

EMISSIONS TRADING

Lessons learned from the
European Union and
Kyoto Protocol Climate
Change Programs



Climate Change and its Causes,
Effects and Prediction Series

Ervin Nagy  Gisella Varga

NOVA

Editors

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**EMISSIONS TRADING: LESSONS
LEARNED FROM THE EUROPEAN
UNION AND KYOTO PROTOCOL
CLIMATE CHANGE PROGRAMS**

**ERVIN NAGY
AND
GISELLA VARGA
EDITORS**

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PREFACE

The European Union's (EU) Emissions Trading Scheme (ETS) is a cornerstone of the EU's efforts to meet its obligation under the Kyoto Protocol. It covers more than 10,00 energy intensive facilities across the 27 EU Member countries; covered entities emit about 45% of the EU's carbon dioxide emissions. This book explores climate change which is generally viewed as a global issue, but proposed responses typically require action at the national level. With the 1997 Kyoto Protocol now in force and setting emissions objectives for 2008-2012, countries that ratified the protocol are developing appropriate implementation strategies to begin reducing their emissions of greenhouse gases. These objectives are discussed in detail in this book.

Chapter 1 - The European Union's (EU) Emissions Trading Scheme (ETS) is a cornerstone of the EU's efforts to meet its obligation under the Kyoto Protocol. It covers more than 10,00 energy intensive facilities across the 27 EU Member countries; covered entities emit about 45% of the EU's carbon dioxide emissions. A "Phase 1" trading period began January 1, 2005. A second, Phase 2, trading period began in 2008, covering the period of the Kyoto Protocol, with a Phase 3 proposed for 2013.

Several positives resulting from the Phase 1 "learning by doing" exercise assisted the ETS in making the Phase 2 process run more smoothly, including: (1) greatly improving emissions data, (2) encouraging development of the Kyoto Protocol's project-based mechanisms — Clean Development Mechanism (CDM) and Joint Implementation (JI), and (3) influencing corporate behavior to begin pricing in the value of allowances in decision-making, particularly in the electric utility sector.

However, several issues that arose during the first phase were not resolved as the ETS moved into Phase 2, including allocation schemes, shutdown credits and

new entrant reserves, and others. In addition, the expansion of the EU and the implementation of the directives linking the ETS to the Kyoto Protocol project-based mechanisms created new issues to which Phase 2 had to respond. A more comprehensive response to these issues is envisioned for Phase 3.

The United States is not a party to Kyoto. However, almost four years of carbon emissions trading has given the EU valuable experience in designing and operating a greenhouse gas trading system. This experience may provide some insight into cap-and-trade design issues currently being debated in the United States.

- The U.S. requires only electric utilities to monitor CO₂. The EU-ETS experience suggests that expanding similar requirements to all facilities covered under a cap-and-trade scheme would be pivotal for developing allocation systems, reduction targets, and enforcement provisions.
- In the U.S. debate on comprehensive versus sector-specific reduction programs, the EU-ETS experience suggests that adding sectors to a trading scheme once established may be a slow, contentious process.
- As with most EU industries, most U.S. industry groups either oppose auctions outright or want them to be supplemental to a base free allocation. The EU-ETS experience suggests Congress may want to consider specifying any auction requirement if it wishes to incorporate market economics more fully into compliance decisions.
- EU-ETS analysis suggests the most important variables in determining Phase 1 allowance price changes were oil and natural gas price changes; this apparent linkage raises possible market manipulation issues, particularly with the inclusion of financial instruments such as options and futures contracts. Congress may consider whether the government needs enhanced regulatory and oversight authority over such instruments.

Chapter 2 - The European Union's (EU's) Emissions Trading System (ETS) is a cornerstone of the EU's efforts to meet its obligation under the Kyoto Protocol. It covers more than 11,500 energy intensive facilities across the 25 EU member countries, including oil refineries, powerplants over 20 megawatts (MW) in capacity, coke ovens, and iron and steel plants, along with cement, glass, lime, brick, ceramics, and pulp and paper installations. Covered entities emit about 45% of the EU's carbon dioxide emissions. The trading program does not cover emissions of non-CO₂ greenhouse gases, which account for about 20% of the EU's total greenhouse gas emissions. The first trading period began January 1, 2005. A second trading period is scheduled to begin in 2008, with a third one planned for 2013. In

deciding on its trading program, the European Commission (EC) adopted a “learning-by-doing” approach to prepare the EU for the Kyoto Protocol’s emission limitations. The EU does not have major experience with emissions trading, and the EC felt that an initial program beginning in 2005 would give the EU practical familiarity in operating such a system.

At first glance, it would appear that the EU may have little difficulty meeting its Kyoto Protocol requirements during the second trading period. The anticipated deficit between the second trading period for the original 15 Member States can be covered by trading with the 10 newer Member States that anticipate a surplus. Also, credits are likely to be available through Joint Implementation (JI) and Clean Development Mechanism (CDM) projects sanctioned under the Protocol.

However, there are other considerations. The availability of surplus credits created via JI and CDM is restricted by the EC requirement that such credits be “supplemental” to a country’s domestic efforts. Each country is to spell out what “supplemental” means in its National Allocation Plans (NAPs) for the second trading period. Individual countries are likely to define that term differently — restricting allowance trades and purchases in some countries.

Another consideration is the overall commitment of the Kyoto Protocol. As noted earlier, the ETS covers only a percentage of the overall greenhouse gas emissions in the various Member States of the EU. Some sectors not covered by the ETS may grow faster than sectors covered by it, creating difficulties for compliance. In particular, the transportation area is already a source of concern.

A final consideration for the ETS is its suitability for directing long-term investment toward a low-carbon future — the ultimate goal of any climate change program. It is too early to tell whether the ETS’s market signal and individual countries’ NAPs will move investment in the appropriate direction. The early signs are not particularly encouraging, with the 2005-2008 NAPs producing an over- allocation of allowances and one major Member State (Germany) attempting to direct its second NAP toward carbon-intensive, coal-fired electric-generating facilities rather than low-carbon alternatives. Reluctance by countries to redirect their NAPs and an inconsistent price signal from the ETS make the long-term effect of the ETS uncertain.

Chapter 3 - According to available information and experts, the ETS phase I established a functioning market for carbon dioxide allowances, but its effects on emissions, the European economy, and technology investment are less certain. Nonetheless, experts suggest that it offers lessons that may prove useful in informing congressional decision making. By limiting the total number of emission allowances provided to covered entities under the program and enabling these entities to sell or buy allowances, the ETS set a price on carbon emissions. However,

in 2006, a release of emissions data revealed that the supply of allowances—the cap—exceeded the demand, and the allowance price collapsed. Overall, the cumulative effect of phase I on emissions is uncertain because of a lack of baseline emissions data. The longterm effects on the economy also are uncertain. One concern about design and implementation was that the economic activities associated with emissions from covered entities would shift from the European Union to countries that do not have binding emission limits—a concept known as leakage. However, leakage does not appear to have occurred, in part because covered entities did not purchase allowances but received them for free. The effect of the ETS on technology investment also is uncertain but was likely minimal, in part because phase I was not long enough to affect such investments. Phase I of the ETS offers three key lessons: (1) accurate emissions data are essential to setting an effective emissions cap; (2) a trading program should provide enough certainty to influence technology investment; and (3) the method for allocating allowances may have important economic effects, namely, free allocation may distribute wealth to covered entities whereas auctioning could generate revenue for governments.

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Chapter 1

CLIMATE CHANGE AND THE EU EMISSIONS TRADING SCHEME (ETS): KYOTO AND BEYOND^{*}

Larry Parker

ABSTRACT

The European Union's (EU) Emissions Trading Scheme (ETS) is a cornerstone of the EU's efforts to meet its obligation under the Kyoto Protocol. It covers more than 10,00 energy intensive facilities across the 27 EU Member countries; covered entities emit about 45% of the EU's carbon dioxide emissions. A "Phase 1" trading period began January 1, 2005. A second, Phase 2, trading period began in 2008, covering the period of the Kyoto Protocol, with a Phase 3 proposed for 2013.

Several positives resulting from the Phase 1 "learning by doing" exercise assisted the ETS in making the Phase 2 process run more smoothly, including: (1) greatly improving emissions data, (2) encouraging development of the Kyoto Protocol's project-based mechanisms — Clean Development Mechanism (CDM) and Joint Implementation (JI), and (3) influencing corporate behavior to begin pricing in the value of allowances in decision-making, particularly in the electric utility sector.

However, several issues that arose during the first phase were not resolved as the ETS moved into Phase 2, including allocation schemes, shutdown credits and new entrant reserves, and others. In addition, the

^{*} Excerpted from CRS Report RL34150, dated November 24, 2008.

expansion of the EU and the implementation of the directives linking the ETS to the Kyoto Protocol project-based mechanisms created new issues to which Phase 2 had to respond. A more comprehensive response to these issues is envisioned for Phase 3.

The United States is not a party to Kyoto. However, almost four years of carbon emissions trading has given the EU valuable experience in designing and operating a greenhouse gas trading system. This experience may provide some insight into cap-and-trade design issues currently being debated in the United States.

- The U.S. requires only electric utilities to monitor CO₂. The EU-ETS experience suggests that expanding similar requirements to all facilities covered under a cap-and-trade scheme would be pivotal for developing allocation systems, reduction targets, and enforcement provisions.
- In the U.S. debate on comprehensive versus sector-specific reduction programs, the EU-ETS experience suggests that adding sectors to a trading scheme once established may be a slow, contentious process.
- As with most EU industries, most U.S. industry groups either oppose auctions outright or want them to be supplemental to a base free allocation. The EU-ETS experience suggests Congress may want to consider specifying any auction requirement if it wishes to incorporate market economics more fully into compliance decisions.
- EU-ETS analysis suggests the most important variables in determining Phase 1 allowance price changes were oil and natural gas price changes; this apparent linkage raises possible market manipulation issues, particularly with the inclusion of financial instruments such as options and futures contracts. Congress may consider whether the government needs enhanced regulatory and oversight authority over such instruments.

OVERVIEW

Climate change is generally viewed as a global issue, but proposed responses typically require action at the national level. With the 1997 Kyoto Protocol now in force and setting emissions objectives for 2008-2012, countries that ratified the protocol are developing appropriate implementation strategies to begin reducing their emissions of greenhouse gases.[1] In particular, the European Union (EU) has decided to use an emissions trading scheme (called a “cap-and-trade” program), along with other market-oriented mechanisms permitted under the Protocol, to help it achieve compliance at least cost.[2] The decision to use emission trading to

implement the Kyoto Protocol is at least partly based on the successful emissions trading program used by the United States to implement its sulfur dioxide (acid rain) control program contained in Title IV of the 1990 Clean Act Amendments.[3]

The EU's Emissions Trading System (ETS) covers more than 10,000 energy intensive facilities across the 27 EU Member countries, including oil refineries, powerplants over 20 megawatts (MW) in capacity, coke ovens, and iron and steel plants, along with cement, glass, lime, brick, ceramics, and pulp and paper installations. Covered entities emit about 45% of the EU's carbon dioxide emissions. The trading program covers neither CO₂ emissions from the transportation sector, which account for about 25% of the EU's total greenhouse gas emissions, nor emissions of non-CO₂ greenhouse gases, which account for about 20% of the EU's total greenhouse gas emissions. A "Phase 1" trading period began January 1, 2005.[4]

A second, Phase 2, trading period began January 1, 2008, covering the period of the Kyoto Protocol, with a Phase 3 planned to begin in 2013.[5]

Under the Kyoto Protocol, the then-existing 15 nations of the EU agreed to reduce their aggregate annual average emissions for 2008-20 12 by 8% from the Protocol's baseline level (mostly 1990 levels) under a collective arrangement called a "bubble." By 2006, collective greenhouse gas emissions in the EU were 2.7% below Kyoto baseline levels (2.2% below 1990 levels), mostly the result of a structural shift from coal to natural gas in the United Kingdom and the incorporation of East Germany into West Germany.[6] In light of the Kyoto Protocol targets, the EU adopted a directive establishing the EU-ETS that entered into force October 13, 2003.[7] The importance of emissions trading was elevated by the accession of 12 additional central and eastern Europe countries to EU membership from May 2004 through January 2007. Collectively, the 27 Members of the expanded EU's greenhouse gas emissions dropped 7.7% from 1990 to 2006.

The EC believes that the Phase 1 "learning by doing" exercise prepared the community for the difficult task of achieving the reduction requirements of the Kyoto Protocol. Several positives resulted from the Phase 1 experience that assisted the ETS in making the Phase 2 process run smoothly, at least so far. First, Phase 1 established much of the critical infrastructure necessary for a functional emission market, including emissions monitoring, registries, and inventories. Much of the publicized difficulties the ETS experienced in the first phase can be traced to inadequate emission data.[8] Phase 1 significantly improved those data in preparation for Phase 2 implementation.

Second, the ETS helped jump-start the project-based mechanisms — Clean Development Mechanism (CDM) and Joint Implementation (JI) — created under the Kyoto Protocol.[9] As stated by Ellerman and Buchner:

The access to external credits provided by the Linking Directive has had an invigorating effect on the CDM and more generally on CO₂ reduction projects in developing countries, especially in China and India, the two major countries that will eventually have to become part of a global climate regime if there is to be one.[10]

Third, according to the EC, a key result of Phase 1 was its effect on corporate behavior. An EC survey of stakeholders indicated that many participants are incorporating the value of allowances in making decisions, particularly in the electric utility sector where 70% of firms stated they were pricing in the value of allowances into their daily operations, and 87% into future marginal pricing decisions. All industries stated that it was a factor in long-term decision-making.[11]

However, several issues that arose during the first phase remain contentious as the ETS implements Phase 2, including allocation (including use of auctions and reliance on model projections), shutdown credits and new entrant reserves, and others. In addition, the expansion of the EU and the implementation of the linking directives create new issues to which Phase 2 has had to respond. These new and continuing challenges for Phase 2 implementation are discussed below.

NATIONAL ALLOCATION PLANS AND THE ETS

National Allocation Plans (NAPs) are central to the EU's effort to achieve its Kyoto obligations. Each Member of the EU must submit a NAP that lays out its allocation scheme under the ETS, including individual allocations to each affected unit. For the second trading period, these NAPs were assessed by the EC to determine compliance with 12 criteria delineated in an annex to the emissions trading directive.[12] Criteria included requirements that the emissions caps and other measures proposed by the Member State were sufficient to put it on the path toward its Kyoto target, protections against discrimination between companies and sectors, delineation of intended use of CDM and JI credits for compliance, along with provisions for new entrants, clean technology, and early reduction credits. For the second trading period, the NAP must guarantee Kyoto compliance.

NAPs for the second trading period were due June 30, 2006. By October 26, 2007, the EC had reviewed and approved (sometimes conditionally) all 27 Member States' NAPs. As indicated by table 1, the EC reduced the proposed allocations of individual Member States by an average of 10.5% to increase the probability that the EU will achieve its target under the Kyoto Protocol. The need to reduce the

requested allocations reflects both the structure of the ETS and the lessons the EC learned during the first phase.

Table 1. ETS Annual Allocations for Phase 2: 2008-2012

Member State	2005 Emissions (MMTCO ₂ E)	Proposed Kyoto Cap (MMTCO ₂ E)	EC Approved Kyoto Cap (MMTCO ₂ E)	Approved as Percent of Proposed
Austria	33.4	32.8	30.7	93.6%
Belgium	55.4	63.3	58.5	92.4%
Bulgaria	40.6	67.6	42.3	62.6%
Czech Rep.	82.5	101.9	86.8	85.2%
Cyprus	5.1	7.12	5.48	77%
Denmark	26.5	24.5	24.5	100%
Estonia	12.62	24.38	12.72	52.2%
Finland	33.1	39.6	37.6	94.8%
France	131.3	132.8	132.8	100%
Germany	474	482	453.1	94%
Greece	71.3	75.5	69.1	91.5%
Hungary	26.0	30.7	26.9	87.6%
Ireland	22.4	22.6	22.3	98.6%
Italy	225.5	209	195.8	93.7%
Latvia	2.9	7.7	3.43	44.5%
Lithuania	6.6	16.6	8.8	53%
Luxembourg	2.6	3.95	2.5	63%
Malta	1.98	2.96	2.1	71%
Netherlands	80.35	90.4	85.8	94.9%
Poland	203.1	284.6	208.5	73.3%
Portugal	36.4	35.9	34.8	96.9%
Romania	70.8	95.7	75.9	79.3%
Slovakia	25.2	41.3	30.9	74.8%
Slovenia	8.7	8.3	8.3	100%
Spain	182.6	152.7	152.3	99.7%
Sweden	19.3	25.2	22.8	90.5%
UK	242.4	246.2	246.2	100%
Total	2122.16	2325.34	2080.93	89.5%

Source: European Commission, "Emissions Trading: EU-wide cap for 2008-2012 set at 2.08 billion allowances after assessment of national plans for Bulgaria," EC Press Release, October 26, 2007.

Need for Further Emissions Reductions

It is unclear to what degree the first phase of the ETS achieved real emissions reductions. Emissions are dynamic over time; a product of a country's population,

economic activity, and greenhouse gas intensity.[13] To capture these dynamics, the Member States of the EU develop emissions baselines from models that project future trends in a country's emissions based on these and other factors, such as anticipated energy and greenhouse gas policies.[14] During the first phase, the emissions goal was to put the EU on the path to Kyoto compliance — not actually comply with the Protocol (which wasn't necessary until the 2008-2012 time period). Thus, countries developed “business as usual” baselines based on projected growth in emissions. Such a projected baseline suffers from two sources of uncertainty: data uncertainties, and forecasting uncertainties. On data, Phase 1 suffered from uncertainties with respect to data collection and coverage, in monitoring methods for historic data, and data verification. On projecting future emissions, Phase 1 faced uncertainties with respect to economic or sector-based growth rates. Fueled in many cases by over-optimistic economic growth assumptions, these uncertainties increased the probability of inflated business as usual baselines.[15]

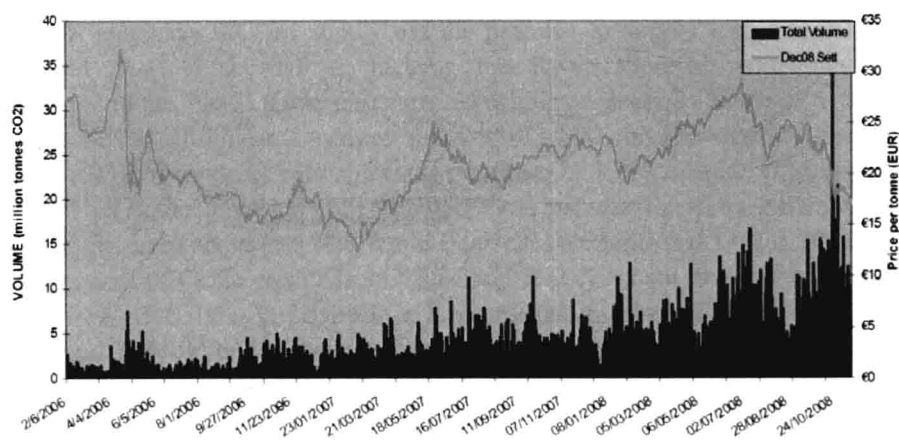
The combination of these factors and modest reduction requirements resulted in the emissions allocations for the 2005-2007 trading period being higher than actual 2005 emissions.[16] This result has raised questions about how much reductions achieved during Phase 1 were real as opposed to being merely paper artifacts. On the positive side, verified emissions in 2005 were 3.4% below the estimated 2005 baseline used during the allocation process. In addition, the allowance prices for 2005 stayed persistently high, suggesting some abatement was occurring and raising questions of “windfall” profits. As stated by Ellerman and Buchner:

First, and most importantly, the persistently high price for EUAs [EU emissions allowances] in a market characterized by sufficient liquidity and sophisticated players must be considered as creating a presumption of abatement. It would be startling if power companies did not incorporate EUA prices into dispatch decisions that would have shifted generation to less emitting plants. There is plenty of anecdotal evidence that this was the case, and the prominent charges of windfall profits assume that the opportunity cost of freely allocated allowances was being passed on (without noting the implications for abatement). Similarly, it would be surprising if there were no changes in production processes that could be made by the operators of industrial plants.[17]

However, EU emissions allowances (EUAs) during Phase 1 did not maintain value. Phase 1 EUAs were basically worthless during the final six months of 2007. This decline in EUA prices at least partially reflected the general non-transferability of Phase 1 EUAs to Phase 2. Only Poland and France included limited banking in their Phase 1 NAPs. The EC further restricted use of Phase 1

EUAs in Phase 2 with a ruling in November, 2006.[18] As a result, excess Phase 1 EUAs were worthless at the end of 2007.[19]

One consequence of the non-transferability of Phase 1 EUAs is that prices for Phase 2 EUAs have been relatively firm, as indicated by figure 1 above. This firmness may reflect the ability of the EC to certify Phase 2 NAPs using more verifiable baseline data than were available for Phase 1.[20] Scarcity is critical for the proper functioning of an allowance market. A major reason the EC rejected *ex post* adjustments[21] was fear that such adjustments would have a disruptive effect on the marketplace.[22] Phase 1 did not firmly establish this foundation of markets;[23] based on the Phase 2 EUA future's market, further market development appears to be occurring, although several challenges to that development will be discussed later.



Source: ECX Exchange.

Figure 1. ECX CFI Futures Contracts: Price and Volume.

Need to Adjust ETS Allocations

While the environmental performance of Phase 1 may be disputed, the need for additional reductions to achieve Kyoto is not. As indicated by the orange line in figure 2, the European Environment Agency (EEA) projects that the EU-15 existing measures will halt the projected increase in greenhouse gases; however, as indicated by the red line, they are insufficient to reduce EU-15 emissions to their Kyoto requirements that began in 2008. To achieve this target the EU envisions three actions: (1) further reductions by EU-15 countries, (2) the use of Kyoto mechanisms (Joint Implementation (JI) and Clean Development Mechanism (CDM); and, (3)