

# Multi-lateral emission trading: lessons from inter-state NO<sub>x</sub> control in the United States<sup>☆</sup>

Alex Farrell\*

*Department of Engineering and Public Policy, Baker Hall 129 Carnegie Mellon University, Pittsburgh, PA 15213-3890, USA*

Received 18 January 2001

---

## Abstract

Marketable emission permit mechanisms are increasingly proposed as efficient means of managing environmental pollution problems such as greenhouse gas emissions. Existing examples of emissions trading in the literature have so far been limited to domestic efforts put in place through the action of a national legislature, which has no parallel in international politics. This paper examines two efforts to establish multi-lateral emissions trading for nitrogen oxides among various states with the US. One, the Ozone Transport Commission's NO<sub>x</sub> Budget program is a success. The other, the Ozone Transport Assessment Group and the federal government's subsequent NO<sub>x</sub> SIP Call has not resulted in a multi-lateral emissions control program, let alone an efficient, market-based one. Due to the relative similarities of the states (compared to highly heterogeneous nations of the world) these are "best case" examples, and explaining the vast differences in outcomes will help explain the potential and the challenges in developing an international emission trading program to control greenhouse gas emissions. © 2001 Elsevier Science Ltd. All rights reserved.

*Keywords:* Emissions trading; Electricity; Politics; Carbon dioxide

---

## 1. Introduction

Marketable emission permit mechanisms are increasingly proposed as efficient means of managing environmental pollution problems such as greenhouse gas (GHG) emissions (Ellerman, 2000). Most often, the United States (US) Acid Rain Program to control SO<sub>2</sub> emissions from electric power plants is held up as an example for such international efforts (Jackson and Bailey, 1997; Solomon, 1995; Edmonds et al., 1999).<sup>1</sup> The SO<sub>2</sub> program is a domestic effort put in place through the action of a national legislature, which has no parallel in international politics. Any international

marketable emissions permit scheme will have to be the product of a multi-lateral agreement among sovereign nations which may have divergent interests and incentives to defect from inconvenient commitments; it will not be the result of an authoritative action by a superior level government and enforceable by a single legal entity. Moreover, countries of the world vary enormously in terms of legal structure, wealth, level of industrialization, vulnerability to climate change impacts, scientific capability and even interest in environmental protection relative to other societal goals. For these reasons, the applicability of lessons from the Acid Rain Program in the US to potential international emissions trading is limited (Fort and Faur, 1997; Victor, 1991).

Better examples for developing insights about multi-lateral emissions trading can be found in two efforts to develop inter-state emissions trading in nitrogen oxides (NO<sub>x</sub>) in the eastern US, the OTC NO<sub>x</sub> Budget and the NO<sub>x</sub> SIP Call (Farrell et al., 1999; US Environmental Protection Agency, 1997). These efforts are designed to combat regional smog in the eastern part of the country by significantly reducing emissions of NO<sub>x</sub> from electric power plants and other large stationary sources. One of them, the OTC NO<sub>x</sub> Budget, has resulted in a successful

---

<sup>☆</sup>The preparation of this paper was supported by the National Science Foundation through the Center for the Human Dimensions of Global Change (SBR-9521914). The authors thank M. Granger Morgan, Terry J. Keating and David G. Victor for comments and suggestions. A previous version of this paper was presented at the Eighth Biennial Conference of the International Association for the Study of Common Property, June 2000, Indiana University, Bloomington, IN.

\*Tel. +1-412-268-3756; fax: +1-412-268-3757.

*E-mail address:* afarrell@cmu.edu (A. Farrell).

<sup>1</sup>The most complete description of the acid rain program can be found in the recent book *Markets For Clean Air*, whose authors, it should be noted, are appropriately cautious about extending the examples to international programs (Ellerman et al., 2000).

emissions trading system that has been in place for two years while the other, the NO<sub>x</sub> SIP Call has been plagued with problems and may never be implemented (Farrell, 2000; US Court of Appeals—District of Columbia, 2000). Further, both had a technical assessment effort that ran parallel to the political negotiations, just as international environmental agreements often do (Keating and Farrell, 1999; Miller, 1999; Jaeger, van Eijndhoven, and Clark, 2001; Castells and Funtowicz, 1997). Most importantly, both examples involved efforts of somewhat heterogeneous and relatively independent political jurisdictions to negotiate a joint agreement on emissions trading that each implemented through state laws and regulations, although they are still imperfect analogs to international applications.

The remainder of this paper is laid out as follows. The next section briefly describes emissions trading and the regulation of NO<sub>x</sub> emissions in the US, providing the context for the two examples. The third section describes the OTC NO<sub>x</sub> Budget and the NO<sub>x</sub> SIP Call in detail, including the steps that led up to their creation. The fourth section contains observations of these two processes that are relevant to other multi-lateral emissions trading applications. The fifth section contains conclusions.

## 2. Background

### 2.1. Emissions trading

Emissions trading first emerged in the US in the late 1970s, but it was implemented awkwardly and was not very successful (Loeb, 1990; Foster and Hahn, 1995; Hahn, 1989; Liroff, 1986). The basic problem with these efforts, usually called Emission Reduction Credits (ERC), was that they were generally afterthoughts to an elaborate command-and-control regulatory program focused on performance standards and operating permits. There were few trades between different firms, so only a small fraction of the potential savings in control costs was achieved. Additionally, there were problems with enforcement of some of the programs (particularly the leaded gasoline phaseout). More recent state-level experiments in ERC programs have also been disappointing (Solomon and Gorman, 1998).

One attempt to get around these problems has been the development the “Open Market Trading” concept which is specifically designed to avoid the structural and procedural shortcomings of US air pollution law by creating a retrospective certification system of voluntary actions (Ayres, 1994). This approach was endorsed by name early in the Clinton Administration (Clinton and Gore, 1995), and led eventually to a proposed rule (US Environmental Protection Agency, 1995). However, this rule was harshly criticized by environmentalists expert

in, and normally very supportive of, emissions trading for being too vague and full of loopholes (Goffman and Dudek, 1995). The proposed rule was never followed up, instead the concept of Open Market Trading was included in a draft of a comprehensive guidance document issued in 1999, which itself has not been followed up on to date (US Environmental Protection Agency, 1999). This guidance resolves many of the concerns that had been raised, but in doing so makes it very difficult to implement Open Market Trading, which remains untried today.

In contrast to these approaches, the two NO<sub>x</sub> emissions trading examples are examples of “cap-and-trade” programs, a much more straightforward form. The central idea of cap-and-trade programs is that regulated firms are allocated a fixed number of allowances (the cap) by an authoritative agency and are required to redeem one allowance for every ton of pollution emitted. Since allocations of emissions allowances are smaller than historical emissions and they tend to decline over time, regulated firms have four basic options, (1) control (i.e. reduce) emissions to exactly match their allocation, (2) “undercontrol” and buy allowances to meet this redemption requirement, (3) “overcontrol” and sell their excess, or, (4) overcontrol and bank allowances for use in future years (if permitted). Thus cap-and-trade programs combine a fixed emission limit with great flexibility for regulated sources, which accounts for their appeal. An important feature of emissions trading programs is that they tend to work better and lead to greater savings the larger the number and the more heterogeneous the regulated sources (Tietenberg, 1990; Stavins, 2000).

But within this relatively simple framework lie many important details. One of the most important issues is how to allocate emissions allowances, that is, how to get them from the government (who creates them) to the regulated sources (who must redeem them back to the government). Under a cap-and-trade system, emissions allowances can represent a significant value, especially if the cap declines over time and it is difficult to substitute for the capital being regulated (e.g. coal-fired power plants), so potential participants often fight bitterly over emissions allocation (Joskow and Schmalensee, 1998; Keohane et al., 1997). The most divisive questions surround the mechanism of allocation: Should emissions allowances be given away, auctioned, or distributed in some other way? Despite the advantages of auctions that economists have pointed out, “grandfathering,” or the free distribution of allowances to existing sources in proportion to historical emissions has been used in every cap-and-trade program in the US to date (Hahn and Noll, 1982; Jung et al., 1996; Klier et al., 1997; Ben-David et al., 1999). Further, if given away, how many goes to whom? If auctioned, who may bid and where do the revenues go?

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات