Our EPA strategy," Hind explained, "was to push them [the US EPA] to document the hazards to people of color and anglers who ate the fish."[3] Recreational and subsistence anglers eat more fish than the average American. While the average American consumed an average of 6.5 grams of fish per day, recreational anglers consumed 30-140 grams/day and subsistence anglers consumed as much as 300 grams/day.[4] The US EPA, Hind emphasized "has previously estimated that these populations face an unprecedented 1 in 1,000 cancer risk."[5] Furthermore, the "EPA's 1993 regulatory impact report on the proposed Cluster Rule estimated that between 560,000 and 1,000,000 recreational and subsistence anglers were exposed to contaminated fish."[6]

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[1] Montague, 1995.
[2] Hind, 2001.
[3] Ibid.
[4] Hind (1997) citing US EPA data.
[5] Ibid.
[6] Ibid.

Environmental justice issues were of, at least rhetorical concern to the Clinton administration. On February 11, 1994, President Clinton signed Executive Order 12898, *Federal actions to address environmental just in minority populations and low-income populations.* Executive Order 12898, which proclaimed that:

> Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such, programs, policies, and activities, because of their race, Color, or national origin.

To protect recreational and subsistence anglers from exposure to persistent bioaccumulative toxics like dioxins and furans in the wastewater effluent Greenpeace USA advocated for TCF bleaching.[1] Environmental justice groups among the active coalition partners advocating TCF included the Indigenous Environmental Network, Penobscot Nation, Washington Office for Environmental Justice, Oneida Environmental Resources Board, and the Tribal Operations Committee.[2] These organizations were part of a broad coalition that Hind and Landman organized to support more stringent Cluster Rule regulations. Other national environmental groups included: American Canoe Association, Center for Health, Environment and Justice,[3] Clean Water Network, Institute for Agriculture and Trade Policy, National Wildlife Federation, Sierra Club, and US Public Interest Research Group (PIRG).[4] State and local groups included: Washington Toxics Coalition, Natural Resources Council of Maine, Montana Environmental Inforamtion Center, South Carolina Environmental Law Project, Columbia Basin Institute, Friends of the Upper Willamette River, and Women's Voices for the Earth (Montana).[5]

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[1] Ibid.
[2] Greenpeace USA, 1997.
[3] Then known as the Citizens Clearinghouse for Hazardous Waste (CCHW).
[4] Robins, 1997.
[5] Greenpeace USA, 1997.

And a group of 13 executive directors from national environmental and public health organizations wrote a letter to Vice President Al Gore in support of ECF-lite.[1] As Laurie Valeriano of the Washington Toxics Coalition recalled, "In late 1997 & 1998, groups across the country mobilized to pressure EPA to adopt a cluster rule based on chorine-free technologies. We held simultaneous news conferences, attended meetings together and pursued numerous sign-on letters."[2]

The environmental groups also persuaded a handful of corporations to write letters to administrator Browner, vice president Gore, or president Clinton in support of more stringent regulations. The CEO of Time Inc. and director of environmental affairs at McDonald's supported ECF-lite by writing letters to Carol Browner. And the CEO's of Ben & Jerry's, Kinko's, and Seventh Generation, and publisher of *Scuba* magazine all sent letters to President Clinton in support of TCF.

The debate over the Cluster Rules in the mid-1990s occurred largely in the absence of any media on the issue. Greenpeace USA tried to create media attention on the issue when it tagged the US EPA's, Washington, DC headquarters with a banner in May 1997. "The men hung a 36-by-24-foot banner -- reading 'Eco-racism & Dioxin Kill: Chlorine-free Papermills Now!'"[3] wrote *The Washington Post*, which covered the action. The action received little other press. By 1997 the Congressional chlorine debates of 1993 and 1994 were three to four years old and the dioxin concerns of the late 1980s were ten years old. The issues concerning paper mill pollution were so old the media had forgotten them. As a *Washington Post* reporter began her

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[1] The 13 were: American Oceans Campaign, Center for Marine Conservation, Environmental Defense, Environmental Information Center, Environmental Working Group, Izaak Walton League, National Wildlife Federation, NRDC, Physicians for Social Responsibility, Populaiton Action International, Sierra Club, US PIRG, and Zero Population Growth.
[2] Valeriano, 1998.
[3] Washington Post, 1997.

story on the issue in April 1997, "You've probably never heard of organochlorine pollution, but it's part of the debate over an impending regulatory decision that, figuratively, is being beat to a pulp."[1]

And at the same the US EPA was about to finalize the Cluster Rules, Administrator Browner was in a public fight for more stringent air quality regulations and expanding the right-to-know (RTK) program on chemical reporting. In a meeting with environmentalists on the Cluster Rules, Administrator Browner closed the January 1997 meeting by making it "very clear (she had just come from the Senate) that the Hill is extremely unfriendly [to environmental regulation] and is looking to overturn any and all of the three major rules EPA is working on (cluster rule, air, RTK)."[2]

When the US EPA finally issued its regulations for water pollution in 1998, 13 years after the discovery of dioxin in mills and 11 years after dioxin pollution became a public issue, the Agency sided firmly with the pulp and paper industry laggards: it only required mills to reduce AOX discharges to 0.623 kg AOX/ton of pulp, a performance standard equivalent to ECF bleaching. As Sheila Frace, acting director of engineering analysis in the US EPA's Office of Water concluded:

> Industry proposed ECF and argued it would be just as protective [as ECF and OD]. ... We [EPA] are seeing mills getting low levels of pollutants at the bleach plant with ECF. The incremental differences are too small to justify OD. There is decreased [water] flow with OD. The principal differences are in AOX, color, and COD. From the national standpoint if is hard to justify a lot of expenditure when there's a variety of receiving streams.[3]
>
> The capital cost difference between Options A [ECF] and B [ECF-lite] is $1 billion. We have a lot of concern about the economic ramifications [of Option B]. In our bankruptcy analysis we saw some impacts. Projecting impacts and actual impacts, it's hard to asses

[1] Skrzycki, 1997.
[2] Robins, 1997.
[3] Frace, 1997.

> what will really happen. But the environmental impacts are too small relative to the economic costs.[1]

The "bankruptcy analysis" Frace refers to concluded that one of the largest pulp and paper corporations in the US would go bankrupt if required to implement ECF-lite.[2] The two most vulnerable corporations to the oxygen delignification requirement, as noted above, were International Paper and Georgia-Pacific. While the US EPA, citing confidential business data, never released the bankruptcy analysis or named the corporation,[3] the word on the environmental street was: International Paper. Given the number of bleached kraft pulp mills owned by International Paper and the corporation's lack of investment in advanced bleaching technologies, International Paper was the logical corporation to be most vulnerable to ECF-lite. NRDC "tried to get that data, but the EPA has refused to release it. Using the EPA's formula and public data, we found that half of all paper companies should have been predicted to go bankrupt, not just one. The economic analysis is clearly flawed,"[4] said an outraged Jessica Landman.

The irony is that shortly after the US EPA promulgated the Cluster Rule's, International Paper bought Union Camp Corporation and Champion International. International Paper purchased Union Camp for $6.6 billion in 1998 and Champion International for $9.3 billion in 2000. And Georgia-Pacific purchased FortJames for $11 billion in 2000. Given the financial capacity of Georgia-Pacific and International Paper to make multi-billon acquisitions after passage of the Cluster Rules, reveals the lie that either of these corporations could have been bankrupted by the Cluster Rules.

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[1] Ibid.
[2] Landman, 2001.
[3] Ibid.
[4] Ibid.

As Jessica Landman concluded, "The EPA caved in to industry pressure. It was massive, relentless, technical, and political. They had a concerted campaign. They lobbied congress to lobby the EPA. They lobbied EPA directly on technical, economic, and scientific issues. And they silenced their environmentally advanced members."[1] And environmentalists had lost any opportunity to mobilize public opinion to support more stringent regulations because it had been years since dioxins and organochlorines were in the media.

The NRDC joined the National Wildlife Federation and other environmental organizations in appealing the US EPA's decision in the US Court of Appeals, District of Columbia Circuit. The Court of Appeals sided with the US EPA in 2002.[2]

10.4 Challenges to success

Environmentalists had many individual successes in their campaigns to transform the American paper industry. They raised public awareness of the problems with paper bleaching in general and elemental chlorine in particular. They achieved a significant policy success with the International Joint Commission (IJC). And they persuaded Time Inc., Kinko's, *Scuba Times*, Ben & Jerry's and others to change their purchasing specifications.

The IJC success arose when environmental groups formed a broad coalition, developed a unified message ("zero discharge"), operated in the context of clear environmental harm (the degradation of wildlife because of exposure to persistent toxic substances), and operated in the absence of industry opposition. The few TCF purchasing successes (Kinko's, *Scuba Times*, Ben & Jerry's, Jossey Bass) arose when Greenpeace USA targeted or worked with executives sympathetic to the goal of TCF bleaching. Time Inc. was a Pyrrhic success because it emerged from the competition of two environmental groups.

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[1] Ibid.
[2] No. 99-1452, National Wildlife Federation, Et Al., V. Environmental Protect Agency, 2002.

Yet the paper industry laggards succeeded when it counted. They prevented market demand for TCF paper from growing beyond a few small isolated businesses. They blocked legislative action for phasing-out the use of chlorine and chlorine dioxide in pulp mills at both the federal and state levels. They delayed regulatory action for 13 years. And when the regulations were finalized they were written to their specification. The paper industry laggards succeeded by contesting every decision made by any organization that was opposed to its goal of ECF bleaching, squelching the dissent of environmental leaders in pulp and paper manufacturing, and trying to intimidate those opposed to ECF. Together these actions delayed decisions and slowed momentum.

The industry laggards also made a number of savvy decisions when events were turning against them. When dioxins were initially found in their wastewaters, they quickly co-opted the US EPA through cooperation. When the IJC was set to recommend a phase-out of chlorine and chlorine dioxide in pulp and paper mills, they persuaded the Commission to expand the phase-out to all users of chlorine and chlorine-containing chemicals. And when the Cluster Rules threatened to divide the industry, they developed voluntary incentives to silence the environmental leaders.

Outside of the IJC where industry opposition was absent until it was too late, the environmental organizations were unable to successfully counter the paper industry laggards. Different goals and competition among the lead environmental organizations hampered opportunities for success in the face of a mobilized, aggressive, and comparatively resource-rich opposition. A fractured coalition is no way to approach an opponent like the paper industry laggards. When Environmental Defense intervened in Greenpeace USA's market campaign with Time Inc., it hampered factors important to success in environmental campaigns: a unified goal

and quick success. With Environmental Defense supporting oxygen delignification (ECF-lite) over TCF, it confused the message to corporate consumers over what is the environmentally preferred paper. If Time Inc. had stayed the course of its 1992 editorial to purchase TCF paper, it would have created momentum for manufacturers like Union Camp to produce TCF paper. But when Environmental Defense intervened, pulling Time Inc. into a multi-year Paper Task Force research project, it delayed action by Time Inc., drastically slowing momentum for market change. When Time Inc. finally made its purchasing decisions, they were made outside of the public spotlight that would have contributed momentum to the diffusion of cleaner bleaching technologies.

There is nothing wrong with Environmental Defense's pragmatic approach and desire for workable solutions. The problem becomes when Environmental Defense enters into issues cultivated by other environmental groups and tries to negotiate a victory on its own by compromising on the goals of the environmental organization that initiated the campaign.[1]

Finally the US EPA proved to be a huge energy sink for environmental activists. After the paper industry laggards succeeded in silencing the industry's environmental leaders and preventing the diffusion of market demand for TCF paper, and environmentalists could not re-create (as they had in the late 1980s) media attention to the problems of paper mill water pollution, the Cluster Rules became a lost cause.

[1] Dowie (1995) cites a similar example when Environmental Defense intervened with a nationwide consumer campaign by Citizens' Clearing House for Hazardous Waste and Concerned Neighbors in Action against the use of styrofoam containers by McDonald's.

11 The social construction of strategic choices: the underlying factors that affected pulp and paper campaigns

I argue in this chapter that the strategic choices of environmental organizations are socially constructed. Neither values/ideology nor sources of funding, the primary factors traditionally emphasized as affecting environmental NGO behavior (see Chapter 2), sufficiently explained the choices environmental groups made during their pulp and paper campaigns. Rather their strategic choices emerged from the confluence of the values and experiences of staff, their interactions with the external environment, and organizational values, ideology, and history.

The political scientist Russell Dalton (1994), in his model of ideologically structured action, concluded that by knowing the ideology of an environmental organization we could predict its actions. "The environmental identity [i.e., ideology] of a group ultimately culminates in its choice of political strategies."[1] Using data from Dalton as well as Dowie (1995) and Gottlieb (1993), I developed in Chapter 2 a set of characteristics for mainstream and alternative ecological organizations (see Table 2.2). Dalton would consider Environmental Defense, NRDC, and SSNC as mainstream groups because they are less challenging of the sociopolitical order, and would consider the Greenpeace organizations as alternative groups.

For researchers of the environmental movement like Dowie (1995) and Gottlieb (1993), who see money as the principal factor affecting organizational behavior, they would identify the national groups running pulp and paper campaigns as mainstream organizations; they have multi-million dollar budgets and offices in their nation's capitol. Yet, as revealed in Table 11.1, the

[1] Dalton, 1994, p. 250. Dalton saw organizational "identity" and "ideology" as being synonymous.

national environmental groups involved with the pulp and paper campaigns do not fit neatly into either categorization, as a mainstream or alternative ecological organization.

Table 11.1 Comparison of predicted strategic choices to actual choices made by environmental groups during their pulp and paper campaigns

Strategic choices	Predicted choices for: Mainstream ecological organization	Actual choices					Predicted choices for: Alternative ecological organization
Goals		ED	NRDC	SSNC	GP Sw	GP USA	
Set most demanding goal	No	Yes then No	No	Yes then No then Yes	Yes	Yes	Yes
Alliances with:							
Other national environmental NGOs	Yes	Yes	Yes	No then Yes	No then Yes	Yes	No
Grassroots groups / individual consumers	No	Weak yes	Weak yes	Yes	No	Yes	Yes
Corporations	Yes	Yes	No	Yes	Yes	Yes	No
Unions	No	No	No	No	No	No	Yes
Tactics							
Lobbying and/or litigation	Yes	Yes then No	Yes	Yes	Yes	Yes	No
Direct action	No	No	No	No	Yes	Yes	Yes
Targets							
National regulatory agency or legislative body	Yes	Yes then No	Yes	No	Yes	Yes	No
Other levels of government	No	No	No	Yes	Yes	Yes	Yes
Corporations	No	Yes	No	Yes	Yes	Yes	Yes

Notes on the table:

- "Weak Yes" = the action happened with individual staff, but was not a major part of the organization's strategy.
- ED = Environmental Defense; NRDC = Natural Resources Defense Council; SSNC = Swedish Society of Nature Conservation; NRCM = Natural Resources Council of Maine; GP Sw = Greenpeace Sweden; and GP USA = Greenpeace USA.
- Shaded columns: the actions predicted by Dalton (1994) in his model of ideologically-shaped action.
- Shaded rows: actions predicted by Dalton to be strongly associated with an organization's ideology.

Table 11.1 compares the predicted behavior of mainstream and alternative ecological organizations to the actual behavior of the national environmental organizations in their pulp and paper campaigns. The shaded columns in Table 11.1 are the predicted behaviors from Table 2.2. Each of the actual choices made during the pulp and paper campaigns is labeled yes, no, weak

yes. "Yes" means the organization clearly made the specified choice or action. "No" means the organization did not make that choice. "Weak yes" means staff in the organization made the choice, but it was not a major part of the organization's strategy. An example of a "weak yes" is when Lauren Blum of Environmental Defense supported the Natural Resources Council of Maine (NRCM) in its legislative campaign for TCF. While allying with grassroots groups was not a core element of Environmental Defense's campaign, Lauren Blum helped grassroots groups when she could.

The two shaded rows in Table 11.1 represent the decisions and actions of environmental organizations that Dalton (1995) sees as strongly associated with alternative organizations: setting the most demanding goals and direct action. For Dowie and Gottlieb, as well as for Dalton, a mainstream organization would not have the most challenging environmental goal. Yet, at times all the environmental groups with the exception of NRDC had the most environmentally challenging goal. Note that the campaign goals for all of the organizations (excepting NRDC) evolved over time. That is why under SSNC for "Set most demanding goal" the cell is: "Yes then No then Yes." See Table 11.2 for details of the evolution of the SSNC's technology goal. And the most challenging goals of the national environmental organizations

Table 11.2 The SSNC's bleached kraft pulp goals over time

Time period	Pulp and paper goal	Among the most demanding goals at the time?
1986 - 1989	Environmentally friendly - chlorine reduced paper (1.0 kg AOX/ton of pulp)	Yes
1990-1992	"Chlorine-free" definition that allowed chlorine dioxide use	No
1993-1998	TCF	Yes

were shared by the grassroots groups in the US; i.e., the most challenging goals of the national environmental organizations were among the most challenging goals held by any environmental organization, local or national, campaigning on the issue.

The use of direct action did follow the prediction of Dalton, with the groups he identifies as "mainstream" (Environmental Defense, NRDC, and SSNC) avoiding direct action, while his "alternative" groups (the Greenpeace organizations) used it. However, the data on alternative groups is limited, reflecting the work of only one organization, Greenpeace, in two different nations. Excluded from Table 11.1 were the campaigns of state and local groups because I did not examine them in the same detail as the campaigns of the national organizations. But it is worth noting that two grassroots groups (alternative ecological organizations) involved in pulp and paper campaigns, the Dead Pigeon River Council and Pigeon River Action Group,[1] did not use direct action;[2] further highlighting the limited predictive value of Dalton's ideologically structured model of environmental organizational behavior. For all the other strategic choices listed in Table 11.1 there is no clear association between predicted and actual choices.

The pragmatic and opportunistic nature of environmental organizations severely limits the value of trying to associate certain types of organizations with specific types of choices. The conclusion of the environmental historian Samuel Hays (1987) on the pragmatic use of ideas by environmentalists also holds true for their actions. Hays concluded that "Environmental inquiry did not lead to a single system of thought such as social theorists might prefer, and it would be difficult to reduce its varied strands to a single pattern."[3] And I would amend Hays conclusion to state that: environmental organizations with different ideological orientations (or sources and

[1] They campaigned against water pollution from the Canton mill in North Carolina (Bartlett, 1995).
[2] Although Greenpeace USA did perform an action at the Canton mill; see chapter 10.
[3] Hays, 1987, p. 247.

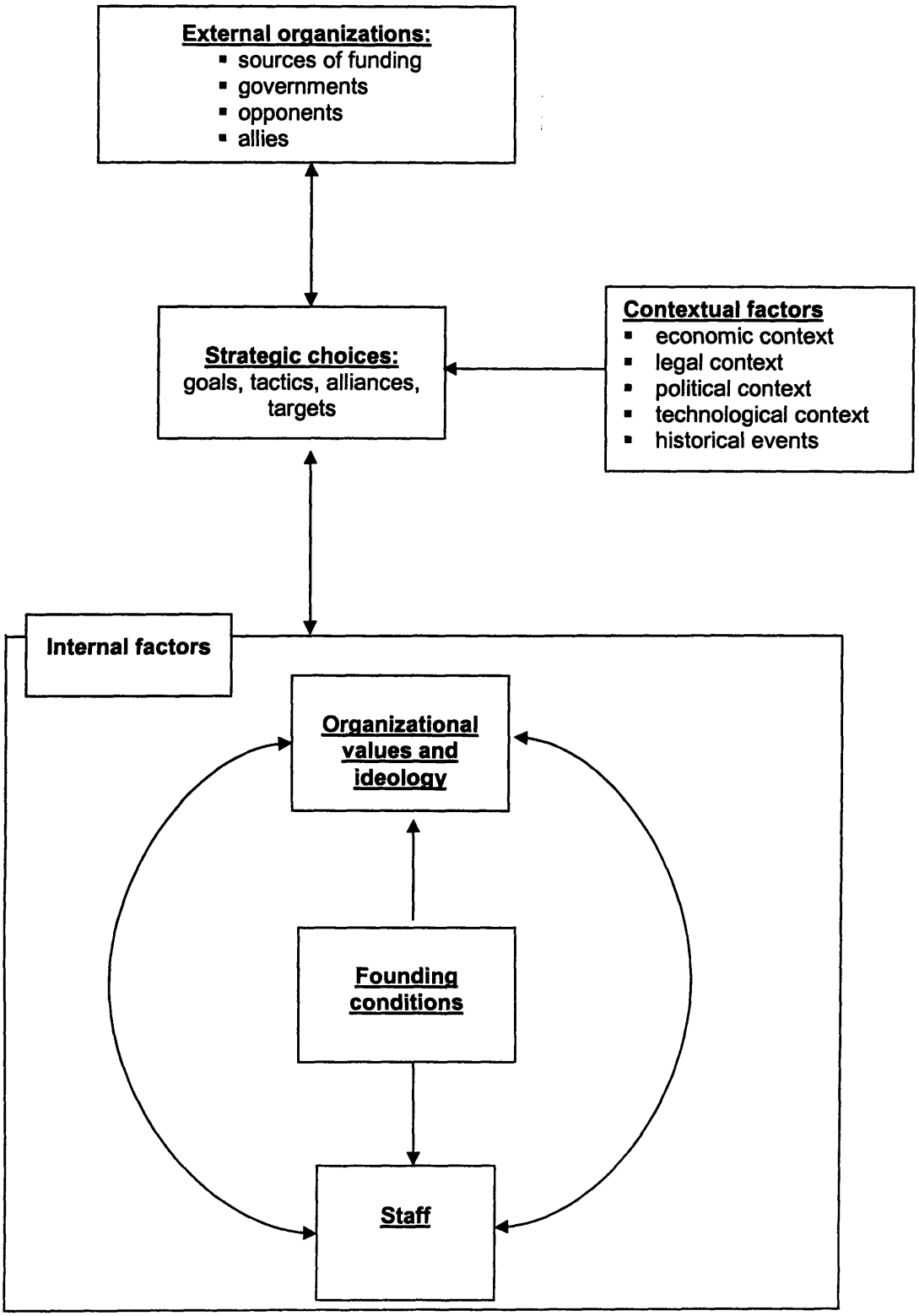
amounts of money) often engage in similar actions, making it difficult to associate ideology (or resources) with specific types of actions as social theorists might prefer.

The limited predictive power of both money- and ideologically-oriented theories of behavior arises from the failure to see strategic behavior as emerging from a confluence of factors. Based on the evidence from the pulp and paper campaigns I conclude that the factors affecting strategic choices are, as depicted in Figure 11.1: the "internal factors" of "staff," "founding conditions,"[1] and "organizational values and ideology;" the "external organizations" that environmental groups interact with in trying to achieve their (including sources of funding, opponents, allies, and government agencies); and the "contextual factors" that shape the environment they try to effect change in. I call this the "social construction of strategic choices" because choices emerge from multiple influences, including the external environment. As Berger and Luckmann (1966) wrote in *The Social Construction of Reality*, "it is impossible for man to develop as man in isolation,"[2] and this holds true for environmental organizations: their strategic choices emerge from the confluence of both internal and external factors rather than emerging from a single source, be it internal organizational ideology or external sources of funding. Below I review how the interplay of these factors affected the strategic choices, especially the setting of goals, of the Greenpeace organizations, NRDC, Environmental Defense, and SSNC during their pulp and paper campaigns.

[1] "Founding conditions" encompass a range of factors present during the formation of an organization. They include the values and professional training of founders, sources of money, tactics used, goals set, and environmental issues addressed.

[2] Berger and Luckmann, 1966.

Figure 11.1 The social construction of strategic choices: the factors affecting the strategies of environmental organizations



To begin with, an important contextual factor influencing the initial goals and causal stories of the pulp and paper campaigns were prior campaigns ("historical events"). Previous campaigns became the roots of future campaigns. The dioxins of grassroots environmentalists influenced Greenpeace USA and the organochlorines of Bryntse at the Environmental Federation influenced the SSNC and Greenpeace Sweden. .

The goal and actions of the Greenpeace organizations were strongly influenced by founding conditions, organizational values, the external environment, and in the collaborative project with IKEA, by staff. Formed as part of a Canadian protest against the American testing of nuclear bombs in 1971, Greenpeace has used direct action and media attention as a means for amplifying its provocative environmental demands ever since. And the pulp and paper campaign was no exception. Direct action, media attention, and challenging environmental goals were all part of the organization's Swedish and American campaigns. All the major pulp and paper targets of Greenpeace Sweden and Greenpeace USA were subjected to a direct action, with one notable exception: IKEA. And the decision to target IKEA without direct action and with little media attention, a project of Margaret Rainey's, caused strife within Greenpeace Sweden and prompted her to quit the organization. That Greenpeace Sweden worked collaboratively without direct action and media attention illustrates how staff influence strategic choices.

Consistent with its rebellious self-image, the Greenpeace pulp and paper campaign was always among the organizations with the most demanding environmental goal. Over the course of the pulp and paper campaign Greenpeace revised its goal three times, with each revision representing a more challenging goal (see Table 11.3). When Greenpeace Sweden began campaigning to reduce pulp and paper mill effluent in 1985 the goal was the same as that set by Göran Bryntse, then of the Environmental Federation: reduce organochlorine discharges by 80

percent. After the discovery of dioxin in 1987, Greenpeace International launched the pulp and paper campaign with the goal of "chlorine-free" production. Whether "chlorine-free" meant eliminating chlorine dioxide as well as chlorine was not specified at the time. However, when firms began marketing paper bleached with chlorine dioxide but without elemental chlorine as "chlorine-free" in 1989, Greenpeace clarified its goal as "totally" chlorine-free (TCF): no chlorine and no chlorine dioxide. When parts of the paper industry countered, "there is no environmental difference between elemental chlorine-free (ECF) and TCF," Greenpeace amended its TCF goal, arguing that TCF is the only path to what should be the industry's goal of totally effluent-free (TEF) production. The evolving goals of Greenpeace reflected both the organizational values of Greenpeace that have existed since the organization's founding -- to have the most challenging yet attainable environmental goals -- as well as the dynamic process of goal setting as organization's interact with their environment.

Table 11.3 The bleached kraft pulp goals of the Greenpeace organizations

Time period	Pulp and paper goal	Among the most demanding goals at the time?
1985-1986	1.0 kg AOX/ton of pulp (Greenpeace Sweden)	Yes
1987-1990	Chlorine-free (Greenpeace International and all national Greenpeace organizations)	Yes
1991-1998	Totally chlorine free (TCF) (Greenpeace International and all national Greenpeace organizations)	Yes

The NRDC's goal of ECF-lite emerged from the combination of founding conditions, organizational values, and external environment. Founded by lawyers with the support of the Ford Foundation in 1970, the NRDC was and remains an organization that tries to bring about change by working with government institutions through its professional staff (primarily lawyers and scientists) and raises money from foundations and individuals to run the organization. NRDC staff generally set goals that they think regulators and legislators will perceive as reasonable. And the NRDC's goal for the pulp and paper industry was: pressure the US EPA to set a standard that would require ECF-lite. Since it was clear that the US EPA would at least require mills to adopt ECF bleaching (the elimination of chlorine gas as a bleaching agent), Jessica Landman (the lead organizer of NRDC's lobbying effort) saw oxygen delignification as a reasonable addition: because oxygen reduced operating costs for many mills, the investment in oxygen delignification would pay for itself over time. While Landman was not opposed to TCF in principle and worked collaboratively with Rick Hind (legislative director) of Greenpeace USA, she viewed oxygen delignification as the priority issue because it was a cost-effective stepping stone technology to TCF as well as TEF.

Environmental Defense's final goal of ECF-lite and its collaborative Paper Task Force project reflected the decision of executive director, Fred Krupp, to reposition Environmental Defense in the 1980s as a "third-wave" organization -- one that solves problems through collaboration. Changes in the goal and tactics of Environmental Defense's pulp and paper campaign mirrored the Krupp-led transformation of the organization. When dioxins in mill effluent first came to public light in 1987, Environmental Defense called for their elimination by ending chlorine use. This initial goal of eliminate chlorine meant Environmental Defense had the same challenging goal as Greenpeace in 1987. And to address the dioxin pollution,

Environmental Defense initially turned to litigation with the US EPA. Using litigation reflected the organization's founding conditions, where staff lawyers and scientists helped achieved a ban on DDT use through litigation.

Then in the early 1990s Environmental Defense shifted from litigation to a collaborative research project, the Paper Task Force, with corporate purchasers of paper. The goal for pulp bleaching mills that emerged from the Paper Task Force report was ambiguously defined as: "give preference to paper manufactured by suppliers who demonstrate continuous environmental improvement toward minimum-impact mills by installing pollution prevention technologies."[1] In practice the goal Environmental Defense advocated for was ECF-lite; same as the NRDC.

Some argue that Environmental Defense's transformation was motivated more by money than values.[2] And the Paper Task Force was a successful money raiser, with eleven foundations[3] helping to fund the project. Yet I found no evidence, nor did I hear rumors within the environmental community, that financial supporters of the Paper Task Force either encouraged Environmental Defense to undertake the project in the first place or influenced its final goals. The creation of the Paper Task Force and Environmental Defense's support for ECF-lite reflected more the direction Krupp set for Environmental Defense than a direction advocated for by any major funder. What the financial support for the Paper Task Force indicates is the receptivity of foundations to such collaborative projects. As Donald Schön concluded, when ideas rise in prominence they have "good currency:" i.e., they enable organizations to raise

[1] Paper Task Force, 1995, p. 191.
[2] For example, see Dowie (1995).
[3] The eleven foundations were: The Mary Duke Biddle Foundation, Carolyn Foundation, The Education Foundation of America, Heinz Family Foundation, Hillsdale Fund, Inc., Lyndhurst Foundation, The Moriah Fund, Newman's Own, Inc., C.D. Spangler Foundation, Inc., Surdna Foundation, Inc., and Turner Foundation Inc. (Paper Task Force, 1995).

money. Thus financial resources support (and conversely the lack of resources undermine) the values of an organization.

The SSNC's strategic choices were strongly influenced by staff and the external environment. Founded in 1909, the SSNC is Sweden's oldest environmental organization. Established during the conservation era, the SSNC is a mainstream organization engaged primarily in trying to bring about change at the national level through lobbying. Yet, the SSNC's pulp and paper campaign was more characteristic of an alternative ecological group. Göran Bryntse tried to create change outside of the national government, targeted corporations directly, and organized municipal authorities. The pulp and paper work represented a new area of work for the SSNC, of trying to effect environmental change through purchasing rather than lobbying. At the heart of this new approach was new staff, especially Bryntse and later Eva Eiderström.

The SSNC is another example of where staff leadership played a principal role in defining organizational goals. When Bryntse brought the paper campaign to the SSNC from the Environmental Federation, he set the goals for the campaign. And when Bryntse placed the SSNC in the compromised position of being attacked by the pulp manufacturer Södra Cell for having a weak environmental goal in 1992, the SSNC removed Bryntse and changed its goal to TCF paper.

The pulp and paper campaigns illustrate the social construction of strategic choices, where founding conditions, organizational values, and staff combined with the external environment (organizations and contextual factors) to shape strategic choices. Founding conditions, especially values and tactics, persisted over time to influence strategic choices made by the national Greenpeace organizations and the NRDC. When strategic approaches differed

from those present at an organization's founding, they were strongly associated with new staff and interactions with the external environment. Staff, with their own experiences and values, operating in different contexts, made strategic choices out of character for the organization. Margaret Rainey, for example, led Greenpeace Sweden to work collaboratively with a corporation without direct action and media attention.

Interactions with the external environment caused technology goals to evolve over time. Conflict with Södra Cell, for example, prompted the SSNC to change its technology goal and Bryntse to leave the organization. And evolving market conditions, technology developments, and scientific data led Greenpeace to revise its goal three times.

The dynamic environment in which strategic choices are made as well as the influence of staff and founding conditions, help to explain the limited predictive value of both the ideological- and resource-based models of environmental organizational behavior. To understand why organizations make their choices we need to look beyond ideology, values, and money.

12 The politics of bleached paper production: environmental groups succeed in (Swedish) markets, fail in government politics

Environmental organizations traditionally have tried to effect technology change through *government politics*, changing manufacturing through legislation, regulation, or litigation. While the environmental organizations did try to bring about change in the pulp and paper industry through government politics, it was through market politics that they achieved their greatest successes. Environmental *market politics* is when organizations try to bring about environmental change by directly targeting and working with manufacturers and consumers. The pulp and paper campaigns represented at the time the most ambitious attempts by environmental organizations to transform an industry sector through market politics.[1]

When the environmental organizations succeeded in implementing their technology goals, they did it through market politics: by developing collaborative working relationships with consumers and proving the technical viability of alternatives. These two factors were critical to the success of environmental organizations in persuading most consumers to implement their goals. Overall the Swedish environmental organizations, with help from Greenpeace Germany, were far more successful than the NRDC, Environmental Defense, and Greenpeace USA in achieving their goals through market politics. In the US, ideologically motivated environmental laggards in the pulp and paper industry organized to oppose market change by successfully intimidating potential environmental leaders among manufacturers and corporate consumers, appealing to common values among corporate executives, and contesting the environmental, economic, and technological arguments of environmentalists.

[1] Simultaneous with the pulp and paper market campaigns were other much smaller market initiatives, including Environmental Defense helping to green McDonald's (EDF, 1990) and Greenpeace Germany working with manufacturers to produce an environmental friendly refrigerator (Verheul and Vergragt, 1994).

This chapter begins by describing how environmental organizations tried to catalyze the development and diffusion of cleaner production technologies. It then assesses why the national environmental organizations in Sweden and the US succeeded and failed in their attempts to green paper production through government and market politics. Within each institutional context I assess the level of responsiveness of targets to the goals of environmental organizations and the causal conditions affecting outcomes. In the analyses of the responsiveness of targets and causal conditions I examine all the cases together (not distinguishing between those in Sweden and those in the US) and comparatively (comparing different national outcomes).

12.1 Trying to effect technology change: the strategic choices of environmental organizations

During their pulp and paper technology campaigns the national environmental organizations made the following strategic choices. They:

- defined goals, i.e., technological solutions
- developed causal stories based on scientific evidence
- raised public awareness, especially through the media
- raised money
- cultivated alliances
- identified and pursued targets in government and market institutions
- used the tactics of lobbying (providing technical information), litigation, direct action, or alternatives development

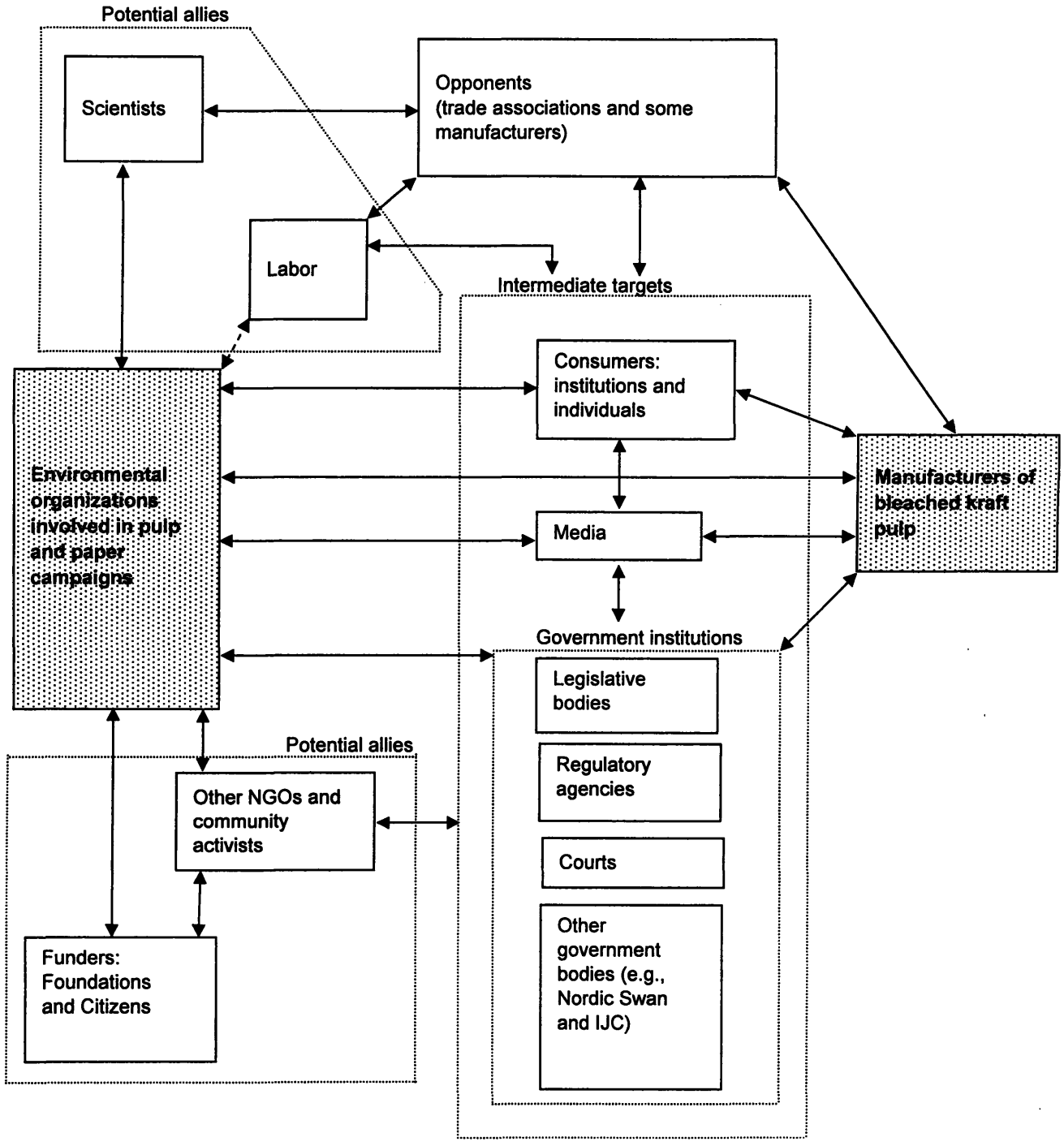
The environmental groups did not make these strategic choices in a linear, step-wise fashion. Many were revisited and revised over the course of the campaign in response to arguments made by opponents, technology changes made by manufacturers, actions taken by other environmental organizations, and changes in campaign staff.

Causal stories, public awareness, and money were all necessary for environmental organizations to generate legitimacy among regulators, politicians, and consumers for their demands that manufacturers reduce pollution by adopting cleaner production technologies (i.e., the technology goals of the environmentalists). In trying to effect change in bleached kraft pulp production environmental organizations sought out multiple allies and targeted many different actors and institutions. Figure 12.1 illustrates the diversity of allies and institutions the national environmental organizations cultivated in trying to change pulp and paper production.

The arrows in Figure 12.1 are two-way, reflecting the dynamic reality of the pulp and paper campaigns. The interactions of staff in environmental organizations with decision makers in different types of institutions affected the actions of environmentalists and vice-versa; it was not a one-way flow from environmental groups to all other organizations. The line between "Environmental organizations" and "Labor" in Figure 12.1 is dotted because none of the environmental groups made allying with labor a primary goal. A central impediment to environmental change was "Opponents" -- primarily environmental laggards among pulp and paper manufacturers and their trade associations -- and their presence is noted in Figure 12.1.

Who national environmental organizations allied with varied depending on their goals and the institution targeted. They allied with: a) national and grassroots groups with similar organizational values when targeting government institutions; b) grassroots groups when targeting material manufacturers at the point of production; and c) corporate and government purchasers, not environmental organizations (be it grassroots or national), when targeting consumers.

Figure 12.1 Targets and allies of environmental organizations in their pulp and paper campaigns



When the environmental organizations targeted institutional and individual consumers they formed alliances with corporations and municipalities, not with other environmental groups. These market campaigns lent themselves to a "go-it-alone" approach because success emerged from environmentalists creating trust and credibility with corporate staff and decisions are easier to reach with fewer participants. In a movement where organizations seek opportunities to distinguish themselves from the pack by creating successes they alone can take credit for, the go-it-alone consumer campaigns are alluring. And when combined with implementation, market campaigns can be very effective. While effective for individual organizations, the go-it-alone approach to targeting institutional consumers can be destructive to the wider diffusion of environmental technologies, as occurred in the US.

The tactics used by the environmental groups varied with the institutional setting of targets as well as with the historical predisposition of the environmental group. Alternatives development, for example, was important when engaging legislative bodies and consumers, but was largely unavailable when targeting regulatory agencies.

Government politics did not foster the diffusion of the cleanest production technologies in either Sweden or the US. Given the capital intensity of the industry and the size of the industry within Sweden and the US, regulators and politicians were receptive to the claims of economic duress from environmental laggards and their trade associations. Thus they refused to require performance standards that the industry laggards did not agree to. There was, however, a false allure to government institutions because of the relative ease of access with legislators and regulators (in comparison to corporate executives). It is ironic that in the institutional setting where environmentalists had the greatest ease of access, government institutions, they had least success in achieving their goals.

When it became clear that the government institutions, especially regulatory agencies, would not take a leadership role in diffusing the cleanest production technologies the environmental groups turned to the market. Engaging in market politics changed the organizing approach of environmental organizations relative to government politics. Now they had to develop a thorough understanding of pulp and paper markets and technologies, work harder to gain access to decision makers, and engage in alternatives development.

In selecting corporate consumers to target environmental organizations sought out both market leaders -- corporations who have the capacity to influence the decisions of both manufacturers as well as other corporations in their business sector by virtue of their size (e.g., Time Inc.) -- and environmental leaders -- typically smaller corporations that define themselves as green businesses (e.g., Kinko's). Access became more difficult and required more creativity in capturing the attention of key decision makers. While access was more constrained in market politics, when environmentalists gained access it became an advantage: the barriers to access switched from environmentalists to their opponents.

The pulp and paper campaigns revealed an important distinction in market politics between manufacturers of materials (pulp and paper producers) and consumers of materials (e.g., IKEA). The manufacturers of materials were much more difficult to access and to work collaboratively with than the consumers. Whereas corporate consumers, with brand names and high public visibility, were more receptive to meeting and working with environmental organizations.

During their market campaigns the environmental organizations engaged in what I call, *alternatives development*: they defined a solution and/or provided technical support to help consumers make the transition to cleaner products. Unlike government politics, especially

regulatory politics, where environmental organizations seldom have a role in helping define the solution, in market politics consumers often need technical assistance: they need help in defining specifications for cleaner products and finding suppliers that offer products that meet their needs. When the environmental groups succeeded with consumers, they demonstrated that alternative products were available and/or helped consumers in the transition to more environmentally friendly products.

By turning to the market, environmentalists expanded politics to encompass consumers (as well as manufacturers) and moved the geography of action away from national capitols to corporate headquarters, households, and communities. By engaging consumers the environmental organizations created new opportunities for change. Consumers in households and institutions were more likely than manufacturers to have values more closely aligned with the environmental groups than the laggards among the pulp and paper manufacturers. And, since corporate consumers are not invested in production technology, it is much easier for them to change products than it is for manufacturers change production technologies. Table 12.1 summarizes the similarities and differences of government and market politics.

An advantage of market politics is it creates positive incentives for change among manufacturers. When the environmentalists were successful in their pulp and paper campaigns they created a price premium for TCF pulp -- pulp is typically a commodity product with little market differentiation -- and opportunities for increased market share. A few Swedish manufacturers leapt at the opportunity to realize a first mover advantage.

A downside to market politics is, once the pressure for change from environmental organizations recedes, diffusion of the cleaner production technologies may stall or even be reversed unless governments develop regulations or laws that require use of the new

technologies. For example, the diffusion of TCF bleaching in Sweden stalled at roughly 35% because Greenpeace stopped campaigning for TCF paper, thinking they had reached *critical mass*, the point at which technology diffusion becomes self-sustaining.[1]

Table 12.1 Comparison of the strategic elements surrounding technology change through government and market politics

Strategic elements	Government politics	Market politics
Causal story: problem and responsible parties	Necessary for action	Necessary for action
Access	Legal requirements and informal contacts guarantee a base level of access	Gaining access to corporations, especially manufacturers of materials is often difficult
Technical information	▪ Scientific evidence of harm ▪ Some technological data, although detailed data on availability of products not necessary	▪ Scientific evidence of harm ▪ Technological data on alternative products or processes, including availability, performance (cost and product quality), and environmental impact comparison with existing product or process ▪ Environmental organization provides technical assistance to organizations interested in change
Decision makers targeted	▪ Politicians ▪ Regulatory authorities ▪ Courts	▪ Governments as consumers; purchasing offices ▪ Businesses throughout the entire product supply chain ▪ Individuals as both activists and consumers
Geography of political action	A nation's capitol (e.g., Washington, DC, or Stockholm)	▪ Local -- location of manufacturing facilities and/or corporate headquarters; and mobilizing citizens as both consumers and activists ▪ Global -- target corporations with similar products & production processes across the globe

Also, as discussed in section 12.4, consumer campaigns lend themselves to national environmental groups going it alone rather than working collaboratively with other environmental organizations. The "go-it-alone" approach created competition among

[1] Rogers, 1995, p. 313.

environmental organizations, slowing the diffusion of cleaner production technologies in Europe and undermining opportunity change in the US.

Finally, market and government politics are not mutually exclusive. For example, Greenpeace International and its national organizations tried to play in every arena -- be it international commissions, national legislative bodies and regulatory agencies, and market politics -- they saw opportunities for change. And in the US, Greenpeace USA and Environmental Defense used their contacts with corporate consumers to write letters to the US EPA in support of more stringent regulation.

12.2 The challenge of government politics: legislators and regulators favor the goals of pulp and paper manufacturers

The NRDC was the only national organization that tried to effect technology change in pulp and paper mills solely through government politics: it lobbied the US EPA and filed lawsuits to overturn decisions of the agency. All the other national environmental organizations -- Greenpeace Sweden, Greenpeace USA, Environmental Defense, and the SSNC -- engaged in a mixture of government and market politics. Together the NRDC and Greenpeace USA mobilized supporters and allies to send letters to US EPA Administrator Carol Browner in support of ECF-lite (NRDC) and TCF (Greenpeace USA). Staff from the NRDC, Greenpeace USA, Environmental Defense and a few other environmental organizations had multiple meetings with EPA staff, including Administrator Browner. In Sweden, the SSNC also engaged in traditional lobbying after Göran Bryntse left (he saw no value in trying to effect change through legislation and regulation), when it tried to persuade the Nordic Swan ecolabeling program to adopt TCF bleaching as part of its criteria for papers eligible for the Swan ecolabel. Greenpeace Sweden targeted the Riksdag (Swedish Parliament), Licensing Board, and the Helsinki Commission.

Only the Greenpeace organizations combined direct action and confrontation with traditional lobbying activities. For example, Greenpeace USA participated in meetings with the Administrator of the US EPA and hung a banner on the US EPA's headquarters in Washington, DC. For Greenpeace, using direct action to capture media attention was a means for trying to create leverage on regulatory agencies that would otherwise be unwilling to take action. By bringing to light what government inaction continued to allow, Greenpeace tried to embarrass regulators (and corporations) into action.

Together the five national environmental groups targeted seven government-related institutions in their pulp and paper campaigns. The institutions included legislative bodies (Riksdag and US Congress), regulatory agencies (Swedish Licensing Board and US EPA), regional-multinational commissions (International Joint Commission and Helsinki Commission), and the regional ecolabeling organization for the Scandinavian nations (Nordic Swan). Table 12.2 lists the institutions targeted and the environmental groups that targeted them. The Swedish Licensing Board has three sub-listings because Greenpeace Sweden targeted it on multiple occasions: each occasion centered on public hearings for revising a mill's operating permit. The US EPA appears in two separate rows because the NRDC and Greenpeace USA had different goals: the NRDC sought ECF-lite and Greenpeace USA sought TCF.

Table 12.2 also includes the responsiveness of the government institutions to the goals of the environmental groups. I divided responsiveness into three levels: access, decision, and implementation.[1] I sub-divided "decision" into three parts: a) did the institution reach a decision related to pulp and paper pollution; b) did the decision adopt the goal advocated by the environmental organization; and c) did the decision adopt the goal of opponents? I added the

[1] For a more detailed description of these levels see Chapter 3.

question on opponents to determine whether the decision represented a win, loss, or compromise for environmentalists.

Table 12.2 Levels of responsiveness with government institutions

Government institutions targeted (environmental organization)	Levels of responsiveness				
	Access?	Government decision?			Implement decision
		Reached a decision related to pulp and paper pollution?	Government adopts goal of environmental organization?	Government adopts goal of opponents?	to adopt environmental organization's goal?
Sweden and regional government institutions					
Riksdag (Greenpeace Sweden)	Yes	Yes (1988)	No	Yes	
Licensing Board (three decisions): (Greenpeace Sweden) a) Södra Cell -- Värö Bruk (1986-1987) b) Munksjö Aspa Bruk (1987-1988) c) Södra Cell - Mönsterås (1991)	a) Yes b) Yes c) Yes	a) Yes b) Yes c) Yes	a) No b) No c) No	a) No b) No c) Yes	not applicable (no target adopted an environmental organization's goal)
Nordic Swan (SSNC)	Yes	Yes (1997)	No	Yes	
Helsinki Commission (Greenpeace International)	Yes	Yes (1990)	No	Yes	
US and regional government institutions					
International Joint Commission (GP International, et al.)	Yes	Yes (1992)	Yes	No	not applicable, no implement-ation authority
US EPA (Greenpeace USA, et al.)	Yes	Yes (1998)	No	Yes	not applicable (no target adopted an environmental organization's goal)
US EPA (NRDC, et al.)	Yes	Yes (1998)	No	Yes	
US Congress -- zero discharge bill (Greenpeace USA, et al.)	Yes	No (1993)	No	Yes (no decision was goal of opponents)	

The column "Government adopts goal of environmental organization?" in Table 12.2 is shaded to highlight the near complete lack of success with government institutions in both Sweden and the US. This contrasts with the many successes of the opponents (see column "Government adopts goal of opponents?"), who were often the laggards among the bleached

kraft pulp manufacturers and their trade associations. The row "International Joint Commission" row is shaded to highlight the one notable success of the environmentalists.

In every single government institution targeted by environmental organizations they had access to key decision makers. They met with legislators, regulators, or commissioners to press their problem definition and solution. And in every case, excepting the zero discharge bill introduced in the US Congress, the government institution issued a decision related to pulp and paper pollution. In only one case, however, did a government institution issue a decision that adopted an environmental organization's goal. The International Joint Commission (IJC) recommended that manufacturers avoid the use of chlorine and chlorine compounds in the Great Lakes watershed. With no legal authority to require implementation of its recommendations, the IJC did not implement its recommendation, nor did the US or Canada, the signatory nations to the IJC.

The IJC decision differed from all the other cases because environmentalists were organized and present while the pulp and paper industry (as well as the chemical industry) was absent until it was too late to change the decision. Industry was not paying attention to the IJC at the same time that environmental organizations were well-prepared, mobilized, and united in the region. Greenpeace International, Greenpeace USA, Greenpeace Canada, Sierra Club, National Wildlife Federation, and Great Lakes United (a regional coalition) had been working the IJC for years. The combination of being well-organized with a broad coalition of environmental organizations working towards the same goal in the absence of industry counter-pressure enabled environmental NGOs to succeed with the IJC. Noteworthy is that the pulp and paper and chemical industries paid close attention to the IJC in the years following the passage of the recommendation to phase-out chlorine use.

In government politics, scientific information has been viewed as the principal factor in success. Yet in the only case where environmentalists achieved their goal with a government institution (the IJC), they also developed ad hoc alliances, performed direct actions, and helped develop the solution. The ad hoc alliances among environmental organizations and the development of a solution (virtually eliminate organochlorine pollution from the Great Lakes watershed) were equally as important to success with the IJC as scientific information. While only a single example, the IJC illustrates how success depends upon the presence of multiple causal conditions; a facet of success true in market politics as well.

Table 12.3 illustrates the association between presence/absence of industry opposition and failure/success of environmentalists in achieving their goals. In all the cases where environmental organizations did not achieve their goal (see the shaded "Outcome" column in Table 12.3), the opposition was present (see the shaded "Opposition" column). And in the only case where the opposition was absent, environmental organizations succeeded (see the shaded "IJC" row).

The presence/absence of having a political party in office that was more likely to favor stronger regulation -- Democratic Party in the US and Social Democratic Party in Sweden -- did not help the environmental organizations achieve their goal (see "Favorable political party in office" column). In fact, the successful case of the IJC occurred when Gordon Durnil was the US co-chairman, an appointee of Republican President George Bush. Note that targets with the exact same "No/Yes" distribution across each column Table 12.3 are listed on the same row.

Table 12.3 Comparative analysis: government institutions targeted by environmental groups, outcomes, and potential causal conditions

Government institutions targeted	Outcome: adopt goal of environmental group?	Potential causal conditions							
		Actions of environmental groups					Other conditions		
		Lobbying or litigation	Alliances	Competition among NGOs	Direct action	Help define solution	Media	Opposition to goal	Favorable political party in office
Sweden and regional government organizations									
Riksdag; Licensing Board (Södra Cell-Värö Bruk and Mönsterås)	No	Yes	No	No	Yes	No	Yes	Yes	Yes
Licensing Board (Munksjö Aspa Bruk); HELCOM	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Nordic Swan	No	Yes	Yes	No	No	No	Yes	Yes	Yes
United States and International Joint Commission									
IJC	Yes	Yes	Yes	No	Yes	Yes	No	No	No
US Congress (zero discharge bill)	No	Yes	Yes	No	No	Yes	No	Yes	Yes
US EPA (NRDC)	No	Yes	Yes	Yes	No	No	No	Yes	Yes
US EPA (GP USA)	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes

The presence of industry opposition made a significant difference: industry achieved its goals in nearly every case. To achieve their goals industry did make some concessions. In the US the pulp and paper manufacturers agreed to reduce dioxin emissions by eliminating chlorine gas use and in Sweden they agreed to make serious reductions in AOX discharges.

Two clear cut victories for the industry in the US were the final regulations promulgated by the US EPA in 1998 and the zero discharge bill in the US Congress. The regulations promulgated by the US EPA were completely in line with what the industry laggards wanted. And opponents prevented the zero discharge bill from moving out of committee in the House of Representatives (of the US Congress).

In Sweden the decisions of government institutions were also generally in line with what industry was willing to accept. While the Swedish Licensing Board required some mills to meet permit levels more restrictive than what the mills wanted, the levels were never as restrictive as desired by Greenpeace Sweden. And all the mills, including the high media profile mills, where Greenpeace Sweden performed direct actions, reduced AOX discharges below the levels required by their permit in order to catch the market for TCF products (which Greenpeace organizations in Europe, including Greenpeace Sweden had catalyzed -- see next section for details).

Regulatory agencies in both the US and Sweden resisted requiring significant changes in production processes at the mills. Instead they were only willing to press for incremental changes (with the exception of Munksjö Aspa Bruk), despite the availability of much cleaner production technologies in use at the most environmentally advanced mills. The regulatory agencies did not attempt to require significant environmental improvements because of the economic costs to the mills and lack of political support for more stringent regulations.

The delegation of decision making to regulatory agencies actually puts environmental organizations in a bind. While they have access to the agency staff, the transformative capacity of the agencies is limited without further legislative support. The implication for environmental organizations is to be wary of the allure of relatively easy access to regulatory agencies.

The failure to win with government institutions slowed the further diffusion of oxygen delignification in the US and TCF in Sweden. For example, if the SSNC had persuaded the Nordic Swan to adopt TCF bleaching as part of its criteria for environmentally friendly papers, it would have significantly increased TCF production in Sweden since nearly all paper sold in Sweden carries the Nordic Swan ecolabel.

While I do not see the environmental agencies as wholly captured by the interests they regulate, there has been, as Hays (1987) concluded, "a persistent tendency among agencies to be more sympathetic to the argument that the nation needed increased production and development more than it needed further environmental progress."[1] And this was certainly the case in both Sweden and the US concerning regulations for bleached kraft pulp mills.

12.3 Material manufacturers: listening (eventually) to Swedish consumers, telling American consumers what they can buy

Gaining access to decision makers in corporations manufacturing pulp and paper products was a challenge for environmental groups. Initially most *targeted* manufacturers of pulp and paper products saw little value in meeting with environmentalists. I emphasize *targeted* because environmental organizations did develop close relations with a few pulp and paper manufacturers that were not targets. For example, Greenpeace USA developed close relations with staff in Lyons Falls Pulp and Paper (a manufacturer of TCF-bleached sulfite pulp in New York state) and Louisiana-Pacific (a manufacturer of TCF-bleached kraft pulp). The manufacturers targeted by environmental organizations for change are typically more resistant to change. By choice, targets are harder corporations to gain access to and to persuade to change.

The SSNC, Greenpeace Sweden, and Greenpeace USA were the national environmental organizations that targeted pulp and paper manufacturers. The NRDC did not run a market campaign and Environmental Defense only targeted institutional consumers. The environmental organizations selected manufacturing targets using two primary criteria: the corporation was a) perceived to be open to change and/or b) a major player in the bleached kraft pulp market. The SSNC, for example, targeted Munkedals AB was because it was an unintegrated paper mill.[2]

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[1] Hays, 1987, p. 409.

[2] "Integrated mills" include both pulping and paper making facilities, located at the same site and owned by the same corporation.

Not owning a pulp mill Munkedals did not need to invest in new technologies; it just had to purchase pulp that met the criteria for environmentally friendly papers. And the SSNC targeted Stora because it was among largest manufacturers of copy paper in Sweden in the 1980s.

With the exception of Munkedals, all the targeted manufacturers initially denied environmentalists access (see Table 12.4, "access" column). The initial response of manufacturers was roughly, "We know how to make our product, there is nothing to be learned from you environmentalists." There was a definite hubris in the manufacturing sector that was held on both sides of the Atlantic at the beginning of the pulp and paper campaigns. Over time, however, the arrogance of manufacturers began to break down in Sweden as manufacturers became more receptive to meeting with environmental activists. This is seen in Table 12.4

Table 12.4 Levels of responsiveness among pulp and paper manufacturers to goals of environmental organizations

Pulp and paper manufacturers (environmental organization)	Levels of Responsiveness		
	Access?	Favorable decision?	Implement decision?
Sweden			
Munkedals AB (SSNC)	Yes	Yes	Yes - 1986
Stora (SSNC) Munksjö Aspa Bruk (Greenpeace Germany and Sweden) Södra Cell (Greenpeace Sweden) Vallvik (Greenpeace Sweden)	No then Yes	Yes	Yes - 1987 Yes - 1990 Yes - 1991 Yes - 1991
United States			
Champion International (grassroots groups and Greenpeace USA) Georgia Pacific (Greenpeace USA) International Paper (Greenpeace USA)	No	No	No
Weyerhaeuser (Greenpeace USA)	No then Yes	No	No

where all of the targeted Swedish manufacturers eventually decided to meet with environmental organizations, while only Weyerhaeuser in the US became more receptive to environmentalists over time.

To try to capture the attention of manufacturers the SSNC used market demand: it organized the Association of Local Authorities to request environmentally preferable products. In their attempts at capturing the attention of manufacturers, Greenpeace Sweden and Greenpeace USA used direct action. For example, Greenpeace Sweden dumped a ton of dead fish in front of the entrance gate to Södra Cell's Värö mill in 1986. And Greenpeace USA, draped Georgia-Pacific's headquarters in Atlanta with a banner in 1990 that read: "Take the Poison out of Pulp." Greenpeace Sweden and Greenpeace USA also targeted manufacturers by trying to create market demand for TCF paper.

Market demand was the principal reason why manufacturers adopted the goals of environmental organizations, as clearly revealed in Table 12.5. Compare the shaded "Outcome" column with the shaded "Market demand" column. Market demand was both positively and negatively associated with outcome. When market demand was present, manufacturers adopted the goal of environmental organizations. Conversely, when market demand was absent, manufacturers did not adopt the goal of environmental organizations.

While responding to the presence of market demand may seem intuitively obvious, that was not the case. First, the presence of market demand was an outcome of the strategic actions of environmental organizations, and its absence was facilitated by the strategic actions of pulp and paper manufacturers. Critical to creating market demand was persuading large consumers to incorporate environmental goals into their purchasing specifications. Environmental groups "persuaded" consumers to change purchasing specifications by forming collaborative ad hoc

Table 12.5 Comparative analysis: manufacturers targeted by environmental groups, outcomes, and potential causal conditions

Manufacturers targeted	Outcome: implement goal of environ-mental group	Potential Causal Conditions										
		Actions of environmental groups						Other conditions				
		Scientific inform-ation: problem definition	Alliances	Comp-etition among NGOs	Direct action	Help define solution	Innovative ideas/ tactics	Media, national	Market demand	Gov't regulation	Opposition to goal	Invested in oxygen tech'y
Sweden												
Munkedals AB	**Yes**	Yes	Yes	No	No	Yes	Yes	No	**Yes**	No	Yes	not applicable
Munksjö Aspa Bruk	**Yes**	Yes	Yes	No	Yes	No	Yes	Yes	**Yes**	Yes	No	Yes
Södra Cell	**Yes**	Yes	Yes	Yes	Yes	No	No	Yes	**Yes**	No	Yes	Yes
Stora	**Yes**	Yes	Yes	No	No	No	No	No	**Yes**	No	No	Yes
Vallvik	**Yes**	Yes	No	No	Yes	No	No	Yes	**Yes**	No	No	Yes
United States												
Champion International	**No**	No	Yes	No	Yes	No	No	Yes	**No**	Yes	No	Yes
Georgia Pacific / International Paper	**No**	No	No	No	Yes	No	No	No	**No**	No	No	No
Weyerhaeuser	**No**	Yes	No	No	Yes	No	No	No	**No**	No	No	Yes

alliances or direct action. Greenpeace Sweden, for example, helped IKEA purchase TCF paper. While Greenpeace Germany embarrassed Axel Springer Verlag (owner of the newsweekly magazine, *Der Spiegel*) into purchasing TCF paper (see next section for details). Environmental laggards, especially in the US, worked hard to ensure that corporate-environmental alliances failed. Pulp and paper manufacturers persuaded Time Inc. to rescind its decision to purchase TCF paper by arguing that the TCF paper was inferior, more costly, and produced no environmental benefits.

Second, laggards in the US were not responsive to consumer demand. For example, the second largest manufacturer of bleached paper products, Georgia-Pacific, sent a letter to all of its customers telling them, "If you feel you must have 'chlorine-free'" paper, "then G-P [Georgia-Pacific] can no longer be a supply source."[1] With negligible market demand the environmental leaders among American pulp and paper manufacturers had no incentive to produce TCF paper. This does not mean that no bleached kraft pulp manufacturer adopted TCF bleaching or that no manufacturer made changes because of market demand for environmentally preferable bleached papers. As noted above, the tables do not address the entire story of technology diffusion, just the targeted corporations. It does mean the number corporations adopting TCF or making changes because of consumer demand were small.

Louisiana-Pacific was the first and only US bleached kraft pulp mill to commercially manufacture TCF-bleached pulp. It did so under legal pressure from the Surfriders Foundation.[2] And Consolidated Papers was the only manufacturer to invest in cleaner production technologies (ozone bleaching) under pressure from its customer, Time Inc. Time Inc., as discussed in the

[1] Correll, 1992.
[2] See Chapter 10 for details.

next section, was pressured by Greenpeace USA to purchase TCF paper and worked collaboratively with Environmental Defense on the Paper Task Force.

An argument has been made by TCF activists like Jack Weinberg of the Greenpeace Great Lakes campaign[1] that US mills did not adopt TCF bleaching in part because they were not invested in oxygen delignification (which is necessary for TCF bleaching). However, a handful of American corporations had invested in oxygen delignification in the 1970s and 1980s and they did not move to TCF pulp. One of them, the Union Camp Corporation, actually produced small batches of TCF pulp that it never marketed as TCF. Environmental leaders like Union Camp never moved to commercial-scale production of TCF pulp because the market did not emerge in the US and Union Camp was concerned with the backlash from the major manufacturers. The backlash was, according to anecdotal evidence from environmentalists and Archie Beaton of the Chlorine Free Products Association,[2] that laggards threatened to undercut manufacturers of TCF paper by bidding below cost for contracts that TCF manufacturers held with large buyers.

Of the tactics used by environmental organizations to persuade manufacturers to change, there was only one case where environmentalists actually worked with a manufacturer to define a solution: Munkedals collaborated with SSNC. Göran Bryntse, a pulp and paper engineer by training and coordinator of the SSNC's paper campaign, worked with Munkedals in defining the SSNC's criteria for environmentally preferable paper. Bryntse's expertise in production combined with Munkedals not manufacturing pulp helped to overcome the arm's length distance most manufacturers established between environmentalists and their productions processes.

While Munkedals was an exception among manufacturers in its willingness to collaborate with environmentalists, Swedish manufacturers as a whole became more receptive to meeting

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[1] Weinberg, 1999.
[2] Floegel, 1999; Landman, 2001; and Beaton, 2001.

with environmentalists over time (as indicated in Table 12.4). In a major transformation Södra Cell became the leading advocate for TCF pulp and paper in Europe. Södra Cell promoted TCF by developing glossy materials, presenting at conferences, and attacking the SSNC for being weak on the environment (because the SSNC defined "chlorine-free" as the equivalent of ECF-lite technology).

A combination of factors made the Swedish firms more receptive to environmental organizations. Certainly the capacity of environmental organizations to develop markets for environmentally preferable paper was recognized and respected among some manufacturers, notably Munkedals, Munksjö Aspa Bruk, and Södra Cell. But more importantly, market demand created a price premium for a commodity product: bleached kraft pulp. Additionally, the ecological crises of 1988 made manufacturers aware of the potential ecological and political perils of massive pollution into the Baltic. Finally, there was a sense among many of the Swedish executives I interviewed that they have a responsibility of being better environmental stewards and that this was something their families and communities expected of them. Even the environmental head of the Swedish industry's trade association -- trade associations are known for representing the lowest environmental common denominator among industries -- remarked: "We cannot wait for a response from the Baltic before we act. If we wait too long and have large-scale effects such as killing seals and fish, then we have gone too far. Problems must be discovered and preventive actions taken earlier."[1]

With no strong market demand and the absence of a national ecological crisis, the average American pulp and paper mill did not experience an increased sense of environmental

[1] Jirval, 1998.

stewardship between the 1980s and 1990s.[1] Rather environmentalism for most American pulp and paper firms remained a competition, to be won or lost, rather than a way of seeing nature that could be shared. From this perspective environmentalists are the enemy, as the director of environmental affairs for the American industry's trade association explained: "The environmental community wants us to stop manufacturing paper."[2] Thus there was no reason to engage in dialogue with environmental organizations.

Over the time of the pulp and paper campaigns the Swedish pulp and paper manufacturers moved towards adopting what Lawrence Susskind and Patrick Field (1996) call a mutual-gains approach in their interactions with environmentalists. They showed a willingness to "Acknowledge the concerns of the other side" as well as to "Accept responsibility"[3] for their role in protecting the environment. The environmental laggards among American pulp and paper manufacturers, however, saw no value in a mutual-gains approach; for them there was no incentive to compromise beyond ECF bleaching.

An irony of environmental campaigns to transform industrial sectors is that industry opponents to change become technological pessimists -- "this product cannot be produced, and if it is, it will be vastly inferior" -- while environmentalists become technological optimists: "we can make this product of equal quality with new, more environmentally friendly materials and processes."

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[1] There were a few notable firms with a stronger commitment to environmental performance relative to the industry average, including Union Camp Corp. and Weyerhaeuser.
[2] Marshall, 1997.
[3] These are two of six principles of the mutual gains approach identified by Susskind and Field (Susskind and Field, 1996). The other four principles are: encourage joint fact finding, offer contingent commitments to minimize impacts, act in a trustworthy fashion, and build long-term relationships (pp. 37-38).

12.4 Consumers: market leaders create momentum for change in Sweden, but not in the US

The SSNC, Greenpeace Sweden, Greenpeace USA, and Environmental Defense all ran market campaigns targeted at consumers. The SSNC was the only group to run both a *retail* campaign -- targeting household consumers -- and a *wholesale* campaign -- targeting major institutional consumers. All the other groups ran wholesale campaigns.

The success of the SSNC's retail campaign hinged upon the media coverage of the ecological crises of the summer of 1988. National media coverage of the problems and how to reduce pollution from mills by changing purchasing habits was critical to the SSNC's retail campaign. The SSNC developed criteria for identifying environmentally friendly paper products and developed a list of environmentally friendly paper products that it updated regularly until establishing its own ecolabeling program with support from the three largest supermarket chains in Sweden -- ICA, KF, and Dagab. Of all the environmental organizations running market campaigns, the SSNC did the best job of identifying products available for institutional or individual consumers to purchase.

Greenpeace Sweden worked collaboratively with IKEA to help it find TCF paper. Greenpeace Germany coordinated the manufacture of the first magazine ever made with TCF paper: *Das Plagiat*, which was a mock version of the newsweekly magazine *Der Spiegel* (owned by Axel Springer Verlag). *Das Plagiat* transformed the market for TCF in Europe because it exposed the fallacy behind the argument of Axel Springer Verlag and pulp and paper manufacturers that manufacturing high quality magazine-grade paper with TCF pulp was not possible. Greenpeace USA used direct action and/or collaboration to capture the attention of and to try to catalyze change within Time Inc., Kinko's, and Jossey-Bass. It also created a magazine made with TCF paper.

Environmental Defense convened a collaborative project -- the Paper Task Force -- with major corporate buyers of paper to develop recommendations for environmentally preferable paper products; although it did not work with Paper Task Force members to implement the recommendations related to bleached paper products. Together the participants developed recommendations for environmentally friendly paper products across the lifecycle of impacts, including paper bleaching. Somewhat surprising for a process where all the organizations voluntarily participated and helped define the solution, was the outcome: only one company, Time Inc., altered its specifications for bleached printing and writing papers. Certainly the Paper Task Force was broader than just bleaching and McDonald's did buy more paper products with recycled-content as a result. Yet on the most controversial issue before the Paper Task Force, bleaching of paper, the outcome was disappointing.

The corporate consumers of paper products were more receptive to meeting with environmentalists than manufacturers. Of the 13 corporations targeted, only two initially denied access to the environmental groups (see Table 12.6, "access" column). And those two eventually agreed to meet with Greenpeace USA after being subjected to direct actions. Table 12.6 addresses the dynamics of decision making by noting when decisions changed. For example, in Table 12.6 the "access" cell for Kinko's and Time Inc. (targeted by Greenpeace USA) is, "No then Yes," reflecting the decisions of these organizations to initially deny access to Greenpeace USA, then to allow access after direct actions.

Table 12.6 Levels of responsiveness among consumers to goals of environmental organizations

Consumers targeted (environmental organization)	Levels of responsiveness		
	Access?	Favorable decision?	Implement decision? (year implemented)
Sweden			
Association of Local Authorities (SSNC) ICA (SSNC) KF (SSNC) Dagab (SSNC) IKEA (Greenpeace Sweden)	Yes	Yes	Yes (1985) Yes (1988) Yes (1989) Yes (1989) Yes (1991)
Individual buyers (SSNC)	not applicable	Yes	Yes (beginning in 1988)
Axel Springer Verlag (Greenpeace Germany)	Yes	No then Yes	Yes (1992)
United States			
Johnson & Johnson / McDonald's / Prudential Insurance (Environmental Defense)	Yes	Yes	No
NationsBank (Environmental Defense)	Yes then No	No	No
Time, Inc. (Environmental Defense) Jossey-Bass (Greenpeace USA)	Yes	Yes	Yes (1995) Yes (1995)
Time, Inc. (Greenpeace USA)	No then Yes	Yes then No	No
Kinko's (Greenpeace USA)	No then Yes	Yes	Yes (1992)

Note: Cells with "Yes then No" and "No then Yes" indicate when consumers changed a decision based upon pressure from environmentalists or opponents.

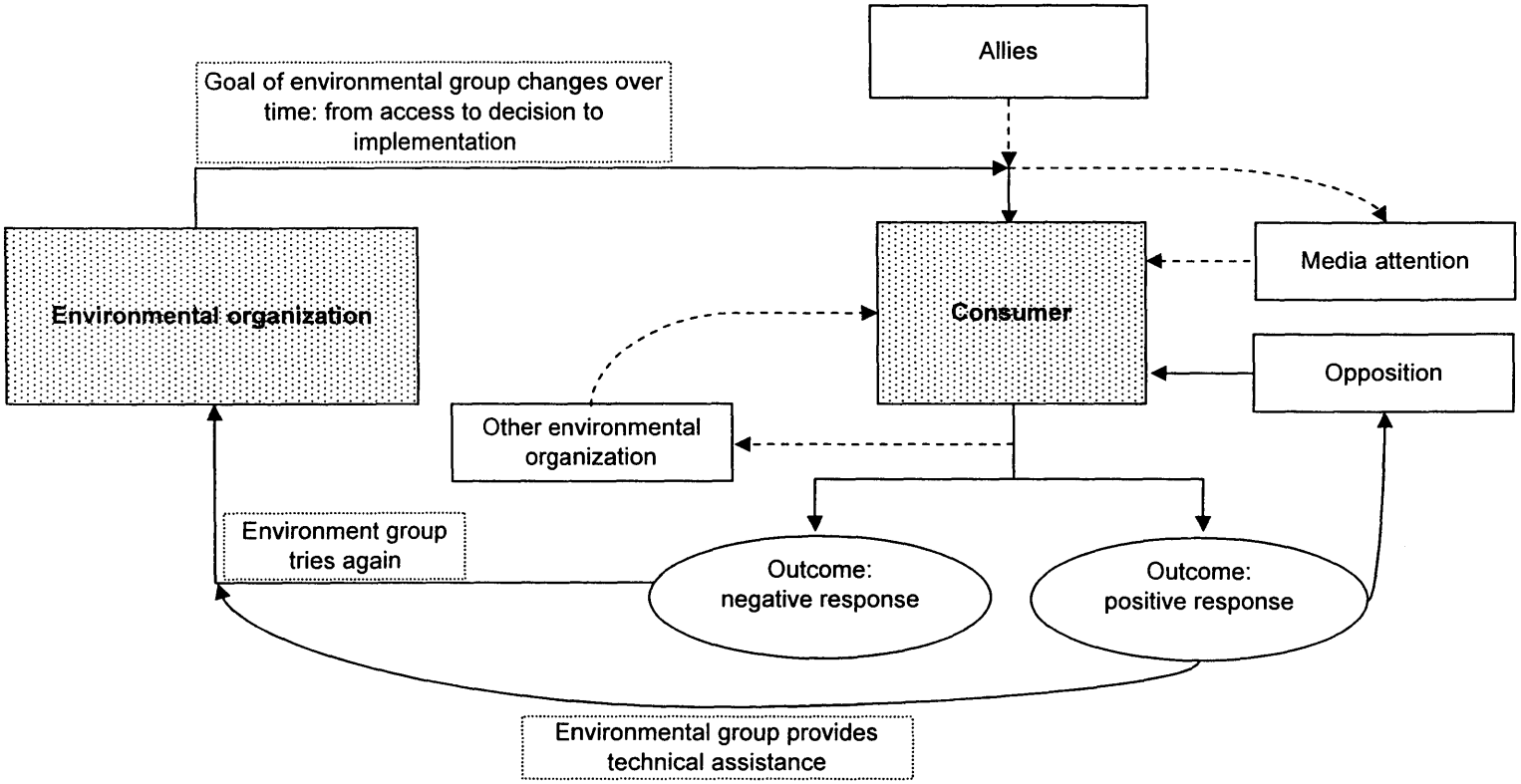
Figure 12.2 illustrates the dynamic, iterative interactions between environmental organizations, their allies, consumers, and opponents. Figure 12.2 is circular because interactions with consumers are iterative and vary as consumers interact with opponents to environmental change as well as other environmental organizations. When environmental groups succeed in gaining agreement to adopt their goal, consumers became targets for counter pressure from opponents. Opponents ask: "who do you trust? These environmentalists who have never manufactured paper, or us, who have supplied you with high quality paper for 20

years?" For example, Time Inc. initially refused to meet with Greenpeace USA, then relented after being receiving 20,000 postcards urging it purchase chlorine-free paper. Time Inc. then agreed to purchase chlorine-free paper, but retracted that decision under pressure from opponents. Then Time Inc. allied with another environmental organization, Environmental Defense.

All of the corporate consumers sold products directly to individuals. For them, creating and maintaining a brand name and image was important: they wanted consumers to buy their products or shop in their stores, and to keep doing so over time. For corporations where brand name matters, any action, especially negative publicity, that could tarnish brand image needed to be addressed. "A company's brand name is its stock-in-trade. Some companies spend millions of dollars trying to build awareness of their brands and create positive associations for the brands in the minds of consumers."[1] If consumers have negative associations with a brand name they will avoid it. That translates into lost sales. And some of the targeted corporations wanted to cultivate a greener image. By the 1990s, IKEA, McDonald's, Kinko's, and Time Inc. were in the process of trying to green their names. For example, both Time Inc. and Kinko's initially rebuffed requests from Greenpeace USA staff to meet to discuss bleached paper products. But after being subjected to direct actions, they moved quickly to meet with Greenpeace USA.

[1] Xixis, 2003.

Figure 12.2 The dynamics of market politics: environmental organizations trying to persuade consumers to adopt their goals



Material manufacturers, however, were more impervious to direct action because of their distance from individual consumers. Among pulp and paper manufacturers, corporate brand names known to household consumers were rare.[1] For most pulp and paper manufacturers interactions with individuals relate to their manufacturing facilities and the people who live in the shadows of the mill or downwind and downstream of mill pollution. International Paper, for example, is the world's largest pulp and paper corporation (headquartered in the US), yet it is much more obscure to the American public than McDonald's or even IKEA. Thus direct actions had little effect upon material manufacturers beyond being a local media story that public relations had to handle.

Developing collaborative working relationships with consumers and/or proving technical viability of alternatives were critical to the success of environmental organizations in persuading consumers to implement their goals. As with government institutions, the presence of opposition made achieving success more difficult.

Table 12.7 lists the causal conditions important to success and failure in consumer campaigns. Shaded in Table 12.7 are five columns. The first shaded column is the "Outcome: implement goal of environmental group." Environmental groups had 10 successes, seven in Sweden and three in the US (note that consumers with the same "yes/no" pattern in the same country are on listed on a single row). The second shaded column is "Outcome: form alliance with environmental group." For environmentalists to succeed they needed, with the exception of Axel Springer Verlag, to develop a working relationship with consumers.

[1] A rare example of an initiative among pulp and paper manufacturers to create a branded product was Union Camp's introduction of *Great White* paper in the 1990s. Reflecting the perceived marketing strengths of the environment, Union Camp sought to distinguish its paper through recycled content, marketing *Great White* as: "state of the art recycled paper" (Greiner, 1995).

Table 12.7 Comparative analysis: consumers targeted by environmental groups, outcomes, and potential causal conditions

Consumers targeted	Outcome: implement goal of environmental group	Outcome: form alliance with environmental group	Potential causal conditions									
			Actions of environmental groups							Other conditions		
			Scientific information: problem definition	Alliances with other organizations	Competition among NGOs	Direct action	Help define solution	Help implement solution	Innovative tactics	Media	Opposition to goal	Historical predisposition to action
Sweden and Germany												
Association of Local Authorities	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	No
ICA / KF / Dagab	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Individual buyers	Yes	not applicable	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes
IKEA	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Axel Springer Verlag	Yes	No	Yes	No	No	Yes	Yes	No	Yes	No	No	No
United States												
Kinko's	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	No	Yes
Time, Inc. (Greenpeace USA)	No	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Time, Inc. (Environmental Defense)	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No
Johnson & Johnson / NationsBank / Prudential	No	Yes	Yes	Yes	No	No	Yes	No	Yes	No	Yes	No
McDonald's	No	Yes	Yes	Yes	No	No	Yes	No	Yes	No	Yes	Yes
Jossey-Bass	Yes	Yes	Yes	No	No	No	Yes	Yes	No	No	No	No

Critical to the success of the environmental-consumer alliances was trust, creditability, and legitimacy. IKEA staff, for example, were willing to work with Greenpeace because they viewed Margaret Rainy (Greenpeace Sweden) and Christoph Thies (Greenpeace Germany) as experts on environmentally friendly papers. The IKEA staff looked to Greenpeace for guidance on defining environmentally preferable paper and trusted the advice of Greenpeace staff in the face of contrary advice from their paper suppliers. Whereas the exact opposite happened between Time Inc. and Greenpeace USA. Influenced by pulp and paper manufacturers, Time Inc. staff came to distrust Greenpeace USA: they thought Greenpeace staff deceived them into agreeing to purchase chlorine-free paper and saw Greenpeace staff as uncredible sources of information.

When the environmental groups established a working relationship they helped consumers define the problem ("Scientific information" column), solution (third shaded column) and, in some cases, helped implement the solution (fourth shaded column). The ideal relationship for environmental groups was to help consumers implement the goal. When environmentalists reached that degree of trust with a consumer they succeeded. This contrasts with the role of environmental groups with regulators and manufacturers, where they rarely helped define the solution.

The rows for the Association of Local Authorities, IKEA, Axel Springer Verlag, and Time Inc. (Environmental Defense) are shaded because they were four market leaders, buyers with significant purchasing power whose decisions had the capacity to shape markets. When the Association of Local Authorities, IKEA, and Axel Springer Verlag implemented the goals of the environmental groups they created a "snowball effect:"[1] they created momentum for change within the industry. Other buyers seeing the opportunity to position themselves as environmental

[1] Rogers, 1995, p. 302.

leaders and manufacturers seeing market opportunities moved quickly to adopt the purchasing specifications or production technologies of leaders. When the SSNC linked the Association of Local Authorities with Munkedals AB they created a market for environmentally preferable papers that had never existed before in Sweden; catalyzing other buyers and manufacturers to follow suit. When the Greenpeace organizations persuaded IKEA and Axel Springer Verlag to purchase TCF paper, they defined environmental leadership among buyers and created significant demand for TCF paper; which catalyzed others to buy and manufacture TCF papers.

Time Inc.'s decision to purchase more environmentally friendly papers did not create a snowball effect because Time Inc. did not implement its decisions until after 1995, when the furor over chlorine bleaching was on the decline and did not publicize its actions. Implementing the decisions years after concerns were raised and without media attention meant no opportunity to catalyze others to adopt their leadership position.

Axel Springer Verlag was the only success where the consumer did not form an ad hoc alliance with an environmental organization. While Greenpeace Germany staff never developed a working relationship with Axel Springer Verlag staff, they embarrassed Axel Springer Verlag into purchasing TCF paper. In initial meetings, Axel Springer Verlag said it would purchase TCF paper for its magazines, but no technically viable alternative was on the market. By demonstrating the viability of producing high quality magazine grade paper with TCF pulp, Greenpeace proved Axel Springer Verlag wrong. To produce magazine grade TCF paper Greenpeace Germany united the market for a green goal, bringing together a manufacturer, paper maker, and printer to manufacture the paper. With no bleached kraft pulp mills in Germany and all of the German bleached sulfite mills producing TCF pulp, there was no German opposition to TCF papers.

The fifth shaded column, "Opposition to goal," highlights the increased level of difficulty opponents create. Of the 10 successes, only three encountered opposition from manufacturers, Time Inc. (with Environmental Defense), IKEA, and the Association of Local Authorities. Both IKEA and Time Inc. agreed to purchase chlorine-free paper under pressure from a national Greenpeace organization.

Time Inc. moved forward in the face of opposition because of intensive campaigning by Greenpeace USA for action. Yet Time Inc. moved forward under the imprimatur of a compromise initiative, the Paper Task Force, developed by Environmental Defense. After announcing its decision to purchase chlorine-free paper, Time Inc. staff were immediately attacked by their paper suppliers. Anecdotal evidence suggests suppliers threatened to stop supplying Time Inc. with paper if it purchased TCF paper, expressed dismay that Time Inc. would ally with the enemies of corporations, environmentalists, and argued that there was no scientific, technological, or economic merit to the positions of environmentalists. Intimidated by suppliers, Time Inc. refused to implement its decision to purchase chlorine-free papers and turned to Environmental Defense for a compromise position. Time Inc. was not the only large American paper buyer to be intimidated by pulp and paper manufacturers (see next section). The competition between Environmental Defense and Greenpeace USA highlights a challenge environmental organizations confront in trying to attain their technology goals: competition among themselves.

IKEA moved forward in the face of opposition because it had a strong pre-disposition to environmental leadership. Its executives saw their bottom-line more closely aligned with the values of the environmental movement rather than the values of pulp and paper industry laggards. When IKEA's suppliers refused to manufacture TCF paper, the staff were outraged that

its suppliers refused to provide the paper the company wanted. IKEA had previously lost sales when some of its products were found to not meet the environmental standards the corporation asserted. It did not want to be tagged again with an anti-environmental label. IKEA staff broke contracts and found new suppliers willing to provide TCF paper.

In summary, developing collaborative working relationships with consumers and proving technical viability of alternatives were critical to the success of environmental organizations in persuading consumers to implement their goals. In addition, environmental organizations revealed a sophisticated capacity to learn how to move markets in the absence of opposition. They learned about markets and identified market leaders. They defined criteria for environmentally friendly paper and scoured the industry for manufacturers producing the paper. When they did not find the paper, they linked environmental leaders in bleached kraft pulp production with papermakers. To inform consumers of the environmentally friendly products, they published product lists. The result, they greened the paper supply chain, from pulp manufacturers to papermakers to institutional consumers to household consumers.

Five key elements of success in the market emerged from the pulp and paper campaigns:

- Identify, educate, and/or pressure key market players.
- Define criteria for environmentally preferable products.
- Identify and promote viable alternatives on the market (diffusion).
- Catalyze development of new products and processes (innovation)
- Connect the environmental leaders among consumers and suppliers.

12.5 Laggards among the raw material manufacturers: organized to prevent environmental change in the US

When new technologies enter channels that threaten existing markets, they stir up conflict. The opposition to environmentally preferable bleached paper products in the US was led by environmental laggards in pulp and paper manufacturing and their trade associations: the American and Forest Paper Association (trade association for pulp and paper manufacturers) and the Alliance for Environmental Technology (trade association for promoting ECF bleaching, led by manufacturers of sodium chlorate, feedstock for chlorine dioxide). The laggards among the manufacturers were primarily International Paper and Georgia Pacific. In Sweden the opponents were led by the Swedish Forest Industries Association and Eka Nobel, a sodium chlorate manufacturer.

The response of environmental laggards among pulp and paper manufacturers differed between Sweden and the US. While the initial response of Swedish manufacturers was the same as American manufacturers, oppose demands for more environmentally friendly papers, the resistance in Sweden receded as a few manufacturers changed production processes to meet consumer demands. In this section I first examine the factors important to the success of American manufacturers in opposing change. Then I explain why these differences arose.

Business needs to show up, as David Vogel (1996) emphasized, to have any chance of winning against environmental organizations. When the pulp and paper industry showed up to contest environmental organizations, they proved to be formidable opponents. They were effective at achieving their goals in government institutions in Sweden and the US, as well as winning in market politics in the US. To achieve their goals opponents did concede elemental chlorine gas, agreeing to ECF bleaching.

Overall the American opponents were more effective than their Swedish counterparts in both delaying change and stopping the diffusion of more advanced pollution prevention technologies like oxygen delignification, ozone, and hydrogen peroxide. For example, the use of elemental chlorine ended at all Swedish mills in 1992, whereas some American mills used elemental chlorine up to 2001, the date the US EPA required them to comply with new bleaching regulations. Important to their success in the US was aggressively contesting any environmental victory, no matter how small. By pushing back hard against any decision, the industry stopped momentum for change from developing. The American laggards successfully insulated themselves from the changes sweeping across Europe by stopping market demand from emerging in the US. They did this by intimidating environmental leaders among corporate consumers and pulp and paper manufacturers, appealing to common values, and sowing doubt with consumers on the arguments of environmental organizations. Their strident opposition succeeded in keeping the US pulp and paper industry united, or at least silenced the dissidents, and delayed regulatory action. In addition, the American opponents successfully managed the media and made a few key concessions.

Intimidation. While substantiating threats is difficult, as noted in Chapter 10, there is anecdotal evidence that suggests the paper industry successfully intimidated: Time Inc. from purchasing TCF paper; papermakers from purchasing TCF pulp from Louisiana-Pacific; Union Camp from manufacturing TCF paper; NationsBank from participating in the Paper Task Force; and Södra Cell from testifying before the Maine legislature for TCF paper. The market threats included: "we will not supply you with any paper if you purchase TCF paper" (laggards to Time Inc.); "we will not supply you with any pulp if you purchase TCF pulp from Louisiana-Pacific" (laggards to papermakers); "we will sell our paper to your customers at below cost if you

manufacture TCF paper" (laggards to Union Camp); and "you will lose our business" (laggards to NationsBank and Södra Cell). Because Georgia-Pacific and International Paper were (and still are) the largest manufacturers of bleached kraft paper products in the US, they had substantial market clout. Lagging far behind the environmental leaders in cleaner production investments, the laggards had the incentive to use that clout to try to block market change.

Appeal to common values. Environmental opponents appealed to common values and a history of contractual relations to sow doubt: "Who do you trust? Us, your fellow business partners for the past 10 years? Or these environmental extremists?" Within a segment of the American business community is the perception that environmentalists are socialists under green cover, and that corporations must unite against this threat to their vitality. Nick Nichols, CEO of the public relations firm Nichols-Dezenhall Communications Management Group, articulates this position in his book, *Rules for Corporate Warriors*: "Karl Marx had a word for what the Green Party is advocating. The socialist movement's color may have changed, but the agenda hasn't."[1] Thus, for a corporate consumer or manufacturer to work with environmentalists is to endanger capitalism.

Contest every scientific, technological, and economic argument of environmentalists and regulators. Any evidence used to support environmental improvements was attacked as wrong. Dioxins were less toxic than believed. Paper made with oxygen or ozone, or without chlorine dioxide was inferior to those bleached only with chlorine dioxide. The lower operations and maintenance costs for oxygen delignification were overstated, etc.

Most people want to see environmental issues as clear-cut problems and solutions. When opponents to environmental change contest every position in favor of environmental change, staff in organizations considering change may begin to wonder, "what it is the right thing to do?"

[1] Nichols, 2001, p. 78.

Strident opposition can make them re-think their decision. Changing their decision will also stop the onslaught of pressure from opponents. Contesting science and technology also serves to delay action, especially by regulatory agencies (see below).

Unity. The combination of contesting every position of environmentalists, appealing to common values, and using market muscle to intimidate stopped the snowball effect from emerging in the US and maintained industry unity. No other manufacturer joined Louisiana-Pacific to manufacture TCF paper and no large paper purchaser requested TCF paper during the heart of the pulp and paper campaigns.[1] In US regulatory politics the AFPA developed a compromise, a voluntary measure to lessen government oversight of environmental leaders, which silenced regulatory support for oxygen delignification among environmental leaders in the paper industry.

In Sweden, the defection of major consumers (IKEA and Axel Springer Verlag) and major manufacturers (Stora for SSNC's chlorine-reduced paper and Södra Cell for Greenpeace Sweden's TCF paper), completely undermined the efforts of the Swedish Forest Industries Association to retain unity against better environmental performance.

Delay and economic duress. Delay is a central strategy of choice for opponents with government institutions. The goal is to stop momentum for change from building by moving conversations for action from the spotlight of the media and Congressional hearings to the backrooms of regulatory agencies. In the US, the AFPA succeeded in delaying action on regulating dioxins and AOX discharges by 14 years. By the time the US EPA promulgated its regulations on pulp bleaching the story was so old that it was forgotten by the media. As a *Washington Post* reporter began her article on the regulations in 1997: "You've probably never heard of organochlorine pollution, but it's part of the debate over an impending regulatory

[1] Time Inc. quietly began purchasing TCF paper in the late 1990s.

decision" on the paper industry.[1] Also by delaying action, it provided time for opponents to amass their substantial financial and staff resources to their advantage.

In the US, the paper industry delayed regulatory action through cooperation, science, and claims of inferior products. In the early years of the discovery of dioxin pollution, the pulp and paper industry delayed action by helping the US EPA study, rather than act on, the problem. To completely undermine any action, the paper industry with help from the chemical industry forced a reassessment of the toxicity of dioxin: in 1991 the US EPA agreed to reassess the toxicity of dioxin. That study is still not complete, 12 years later. In challenging science the industry went to the strength of the environmental organizations by attempting to undermine their causal story. The counter to environmentalists' causal story is opponents *no causal story*: e.g., dioxin is not toxic.

Another argument for delay is, alternative technologies are inferior, cost more, and will result in massive job layoffs. This argument has been perfected in opposition to the implementation of pollution control regulations. Because manufacturers have the financial data, regulators rely on their cost estimates and job impacts of implementing new technologies. For example, the US EPA concluded that a major manufacturer would have gone bankrupt if it required the implementation of oxygen delignification.

There is a reality to the argument that new technologies are often inferior and cost more. Although, over time quality typically increases quickly and costs decline as manufacturers achieve economies of scale. Additionally, as a general rule in the innovation and diffusion process, manufacturers often stretch the performance of old technologies to prevent loss of

[1] Skrzycki, 1997.

market share. This is only a delay tactic as the new technologies are quickly improved and soon overtake the old technologies.[1]

Manage the media. In the heat of the dioxin crisis in the US, from 1987-1989, the AFPA was able to keep the US media roughly to its message: these are small amounts of dioxins that pose no threat to human health. The large amounts of organochlorine discharges from mills never became an issue worthy of press attention and the problems of persistent organochlorines like dioxins in the Great Lakes region did not become national news. Then beginning in the late 1980s the paper and chemical industries scored a major media coup with prominent news coverage of stories that dioxins are less toxic than formerly believed. This story line climaxed when Keith Schneider reported in the *New York Times* that dioxin might be no more toxic than sunbathing.[2] Certainly the industry suffered stories that were damaging to its credibility, including a detailed story in the *Washington Post* by Weisskopf reporting the US EPA-paper industry cooperation in keeping dioxin pollution out of the public eye.[3] Yet overall industry succeeded in keeping the media from creating momentum for demands for broad changes in the industry.

Concede then fight. The pulp manufacturers in Sweden and the US both conceded the use of elemental chlorine gas. After making that concession, however, the laggards in the American industry allied with the manufacturers of sodium chlorate to promote ECF bleaching. This created a situation where environmentalists had to be the "hair splitters," calling for TCF not ECF; making their work more difficult in the public sphere. Environmentalists like Jack Weinberg of Greenpeace USA argued that the American industry won when it created the distinction between ECF and TCF. Yet the evidence is that this distinction emerged initially in

[1] Utterback, 1994.
[2] Schneider, 1991.
[3] Weisskopf, 1987.

Europe and there was a heated battle between the SSNC and Greenpeace Sweden over how to define "chlorine-free." That battle ended when one of Sweden's largest bleached kraft pulp manufacturers, Södra Cell attacked the SSNC for being environmentally weak. No Södra Cell-type defection occurred in the US to promote TCF bleaching.

The strength of the ECF position was it nearly eliminated dioxins, the principal concern of American environmentalists in 1987, and there was no clear cut toxic pollutant in the soup of organochlorines remaining from ECF bleaching that could create public outrage against the industry. In adopting and defending ECF, the American opponents slowed momentum for adopting the cleaner production technologies of oxygen, ozone, and hydrogen peroxide.

Overall the conditions affecting success in business opposition reinforced Vogel's (1996) findings as discussed in Chapter 2, including: presence and manage media (Vogel: run well-organized campaign), unity (Vogel: coalitions), and claims of economic duress and make some initial concessions (Vogel: make convincing arguments). Missing from Vogel's analysis are the use of uncertainty to delay action and market muscle to curb market-based change.

The use of uncertainty to delay action did not arise in Vogel's analysis because he examined the US Congress not regulatory agencies. The pulp and paper manufacturers used scientific, technological, and economic uncertainty to delay regulatory action. The slow moving process of regulatory agencies cools the passion of public demand for change by moving decisions out of the public spotlight (in contrast to congressional hearings) and shifting decision making authority to experts and away from elected representatives. And because Vogel only considered government politics, he could not have foreseen how environmental laggards are using their market muscle to try to impede environmental change.

I attribute the greater opposition to cleaner paper production technologies in the US as arising from the ideological opposition to any public, be it government or NGO, influence of corporate investment decisions. As David Vogel (1986) concluded in the context of government regulation, American corporations are inclined to be "both extremely jealous of their autonomy and highly mistrustful of public authority."[1] At its most extreme this ideological opposition manifests itself in Nichols' (2001) accusation that environmentalists are socialists in disguise, intent on destroying rather than transforming capitalism.

From this perspective, initiatives to create green paper markets are perceived as an attack that must be repelled. As Nichols (2001) warns:

> American businesses had better wake up and smell the menacing dogs before their execs find themselves in the same boat as their brethren across the Atlantic. Corporate executives who understand the threat posed by attackers like the Green Party, Greenpeace, Sierra Club, Health Care Without Harm [etc.] ... must also recognize that efforts to launch a counter-attack will require a dramatic shift in how they conduct battlefield operations.[2]

This ideological opposition to regulation in general and environmentalism in particular certainly was present in the paper industry's trade association, the AFPA, where environmentalists were viewed as trying to end paper manufacture in the US. In addition to the ideological opposition, the largest manufacturers of bleached kraft pulp in the US, Georgia-Pacific and International Paper (as detailed in Chapter 10) had the greatest to lose if market demand for cleaner products blossomed in the US. Together these two factors combined to create strident opposition among the laggards and the industry's trade to cleaner production technologies.

A striking difference that emerged between the US and Sweden was how easily suppliers intimidated Time Inc. in comparison to IKEA. IKEA was bolstered by a much stronger green

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[1] Vogel, 1986, p. 245.
[2] Nichols, 2001, p. 79.

consumer movement in northern Europe, where Sweden and Germany have a high percentage of green shoppers,[1] while Time Inc. did not have the same level of green consumer support among Americans.[2] Although it is important to note that simultaneous to the efforts of the environmental groups to create demand for environmentally friendly bleached papers, market demand did emerge in the US for paper with recycled content. Recycled content was the environmental issue most prominent on the minds of magazine publishers, not chlorine content.[3] Also I hypothesize that the relative weakness of green markets in the US, like the weak demand for chlorine-free papers, was more a result of business opposition than lack of consumer interest. The frequent refrain in the US is, "there is little demand for environmentally friendly products." The reality is, that demand must grow in harsh conditions.

12.6 Comparing pulp and paper campaigns: key causal conditions affecting success and failure in market politics

The successes of environmental organizations in Sweden and the difficulties of environmental organizations in the US offer an opportunity to compare at a national level the opportunities and barriers to success through market politics.

The key conditions affecting market success in Sweden were:

- **Environmental roots in pulp and paper** campaigns, stretching back to 1980. When the media spotlight turned on in 1987 and 1988, environmentalists were ready to discuss pollution problems and propose solutions.
- **Media attention** to dioxins in 1987 and the ecological crises of 1988 in the seas surrounding Sweden. This heightened public sensitivity in Sweden to the problems associated with water pollution in general and pollution from pulp and paper mills in particular.
- **Alliances** with corporations to **define, develop, and promote alternative products (development tactics)**. The SSNC allied with ICA, KF, and Dagab to create an ecolabeling program for supermarkets. IKEA allied with Greenpeace Sweden to purchase TCF paper in the face of industry opposition. Greenpeace Germany allied

[1] Rosen and Sloane, 1995; and Kirkpatrick, 1990.
[2] Kirkpatrick, 1990.
[3] Bogardus, 1995.

with Munksjö Aspa Bruk, a papermaker, and a printer to produce a high quality TCF magazine.

- **Innovative development tactics** at the right time. *Das Plagiat*, Greenpeace Germany's mock magazine of *Der Spiegel*, was the right action at the right time. It exploded the myth that quality paper could not be made with TCF-bleached pulp.

- The creation of **market demand** for environmentally preferable papers **through the combination of media attention, alliances, and innovative development tactics.** Market demand then created a price premium, which created first mover advantages for innovative manufacturers like Munksjö Aspa Bruk and Södra Cell.

- **Absence of opposition** to TCF paper in Germany, the largest consumer of Swedish pulp and paper outside of Sweden. Pulp and paper manufacturers in Germany supported the transition to TCF production.

Seeing opportunities for purchasing environmentally preferable paper products and pitfalls in not doing so, a handful of large consumers of paper products adopted the goals of the environmental organizations in Sweden and Germany. When pulp manufacturers realized they could receive a price premium for more environmentally friendly pulp, a few leapt at the chance and changed manufacturing processes. When large producers like Stora produced SSNC's environmentally preferable paper in 1987 and Södra Cell produced the TCF pulp wanted by the Greenpeace organizations, the market shifted. The large defections from the corporate status quo splintered industry opposition to change in Sweden. The Swedish and German corporations, both consumers and material manufacturers were more likely to see the power of green markets, for both the positive (first mover advantage) and negative (lost sales) than their American counterparts. Finally, US opponents saw the successes in Europe and worked hard to make sure they were not replicated in the US.

In contrast, failure in US market politics hinged upon:

- **No national environmental roots in pulp and paper** campaigns prior to 1987. When Greenpeace USA captured media attention on dioxin pollution from paper mills in 1987, the environmentalists had no clear solution to offer -- pulp and paper pollution was a "new" issue.

- **Strong opposition** from paper industry laggards that overwhelmed the environmental organizations.

- **No alliances** with major institutional consumers to purchase environmentally friendly bleached papers. Although Time Inc. collaborated with Environmental Defense on the Paper Task Force; after the task force finished its report, Environmental Defense did not work with Time Inc. to implement recommendations in the report.

- **Competition among environmental organizations** reduced the overall effectiveness of the environmental movement.

Unity in a movement, especially when confronting a well-funded and motivated adversary, at a minimum increases the chances for success. With their scarce resources of time and money, environmental organizations can ill afford to squander them fighting with each other. If national environmental organizations are to stand any chance of winning in the face of strident opposition they will need to work together.

A lesson from the pulp and paper campaigns is that success with the "go-it-alone" strategy, when confronting a major industry sector opposed to change, depends on good fortune and timing as well as savvy organizers. In the absence of these conditions, environmental organizations will need to do a better job of organizing, both within and outside the movement. Ironically, the hardest part is likely to be gaining agreement within the movement.

What the successes and failures of the pulp and paper campaigns do not reveal is how environmental organizations can succeed in either government or market politics when the opposition is well-organized, well-funded, and willing to fight every detail, down to whether dioxin is a toxic chemical. The lead campaigners for the American environmental organizations were all rather glum about the possibility of how they could have won, with reactions ranging from: allying with labor unions to having more money for scientists or lawyers to we were over our heads, we never stood a chance.

For the US environmental organizations to have catalyzed the same level of diffusion as in Sweden -- in the face of the savvy counter-campaign run by AFPA and the Alliance for Environmental Technology -- they needed to change campaigning strategy. They needed to shift from the largely "go-it-alone" strategy to a broader coalition (while this started to happen in the mid-1990s, it was too little too late) and the overall focus of their campaigns needed to expand beyond just bleaching. In the next chapter I propose how environmental organizations might succeed in the face of intense industry opposition.

12.7 Production pluralism emerges first with corporate consumers

Are we moving to production pluralism, where the public, or at least NGOs like environmental groups, have input into corporate decisions? In Chapter 2, I defined *production pluralism* as arising when NGOs have access to decision makers in corporations. The pulp and paper campaigns revealed two factors affecting the ability of environmental groups to access corporations: corporate environmental values and whether the corporation is a consumer or producer of raw materials.

The first characteristic, that the presence of strong environmental values within a corporation creates greater opportunities for accessing corporate executives is obvious: corporations with strong environmental values will be more likely to meet with environmental groups. What deserves note here is, the activities of environmentalists can cultivate environmental values. When Göran Bryntse began campaigning for environmental improvements in Swedish pulp and paper mills in 1980, he had no access to corporate executives. But by the 1990s, after a decade of campaigns by environmentalists and public concern with pollution from the industry, Swedish pulp and paper manufacturers were willing to meet with environmentalists to discuss their concerns. This did not mean Swedish manufacturers would act on environmentalist concerns, it just meant they had become open to dialogue. The

implication is, the activities of environmental organizations affect corporate values, thereby affecting future access opportunities.

Second, corporations that are consumers of raw materials are more receptive to environmental concerns than those than manufacture raw materials. Opportunities for access were greatest among *corporate consumers* -- corporations that manufacture and/or sell products, but do not manufacture the raw materials used in the products. Corporate consumers, with their brand names, were more concerned than raw material manufacturers with their environmental image. Trying to sell their products to household consumers, corporate consumers do not want their products to be tarnished with a negative environmental image. To avoid a negative environmental image, corporate consumers were more willing than raw material manufacturers to meet with environmental groups to discuss their products as well as to work collaboratively with environmentalists in defining a solution.

Corporate consumers were also more likely to share common environmental values with the environmentalists. The CEO's and senior executives of Ben & Jerry's, Kinko's, and IKEA viewed themselves and their corporations as more in alignment with the environmental groups than with the raw material manufacturers. The alignment of values created opportunities for dialogue and change within the corporate consumers, who then found suppliers that provided new, more environmentally friendly products that performed as well as the prior products at comparable cost. Even among corporate consumers that were initially reluctant to dialogue, like Time Inc., they were much more susceptible to being embarrassed into dialogue.

Raw material manufacturers, with their greater distance from household consumers, lack of household brand names, sunk investments in capital, and depth of technical knowledge were much less willing to engage in dialogue with environmental groups. The majority of American

pulp and paper manufacturers staunchly resisted meeting with environmentalists, and some were even unwilling to engage in dialogue over bleaching processes with their customers. The American pulp and paper producers viewed market accountability from the same perspective as government regulation: an adversarial process in which there are winners and losers.[1] Demands for greater environmental accountability, even from their corporate consumers, were greeted as an extension of adversarial regulatory politics and as an affront to corporate autonomy. Even environmental leaders like Champion International and Union Camp Corporation were wary and distrustful of environmental groups. Only the Weyerhaeuser Company was willing to engage in dialogue with the environmental groups.

The resistance of American manufacturers and eventual openness of Swedish manufacturers to granting access to environmental organizations reveals the importance of strong market demand in creating opportunities for accessing raw material manufacturers. The strength of environmental organizations in market politics depends on their capacity to influence purchasing decisions. It is large consumers like Time Inc., Axel Springer Verlag, and IKEA that can alter the investment decisions of raw material manufacturers.

The emergence of production pluralism will depend on opposition politics. As David Vogel concluded in the context of government politics, pluralism flourishes when opposition to business-as-usual is active. And so it will be with corporations. If NGOs, such as environmental groups, are engaged in a campaign to transform a corporation or an industry sector, environmental organizations are likely to gain access to corporate consumers. Thus, we see production pluralism emerging most strongly within corporate consumers and more weakly, although on occasion, within manufacturers of raw materials.

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[1] On the adversarial American regulatory process see Vogel, 1986.

13 Moving to the cleanest production technologies: the need for sectoral and lifecycle organizing

Since the pulp and paper campaigns offer only limited guidance on how to succeed in the face of strident industry opposition, I speculate here on how American environmental organizations may have succeeded by changing their organizing strategy. The guidance that the pulp and paper campaigns offer is that common goals, NGO unity, and environmental-consumer alliances are important to success in technology campaigns in the face of opposition. Environmentalists succeeded when they developed working relationships with institutional consumers to implement their technology goal (e.g., IKEA) and when they developed broad-based coalitions united on around a similar goal (e.g., IJC).

The pulp and paper campaigns were what I call *chemical campaigns*: where environmental organizations target a problem chemical or class of chemicals -- e.g., dioxins or organochlorines -- and work to eliminate them. The environmental organizations succeeded in their chemical campaigns within the pulp and paper industry when targeted organizations adopted their goal: e.g., IKEA purchasing TCF paper. But when American consumers balked in the face of industry opposition and a divided environmental movement, the American pulp and paper campaigns floundered.

To improve chances of success in the face of serious opposition, environmental organizations will need to unite rather than compete, strengthen their alliances with corporate consumers, and broaden their alliances. The go-it-alone approach of Environmental Defense and the Greenpeace organizations will seldom succeed in the face of a well-organized opposition. By forming broader advocacy networks[1] environmental organizations will: increase staff

[1] See Keck and Sikkink (1998).

resources working on a campaign; create multiple points of action, making it more difficult for industry opposition to follow-up on every success; and create new opportunities for success with consumers.

To facilitate forming successful alliances with corporate consumers and broader advocacy networks environmental organizations will need to engage in what I call *sectoral* and *lifecycle* organizing. In *sectoral organizing* environmental organizations work to create a more environmentally sustainable business sector by simultaneously targeting multiple environmental problems within that sector (rather than a single environmental problem, such as organochlorines in water pollution from pulp mills). In *lifecycle organizing* environmental groups try to effect technology change by working with actors across the lifecycle of a product or material. Sectoral and lifecycle organizing overlap with each other, and depending on the industry sector, may be identical.

For the pulp and paper industry, lifecycle and sectoral organizing would have been the same. If the pulp and paper campaigns had been based on sectoral/lifecycle organizing, they would have targeted environmental problems across the lifecycle of paper products, including: forestry, pulp and paper manufacturing, paper consumption, and recycling. Environmental Defense moved in this direction with its Paper Task Force report, but it never organized a campaign to implement the recommendations of its report. Sectoral and lifecycle organizing overlap because the business sector -- forestry and paper products -- and the product lifecycle of paper are the same.

An example that illustrates the differences between sectoral and lifecycle organizing is the Health Care Without Harm campaign. Health Care Without Harm is a coalition of environmental, public health, and health care organizations working to make the health care

sector more environmentally sustainable across the globe, with members in Europe, North America, Asia, Latin America, and Africa. The environmental issues Health Care Without Harm addresses include working to eliminate the incineration of hospital waste and to eliminate the use of mercury- and PVC- (polyvinyl chloride) containing products in health care settings. The initiative to eliminate incineration is an example of lifecycle organizing, where Health Care Without Harm members work with hospitals in trying to reduce the volume and toxicity of their waste as well as their reliance on incinerators as a disposal option, communities in trying to close incinerators, and owners of incinerators in developing and using alternative disposal technologies.[1]

In the absence of a sectoral organizing strategy, a problem environmental groups confront with consumers is a limited number of solutions, often limited to just one. For example, during the pulp and paper campaign Time Inc. had only one choice that would satisfy Greenpeace USA: purchase TCF paper. The combination of Greenpeace USA's challenging goal and refusal to compromise, and Time Inc.'s reluctance to interact with Greenpeace, created no opportunity for Greenpeace staff to develop legitimacy, trust, and credibility with Time Inc. Yet these are the characteristics of environmental-corporate alliances that are most likely to result in consumers implementing the goals of environmental groups.

An alternative approach within the chemical campaign model is to compromise on the goal. This was the approach of Environmental Defense, which gained legitimacy and trust with Time Inc. because it was willing to accept a less demanding goal than Greenpeace USA for bleached paper products.

Sectoral organizing, however, creates opportunities for achieving challenging environmental goals without compromise by adopting the strategic approach used by

[1] For further details on Health Care Without Harm, see Straus (Straus, 2000) and www.noharm.org.

corporations implementing pollution prevention measures in their facilities. When businesses first start implementing pollution prevention measures, they usually pick the "low hanging fruit" -- the easy to reach prevention actions -- first. By succeeding with the low hanging fruit, organizations create confidence and capacity that enables them to achieve more complex and challenging prevention goals.[1]

This is the strategy behind sectoral organizing. Identify low hanging fruit opportunities where environmental groups can work with consumers in changing purchasing specifications; first addressing environmental problems where alternative products or technologies are readily available and the potential for environmental harm is clear and relatively uncontested. For Health Care Without Harm, the low hanging fruit was helping hospitals remove of mercury-containing medical devices, including thermometers, from hospitals.[2]

Lifecycle organizing creates opportunities to expand alliances. For example, during the height of the pulp and paper campaigns (late 1980s to early 1990s), environmentalists in the US and Germany were demanding the greater use of recycled content in paper products. Solid waste activists in the US -- who included waste management officials in cities and towns, local recycling groups, and national environmental groups like the now defunct Environmental Action -- succeeded in defining criteria for post-consumer content in paper and catalyzed laws mandating recycled content in newspapers in ten states.[3] Yet, the pulp and paper campaigns did not unite with recycling advocates. Demands for more environmentally friendly bleached paper (reduced toxicity) remained separate from demands for paper with recycled content (reduced material use). By keeping recycling and bleaching initiatives separate, American

[1] For example, see Hirschhorn and Oldenburg (Hirschhorn and Oldenburg, 1991) chapter 3.
[2] "Since knowledge of mercury poisoning is widespread, HCWH has had a fairly easy time convincing its constituencies that change is in order" (Straus, 2000).
[3] Paper Recycler, 1994.

environmentalists missed an opportunity to create a broad coalition for defining and advancing an agenda for environmentally friendly paper that encompassed toxicity and material issues. It would have been a lot harder for Time Inc. to resist united demands for increased recycled content -- which had greater public recognition than chlorine use in bleaching[1] -- and TCF bleaching.

In addition to not uniting with the recycling community, in their initiatives to create market change in bleached paper products Environmental Defense, the national Greenpeace organizations, and the SSNC all chose to go-it-alone rather than in coalition with other NGOs. To achieve its goals Health Care Without Harm (HCWH) has brought together over 260 organizations from 22 countries. "Many, like Colin Greer of The New World Foundation, attribute HCWH's success to its coalition work. ... Perhaps more importantly, says Greer, whose foundation does not fund the group, HCWH has proved that effecting change in the increasingly profit-oriented public health industry requires the tactics of a nimble yet cohesive army."[2]

Table 13.1 outlines the key elements of a sectoral campaign. Many of these elements have already been addressed in Chapter 12. A few deserve additional comment here. The second element listed in Table 13.1, "Establish a suite of challenging goals," emerges from my position that environmental organizations should play a leadership role in defining "stretch" goals -- a business term for a challenging yet attainable goal -- for business sectors. When environmentalists do not advocate for stretch goals they abdicate environmental leadership to

[1] To illustrate the environmental prominence of recycled content, when Union Camp Corp. decided to introduce a brand name copy paper for retail consumers -- "Great White" paper -- it chose recycled content not bleaching method (e.g., TCF bleached paper) as the criterion for distinguishing its paper (Greiner, 1995).
[2] Straus, 2000.

Table 13.1 Elements of a sectoral campaign

- Identify industry sector
- Define and agree to a suite of challenging goals
- Commit to 10-15 years of organizing and funding
- Create momentum for change
  - Define causal story for each goal
  - Generate media attention to problems
- Develop alliances across lifecycle of each target material or product
- Engage in market politics
  - Identify, educate, and/or pressure key market players
  - Create market demand
    - Define cleaner product specifications
    - Identify alternative products
    - Form alliances with consumers, especially market leaders
  - Change supply
    - Identify manufacturers of alternative products
    - Create opportunities for increasing market share or capturing price premium
  - Green product supply chain
    - Connect environmental leaders among consumers with manufacturers
- Engage in government politics
  Look to legislatures rather than regulatory agencies for support for major technological transformations.
- Outmaneuver the Opposition
  - Surprise and innovation
  - Maintain perception of harm
  - Inoculate supporters against counter-claims of opponents
  - Create divisions among opponents by catalyzing "sufficient" supply and demand
  - Maintain unity within environmental movement

corporations and visionary consultants. As Kenneth Geiser writes in *Materials Matter*, "For too long advocates for environmental and public health have settled for too little."[1]

For example, when the NRDC and Environmental Defense advocated for ECF-lite instead of TCF bleaching, they placed themselves behind the leading corporations in the US and

[1] Geiser, 2001, p. 390.

Sweden who were producing and buying TCF bleached products. And a few visionary consultants are working with corporations to bring them to a much higher level of environmental performance. For example, when William McDonough and Michael Braungart (the principals in the environmental consulting firm of McDonough Braungart Design Chemistry) worked with Steelcase on upholstery fabric, they "decided to design a fabric that would be safe enough to eat: it would not harm people who breathed it in, and it would not harm natural systems after its disposal."[1] McDonough and Braungart are not compromising on environmental goals when they work with corporate clients like Steelcase. They are defining a bold vision of sustainability and working with corporations who want to achieve it. Defining environmentally challenging goals does not make for irrelevance. In fact, the opposite may be more the case: in defining environmentally weak goals environmental groups will become increasingly irrelevant to environmental leaders in corporations (although increasingly relevant to industry laggards).

I include the third element, "Commit to 10-15 years of organizing and funding" to emphasize that success in sectoral organizing often depends on long-term organizing. Greenpeace USA and Environmental Defense campaigned on pulp and paper issues for 11 years, from 1987 to 1998. The SSNC campaigned on pulp and paper bleaching issues from 1986 to 1997. And Göran Bryntse campaigned for environmental friendly papers first with the Environmental Federation, then with the SSNC from 1980-1992. When committing to sectoral campaigns both national environmental organizations and foundations need to recognize upfront that quick successes are unlikely and creating legitimacy and trust with corporate consumers will take time. To assume that sectoral campaigns are a 1-5 year commitment is to be unrealistic in the amount of time it takes to catalyze significant technological change.

[1] McDonough and Braungart, 2002, pp. 106-107.

Engaging in both market and government politics (the sixth and seventh bullets in Table 13.1) is necessary for broad-based success. I see success in technology change emerging initially from market institutions, with follow-up support from government institutions. Winning in market politics will require empowering consumers, both individual and institutional, to stand up and confront raw material manufacturers with their demands for cleaner and safer products.

While market campaigns can achieve initial successes, to increase the odds that these successes will be retained after a sectoral campaign ends they need to be institutionalized. Institutionalizing environmental goals is a strength of regulatory institutions.

Finally, within the last bulleted element, "Outmaneuver the opposition," I want to emphasize "surprise and innovation." Given the successes of opponents to the pulp and paper campaigns, a lesson for market politics is that environmental organizations should engage in more "stealth organizing," where environmental organizations wait until a goal is implemented, rather than decided, before making a public announcement. To create momentum for change by capturing media attention environmental organizations often announce decisions of corporate consumers to change purchasing specifications. Yet when environmental organizations announce a decision by a consumer to change they create a backlash from opponents who try to persuade consumers to retract their decision. In stealth campaigning environmental organizations wait until the decision is implemented, then make the announcement -- when it is too late to be retracted. Environmental organizations need to recognize that there is a tension between media attention and success in market campaigns. Media attention is not always necessary for success, and may impede success by alerting opponents to impending success.

Also "Create divisions among opponents by catalyzing 'sufficient' supply and demand" requires further explanation. Critical to the pulp and paper successes in Sweden was that market

leaders, very large consumers (e.g., IKEA and Axel Springer Verlag) and major manufacturers (e.g., Stora and Södra Cell), adopted the technology goals of environmentalists. When the market leaders adopted the goal, it splintered the opposition. However, when only small purchasers (e.g., *Scuba Times*) and manufacturers (e.g., Louisiana-Pacific) adopt the technology goal, it enabled opponents to maintain unity against change.

The success of sectoral organizing will depend upon the capacity of environmental organizations to build trust, legitimacy, and credibility with large consumers and to broaden their alliances to other NGOs. Creating trust, legitimacy, and credibility, however, does not require compromising on environmental goals. What it will entail is working with consumers over time to nurture the capacities to meet the more challenging environmental goals. As Laws, et al. (2001) emphasize in their recent research work on public entrepreneurship networks, success in promoting radical, greener technologies, will depend upon a network of actors "that spans the public, private, and civic spheres."[1]

While sectoral and lifecycle organizing present opportunities for success in the face of organized opposition, they will also present challenges to national environmental organizations. Different values, the need for name recognition to raise money, and personality conflicts will create a set of steep barriers to crafting common goals and structures for coordinating work among environmental organizations. When these barriers are overcome, as they have been with the Health Care Without Harm campaign, the potential for success can be realized. Sectoral coalitions that span the many grievances spawned by corporate activity are the antidote to corporate resources.

Laws, et al. (2001) in their research on sustainable technology development and the role of public entrepreneurship networks conclude that it is government agencies, not environmental

[1] Laws et al., 2001, p. 4.

groups, who will be central to success: "Government must participate to ensure that public entrepreneurship networks function effectively and stay oriented to publicly endorsed goals" of technology development.[1] The pulp and paper campaigns, however, revealed that government agencies were unwilling to promote the cleanest production technologies in the face of opposition. I see government agencies as having an important role in diffusing the cleanest technologies and products once the conflicts over the science and the performance of the technologies have largely been resolved; or at least by the time diffusion has reached the early majority stage of diffusion. Government agencies are effective in promoting the cleanest production technologies when there is no or minimal opposition.

It is my position that environmental organizations need to be the leaders of sectoral campaigns because they have shown the capacity to promote the cleanest production technologies in the face of opposition. In emphasizing the coordinating role of environmental organizations, I agree with Keck and Sikkink's (1998) conclusion that NGOs have a central role to play in *advocacy networks*.[2] Keck and Sikkink defined the central role of NGOs in advocacy networks as quickly moving information to the actors and situations where it would be most effective. While acting as disseminators of information is an important role of NGOs, that is not what makes them unique.

What makes environmental organizations uniquely positioned to play the leadership role in sectoral campaigns is their willingness to press for challenging goals in the face of political opposition. Actors in the private sector, be they companies or consultants, are vulnerable to

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[1] Ibid., p. 5.

[2] Sabatier and Jenkins-Smith (1993) who developed the similar although slightly different concept of *advocacy coalitions*, did not specify who would unify a coalition, but rather emphasized that common beliefs (values) would cause "people from various governmental and private organizations" to "act in concert." While common values and beliefs help to bind coalitions together, to form a coalition requires someone or some organization to unite the various actors together (i.e., to organize them) (p. 18).

threats to their bottom-line. The same is true of environmental organizations that receive corporate funding.

For example, in the pulp and paper campaigns, Södra Cell developed a sophisticated marketing campaign for TCF papers in Europe, creating glossy materials and presenting at conferences. But when Södra Cell agreed to present at public hearings for law requiring TCF production in the State of Maine, it was pressured (successfully) by paper industry laggards in the US to not present. The threat to Södra Cell was from American manufacturers with paper mills in Europe: "our paper mills will stop purchasing your pulp if you present in Maine."

And the pulp and paper campaigns revealed that government institutions are unlikely to take a leadership role in trying to diffuse the cleanest production technologies in the face of opposition. Regulators and politicians in Sweden and the US were only willing to press for incremental changes, enough to state they had taken action, but were unwilling to press the entire industry to achieve the levels possible with the cleanest technology, TCF, because of resistance from manufacturers. TCF bleaching virtually eliminated organochlorine pollution, resulted in the greatest reductions of BOD and COD, and created the greatest opportunities for recycling wastewater. Yet proving the environmental benefits of eliminating organochlorine pollution and reducing BOD and COD below compliance levels was difficult. It was much easier to claim bleached kraft pulp mills harmed the environment when they used elemental chlorine and discharged dioxin (2,3,7,8-TCDD), which is persistent, bioaccumulative and toxic at very low doses. However, when the mills stopped using elemental chlorine (ECF bleaching) and nearly eliminated dioxin discharges (but continued to discharge a soup of organochlorines that scientists know little about), it became difficult to define the environmental benefits of TCF beyond the common sense notion that less pollution is better for the environment. Conversely, it was easier

for opponents to contest TCF by arguing that the technology changes were too costly relative to the environmental benefits.

As technologies become cleaner, resulting in significantly less pollution, the harm avoided becomes more difficult to prove, the costs of achieving the benefits higher, and the political resistance greater. Thus the cleanest commercially available technologies, which result in the greatest reductions in pollution and move us furthest along the path to sustainable material cycles, are likely to confront the greatest resistance from the laggards among the raw material manufacturers. At each step in the process of trying to effect change, opponents, especially raw material manufacturers, will attempt to thwart efforts by environmentalists to create momentum for change. Causal stories will be assailed as lacking scientific evidence. Environmental organizations will be attacked for lacking credibility. And new technology will be maligned as worse than existing technology.

In the pulp and paper campaigns, only the environmental organizations were willing to step into the conflict-filled void between the presence of the cleanest production technologies and the absence of these technologies diffusing into the market. As the environmental historian Samuel Hays concluded in his book on American environmentalism: "It was a curious twist that environmentalists were the purveyors of optimism about the possibilities of human achievement while the administrative and technical leaders were the constant bearers of bad news."[1]

[1] Hays, 1987, p. 542.

Appendix 1. List of interviewees (sorted by organization)

Organization (during the pulp and paper campaigns)	Last Name	First Name	Title	Interview date	Location
Alliance for Environmental Technology	Pryke	Douglas	Executive Director	29 January 2001	Telephone
American Forest and Paper Association	Festa, Ph.D.	John	Senior Scientist	01 October 1997	Washington, DC
American Forest and Paper Association	Marshall	Catherine	Director, Environmental Affairs	01 October 1997	Washington, DC
American Forest and Paper Association	Seiler	Elizabeth	Senior Director Fiber Recovery and Utilization	01 October 1997	Washington, DC
Champion International Corporation	Antonucci	Frank R.	Manufacturing operations support and applied technologies	03 October 1997	West Nyack, New York
Champion International Corporation	Steltenkamp	Michael S.	Portfolio Manager -- Technology Development Applied Technologies	03 October 1997	West Nyack, New York
Chlorine Free Products Association	Beaton	Archie	Executive director	22 January 2001	Telephone
Environmental Defense	Blum	Lauren	Senior Scientist	01 August 1995	Telephone
Environmental Defense	Blum	Lauren	Senior Scientist	30 September 1997	New York, New York
Greenpeace International	Kroesa	Renate	International Coordinator, Pulp and Paper Campaign	16 October 1999	Telephone
Greenpeace International	Thies	Christoph	Director, Toxics Campaign	04 November 1999	Telephone
Greenpeace International	Weinberg	Jack	Great Lakes Coordinator	15 June 1999	Chicago, Illinois
Greenpeace Sweden	Leithe-Ericksen	Rune	Toxics Campaigner	22 June 1998	Göteborg, Sweden
Greenpeace Sweden	Nordin	Håken	Director, Toxics Campaign	16 June 1998	Telephone
Greenpeace Sweden	Rainey	Margaret	Pulp and Paper Campaigner	04 November 1999	Telephone
Greenpeace Sweden	Rosander	Per	Toxics Campaigner	09 June 1998	Stockholm, Sweden
Greenpeace USA	Floegel	Mark	Pulp and Paper Campaigner	10 November 1999	Telephone
Greenpeace USA	Floegel	Mark	Pulp and Paper Campaigner	18 November 1999	Telephone
Greenpeace USA	Hind	Rick	Legislative Director	26 January 2001	Telephone
Greenpeace USA	Van Strum	Carol	Consultant	17 February 2001	Telephone
IKEA	Hildorsson	Hans	Catalogue Group Head	24 November 1998	Telephone
Institute of Applied Environmental Research (Stockholm)	Bengtsson	Bengt-Erik	Senior Scientist	30 June 1998	Trosa, Sweden
Institute of Paper Science and Technology	Heindel, Ph.D.	Theodore	Assistant Professor, Engineering and Paper Materials	29 September 1997	Atlanta, Georgia

Institute of Paper Science and Technology	McDonough	Tom	Professor	29 September 1997	Atlanta, Georgia
Institute of Paper Science and Technology	Robbins	Wayne	Associate Professor, Director of Research Services	29 September 1997	Atlanta, Georgia
KF	Baumann	Per	Environmental Director	26 June 1998	Stockholm, Sweden
MacMillan Bloedel	Chmelauskas	Al	Director of Environmental Services	04 January 1996	Telephone
MacMillan Bloedel	Procter	Alan	Director of Pulp and Paper Research	08 August 1995	Telephone
Munksjö Aspa Bruk	Fasten	Hans	Mill Manager	29 June 1998	Aspa Bruk, Sweden
Munksjö Aspa Bruk	Wiklund	Sam	Marketing Director	29 June 1998	Aspa Bruk, Sweden
N. McCubbin Consultants	McCubbin	Neil	President	14 July 1995	Telephone
National Council for Air and Stream Improvement	Gellman	Isaiah	Director	14 July 1995	Telephone
Native Forest Network	Stern	Billy	Pulp and Paper Strategist	29 January 2001	Telephone
Natural Resources Council of Maine	Bennett	Nick	Staff Scientist	1997	Augusta, Maine
Natural Resources Council of Maine	Hagstrom	Anne	Staff Attorney	1997	Augusta, Maine
Natural Resources Defense Council	Landman	Jessica	Senior Attorney	09 March 2001	Telephone
SCA Graphic	Morin	Roine	Environmental Manager	08 June 1998	Sundsvall, Sweden
SIS Miljömärkning AB (Swedish technical organization to the Nordic Swan)	Hedenmark	Magnus	Project Officer	15 June 1998	Stockholm, Sweden
SIS Miljömärkning AB (Swedish technical organization to the Nordic Swan)	Vass	Anne Marie	Project Officer	09 June 1998	Stockholm, Sweden
Södra Cell	Lövblad	Roland	Environmental Manager	06 June 1998	Telephone
Swedish Environmental Protection Agency	Fallenius	Ulla-Britta	Director Monitoring and Evaluation Department	30 June 1998	Stockholm, Sweden
Swedish Environmental Protection Agency	Lagergren	Staffan	Head of Heavy Industry Section	30 June 1998	Stockholm, Sweden
Swedish Environmental Protection Agency	Nyström	Erik	Principal Technical Officer, Industry and Ecocycles Department	27 May 1998	Stockholm, Sweden
Swedish Environmental Protection Agency	Nyström	Erik	Principal Technical Officer, Industry and Ecocycles Department	10 June 1998	Stockholm, Sweden
Swedish Forest Industries Association	Jirval	Nils	Vice President Environmental Policy	03 June 1998	Stockholm, Sweden
Swedish Ministry of Environment	Dahl	Birgitta	Environment Minister	25 June 1998	Stockholm, Sweden

Swedish National Licensing Board for Environment Protection	Rosengardten	Anna-Lena	Chief Engineer	17 June 1998	Stockholm, Sweden
Swedish National Licensing Board for Environment Protection	Svedberg	Rolf	Chief Engineer	17 June 1998	Stockholm, Sweden
Swedish Pulp and Paper Research Institute (STFI)	Axegård	Peter	Associate Professor	11 June 1998	Stockholm, Sweden
Swedish Pulp and Paper Research Institute (STFI)	Axegård	Peter	Associate Professor	26 May 1998	Stockholm, Sweden
Swedish Society for Nature Conservation	Andersson	Helena	Project Coordinator, Good Green Buy	23 June 1998	Göteborg, Sweden
Swedish Society for Nature Conservation	Bryntse	Göran	Director Paper Group	15 June 1998	Telephone
Swedish Society for Nature Conservation	Eiderström	Eva	Department Head For Ecolobeling	23 June 1998	Göteborg, Sweden
Time, Inc.	Refkin	David	Director of Paper and Environmental Affairs	30 September 1997	New York, New York
Union Camp Corporation	Eachus	Spencer	Assistant Research Director, Paper	30 September 1997	Princeton, New Jersey
Union Camp Corporation	Greiner	Charles	Senior Vice President	10 November 1995	Franklin, Virginia
Union Camp Corporation	Matthews	Christopher H.	Director, R&D Projects	30 September 1997	Princeton, New Jersey
Union Camp Corporation	Matthews	Christopher H.	Director, R&D Projects	21 September 1995	Princeton, New Jersey
Union Camp Corporation	Raymond	Dale R.	Director of Quality and Technology	10 November 1995	Franklin, Virginia
Union Camp Corporation	Trice	William H.	Executive Vice President	21 September 1995	Wayne, New Jersey
Union Camp Technology, Inc.	Nutt	Wells E.	President	10 November 1995	Franklin, Virginia
US Department of Energy, Office of Industrial Technologies	Robinson	Valri	Forest Products Team Leader	02 October 1997	Washington, DC
US Department of Energy, Office of Industrial Technologies	Smith	Merryl	Program Manager	02 October 1997	Washington, DC
US Environmental Protection Agency, Office Of Water	Frace	Sheila	Acting Director of EngineeringaAnd Analysis	01 October 1997	Washington, DC
Washington Toxics Coalition	Valeriano	Laurie	Policy Director	05 February 2001	Telephone
Westvaco Corp	Andrews	Lee	Senior Vice President Marketing	15 August 1995	New York, New York
Westvaco Corp	Burton	Richard N.	Vice President	15 August 1995	New York, New York
Westvaco Corp	Dickinson	Robert H.	Vice President and Director Corporate Environmental Safety and Health	15 August 1995	New York, New York

Westvaco Corp	Hintz, Ph.D.	Harold	Technical Assistant to Vice President Corporate Research Director	15 August 1995	New York, New York
Westvaco Corp	Hise	Ron	Technical Director	09 November 1995	Covington, Virginia
Westvaco Corp	Wallinger	R. Scott	Senior Vice President	15 August 1995	New York, New York
Weyerhaeuser	Panco	David	Program Manager, Corporate R&D	18 July 1995	Telephone
World Resources Institute	Banks	Darryl	Program Director, Technology and the Environment	02 October 1997	Washington, DC

Appendix 2. Paper Task Force recommendations for pulp and paper manufacturing

Recommendation 1. Purchasers should give preference to paper manufactured by suppliers who have a vision of and a commitment to minimum-impact mills ...

Recommendation 2. Purchasers should give preference to paper manufactured by suppliers who demonstrate a commitment to implementing sound environmental management of their mills. ...

Recommendation 3. Purchasers should give preference to paper manufactured by suppliers who demonstrate continuous environmental improvement toward minimum-impact mills by installing pollution-prevention technologies.

- The substitution of chlorine dioxide for elemental chlorine in the first stage of the bleaching process reduces the discharge of chlorinated organic compounds.
- The installation of oxygen delignification and extended cooking, two available and proven cost-effective manufacturing technologies that maximize lignin removal in the pulping process, forms a foundation for further progress towards the minimum-impact mill.
- Mills that recirculate the filtrates from the first bleaching and extraction stages of the bleach plant make additional progress toward the minimum-impact mill. These low-effluent processes represent the most advanced current technologies.
- Future technologies may emerge that make additional progress toward the minimum-impact mill.

Recommendation 4. Purchasers of paper packaging, such as corrugated boxes and folding cartons, should seek to purchase paper products made of unbleached kraft paperboard rather than bleached kraft paperboard ...

Recommendation 5. Purchasers of coated printing and writing papers should express their preference for paper that increases the substitution of mechanical pulp for bleached kraft pulp ...

Recommendation 6. Purchasers of printing and writing papers should express their preference for paper that substitutes bleached kraft for bleached sulfite pulps ...

Recommendation 7. Purchasers of coated and uncoated freesheet paper should consider paper products that contain bleached chemithermomechanical pulp (BCTMP) as a partial substitute for hardwood kraft pulp ...

Recommendation 8. Purchasers should be open to considering paper products that contain non-wood agricultural residue fiber ...

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