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Electricity Deregulation, Environmental Externalities and the Limitations of Price

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ELECTRICITY DEREGULATION, ENVIRONMENTAL EXTERNALITIES AND THE LIMITATIONS OF PRICE

I. INTRODUCTION

Electricity is arguably the central infrastructural element of modern society. Powering industrial machine tools, food refrigeration, building illumination, phone communication, computers, television and thousands of other devices and processes, electricity's contribution to 20th century life in developed nations has become indispensable. Society's interest in reliable, low-cost electricity is thus understandable and undeniable.

As economists, policy-makers and sometimes even consumers have realized, however, "cost" is not always fully apparent in the deceivingly simple, disarmingly determinate figure of price. Low-priced power may not be the same as low-cost power. By the 1930s, economists began to acknowledge that, for some activities, certain costs were imposed on third parties or the public at-large and, consequently were not adequately reflected in the price of that activity.[1] This phenomenon—costs that elude capture in price—has been analyzed under the term "social costs," or more recently, "externalities."[2] For industries with substantial environmental impacts, like electricity production, environmental externalities can be significant.[3]

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[1] *See, e.g.*, A.C. PIGOU, THE ECONOMICS OF WELFARE 134, 183–88 (4th ed. 1932).

[2] The British economist A.C. Pigou is credited with some of the earliest comprehensive analysis of external costs, done in the 1930s, and taxes levied on emissions or other externalities have been named "Pigovian" or "Pigouvian" taxes after him. *See, e.g.*, PIGOU, *supra* note 1, at 183–88; *see also* R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960) (analysis of situations where actions of business have harmful effects on others has largely followed analysis of Pigou); David M. Driesen, *The Societal Cost of Environmental Regulation: Beyond the Administrative Cost-benefit Analysis*, 24 ECOLOGY L.Q. 545, 577 (1997) ("Pigovian" externality tax named after Pigou). In one of the most heavily cited articles in legal scholarship, economist Ronald Coase dealt generally with the problem of externalities under the rubric of "social cost," treading similar terrain as Pigou but coming to different conclusions. *See* Coase, *supra*, at 29. Coase concluded that government should not always intervene to force industry to compensate those injured by the side-effects of industrial activity, and suggested that Pigou came to different conclusions. *See id.*

[3] *See, e.g.*, *infra* notes 178–93. By the mid-1970s pollution and pollution control were being discussed using the terminology of "environmental externalities," a conceptual framework that has persisted. *See, e.g.*, HIROFUMI SHIBATA & J. STEVEN WINRICH, THE OPTIMAL CONTROL OF ENVIRONMENTAL EXTERNALITIES 5 (1976); Re Integrated Resource Management Practices, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR), 67, 87 (Mass. D.P.U. 1990) [hereinafter D.P.U. 89-239].

Environmental externalities are the environmental costs to society of given products that are not reflected in the transaction price for those products, and that therefore may be imposed on parties not involved in the transaction or on society as a whole.[4] From the standpoint of individual corporate accounting, shifting private costs onto the public is advantageous and leads to apparent corporate efficiencies because the same revenue now appears to be generated on a smaller level of expenditures.[5] From a social standpoint, however, allowing private parties to externalize their costs may lead to overall economic inefficiencies for society.[6] If, for example, a coal plant can generate electricity a million dollars cheaper per year than a gas-fired plant, but causes a million and a half dollars more in health costs due to coal-induced increases in air pollution, from a society-wide standpoint it is economically inefficient to invest in coal-fueled electricity generation.[7] The value of these environmental externalities is often expressed as the cost of environmental damages that occur in spite of, or outside of, legally required mitigation measures.[8] For electricity, these exter-

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[4] *See generally* Pricing and Ratemaking Treatment to Be Afforded New Electric Generating Facilities Which Are Not Qualifying Facilities as Defined in 220 C.M.R. § 8.02, D.P.U. 86-36-G, *available in* 9 Massachusetts Administrative Law Library, Department of Public Utilities File (Jan. 1998), at 77 (Mass. D.P.U. 1989) [hereinafter D.P.U. 86-36-G] (cost of externalities is cost of environmental damages caused by activity for which compensation to affected parties does not occur; externalities result from production and purchase of product that yields incidental injuries to third party not directly involved in transaction). When regulations compel a market actor to account for the externality within the cost of the transaction, for example by installing pollution control equipment to correct the environmental impact, the social cost is eliminated or reduced and the externality is said to be "internalized." *See generally* D.P.U. 86-36-G, at 77; ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 40-41 (1992). The previously external social cost is now reflected in the costs and prices of the transaction. *See generally* D.P.U. 86-36-G, at 77; PLATER ET AL., *supra*.

[5] *See generally* AL GORE, EARTH IN THE BALANCE 189 (1992) (easy way to increase measured economic values is at expense of things left outside circle of economic accounting; more pollution dumped, the higher the short-term profits for polluter and his shareholders); PLATER ET AL., *supra* note 4, at 29 (in absence of legal rule forbidding pollution or requiring payment for pollution harms, rational producer will not undertake pollution controls because would increase costs and thereby reduce profits); Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1245 (1968) (each rational person finds that his share of the costs of his pollution is less than his costs for pollution control, so as free enterprisers each is locked into fouling the collective nest).

[6] *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 87; D.P.U. 86-36-G, at 79.

[7] *See generally* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 90; GORE, *supra* note 5, at 190.

[8] *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 90; D.P.U. 86-36-G, at 77. *But see* PAUL L. JOSKOW, DEALING WITH ENVIRONMENTAL EXTERNALITIES: LET'S DO IT RIGHT! 4 (1992) (incorrect to assume that the price of externalities can be inferred from costs of residual environmental damages). This Note uses the terms "environmental impacts" and "environmental externalities" more or less interchangeably, because where such environmental impacts have

nalities range from damages due to loss of fisheries on a river dammed for hydropower to the impact of global warming caused, in part, by fossil-fuel fired electricity production.[9]

Costs and prices are inextricably tied to legal and policy decisions that determine, for example, the definition and enforcement of property rights, the extent of public subsidy, the level of taxation, the imposition of uniform standards, the thoroughness of regulation, currency exchange rates and the validity of contracts.[10] Along with these general legal and policy factors, the costs and prices of electricity have been specifically shaped by the legally determined regulatory framework of the industry.[11] This framework, which coalesced in the early part of this century and endured for over fifty years, is now being reexamined and fundamentally restructured.[12] Because the legal constructs affecting electricity's price are being publicly renegotiated in the current restructuring debate, this is an opportune moment to address environmental externalities that have previously eluded capture in electricity's price.[13] In doing so we may find that price is not the only, nor always the best, mechanism for securing all public policy objectives for this indispensable industry.[14]

From the inception of federal electric utility regulation, control of the environmental impacts of power production has been a concern of regulation, becoming a significant and clearly articulated objective since the 1970s.[15] The initial governmental approach to regulating these environmental externalities was to eliminate or restrict them

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occurred they have obviously not been successfully contained by required pollution control practices, and, unless paid for by some other mechanism, have become externalities. *See generally* Re Biennial Resource Plan Update Following the California Energy Commission's Seventh Electricity Report, Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) 181,189 (Cal. P.U.C. 1991) [hereinafter Decision No. 91-06-022] (producers that create pollution have generally not had to bear all costs of pollution but have instead "externalized" substantial part of those costs to society). *But see* JOSKOW, *supra* note 8, at 3, 12, 13 (arguing it is misleading to equate environmental impacts with externalities; asserting externalities are only those environmental impacts that could be eliminated *cost-effectively*).

[9] *See, e.g., infra* note 215.

[10] *See, e.g.*, ENERGY INFO. ADMIN., FEDERAL ENERGY SUBSIDIES: DIRECT AND INDIRECT INTERVENTIONS IN ENERGY MARKETS 8, 53, 55 (1992); PLATER ET AL., *supra* note 4, at 31.

[11] *See, e.g.*, LEONARD S. HYMAN, AMERICA'S ELECTRIC UTILITIES: PAST, PRESENT AND FUTURE 143 (1983).

[12] *See infra* notes 33–174 and accompanying text.

[13] *See, e.g.*, Congressional testimony to Senate Committee on Energy and Natural Resources by P. Chrisman Iribe (Vice Chair, Electric Power Supply Association), Mar. 6, 1997, *available in* 1997 WL 8220935 (environmental issues are properly part of restructuring debate).

[14] *See, e.g., infra* notes 335–417 and accompanying text.

[15] *See infra* notes 33–135 and accompanying text.

through prohibitions or regulatory licensing schemes.[16] With increasing regulation of power plant emissions after the passage of the Clean Air Act in 1970, for example, at least some of these externalized costs were eliminated; internalized in a price of electricity reflecting the expense of pollution control equipment needed to eliminate the externality.[17] With growing environmental knowledge, and with a changing public perception of what is valuable, however, regulators and the public began to confront the possibility that significant costs caused by certain types of electricity were still being imposed on society, despite existing pollution control regulation.[18]

This Note explores some of the legal devices being implemented or considered for reducing these environmental externalities in the context of the restructuring of the electricity industry. To place the externalities and restructuring debate in context, this Note first examines the co-evolution of two interwoven policy objectives of electric utility regulation: 1) the search for least-cost power, through regulation and later through deregulation of the electricity generation system; and, 2) the continued effort to protect environmental objectives through the organization of power production.[19] This co-evolution is explored in the context of key federal regulatory statutes.[20] The reaffirmation of these twin policy goals—least-cost power and environmental protection—is then examined in the electricity restructuring statutes of two states playing a leading role in deregulation, California and Massachusetts.[21]

Second, this Note discusses the environmental externalities involved in electricity generation, using carbon dioxide ("CO_2") emissions linked to global warming as representative of an intractable externality that the market on its own might not address.[22] Third, this Note looks at possible regulatory mechanisms that could address electricity generation's CO_2 emissions and other externalities, particularly the mechanisms mandated in provisions of the California and Massa-

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[16] *See, e.g.*, Clean Air Amendments of 1970 ("Clean Air Act"), Pub. L. No. 91-604, § 4, 84 Stat. 1676, 1679, 1680 (codified as amended in 42 U.S.C. § 7409(a), 7410(a) (1994)).

[17] *See generally id.* § 4, 42 U.S.C. §§ 7410, 7411 (1994); *see also* JOSKOW, *supra* note 8, at 8 (emissions limits applied by environmental regulators have been used widely and internalize externalities).

[18] *See, e.g.*, D.P.U. 86-36-G, at 77.

[19] *See infra* notes 33–176 and accompanying text.

[20] *See infra* notes 33–134 and accompanying text.

[21] *See infra* notes 136–76 and accompanying text.

[22] *See infra* notes 178–93 and accompanying text.

chusetts restructuring statutes.[23] Both market-based and non-market-based mechanisms are examined.[24]

Using the example of CO_2 emissions, this Note then analyzes the advantages and disadvantages of market/price-based approaches to environmental externalities.[25] It explores some of the reasons why price and the market may have difficulty addressing long-term, world-wide environmental impacts like global warming.[26] Finally, it suggests that pursuit of the twin policy objectives of least-cost power and environmental protection may require the express and unapologetic use of both market and non-market mechanisms in a restructured electricity industry.[27]

II. BACKGROUND

A. *Twin Goals for the Structure of Electricity Generation: Least-Cost Power and Environmental Protection*

Recent public debate on electricity restructuring has focused on low-cost power as if it were the paramount public objective for the structure of the industry.[28] Thus, at first glance, lower-cost power might seem the principal yardstick by which to measure restructuring proposals for the electricity industry.[29] In fact, structuring the electricity industry in a way that protects the environment is also a fundamental public policy objective, repeatedly affirmed by federal and state legislation, often as an objective co-equal with, or delimiting, least-cost power.[30] Environmental concerns have played a part in federal electricity regulation from its earliest days, and paradoxically have played a pivotal, if inadvertent, role in bringing about the movement towards electricity deregulation.[31] Thus, the history of electricity regulation and deregulation has been determined by both the search for least-cost

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[23] *See infra* notes 194–302 and accompanying text.

[24] *See supra* note 23.

[25] *See infra* notes 308–520 and accompanying text.

[26] *See infra* notes 337–417 and accompanying text.

[27] *See infra* notes 480–520 and accompanying text.

[28] *See generally*, Tribe, *supra* note 13.

[29] *See, e.g.*, Tribe, *supra* note 13 (ultimate goal of restructuring is lower electricity prices); Massachusetts Department of Telecommunications and Energy, *The Electric Industry is Changing* (visited Apr. 1, 1998) <http://www.magnet.state.us/dpu/brochure.htm#q1> (stating that goal of restructuring is to reduce costs to all consumers over time by means of competitive market structure for electricity).

[30] *See, e.g.*, Act effective Sept. 24, 1996, ch. 854, § 1(a), 1996 Cal. Legis. Serv. 3678, 3679 (West); Act of Nov. 25, 1997, ch. 164, § 1(b), (l), 1997 Mass. Legis. Serv. 637, 638 (West).

[31] *See, e.g., infra* notes 33–134 and accompanying text.

power and the co-evolution of environmental policy aims in the structure of electricity generation.[32]

1. The Co-Evolution of Least-Cost Power and Environmental Protection as Goals for the Structure of Electricity Generation

Although electric utilities are largely state regulated, the history of the rise and decline of electricity regulation, and the parallel emergence of public environmental objectives for the industry, can be sketched by tracing the evolution of a handful of federal statutes that strongly influenced that regulation: the 1920 Federal Water Power Act,[33] the 1935 Federal Power Act,[34] the Public Utility Regulatory Policies Act of 1978[35] and the Energy Policy Act of 1992.[36]

Federal electricity regulation emerged against the backdrop of widespread state regulation of the industry.[37] In the early years of electric utility development—from the 1880s through the turn of the century—towns and cities granted electric utility franchises that were sometimes non-exclusive or even deliberately duplicative to create utility competition.[38] Disastrous competition in some cases led to company

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[32] *See, e.g., infra* notes 77, 89, 123, 143, 160–61 and accompanying text; *see also Mass. Enviro Official Warns Midwest Regulators to Address Ozone Transport, Energy Report*, Dec. 2, 1996, *available in* 1996 WL 11831807 [hereinafter *Mass. Enviro Official Warns Midwest Regulators*] (quoting Mass. DEP Commissioner Struhs' observation that EPA, FERC and the Chair of the Council on Environmental Quality all made solemn promises that deregulation will not interfere with achievement of minimum clean air standards for all Americans).

[33] Federal Water Power Act, ch. 285, 41 Stat. 1063 (1920) (codified as amended in scattered sections of 16 U.S.C. (1994)).

[34] Federal Power Act, ch. 687, title II, 49 Stat. 838 (1935) (codified as amended in scattered sections of 16 U.S.C.).

[35] Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95–617, 92 Stat. 3117 (codified in scattered sections of 16 U.S.C.).

[36] Energy Policy Act of 1992, Pub. L. 102–486, 106 Stat. 2776 (codified in scattered sections of 15, 16 and 42 U.S.C.); *see also* Union of Concerned Scientists, *Risks and Opportunities: Renewable Energy in a Changing Electricity Industry* (visited Feb. 10, 1998) <http://www.ucsusa.org/energy/restructure.intro.html> (political factors including enactment of PURPA and EPAct encouraged competition in electric sector).

A law intended to have primarily regional consequence, the Pacific Northwest Electric Power Planning and Conservation Act (1980), also played a role in explicitly merging least-cost power and environmental objectives for electricity regulation. *See* Pacific Northwest Electric Power Planning and Conservation Act, Pub. L. No. 96–501, 94 Stat. 2697 (1980) (codified at 16 U.S.C. § 839). Like numerous other federal acts regulating power discussed *supra*, this Act articulated strong environmental purposes, alongside its reliability, efficiency and cost-reduction goals. *See id.* § 2. It specifically identified the development of renewable resources in the region, conservation of electricity and the protection of fish and wildlife resources. *See id.*

[37] *See infra* notes 38–51 and accompanying text.

[38] *See* JOHN E. KWOKA, JR., POWER STRUCTURE: OWNERSHIP, INTEGRATION, AND COMPETITION IN THE U.S. ELECTRICITY INDUSTRY 3–4 (1996).

failures and consolidation.[39] The consolidation of monopolies, free to charge monopoly prices, in turn spurred widespread calls for public takeover of the industry.[40] The form of public ownership widely proposed and widely implemented was municipalization.[41]

In 1898, Samuel Insull, a dominant electricity industry leader, proposed to the National Electric Light Association ("NELA") that electric utilities should be regulated by state agencies that would fix rates and set service standards.[42] Insull saw such an approach as a means to avoid calls for municipal takeovers of the industry on the one hand, and as a method of reducing disadvantageous intra-industry competition on the other.[43] In 1907 NELA called for such regulation.[44] By the end of that year, Wisconsin and a few other states had established utility regulatory agencies or added utility regulation to the duties of other existing state commissions.[45] By 1916 thirty-three states had such agencies, and virtually all had them by the 1920s.[46] Significantly, state regulation was then seen as a means of keeping electricity prices down.[47] As the Supreme Court of Wisconsin explained, the adoption of state regulation of electricity had as its goal the best possible service "at the lowest price practicable."[48] The state's high court observed that the granting of monopoly franchises in given geographical areas was necessary to eliminate excessive investments and expenses caused by two or more utilities co-existing where consumers only required one.[49] According to the court, the legislature

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[39] *See generally* Calumet Service Co. v. City of Chilton, 135 N.W. 131, 143 (Wisc. 1912) (explaining one goal of Wisconsin's electricity regulatory statute as elimination of competing utilities with their excessive investments and consequent waste, displacement of existing utilities and increased electricity costs).

[40] *See generally* KWOKA, *supra* note 38, at 4 (municipally owned utilities portrayed private systems as unconstrained monopolists and portrayed themselves as defenders of electricity at fair prices).

[41] *See* HYMAN, *supra* note 11, at 71.

[42] *See id.* at 67, 71; *see also* Richard F. Hirsh, *Consensus, Confrontation and Control in the American Electric Utility System, in* THE VIRTUAL UTILITY: ACCOUNTING, TECHNOLOGY & COMPETITIVE ASPECTS OF THE EMERGING INDUSTRY 19, 23 (Shimon Awerbuch & Alistair Preston eds., 1997) (noting Insull's advocacy of public regulatory bodies establishing allowable electricity rates based on utility costs plus a reasonable profit).

[43] *See* Hirsh, *supra* note 42, at 23.

[44] *See* HYMAN, *supra* note 11, at 71.

[45] *See, e.g.*, Wisconsin Traction, Light, Heat & Power Co. v. Green Bay & Mississippi Canal Co., 205 N.W. 551, 554 (Wisc. 1925) (discussing 1907 Wisconsin utility regulation statute's enactment and scope); HYMAN, *supra* note 11, at 71.

[46] *See* HYMAN, *supra* note 11, at 71; KWOKA, supra note 38, at 4.

[47] *See, e.g., Calumet Service Co.*, 135 N.W. at 143.

[48] *See* City of La Crosse v. La Crosse Gas & Elec. Co., 130 N.W. 530, 536 (Wisc. 1911); *see also Calumet Service Co.*, 135 N.W. at 143.

[49] *See Calumet Service Co.*, 135 N.W. at 143.

understood that allowing competing utilities to threaten existing investments and displace existing utilities would lead to waste, injustice to previous investors and ultimately increases in electricity costs.[50]

The result of this state regulatory trend in the first quarter of the century was an electricity industry principally structured as a series of regional monopolies, whose rates and investment decisions were regulated by state public utility commissions.[51] The typical regulated monopoly was vertical integration in a single electric utility of all three components of the business: 1) electricity generation facilities, 2) transmission lines and equipment and 3) distribution equipment.[52] This arrangement was often justified by high costs of market entry and economies of scale that were thought to make electric utilities "natural monopolies."[53] The economies of scale achievable by these monopolies could be reaped for society by blocking exploitative monopoly pricing through government regulation.[54] Theoretically, government regulation would replicate market forces that ordinarily would keep price near the lowest cost of production through the pressure of competition.[55]

Because of jurisdictional limits to state regulation, however, states had difficulty controlling the sprawling interstate electric utility holding companies that emerged in the 1920s and 30s.[56] By 1932, sixteen utility holding companies controlled an estimated seventy-five percent of all electricity produced in the United States.[57] The concentration of control permitted by this holding company structure led to excessive rates for consumers and the obstruction of state utility regulation.[58] In an attempt to regain control over the industry and reestablish reasonable rates for electricity, federal regulatory legislation was enacted.[59]

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[50] *See id.*

[51] *See, e.g., id.* at 140; Hirsh, *supra* note 42, at 19.

[52] *See, e.g.*, Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, 61 Fed. Reg. 21,540, 21,543 (1996) [hereinafter Order No. 888].

[53] *See* Re Pricing and Rate-making Treatment for New Electric Generating Facilities Which are Not Qualifyng Facilities, D.P.U. 86-36-A, 89 Pub. Util. Rep. 4th (PUR) 190, 193 (Mass. D.P.U. 1987) [hereinafter D.P.U. 86-36-A]. *But see* HYMAN, *supra* note 11, at 72, 73 (regulation may not simply have been inevitable result of a natural monopoly; utilities may have sought regulated monopoly status to maintain profitability).

[54] *See generally* D.P.U. 86-36-A, 89 Pub. Util. Rep. 4th (PUR) at 193.

[55] *See id.* at 195.

[56] *See* DIVISION OF INVESTMENT MANAGEMENT, UNITED STATES SECURITIES AND EXCHANGE COMMISSION, THE REGULATION OF PUBLIC-UTILITY HOLDING COMPANIES 2, 2 n.4 (1995).

[57] *See* KWORA, *supra* note 38, at 5-6 (citing Asghar Zardhoohi, *Competition in the Production of Electricity, in* ELECTRIC POWER: DEREGULATION AND THE PUBLIC INTEREST 66 (Moorhouse, ed. 1986)).

[58] *See* DIVISION OF INVESTMENT MANAGEMENT, *supra* note 56, at 1.

[59] *See id.* at 1, 4.

One of the earliest federal statutes regulating electricity production was the Federal Water Power Act ("FWPA"), enacted in 1920.[60] The FWPA created the Federal Power Commission ("FPC"—later renamed the Federal Energy Regulatory Commission, "FERC") and gave it authority over hydroelectric projects in the navigable waters of the United States.[61] The FWPA authorized the FPC to issue a license to citizens or American corporations wanting to create or operate hydropower facilities on navigable waters.[62] The FWPA also allowed the Commission to regulate the power rates and services of the licensee where the states did not do so, and prohibited unreasonable, discriminatory and unjust rates or services for power sold interstate.[63]

Congress passed the FWPA, in part, due to conservationists' efforts on behalf of comprehensive development of the water resources of the nation.[64] Conservationist W. J. McGee, the Secretary of the Inland Waterways Commission appointed by President Theodore Roosevelt in 1908, called for comprehensive river planning which would take account of "the purification of the waters," the control of floods, commercial river navigation and other benefits, as well as the development of hydropower.[65] The FWPA, as eventually enacted, expressed this comprehensive interest in both development and conservation.[66] The statute allowed the FPC to give priority to hydropower applicants whose plans were "best adapted to develop, *conserve* and utilize in the public interest the . . . water resources of the region . . . ."[67] Though the FWPA was utilitarian in its focus, addressing navigation, water supply and hydropower in various provisions, it did address resource conservation in two provisions concerning the operation, maintenance or regulation of fishways connected with dams or river diversions.[68] In its concern about public losses due to private obstruction of navigation by hydropower dams, the FWPA implicitly recognized the need to regulate where private parties might externalize costs onto the public.

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[60] *See supra* notes 33–36 and accompanying text.

[61] *See* Gifford Pinchot, *The Long Struggle for Effective Federal Water Power Legislation*, 14 GEO. WASH. L. REV. 9, 19, 20 (1945) (recounting history of statute's evolution).

[62] *See* Federal Water Power Act § 4(d).

[63] *See id.* §§ 19, 20.

[64] *See* First Iowa Hydro-Electric Coop. v. Federal Power Comm'n, 328 U.S. 152, 180 (1946); *see also* Pinchot, *supra* note 61, at 15–19 (recounting conservationists' battles leading to Federal Water Power Act).

[65] *See* Pinchot, *supra* note 61, at 16 (quoting principles formulated by McGee in report of the Inland Waterways Commission). President Theodore Roosevelt similarly supported comprehensive planning of the nation's waterways that would go beyond the single-purpose thinking of prior river projects. *See id.* at 15.

[66] Federal Water Power Act § 7.

[67] *Id.* (emphasis added).

[68] *See, e.g., id.* §§ 7, 10(a), 18, 25.

Also important in the emergence of federal regulation of hydropower were the arguments of conservationists like Forest Service head Gifford Pinchot against the give-away of hydropower sites on federal lands.[69] Pinchot proposed charging for such grants and limiting them to a set number of years—proposals enacted in the FWPA.[70] Thus, alongside concern over unreasonable electricity rates, concerns about the environment and about the free private use of public resources were implicit in one of the earliest federal statutes concerning power production.[71]

The Federal Water Power Act, however, proved insufficient to control the excesses of the electric utility holding companies.[72] Voluminous reports on the industry by the Federal Trade Commission and the House Committee on Interstate and Foreign Commerce revealed ongoing abuses.[73] As a result of these reports, Congress passed the Public Utility Holding Company Act of 1935 ("PUHCA"), regulating certain financial and securities practices of these electric companies, in tandem with the Federal Power Act ("FPA").[74] The FPA subsumed the earlier FWPA.[75] The FPA granted the FPC jurisdiction over all interstate electricity transmission facilities of electricity, unless they were expressly excepted by statute.[76] The FPA also authorized the FPC to create regional districts for the voluntary interconnection and coordination of electric generation and transmission facilities for the purpose of "assuring an abundant supply of electric energy . . . with the greatest possible economy and with regard to the proper utilization and conservation of natural resources . . . ."[77] Thus, early on, Congress spoke of least-cost and environmental conservation goals for electricity regulation in the same breath.[78]

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[69] *See* Pinchot, *supra* note 61, at 12.

[70] *See* Federal Water Power Act §§ 6, 10(e); Pinchot, *supra* note 61, at 12, 13, 19.

[71] *See supra* notes 64–70 and accompanying text. The free use of the nation's waterways to generate electricity is not that dissimilar from the free use of the nation's air in the generation of electricity. In both cases an essential component in the electricity generation process—a riparian resource for hydropower input in the former case and an atmospheric resource for combustion emission output in the latter—is being obtained gratis from public resources.

[72] *See infra* notes 73–75 and accompanying text.

[73] *See* Public Utility Holding Company Act of 1935, ch. 687, title I, 49 Stat. 803 (codified at 15 U.S.C. § 79); DIVISION OF INVESTMENT MANAGEMENT, *supra* note 56, at vii.

[74] Public Utility Holding Company Act § 1; Federal Power Act § 201.

[75] *See First Iowa Hydro-Electric Coop.*, 328 U.S. at 172 n.17 (recounting statutory evolution of FPA and Federal Water Power Act).

[76] *See* Federal Power Act § 213.

[77] *Id.*

[78] *See id.*

With the price restraints established by a settled state/federal regulatory structure, ever-increasing economies of scale in power production and relatively stable costs for fuel and other inputs, the price of electricity continued to fall in the initial decades of government regulation and into the post-World War II period.[79] But the dramatic upturn in the cost of oil after the 1973 oil embargo and the substantial investment by the electric industry in costly nuclear plants and other large, capital-intensive generating facilities in the 1960s and 70s began a noticeable escalation of electric rates.[80] The inflation-adjusted average residential electric rate rose twenty-five percent from 1970 to 1985; the average adjusted industrial rate rose eighty-six percent.[81] The largest generating facilities were no longer experiencing economies of scale.[82] As FERC would later observe, "[b]igger was no longer better."[83] Consequently, some industrial customers decided to opt out of the utility system and build their own generation facilities.[84]

By the late 1970s, the Senate Committee on Energy and Natural Resources expressed concern over higher electric bills, consumption of scarce fuels, the decline of domestic reserves of those fuels, increasing reliance on imported fuels and the costly, "and perhaps unnecessary," expansion of electric generating capacity.[85] Against the backdrop of the energy crisis of the 1970s and legislative concerns over energy conservation, efficient resource use and equitable electric rates, Congress passed the Public Utility Regulatory Policies Act of 1978 ("PURPA").[86] Congress enacted PURPA, in part, to encourage the

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[79] *See generally* Order No. 888, 61 Fed. Reg. at 21,543.

[80] *See id.*; *see also* S. REP. NO. 95-442, at 9 (1978), *reprinted in* 1978 U.S.C.C.A.N. 7903, 7905-06. Fuel oil rose 400% in cost from 1973-1978; natural gas costs rose 175% in the same period. *See* S. REP. NO. 95-442, at 9 (1978), *reprinted in* 1978 U.S.C.C.A.N. 7906. In terms of capital intensive facilities, the costs of nuclear plants particularly exceeded estimates, sometimes by as much as 1000%. *See* Bernard S. Black, & Richard J. Pierce, Jr., *The Choice Between Markets and Central Planning in Regulating the U.S. Electricity Industry*, 93 COLUM. L. REV. 1339, 1346 (1993). Nuclear power in particular, once promised as a source of electricity "too cheap to meter," had proven too expensive to afford. *See, e.g.*, HYMAN, *supra* note 11, at 115; Hirsh, *supra* note 42, at 29.

[81] *See* Order No. 888, 61 Fed. Reg. at 21,544. *But see* Congressional testimony by Commissioner Susan F. Clark (of Florida Public Service Commission), Apr. 14, 1997, *available in* 1997 WL 11233109 (asserting U.S. as a whole has among the lowest electric rates in world; of industrialized countries only Canada and Sweden, both with large hydropower resources, have lower rates).

[82] *See* S. REP. NO. 95-442, at 9 (1978), *reprinted in* 1978 U.S.C.C.A.N. at 7906; Hirsh, *supra* note 42, at 29.

[83] Order No. 888, 61 Fed. Reg. at 21,544.

[84] *See id.*

[85] *See* S. REP. NO. 95-442, at 9 (1978), *reprinted in* 1978 U.S.C.C.A.N. at 7906.

[86] Pub. L. No. 95-617, 92 Stat. 3117 (1978) (codified in scattered sections of 16 U.S.C.); *see also* S. REP. NO. 95-442, at 10 (1978), *reprinted in* 1978 U.S.C.C.A.N. at 7906-07.

development of alternative electricity sources that would reduce the demand for fossil fuels, such as small hydroelectric projects, cogeneration and other small power producers.[87] By encouraging the formation of numerous independent power producers, PURPA helped begin the erosion of the existing structure of utility monopolies operating as sole electricity generators for franchised service territories.[88] After the enactment of PURPA, the twin, often interwoven, trajectories of deregulation and environmental conservation began to emerge more distinctly.

PURPA announced as its purposes: 1) the conservation of energy; 2) the optimization of efficiency of use of facilities and resources by electric utilities; and 3) equitable rates to electric consumers.[89] To accomplish these ends the statute established a number of federal standards for electric utilities.[90] Though not mandatory for the states, the standards were to be formally considered and adopted or rejected by each state regulatory commission.[91] The standards included: 1) the requirement that rates charged for electricity reflect the costs of providing electric service to each class of consumer; 2) a prohibition on quantity discounts for the energy component of electricity unless costs could be shown to decrease with such increased consumption; and 3) the requirement that each utility offer to its customers load management techniques determined to provide useful energy or capacity management advantages and to be practicable, cost-effective and reliable.[92] Over time the approach outlined in these standards would evolve into "integrated resource planning" by the industry, where both generating facilities and load management/conservation techniques would be weighed in developing least-cost electricity services.[93]

In addition to describing these standards, the statute also gave FERC authority to require any electric utility to provide transmission

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[87] *See* Public Utility Regulatory Policies Act § 210; Massachusetts Elec. Co. v. Department of Pub. Utils., 643 N.E.2d 1029, 1031 (Mass. 1994); *see also* S. REP. No. 95-442, at 10 (1978), *reprinted in* 1978 U.S.C.C.A.N. at 7906-07.

[88] *See* Mark E. Haedicke, *Competitive-based Contracts for the New Power Business*, 17 ENERGY L.J. 103, 103, 104 (1996); Hirsh, *supra* note 42, at 30; Iribe, *supra* note 13.

[89] *See* Public Utility Regulatory Policies Act § 101.

[90] *See id.* § 111.

[91] *See id.* §§ 111(a)-(c), 117.

[92] *See id.* § 111(d). Quantity discounts encourage greater electricity use and may encourage waste, and can therefore have a negative impact on utility capacity management, national economic efficiency and the environment.

[93] *See generally* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 72; *see also* 16 U.S.C. § 2621(d)(7) (1994) (adding integrated resource planning to federal standards). Environmental externality programs would later take place in the context of integrated resource planning. *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 74.

services to any other electric utility, provided certain conditions were met.[94] Conceptually at least, the statute raised the possibility of a national electric transmission system more open to utilities' commercial power transmission, or "wheeling," from point to point.[95] PURPA and associated federal regulations also defined non-utility generating facilities that met certain size, ownership and fuel criteria as "qualifying facilities" ("QFs"), and gave them the right to request connection to utility transmission facilities.[96] Environmental conservation and fuel diversity objectives were manifest in the suggestion that QFs use renewable energy as their primary energy sources.[97] Under the statute, QFs were also given the right to require utilities to purchase the electricity they generate at a non-discriminatory price that did not exceed the utility's incremental, or avoided, cost.[98]

Although benefiting from an implicit state subsidy in the form of guaranteed utility power purchases at a price not exceeding the relatively high avoided cost rate,[99] QFs are entrepreneurial and stand at least partially outside the regulated monopoly framework.[100] Such independent power production soon became a significant source of the nation's electricity, accounting for about half of the new generating capacity created between 1990 and 1992.[101] In California, QFs rose from only a negligible amount of electricity-generating capacity in the early 1980s to representing twelve percent of dependable capacity by 1991.[102] The emergence of QFs, prompted by PURPA, thus began to create a pool of independent power generators—another building block for the foundation of a deregulated electric industry; and simultaneously pushed forward the development of renewable energy sources with fewer environmental externalities.[103]

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[94] *See* Public Utility Regulatory Policies Act § 203.

[95] *See id.*

[96] *See id.* §§ 201–202; *see also* Haedicke, *supra* note 88, at 104.

[97] *See* Public Utility Regulatory Policies Act § 201. The statute allowed FERC to establish rules governing the qualifying criteria, but the statute referred to an eighty megawatt power production facility capacity limit, the use of renewable resources, biomass, or waste as a primary energy source, and ownership terms that generally excluded electric utilities. *See id.*

[98] *See id.* § 210, 16 U.S.C. § 824a-3(a)—(b). The incremental cost, also known as the avoided cost, is the cost a utility would incur if the utility generated that increment of additional power itself or purchased it elsewhere. *See, e.g.*, 16 U.S.C. § 824a-3(d); Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 184; *see also* Haedicke, *supra* note 88, at 104 & n.12.

[99] *See* Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 186 (utilities are now legally required to connect with QFs and buy their output under terms regulated by public utility commission).

[100] *See generally* Haedicke, *supra* note 88, at 105.

[101] *See* H.R. REP. No. 102-474, pt. 1, at 138 (1992), *reprinted in* 1992 U.S.C.C.A.N. 1954, 1961.

[102] *See* Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 186.

[103] *See supra* note 96–97 and accompanying text. *See generally* H.R. REP. No. 102-474, pt. 1,

Along with the statutory changes, technological innovations helped lay the groundwork for the deregulation of the electric industry.[104] While very large facilities began to lose economies of scale, new, more efficient, smaller-scale technologies emerged, including natural-gas-fired combined-cycle generating plants.[105] Bolstering the potential of the new gas-fired technologies, a major upward revision in estimates of domestic and world-wide natural gas reserves occurred at the close of the 1970s and in the early 1980s.[106] The new gas-fired generation stations had the advantage of shorter construction times and generally lower impact on the environment.[107] Compared to coal, natural gas produces negligible amounts of sulfur dioxide and roughly two-thirds less CO_2 when burned.[108] Most significantly, the new gas-fired generation technologies could produce electricity at lower cost.[109] From a fuel

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at 138 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1961 (PURPA facilitated emergence of independent power producers and introduced utilities to purchased power); Haedicke, *supra* note 88, at 104, 105.

[104] *See, e.g., infra* note 105 and accompanying text.

[105] *See* Order No. 888, 61 Fed. Reg. at 21,544. Combined-cycle generation plants use a combination of gas-fired turbines and steam turbines to generate electricity. *See, e.g.*, W.M. Burnett & S.D. Ban, *Changing Prospects for Natural Gas in the United States*, 244 SCIENCE 305, 307 (1989); M.R. Erbes et al., *Off-design Performance of Power Plants: an Integrated Gasification Combined-cycle Example*, 237 SCIENCE 379, 381 (1987). The exhaust of the gas turbine is used to heat steam to power a steam turbine to produce additional electricity. *See* Erbes, *supra*, at 381. The addition of the steam cycle puts energy to work that once escaped up the chimney, thereby increasing electricity output per unit of fuel burned. *See generally id.* Combined-cycle plants can be fired by natural gas, or they can be fired by coal which is first gasified and cleaned of pollutants, in so-called "integrated coal gasification combined-cycle" ("IGCC") plants. *See id.*

[106] *See* Burnett & Ban, *supra* note 105, at 305, 306.

[107] *See* Order No. 888, 61 Fed. Reg. at 21,544. The greater efficiency of combined-cycle technology over conventional coal generation, coupled with the cleaner-burning quality of natural gas, means that combined-cycle systems produce less than half the CO_2 per kilowatt-hour produced by conventional coal-fired stations. *See* Burnett & Ban, *supra* note 105, at 307. Natural gas-fired combined-cycle plants also emit negligible quantities of volatile organic compounds or particulates, and produce 40% less nitrogen oxides (NO_x) than coal plants. *See id.* As clean as gas-fired plants may be in some respects, they still generate large quantities of CO_2—the main culprit in global warming. *See, e.g.*, Tim Woolf & Bruce Biewald, *Efficiency, Renewables and Gas: Restructuring as if Climate Mattered*, ELECTRICITY J., Jan.-Feb. 1998, at 64.

[108] *See, e.g.*, Burnett & Ban, *supra* note 105, at 306; Woolf & Biewald, *supra* note 107, at 66.

[109] *See* Order No. 888, 61 Fed. Reg. at 21,544; *see also* Peter Navarro, *A Guidebook and Research Agenda for Restructuring the Electricity Industry*, 16 ENERGY L.J. 347, 352–53 (1995) (at current natural gas prices medium-sized gas-fired plants often produce power cheaper than large coal-fired or nuclear plants). Combined-cycle facilities can generate electricity as cheaply as 3–5 cents/kilowatt-hour (kWh), compared with 4–7 cents/kWh for large coal-fired stations and 9–15 cents/kWh for nuclear plants. *See* Order No. 888, 61 Fed. Reg. at 21,544. It is important to note, however, that the current relatively low price of natural gas is an important part of the present low cost of gas-fired electricity generation. *See, e.g.*, MASSACHUSETTS DIV. OF ENERGY RESOURCES, THE POTENTIAL IMPACT OF ENVIRONMENTAL EXTERNALITIES ON NEW RESOURCE SELECTION AND ELECTRIC RATES 8 (1991); Michael F. Donlan, *Brief Whitepaper on Open Access and Deregulation*

with dismal and diminishing prospects in the 1970s, natural gas became by the close of the 1980s "the fuel of the future."[110]

Thus, by the late 1980s, relatively abundant gas reserves, combined with independent power producers using cheaper, less-polluting, gas-fired electricity generation, gave policy-makers a stronger technological foundation for simultaneously advancing the twin goals of least-cost power and environmental protection.[111] Some policy-makers believed, however, that existing state and federal regulatory schemes were obstacles to full realization of the opportunities presented by these technological and organizational changes in the industry.[112] Consequently, certain state regulators suggested that electricity deregulation might now be appropriate.[113] They argued that old justifications for regulated monopolies—such as very high capital start-up costs for generation companies—might no longer apply.[114]

Members of Congress were becoming similarly concerned that federal statutes, particularly PUHCA, were constraining the development of independent power.[115] The House Committee on Energy and

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of Retail Sales of Electricity and Gas, in RETAIL UTILITY DEREGULATION 1, 3 (Massachusetts Continuing Legal Education, Inc. 1996).

[110] *See* Burnett & Ban, *supra* note 105, at 305; *see also* Hon. Richard D. Cudahy, *PURPA: The Intersection of Competition and Regulatory Policy*, 16 ENERGY L.J. 419, 426 (1995) (in late 1970s natural gas was believed to be in permanent shortage and use in electricity generation was drastically limited). Even with these favorable prognostications, the use of natural gas for electricity generation continued to decline into the early 1990s. *See Statistical Comm. of the Edison Elec. Inst., Statistical Yearbook of the Electric Utility Industry—1993* 29 tbl. 22 (1994). In the twenty-year period natural gas use in electricity generation declined from fueling 18.3% of the electricity generated in the United States in 1973 to fueling only 9.0% of electricity produced in 1993. *See id.* By 1996, however, natural gas had become the energy source for about 13.5% of electricity generated in the U.S. and was predicted to account for a little over 23% of generation in the year 2005. *See* INTERNATIONAL ENERGY AGENCY, ELECTRICITY INFORMATION 1996 671 (1997).

[111] *See supra* notes 96–110 and accompanying text. Technological determinists could convincingly argue that the current deregulatory movement is the product of the collapse of one fuel, nuclear, and the ascent of another, gas. *See generally supra* notes 80, 96–110 and accompanying text.

[112] *See infra* notes 113–14 and accompanying text.

[113] *See, e.g.*, D.P.U. 86-36-A, 89 Pub. Util. Rep. 4th (PUR) at 196 (utility regulation need not be a permanent form of business control; where competition emerges in industries that formerly had natural monopoly characteristics it may be appropriate or essential that regulatory constraints be replaced by competitive market forces). The old argument that a single, integrated monopoly generating, transmitting and distributing electricity in a given service area was seriously undermined once utilities began buying substantial amounts of electricity from independent power producers (IPPs). *See generally* Larry Parker, Congressional Research Service, *Electricity: The Road Toward Restructuring*, (visited Oct. 14, 1997) <http://www.cnie.org/nle/eng-7.html>. These purchases demonstrated that contractual arrangements, rather than single-company operation of both electricity production and distribution, could reliably meet customer demand. *See id.*

[114] *See generally supra* note 113.

[115] *See* H.R. REP. No. 102-474, pt. 1, at 139 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1962.

Commerce noted the success of independent power production that resulted from PURPA.[116] Independent electricity generators could not build projects in more than one state, however, without coming under the exacting SEC regulation specified by PUHCA.[117] It was also unclear whether, under existing federal law, FERC had authority to order utilities to transmit, or "wheel," electricity for other companies.[118] Without such open access to the transmission lines, the formation of regional and national markets for electricity would likely be inhibited.[119] The federal Energy Policy Act of 1992 ("EPAct") was meant to eliminate some of these barriers and open the monopoly-held transmission grid to a variety of electricity generators.[120]

Through EPAct, Congress sought to slow the rise of American oil imports, conserve energy, encourage efficiency, provide new energy options and more diverse supplies, develop renewable energy resources, increase competition in the electric industry and address global warming.[121] Moreover, the Act expressly linked least-cost goals and environmental objectives in the nation's energy strategies.[122] The statute announced, for example, that the goals of United States energy research and development included "meeting future needs for energy services at the lowest total cost to the Nation, including environmental costs . . . ."[123]

In formulating EPAct, congressional committee members observed the direct link between the level and type of energy consumption and the quality of the environment.[124] More efficient use of energy could be used to reduce power plant emissions of CO_2, the principal "greenhouse gas" causing global warming, and also of pollutants such

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[116] *See id.* at 133 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1956.

[117] *See id.* at 139 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1962.

[118] *See id.*

[119] *See generally id.*

[120] *See generally* Energy Policy Act of 1992, § 721; H.R. REP. No. 102–474, pt. 1, at 140 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1963.

[121] *See* H.R. REP. No. 102–474 pt. 1, at 133 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1955.

[122] *See* Energy Policy Act of 1992 § 2001(3).

[123] *Id.* In its merger of environmental protection goals and lowest price goals in an implicit "environmental least-cost" formula, EPAct echoed the formulation of the earlier 1980 Pacific Northwest Electric Power Planning and Conservation Act. *See* Pacific Northwest Electric Power Planning and Conservation Act § 3. Cost-effective electric systems under that 1980 Act were determined by least-cost reliable energy sources, and system costs were defined to include "quantifiable environmental costs and benefits . . . directly attributable" to a given electricity resource. *Id.* Thus, in EPAct and in the earlier Pacific Northwest Electric Power Planning and Conservation Act, least-cost objectives and environmental goals were clearly joined. *See id.; supra* note 122 and accompanying text.

[124] *See* H.R. REP. No. 102–474, pt. 1, at 133 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1955.

as sulfur oxides, nitrogen oxides and particulates.[125] Thus, in developing EPAct, Congress expressly linked a competitive structure for electricity generation with the goal of reducing global warming and other environmental impacts.[126]

EPAct authorized a new class of power producers, the "exempt wholesale generator" ("EWG").[127] An EWG is a generator exclusively in the business of owning and/or operating a facility used for the generation of electricity to sell at wholesale.[128] EWGs are exempted from the utility registration and regulatory requirements of PUHCA.[129] Unlike the case of QFs under PURPA, utility holding companies are permitted to own an interest in one or more EWGs under EPAct.[130] EWGs also do not have to meet the technical energy source criteria required for QFs.[131] EPAct also amended the Federal Power Act to allow any electricity generator to apply to FERC for an order requiring a transmitting utility to provide transmission services to the generator.[132]

Thus, EPAct considerably liberalized and widened the opportunities for independent power producers, freeing them from the regulatory burdens of PUHCA and potentially opening utility transmission facilities to their electricity.[133] While giving this impetus to the least-cost power objectives of the deregulatory momentum growing in the states, EPAct also expressly placed the reduction of global warming on the national energy agenda, and implicitly advanced the goal of reducing other environmental externalities.[134] In states leading the deregulatory movement, like California and Massachusetts, the twin objectives of low-cost power and environmental protection would soon be reaffirmed in state utility restructuring legislation.[135]

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[125] *See id.* at 134, *reprinted in* 1992 U.S.C.C.A.N. at 1956.

[126] *See, e.g.*, Energy Policy Act of 1992 §§ 1602(a)(2), 2001(3).

[127] *See id.* § 711; *see also* Haedicke, *supra* note 88, at 106.

[128] *See* Energy Policy Act of 1992 § 711.

[129] *See id.*

[130] *See id.*

[131] *See id.*; *see also* Haedicke, *supra* note 88, at 106. QFs are limited in size and must use renewable or alternative fuel sources or meet certain efficiency standards if they burn fossil fuels. *See, e.g.*, Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 188.

[132] *See* Energy Policy Act of 1992 § 721.

[133] *See supra* notes 127-32 and accompanying text; *see also* Iribe, *supra* note 13 (Congress pushed the competitive evolution of the electric industry further with passage of EPAct). QFs are allowed to sell electricity at retail, however, while EWGs are limited to wholesale power sales. *See* Haedicke, *supra* note 88, at 106.

[134] *See, e.g.*, Energy Policy Act of 1992 §§ 1602(a)(2), 2001(3). The Act called on the Secretary of Energy to develop an energy strategy "designed to achieve to the maximum extent practicable and at least-cost to the Nation . . . the stabilization and eventual reduction in the generation of greenhouse gases . . . ." *Id.* § 1602(a)(2).

[135] *See infra* notes 143, 160-61 and accompanying text.

2. State Deregulation of Electricity Generation and the Reaffirmation of Environmental Protection and Least-Cost Power as Twin Objectives

California and Massachusetts have played leading roles in the push for deregulation, with both the California Public Utilities Commission ("PUC") and the Massachusetts Department of Public Utilities ("DPU") proposing restructuring programs in 1995.[136] Their state legislatures enacted restructuring legislation in 1996 and 1997, respectively.[137] Very high electric rates in both states played a role in this early drive to deregulate the industry.[138] California's electric rates were fifty percent above the national average, and were held to be one of the causes of its job loss to foreign competitors and to neighboring cheap-power states.[139] In 1996 California and Massachusetts ranked eighth and ninth in the nation respectively in the cost of residential electricity.[140] By 1997 California was spending $23 billion a year on electricity.[141]

The California legislature enacted its electricity restructuring statute, Assembly Bill 1890 ("A.B. 1890"), in the fall of 1996.[142] In A.B. 1890 the legislature explicitly linked the goals of low-cost power and environmentally sensitive electricity production; "It is the intent of the

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[136] *See* Re Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation, Decision No. 95-05-045, 161 Pub. Util. Rep. 4th (PUR) 217 (Cal. P.U.C. 1995) [hereinafter Decision 95-05-045]; Re Electricity Industry Restructuring, D.P.U. 95-30, 160 Pub. Util. Rep. 4th (PUR) 76 (Mass. D.P.U. 1995) [hereinafter D.P.U. 95-30]; *see also* Donlan, *supra* note 109, at 1 (California and New England at front of deregulation movement); Navarro, *supra* note 109, at 347 (California at forefront of deregulation). The California PUC actually made its initial proposal for restructuring on April 20, 1994, in "A Vision for the Future of California's Electric Services," also known as the "Blue Book" for the color of its cover. *See* Ed Smeloff and Peter Asmus, Reinventing Electric Utilities—Competition, Citizen Action, and Clean Power 75 (1997). In 1995, in D.P.U. 95-30, the Massachusetts DPU outlined its vision of electric utility restructuring, followed by a more detailed elaboration in D.P.U. 96-100 the next year. *See* Re Electric Industry Restructuring, D.P.U. 96-100, 172 Pub. Util. Rep. 4th (PUR) 391 (Mass. D.P.U. 1996) [hereinafter D.P.U. 96-100]

[137] *See* Act effective Sept. 24, 1996, ch. 854, 1996 Cal. Legis. Serv. 3678 (codified in scattered sections of Cal. Code (West 1998), commonly referred to as A.B. 1890); Act of Nov. 25, 1997, ch. 164, 1997 Mass. Legis. Serv. 637 (codified in scattered sections of Mass. Gen. Laws (1997)).

[138] *See, e.g.*, Act of Nov. 25, 1997, ch. 164, § 1(d), 1997 Mass. Legis. Serv. at 638.

[139] *See* Navarro, *supra* note 109, at 354; Marla Dickerson & Chris Kraul, *What You Need to Ask to Make an Informed Decision—Power to the People: California's Era of Electricity Deregulation Begins Jan. 1, Bringing Consumers Many Choices, But Also More Than a Little Uncertainty*, L.A. Times, Dec. 21, 1997, at D1 (sidebar *Expensive Electricity*); *see also* Decision 95-05-045, 161 Pub. Util. Rep. 4th (PUR) at 245 (current regulatory scheme has failed to prevent California electric rates from being much higher than rest of nation).

[140] *See* Dickerson & Kraul, *supra* note 139, at D1 (sidebar: *Expensive Electricity*).

[141] *See* Cal. Pub. Util. Code § 330(b).

[142] *See* Act effective Sept. 24, 1996, ch. 854, 1996 Cal. Legis. Serv. 3678.

Legislature to ensure that California's transition to a more competitive electricity market structure . . . creates a new market structure that provides competitive, low cost and reliable electric service . . . and preserves California's commitment to developing diverse, environmentally sensitive electricity resources."[143] The competitive framework created by A.B. 1890 will give customers the right to choose their supplier of electricity.[144] Transmission functions are to be separated from electricity generation functions, with the former left as a controlled monopoly and the latter rendered competitive and eventually unregulated.[145]

Under A.B. 1890 California will create two state-chartered, nonprofit market institutions: an "Independent System Operator" and a "Power Exchange."[146] The Power Exchange will provide a competitive auction similar to a commodities exchange, open on a non-discriminatory basis to all electricity providers where customers can meet their electricity demands.[147] The Independent System Operator will have centralized control over the statewide transmission grid, dispatching electricity from the suppliers to meet this demand.[148] The plan was scheduled to begin January 1, 1998, but difficulties with the complex computer programming required to coordinate the interconnected real time trading of electricity and the management of the electric grid caused a four month postponement of the system's start-up.[149]

That least-cost power is not the sole goal for California's restructuring is perhaps best indicated by A.B. 1890's provision for accelerated and full recovery of costs associated with previous uneconomic utility investments and contractual obligations (so-called "stranded costs" or "transition costs").[150] The statutorily guaranteed recovery of stranded costs will raise the price of electricity that consumers actually pay above the power's going minimum market price.[151] Stranded costs include those associated with large capital investments in nuclear generating stations and other expensive power plants.[152] They also include long-term power purchase agreements that were made under the previous

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[143] *Id.* § 1(a).

[144] *See* CAL. PUB. UTIL. CODE § 330(d).

[145] *See id.* § 330(k), (l).

[146] *See* Act effective Sept. 24, 1996, ch. 854, § 1(c), 1996 Cal. Legis. Serv. at 3680.

[147] *See id.*; Chris Kraul, *Computer Woes Delay Electricity Deregulation*, L.A. TIMES, Dec. 23, 1997, at A1.

[148] *See generally* Act effective Sept. 24, 1996, ch. 854, § 1(c), 1996 Cal. Legis. Serv. at 3680.

[149] *See* CAL. PUB. UTIL. CODE § 330(n); Kraul, *supra* note 147, at A1.

[150] *See generally* CAL. PUB. UTIL. CODE § 367; *see also* CAL. PUB. UTIL CODE §§ 840, 841.

[151] *See generally id.* § 330(s).

[152] *See, e.g., id.* §§ 330(s), 368(d); *see also id.* § 840(f). The cost of nuclear power plants and

regulatory system but that may not be recoverable at market prices in a competitive system.[153] These costs are to be paid through a non-bypassable transition charge levied on electricity consumers.[154] The legislature also intends, however, to give an immediate rate reduction of no less than ten percent for residential and small commercial ratepayers, financing the rate reduction through the issuance of "rate reduction bonds."[155] Through the device of the rate reduction bonds, California is attempting to reconcile the goal of low-cost power with full repayment of utility investors for earlier costly misinvestments in nuclear power and other expensive energy sources.[156]

In late 1997, in language closely tracking many of the provisions of the California statute, the Massachusetts Legislature enacted chapter 164 to restructure its electric utility industry.[157] The Legislature's finding that the state had one of the highest electricity rates in the United States, and that these high rates were having an adverse effect on Massachusetts business' ability to compete, prompted the enactment of chapter 164.[158] The Legislature's avowed goal was to create a framework by March 1, 1998 under which competitive electricity generators would offer power and customers would gain the right to choose their electric power supplier.[159]

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nuclear decommissioning may be the principal component of the problem of stranded costs. *See, e.g.*, Congressional testimony to Senate Committee on Energy and Natural Resources by William D. Steinmeier (former president of the National Association of Regulatory Commissioners, and prior chair of Missouri Public Service Commission), May 22, 1997, *available in* 1997 WL 11233078 at *16–17, 22; Decision 95–05–045, 161 Pub. Util. Rep. 4th (PUR) at 223.

[153] *See* Act effective Sept. 24, 1996, ch. 854, § 1(b), 1996 Cal. Legis. Serv. at 3679; CAL. PUB. UTIL. CODE § 330(s); *see also* CAL. PUB. UTIL. CODE § 840(f).

[154] *See* CAL. PUB. UTIL. CODE § 330(v). Debate concerning stranded costs has centered on whether under deregulation *rate-payers* will pay off these costs through a surcharge on their electricity distribution bill, or whether the costs will indeed be left unpaid, in essence leaving the loss with existing utility *investors* in the form of depressed stock values or diminished dividends. *See* Steinmeier, *supra* note 152, at *16; Charles Stein, *For Investors, a Future of Uncertainty, Promise*, BOSTON GLOBE, Mar. 17, 1998, at F3 (observing that allowing utilities to recoup their stranded costs has been bad news for ratepayers who 'picked up the tab,' but good news for utility stock investors).

[155] *See* Act effective Sept. 24, 1996, ch. 854, § 1(b); *see also* The Utilities Reform Network, *Sparks Fly in the Electricity Market . . . Still More Deregulation* (visited Jan. 18, 1998) <http://www.turn.org/sparks.html> (expressing skepticism about rate-cut financed through sale of bonds, similar to refinancing mechanisms with lower monthly payments but a larger total payment over the long-run).

[156] *See generally supra* notes 151–55 and accompanying text.

[157] *See supra* note 137 and accompanying text. This session law should not be confused with Massachusetts General Laws chapter 164, which the Act of Nov. 25, 1997 amends.

[158] *See* Act of Nov. 25, 1997, ch. 164, § 1(d)-(e).

[159] *See id.* § 1(c); *see also id.* § 1(m).

The statute stresses the importance of increased competition in achieving long-term rate reductions.[160] It also asserts, however, that enhanced environmental protection goals are essential to a more competitive electricity market and calls for utilities to propose programs to promote energy conservation and demand-side management as part of their restructuring.[161] Moreover, the statute requires the Commonwealth of Massachusetts ("Commonwealth") to ensure that energy conservation policies, activities and services are appropriately funded and available throughout the state.[162] In its energy facilities siting provisions, it calls on the Energy Facilities Siting Board to act "so as to provide a reliable energy supply for the commonwealth with a minimum impact on the environment at the lowest possible cost."[163] Thus, as in California, the Massachusetts restructuring statute interweaves least-cost and environmental protection objectives.[164]

As in the California plan, Massachusetts decided to separate the function of electricity generation from transmission and distribution services.[165] The successor distribution companies will have to ensure direct retail access by consumers to all electricity generators.[166] The separated generating companies will generally no longer be regulated as public utilities.[167] Distribution and transmission companies, however, will continue to be substantially regulated.[168] Distribution companies, for example, will have exclusive service territories defined by the Department of Telecommunication and Energy.[169] Thus, electricity distribution will, for now, effectively remain a regulated monopoly.[170]

Further paralleling California, an important selling feature of the Massachusetts deregulation scheme is that chapter 164 requires utility

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[160] *See id.* § 1(k).

[161] *See id.* § 1(l).

[162] *See id.* § 1(j).

[163] Act of Nov. 25, 1997, ch. 164, § 204, MASS. GEN. LAWS ch. 164, § 69H.

[164] *See supra* notes 143, 160-63 and accompanying text.

[165] *See* Act of Nov. 25, 1997, ch. 164, § 1(m) 1997 Mass. Legis. Serv. at 638; *see also* MASS. GEN. LAWS ch. 164, § 1A(b)-(c).

[166] *See* MASS. GEN. LAWS ch. 164, § 1A(a).

[167] *See id.*

[168] *See, e.g., id.* §§ 1B, 69H.

[169] *See id.* § 1B.

[170] *See id.* The Act does, however, require a study of exclusive distribution service territories to determine if such exclusivity should be terminated or altered. *See* Act of Nov. 25, 1997, ch. 164, § 312, 1997 Mass. Legis. Serv. at 713. Instead of a single electricity rate, consumers will be charged separate ("unbundled") rates for generation, for distribution, for transmission and for other services. *See* MASS. GEN. LAWS ch. 164, § 1D. Any stranded cost charges allowed by the Commonwealth will also be listed separately on the bill, as so-called "transition charges." *See id.* For consumers who decide not to purchase electricity from an independent generating company,

restructuring plans to reduce consumer electric rates by ten percent from the average undiscounted rates applicable in August of 1997.[171] Chapter 164 similarly provides for recovery of stranded costs, called "transition costs" in the statute.[172] Because it may be difficult to cover all costs of generating, transmitting and distributing electricity, pay off old misinvestments that contributed to high electricity rates in the first place and give consumers a ten percent rate cut, the statute authorizes rate reduction bonds to refinance some of these costs.[173]

In sum, electricity deregulation as expressed in California's and Massachusetts' restructuring legislation does not depart from, but rather reaffirms, the twin policy objectives of least-cost power and environmental protection articulated in the evolution of federal regulatory statutes.[174] As Peggy Welsh, Executive Director of the National Association of Regulatory Utility Commissioners, has observed, values other than economic efficiency will continue to be important for the restructured electricity industry, including protecting the environment.[175] In restructuring the industry, least-cost power is not the sole or even paramount goal.[176] Thus, even under deregulation, the question is not whether to incorporate environmental protections and a reduction of externalities in restructuring the electric industry, but rather, how best to do so.[177]

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the distribution company will act as the default electricity provider. *See id.* § 1B(d). The distribution company also serves as the default provider of electricity for consumers who buy electricity from an independent generator, if and when the independent generator does not deliver. *See id.* § 1B(b), (d).

[171] *See* MASS. GEN. LAWS ch. 164, § 1B(b). By Sept. 1, 1999 the rate reduction is required to reach 15%. *See id.*

[172] *See, e.g., id.* §§ 1A(a), 1G. Transition costs may include unrecovered costs for generation plants, recovery for nuclear entitlements and certain post-shutdown and decommissioning costs for nuclear plants that are not recoverable from the Nuclear Regulatory Commission's decommissioning fund. *See id.* § 1G(b). In addition, transition costs may include purchased power agreements contracted earlier at rates that are now above market. *See id.*

[173] *See generally id.* §§ 1, 1G(c)(2) (companies demonstrating that 10% rate reduction is not financially viable, without use of rate reduction bonds to refinance debt associated with transition costs, may be allowed to use such bonds).

[174] *See supra* notes 143, 160–63 and accompanying text. California had already linked least-cost power and environmental protection objectives in earlier amendments to its public utility regulatory law, declaring that "in addition to other ratepayer protection objectives, a principal goal of electric . . . resource planning and investment shall be to minimize the cost to society of the reliable energy services that are provided by . . . electricity, and to improve the environment . . . ." CAL. PUB. UTIL. CODE § 701.1(a).

[175] *See* Lori M. Rodgers & Joseph F. Schuler Jr., *Ready, Fire, Aim—California and the Nation on the Eve of Competition*, PUBLIC UTILS. FORTNIGHTLY, Jan. 1, 1998, at 28–29.

[176] *See* Act of Nov. 25, 1997, ch. 164, preamble, § 1(b), (l), 1997 Mass. Legis. Serv. at 638; Act effective Sept. 24, 1996, ch. 854, § 1(a), 1996 Cal. Legis. Serv. at 3679.

[177] *See supra* notes 174–76 and accompanying text.

B. *Advancing the Goal of Environmental Protection Through the Regulation of Environmental Externalities—The Case of Carbon Dioxide Emissions*

Electricity generation is the source of a variety of environmental externalities.[178] These externalities may be relatively localized impacts, such as water consumption, the production of liquid and solid waste, land use impacts, fuel delivery impacts, noise, related transmission line impacts and aesthetic impacts.[179] Other effects of the industry are global in impact or reach irretrievably into the distant future. The radioactive waste from nuclear power plants, for example, will have to be safely isolated from the environment for at least 10,000 to 100,000 years.[180] Electric generating stations are also a significant source of air pollution, including sulfur oxides, nitrogen oxides, particulates and CO_2—the principal greenhouse gas.[181] Because of the widely diffused and long-term consequences of global warming, electricity generation's CO_2/global warming externality is used here as a representative case of the general problem of environmental externalities for the industry.[182]

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[178] *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR), at 94; Mary Nagelhout, *Valuation of Environmental Externalities in Electric Resource Selection*, PUBLIC UTILS. FORTNIGHTLY, Mar. 1, 1993, at 45.

[179] *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 94; D.P.U. 86-36-G, at 78; Nagelhout, *supra* note 178, at 45.

[180] *See* 10 C.F.R. § 960.4-2-1 (1997); *see also Nuclear Waste Policy Act of 1995: Hearing Before the Senate Comm. on Energy and Natural Resources*, 104th Cong. 14-15 (1995) (statement of Sen. Paul Wellstone) (estimated life-cycle costs of repository keep climbing and have reached $33.1 billion with only $19 billion in utility funding currently projected; shortfall could be left with public along with title to radioactive waste for 10,000 years and potentially infinite liability).

[181] *See, e.g.*, Congressional testimony of Lewis M. Milford (senior attorney for Conservation Law Foundation), Sept. 9, 1996, *available in* 1996 WL 10830888 (electric power industry is the largest single industrial source of air pollution, contributing to ozone, acidification and nitrification of lakes, rivers, estuaries and forests, premature death from small particle inhalation and mercury contamination); Woolf & Biewald, *supra* note 107, at 66 (electricity sector responsible for about one-third of U.S. CO_2 emissions).

[182] *See infra* notes 183-92 and accompanying text. The environmental impacts of CO_2 are largely occurring as externalities because carbon dioxide is not yet subject to extensive federal and state regulation. *See* JOSKOW, *supra* note 8, at 10.

Although not as significant an externality as nuclear waste when measured by the dimension of time, the greenhouse gases carbon dioxide and nitrous oxide (N_2O), once emitted, do remain in the atmosphere for decades to centuries. *See* Intergovernmental Panel on Climate Change, *Summary for Policymakers: The Science of Climate Change—IPCC Working Group I*, § 1 (visited Feb. 10, 1998) <http://www.ipcc.ch/cc95/wg1.htm>. Thus, even immediate human action to reduce greenhouse gas emissions radically will not restore preexisting atmospheric conditions for some time. *See generally id.*, § 5 (thermal inertia of oceans would mean global warming would continue even after greenhouse gas concentrations were stabilized).

In the 1960s, climatologists like Syukuro Manabe of Princeton and oceanographer Roger Revelle began to speculate that increasing atmospheric CO_2 could cause global warming.[183] By the time the Intergovernmental Panel on Climate Change issued its 1995 report on global warming, the international scientific consensus had concluded that the balance of evidence suggested a discernible human influence on global climate was occurring,[184] with the consequent possibility that the earth's mean surface temperature would rise 1–3.5°C. by the year 2100.[185] Such a temperature increase might cause drought in some parts of the world, increased flooding in other areas, increased pest and disease outbreaks and other adverse effects on ecological systems and human society.[186] The increased melting of polar ice or thermal expansion of the oceans caused by the warming could raise ocean levels by nearly a meter, leading to greater coastal erosion, storm damage and potentially devastating losses of low-lying lands.[187] Many shoreline regions and small island nations are thus particularly concerned over the possible impacts of global warming due to greenhouse gases.[188]

CO_2 is considered the most significant of the greenhouse gases and most of the human-originated CO_2 results from fossil fuel combustion.[189] The United States bears particular responsibility for the problem, as it produces over twenty percent of the world's energy-related CO_2 emissions.[190] Electricity generation is the sector of the American

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[183] *See, e.g., Gore, supra* note 5, at 4–5; Kitta MacPherson, *Princeton Prophet—'Greenhouse godfather' predicted effect*, NEWARK STAR-LEDGER, June 11, 1990.

[184] *See* Intergovernmental Panel on Climate Change, *supra* note 182, § 4; *see also* WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 1995: IMPACTS, ADAPTATIONS AND MITIGATION OF CLIMATE CHANGE: SCIENTIFIC-TECHNICAL ANALYSES 78 (Robert T. Watson et al., eds., 1996) (energy-related greenhouse gases create a danger of anthropogenic interference with Earth's radiative balance).

[185] *See* WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 184, at 22.

[186] *See id.*

[187] *See id.* at 22, 24, 31, 269. The Working Group II estimated that a one meter ocean level rise could result in a 6% loss of land area for the Netherlands, a 17.5% loss for Bangladesh and up to an 80% loss for the Majuro Atoll in the Marshall Islands, given current coastal protection systems. *See id.* at 36.

[188] *See, e.g.*, ROSS GELBSPAN, THE HEAT IS ON: THE HIGH STAKES BATTLE OVER EARTH'S THREATENED CLIMATE 109 (1997) (Alliance of Small Island States, worried about territory losses from coastal flooding, is strongest advocate of tough greenhouse gas emissions limits).

[189] *See, e.g.*, WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 184, at 12, 78, 84. About three quarters of human-caused CO_2 emissions are caused by fossil fuel combustion. *See* 1 *International Energy Agency, Climate Change Policy Initiatives—1994 Update* 14 (1994) [hereinafter *International Energy Agency, Climate Change Policy*].

[190] *See International Energy Agency, Climate Change Policy, supra* note 189, at 24–26 tbls.4–6.

economy most responsible for these massive CO_2 emissions, causing approximately thirty-seven percent of the U.S. output.[191] Thus, the global significance of CO_2 externalities from the U.S. electricity industry is pronounced.[192] Physical reduction of this externality could be achieved by: 1) reducing electricity consumption through conservation and efficiency; 2) increasing the electricity generated by non-combustion energy sources such as wind or solar power; 3) switching from coal and oil to natural gas, which emits less CO_2; or 4) absorbing CO_2 in carbon "sinks," such as forest preserves.[193]

C. *Regulatory Options for Remedying Externalities Like Carbon Dioxide Emissions*

The overall thrust of electricity deregulation suggests that market pricing of electricity will steer, on its own, investment into the above four physical remedies for excessive CO_2 emission and thus adequately deal with the externality.[194] In their details, however, California and Massachusetts' electricity restructuring statutes have not left such environmental objectives to the workings of raw market price alone.[195] Instead, the statutes intervene in the electricity market with various

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[191] *See id.* at 178.

[192] *See supra* notes 189–91 and accompanying text.

[193] *See generally* WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 184, at 589. Some consultants estimate that every forested acre pulls two tons of carbon from the atmosphere and stores it (in the form of wood) each year. *See, e.g.*, Elizabeth Striano, *Carbon Sequestration: Robin Hoods of the Forest?*, PUBLIC UTILS. FORTNIGHTLY, Aug. 1997, at 24. A single average coal generation station, however, emits 4.3 million tons of CO_2 each year. *See id.*

American electric utilities have begun buying forest land or environmental easements to maintain forests to serve as carbon sinks (carbon sequestration). *See id.* at 25. For example, in the Rio Bravo Carbon Sequestration Project, Wisconsin Electric Power Co., Cinergy Corp., Detroit Edison Co. and PacifiCorp., working with the Nature Conservancy, UtiliTree Carbon Co. and the Programme for Belize, purchased 14,400 acres in Rio Bravo, Belize, to preserve it as forest. *See id.* Utilities are interested in preserving forests in the developing world, because the projects there are more cost-effective. *See id.* at 24. Even the Edison Electric Institute, which helped form the UtiliTree Carbon Co. as a sequestration project of 40 electric companies, admits that there are political problems involved with American companies going into another country, buying up its land and putting that land off limits for the next 100 years. *See id.* at 25; *see also* Michael D. Lemonick, *Turning Down the Heat*, TIME, Dec. 22, 1997, at 23, 24 (noting many developing countries rejected greenhouse gas emissions trading).

Engineers are also looking for technological means to separate CO_2 from the exhaust gases of power plants, for piping to exhausted natural gas fields for subterranean injection and permanent geologic storage. *See generally* WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra*, at 589.

[194] *See generally* MASS. GEN. LAWS ch. 164, § 69H (suggesting policy of Commonwealth is to allow market forces to determine the need for and cost of electricity generation facilities).

[195] *See, e.g., infra* notes 260–63 and accompanying text.

mechanisms which will have the effect of reducing CO_2 emissions and other externalities.[196]

Some of these interventions are market-based, in that they make heavily polluting generation more expensive or make less-polluting generation cheaper, but still allow consumers to choose the dirtier source of electricity if they wish.[197] Subsidies for conservation and renewable energy enacted by the restructuring statutes are such market-based interventions.[198] Statutory requirements to label electricity products by their power sources (e.g., percent nuclear, percent wind-generated) or air emissions are likewise market-based interventions because they give consumers information needed to make intelligent cost comparisons but still allow consumers to decide between various electricity products.[199]

Some intervention mechanisms take a non-market form—for example, requiring an electricity vendor to use a certain percentage of power generated by renewable energy sources, or to meet certain emission performance standards.[200] Such mechanisms do not allow the consumer to choose to pay more to pollute.[201] Instead, the state uses traditional "command-and-control" regulation to require or prohibit certain conduct by the electric utility.[202] Various market-based and non-market-based regulatory interventions are discussed below.

1. Market-Based Regulatory Mechanisms to Control Environmental Externalities Like Carbon Dioxide Emissions

a. *Environmental Adder Programs*

Shortly before the emergence of the electricity deregulation movement, the Massachusetts DPU, the California PUC and other state public utility commissions experimented with an explicit attempt to price externalities as "environmental adders."[203] This method, also known as

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[196] *See, e.g., infra* notes 260–63 and accompanying text.

[197] *See generally infra* notes 260–63 and accompanying text.

[198] *See infra* notes 260–63 and accompanying text.

[199] *See generally* MASS. GEN. LAWS ch. 164, § 1F(6) (requiring labeling of electricity products, but not barring particular products).

[200] *See, e.g.*, MASS. GEN. LAWS ch. 25A, § 11F.

[201] *See infra* note 202.

[202] *See, e.g.*, MASS. GEN. LAWS ch. 111, § 142N (requiring the Department of Environmental Protection to promulgate uniform emissions standards for fossil fuel-fired generating facilities).

[203] *See infra* notes 210–42 and accompanying text. The monetary values for the externalities were added (hence "adders") to other conventional costs for the resource to allow cost-comparison between options, with non-price criteria such as reliability or fuel diversity then applied to further weight various options. *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 94.

"monetization," set a dollar value—the adder—for each externality.[204] The adder—for example, $22/ton of CO_2 emitted—was used in cost comparisons between different power generation and conservation methods to select the least-cost generation option.[205] Because the environmental adders programs were a well-developed attempt to address externalities in market form, they bear examination as an initial benchmark useful in assessing other intervention mechanisms.

Regulators argued that such adders would create a more accurate estimate of the full social costs of any given utility investment option.[206] Theoretically, by giving a more realistic cost comparison of electricity alternatives, adders would ensure inclusion of environmentally preferable independent power sources, demand-side management ("DSM") and conservation and load management ("C&LM") measures in the meeting of electricity demand.[207] State officials anticipated that the use of the adders would lead to less-polluting forms of electricity generation.[208] Massachusetts and California briefly used this monetization approach.[209]

In 1989 DPU proposed various options for the inclusion of environmental externalities in facility and resource evaluation.[210] The next year the DPU issued final regulations requiring electric companies to use certain monetized values to account for the environmental externalities caused by the electricity resources they were considering.[211] The DPU reasoned that in choosing between two equally priced, equally reliable facilities that both met federal pollution control standards, but that nevertheless caused markedly different levels of pollution, society

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[204] *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 87, 89.

[205] *See id.* at 89, 98; MASSACHUSETTS DIV. OF ENERGY RESOURCES, *supra* note 109, at 1-2, 4.

[206] *See, e.g.*, Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 187; MASSACHUSETTS DIV. OF ENERGY RESOURCES, *supra* note 109, at 4.

[207] *See generally* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 71 (part of integrated utility planning is to ensure inclusion of all appropriate resources including QFs, independent power producers ("IPPs"), conservation and load management ("C&LM") measures and other demand-side management ("DSM") options). Contrasted with supply-side management (increasing electricity supply), DSM includes electricity conservation, shifting electricity demand to off-peak hours and improving the energy efficiency of appliances and buildings. *See* Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 187. The term C&LM is often used more or less interchangeably with the term DSM. *See, e.g.*, MASS. REGS. CODE tit. 220, § 10.02 (1995); *see also* James W. Moeller, *Electric Demand-Side Management Under Federal Law*, 13 VA. ENVTL. L.J. 57, 57 (1993).

[208] *See, e.g.*, MASSACHUSETTS DIV. OF ENERGY RESOURCES, *supra* note 109, at 5.

[209] *See infra* notes 210-42 and accompanying text.

[210] *See* D.P.U. 86-36-G, at 82-96; *see also Massachusetts Elec. Co.*, 643 N.E.2d at 1031 (in D.P.U. 89-239 the Department determined that in selecting new resources, electric company must consider environmental externalities); D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 71.

[211] *See* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 71, 89.

would pick the less polluting facility.[212] Therefore, the DPU reasoned that the additional pollution from the non-selected facility must have an economic value to society.[213]

The DPU's externalities regulations set out initial values for certain air emission externalities connected with combustion-based generating stations.[214] The DPU tried to account for a wide variety of environmental impacts in establishing environmental externality values, including human death, genetic effects, materials damage, losses in agricultural productivity and also impacts on non-priced "goods" such as losses of scenic value and damages to non-human species and natural systems.[215] Environmental externalities were used in cost-effectiveness tests for preapprovals of C&LM and generation programs, QF requests for proposals, power purchase agreements and resource planning filings with the DPU.[216]

Because estimates of comprehensive damage costs caused by environmental externalities are difficult to make, the DPU decided to use the "cost-of-control" (also known as "implied valuation") method for approximating those damages and valuing the environmental adders.[217] Under this method the cost of pollution control equipment to reduce a given air emission by a ton is assumed to approximate the value to society to eliminate that ton of pollution.[218] The DPU assumed that society would be willing to pay that amount to avoid a ton of emissions in order to further avoid an equivalent or greater amount of environmental damage.[219] In other words, if society was, for example, already mandating the expenditure of $6,500 per ton to reduce someof the nitrogen oxide emissions of generating stations, under the cost-of-control approach the environmental adder was set at $6,500 per ton

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[212] *See id.* at 90.

[213] *See id.*

[214] *See id.* at 98. Externality values established by the DPU included: nitrogen oxides at $6,500/ton emitted, sulfur oxides at $1,500/ton, volatile organic compounds at $5,300/ton, total suspended particulates at $4,000/ton, carbon monoxide at $870/ton, CO_2 at $22/ton, methane at $220/ton and nitrous oxide at $3,960/ton. *See id.*

[215] *See Massachusetts Elec. Co.*, 643 N.E.2d at 1032. The DPU decided, however, to assess externalities from a "global perspective" and not consider site-specific environmental externalities, such as noise, visual and wetland impacts of specific facilities in the IRM process. *See* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 94, 95, 96. It also decided not to consider externalities connected with the production of the fuel used by the generator, in terms of mining impacts for coal. *See id.* at 95. Instead it focused on all impacts resulting from plant operation including air, water, solid waste, spent fuel disposal impacts and resource use. *See id.*

[216] *See* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 97.

[217] *See id.* at 90, 93.

[218] *See id.* at 91.

[219] *See id.*

for any remaining nitrogen oxides still being emitted by the plant.[220] Although the DPU adopted this cost-of-control/implied valuation methods for adders, it announced as its ultimate objective the use of comprehensive damage costs as the basis for environmental externality adders where feasible.[221]

In late 1994, however, in *Massachusetts Electric Co. v. Department of Public Utilities,* the Massachusetts Supreme Judicial Court disallowed central aspects of the DPU's environmental externality requirements.[222] The court held that the DPU exceeded its authority when it required consideration of environmental externality values that might not reasonably be expected to affect a utility's costs and hence the rates that electric customers pay.[223] The court held that the effects of pollution on persons other than the ratepayers and the over-all impact of pollution on society were important subjects, but were beyond the reach of DPU regulatory authority.[224] According to the court, these wide-ranging environmental effects were the domain of the legislature and environmental and other regulators to whom the legislature has delegated authority.[225]

Following the Supreme Judicial Court's decision, the DPU stopped imposing monetized externality values on utilities.[226] The DPU, however, continued to mandate that reasonably foreseeable environmental control requirements with cost implications for ratepayers be considered by utilities when weighing resource procurement alternatives.[227]

Unlike Massachusetts, the California Legislature required by statute that the state's PUC include a value for any costs to the environ-

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[220] *See id.*

[221] *See* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 93.

[222] *See Massachusetts Elec. Co.*, 643 N.E.2d at 1033, 1034.

[223] *See id.* at 1033.

[224] *See id.* at 1034.

[225] *See id.* The court rejected the view that the DPU lacked statutory authority to direct utilities to consider the relative environmental impact of alternative sources of electricity when deciding among alternative power sources. *See id.* at 1031. The court observed that reasonable costs incurred in protecting the environment, whether mandated or voluntary, could be reflected in a utility's approved rates. *See id.* at 1033. The court further held that if it reasonably appears that the emission of a pollutant will be affected in the foreseeable future by prohibitions, new restrictions, costly regulation or pollution penalties or taxes, the DPU could require the utility to pursue a course likely to be less costly to rate-payers in the long-run. *See id.* at 1034. The court accepted the DPU's conclusion that the acceptability of a potential electric power option should be determined, in part, by the possible costs to the utility of that source's likely pollution. *See id.*

[226] *See* Re Boston Edison Co., D.P.U. 95-1-CC, at *7 (Mass. D.P.U. 1995), *available in* 1995 WL 109422.

[227] *See id.*

ment when calculating the cost effectiveness of energy resources, including C&LM options.[228] The legislature added this provision in 1990, declaring the principal goals of electric utility resource planning and investment to be minimizing the cost to society of reliable energy services and improving the environment.[229] The legislature also announced as part of this goal the encouragement of a diversity of energy sources through improvements in energy efficiency and the development of renewable energy resources, such as wind, solar and geothermal energy.[230]

In 1991 the California PUC began incorporating consideration of non-price factors, such as environmental impacts, in determining appropriate levels of QF development.[231] The PUC's announced goal was to arrive at "environmental least-cost" resource planning.[232] The commission noted that, although environmental quality had long played a significant role in discussions of electric resource strategies, the commission had not previously established a quantitative basis for weighing such non-price factors to determine the value of particular resource options.[233] The commission also noted that the value of DSM is better appreciated when non-price factors are taken into consideration.[234]

Because of the severe air pollution problems in parts of California, the PUC first targeted air emissions in implementing its externality program.[235] The PUC suggested, however, that it would eventually include water and land use impacts in assessing externalities.[236] Like Massachusetts, California decided to calculate the value of these externalities by means of the "revealed preferences" method (i.e., implied valuation), using the costs of existing pollution control per ton of pollutant eliminated to approximate the externality's cost.[237]

In 1992, however, the PUC decided to retreat from a sweeping application of externalities.[238] It decided not to apply externality values

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[228] *See* CAL. PUB. UTIL. CODE § 701.1(c).

[229] *See id.* § 701.1(a).

[230] *See id.* The legislature later added biomass as a renewable energy resource to be developed. *See id.*

[231] *See* Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 184.

[232] *See id.*

[233] *See id.* at 187.

[234] *See id.*

[235] *See id.* at 189, 190.

[236] *See* Decision No. 91-06-022, 124 Pub. Util. Rep. 4th (PUR) at 189.

[237] *See id.* In its 1991 decision implementing its externality adder program, the PUC proposed deriving the dollar/ton monetary value for various pollutants from various sources: the pollution control requirements of the air management district of the utility's service area, from a Pace University Study of pollution costs and from the California Energy Commission's 1990 Electricity Report, depending on the pollutant involved and other factors. *See id.* at 195, 196.

[238] *See* Decision 92-04-045, 132 Pub. Util. Rep. 4th (PUR) at 222, 223; *see also* Richard D.

to "short term" power purchases—power supply agreements of less than five years—aiding the cost-competitiveness of existing coal-fired plants.[239] Moreover, in a June 1995 decision involving QF bids governed by PURPA, FERC ruled against central aspects of the California PUC's use of environmental adders, in terms similar to the Supreme Judicial Court's ruling against the Massachusetts externality program.[240] FERC did not object, however, to states using numerous other ways outside of PURPA to encourage electrical generation using renewable energy, such as directly ordering utilities to build renewable generation, denying certification to other types of facilities, encouraging renewables through the tax structure or giving direct subsidies to renewable energy generators.[241] FERC suggested, for example, that imposing a tax on fossil fuel generation or giving tax incentives to renewable energy sources might be one way to allow alternative generation to be cost competitive with fossil-fueled power without violating PURPA.[242]

Notably, neither the Supreme Judicial Court nor FERC denied the existence of environmental externalities in their rulings.[243] Neither body definitively denied that attempting to account for externalities was socially beneficial.[244] The Supreme Judicial Court instead reasoned that the DPU was not the appropriate body to make the decision about such externalities.[245] For its part, FERC suggested alternative means of accomplishing environmental goals in electricity generation that did not violate PURPA.[246]

Gary & Michael L. Teague, *The Inclusion of Externalities in Electric Generation Resource Planning: Coal in the Crossfire*, 95 W. VA. L. REV. 839, 858, 859 (1993).

[239] *See* Decision 92-04-045, 132 Pub. Util. Rep. 4th (PUR) at 223.

[240] *See* Southern Cal. Edison Co., 71 F.E.R.C. ¶ 61,269, at 62,080 (June 2, 1995). FERC said that the California PUC could account for environmental costs of fuel sources in the bidding process for power providers, but only for costs that would actually be incurred by the utility. *See id.* The FERC held that a state "may not set avoided cost rates or otherwise adjust the bids of potential suppliers by imposing environmental adders or subtractors that are not based on real costs that would be incurred by utilities." *Id.* FERC noted that PURPA set the utility's incremental or avoided cost as the maximum rate at which a utility could be required to purchase power from a QF. *See id.* at 62,079–80. FERC reasoned that to use methods like environmental adders would result in rates exceeding the incremental costs to the utility in violation of PURPA. *See id.* at 62,080.

[241] *See id.*

[242] *See id.*

[243] *See Massachusetts Elec. Co.*, 643 N.E.2d at 1034; Southern Cal. Edison Co., 71 F.E.R.C. at 62,080.

[244] *See supra* note 243.

[245] *See Massachusetts Elec. Co.*, 643 N.E.2d at 1034.

[246] *See* Southern Cal. Edison Co., 71 F.E.R.C. at 62,080.

b. *Emissions Taxes, Subsidies for Conservation and Renewable Energy*

Although use of environmental adders may be waning, other market-based mechanisms for controlling or addressing environmental externalities are being implemented or widely discussed.[247] One such market-based mechanism is the emissions tax.[248] Emission taxes assessed per unit of pollutant could be used to internalize environmental externalities.[249] In effect, this approach adds a price to the emission.[250] Polluters will theoretically reduce their pollution when the cost per unit of pollution control is lower than the tax per unit of pollution.[251] By paying for the additional pollution control equipment in the price of electricity, consumers will pay a price reflecting the environmental impact of that power's production.[252] Consequently, they may reduce their purchases of high-emissions electricity products, thereby reducing the environmental impact of their power consumption.[253] Without resorting to government mandated emissions limits, the market mechanism of price, as modified by the emissions tax, would encourage consumers to select electricity options with fewer emissions.[254]

Another market-based means of reducing externalities is to subsidize energy efficiency and the production of electricity by renewable energy.[255] By subsidizing renewably generated electricity, thereby making it cheaper, more consumers will select environmentally preferable electricity products.[256] The externalities connected with coal or nuclear generation will be correspondingly reduced.[257]

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[247] *See, e.g.*, *infra* notes 248–53 and accompanying text.

[248] *See, e.g.*, Black & Pierce, *supra* note 80, at 1393 (emission fees being discussed widely as feasible means of limiting greenhouse gas emissions).

[249] *See, e.g.*, JOSKOW, *supra* note 8, at 3; PLATER ET AL., *supra* note 4, at 31.

[250] *See generally* JOSKOW, *supra* note 8, at 7.

[251] *See id.*

[252] *See generally id.*

[253] *See generally id. Cf. generally* D.P.U. 86–36-G, at 79 (failure to internalize externalities through price or other means increases likelihood of suboptimal choice).

[254] *See generally* JOSKOW, *supra* note 8, at 7; Black & Pierce, *supra* note 80, at 1392 (power producers will reduce emissions if doing so costs less than the emissions tax).

[255] *See, e.g.*, CAL. PUB. UTIL. CODE § 381.

[256] *See generally* Jon Steinman, *Green Power May Be Too Pricey for the People—Deregulation: Environmentalists Worry That the Cost of Eco-friendly Electricity Will Discourage Consumers From the Choice Come January*, L.A. TIMES, Nov. 18, 1997, at B1 (one poll indicated 30% of California's consumers would pay premium for environmentally safe energy; most people will choose power provider based on price).

[257] *See, e.g.*, Stephen Bernow et al., *Quantifying the Impacts of a National, Tradable Renewables Portfolio Standard*, ELECTRICITY J., May, 1997, at 42–43; *see also* Woolf & Biewald, *supra* note 107, at 64–65 (renewable energy technologies could reduce CO_2 emissions from electricity, whereas coal and even gas may increase those emissions).

California's and Massachusetts' restructuring statutes provide for the subsidization of conservation and electricity generated with renewable energy.[258] Without explicitly calling for electricity price mechanisms to account for environmental externalities, the statutes' subsidy provisions would, like adders, increase the relative cost of electricity options with high environmental impacts and decrease the cost of environmentally preferable electricity.[259] California's A.B. 1890, for example, creates a special mandatory ("non-bypassable") rate component to fund certain environmental programs, to be collected by the distribution service on the basis of electricity usage.[260] This charge will be used to fund cost-effective energy efficiency and conservation activities and in-state operation and development of existing, new and emerging renewable energy technologies.[261]

Massachusetts similarly promotes energy efficiency and renewable energy sources in its electricity restructuring plan.[262] The Massachusetts restructuring statute creates, for example, a five-year mandatory charge per kilowatt-hour (kWh) for most electricity consumers to fund energy efficiency and DSM programs.[263] Chapter 164 of the Massachusetts General Laws also requires the Commonwealth's Department of Revenue to investigate a possible income tax deduction for purchases of specified minimum levels of renewably generated electricity and for purchases of energy efficient equipment such as high-efficiency lighting.[264] The statute directs the Secretary of Administration and Finance to study the possibility of requiring all state agencies and facilities to purchase electricity that includes a minimum of ten percent derived from renewable energy sources.[265]

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[258] *See infra* notes 260–68 and accompanying text.

[259] *See generally infra* notes 260–68 and accompanying text.

[260] *See* CAL. PUB. UTIL. CODE § 381.

[261] *See id.* Energy efficiency and conservation activities are to be funded at over $228 million per year for the first three years of restructuring. *See id.* Renewable resource technologies are to be funded at $109.5 million or more per year during this period. *See id.* The legislature stipulated that these programs should include options that reward the most cost-effective generation. *See id.* § 383. The statute effectively defines renewable energy resources as those whose electricity is not produced by nuclear energy, hydropower facilities greater than 30 megawatts, non-cogeneration fossil-fuel burning facilities or facilities that derive more than 25% of their energy from fossil fuel. *See id.*, § 381(b)(3); *see also* § 2805 (defining "conventional" power sources). The legislature particularly cited the need to support certain emerging photovoltaic and innovative solar thermal technologies and renewable energy facilities. *See id.* §§ 381(c)(3),(h), 383(a)(1),(3).

[262] *See infra* notes 263–68 and accompanying text.

[263] *See* MASS. GEN. LAWS ch. 25, § 19. This charge is to be 3.3 mils ($0.0033) per kWh the first year and decrease every year down to 2.5 mils per kWh. *See id.* Municipal lighting company electricity consumers are exempted from the charge. *See id.*

[264] *See* Act of Nov. 25, 1997, ch. 164, § 318, 1997 Mass. Legis. Serv. at 714–15.

[265] *See id.* § 330. Section 331 of the Act also requires state agencies doing new construction

Similar to California, Massachusetts' deregulatory legislation requires a five-year mandatory per kWh charge for most of the Commonwealth's electricity consumers to support the development of renewable energy projects.[266] The revenues from renewable energy charges are to be paid into the Massachusetts Renewable Energy Trust Fund established by chapter 164.[267] The purpose of the fund is to promote the increased availability, use and affordability of renewable energy in a more competitive energy marketplace.[268]

c. *Labeling Electricity Products*

Massachusetts' electricity product labeling requirement is another market-based regulatory mechanism that may be useful in controlling the environmental externalities of electricity generation.[269] One necessary condition for efficiently functioning markets is full information about the products/services being selected by the consumer.[270] Often, however, the market itself fails to provide full information, particularly concerning deleterious aspects or side-effects of products.[271] Manda-

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or substantial renovations to design and build so as to reduce facility life cycle costs by using energy efficiency or renewable energy technologies. *See id.* § 331.

[266] *See* MASS. GEN. LAWS ch. 25, § 20. The renewable energy project charge is set at 0.75 mils/kWh the first year, goes up to 1.25 mils/kWh by the third year and then decreases to 0.5 mils/kWh by the fifth year. *See id.*

[267] *See id.*, § 68; MASS. GEN. LAWS ch. 40J, § 4E.

[268] *See* MASS. GEN. LAWS ch. 25 §§ 20, 68; MASS. GEN. LAWS ch. 40J, § 4E. For purposes of expenditures from the fund, renewable energy technologies include solar and wind energies, ocean thermal, wave, or tidal energy; fuel cells; landfill gas; naturally flowing water and hydroelectric and low emission; and advanced biomass power conversion technologies such as gasification of agricultural and food wastes. *See* MASS. GEN. LAWS ch. 40J, § 4E(f)(1). Circumscribed funding is also available for waste-to-energy projects for a limited time. *See id.*

Beyond the promotion of renewable energy, the fund may also be used to advance public interests in the protection of the environment through the prevention, mitigation and alleviation of adverse pollution effects associated with certain types of electricity generation. *See id.* § 4E(c). To advance these purposes and the purpose of promoting renewable energy, the fund may be used to make grants, loans, equity investments, energy production credits, bill credits or rebates to customers. *See id.* § 4E(d). The Division of Energy Resources is required to issue an annual report containing information on the extent to which the energy markets are achieving the energy efficiency and fuel diversity goals of the state. *See* MASS. GEN. LAWS ch. 25A, § 11E.

[269] *See infra* notes 270–83 and accompanying text.

[270] *Cf.* Re Pricing and Rate-making Treatment for New Electric Generating Facilities Which Are Not Qualifying Facilities, D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) 76, 82–83 (Mass. D.P.U. 1988) [hereinafter D.P.U. 86-36-F] (information barriers helped caused market failure concerning some electricity options).

[271] *See, e.g.*, H.R. REP. No. 449 (1965), *reprinted in* 1965 U.S.C.C.A.N. 2350, 2352 (legislative history of federal cigarette labeling act noting public relies on government for cautionary labeling of hazardous substances, thus Congress should take affirmative action to require cautionary health warning on cigarette packages); H.R. REP. No. 1861 (1960), *reprinted in* 1960 U.S.C.C.A.N.

tory uniform labeling requirements may, therefore, be necessary to make market choices optimize the allocation of consumer dollars.[272] In a competitive electricity market, labeling electricity products with environmental impact and fuel-source information could theoretically enable consumers to select environmentally preferable electricity options, thereby reducing environmental externalities.[273]

Massachusetts' chapter 164 requires such labeling for electricity products.[274] For example, before service is initiated by a generation company, the company must give the customer a written statement on the fuel mix and emissions of the generation sources the company uses.[275] The company is also allowed to advertise the environmental benefits of the power sold, although there is no requirement to do so.[276]

Moreover, the Massachusetts Department of Telecommunications and Energy is directed to promulgate uniform labeling regulations for energy suppliers.[277] The labeling must include fuel sources as well as air emissions of sulfur dioxide, nitrogen dioxides, CO_2, heavy metals and any other emission which the Department may determine causes significant health or environmental impact and for which sufficiently accurate and reliable data is available.[278] Electrical suppliers are required to present such information to customers, including information about environmental characteristics of the sale of electric power products.[279]

In addition, chapter 164 requires the Massachusetts Commissioner of Energy Resources to provide consumers with information giving a consistent and reliable basis for comparing electricity services offered in the market.[280] That information *may* include billing inserts providing information that allows consumers to select their electricity

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2833, 2834 (legislative history of Federal Hazardous Substances Act noting need for mandatory labeling of hazardous materials; many have been injured or killed by substances not bearing adequate cautionary labels).

[272] *See generally supra* notes 270–71 and *infra* notes 274–83 and accompanying text.

[273] *See generally infra* notes 274–83 and accompanying text.

[274] *See infra* notes 275–83 and accompanying text.

[275] *See* MASS. GEN. LAWS ch. 164, § 1F(5)(i) (1997).

[276] *See id.* § 1F(5)(ii-iii).

[277] *See id.* § 1F(6).

[278] *See id.* Voluntary environmental labeling programs for electricity, such as the "Greene" program in California run by the Center for Resource Solutions, have also appeared in the restructured electricity market. *See* Natural Resources Defense Council, *Choosing Clean Power in California* (visited Feb. 10, 1998) <http://www.nrdc.org/nrdc/howto/encagp.html.

[279] *See* MASS. GEN. LAWS ch. 164, § 1F(6).

[280] *See* MASS. GEN. LAWS ch. 25A, § 11D.

suppliers based on resource type and environmental considerations.[281] The Commissioner also *may* disseminate information identifying the mix of fuel and power generation sources and the level of air emissions for the different electricity services offered in the market.[282] Thus, one of the premises of restructuring seems to be that optimal environmental protection in electricity generation will be determined through a market governed by informed consumers selecting the level of emissions and the types of fuels they believe are best.[283]

2. Non-Market Regulatory Mechanisms for Controlling Externalities Like Carbon Dioxide

a. *Emission Performance Standards*

State restructuring schemes are also incorporating other regulatory mechanisms that more closely resemble conventional command-and-control environmental regulation.[284] Under chapter 164 in Massachusetts, for example, to prevent and mitigate the impacts of pollutants from fossil fuel-fired generation facilities, the Department of Environmental Protection ("DEP") is required to promulgate uniform generation performance standards for emissions produced per unit of electrical output for any pollutant DEP determines to be a public health concern.[285] DEP is only required, however, to have such a performance standard in place for one pollutant by May 1, 2003.[286]

Chapter 164 also amends statutory provisions concerning the state's Energy Facilities Siting Board ("the Board").[287] The Board is required to review the need for, and the environmental impacts of, transmission lines.[288] But the Board is no longer authorized to review the need for electrical generating facilities, and may only review their environmental impacts consistent with the policy of allowing market forces to determine the need for and cost of such facilities.[289] To

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[281] *See id.*

[282] *See id.*

[283] *See generally supra* notes 274–82 and accompanying text.

[284] *See infra* notes 285–95 and accompanying text.

[285] *See* MASS. GEN. LAWS ch. 111, § 142N.

[286] *See id.* If other northeastern states enact similar standards before May of 2003, DEP *may* adopt such standards. *See id.*

[287] *Compare* MASS. GEN. LAWS ch. 164, § 69H (1997) *with* MASS. GEN. LAWS ch. 164, § 69H (1996).

[288] *See* MASS. GEN. LAWS ch. 164, § 69H (1997).

[289] *See id. Compare* MASS. GEN. LAWS ch. 164, §§ 69I, 69J (1996) (previously requiring construction of electricity facilities to be consistent with filed long-range electricity demand forecasts)

"streamline" review of such applications, chapter 164 provides that the Board shall conduct rulemaking to establish a "technology performance standard" for generating facilities emissions, including sulfur dioxide, nitrogen oxides, particulate matter, fine particulates, carbon monoxide, volatile organic compounds and heavy metals.[290] Notably, carbon dioxide emissions are not on this initial statutory list.[291] The standard is to reflect emission rates achievable by *fossil fuel* generating technologies, as demonstrated by air permits that have previously been issued by the DEP.[292]

Reflecting concerns similar to those expressed in DPU's prior externality adder program, chapter 164 also authorizes the Energy Facilities Siting Board to establish its own guidelines requiring sufficient data to enable it to review the local and regional land use impact, local and regional cumulative health impact, water resource impact, wetlands impact, air quality impact, solid waste impact, radiation impact, visual impact and noise impact of the proposed facility.[293] But any such guidelines are generally not allowed to require any data related to the necessity or cost of the facility.[294] Furthermore, chapter 164 does not require the Board to make findings regarding alternative generating technologies for the proposal, as long as the proposed facility meets the technology performance standard—i.e., matches the performance of previous air emission permits issued by DEP.[295]

b. *Mandatory Generation Portfolio Characteristics*

Another strategy for reducing CO_2 emissions and other electricity externalities is to require that a certain percentage of electricity offered for sale in the restructured market be generated using renewable energy.[296] In its simplest form, such an approach would amount to a non-market, command-and-control mechanism for addressing such

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with MASS. GEN. LAWS ch. 164, § 69J1/4 (1997) (now barring requirement of data related to necessity or overall cost of facility). Generating facilities may not be built unless approved by the Board. *See* MASS. GEN. LAWS ch. 164, § 69J1/4 (1997).

[290] MASS. GEN. LAWS ch. 164, § 69J1/4 (1997).

[291] *See id.* The list, however, is not exclusive. *See id.*

[292] *See id.*

[293] *See id.*

[294] *See id.* Despite the fact that the statute generally does not require an analysis of cost or need, the statute provides that the generating facility "shall be deemed to contribute to a necessary energy supply for the commonwealth with a minimum impact on the environment at the lowest possible cost" upon satisfactory completion of board review. *Id.*

[295] *See* MASS. GEN. LAWS ch. 164, § 69J1/4.

[296] *See, e.g.*, MASS. GEN. LAWS ch. 25A, § 11F; Bernow et al., *supra* note 257, at 42.

environmental externalities.[297] Market mechanisms, in the form of credits for renewable generation tradable between electric companies, however, could be used to reduce the cost of such a mandate.[298] Proposals for this type of "renewables portfolio standard" are being discussed or implemented at both the state and federal levels.[299]

The Massachusetts restructuring statute, for example, scheduled an increasing mandatory percentage of electricity to be generated from renewable energy.[300] Under chapter 164, the Massachusetts Division of Energy Resources is required to determine the current percentage of kWh sales to end-use customers in the Commonwealth that is derived from renewable energy.[301] Every retail electricity supplier must then provide an additional one-half to one percent of sales of electricity derived from renewables to end-use customers each year after 2003.[302]

III. Analysis

A. *Reaffirming the Twin Policy Objectives of Least-Cost and Evironmental Protection in the Restructuring of the Electricity Industry*

Since 1920 a growing theme in federal power regulation has been that electricity must be organized in a way that also serves the nation's environmental interests.[303] PURPA and EPAct made this theme explicit

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[297] *See generally* Bernow et al., *supra* note 257, at 43.

[298] *See, e.g., id.* at 42, 43. Generators using renewable energy in such a credit system would have two sources of income—one from the sale of their electricity, and another from the sale of renewable energy credits to generators or retail electricity suppliers in regions short on renewable generation. *See id.* at 43. A credit system is not just a market tool for achieving least-cost power. *See id.* at 44. It is also a means of overcoming the fact that some regions may be able to produce more renewably generated electricity than others, due to an abundance of wind, available solar energy, tidal power, etc. *See id.*

[299] *See, e.g.*, Mass. Gen. Laws ch. 25A, § 11F; *see also* Bernow et al., *supra* note 257, at 42.

[300] *See infra* notes 301–02 and accompanying text.

[301] *See* Mass. Gen. Laws ch. 25A, § 11F.

[302] *See id.* § 11F(a). The statute creates the following schedule for increases in electricity derived from renewable energy: an additional one percent of sales by the end of 2003, an additional one-half percent of sales each year from 2004 through 2009, and an additional one percent of sales from 2010 on until determined otherwise by the Division of Energy Resources. *See id.* Chapter 164 considers solar, wind, ocean thermal, wave or tidal energy, fuel cells utilizing renewable fuels, landfill gas and low-emission biomass power conversion as renewable energy generating sources for these purposes. *See id.* § 11F(b). Waste-to-energy electricity generation from municipal solid waste and hydroelectric power may be counted as renewable generating sources in the base calculation until December 31, 1998. *See id.* The Division of Energy Resources is allowed to add other renewable energy technologies to the list, but coal, oil, natural gas except when used in fuel cells, and nuclear power are statutorily excluded from classification as renewable energy supplies for this calculation. *See id.*

[303] *See, e.g., supra* notes 60–78 and accompanying text.

and planted it firmly alongside the goal of least-cost power in federal and state approaches to electricity regulation.[304] Even in the heat of deregulatory restructuring, both California and Massachusetts have legislatively asserted that environmental protection goals are central to any reorganization of the electric industry.[305] Thus, appraisal of evolving electricity restructuring proposals should include an analysis of how well they will address environmental externalities.[306] In any analysis of the restructuring of the industry the question should not simply be: "How can we obtain the cheapest power?" The question should instead be: "How can we obtain low-cost, reliable power in ways that advance our national environmental goals?"[307]

Some enthusiasts for market and price as sole determiners of social investment might claim that deregulation of electricity and reliance on price will alone take care of environmental externalities.[308] But the record of price in adequately assigning costs in the electricity industry is not reassuring.[309] If price alone will not achieve our national environmental objectives, policymakers will need to enact regulatory mechanisms to intervene in the market.[310]

The following analysis looks at some of the historic environmental failures of price in the electricity industry.[311] It examines why price may have difficulty addressing environmental problems like CO_2 emissions, thus leaving them as externalities.[312] It explores the advantages and shortcomings of some of the mechanisms developed by the states to intervene in the electricity market to answer environmental concerns.[313] Finally, it suggests some of the additional steps that could be

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[304] *See supra* notes 89–103, 121–34 and accompanying text.

[305] *See, e.g.*, Act effective Sept. 24, 1996, ch. 854, §1(a), 1996 Cal. Legis. Serv. 3678, 3679 (West); Act of Nov. 25, 1997, ch. 164, § 1(l), 1997 Mass. Legis. Serv. 637, 638 (West).

[306] *See generally* Act effective Sept. 24, 1996, ch. 854, §1(a), 1996 Cal. Legis. Serv. at 3679; Act of Nov. 25, 1997, ch. 164, § 1(l), 1997 Mass. Legis. Serv. at 638.

[307] *See generally supra* note 304 and accompanying text.

[308] *See, e.g.*, Iribe, *supra* note 13 (competition can be expected to provide lowest possible price and improve environmental performance); Bruce Biewald, *Competition and Clean Air: The Operating Economics of Electricity Generation*, ELECTRICITY J., Jan.-Feb. 1997, at 41, 42 (quoting utility official's argument that competition will produce environmental benefits because older coal and oil plants will not be economically viable in competitive market); *What is deregulation?*, BOSTON GLOBE, Mar. 17, 1998, at F1, F8 (some think competition will do more to improve environment than regulation ever did). *But see* Biewald, *supra*, at 44, 45 (one study concludes that existing dirtier plants will be competitive economically; competition alone cannot be counted on to improve environment); Woolf & Biewald, *supra* note 107, at 68 (older coal plants likely to be very competitive relative to new gas facilities and thus unlikely to be retired).

[309] *See, e.g., infra* notes 315–26 and accompanying text.

[310] *See, e.g., supra* notes 60–71, *infra* note 319 and accompanying text.

[311] *See infra* notes 315–26 and accompanying text.

[312] *See infra* notes 327–417 and accompanying text.

[313] *See infra* notes 418–79 and accompanying text.

taken to better achieve the public goal of environmental protection within a restructured electricity industry.[314]

B. *The Limitations of Price in Addressing Long-Term, Global Environmental Problems Like Climate Change*

1. Historic Failures of Price to Protect the Environment and Prevent Environmental Externalities

Price has repeatedly failed to signal full costs in the generation and use of electricity.[315] The cost of damming a river in 1920, in concrete and steel, labor and capital, for example, did not adequately capture the costs to society of impaired navigation or fisheries.[316] The federal government was forced to intervene, through the FWPA and other regulation of hydropower dam construction, to protect navigation, fisheries and other public interests that the market had failed to safeguard adequately .[317] Similarly, the market costs of erecting a coal-fired generating station in 1969 did not adequately reflect the social costs that the station imposed by degrading air quality.[318] The government was forced to mandate air pollution control through the 1970 Clean Air Act Amendments in order to protect air quality interests not previously recognized in conventional price-based decision-making.[319] If the market, by itself, had been sufficient to allocate all the environmental costs of electricity production to electricity companies without intervention, statutes like the 1970 Clean Air Act should not have been necessary.[320] Instead, the market repeatedly has had to be corrected by

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[314] *See infra* notes 480–518 and accompanying text.

[315] *See infra* notes 315–26 and accompanying text.

[316] *See generally supra* notes 60–71 and accompanying text.

[317] *See generally supra* notes 60–78 and accompanying text. Sadly, even upon regulation the government itself often undervalued public environmental resources. *See, e.g.*, Pinchot, *supra* note 61, at 11.

[318] *See infra* note 319.

[319] *See generally* H.R. REP. No. 91-1146 (1970), *reprinted in* 1970 U.S.C.C.A.N. 5356, 5360, 5356, 5357 (observing that air pollution continues to threaten health and well-being of American people and that strategies previously pursued against air pollution have been inadequate; establishment of national air quality standards by Clean Air Act Amendments will assure war against air pollution will take place nationwide). Prior to the 1970 amendments to the Clean Air Act, emissions standards for stationary sources of air pollution, like electricity generating plants, were established exclusively state by state. *See id.* at 5358. Members of Congress believed that national air emission standards would preclude states competing to attract plants by means of inadequate state air pollution regulations. *See id.* The amendments did not address CO_2 emissions, *see id. at* 5357 & n.1, a problem then just beginning to be suspected by only a small section of the scientific community. *See generally supra* notes 183–84 and accompanying text.

[320] *See generally supra* note 319.

state and federal regulation to prevent the imposition on the public of the environmental costs of electricity.[321]

As the Massachusetts DPU itself warned when it first announced its original environmental externalities ruling:

> In a competitive resource market in which price plays a predominant role in determining the business success of competing resource developers, there is a danger of increasing the pollution of valuable environmental resources. This occurs because resource developers have the incentive to minimize environmental controls in order to minimize production costs, which in turn enables them to keep their price as low as possible (thus increasing their chances of winning a competitive resource solicitation), and affords them the opportunity to make private profits. By minimizing environmental controls, environmental costs external to the production and sale of energy increase . . . . Failure of the resource selection process to consider the differences in environmental impacts between various resource types—either by failing to internalize such environmental externalities directly with the price of energy produced by such options or by some nonprice mechanism that assigns a value on externalities produced or avoided—increases the likelihood of selecting suboptimal energy projects.[322]

Thus, in some respects the market is not only inadequate to guide consumers' allocation of resources in a way that advances the public goal of environmental protection and least overall cost, it may, in some instances, guide investment and consumption in directions that damage the environment and increase long-term cost.[323]

The market repeatedly ignored negative externalities imposed by the electric industry on the public.[324] The market also failed to direct consumer and utility investment to environmentally preferable electricity options like energy conservation and renewable energy.[325] This

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[321] *See, e.g., supra* note 319.

[322] D.P.U. 86-36-G, *available in* 9 Massachusetts Administrative Law Library, Department of Public Utilities File (Jan. 1998), at 79 (Mass. D.P.U. 1989).

[323] *See id.; see also* Congressional testimony to Senate Committee on Energy and Natural Resources by Julie A. Keil (president of the National Hydropower Association), May 8, 1997, *available in* 1997 WL 10571005 (in competitive electric sector decisions made are based exclusively on economic, cost-driven theories that do not recognize natural resource or environmental values).

[324] *See, e.g., supra* notes 206–08, 319.

[325] *See infra* notes 340–43 and accompanying text; *see also* Edward Rubin et al., *Realistic Mitigation Options for Global Warming*, 257 SCIENCE 148, 262, 264 (1992) (existing cost-effective

failure was evident, for example, in the lack of investment in cost-effective energy efficient lighting and appliances until regulators intervened.[326]

One of the principal environmental concerns regarding deregulation is that conservation and renewable energy may have difficulty making progress in a competitive electricity market.[327] It is widely expected that renewable power from solar, wind, geothermal and other sources will cost more than conventional power—perhaps ten to twenty percent more.[328] If California is any indication, though some niche marketers may sell their power based on its renewable energy content, most electricity will be marketed and purchased on the basis of low price rather than environmental considerations.[329]

The numerous provisions in restructuring statutes that constrain, adjust and modify the competitive generation market, suggest policymakers are aware that price, on its own, will not adequately control environmental externalities and steer power purchases to environmentally preferable resources like conservation and renewable energy.[330] For example, if legislatures were confident an electricity system governed solely by competitive pricing would steer sufficient investment to the generation of electricity with renewable energy, there would be no need to subsidize or require the use of renewable energy sources.[331] But both California and Massachusetts legislatures mandated support for renewable energy in their electricity restructuring statutes.[332] Similarly, the decade spent by numerous public utility commissions attempting to develop environmental externality adder mechanisms to

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technologies could reduce electricity use by 45%, eliminate 515 million metric tons of CO_2 emissions per year and save American consumers $30 billion annually; information barriers, institutional problems and other obstacles make it unlikely these measures will be fully implemented in absence of effective policy tools and incentives).

[326] *See infra* text accompanying notes 340–43.

[327] *See, e.g.*, Keil, *supra* note 323. *But see* Greg Johnson, *Color of Power—'Green' Energy Firms' Tactics Mark Change in a Sleepy Industry*, L.A. TIMES, Nov. 20, 1997 at D4 (surveys suggest that 70% of Americans might embrace green power if prices are not too far out of line; early reports suggest green power marketing tests drawing 20% of customers).

[328] *See, e.g.*, Natural Resources Defense Council, *supra* note 278; Steinman, *supra* note 256, at B1; *see also* Adam Pertman, *Principle, Not Price, Sells Green Power*, BOSTON GLOBE, Mar. 17, 1998, at F8 (most analysts predict alternative nonpolluting electricity will cost more).

[329] *See, e.g.*, Johnson, *supra* note 327, at D4 (battle over California's electricity market will be waged mostly on price); *see also* Pertman, *supra* note 328, at F8 (most consumers will be driven primarily by lower prices in choosing power suppliers; studies show 5–33% of Massachusetts consumers will choose "green" electricity).

[330] *See generally supra* notes 258–95 and accompanying text.

[331] *See supra* notes 258–61, 266–68, 300–02 and accompanying text.

[332] *See supra* note 331.

compensate for unregulated CO_2 emissions and other unaddressed costs of electricity generation also suggests regulatory awareness of the shortcomings in price.[333] Even some of the harshest critics of adders admitted that certain environmental costs were not adequately incorporated in the price of electricity.[334]

2. Why Price May Fail to Address Long-Term, Global Environmental Problems Like Climate Change

The repeated failure of price to serve successfully both principal public objectives for the electricity industry—least-cost power and environmental protection—suggests that price is inadequate for achieving certain public purposes.[335] There are a number of credible explanations for this possible limitation.[336] The limitations of price may spring from some combination of: 1) information costs to consumers, discouraging change from the status quo; 2) the relatively short time frame used by individual consumers to assess costs and benefits compared to the much longer time frames appropriate for societal decisionmaking; 3) the difficulty of pricing geographically diffused costs, particularly those which will be borne by millions of widely dispersed individuals; 4) the difficulty of assessing costs for harms whose full magnitude is uncertain; and 5) the non-recognition by the market of important social values—like neighborliness, altruism, belief in international equity, reverence for the diversity of life, religious tenets and hope for our children's children.[337] Each of these factors which may impair the adequacy of price in allocating resources is discussed below, with particular emphasis on its relation to CO_2 emissions.

a. *The Problem of Information Costs*

The market may have difficulty reliably steering consumers to least-cost and environmentally preferable electricity options in part

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[333] *See supra* notes 203–37 and accompanying text.

[334] *See, e.g.*, JOSKOW, *supra* note 8, at 3, 11.

[335] *See, e.g.*, *infra* notes 340–43 and accompanying text; *see also* John H. Cushman Jr., *U.S. Says Its Greenhouse Gas Emissions Are at Highest Rate in Years*, N.Y. TIMES, Oct. 21, 1997, at A22 (quoting observation of director of American Council for an Energy-Efficient Economy, in face of *increased* U.S. CO_2 emissions in 1996 despite commitment to reduce greenhouse gases, that "[l]aissez-faire does not work").

[336] *See infra* notes 338–417 and accompanying text.

[337] *See, e.g.*, GELBSPAN, *supra* note 188, at 131 (quoting Philippine environmental official's observation that climate change problem necessitates transcending greed; ultimately is question of ethics).

because of the problem of information costs.[338] The time it takes a consumer to uncover information on cost-saving alternatives and to calculate if those cost-savings apply to the consumer's existing equipment and/or patterns of usage represents an additional cost to the consumer for any change from the status quo.[339]

A revealing example of a failure of market mechanisms in the electric industry caused by information barriers was the failure of consumers to buy energy-efficient lighting, refrigerators and other appliances in the 1980s, even where those appliances were cost-effective.[340] As the California PUC admitted, programs that transform the market for energy-efficient products, for example by increasing building or appliance standards, are unlikely to be naturally provided by a competitive market.[341] The Massachusetts DPU similarly noted the dysfunction of the market in consumer failures to invest in cost-effective electricity-saving technologies.[342] Consumers frequently did not invest in electricity-conserving lighting, appliances and other technologies, even where those technologies were cost-effective when compared to the alternative of purchasing more electricity for conventional lighting and appliances.[343]

In explaining this market failure, the Massachusetts DPU agreed with commenters that consumer lack of information, particularly concerning recently developed technologies, was a cause of the lack of investment in cost-effective technologies.[344] Thus, information barriers prevented market price from directing investment to the least-cost

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[338] *See generally* Coase, *supra* note 2, at 15 (observing that transaction costs, including discovering whom to deal with, are often sufficiently costly to prevent many otherwise desirable transactions).

[339] *See generally* D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) at 82–83, 84 (consumers may fail to make cost-effective choices due to lack of information); Union of Concerned Scientists, *Market Barriers* (visited Feb. 10, 1998) <http://www.ucsusa.org/energy/barriers.market.html> (retail customers may have much less sophisticated understanding and modeling tools than utilities and industrial communities who themselves undervalue renewable energy).

[340] *See generally* D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) at 82–83, 84.

[341] *See* Decision 95-05-045, 161 Pub. Util. Rep. 4th (PUR) at 258.

[342] *See generally* D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) at 82–83.

[343] *See id.*; *see also* Decision 95-05-045, 161 Pub. Util. Rep. 4th (PUR) at 258.

[344] *See* D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) at 82, 83. The DPU concluded consumers did not invest in energy-efficient electrical appliances for two other important reasons. *See id.* at 83. Some consumers lack the capital to make the initial investments in cost-effective lighting, appliances and other conservation options. *See id.* Electricity-saving devices often involve a higher initial cost. *See id.* Consequently, lack of capital may result in consumer investment in devices which are cheaper in the short-run, but more costly over the long-run. *See generally id.* The DPU further noted institutional barriers to investment in energy-efficient devices—for example, where landlords install the lighting and appliances, but tenants pay the electricity bills. *See id.* The landlord may therefore have an economic incentive to install cheaper lighting and appliances,

method of meeting demand.[345] Because these market imperfections led to lack of investment in cost-effective conservation technologies, the DPU required direct involvement of utilities in marketing and implementing conservation options.[346] In other words, government had to apply correctives to such market failures to capture the environmental and least-cost benefits of such conservation technologies.[347] In the telling example of cost-effective conservation appliances, the market failed to advance the public objectives of least-cost and environmental protection adequately.[348]

A corollary to the problem of information costs is the fact that small cost-advantages for a given electricity option may only be apparent when aggregated over large numbers of consumers, and will not readily appear when calculated at the level of a single consumer or household.[349] Aggregated demand has a bearing on information costs in that it may be cost-effective for utilities or utility commissions analyzing the aggregated demand of tens of thousands of consumers to hire expert staff to make comparisons on how to answer that demand at the least cost.[350] In most cases it would not be equally cost-effective for an individual consumer to hire such expertise.[351]

Mandatory labeling requirements, where electric companies distill the research on the environmental impacts of their product and present that information in a standardized format easily comparable to other companies' products, is a necessary, partial step in correcting this information costs problem.[352] From the corporate standpoint, the presentation of environmental impacts in readily comparable form is only a market advantage to the few companies with the least polluting generation of power.[353] Thus, such labeling would not likely be done

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since the higher operating costs will be borne by other economic actors. *See id.* The tenants may not want to install energy-saving refrigerators, lighting fixtures, etc. since the duration of their occupancy of the rental unit may be uncertain or limited. *See id.*; *see also* Rubin et al., *supra* note 325, at 264 (lack of information is one explanation for consumer failure to invest in cost-effective electricity saving devices).

[345] *See generally* D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) at 83, 84.

[346] *See id.* at 84.

[347] *See supra* note 344 and accompanying text.

[348] *See supra* note 344 and accompanying text.

[349] *See generally* Navarro, *supra* note 109, at 388-389 ("In a world of imperfect information with significant transaction costs, larger customers with resources to fathom the market will have better access to bargains than smaller customers . . . ."); Union of Concerned Scientists, *supra* note 339 (retail customers may have much less sophisticated understanding and modeling tools than utilities and industrial communities who themselves undervalue renewable energy).

[350] *See generally supra* note 349.

[351] *See generally supra* note 349.

[352] *See generally infra* notes 353-59.

[353] *See generally supra* note 5.

by individual electric companies governed solely by profit and market considerations.[354] From a social standpoint, quick comparability of the otherwise hidden environmental side-effects of electricity products helps consumers allocate resources optimally, thus overcoming information cost barriers to desirable transactions.[355] Mandatory electricity labeling, properly done, is a clear case of regulatory intervention helping achieve the optimal allocation of social resources where the market itself would not have done so.[356]

b. *Problems in Accounting Over Long Time Frames*

In its analysis of the failure of consumers to invest in cost-effective electricity-conserving appliances, the Massachusetts DPU concluded that the time frame used by consumers to compare electricity options was too short.[357] Consumers may not evaluate energy-saving technologies on the ten- to twenty-year product life cycle over which the savings occur, but may consider only those products with a short payback period.[358] By contrast, the cost-effectiveness of utility investments in generating facilities may be examined over payback periods as long as twenty years.[359] If consumers make purchases based on too short a payback time frame, they may actually invest in more costly means of meeting their demands, thereby leading to a failure of the market to allocate resources efficiently.[360]

Where the costs of an electricity option are not fully manifest for scores of years, or even centuries—as may be the case with the global warming impacts of CO_2 emissions—the inherent near-sightedness of individual consumer choices based on price may be even more problematic.[361] At best, individuals have perhaps a fifty-year time frame for analyzing the rationality of their own purchasing decisions, i.e., the length of their adult lives.[362] Costs of a purchase that must be "paid"

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[354] *See generally supra* note 5.

[355] *See generally* Union of Concerned Scientists, *supra* note 339.

[356] *See supra* notes 344–55 and accompanying text.

[357] *See* D.P.U. 86-36-F, 98 Pub. Util. Rep. 4th (PUR) at 82–83.

[358] *See id.* at 83; Ralph C. Cavanagh, *Least-Cost Planning Imperatives for Electric Utilities and their Regulators*, 10 HARV. ENVTL. L. REV. 299, 318 (1986); Rubin et al., *supra* note 325, at 263–64.

[359] *See, e.g.*, D.P.U. 86-36-F, Pub. Util. Rep. 4th (PUR) at 83.

[360] *See id.* at 82–83.

[361] *See infra* notes 362–69 and accompanying text.

[362] *See generally Global Climate Change: Hearing Before the Senate Comm. on Energy and Natural Resources*, 104th Cong. 25–26 (1996) (statement of Timothy E. Wirth, Under Secretary of State for Global Affairs) (in understanding the limits and opportunities in what an industry can do, we should be asking what does that industry want to look like in 2020, 2030 or 2050); PIGOU, *supra* note 1, at 26.

more than fifty years into the future are probably ignored in making current purchases, or so heavily discounted that they are, for all practical purposes, ignored.[363] Thus, from the perspective of an individual consumer, cheap natural gas-fired electricity today might be a rational choice, even if it would cause global climate disaster a century from now.[364]

Unlike individuals, society must make decisions based on its needs for centuries, since it will last longer than the individuals who comprise it.[365] Thus, what is rational from an individual economic point of view may be irrational from a societal point of view.[366] Moreover, there are intergenerational inequities in making decisions now that have irreversible negative impacts on future generations.[367] A decision by millions of individual market actors to burn off all of the earth's fossil fuels now at maximum consumption rates at the cost of a depleted and overheated earth, a century hence may represent such a disjuncture between individual and social rationality.[368] In such cases, particularly

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[363] *See* generally PIGOU, *supra* note 1, at 26–30 (analyzing discrepancy between valuation of present satisfactions and satisfactions to be had in distant future); Cudahy, *supra* note 110, at 427 (markets not notable for long-term foresight).

[364] *See generally* PLATER ET AL., *supra* note 4, at 30, 33 (interests of the future underrepresented in market; unborn generations who will inherit environmental problems generated in this century have no say in today's marketplace; efforts at monetization too heavily discount future values, such as preserving natural patrimony for future generations); *see also* Union of Concerned Scientists, *supra* note 339 (suggesting in deregulated electric market energy decisions will be made using shorter payback periods than utility discounted rates generally used; even investments cost-effective to society based on long-term economic savings will be ignored).

[365] *See generally* United Nations Framework Convention on Climate Change, May 9, 1992, art. 3, 31 I.L.M. 849, 854 [hereinafter Framework Convention on Climate Change] (parties should protect climate system for benefit of present and future generations); H.R. REP. No. 102-474(I), at 133 (1992), *reprinted in* 1992 U.S.C.C.A.N. at 1956 (in crafting EPAct legislators endeavored to take the long view by developing infrastructure that will steadily improve our environment, energy security into 21st century).

[366] *See, e.g.*, *supra* notes 362–65, *infra* note 367–69 and accompanying text.

[367] *See generally* GORE, *supra* note 5, at 190–91 (criticizing accepted formula of conventional economics that heavily discounts value of resources to future generations; effect is to magnify the power of current generation to compromise all future generations; need for intergenerational equity not yet reflected in current economic system); K.S. SHRADER-FRECHETTE, BURYING UNCERTAINTY: RISK AND THE CASE AGAINST GEOLOGICAL DISPOSAL OF NUCLEAR WASTE 189–201 (1993) (summarizing philosophical and ethical arguments for a duty to future generations and rebutting position that no duty is owed to future generations).

[368] *See* PIGOU, *supra* note 1, at 28, 29; *see also* SHRADER-FRECHETTE, *supra* note 367, at 193 (at simplest level intergenerational equity means each generation will have same opportunity to use resources like oil, clean air, soil, water or be compensated for the depletion of those resources); Cudahy, *supra* note 110, at 426 (simple common-sense virtue of conserving energy speaks for itself; waste is never sound policy). In 1932, in a disturbingly early framing of the problem, Pigou wrote:

> There is also waste, in the sense of injury to the sum total of economic satisfaction,

where future consequences are extreme, society may not be able to afford to let the market alone make the decision.[369]

Thus, while it may be correct that the current value of a given power plant's or even state's contribution to global warming may be small,[370] a given state or nation may still want to spend more now on non-CO_2 emitting power sources.[371] This decision would be difficult enough to make for politicians and regulators who are paid to review hundreds of pages of scientific reports and testimony; it is nearly impossible for the market to make through the actions of individual consumers.[372] Such a decision would likely be irrational in *market* terms because of the low market value of events which may occur scores of years into the future.[373] For situations where what is rational for society is irrational for individual consumers, society may need to make and implement investment decisions by non-market means.[374]

c. *Problems in Accounting for Diffused Global Impacts and Impacts on Community Members who have Little Cash*

When the harms of pollution are widely dispersed, and particularly when the individuals harmed are not in a position to bargain with the polluter, market failure is likely.[375] In the context of electricity production and global warming, this shortcoming of the market may

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> when one generation . . . uses up for trivial purposes a natural product which is abundant now but which is likely to become scarce and not readily available, even for every important purposes, to future generations. This sort of waste is illustrated when enormous quantities of coal are employed in high-speed vessels in order to shorten to a small degree the time of a journey that is already short. We cut an hour off the time of our passage to New York at the cost of preventing, perhaps, one of our descendants from making the passage at all.

Pigou, *supra*, at 28. Pigou's example raises clearly the general problem of non-conservation for the future, even though we know that technology may be able to compensate for resource destruction in some cases, as here, where oil-powered transoceanic travel has now replaced coal-powered. *See id.*

[369] *See, e.g.*, *id.* at 29 (wide agreement that government should protect interests of future in some degree against irrational discounting and our preference for ourselves over our descendants).

[370] *See, e.g.*, JOSKOW, *supra* note 8, at 11; Black & Pierce, *supra* note 80, at 1417–18.

[371] *See generally* PIGOU, *supra* note 1, at 28–30.

[372] *See generally* Union of Concerned Scientists, *supra* note 339.

[373] *See generally* GORE, *supra* note 5, at 191 (our economic system does not measure effect of decisions on future generations).

[374] *See generally* PIGOU, *supra* note 1, at 29–30 (clear duty of government as trustee for unborn and present generations to defend, by legislative enactment if necessary, exhaustible resources from reckless spoliation).

[375] *See* PLATER ET AL., *supra* note 4, at 32; *see also* Coase, *supra* note 2, at 18 (governmental regulation may lead to improvements in economic efficiency when, as is normally the case with

be best illustrated by the problem of small islands far removed from the consumption transactions of the American electricity system.[376] As discussed above, consumption of cheap fossil-fuel fired electricity products may superficially benefit American consumers in terms of price, but lead to increased global warming which may cause territorial losses for some small islands.[377] With the difficulty of foreign access to American courts, alongside difficulties of proving causation, legal remedies for these island losses seem unlikely.[378] But even if monetary compensation to islanders could somehow be imposed on American producers and consumers of electricity, there may be no sum of money adequate to compensate for the loss of ancestral homelands.[379] Similarly, Americans' sense of neighborliness, empathy or equity may make us unwilling to have our electricity system impose such burdens on others even if we paid more for the privilege of doing so.[380]

A related problem of the market is that it fails to recognize the needs of community members who have little cash.[381] In weighing the diminution in property value or the increased expenditures in remedial health care of a poor community due to global warming against the income savings of wealthy communities consuming large amounts of cheaper electricity, the cost-benefit balance may be unfairly skewed to the latter.[382] The undesirably skewed outcome in letting the market "solve" the emissions problems of the developed world at the expense of the poorer developing world is apparent, for example, in current

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smoke nuisance, large numbers of people are involved and therefore transaction costs of handling the problem through the market would be high).

[376] *See generally supra* notes 186–87 and accompanying text.

[377] *See generally supra* note 376.

[378] *See, e.g.*, Delgado v. Shell Oil Co., 890 F. Supp. 1324, 1335, 1372–73 (S.D. Tex. 1995) (dismissing under doctrine of forum non conveniens suit by thousands of foreign farmworker-plaintiffs alleging injury by U.S. pesticide used on farms abroad).

[379] *See generally* GELBSPAN, *supra* note 188, at 109 (quoting Samoan Ambassador's comment that "we will not allow some to barter our homelands . . . for short-term economic interest"); *id.* at 186 (quoting noted scientist's observation that "[i]t may be cost-effective, for example, to relocate the inhabitants of the Marshall Islands . . . but it wouldn't be moral"); Navarro, *supra* note 109, at 399 (marketed goods, like hamburgers, easy to value because they are regularly sold in the marketplace at posted prices; much more difficult to value non-marketed goods, such as clean air, because there are few if any markets where such amenities are bought and sold at posted prices).

[380] *See generally* Union of Concerned Scientists, *Energy Solutions to Fight Global Warming* (visited Feb. 10, 1998) <http://www.ucsusa.org/energy/energy.gwsolutions.html> (as largest contributor of CO_2 emissions U.S. bears special responsibility for curbing global warming); *infra* note 409.

[381] *See generally* PLATER ET AL., *supra* note 4, at 30.

[382] *See generally infra* notes 384–89 and accompanying text.

discussions on "joint implementation" strategies for addressing the high CO_2 emissions of the industrialized world.[383]

Under joint implementation, a developed nation would not have to meet its emissions reductions targets within its own borders if, by acting jointly with another nation, it could meet reductions targets through actions there.[384] Under such a scheme, a developed country could continue its CO_2 emissions from electric generating stations, but make up for them in the developing world by funding CO_2 emissions reduction or the creation of carbon dioxide "sinks," like forest preserves, there.[385] Because preserving forest land and other remedial actions are often cheaper in the developing nations than in the developed world, such an approach is cost-effective and thus desirable in market terms.[386] But joint implementation has proven controversial, particularly among the developing countries.[387] Understandably, a plan where the United States will continue driving high fuel consumption cars and using large quantities of fossil-fuel fired electricity, while in exchange developing countries will submit to foreigners buying their forests and putting them off limits to local economic use, does not strike many in the developing world as the best approach to CO_2 reduction.[388] When there are gross disparities in purchasing power between the world's human communities, cost-benefit market-based decisionmaking may distribute costs to the poor and benefits to the wealthy.[389]

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[383] *See generally infra* notes 384–89 and accompanying text.

[384] *See generally International Energy Agency, Climate Change Policy, supra* note 189, at 15.

[385] *See, e.g., supra* note 198. *See generally* Framework Convention on Climate Change, *supra* note 365, art. 3:3, 31 I.L.M. at 854 (efforts to address climate change may be carried out cooperatively by adherent nations); *International Energy Agency, Climate Change Policy, supra* note 189, at 15, 16 (many joint implementation efforts involving companies have involved afforestation projects in developing countries).

[386] *See, e.g., Global Climate Change: Hearing Before the Senate Comm. on Energy and Natural Resources*, 104th Cong. 32–33 (1996) (statement of Senator Kyl) (arguing there are greater opportunities for emissions control in Third World countries in terms of cost/benefit than there are in the developing nations);

[387] *See, e.g., International Energy Agency, Climate Change Policy, supra* note 189, at 15; Lemonick, *supra* note 193, at 24.

[388] *See generally International Energy Agency, Climate Change Policy, supra* note 189, at 15; *see also* Framework Convention on Climate Change, *supra* note 365, art. 3:5, 31 I.L.M. at 855 (cooperation by adherent nations should lead to sustainable economic growth and development in all adherents, particularly developing countries). Energy efficiency and alternative energy technology transfers, however, might prove more acceptable forms of joint implementation. *See generally* Framework Convention on Climate Change, *supra* note 365, art. 4:5, 31 I.L.M. at 858 (developed countries shall take all practicable steps to facilitate transfer of environmentally sound technology, particularly to developing countries); *International Energy Agency, Climate Change Policy, supra*, at 175 (Clinton administration believes there is substantial potential in joint implementation projects, perhaps involving technology transfers).

[389] *See supra* notes 384–88.

While the market often undervalues the needs of poor human communities because of their meager purchasing power, the market usually completely ignores the needs of non-human communities for similar reasons.[390] Even if trees may occasionally have standing, they definitely have no purchasing power.[391] Thus, the last surviving colony of an endangered alpine wildflower species about to be extinguished by climate change, for example, has no way to register its own "demands" in market terms.[392] Unless someone with cash, or property rights exchangeable for cash, somehow sets a price on such a loss, the market will probably not recognize the loss.[393]

d. *The Problem of Uncertain Harms; the Precautionary Principle*

Uncertain harms may also be very difficult for market mechanisms to handle appropriately.[394] Price, in part, reflects a summation of all past production costs of a product and all future costs which may be properly assessed against the product.[395] Future costs, however, may not be easily predictable.[396] Some cost-benefit accounting appears to assume each additional ton of CO_2 added to the atmosphere produces a proportional additional global warming harm as compared to each prior ton of CO_2 in a smooth linear progression.[397] Where such a linear progression exists, a simple cost-benefit calculus of marginal costs versus marginal harms might make some sense, with every additional ton of CO_2 being counted as equivalent to a prior ton.[398]

Climate scientists have noted, however, that the climate system is non-linear in nature and future changes may involve surprises, particularly when the system is rapidly forced.[399] Thus, there may be one or more environmental thresholds, below which the harm of additional

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[390] *See, e.g.*, GORE, *supra* note 5, at 183; PLATER ET AL., *supra* note 4, at 31.

[391] *See generally* Sierra Club v. Morton, 405 U.S. 727, 741–43 (1972) (Douglas, J., dissenting) (concern for protection of nature should lead to conferral of standing upon trees and other environmental objects to sue for their own preservation); PLATER ET AL., *supra* note 4, at 31 (trees do not buy and sell).

[392] *See generally* John R. Luoma, *Warming the Wild*, AUDUBON, July-Aug. 1996, at 102, 104 (reporting troubling news for rare alpine flowers; warmer, drier climate would lead to elimination of some rare alpine plants); Paul Rauber, *Heat Wave: If We Continue to Ignore the Danger Signs the World of the Future Will Be a Hotter, Poorer, Deadlier Place*, SIERRA, Sept.-Oct. 1997, at 34, 38 (suggesting alpine species moving upwards to escape global warming effects may run out of mountain).

[393] *See generally* GORE, supra note 5, at 183.

[394] *See generally infra* notes 399–400.

[395] *See generally supra* notes 219–20 and accompanying text.

[396] *See, e.g., infra* notes 399–400 and accompanying text.

[397] *See, e.g.*, JOSKOW supra note 8, at 6 & fig. 1, 7.

[398] *See generally supra* note 395 and accompanying text.

[399] *See* Intergovernmental Panel on Climate Change, *supra* note 182, § 6.

CO_2 is minimal and can be absorbed by atmospheric systems, and above which the harm of the additional tonnage is severe or accelerated.[400] Determining the correct environmental costs in such instances will be problematic if the exact thresholds are not known. Thus, even where price reflects environmental costs, if those costs are unlikely to increase in a predictable, linear fashion, the market may undervalue the impacts of additional production and fail to allocate resources appropriately.[401]

Where the exact parameters of environmental consequences are unknown, the international consensus expressed in both the Rio Principles and the United Nations Framework Convention on Climate Change is to adopt a precautionary approach.[402] As expressed by the Framework Convention on Climate Change, this approach means that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing preventative or mitigating measures.[403] As applied to the electricity industry, a precautionary approach may mean that crude price mechanisms are inappropriate regulators where greenhouse gases are involved.[404] Until the causal links of the global warming problem are more precisely understood, so that one ton of CO_2 is known to cause about $X in harm, a precautionary approach argues against reliance on price alone as a guide to the optimal quantity of fossil-fueled electricity generation.[405]

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[400] *See generally* WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 184, at 5 (ecological and social systems complex, with many non-linear feedbacks; as future climate extends beyond impacts of past climate variation it becomes more likely actual outcomes will include surprises and unanticipated rapid changes).

[401] *See generally supra* note 400 and accompanying text.

[402] *See* The Rio Declaration on Environment and Development, Principle 15, June 13, 1992, United Nations Conference on Environment and Development, 31 I.L.M. 876, 879; Framework Convention on Climate Change, *supra* note 365, art. 3:3, 31 I.L.M. at 854.

[403] *See* Framework Convention on Climate Change, *supra* note 365, art. 3:3, 31 I.L.M. at 854. The Convention does recognize, however, that even measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost; and that economic development is an essential aspect of climate change measures. *See id*; *see also id.* art. 12:4, 31 I.L.M. at 865 (developing countries proposing climate protective projects for financing may include estimate of incremental costs and benefits); *id.* art. 4:7, 31 I.L.M. at 858 (extent developing countries will implement Convention commitments will take into account that economic and social development and poverty eradication are priorities of developing country parties).

[404] *See supra* notes 399–403 and accompanying text.

[405] *See generally supra* notes 399–404 and accompanying text.

c. *The Problem of the Market's Inability to Value Non-Market Social Goals*

For individuals and for societies, cost-effectiveness is not the only grounds for making investment decisions.[406] It was probably not "cost-effective," for example, to build a National Park system, nor to launch a program to land humans on the moon. Left to the market, these types of projects would probably not have been undertaken. The market might determine the most cost-effective means to achieve such goals—it might even render such goals infeasible—but it did not, and probably could not, on its own begin to mobilize resources for such goals. There was no clear profit in such projects. Paybacks, if any, were decades away; thus, real and substantial costs outweighed uncertain benefits. Consequently, these projects, though nationally desirable, were not the kind of undertakings endorsed by the market. The market may be similarly ill-equipped to initiate important environmental goals, such as a habitable, biologically diverse planet in the year 2198.[407]

In addressing a problem like global warming, which is caused in part by electricity generation's CO_2 emissions, numerous legitimate non-market-based motivations are conceivable, including altruistic, good neighbor motives and equity considerations.[408] The United States might, for example, want to act as a good neighbor to keep small island nations from drowning in rising seas due to global warming.[409] It might wish to do so even if the costs of such action outweigh any costs to American electricity consumers caused by the loss of island nations.[410]

Similarly, equity considerations, or a sense that reparations are due, might motivate the United States to make sharp greenhouse gas emissions reductions now in order to compensate for its high volume of prior emissions.[411] Such action would be legitimate even if the con-

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[406] *See generally* PIGOU, supra note 1, at 11–13 (distinguishing between economic and non-economic welfare).

[407] *See generally* GORE, supra note 5, at 190 (past a certain point, it is impossible to price environmental effects; value of clean air and water, abundance of life on earth is incalculable).

[408] *See, e.g., infra* notes 409–10 and accompanying text.

[409] *See generally Mass. Enviro Official Warns Midwest Regulators, supra* note 32 (quoting Mass. DEP Commissioner David Struhs' observation that we all bear a "common responsibility . . . to something higher than shareholders. And that's the health and well-being of neighbors."); Black & Pierce, *supra* note 80, at 1418 (introducing an altruism factor strengthens the case for greenhouse gas environmental adders); *see also* Framework Convention on Climate Change, *supra* note 365, art. 4:8(a), 31 I.L.M. at 858 (parties shall consider actions necessary to meet specific needs of developing country parties arising from climate change, especially on small island countries); *supra* notes 187–88.

[410] *See generally supra* note 409.

[411] *See, e.g.*, GELBSPAN, supra note 188, at 112 (quoting Chinese environmental official's

sequent costs to American electricity consumers exceed the global warming harms that those consumers would individually avoid by reducing their emissions.[412] Given that the developing world may need to give priority to poverty eradication over greenhouse gas containment, it may be especially important for the United States and other developed nations to reduce emissions at a level proportional to or greater than their historic contributions to the causes of the climate problem.[413]

Although no national consensus has expressly endorsed these non-market motivations, a general consensus favoring environmental objectives has long been evident in electricity regulatory statutes.[414] Moreover, the United States has ratified the United Nations Framework Convention on Climate Change, agreeing to the international goal of stabilizing atmospheric greenhouse gas concentrations at levels that do not dangerously interfere with the climate system.[415] Furthermore, both Congress and the state legislatures have repeatedly shown a willingness to subsidize—i.e., to undertake even where not cost-effective—environmentally preferable forms of electricity generation.[416] Thus, it is inappropriate to assume that the American people want only those environmental protection measures that are "cost-effective" and that our electricity generation system must make all of its investment decisions based simply on market price.[417]

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comment that "80 percent of the world's pollution is caused by the developed countries and they should be responsible for those problems").

[412] *See generally* Framework Convention on Climate Change, *supra* note 365, art. 3:1, 31 I.L.M. at 854 (on basis of equity, differentiated responsibilities and respective capabilities, developed countries should take lead in combating climate change); *see also id.* art. 4:2(a), 31 I.L.M. at 856 (developed countries taking lead in controlling climate change taking into account need for equitable and appropriate contributions by each of the parties). The United States has repeatedly been the source of 22–23% of the entire world output of CO_2 from energy use and production. *See International Energy Agency, Climate Change Policy, supra* note 189, at 24–26 tbls.4–6. Even compared to many other developed countries, we have double to quadruple the CO_2 emissions per capita of most other nations. *See id.*

[413] *See generally* Framework Convention on Climate Change, *supra* note 365, arts. 3:1, 4:7, 31 I.L.M. at 858.

[414] *See, e.g., supra* notes 64–71, 77, 89–93, 121–26, 143, 161–62 and accompanying text.

[415] *See* Framework Convention on Climate Change, *supra* note 365, arts. 2, 4:2(a), 31 I.L.M. at 854, 856; *International Energy Agency, Climate Change Policy, supra* note 189, at 11, 175. One of the aims of the Convention is to return the carbon dioxide and other greenhouse gas emissions of the parties to their 1990 levels. *See* Framework Convention on Climate Change, *supra*, art. 4:2(b), 31 I.L.M. at 857.

[416] *See, e.g., supra* notes 258–63 and accompanying text.

[417] *See supra* note 416. By way of comparison it is useful to note that the public goal of around

C. *Advantages and Disadvantages of Possible Regulatory Mechanisms for Controlling Environmental Externalities in the Context of a Restructured Industry*

1. Externality Adders and Their Problems

As discussed above, price has repeatedly failed to direct the electricity industry in ways necessary to protect the environment.[418] Given this history of price failure and the fact that global warming may well fit many of the criteria for situations where price has inherent limitations—for example, having impacts that are geographically dispersed, that develop over long time periods and that may invoke non-market social concerns—interventions in the market are probably needed to protect the environment.[419] Various possible market intervention measures may offer advantages over price alone, but they also carry disadvantages.[420]

Neither the Massachusetts nor California restructuring statutes expressly utilize externality adders to level the playing field between combustion and non-combustion power sources.[421] Because their externality adder programs explicitly focused on the problems of environmental externalities, and because they were such well-developed and widely debated corrective programs, a discussion of adders is useful in clarifying the limitations of other market intervention mechanisms.[422]

Monetized externality adder programs like California's and Massachusetts', although meant to correct the failings of the market, are themselves essentially market-based mechanisms.[423] Environmental adder programs attempted to adjust the mix of electric generation/conservation options used by assigning an additional environmental cost

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the clock electricity availability and reliability is taken as a given by regulators and market advocates alike. *See, e.g.*, Rodgers & Schuler Jr., *supra* note 175, at 28–29 (quoting executive director of National Association of Regulatory Commissioners' observation that reliable service will continue to be a goal for restructured industry); *see also* Southern Cal. Edison Co., 71 F.E.R.C. ¶ 61,269, at 62,081, 62,082 (June 2, 1995) (Massey, Comm'n, concurring in part and dissenting in part) (a ruling eliminating consideration of environmental non-price factors, if strictly construed, might prevent consideration of range of other non-price factors that are important but very difficult to assign a dollar value to, such as fuel diversity).

[418] *See, e.g., supra* notes 64–71, 319, 340–48 and accompanying text.

[419] *See, e.g., supra* notes 357–93 and accompanying text.

[420] *See infra* notes 421–79 and accompanying text.

[421] *See generally supra* notes 260–68.

[422] *See infra* notes 423–60 and accompanying text.

[423] *See, e.g.*, D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 97, 98.

factor.[424] The decision between options, however, was still made on a cost-benefit basis.[425] In discussing how to value environmental adders, for example, the Massachusetts DPU suggested that if the price advantage of a more polluting electricity option is greater than the value of environmental damages caused by that option, "it would be to society's net benefit to prefer the dirtier resource."[426] This type of cost-benefit calculation is, in essence, a market approach. Thus, paradoxically, while the need to create adders was an implicit criticism of the market's failure to address certain environmental problems, certain difficulties with environmental adders may be due to the fact that they were themselves market-based mechanisms.[427]

Beyond the narrow critiques the Supreme Judicial Court and FERC levied against utility commission externality adder programs, wider criticisms were made.[428] Some critics argued that by insisting on such environmental adders for electricity, but not for other competing industries—e.g., heating oil for heating buildings, gasoline for powering cars, etc.—the adders may have actually harmed the environment by making electricity seem more costly in environmental terms than other industries which simply had not been scrutinized.[429] Thus, arguably, adders might have shifted investment and consumption to dirtier industries.[430] This problem exists whenever alternative products are not simultaneously and uniformly regulated.[431] The fact the regulation of powerplant smokestacks under the Clean Air Act may cause some to heat with polluting woodstoves rather than electricity, for example, is

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[424] *See supra* notes 203–21 and accompanying text.

[425] *See, e.g.*, D.P.U. 89–239, 116 Pub. Util. Rep. 4th (PUR) at 89, 92. As the DPU claimed:

> Economic theory posits that it is appropriate to value the avoidance of environmental externalities at the intersection of the marginal cost and marginal benefit curves of pollution abatement. It is at the intersection of the marginal cost and marginal benefit curves of pollution control where societal value is maximized and, thus, defines the market-clearing price or equilibrium value of avoiding environmental externalities.

See D.P.U. 89–239, 116 Pub. Util. Rep. 4th (PUR) at 92. The DPU suggested that where pollution control was occurring in excess of the optimal—indicated by the intersection of the marginal cost and benefit curves—"societal value" would be enhanced by reducing the amount of pollution control being practiced. *See id.*

[426] *Id.* at 90.

[427] *See generally supra* notes 423–26 and accompanying text.

[428] *See, e.g.*, JOSKOW, supra note 8, at 1, 21; Black & Pierce, *supra* note 80, at 1398–1430; Gary & Teague, *supra* note 238, at 870–75.

[429] *See* Black & Pierce, *supra* note 80, at 1406; *see also* JOSKOW, *supra* note 8, at 19 (piecemeal control of utilities only may shift production to another economic sector, reducing or reversing environmental gains).

[430] *See* Black & Pierce, *supra* note 80, at 1402, 1406.

[431] *See, e.g.*, H.R. REP. NO. 91–1146 (1970), *reprinted in* 1970 U.S.C.C.A.N. at 5358 (promulgation of federal emissions standards under Clean Air Amendments will preclude efforts on part

not sufficient reason to abandon the regulation of powerplants.[432] Rather, it argues for equivalent regulation of the substituted forms of energy as well.[433] Consumer substitution of dirtier energy sources can be avoided in future regulatory efforts through consistent regulation of CO_2 throughout the restructured electricity industry and in alternative energy forms as well.[434]

Similarly, some criticized state regulation because the higher costs caused by state-imposed environmental adders may have put a given state's utilities at a disadvantage relative to out-of-state generators who may have been causing even more pollution.[435] Notably, however, state adder programs, which often dealt with CO_2 emissions, were installed in the absence of any federal emissions control over CO_2.[436] Thus, at least in terms of CO_2, this criticism is misdirected—the problem was not state regulation, but lack of national regulation.[437] Nevertheless, state-by-state regulation of air pollutants is problematic in an industry, like electricity, that will be shipping its product interstate.[438] This problem could be corrected by national CO_2 emissions standards, interstate compacts or other mechanisms that prevent states from gaining competitive advantage by weak emissions regulation.[439]

Opponents of adders complained that calculating a dollar value for externalities is difficult and necessarily speculative.[440] It is true that

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of states to compete with each other to attract new plants without assuring adequate control of large-scale emissions).

[432] *See generally* William Funk, *When Smoke Gets in Your Eyes: Regulatory Negotiation and the Public Interest—EPA's Woodstove Standards*, 18 ENVTL. L. 55, 62, 68 (1987) (discussing addition of woodstove air emissions regulations under the Clean Air Act nearly two decades after powerplant emissions were regulated; noting that, other than cars and trucks, no consumer goods were previously regulated by EPA under the Clean Air Act); *see also* 40 C.F.R. § 60.530 et seq. (1997) (air emissions standards for woodstoves made after July 1, 1988; provisions do not apply to woodstoves made previously nor to masonry fireplaces).

[433] *See generally* Black & Pierce, *supra* note 80, at 1406, 1407 (discussing problem of substitution of dirtier, less regulated fuels when emissions of competing power sources are not similarly regulated).

[434] *See generally supra* notes 429–33 and accompanying text.

[435] *See* D.P.U. 86-36-G, at 81; *see also* JOSKOW, *supra* note 8, at 15 (mixing states with adders and states without adders could have unintended adverse consequences); Black & Pierce, *supra* note 80, at 1415–16 (geographic substitution where consumers relocate to less regulated state limits effectiveness of some local environmental regulation; solution may require regional, national or international regulation).

[436] *See, e.g.*, JOSKOW, supra note 8, at 9, 11, 18.

[437] *See generally supra* note 436 and accompanying text.

[438] *See generally* H.R. REP. No. 91-1146 (1970), *reprinted in* 1970 U.S.C.C.A.N. at 5358.

[439] *See, e.g., infra* note 492.

[440] *See generally* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 90 (costs of environmental damages are difficult to estimate); Black & Pierce, *supra* note 80, at 1427 (estimating marginal harm attributable to emissions of various pollutants an "extraordinarily difficult task"). The proxy method for calculating externalities—cost-of-control (implied valuation)—used in many adder programs is even more speculative, and drew the sharpest condemnations by critics. *See, e.g.*,

the calculation of externalities is inherently difficult, given the difficulty of tallying the actual environmental damages attributable to a given powerplant or fuel.[441] The difficulty of professionally estimating appropriate price signals for these costs underscores the improbability that individual consumers, unaware of the possible environmental costs of electricity production, could determine the appropriate price to pay for that electricity.[442] The fact that the rational price for electricity from a given source, accounting for all of its indirect, multi-variable and long-term consequences, may be difficult or impossible to calculate suggests that the market price of that electricity may not always be a rational price.[443] This potential irrationality of the market price of electricity provides another reason for skepticism regarding the use of the market alone to allocate resources in the electricity industry.[444]

Two widely cited critics of environmental adders/externality programs, Professors Bernard Black and Richard Pierce, have argued that at the level of a given state there was little cost-benefit rationale for substantial adders to control greenhouse gases.[445] They suggest that any factor for the fraction of the total harm from such emissions actually experienced within the state would be minuscule.[446] Consequently, the net in-state benefit to be realized from each ton of greenhouse gas emissions reduced would be relatively small.[447] Thus, they argue that any case for state environmental adders for greenhouse gases rests almost entirely on altruism.[448]

In terms of global warming, they assert, one state acting alone, or even one country acting alone, can accomplish little except self-impoverishment.[449] This argument is unconvincing, however, when applied to this country and its electricity industry.[450] The United States is the source of over a fifth of the world's CO_2 generation and its electricity production is responsible for approximately seven percent of the world

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D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 71, 90-93; Joskow, *supra* note 8, at 16; Black & Pierce, *supra* note 80, at 1402, 1420-21, 1422.

[441] *See* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 90.

[442] *See generally* Pigou, *supra* note 1, at 195 (in certain planning contexts expecting coherent plan from independent activities of isolated speculators is like expecting satisfactory painting to be made if each square inch is painted by an independent artist).

[443] *See generally supra* notes 440-42 and accompanying text.

[444] *See generally supra* notes 440-43 and accompanying text.

[445] *See* Black & Pierce, *supra* note 80, at 1416-18.

[446] *See id.* at 1417.

[447] *See id.*

[448] *See id.*

[449] *See id.* at 1418, 1425; *see also* Joskow, *supra* note 8, at 11 (suggesting nothing a single state alone can do to significantly affect global warming).

[450] *See infra* note 451 and accompanying text.

CO_2 output.[451] Thus, although it is true that world cooperation on the problem is needed, the United States and its electricity industry bear tremendous responsibility for global warming compared to other nations and industries.[452]

Black and Pierce's criticism on this point implies that if environmental adders for greenhouse gases were priced in market terms, to reflect the marginal harms actually experienced in-state for every additional ton of greenhouse gas emitted, the adders would drop to an extremely small value.[453] The marginal harm of global warming to the consumers of a state, they imply, would be so small that the correct price for an additional ton of CO_2 emitted by the electricity purchases of those consumers in the state would be next to nothing.[454]

If Black and Pierce are correct, their analysis points to a more fundamental problem with environmental externality programs: if priced by market rules they might not be able to deal effectively with global environmental problems.[455] The implication is that any correctly priced adder for CO_2's environmental costs would be so small it would not deter consumers from selecting electricity from a high CO_2 output fuel or facility.[456] But pricing adders by market rules confines them to harms and benefits cognizable in economic or price terms.[457] The non-price advantages of centuries-long global sustainability or respect for small island states' traditional homelands, for example, would still go unrecognized in selecting electricity generation options.[458] When Black and Pierce and other critics point to the infinitesimal global warming costs of the CO_2 emissions for a given power plant, they may be right that any substantial environmental adder would overstate the correct market price of the CO_2 emissions.[459] But this observation just confirms that the market is not an adequate mechanism for recognizing and addressing certain types of socially-borne harms.[460]

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[451] *See supra* notes 190–91 and accompanying text; *see also* Joskow, supra note 8, at 11 (U.S. electric industry accounts for about 6% of world CO_2 emissions).

[452] *See supra* notes 450–51 and accompanying text.

[453] *See* Black & Pierce, *supra* note 80, at 1416, 1417.

[454] *See generally id.*

[455] *See generally id.* at 1416–18.

[456] *See generally id.*

[457] *See generally* Pigou, *supra* note 1, at 11–13 (distinguishing between economic and non-economic welfare).

[458] *See generally supra* notes 187–88 and accompanying text.

[459] *See, e.g.*, Black & Pierce, *supra* note 80, at 1416–17, 1425.

[460] *See supra* notes 455–59 and accompanying text.

2. Advantages and Disadvantages of Emission Taxes and Subsidies for Renewables and Conservation

Absent taxes on CO_2 emissions, or subsidies or other supports for renewable energy, environmentally preferable power options may have difficulty making progress in a competitive electricity market.[461] It is widely expected, for example, that renewable power from solar, wind, geothermal and other sources will cost more than conventional power—perhaps ten to twenty percent more.[462] Although some niche marketers may sell their power based on its renewable energy content, most electricity will be marketed and purchased on the basis of low price rather than environmental considerations, if California is any indication.[463] Subsidies for renewable energy and emissions taxes on combustion-based power sources could be used, however, to adjust market prices enough that price-based consumer choices harmonize with national environmental objectives.[464]

Even some of the critics of adders are interested in the possibility of emissions taxes (i.e., Pigovian taxes) as a market-based mechanism for addressing externalities like the impacts of CO_2.[465] Tax structures have long been used to encourage various types of energy development—the depletion allowance for oil, natural gas and coal, for example, cost the federal government an estimated $745 million in lost tax revenues in 1992.[466] CO_2 emissions taxes would likely encourage renewable energy and conservation, and discourage polluting fossil fuels, such as coal, oil and to a lesser extent, natural gas.[467]

A distinct advantage to emissions taxes, if applied across all sources and not just to electricity generation stations, is that they would prevent the substitution of dirtier, unregulated forms of energy for heavily

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[461] *See, e.g.*, Johnson, *supra* note 327, at D4 (battle over California's electricity market will be waged mostly on price). *But see id.* (surveys suggest that 70% of Americans might embrace green power if prices not too far out of line; early reports suggest green power marketing tests drawing 20% of customers).

[462] *See, e.g.*, Steinman, *supra* note 256, at B1; Natural Resources Defense Council, *supra* note 278 (noting price of selected low environmental impact electricity offerings is 10–20% above current consumer rate).

[463] *See, e.g.*, Johnson, *supra* note 327, at D4.

[464] *See infra* notes 475–79 and accompanying text.

[465] *See, e.g.*, JOSKOW, *supra* note 8, at 3; *see also supra* note 2. *But see* Karen Tumulty, *A Treaty Meets a Sour Congress*, TIME, Dec. 22, 1997, at 27, 27 (White House has "completely ruled out" use of taxes to meet climate treaty goals).

[466] *See* Union of Concerned Scientists, *Unequal Tax Burdens* (visited Feb. 10, 1998) <http://www.ucsusa.org/energy/barriers.taxes.html>; *Energy Info. Admin.*, *supra* note 10, at 117; see also *Energy Info. Admin.*, *supra* note 1, at 1 (long history of government intervention to stimulate oil and gas production dates back to World War I).

[467] *See generally supra* notes 107–08 and accompanying text.

environmentally regulated electricity.[468] Similarly, if the taxes were national in scope, and not just state-imposed, environmental controls would not act as an incentive to relocate energy facilities to other, less-regulated jurisdictions.[469] Taxes would also have to be applied to older facilities, and not just newly built facilities, or they would act as an incentive to overuse older, dirtier generating stations.[470]

One difficulty with taxes, however, is determining the level of taxation necessary to achieve the desired level of pollution reduction.[471] Moreover, monitoring emissions to determine the appropriate level of taxation may lead to many of the bureaucratic intrusions and record-keeping problems critics of command-and-control hoped to avoid with a market-based approach.[472] Monitoring numerous small sources of CO_2 emissions could prove more costly than conventional command-and-control regulation.[473] In addition, if such taxes are not made "revenue neutral" by corresponding cuts in other taxes, they might act as a general drag on the economy, and not just on the dirtiest portions of the economy.[474]

Subsidies of conservation measures and electricity generated using renewable energy would accomplish the same ends as emissions taxes, but by using opposite means.[475] Such subsidies would increase consumer purchases of renewables-based electricity, while emissions taxes would decrease consumer purchases of fossil-fuel fired electricity. There certainly can be no complaints from the other power sources about subsidizing renewable energy—most other methods of generating electricity, such as nuclear, coal, oil and large-scale hydroelectric, have received extensive subsidization from the federal government.[476]

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[468] *See generally* JOSKOW, *supra* note 8, at 18 (optimal solution to externalities might be through emissions fee if applied to all sources of a given pollutant).

[469] *See* JOSKOW, *supra* note 8, at 19 (state commissions not well-suited to regulate emissions with global and regional impacts); *see also* H.R. REP. No. 91-1146, *reprinted in* U.S.C.C.A.N. at 5358 (giving rationale for federal as opposed to state-by-state air emission regulation under Clean Air Act).

[470] *See generally* Iribe, *supra* note 13 (older plants have been allowed to pollute at higher rates than new plants; restructured power market should not allow older plants a pricing edge simply because have largely avoided pollution controls).

[471] *See* PLATER ET AL., *supra* note 4, at 51.

[472] *See generally*, Black & Pierce, *supra* note 80, at 1392.

[473] *See id.*

[474] *See generally* Biewald, *supra* note 308, at 42 (suggesting revenue-neutral taxes that reduce tax on income while increasing taxes on air emissions).

[475] *See generally infra* notes 476-78.

[476] *See, e.g.*, Union of Concerned Scientists, *Commercialization Barriers to Renewable Energy* (visited Feb. 10, 1998) <http://www.ucsusa.org/energy/barriers.commercial.html> (citing U.S.

At first glance subsidization appears to conflict with the goal of least-cost power, because it would prop up expensive energy sources.[477] There is some hope, however, that further subsidies of solar and other renewable energy forms may create a large enough market for these forms of energy that economies of scale and further technical innovation may actually bring down their cost per kWh generated.[478] Furthermore, by reducing environmental externalities, renewably generated electricity may actually be least-cost power from a societal standpoint.[479]

D. *Using Price and Non-Price Mechanisms to Eliminate Externalities in the Context of Electricity Restructuring in California and Massachusetts*

The analysis above suggests that the market is likely to be a weak method of addressing environmental impacts, particularly where, as with the problem of CO_2 emissions and global warming, the impacts are fully manifest only in the distant future, the impacts are diffused geographically and over millions of persons, the complexities of causation may make the information costs too high for optimal consumer choice and significant non-market social goals are involved.[480] Implicitly realizing the limitations of a pure market approach to environmental issues, the Massachusetts and California electricity restructuring statutes have numerous provisions that soften, constrain or correct the shortcomings of the market.[481] The statutes, however, do not go as far as they should in addressing the public objectives of least-cost power and environmental protection.[482]

First, the statutes ignore some of the problems whose market-invisibility triggered externality programs in the first place, notably the CO_2 emissions problem of an electricity generating system based on fossil-fuel combustion.[483] The plans will, for example, likely result in increased natural gas use, and possibly greater coal use, both sig-

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Dept. of Energy study showing $23.5 billion in federal research and development expenditures for nuclear power, $12.9 billion for coal and $2.8 billion for oil and natural gas compared with $9.3 billion for renewable energy and $4.7 billion for energy efficiency); ENERGY INFO. ADMIN., *supra* note 10, at 44 (nuclear and coal absorbed two-thirds of 1992 federal applied research and development expenditures).

[477] *See generally supra* note 462.

[478] *See, e.g.*, Union of Concerned Scientists, *supra* note 476 (noting 20–25% reduction in cost for each doubling of production volume of photovoltaic units; without government support of such renewables, ability to reap economies of scale likely to be delayed).

[479] *See, e.g., supra* notes 206–08 and accompanying text.

[480] *See supra* notes 357–417 and accompanying text.

[481] *See, e.g., supra* notes 260–68 and accompanying text.

[482] *See infra* notes 483–98 and accompanying text.

[483] *See, e.g., supra* note 291 and accompanying text.

nificant sources of CO_2 emissions.[484] Reduction in the price of electricity—a fundamental goal of deregulation—could, in itself, spur increased consumption of electricity.[485] Any resulting increase in electricity consumption, absent other compensating changes, will likely increase CO_2 emissions.[486]

Second, particularly in light of the CO_2 problem, it is not enough to use renewable energy and conservation subsidies or portfolio mandates to change the ratio of fossil-fuel generation to renewables or conservation in the electricity resource mix.[487] The ratio of fuel types *within* the fossil-fuel component needs to be altered if we want to reduce CO_2 emissions from the electricity-generation sector.[488] More coal-fired generation, even if it is cheaper than gas-fired generation, is not desirable, even if the sum of the two goes down slightly due to subsidized renewables-based electricity generation.[489] Coal produces more CO_2 per unit of energy than natural gas does and, unfortunately, it currently fuels more than three times the electricity generation that gas does.[490] Without environmental adders, carbon emissions taxes or other penalties on CO_2 output, cost advantages for coal could maintain or increase its use, thereby increasing global warming.[491] Thus, electric-

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[484] *See generally* Woolf & Biewald, *supra* note 107, at 66, 64 (in restructured industry natural gas likely to be main source of new generation and CO_2 emissions will continue to climb).

[485] *See generally* Cushman, *supra* note 335, at A22 (relatively low energy prices are one cause of growing U.S. energy use in 1996, suggests director of American Council for an Energy-Efficient Economy).

[486] *See id.* This tension points to certain contradictions in the simultaneous goals of least-cost electricity generation and generation that protects the environment. The details of the balance between these two goals will need periodic readjustment as our understanding of global warming increases.

[487] *See generally* D.P.U. 89-239, 116 Pub. Util. Rep. 4th (PUR) at 92 (estimation of externalities also essential for comparing different generating facilities whose fuel and other differences lead to different pollution impact and not just for comparing non-polluting and polluting options).

[488] *See generally id.*

[489] *Cf.* Woolf & Biewald, *supra* note 107, at 67 (if gas-fired generating facilities replace older, less efficient coal plants, CO_2 emissions would likely decline because gas plants have lower CO_2 emission rates).

[490] *See* WORKING GROUP II TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 184, at 14 (natural gas has lowest CO_2 emissions per unit energy of any fossil fuel, emitting only 14 kg of carbon per gigajoule (GJ) of energy while coal produces 25 kg of carbon per GJ); INTERNATIONAL ENERGY AGENCY, *supra* note 110, at 671. Oil, though not as attractive as coal due to its price, is still being used for electricity generation and also produces more carbon dioxide per unit of energy than natural gas. *See id.*

[491] *See generally* Biewald, *supra* note 308, at 42-43; Milford, *supra* note 181 (retail competition will likely dislodge some, but not majority, of old, more polluting coal- and oil-fired generating plants). Denmark began a CO_2 tax in 1992, and the Netherlands, Norway and Sweden also now have such a tax. *See International Energy Agency, Climate Change Policy, supra* note 189, at 21, 22.

ity restructuring statutes may need to be coupled with additional statutorily enacted intervention mechanisms, probably at the federal level, such as carbon taxes, mandatory CO_2 emission limits or national renewable energy requirements.[492] State-specified emission performance standards, as allowed under the Massachusetts statute, will probably be too weak a mechanism for addressing the CO_2 problem.[493] As critics of environmental adder programs have observed, in a deregulated national electricity market consumers or power companies could simply shift production to other, less-regulated states.[494] Similarly, as critics of adder programs suggested, emissions regulations applied solely to the electricity industry, and not to substitutable energy products such as gasoline or home heating oil, may have the undesirable effect of encouraging consumers to shift their purchases away from low CO_2 electricity to higher CO_2 alternatives.[495] Thus, in terms of CO_2, consistent emissions regulation should be applied to as many energy sources as practicable—for example, through a carbon tax on all fuels or similar mechanism—and not just to electricity.[496] Third, the subsidies for renewable energy and energy efficiency measures[497] are overly mod-

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[492] *See, e.g.*, Union of Concerned Scientists, *supra* note 380 (policies to combat global warming might include subsidizing renewable energy and requiring some percentage of its use in electricity generation); Woolf & Biewald, *supra* note 107, at 70 (recommending renewable portfolio standards for regions coupled with tradable renewables permit system for flexible implementation of standard); Biewald, *supra* note 308, at 42 (suggesting revenue-neutral pollution taxes). Combining market approaches with regulation or absolute prohibition is not a new strategy in dealing in commodities with severe unwanted side-effects. It is already used with scores of commodities, cigarettes being one obvious example. Minors are not allowed to buy them at any price (non-price limits on allocation). Cigarettes are taxed heavily for adult users, in part to discourage consumption. Endless media campaigns and smoking ban regulations are employed to curtail and channel use. It would be inconceivable to use market price alone to keep cigarettes out of the hands of minors; not even market price with a costly "adder" thrown on for minors. Price is simply not the right regulatory or allocational mechanism for certain commodities in certain contexts.

[493] *See infra* note 494 and accompanying text.

[494] *See generally infra* note 435.

[495] *See supra* notes 429–30 and accompanying text.

[496] *See generally supra* notes 429–32 and accompanying text.

[497] *See* Woolf & Biewald, *supra* note 107, at 70 (transition policies have focused on maintaining historic levels of support for conservation and renewables, but to stabilize or reduce New England's CO_2 emissions these alternatives must play larger role than have to date). In terms of mandating minimum usage of renewables, the Massachusetts restructuring statute mandates a five percentage points increase in renewables over current levels by the end of 2010. *See* MASS. GEN. LAWS ch. 25A, § 11F(a). Other than hydropower, current levels of renewable energy generation of electricity in New England, for example, are negligible. *See* Woolf & Biewald, *supra* note 107, at 67 fig.4. Nationally, the combination of solar, tidal, wind, fuel cells, geothermal and waste-fueled power accounted for about 2% of electricity generation in 1995; hydropower accounted for about 9%. *See International Energy Agency*, *supra* note 110, at 671. In comparison, Woolf & Biewald's "zero carbon option," based on energy efficiency and renewably generated

est. In the Massachusetts case, after an initial period they decrease over time and are not guaranteed beyond five years.[498]

In general, for critical resources, and for activities that pose the risk of substantial, widespread or irrevocable harm, the best approach may be to set environmental goals politically and then to use market and non-market mechanisms to achieve those goals.[499] The decision between market and non-market mechanisms should not be based on an ideological commitment to state regulation nor to an unregulated market, but rather on which mechanism works best.[500] For example, with global warming we may need to set stringent national targets for CO_2 emissions and determine how much of that target must be met from the power generation sector.[501] Then regulators could use market mechanisms, like subsidies for energy efficiency or emissions taxes, or non-market mechanisms, like mandatory emissions standards, to achieve the target, depending on which works best and quickest.[502] In broad outline, this is the approach recently agreed to at the Climate Change summit in Kyoto.[503]

Finally, where catastrophic consequences like global warming are threatened, or essential infrastructure like electricity is involved, planning should be done on the basis of long-term sustainability.[504] In such

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electricity, suggests that to stabilize CO_2, New England would have to answer 17% of electricity demand by means of renewables and conservation by the year 2010. *See* Woolf & Biewald, *supra* note 107, at 69.

[498] *See* MASS. GEN. LAWS ch. 25, §§ 19, 20 (1997). The surcharge on electricity to support these subsidies totals 3.0 to 4.1 mills per kWh ($0.003–0.0041/kWh), depending on the year involved. *See id.*

[499] *Compare* Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental* Law, 37 STAN. L. REV. 1333, 1343, 1353 (1985) (level of pollution reduction is quintessentially political question that should be answered by legislative process rather than cost-benefit analysis; method used to achieve level should include marketable pollution rights), *with* Joskow, *supra* note 8, at 6 (optimal emissions level for pollutant should be selected by balancing incremental benefits against incremental costs of reduced emissions).

[500] *See generally* Coase, *supra* note 2, at 18 (problem is one of choosing appropriate social arrangement for given harmful effects; no reason to suppose government regulation called for simply because market has failed; satisfactory policy can only come from study of how the market and governments handle harmful effects); Ackerman & Stewart, *supra* note 499, at 1343, 1353.

[501] *See generally* Biewald, *supra* note 308, at 42 (regional or national caps should be implemented for carbon dioxide and other emissions with emission credit trading or alternatively revenue-neutral pollution taxes; these mechanisms would use market forces to work out specific abatement response).

[502] *See, e.g.*, *supra* note 501.

[503] *See, e.g.*, Lemonick, *supra* note 193, at 23 (Kyoto Protocol dictates 7% U.S. CO_2 emissions reduction below 1990 levels by year 2012); Tumulty, *supra* note 465, at 27 (U.S. administration has ruled out use of taxes to achieve Kyoto target, but will propose subsidies aimed at increasing energy efficiency).

[504] *See generally supra* notes 357–74 and accompanying text.

circumstances, society cannot afford the myopic five- to fifty-year horizon and heavily discounted future of the current market approach.[505] For critical issues like global warming, decisions should be based not just on the choices of individual market actors, not just on price, but on the basis of society's undivided and long-term interests.[506]

IV. Conclusion

From the earliest days of electricity regulation, the twin objectives of least-cost power and environmental protection began to emerge in the structure of the industry.[507] The co-evolution of these social goals began to surface distinctly with the passage of PURPA, and was clearly evident in EPAct and in the restructuring statutes of states leading the move towards deregulation, like Massachusetts and California.[508] Least-cost power was probably never the sole goal of electricity regulation.[509] But since the 1970s it certainly has not been.[510] It would thus be inappropriate to assess new proposals for the industry solely in terms of the cost of the electricity produced. The question instead, as we renegotiate the legal bases for the industry, is how best to reconcile society's goal of low-cost power with its goal of reducing the environmental externalities of electricity production.

Some of those environmental goals may be achieved simply by the functioning of the competitive market for least-cost power. The phase-out of nuclear power, for example, ending additional radioactive waste, is probably dictated simply by conventional price considerations.[511] Certain environmental impacts of the electricity industry, however, are unlikely to be addressed by the functioning of price in an unadjusted market.[512] Environmental impacts that are dispersed beyond the borders of the American consumer's transactions and consciousness, or whose consequences are sufficiently postponed into the future, like the impact of CO_2 emissions, are particularly unlikely to affect the price of electricity.[513] Thus, the market on its own will probably not address the

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[505] *See generally supra* notes 357–74 and accompanying text.

[506] *See, e.g., supra* notes 357–74 and accompanying text.

[507] *See, e.g., supra* note 77 and accompanying text.

[508] *See, e.g., supra* notes 123, 143, 160–61 and accompanying text.

[509] *See, e.g.*, Calumet Service Co. v. City of Chilton, 135 N.W. 131, 140, 142 (Wisc. 1912) (describing goals of early Wisconsin electricity regulation as including "efficient service" and "best service practicable").

[510] *See supra* notes 89, 123, 143, 160–61 and accompanying text.

[511] *See supra* note 80.

[512] *See, e.g., supra* notes 337–417 and accompanying text.

[513] *See supra* notes 357–93 and accompanying text.

electricity sector's contribution to global warming nor other similar externalities.[514] These failures of price consequently require legal interventions to correct the shortcomings of the market.

States leading the deregulatory movement, like Massachusetts and California, have incorporated many such interventions into their restructuring statutes in an effort to constrain and soften the environmental impacts of electricity deregulation.[515] But more may be necessary, particularly to deal with difficult externalities like the climate impacts of CO_2 emissions.[516] In developing further corrective interventions in the market, both non-market mechanisms, like national CO_2 emissions standards, and market-like mechanisms, such as carbon taxes for most fuels, should be explored.[517]

After setting emission reduction targets through domestic or international political processes, market-oriented mechanisms may be particularly helpful in achieving those targets in the most cost-effective manner. In the face of the repeated failure of price to properly guide environmental practices in the electricity sector, however, policy-makers should be wary of conventional cost-benefit analysis as the sole arbiter of appropriate actions on the environmental front. Some interventions in the electricity market that are not "cost-effective" may be appropriate on other valid grounds and deserving of subsidy—preservation of a healthy planet many centuries into the future, for example.[518] The market is, ultimately, simply a tool to achieve human ends.

It may be impossible to properly price the fair distribution of burdens between rich nations and poor, the health of the planet 300 years hence or the preservation of the last surviving members of a remote alpine wildflower species. Just because something has no price does not mean it has no value.[519] What the market cannot recognize, we should still have the political wisdom to see.[520]

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[514] *See generally supra* notes 337–417 and accompanying text.

[515] *See, e.g., supra* notes 260–68 and accompanying text.

[516] *See supra* notes 483–98 and accompanying text.

[517] *See* PIGOU, *supra* note 1, at 203 (no tax can provide a complete remedy for certain negative activities, thus absolute prohibition is required); *supra* notes 499–502 and accompanying text.

[518] *See, e.g., supra* notes 406–10 and accompanying text.

[519] *See, e.g.*, Massachusetts Elec. Co. v. Department of Pub. Utils., 643 N.E.2d 1029, 1032 (Mass. 1994) (DPU set externality value on "non-priced goods" such as damages to species and natural systems).

[520] *See generally* GORE, supra note 5, at 182–83.