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8. Innovation of Governance: the Case of Emissions Trading¹

Jan-Peter Voß

INTRODUCTION

This chapter deals with the relation between governance and innovation. In contrast to other chapters of this book, however, it is not primarily concerned with the ‘governance of innovation’, but with the ‘innovation of governance’. This entails a shift in perspective towards seeing governance not only as a design challenge, but also and foremost as a dynamic field of social practices and institutions. The practices and institutions that constitute *de facto* existing governance are changing and, from time to time, new patterns emerge and spread across domains and jurisdictions. Such phenomena may be referred to as instances of innovation in governance (Voß, 2007a).

This chapter explores how far the development of a new policy instrument can be understood as an innovation process in governance. To this end, I adapt the innovation journey from organization and technology studies and use it to study the process through which emissions trading came into being, how it developed, took on dynamics of its own, partly independent of policy problems and goals, spread out across policy domains and jurisdictions, and gained dominance as a new design for environmental governance on a global scale.

The analysis shows that the relation between innovation and governance entails a high degree of contingency at both ends – not only the challenge to think conceptually about new governance forms that can cope with the contingency of innovation on science, technology and organizations, but also the challenge to induce and navigate complex processes of change in the real world of governance practices for envisioned concepts to become real. Surprises and unintended effects in the innovation journey of emissions trading caution against too heroic an attitude in raising promises and proclaiming straightforward solutions to political problems by new designs for governance. Rather it shows that (re-)design of governance practices is an extended process in close interaction with ongoing dynamics in particular political contexts. In the course of this process original models become

adapted, sometimes warped and distorted. Governance design itself needs to be reflexive with regard to its embedding in broader dynamics of change and a consequent lack of control over outcomes of reconfiguration processes that are oriented towards the shining promise of new model designs.

In the context of this chapter governance is understood in a broad sense as *de facto* existing patterns of regulation within a particular domain of societal interaction. To a large extent such patterns are rooted in institutions that emerge from interactions in economic and social life. But there are also marked influences of design. Public policy, or governing more generally, is, together with other issues, concerned with the (re-)configuration of institutions to bring about desired outcomes. The particular techniques that are applied to this purpose are referred to as 'policy instruments': specified models of governance that guide the design of institutions to steer social development into desired directions. The governance of modern societies is interspersed with intended and unintended results of the application of policy instruments. Understanding governance change thus suggests a closer look at them.

Policy studies commonly analyse change in governance with a focus on shifting problems, goals, preferences and beliefs to which policy instruments follow suit.² Here I make a shift in perspective and put policy instruments – often referred to as 'means', 'tools' or 'techniques' of governance – at centre stage (Linder and Peters, 1998; van Nispen and Ringeling, 1998; Salamon, 2002; Howlett, 2005). I propose to follow the instruments along their life course. This allows a new perspective on dynamics in governance; that is, the innovation of policy instruments as 'technologies of governance' and their impact on the transformation of governance structures.

In this chapter I use the 'innovation journey' concept to track the process by which new policy instruments come into being. This notion was introduced by Van de Ven et al. (1999) as a loose concept to grasp the open-ended nature of innovation in the context of organizations that were developing new management strategies, production processes or products. Rip and Schot (1999, 2001) have proposed an elaborated and extended version for the analysis of technology in a broader societal context. Typical phases are the emergence of new options, delivery of proof-of-principle through early developments in a protected space, stepping out into the real world by experiments with a prototype, and wider introduction and diffusion that may lead into the formation of a new technological regime. I build on this elaborated concept of innovation journey and explore how far it can be transferred to the study of policy instruments as innovations in governance. Results from a pilot application to emissions trading are presented in this chapter.

The development of emissions trading had considerable influence in the transformation of environmental governance regimes throughout the world. The instrument already attracted attention in its early days when it was

merely a policy proposal by the US Environmental Protection Agency to introduce some flexibility into command-and-control regulation under the US Clean Air Act. A close observer at that time noted that:

... remarkably few reform proposals (...) have successfully negotiated the perilous path from concept to implementation. Certainly this is not due to any shortage of ideas on how existing regulations or the regulatory process could be improved (...). Even if only a fraction of the proposals were to prove meritorious, the number of implemented reforms would be insignificant compared with the number of ideas. The paucity of implemented reforms suggests that there may be much to learn from those that did become policy. One leading example is the emissions trading program. (Tietenberg, 1985, p. 2)

Today, about twenty years later, emissions trading has become something like a global standard in environmental governance. With a view to the fundamental changes in concepts, institutions and practices of environmental policy (as compared to the formerly predominant mode of command-and-control regulation) emissions trading appears as not only a successful, but also a radical innovation in governance.

What made this innovation possible? Did emissions trading develop and break through because new solutions were required for new problems? Or does the success of emissions trading signify that policy makers learned how to deal with existing problems? The literature on policy change would suggest an explanation based on the idea of policy makers learning how to better achieve their (shifting) goals or new coalitions with different goals gaining power. A side glance at the innovation studies literature, however, gives rise to some scepticism. Innovations can develop a life of their own. They are not necessarily successful because they perform better, but they may become successful because they develop momentum or fit with other ongoing changes. Innovation processes are full of complexities and ironies. Success may be the result of the influence of powerful constituencies or contingent context conditions and path-dependencies (Nelson and Winter, 1982; David, 1985; Dosi, 1988; Rip and Kemp, 1998; Van de Ven et al., 1999; Garud and Karnøe, 2001). This raises questions about how emissions trading actually became what it is. What are its origins, what is its course, what are the phases of its innovation journey? Which factors and mechanisms shaped its dynamics? How did it become established in the context of pre-existing governance structures?

I follow up on these questions by briefly setting out how the innovation journey concept can be applied to policy instruments. I present a case study that reconstructs how emissions trading unfolded, and how it became embedded in existing governance contexts and gained momentum. In a separate section I highlight regimes around 'technologies of governance' as a new insight into the dynamics of governance. In conclusion I discuss the added value of an innovation process perspective on governance.

INNOVATION JOURNEYS IN GOVERNANCE

Most commonly, the term innovation is used for the creation of novel products, artefacts or procedures in a commercial environment. More sparingly it is used for new forms of organization in the public sector. When using the innovation journey concept to study the life of emissions trading as a policy instrument, I am looking at a case of innovation in governance. A brief excursion is necessary to indicate what an innovation journey in the realm of governance will look like, and how it is visible for emissions trading.

I use a broad notion of governance that comprises the totality of *de facto* existing rule patterns that regulate interaction within a social domain such as a region or a sector of society (Kooiman, 1993; Pierre, 2000; Benz, 2004). These rule patterns comprise public and/or private actors as well as codified and non-codified rules. *De facto* existing governance patterns are partly designed, partly emergent (Czada and Schimank, 2000). Against the background of such a broad notion of governance, political action can be understood as the intervention in *de facto* governance with the aim to reconfigure patterns of interaction and in this way influence outcomes (cf. H  ritier et al., 1998, pp. 11–13; Kooiman, 2003).

I understand innovation in governance as the development of new ‘configurations that work’ (Rip and Kemp, 1998, p. 338) for the purpose of shaping social interaction patterns and outcomes. This involves the engineering of hybrid networks of elements with a view to produce a desired outcome (cf. Callon, 1987, pp. 93–7; Callon, 1992). The elements of such networks do not only include rules in the narrow sense of laws or administrative orderings, but also informal norms, financial resources, organizational capacities, orientating symbols, theoretical models, social actors with certain skills and resources, monitoring systems and databases etc. Innovating governance involves the formation and stabilization of such hybrid networks.

The development of policy instruments is a special case of innovation in governance. It deals with the articulation of general, transferable designs for undertaking such reconfiguration work. This entails the modelling of network configurations that are expected to produce desired outcomes (Braithwaite and Drahos, 2000, p. 15). Modelling and reconfiguration work interact. Empirical studies of innovation processes in the realm of material technology show the difficulties of developing robust designs in interaction with dynamic elements and broader contexts. Compromises, unintended effects, repair work, setbacks, shifts in form and function are essential features of innovation processes. Policy instruments are similarly complex, so that irony is in place (Rip, 2006).

Rip and Schot (1999) develop the innovation journey concept with respect to material technologies that are produced and used in a commercial environment. The innovation journey concept needs some adaptation for the

application to policy instruments. I propose to conceptualize innovation journeys of policy instruments as emerging from network interactions between the poles of science, policy development and governance domains as particular areas of application. Relevant areas of science include economics, law and the social sciences. Policy development comprises policy analysis in national and international public and private organizations as well as service provision by, for example, law firms, banks, public relations agencies and software developers. Governance domains are policy areas within specific jurisdictions, on specific levels of governance, with given policy patterns, actor constellations, institutions, material technical and geographical conditions (for example the USA's clean air policy or global climate policy).

Continuing to use concepts and terminology from innovation studies, I can distinguish typical phases of the innovation journey of policy instruments: a phase of gestation brings up precursors in form of new options, variations in practice, emerging pressures on existing governance regimes, but still without the interlinkages that make a new configuration. A first critical stage shows developments towards linking up elements into a new configuration that could work. These developments take place in a protected space, shielded from immediate pressures of the political selection environment. If they are successful they establish a 'proof of principle' that a new operational principle might work to produce a certain type of governance outcome. Partly overlapping with this phase, the next phase develops a prototype of a new policy instrument with articulated functional principles. First steps are taken out of the protected space and into real world governance contexts. Experiments with implementation occur when niches open up that can provide an amenable local selection environment within the structures of a governance domain. Learning and embedding take place within these niches. Communities of practice emerge, sharing special experiences and skills. After proof of principle and experimentation with prototypes a third phase begins, if the instrument is able to branch off from initial niche applications into new and wider openings within the original governance domain and beyond. If experiences, skills, legitimization, resources, and social support from various implementation sites can be linked up with each other and cumulate, the innovation develops momentum and may stretch or crack established governance structures, thus creating further space for expansion and diffusion. Enlarged scope and broader diffusion of the instrument lead into the differentiation of special skills and services (such as legal advice, financing, training), and the emergence of professional institutions and organizations that are directly linked up with the policy instrument and its further development. Following this phase of expansion and diffusion local communities of practice become arched over with organizational structures that guard and retain the instrument by providing support for implementation. Benchmarks, standards and certification schemes come up. At this stage one can speak of the formation of a regime around the new instrument. The

regime cuts across governance domains, and is transnational in scope. It stabilizes and supports the policy instrument within particular domains of application.

These typical phases of an unfolding innovation journey manifest themselves in the case of emissions trading. In the following section I use them to structure the case study. Emissions trading addresses the need to regulate the release of harmful gases into the atmosphere by making use of the market mechanism. The basic concept is to define a total amount of emissions for a population of installations (usually an entire sector of the economy), issue allowances for a proportionate amount of this total, and let these be traded freely among those actors who wish to produce corresponding amounts of emissions. According to economic theory this will lead to the optimal allocation of emissions: those who are willing to pay most for the allowance are the ones who face the highest costs of reducing emissions. Other ones who have cheap opportunities for emission reductions will prefer to exploit them rather than buying permits. Emissions trading thus promises that whatever level of emission control is politically required, it can be achieved in the most efficient way, at minimal cost to society. Or, the other way round, each dollar spent on emission control produces the highest possible effect for the environment (Baron and Philibert, 2005; Tietenberg, 1985; Dales, 1968).

Figure 8.1 gives a brief overview of the major events and instances of implementation in the history of emissions trading. The vertical axis indicates the scope of application of the instrument in various instances of implementation. The dotted lines represent informal influences between instances of implementation, and the solid lines represent formal legal relations.

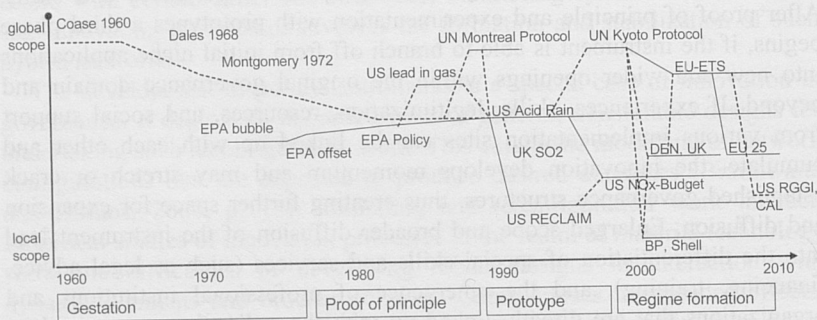


Figure 8.1 Outline of emissions trading's innovation journey

A qualitative analysis of the dynamics in the innovation journey framework is presented in the following sections. I use the adapted innovation journey concept, including poles and phases of the innovation journey, when they

capture patterns and dynamics that I find in the case study. In this way, I wish to provide additional insight into dynamics of governance and show the added value of using innovation concepts for governance analysis.

GESTATION AND PROOF-OF-PRINCIPLE: FIRST DEVELOPMENTS IN THE SHADOW OF COMMAND-AND-CONTROL REGULATION AT THE US ENVIRONMENTAL PROTECTION AGENCY

In contemporary policy debates emissions trading is treated as if it were always around – an unhistorical generic form of governing the environment that recently happened to be chosen for implementation. Against this backdrop it is inspiring to look back at when emissions trading first appeared in policy debates. The reconstruction of wider developments at that time actually reveals events and processes in which the instrument took shape. Interestingly, emissions trading originated from two different strands of precursors, one in science and one in the practice of US clean air regulation. The two strands brought up new options such as theories, legal rules, legitimating narratives, routines, skills, etc. that could be combined into a new type of policy instrument. A first emissions trading programme was cobbled together and grafted on existing regulation, in a protected space provided by legal interstices in the incumbent command-and-control regime. With this a proof-of-principle became established for the working of emission markets, even if the actual performance of the initial configuration remained below expectations.

Looking back, a scientific trajectory emerged throughout the 1960s and 1970s with new findings in economic theory. With the conceptualization of tradable permits as an alternative to command-and-control and taxes (Coase, 1960) the establishment of emission markets became an option for controlling environmental pollution (Dales 1968). A vigorous debate among economic theorists about the pros and cons of permits versus charges resulted in a refined articulation of the concept, its representation in economic models and an assemblage of arguments for its superiority over taxes including formal theoretical proof (Montgomery, 1972). In an abstract and principled form new options for emissions regulation were invented during the course of this debate.

Environmental governance, however, was only just about to become established at that time. Regulatory practice became shaped in implementing facility-oriented emission standards from the US Clean Air Act. In 1970 the US Environmental Protection Agency (EPA) was set up and environmental regulation started to show an effect, including upcoming opposition from targeted industries who put the infant regime under pressure, for example, by

circulating the idiom of a 'growth ban'. Attempting the balance between statutory provisions and interest groups EPA officials tinkered with 'flexible regulation'. A first instance was the 'bubble concept', developed between 1972 and 1975, which allowed the breaching of standards for one particular facility, if it was compensated by emissions below the standards at another facility of the same company. The 'offset mechanism' extended this concept to compensation across companies, one year later; so that a first limited market for emission rights became established. The offset mechanism was accommodated with the legal framework of the Clean Air Act (CAA) in 1977 – officially not as a policy shift, but as pragmatic repair work within the existing command-and-control regime (Cook, 1988). It did represent an interstice within the regime, however. The opening was used by young entrepreneurial economists at the EPA who 'cast about for new initiatives which they could hook their stars to and use to separate themselves from the crowd' (Meidinger, 1985, pp. 462–3). They set up a development programme for market based environmental regulation, starting from the practice of flexible regulation and linking it with the theory of tradable permits. A protected space within the EPA was provided by the Office of Planning and Evaluation (later Office of Planning and Management, OPM) as an institutional stronghold for economic concepts in regulation (Cook, 1988).

Within this protected space first developments for emissions trading as a new policy instrument took place in the shadow of broad public debates about political values and regulatory culture with resources in the form of economic knowledge and institutional authority provided by the OPM and broader linkages to the regulatory reform movement. 'The offset policy provided a window of opportunity, albeit initially a narrowly opened one, allowing EPA reformers room to manoeuvre in exploring alternative control strategies with at least the semblance of incentive characteristics' (Cook, 1988, p. 46).

In 1977 emissions trading was not more than an abstract model of tradable permits, on the one hand, and highly contextual, improvised practices of flexible regulation, on the other hand. It was something that Rip and Schot, in their conception of technological innovation call a 'hopeful monstrosity (...): full of promise, but not able to perform very well' (2001, p. 162). From early on, the development of market-based regulation was based on the promise of more efficient and less contentious regulation: markets would smoothly organize themselves without much political intervention and minimise the resistance of business actors to environmental protection measures. The promise worked to mobilize resources. After 1978 the OPM 'grafted economic incentives in an incremental and piecemeal fashion on an existing directive framework' (Marcus, 1980, p. 171). The result was a programme initially called 'controlled regulation'. In 1979 'emission reduction credits' were introduced as a currency for emissions amounts below standards. Further support came from the Reagan Administration's agenda for

'regulatory relief' in 1980 (Cook, 1988, pp. xi–xii, 1–2). In 1982 the EPA presented a proposal for an 'Emissions Trading Policy Statement. General Principles for Creation, Banking, and Use of Emission Reduction Units'.

Part of these early developments was an increasing articulation of promises and requirements. Tinkering gave way to more systematic and coordinated research and development. For business actors to support the scheme it was necessary to assure the liquidity of the emission markets and avoid volatility of prices and related risks. This requirement shaped development efforts so that 'banking' was introduced as a new design component to smooth price development. This further sophistication of the design of emission markets created promises for other actors such as the finance industry who realized that trading and banking of emission certificates could be a future business field. Again, new requirements were added to assure that markets of emission certificates were compatible with the established financial market regime and its regulations and routines. The development agenda successively became more complex and more powerful in terms of the resources that were devoted to it. A promise-requirement cycle, as can be observed in the processes of technological innovation, had kicked in and boosted early developments of emissions trading in the protected space within the CAA (Van Lente, 1993; Van Lente and Rip, 1998). Promise and requirement created momentum to overcome internal resistance to the innovation at EPA, for example by engineers and lawyers who had a central role in command-and-control regulation and feared devaluation of their competences (Cook, 1988, p. 4).

The EPA programme was a laboratory creation and survived within the particular political space created by offset and OPM. Some first checks of compatibility with public opinion and legal frameworks, however, have taken place at this early stage. Elements of the EPA's emissions trading programme were repeatedly contested at the courts, mainly by environmental NGOs who found it ethically unacceptable to put pollution on sale. A key point was the legal framing of emission reduction credits. The term 'property right', which was proposed by economic theorists, had to be substituted by the term 'allowance' in order to retain legal powers of the state *vis-à-vis* the holders of permits (Tietenberg, 2002). Legal contestation and internal controversy at EPA delayed issuance of a final version of the Emissions Trading Policy Statement until December 1986.

In 1985 a first evaluation study of the EPA's emissions trading programme was published. The working of the configuration was assessed against the theory of tradable permit markets (Tietenberg, 1985). This pulled the nascent policy scheme out from under the shadow of the command-and-control regime and highlighted it as a first instance of a new policy instrument in practice, a proof of the principle that emission reduction obligations could be traded. From the viewpoint of business, however, the new options for flexibility did not receive much attention. Banking and trading of emission

credits was only sporadically used and did not result in any considerable cost reductions (Tietenberg, 1985). Most of these deficiencies were attributed to the fact that the theoretical design principles were not yet implemented systematically.

STEPPING OUT INTO THE REAL WORLD WITH A PROTOTYPE: PROJECT 88 AND TRANSFORMATION OF US CLEAN AIR POLICY

A second phase with major importance for the development of emissions trading sees the configuration of the US Acid Rain Program as a prototype that is actually designed and presented as a new form of governance in its own right. This emissions trading exemplar explicitly combined economic theory with regulatory experiences from the EPA programme and was announced as a paradigmatic shift towards market-based environmental governance. The prototype induced many attempts at reproduction within and outside the USA. Several of these attempts were successful in the USA and worked to transform clean air governance from command-and-control to market-based patterns. Leading up to the development and implementation of the prototype was a comprehensive process of alignment and agenda building within environmental policy networks, labelled Project 88.

Normally, a radical innovation such as emissions trading would be expected to find difficulties in acceptance. In the context of the EPA programme this was the case. The instrument had been kept in its niche, officially leaving the command-and-control regime intact. The wider world of environmental governance and political discourse in general, however, was undergoing some changes during the 1980s.

The problem of acid rain moved onto the political agenda, adding to the problem of health effects from local air pollution. The environmental movement gained broad support in society. At the same time, international competition increased, financial deficits grew, and trust in government eroded. The Reagan Administration championed regulatory reform for a business-friendly society. These parallel developments furthered social cleavages around the conceptual opposition of ecology and economy. During the 1980s, several unsuccessful legislative proposals were launched to extend the application of emission standards from new sources to existing sources. Although accompanied by flexibility and burden-sharing mechanisms, industrial and regional interests in the House, Senate and the Reagan Administration blocked off any political measures against acid rain in the 1980s (Ellermann et al., 2000, p. 20).

It was against this background that emissions trading entered the next phase of its innovation journey. Around 1988, on the occasion of another presidential election in the USA, a broad range of political interests, notably

from industry as well from the environmental movement, became enrolled in a concerted effort to feature emissions trading as a solution to reconcile environmental and economic interests and overcome the stalemate in acid rain policy. In the wake of the election campaigns, a coalition of policy entrepreneurs initiated Project 88 as ‘a non-partisan effort to find innovative solutions to major environmental and natural resource problems’ (Project 88, 1988, p. ix).³ With Project 88, emissions trading left its protected space and stepped out into the wider world of environmental politics. Pioneering parts of the administration and other users, legal frameworks, existing policy instruments, interest groups, and issues in public discourse became integrated as part of the configuration. Extensive consultation with key figures from industry, environmental NGOs, government and academia produced a report entitled ‘Harnessing Market Forces to Protect the Environment’. The report paved the way for a broad political coalition by framing environmental policy as a question of technical design, independent of contending values and political positions: ‘Project 88 steps away from ongoing debates over specific environmental goals, to focus instead on finding better mechanisms for achieving whatever standards are set’ (Project 88, 1988, p. ix).

When the new Administration moved into office it started the implementation of a prototype. Project 88 was sent into a second round so as to ensure embedding in the political context. The prototype followed the design of a cap-and-trade system that represented the state of the art in economic theory. Looking back in 1991, when introducing proposals to include emissions trading into the Clean Air Act, President Bush said: ‘Let me commend Project 88 and groups like the Environmental Defense Fund for bringing creative solutions to long-standing problems, for not only breaking the mold, but helping to build a new one’ (Project 88, Round II, 1991, p. 2). Final rules for emissions trading were adopted in January 1993. By 1994 a market had developed.

The other side of successfully stepping out into the wider world is that the messiness of reality breaks into the design. The US Clean Air Act was meant to be an example of emissions trading as discussed in economic theory. The transferral of the instrument from economics textbooks to political reality, however, brought several problems to the fore: in economic theory distributive effects were neglected, because in the world of market models they do not have an impact on the overall efficiency of the instrument. In the policy process they came to the fore and fed conflicts about alternative forms of allocating emissions reduction allowances and various other details of design (Ellermann et al., 2000, p. 27). The proposal by the administration also raised concern with respect to the feasibility and ethical acceptability of emissions trading – this time in larger circles than the few experts that had followed the development of the EPA mechanisms. In a complex constellation of involved parties with diverging interests and under high time pressure the neat theoretical concept of emissions trading had to be broken up

and additional elements be introduced to repair it. Compromises and *ad hoc* developments were rationalized in order to defend the project on the ground of the promise of efficiency in order to stabilize support for ongoing development work and secure acceptance by target groups and the wider public. In effect, as one of the later evaluators of the instrument has termed it, 'Title IV is built on more or less arbitrary emission limits, trading to reduce costs, and an allowance-allocation scheme that is at least as messy as most tax legislation and that has a history with no more nobility' (Ellermann et al., 2000, pp. 316–17).

Throughout the 1990s emissions trading became wide spread and accepted as an environmental policy instrument in the United States. Several emissions trading schemes became established on a regional level in the United States and the concept of market-based regulation gained dominance. In 1994 the EPA required states to establish market-based systems of regulation in order to achieve national air quality standards. A prominent example is the Regional Clean Air Incentives Market (RECLAIM) for the regulation of NO_x and SO₂ in the Los Angeles area (Harrison, 1999). RECLAIM was developed in parallel with the US Acid Rain Program from 1990 to 1993. It went into operation in 1994. Other examples that gained some international visibility are the NO_x Budget Program that was set up in 1999 and comprises nine states in the Northeast of the United States, and the Illinois VOC trading scheme established in 1999 for the Chicago area.

At the same time, there was continued resistance internationally and, especially, in Europe. While also in Europe the prototype induced some activity in exploration and development of emissions trading for regulating air pollution, for example, a proposal for SO₂ emission regulation in the United Kingdom (Sorrell, 1999) and a proposal by the business community in Norway (Hoibye, 1999), regulatory culture, institutions and balance of interest groups provided a less favourable selection environment in Europe. The proposals therefore failed to gain support in the legislative process. Scepticism about the promises of market models was deeply anchored, and these were also ethical and political concerns about shifting responsibility for emission reduction away from polluters. Command-and-control based regimes of environmental regulation were stronger in many European countries than in the US, with incumbent interests and institutional inertia making radical innovation more difficult (Woerdman, 2002; Cass, 2005).

Six years after it started, the US Acid Rain Program was evaluated as a great success with respect to economic as well as ecological goals. One commentator emphasized that '(t)he explanation must lie in departures from the textbook world of perfect rationality, perfect competition, and perfect certainty, in which the system always follows the long-run equilibrium path – that is, in mistakes, market imperfections, and forecasting errors' (Ellermann et al., 2000, p. 299). Unintended effects helped to boost the instrument: it turned out that low-sulphur coal was much more widely available than

forecasted, because of a considerable drop in rail transport rates due to the liberalization of railroads in the 1980s. This meant that low sulphur coal became widely available as an alternative to the installation scrubbers (Ellermann et al., 2000, pp. 104–5). Whether these additional factors were recognized or not, the prototype was recommended for large-scale application: ‘We believe that our analysis of the U.S. Acid Rain Program supports a number of general lessons ... The experience ... clearly establishes that large-scale tradable permits programs can work more or less as textbooks describe’ (Ellermann et al., 2000, p. 315).

With the US Acid Rain Program as a working exemplar in place, however, ‘the concept of harnessing market forces to protect the environment has gone from being politically anathema to politically correct’ (Stavins, 2002, p. 1). At least in US environmental policy, ‘market-based instruments have moved centre stage, and policy debates look very different from the time when these ideas were characterized as ‘licenses to pollute’ or dismissed as completely impractical’ (Stavins, 2002, p. 14).

REGIME FORMATION: LINKAGE WITH INTERNATIONAL CLIMATE POLICY, EU EMISSIONS TRADING, AND THE CARBON INDUSTRY

Emissions trading’s innovation journey did not come to an end with becoming established in the domain of US environmental governance. It branched out into other domains, found interstices to gain ground in and flourish. Emissions trading became linked to the nascent governance framework of international climate policy. When it met resistance on this level it shot further branches into governance domains at the level of transnational corporations. Oil companies BP and Shell became loci for the implementation of first examples of greenhouse gas emissions trading schemes. The transnational scope of these corporate schemes provided bridgeheads for the policy instrument to travel across the world and link up with European policy networks. The instrument gained support from the OECD and business corporations worldwide. Its constituency became institutionalized, one example being by founding a global association to promote emissions trading. In connection with revisions of energy market and climate policy regulations, Denmark and the UK were the first countries to start developing national emissions trading schemes for greenhouse gases. The cumulation of these developments on various governance levels created a global hype around emissions trading as the instrument of future environmental policy. It nurtured the expectation that emissions trading would come anyway and reversed scepticism and criticism in European policy circles into widespread attempts to become part of the emerging movement. Finally, the withdrawal by the US government from international

climate negotiations freed the European Union (EU) Commission to pursue emission trading on its own terms – after carefully reframing the instrument that it had so firmly contested on the international level. The Commission orchestrated the development of a European directive as a framework for interlinked emissions trading systems in 25 member states. Implementation of the directive nurtured national constituencies of emissions trading and gave rise to an emerging global regime for development and operation of emissions trading. Although reconfiguring governance structures throughout Europe led into diverging trajectories, in which the design became adapted and repaired to fit existing political circumstances in national domains, the global regime around the instrument, together with the authority of the EU Commission can be observed to effectively work to establish design standards. Currently, it seems as if the instrument, in form of the global regime to which it gave rise, has taken on a life of its own, quite independent of ongoing problem cycles and politics within any singular governance domain.

With international climate negotiations an opportunity opened up for emissions trading to branch out from US clean air policy into other governance domains. US diplomats, with the support of the international business community, pressed international emissions trading into the Kyoto Protocol – against resistance from the EU who feared that reduction commitments could be evaded by importing excess emissions rights (hot air) from former socialist countries (Oberthür and Ott, 1999, pp. 188–90; Damro and Luaces Méndez, 2003, p. 76). The development of a working rule system for international emissions trading under the Kyoto Protocol was finally stranded because the EU insisted on limiting trading to 50 per cent of required emission reductions (Woerdman, 2002, pp. 350–84; Cass, 2005). This was not the only route, however, along which the innovation network branched out from the US clean air policy. When international negotiations reached stalemate Environmental Defense Fund (EDF) set up an initiative to encourage business corporations to move ahead with company internal trading schemes for carbon emission allowances as a means to demonstrate their support for the instrument and show that it is feasible to apply it to greenhouse gases. In 1998 BP indeed announced the introduction of such a scheme. Shell followed soon after (Zapfel and Vainio, 2002, p. 8). The BP and Shell schemes attracted attention as the first applications of emissions trading to greenhouse gases. These examples allowed the instrument to travel through conferences and workshops to Europe and around the world and link up with discourses of local policy and business circles (Christiansen and Wettestad, 2003, p. 9). Towards the end of the 1990s the OECD also picked up tradable permits and emissions trading as a pet proposal for which it could provide review and dissemination services and manifest its role as a neutral policy broker and testing agency (OECD, 1997; OECD/IEA, 2004).

Increasingly also actors beyond established environmental policy networks became enrolled in the innovation network: '(...) market intermediaries and other potential service providers (auditing companies, consultants, lawyers, academics, commercial conference organisers) saw a potential market arising and were more than willing to invest some resources under the header of business development' (Zapfel and Vainio, 2002, p. 7). Their 'helper's interest' (Prittitz, 1990, pp.116–21) brought forward exploratory studies and R&D activities in Europe that were justified by the need to be prepared for upcoming policy debates. Part of the dynamics in these years was the emergence of what is now called the carbon industry - an increasingly organized sector of specialized businesses that provide service for the development and maintenance of emissions markets. Emissions trading gained additional momentum - not only as an environmental policy instrument, but also as a thriving service economy that started to actively advertise its products and lobby for the expansion of its market.

In the context of these ongoing developments on a supra- and sub-national level, policy initiatives started to take shape, also on a national level in Europe. In 1999 Denmark introduced the first emissions trading scheme in Europe (Pedersen, 2000, pp. 3–5). In the UK business actors set up an Emissions Trading Group (ETG) to develop a voluntary scheme as an alternative to tax proposals. With the ETG a European bridgehead of the emissions trading innovation network became established. Central actors from the US emission trading innovation network participated regularly in working group sessions (Smith, 2004, pp. 83–4). In 2002 the UK government endorsed and financially supported a pilot scheme developed by the ETG on the grounds of 'to enable business to gain practical experience of emissions trading ahead of a European and international system, and to help the City of London establish itself as a global centre for emissions trading' (UK gov. dept. of environment, Defra, press release, 12 May 2003: 'Commentary on preliminary 1st year results and 2002 transaction log').

Because of such investments and activities, the expectation of something new and big coming up in environmental policy was rising. A global hype started around emissions trading as the policy instrument of the future. There was 'a conference on emissions trading somewhere in the world every day, each accompanied by a raft of papers from universities, think tanks, and government agencies. In less than a decade, emissions trading has gone from being a pariah among policymakers to being a star - everybody's favourite way to deal with pollution problems' (Ellermann et al., 2000, p. 4). Europe was still rejecting emissions trading under the Kyoto Protocol, but European policy development networks were part of the hype. More and more believed that emissions trading would come, anyway, and that it would only be sensible to get involved - and the more who believed in it the more likely it became that this would happen. This made it difficult to be against emissions trading. Around 2000 a reversal happened in Europe. Academics, analysts,

consultants, environmental interest groups and others who were critical of emissions trading, turned into supporters, the debate shifted from the question of 'if' to 'how' (Zapfel and Vainio, 2002, pp. 9–10). The hype enrolled important centres of policy development in Europe to the emissions trading innovation network. US experts frequently travelled to Europe for lecturing and consulting. Reports, technical terms, design principles, metaphors etc. started to circulate across the Atlantic (Zapfel and Vainio, 2002, pp. 7–8).

The European Commission became a hub of informal consultations and exploration of emissions trading as a policy instrument for domestic climate policy. The Commission hired US experts and started to take on the role of a policy entrepreneur for emissions trading within the EU while keeping up resistance against international emissions trading under the Kyoto Protocol (Wettestad, 2005, p. 16). Cass (2005) explains this divergence by 'norm-entrapment' on the side of the EU, resulting from earlier strategies of delegitimizing emissions trading as an attempt of the USA to water down emission reduction commitments. So, even when large parts of European policy networks had already become supporters of the instrument, the EU was trapped by the normative objections against the instrument that it had raised earlier. When the USA withdrew from the Kyoto Protocol in 2001 the next critical juncture arose. The EU was urged to take over the lead in climate policy and demonstrate concrete successes in order to keep the international process alive (Wettestad, 2005, p. 16). Substantial effort, however, had to be invested to reframe emissions trading: from a strategic device to water down binding emission reduction commitments in the hands of the USA, into an effective and efficient instrument for the EU. The main argument was that the problem of 'hot air' (excess emission rights for former socialist countries due to deindustrialization) did not apply to an EU-wide trading scheme. Another important factor made a particularly good fit of emissions trading with the domain of European climate policy at that time: while the Commission had worked without success for years for an unanimity vote of the Council on a proposal for a European energy tax, emissions trading (as a non-fiscal measure) was allowed to move ahead on the basis of a majority vote only (Christiansen and Wettestad, 2003, pp. 6–7).

In 2001 the Commission tabled a draft Directive to establish the EU-ETS. The proposal acknowledged the diversity of political and technical circumstances on the level of member states by providing a mere framework to be filled by National Allocation Plans (NAP), which should specify concrete designs. In an 'ultra-quick process' the Directive became adopted in 2003 for the EU-ETS to commence in 2005 (Wettestad, 2005).

In the course of domesticating emissions trading within national policy contexts a tension became apparent between the need for standardized design for compatibility of emission markets and particular social, technical, environmental and – above all – political conditions in the respective settings of implementation. Powerful political interests, policy legacies, legal

frameworks and specific industry structure required repair work and partial re-innovation to arrive at configurations that could work, embedded in peculiar contexts of use. Ongoing conflicts between the European Commission and member states over the acceptability of various special shapes give ample evidence of these difficulties, but also show that approval of NAPs by the Commission – as one of the elements of the EU-ETS framework design – establishes an effective mechanism for the standardization of policy instruments.

From 2005 onwards, the EU-ETS established a European market of allowances for 2.2 billion tons of carbon emissions from 11500 installations. In 2006 the daily transaction volume in emission allowances reached €60 million. Linked to this was a fundamental transformation of basic structures of environmental governance. Tradable permits and certificates of all kinds have become state of the art in environmental regulation, and there is hardly any problem to which they are not applied even in an exploratory manner. Linked to this shift are a stronger role for economic expertise and a reframing of the pollution problem from moral condemnation to efficient allocation. Attached to the new paradigm in policy development is a social infrastructure of specialized skills, professional careers, organizations and, in the case of emissions trading, the peculiar phenomenon of the carbon industry as a whole new service economy that prospers around emission allowances as an artificially created commodity. One can speak of a new regime that has developed around emissions trading as a technology of governance. Various parts of the working configuration (such as public agencies, trading departments in companies, auditors for emissions) plus elements of the multi-level infrastructure of policy development (newly created departments in public administration, think tanks, consultancy and law firms) and the carbon industry (project developers, traders, banks, exchanges), rely upon and mutually reinforce each other. This regime holds emissions trading in place – and it creates additional momentum. Even if, over the coming years, some of the great promises of efficiency and effectiveness become deconstructed in scientific and political debate (for example, by highlighting transaction costs and other hidden costs of regulation or focusing on the distortion of textbook designs in real world politics), there is still a good chance that the instrument will be retained, and expanded and branch out into other governance domains. There are developments under way to include air traffic into the EU-ETS and to establish links between European climate policy with regional initiatives for greenhouse gas emission trading in the USA and in other countries such as Japan and Canada. A vision that guides these stabilizing interactions across national policy development communities is a global emission market of interlinked mutually compatible trading systems.

REGIMES AROUND TECHNOLOGIES OF GOVERNANCE

Studying the case of emissions trading as an innovation journey in governance brings an interesting new aspect to the fore: the policy instrument builds a specialized social constituency and gives rise to the formation of a transnational regime. Regime formation is visible in the emergence actor networks, codified knowledge and institutions that are grouped around the instruments and are specifically targeted at making it operational and developing it further. In the case of emissions trading, national and international markets for emission allowances form an entirely new business sector that depends on the policy instrument being in place and working. In contrast to established notions of regimes in the context of governance studies (for example Gehring, 1994; Black, 2005) this regime is not centred on a problem area (such as international climate policy), but on a policy instrument, a particular technology of governance. The regime can be conceptualized as a 'technological regime' in governance: 'A technological regime is the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling relevant artifacts and persons, ways of defining problems – all of them embedded in institutions and infrastructures' (Rip and Kemp, 1998, p. 338). In the case of emissions trading a specific 'rule-set or grammar' of governance is embedded in policy theories, skills and expertise of policy analysts, public administrators and 'carbon market' professionals, specific emission market institutions and special interest organizations. The interdependence of these elements and their direct connection with emissions trading as a working configuration in governance gives momentum to policy development.

Such a view on the social life of policy instruments complements an established understanding of policy instruments as ideas or cognitive constructs (Majone, 1991; Howlett and Ramesh, 1993; Dolowitz and Marsh, 1996). The concept of technological regimes in governance offers a view on policy instruments as social entities, quasi-actors and institutional trajectories in their own right. For the technological regime the instrument becomes an end in itself. By way of (collective) political activities and participation in public discourses the social constituency of the instrument gains influence on problem definitions and policy goals in governance domains.

CONCLUSIONS

The innovation perspective on policy development that I adopted for the case study on emission trading brought aspects to the fore that are grounded in studies that take problem- or domain-oriented approaches to governance. The innovation journey of a single instrument across policy areas and

jurisdictions has shown that it has a life of its own. In historical dynamic analysis the development of emissions trading appears as a process with twists and turns extending over three decades. Design, legitimacy and attributed performance characteristics of the policy instrument have changed over the course of its life, shaped by a distributed agency, and a formation of networks and linkages with contexts of implementation.

An important insight is that, as the instrument matures, it develops a specialized social constituency and becomes institutionalized in the form of a transnational regime. Instruments are not only ideas that passively wait to be picked up and enacted, but they can take on characteristics of collective actors that actively promote solutions, looking for problems and seeking to create political demand. Dealing with innovation in governance thus resembles dealing with innovation in material technologies such as automobiles or photovoltaics. These technologies represent autonomous social constituencies with their own institutions and dynamics. They can get 'out of control' (Winner, 1977). This means that policy instruments cannot easily be chosen from the textbook or be transferred from one context to another by reference to their basic operational principle. Finally, the differentiation of a specialized social subsector for the development and maintenance of a particular policy instrument – which is especially relevant in the case of the global carbon industry – emphasizes the relevance of research into technological dynamics in governance. Understanding political transformations such as the emergence of 'new modes of governance' seems to be limited by a focus on shifting ideology, institutions or actor constellations and the effect on the choice of policy instruments. Policy instruments are not only dependent variables. To some degree, especially in a more mature state of development, policy instruments may themselves shape some of the framework conditions of their application and on their part make a choice with respect to the problems to which they could potentially be applied. In perspective, this points to a revised understanding of the co-evolution of policy instruments and governance, similar to the co-evolution of technology and industry structure (Tushman and Rosenkopf, 1994).

Studying the development of a policy instrument as an innovation process in governance has proven fruitful for this pilot study. The innovation journey concept was able to deliver an appropriate heuristic for the development of emissions trading. The case turned out to be a clear-cut example, ideal to demonstrate the added value of an innovation perspective on governance. In other cases it may not always be possible to reconstruct the innovation journey with the conceptual elements at hand. Some hypothetical generalizations, however, may be drawn for other economic instruments, especially those that are based on expert knowledge of sophisticated theoretical constructs and that give rise to new markets for advice and services. For deeper and more valid insights into the dynamics of technologies of governance, however, more case studies are needed for

different kinds of policy instruments. This could lead into the identification of different patterns of co-evolution between policy instruments and governance with varying elements of 'push' and 'pull'.

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NOTES

1. This article draws in large parts on Voß, 2007a.
2. The policy studies literature is diverse in itself. It has moved far beyond a simple stages model of the policy process (for an overview see Sabatier, 1999). Most concepts of policy change and learning, however, view policy instruments as secondary elements of governance patterns and assume that instruments follow basic political beliefs, problem perceptions and dominant goals, rather than having dynamics of their own (Sabatier and Jenkins-Smith, 1993; Hall, 1993; Howlett and Ramesh, 1993; Linder and Peters, 1998; Maier et al., 2003).
3. Project 88 was formally a study. In effect it was a focused strategy of coalition building. Key actors behind Project 88 were two senators who sponsored the project (Timothy E. Wirth, Colorado, and John Heinz, Pennsylvania), economist Robert Stavins, Professor for public policy at Harvard and former official of the Environmental Defense Fund (EDF), who managed it: 'EDF was a major participant in the Project 88 effort and worked closely with White House staff to develop the administration's Clean Air Act proposal (...)' (Hahn and Stavins, 1991, p. 24).

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