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Climate Change: The European Union's Emissions Trading System (EU-ETS)

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Summary

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-CO_2 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.

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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, 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) 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-CO_2 greenhouse gases, which account for about 20% of the EU's total greenhouse gas emissions. The first trading

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[1] Six gases are included under the Kyoto Protocol: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The United States has not ratified the Kyoto Protocol and, therefore, is not covered by its provisions. For more information on the Kyoto Protocol, see CRS Report RL30692, *Global Climate Change: The Kyoto Protocol*, by Susan Fletcher.

[2] Norway, a non-EU country, also has instituted a CO_2 trading system (described in **Appendix A**). Various other countries and a state-sponsored regional initiative located in the northeastern United States involving several states are developing mandatory cap-and-trade system programs, but are not operating at the current time. For a review of these emerging programs, along with other voluntary efforts, see International Energy Agency, *Act Locally, Trade Globally* (2005).

[3] P.L. 101-549, Title IV (Nov. 15, 1990).

period began January 1, 2005. A second trading period is scheduled to begin in 2008, covering the period of the Kyoto Protocol, with a third one planned for 2013.[4]

Under the Kyoto Protocol, the then-existing 15 nations of the EU agreed to reduce their emissions by 8% from 1990 levels under a collective arrangement called a "bubble." By 2001, collective greenhouse gas emissions in the EU were 2.3% 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. Several countries, including Ireland, Spain, and Portugal, experienced emissions growth of over 30% during this period.[5] In light of the Kyoto Protocol targets, the EU adopted a directive establishing the EU-ETS that entered into force October 13, 2003.[6] The importance of emissions trading was elevated by the accession of 10 additional central and eastern Europe countries to EU membership in May 2004. Collectively, these 10 countries' greenhouse gas emissions dropped 22.6% from 1990-2001, with only Slovenia's emissions increasing during that time (10.4%). This expansion of the EU trading zone to 25 countries greatly increases the opportunities for cost-effective allowance trades.

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 emissions limitations. The EU does not have major experience with emissions trading, and the EC felt an initial program beginning in 2005 would give the EU practical familiarity in operating such a system. The EC also wanted the most comprehensive program possible. As stated in its "Green Paper":

> The wider the scope of the system, the greater will be the variation in the costs of compliance of individual companies, and the greater the potential for lowering costs overall. This argues in favour of a comprehensive trading scheme across different Member States covering all 6 greenhouse gases and sinks, and encompassing all emissions sources.[7]

Economic analysis conducted by the European Commission confirms the potential cost-saving available from a comprehensive trading scheme. As shown in **Table 1**, a comprehensive trading program is estimated by the EC to reduce Kyoto compliance costs to EU countries by 3 billion euro, or one-third over a compliance scenario that does not include trading among Member countries, and by 0.9 billion

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[4] More information, including relevant directives, on the EU-ETS is available on the European Union's website at [http://europa.eu.int/scadplus/leg/en/lvb/l28012.htm].

[5] Pew Center on Global Climate Change, *The European Union Emissions Trading Scheme (EU-ETS): Insights and Opportunities* (no date), available at [http://www.pewclimate.org/docUploads/EU%2DETS%20White%20Paper%2Epdf].

[6] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emissions allowance trading within the Community and amending Council Directive 96/61/EC.

[7] Commission of the European Communities, *Green Paper on Greenhouse Gas Emissions Trading within the European Union* (presented by the Commission), Brussels, COM(2000) 87 final (Mar. 8, 2000), p. 10.

euro, or 13% below the estimate cost of compliance with the trading scheme ultimately chosen by the EC.

Table 1: Cost of Reaching Kyoto Target to EU Member States in 2010
(in billions of 1999 euro)

No Trading Among EU Member States	EU-wide Trading Among Energy Producers	EU-wide Trading Among Energy Producers and Energy-Intensive Industries	EU-wide Trading Among All Sectors
9.0	7.2	6.9	6.0

Source: EC *Green Paper* (Mar. 8, 2000), p. 27.

For a variety of reasons, the EC chose a trading system with limited coverage rather than a comprehensive system covering all sources and gases. Some European analysts have noted that EU politics played an important role in preventing serious consideration of a comprehensive program. As noted by Boemare and Quirion:

> A significantly wider coverage could have been provided only by an upstream system, which had been excluded by the [European] Commission at the beginning of the process. The reason was again political: an upstream scheme would have too much looked like a tax.[8]

Not surprisingly, this reason was not employed by the EC in explaining its decision to create a less comprehensive trading scheme at this time. As stated by the EC:

> ... there are sound scientific and practical reasons why the Community might not wish to establish a comprehensive scheme at this stage. There are considerable uncertainties surrounding the emissions of the fluorinated gases [HFC, PFC, SF_6] and the absorption of carbon dioxide by sinks. Allocating allowances, monitoring emissions and enforcing compliance of small mobile emitters, such as private cars, raise complex technical and administrative issues.[9]

For determining the size of the trading program, the EC looked at five criteria: (1) environmental effectiveness, (2) economic efficiency, (3) the potential effects on competition, (4) feasibility, and (5) existence of alternative policies and measures.

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[8] The first political decision noted by the authors was the exclusion of process emissions from the chemical industry from the ETS. Catherine Boemare and Philippe Quirion, *Implementing Greenhouse Gas Trading in Europe: Lessons from Economic Theory and International Experiences*, Centre International de Recherche sur l'Environnement et le Developpement, CNRS/EHESS, France (June 2002), p. 5.

[9] Commission of the European Communities, *Green Paper on Greenhouse Gas Emissions Trading with the European Union* (presented by the Commission), Brussels, COM(2000) 87 final (Mar. 8, 2000), p. 10.

It felt that starting with a relatively small number of economic sectors and sources that contribute significantly to total emissions and for which trading could reduce cost significantly would "substantially" satisfy these criteria.[10] As noted, the six sectors chosen emit about 45% of the EU15's CO_2 emissions (which are about 80% of the EU's total greenhouse gas emissions). The coverage for individual countries varies widely; only 20% of France's greenhouse gas emissions are covered, compared with 69% of Estonia's emissions.[11]

Implementing the ETS: National Allocation Plans

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 first trading period, each country had to prepare a NAP by March 31, 2004 (May 1, 2004 for the 10 new EU Members). NAPs for the second period were due June 30, 2006. These NAPs are assessed by the EC to determine compliance with 11 criteria (12 for the second period) delineated in an annex to the emissions trading directive.[12] Criteria include requirements that the emissions caps and other measures proposed by the state are sufficient to put it on the path toward its Kyoto target, protections against discrimination between companies and sectors, along with provisions for new entrants, clean technology, and early reduction credits. For the second period, the NAP must guarantee Kyoto compliance.

For the first period, the EC approved most of the necessary NAPs by the end of 2004. The last NAP was approved June 20, 2006 (from Greece). In general, the primary problem the EC found with NAPs that resulted in revisions were excessive allocation of allowances and state efforts to permit "ex-post adjustments" to their allocations. Excessive allocation problems resulted from states that left a gap in how they would achieve their target, to be filled with measures to be defined later; insufficiently delineated plans to purchase allowances; and unrealistic economic or emissions growth assumptions. Ex-post adjustments by states are not allowed; such adjustments are seen by the EC as potentially disruptive to the emissions market and creating uncertainty for companies.

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[10] Commission of the European Communities, *Green Paper on Greenhouse Gas Emissions Trading with the European Union* (presented by the Commission), Brussels, COM(2000) 87 final (Mar. 8, 2000), p. 13

[11] International Energy Agency, *Act Locally, Trade Globally (*OCED/IEA, 2005), p. 74

[12] Commission of the European Communities, Directive 2003/87/EC, available at [http://ec.europa.eu/environment/climat/emissions_plans.htm]

Results From the First Year

Emissions Levels

For the 2005-2007 period, the European Union is not attempting to meet the Kyoto Protocol but to get experience with emissions trading with some modest emissions targets (i.e., to put the EU on the path toward meeting the Kyoto requirements). **Table 2** provides the national emissions allocations and 2005 emissions levels for 21 EU countries as recorded by the Community Independent Transaction Log (CITL) by the compliance deadline of April 30, 2006.[13] For the first trading period, the 21 countries have allocated an annual average of 1.8295 billion allowances and set aside 73.4 million allowances for allocation to new sources or for auctions. Verified emissions in 2005 for covered sources is 1.7853 billion metric tons, according to the CITL.[14] The 44.2 million allowances allocated in excess of actual 2005 emissions have been characterized by EU's Environment Commissioner as an "over-allocation" of allowances[15] and is considered responsible for a significant drop in allowances prices in May, 2006. The 2005 emissions total reflects emissions from 8,980 sources representing more than 99% of the allowances allocated. As of April 30, 849 sources in the 21 countries had not surrendered sufficient allowances. The EC will determine whether the insufficiency is the result of technical difficulties in national registries, tardiness, or noncompliance. Noncomplying sources are subject to a 40-euro penalty for each ton of emissions in excess of surrendered allowances under the ETS.

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[13] Four of the 25 Member States (Cyprus, Luxembourg, Malta, and Poland) have not submitted information because their allowance registries are not operational yet. Cyprus and Malta do not have emissions targets under the Kyoto Protocol.

[14] European Commission, *EU Emissions Trading Scheme Delivers First Verified Emissions Data for Installations* (Brussels, 15 May 2006), available at[http://ec.europa.eu/comm/environment/climat/pdf/citl_pr.pdf]

[15] Comments of EU Environment Commissioner Stavros Dimas, as reported by Jeff Mason in "EU's Dimas Says States Allocated too Much CO2 in '05" (Reuters, May 22, 2006).

Table 2. Summary Information Per Member State

Member State	CO_2 emissions for 2005 in tonnes	Installations that have not reported by 30 April	Share of installations with verified emissions reports	Installations covered[a]	Installations not in compliance on 30 April 2006	Annual average allocation in 2005 to 2007 in tonnes[b]	Annual average allocation not allocated at the outset in tonnes[c]
Austria	33,372,841	0	100.0%	199	0	32,674,905	330,050
Belgium	55,354,096	2	99.9%	309	2	59,853,575	2,545,876
Czech Republic[d]	82,453,727	39	98.4%	389		96,907,832	348,020
Denmark	26,090,910	2	98.9%	380	4	31,039,618	2,460,382
Estonia	12,621,824	0	100.0%	43	1	18,763,471	189,529
Finland	33,072,638	10	100.0%	578	19	44,587,032	862,952
France[d]	131,147,905	17	99.7%	1075		150,500,685	4,871,317
Germany	473,715,872	13	99.8%	1842	90	495,073,574	3,926,426
Greece	71,033,294	28	99.5%	141	29	71,135,034	3,286,839
Hungary	25,714,574	13	99.0%	229	19	30,236,166	1,424,738
Ireland	22,397,678	0	100.0%	109	0	19,238,190	3,081,180
Italy	215,415,641	208	95.4%	943	647	207,518,860	15,551,575
Latvia	2,854,424	1	99.9%	92	1	4,054,431	505,760
Lithuania	6,603,869	2	99.9%	93	4	11,468,181	797,213
Netherlands	80,351,292	0	100.0%	209	0	86,439,031	2,503,305
Portugal	36,413,004	1	99.9%	243	2	36,898,516	1,262,898
Slovak Republic[d]	25,237,739	0	100.0%	175		30,364,848	7,180

Member State	CO_2 emissions for 2005 in tonnes	Installations that have not reported by 30 April	Share of installations with verified emissions reports	Installations covered[a]	Installations not in compliance on 30 April 2006	Annual average allocation in 2005 to 2007 in tonnes[b]	Annual average allocation not allocated at the outset in tonnes[c]
Slovenia	8,720,550	0	100.0%	98	0	8,691,990	66,667
Spain[d]	181,063,141		99.1%	800		162,111,391	13,162,130
Sweden	19,306,761	29	99.4%	705	31	22,530,831	678,149
United Kingdom	242,396,039	15	99.9%	768	16	209,387,854	15,527,484
Total	**1,785,337,819**		**99.1%**	**9,420**		**1,829,476,015**	**73,389,670**

Note: As all data are held in the CITL and national registries, no data are available for those Member States without an active registry.

a. The figures in this column indicate the number of installations with active registry accounts on 30 April 2006. They differ from figures communicated in earlier press releases because they are updated for installations that opted-out for the first trading period, opted-in, and installations without open accounts.

b. The figures in this column are allowances allocated to existing installations at the start of the scheme.

c. The figures in this column are allowances not allocated to existing installations at the start of the scheme but put aside mainly for new entrants and auctioning (in the cases of Denmark, Hungary, Ireland, and Lithuania).

d. Due to technical problems in the national registries of the Czech Republic, France, the Slovak Republic, and Spain, the CITL did not receive wholly reliable information on the installation level surrenders from these Member States. Therefore, some fields are empty for these Member States. All data represented in the table were communicated directly to the European Commission by the respective authorities of these Member States.

Some commentators have suggested that annual average 2005-2007 allocations that are actually 44.1 million metric tons higher than the reported 2005 emissions are neither putting the EU on the path to the Kyoto requirements nor developing the trading market. In addition, this "over-allocation" does not include the 73.4 million metric tons of allowances held in reserve by the various countries for new entrants. The Climate Action Network (CAN), a network of 365 non-governmental organizations, stated the following:

> Emissions limits set by Member States for the first phase were a major disappointment. To ensure maximum environmental benefit of the ETS and the overall success of the system as a whole, they need to be strengthened considerably. The Kyoto targets require ambitious caps with absolute reductions for the phase 2008-2012.[16]

In general, the EC has seen the over-allocation issue as part of the "learning-by-doing" process that should help the EU in implementing the second trading period beginning in 2008. As stated in its press release:

> The new 2005 emissions data gives independently assessed installation-level figures for the first time and so provides Member States with an excellent factual basis for deciding upon the caps in their forthcoming national allocations plans for the second trading period, when the Kyoto targets have to be met. The plans are subject to approval by the Commission, which will also be making extensive use of the 2005 emissions data.[17]

Market Activity, Prices, and Impact

According to Point Carbon's proprietary databases, the EU-ETS traded 362 million metric tons of CO_2 in 2005, valued at 7.218 billion euro. Brokers were responsible for 57% of the volume, exchange markets did 15%, and bilateral transactions accounted for 28%. Of the exchange market volume, the European Climate Exchange (ECX) had the largest share at 63%, followed by Nord Pool with 24%, and Powernext with 7.9%.[18]

The average price for an allowance traded in 2005 was 19.9 euro, with brokered and exchanged allowances averaging 20.6 euro and bilateral transactions averaging 18.2 euro. However, allowance prices have been quite volatile since trading begin in 2005, as indicated in **Figure 1** below.[19] In particular, allowance

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[16] CAN Europe, *National Allocation Plans 2005-7: Do They Deliver? Summary for Policymakers* (April 2006), p. 2.

[17] European Commission, *EU Emissions Trading Scheme Delivers First Verified Emissions Data for Installations* (Brussels, May 15, 2006), available at [http://europa.eu.int/luxembourg/docs/217-2006_en.pdf]

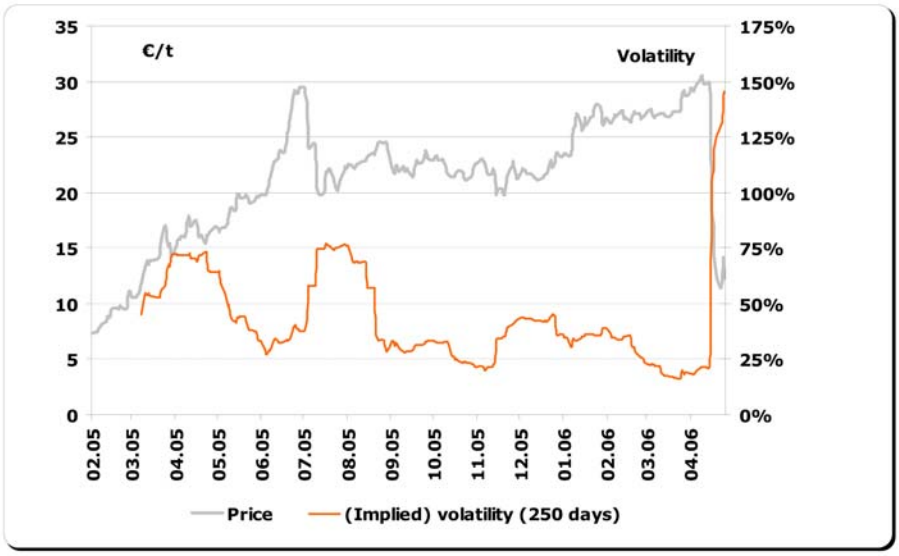
[18] Point Carbon, *Carbon 2006: Towards a Truly Global Market* (28 February 2006) pp. 15-16. It should be noted that there is significant uncertainty in the estimates of the bilateral market.

[19] Margus Kaasik (CFO Eesti Energia), *Carbon Market: EU ETS* (May 9, 2006). Implied

(continued...)

prices dropped from almost 30 euro to about 9-11 euro in April and May, sparked by a series of reported over-allocation of allowances in several Member States. By July 2006, allowance prices had recovered to about 17 euro in July.

Figure 1. CO2 Market: Even If No "Big" News Highly Volatile



Note: EUA 2 006, based on 30 day rolling price change

9. May 2006

Source: Margus Kaasik, Eesti Energia, *Carbon Market: EUETS* (May 9, 2006), p. 14.

There are several reasons for the overall volatility in the allowance market. The EU-ETS is a maturing but still narrow market. Monthly volumes are increasing, but have never exceeded a 1.6% share of phase 1 allocations.[20] Modest volume for a new system is not surprising; trading volumes under the U.S. Clean Air Act Title IV sulfur dioxide trading program were very thin in the beginning. Even after several years of operation, SO_2 allowances prices can change unpredictably and inexplicably.[21]

Some reasons for ETS allowance price derivatives are explicable. As illustrated by **Figure 2**, the ETS market responded to a variety of regulatory, climatic, and economic events over the first trading period. Regulatory events include the late approval of NAPs for several countries, along with the resulting

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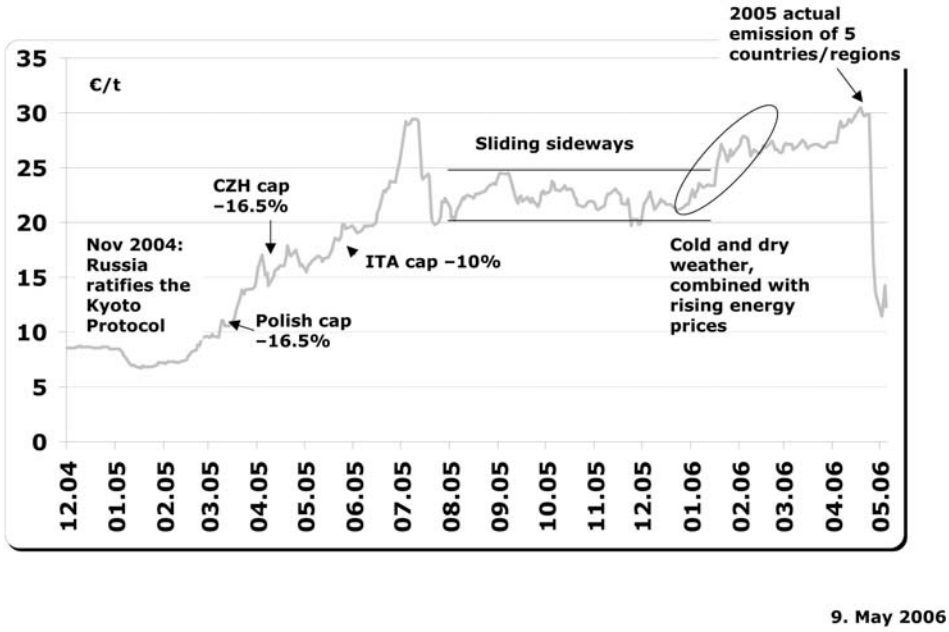
[19] (...continued)
volatility is a measure used primarily in options analysis to estimate how much the market expects an asset price to move for an option price. Two hundred-fifty days is commonly used for this analysis, as it represents the number of business days in a year.

[20] Margus Kaasik (CFO Eesti Energia), *Carbon Market: EU ETS* (May 9, 2006), p. 13.

[21] Vivian E. Thomson in collaboration with the Pew Center on Global Climate Change, *Early Observations on the European Union's Greenhouse Gas Emissions Trading Scheme: Insights for United States Policymakers* (Apr. 19, 2006), p. 16

over-allocation causing the sudden market correction in May 2006. Climatic events influencing prices include cold weather, which increased energy usage, and dry conditions, which decreased the availability of hydroelectric power.[22]

Figure 2. CO2 Market: Large Price Changes in Very Short Amount of Time



Source: Margus Kaasik, Eesti Energia, *Carbon Market: EUETS* (May 9, 2006), p. 14.

The primary economic influence on the ETS revolved around fuel prices. During 2005, Point Carbon analysis indicates 79% of the variance (R^2) in allowance prices was explained by changes in fuel prices (particularly for electric power), with 23% of the variance explained by the weather. This linkage between allowance prices and the power market is not surprising, as the power sector conducted the majority of trades in 2005 and therefore significantly influenced price development.

Kaasik argues that the evidence from the past year indicates that fuel prices influence carbon prices, but not the reverse. Specifically, Kaasik sees allowance prices as a derivative of natural gas and coal pricing, at least in the short-term. Assuming natural gas-fired and coal-fired generation are the marginal cost suppliers of power, allowance prices will respond positively to increasing natural gas prices or decreasing coal prices. Likewise, allowance prices will respond negatively to decreasing natural gas prices or increasing coal prices. This creates a correlation over time between allowance prices and electricity price by influencing the marginal price of electricity. How this has evolved during the first trading period is illustrated by **Figure 3**.

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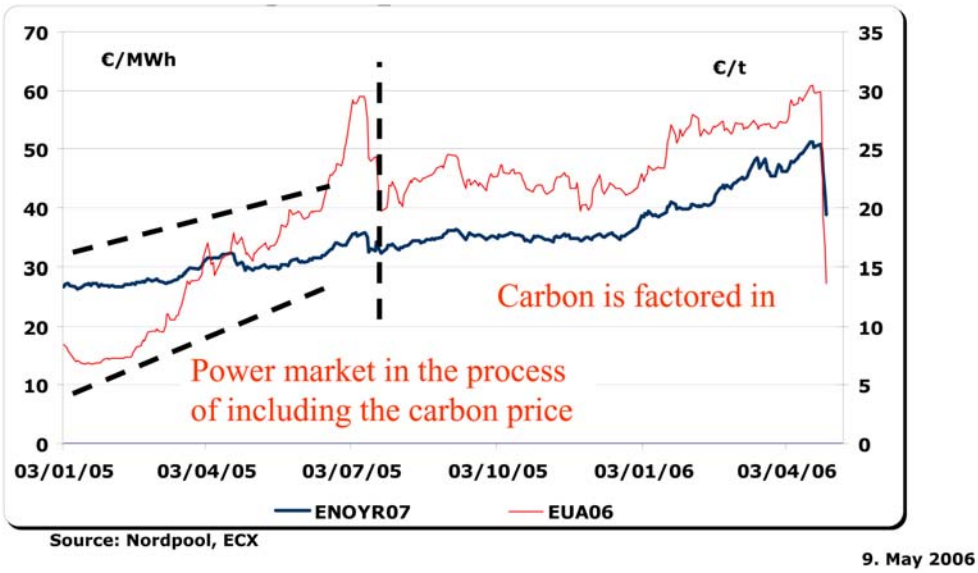
[22] Point Carbon, *Carbon 2006: Towards a Truly Global Market* (Feb. 28, 2006) pp. 18-19.

Figure 3. There is a Very Long-Term Correlation Between CO2 and Electricity Price: Link Via Marginal Producer



Source: Margus Kaasik, Eesti Energia, *Carbon Market: EUETS* (May 9, 2006) p. 11.

Use of Clean Development Mechanism (CDM) and Joint Implementation (JI)

The EU-ETS has provisions for linking its trading scheme to the Joint Implementation (JI) and Clean Development Mechanism (CDM) components of the Kyoto Protocol for countries that have ratified it. These project-based instruments involve Annex 1 countries in the case of JI, and between Annex 1 and developing countries in the case of CDM.[23] The EC's linking directive allows operators to fulfil their allowance obligations under the EU-ETS using credits derived from JI and CDM projects. Their credits are equivalent to allowances in environmental and economic terms, but are not interchangeable. "Certified Emissions Reductions" (CERs) under the CDM must be issued by the Clean Development Mechanism Executive Board and may be used in either the first or banked for use in the second trading period.[24] Emissions Reduction Units (ERUs) under JI are transferred from one country to another — an exchange that cannot begin until the second trading period. Neither CERs nor ERUs are

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[23] Annex 1 countries are the 36 industrialized countries and economies-in-transition listed in Annex 1 of the United Nations Framework Convention on Climate Change and allowed to engaged in JI and CDM projects under the Kyoto Protocol.

[24] The time between submission of a CDM project design document and approval can be as much as 18 months because CDM credits must be approved by the Designated National Authority (DNA) and the CDM Executive Board. Brown Rudnick Berlack Israels LLP, *Emissions Trading: Questions and Answers* (February 2006), p. 7.

converted into EU-ETS allowances; rather, they are entered directly into the surrendered allowance table. There are other restrictions on the use of CERs and ERUs. In particular, for the second trading period the amount of CERs and ERUs that can used by an affected unit is limited by a percentage specified by its country. Several EU countries have established carbon funds to pursue JI and CDM opportunities.[25]

In general, CER and ERU credits have sold at a discount to ETS allowance prices. The degree of discount has depended on the riskiness of the project. CER and ERU credits are available only when the projects are completed. Thus, where buyers take the risk of non-delivery, such as an emissions reduction purchase agreement (ERPA), prices are in the range of 8-12 euro. In contrast, for CERs already issued, or where the sellers take the risk, prices are in the range of 13-15 euro.[26] The real impact of CDM and JI on the EU-ETS system will not be fully known until the second trading period, when EU demand for credits will increase substantially and other non-EU countries would be implementing their own Kyoto compliance strategies.

Issues

To assist its review of the ETS, the EC has surveyed stakeholders' viewpoints on ETS implementation and long-term issues.[27] The report surveys the viewpoints of participating companies, governments, industry associations, market intermediaries, and non-governmental organizations (NGOs) from June to September 2005. Asked which of 12 topics surrounding ETS implementation entities felt were most important to them, companies, industry associations, and governments all ranked topics such as emissions reduction targets, allocation rules, and rules for new entrants and closures as the most important — topics that all relate to long-term uncertainty. **Table 3** indicates the top five topics according to governments surveyed, along with their corresponding ranking by other stakeholders. The five issues are discussed below.

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[25] For a list of countries with carbon funds, see [http://carbonfinance.org/Router.cfm?Page=Funds&ItemID=24670]

[26] As reported in *Carbon Positive*, "CER Prices Stabilise After EU Market Hit" (June 14, 2006), available at [http://www.carbonpositive.net/viewarticle.aspx?articleID=137].

[27] European Commission, *Review of EU Emissions Trading Scheme* (November 2005).

Table 3. Importance of EU ETS Topics
(ranking)

Topic	Governments	Companies	Industry Associations	Market Intermediaries	NGOs
Emissions reduction targets	1st	1st	1st	3rd	1st
Further harmonization of allocation plans	2nd	3rd	2nd	Tied for 5th	Tied for 6th
Treatment of new entrants/ closures	3rd	2nd	5th	7th	Tied for 6th
Definition of combustion installations	4th	10th	Tied for 8th	Tied for 8th	Tied for 11th
Inclusion of sectors and gases	5th	Tied for 6th	Tied for 8th	Tied for 4th	3rd

Source: European Commission, *Review of EU Emissions Trading Scheme* (November 2005), p. 13.

Tightening of Emissions Caps

With the over-allocation issue in the first trading period, it is likely that the EC will take a harder stance in reviewing NAPs for the second trading period. The relationship between the ETS cap for the first trading period and the estimated ETS cap for the second trading period (the Kyoto Protocol requirements) varies substantially between countries, as illustrated in **Table 4**. In general, the original EU-15 countries have to reduce their emissions caps the most to meet their share of the EU's requirements under the Kyoto Protocol, with several countries facing double-digit percentage reductions. As indicated, EU-15 states, on average, have to reduce their emissions caps 6.8% (119 million metric tons) from their current levels to meet their requirements under the Kyoto Protocol-based second trading period. In contrast, as a group, the newer countries and the EU as a whole are in substantially better shape.[28]

[28] Two EU countries, Malta and Cyrus, are not included here because they are non-Annex 1 countries and, therefore, do not have mandatory reduction requirements under the Kyoto Protocol.

Table 4: Comparison of 1st and 2nd Trading Period ETS Caps

(in millions of metric tons of CO_2 Equivalent unless otherwise noted)

	Average Annual ETS Cap (first trading period)[a]	Estimated Annual ETS Cap (Kyoto Protocol)	Percentage Difference
Austria	33.0	24.6	-25.5%
Belgium	62.9	57.9	-8.0%
Czech Republic	97.6	118.6	21.6%
Denmark	33.5	24.9	-25.6%
Estonia	19.0	35.4	86.5%
Finland	45.5	37.5	-17.7%
France	156.5	159.6	2.0%
Germany	499.0	483.2	-3.2%
Greece	74.4	75.5	1.5%
Hungary	31.3	43.0	37.3%
Ireland	22.3	20.1	-9.7%
Italy	232.5	194.7	-16.3%
Latvia	4.6	10.1	119.8%
Lithuania	12.3	33.4	171.5%
Luxembourg	3.4	2.7	-19.4%
Netherlands	95.3	88.9	-6.7%
Poland	239.1	331.0	38.4%
Portugal	38.2	35.4	-7.2%
Slovakia	30.5	38.9	27.7%
Slovenia	8.8	8.3	-5.4%
Spain	174.4	142.8	-18.1%
Sweden	22.9	24.4	6.7%
UK	245.3	247.8	1.0%
EU-ETS 15	1,739.1	1,620.1	-6.8%
EU-ETS 23	2,182.3	2,239.0	2.6%

Source: Based on data provided in Annex 1, European Commission, "Further Guidance on Allocation Plans for the 2008 to 2012 trading period of the EU Emissions Trading Scheme" (Brussels, Dec. 12, 2005) p. 11.

a. These figures do not account for changes to the number of installations subsequent to the respective Commission decision (e.g., opt-ins or opt-outs of installations).

At first glance, it would appear that the EU would 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 newer Member States that anticipate a surplus. However, there are other considerations. First, countries with potential surpluses may want to retain at least some of that surplus to help fuel their countries' economic growth, possibly at the expense of a Member State that needs allowances. Second, the extent to which surplus credits would be created via JI, the EC linking directive, requires that such credits (including from CDM) be "supplemental" to a country's domestic efforts. Each country is to spell out what "supplemental" means in its NAP for the second trading period.

A third consideration is the overall commitment of the Kyoto Protocol. As noted earlier, the ETS only covers a percentage of the overall greenhouse gas emissions in the various Member States of the EU. The analysis provided in **Table 3** assumes that the ETS will have to provide a proportional amount of that reduction based on 2003 emissions. However, some sectors not covered by the ETS may grow faster than sectors covered by the ETS, creating difficulties for compliance. In particular, the transportation area has become a major source of concern. The transportation sector is not a part of the ETS and is not likely to be included before the third trading period.[29] Instead, transport controls are based on voluntary agreements with automobile manufacturers to improve fuel economy, fuel-economy labelling of cars, and promoting fuel efficiency by fiscal measures.[30] The cornerstone is the agreements with automobile manufacturers to achieve improve new car fleet average CO_2 emissions rates. As announced in 1996, the objective of the EU Council of Environmental Ministers and European Parliament was to achieve a new car fleet average CO_2 emissions rate of 120 grams per kilometer (g CO_2/km) by 2005, or by 2010 at the latest.[31]

This objective was not met in 2005 and is unlikely to be met by 2010. Voluntary commitments by the European, Japanese, and Korean Automobile Manufacturers Associations in 1998 and subsequently endorsed by the EC set targets of 140 g CO_2/km by 2008/2009. At the end of 2005, the average new car emissions rate is about 160 g CO_2/km. The rate of reduction in CO_2/km for new cars would have to double for the automobile manufacturers to achieve their commitments, which appears unlikely.[32] Indeed, despite improvements in emissions rates, CO_2 emissions in the EU continue to rise because of increased miles driven, increased size and weight of cars, and falling car occupancy rates. The EC 2005 progress report also notes that despite EU's effort to increase information on fuel efficiency and CO_2

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[29] EurActiv.com, *Transport to Stay Out of CO_2 Trading until 2013* (June 21, 2006).

[30] European Commission, *Implementing the Community Strategy to Reduce CO_2 Emissions from Cars: Fifth Annual Communication on the Effectiveness of the Strategy* (Brussels, June 22, 2005).

[31] Council conclusions of June 25, 1996.

[32] European Federation for Transport and Environment, *Cleaner is Cheaper* (Brussels, 2005). p. 1.

emissions for consumers, the effectiveness of the effort seems low: "a significant impact on consumer's decisions could not yet be noticed."[33]

Attempts to balance the burden between ETS and non-ETS sectors have already created tension in Germany with respect to the second trading period. In its draft NAP for the second trading period (NAP II) submitted June 28, 2006, Germany proposes to reduce its ETS allocation from about 499 million metric tons to about 471 million metric tons, a decrease of 5.6%.[34] However, Germany's 2005 emissions were only 474 million metric tons; thus the reduction is only 0.6% from last year's emissions. In addition, Germany is proposing to permit every new power station built between 2008 and 2012 to opt out from CO_2 caps and the ETS for 14 years, generally to encourage construction of coal-fired facilities. These emissions increases will have to be covered by the non-ETS sectors — commercial, residential, and transportation. An assessment done for Greenpeace International states that the German NAP II places "a disproportionate burden for emissions reductions on the non-ETS sectors" in terms of meeting its commitments under the EU Burden Sharing agreement.[35] Policies to fill in the gap reportedly include one plan to reduce emissions by 3 million tons by training German drivers to drive more economically.[36] As noted by the EC Report cited above, the effectiveness of public education programs such as this may be problematic.

Harmonizing NAPs

The EU-ETS system involves an interplay between definitions and procedures that are EU-wide and those that are nationwide. The groundwork for the system is the Kyoto Protocol, which (1) defines the pollutants and sets the countries' emissions targets; (2) defines the scope of participation: Annex 1 countries may implement emissions trading programs, and non-Annex 1 countries may participate through the CDM; (3) defines baseline emissions years and sinks; and (4) sets national inventory and compliance requirements. Within this framework, the EU defines the elements that make the EU-ETS work, including industry participants, the unit of trade (tradeable allowances equal to 1 metric ton of CO_2), trading periods, settling up procedures, and linkages within and beyond the EU.

With respect to the individual Member's NAPs, the EC harmonizes the NAPs with respect to penalties, allocation method (e.g., grandfathering), monitoring, and registries with the goal of achieving the Kyoto targets. It allows Members flexibility

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[33] European Commission, *Implementing the Community Strategy to Reduce CO_2 Emissions from Cars: Fifth Annual Communication on the Effectiveness of the Strategy* (Brussels, June 22, 2005) p. 7.

[34] On a like-kind basis. The NAP II cap is actually 482 million metric tons because it include 11 million tons for facilities covered under the second phase that were not covered under the first phase.

[35] Karoline Rogge, Joachim Schleich, Regina Betz, and Jos Cozijnsen, *Increasing the Ambition of EU Emissions Trading* (June 2006), p. 1.

[36] Roger Harrabin, BBC environmental analyst, *Germany to Spark "Climate Crisis"* (June 28, 2006).

with respect to allocations to individual participants, the extent to which banking is permitted, and whether to permit the auctioning of up to 10% of allowances in the second trading period. As a result of this framework, there are significant differences between Members with respect to participant definitions, industry level emissions caps and allocations, and enforcement.

To increase the economic and administrative efficiency of the ETS, some stakeholders are interested in improved harmonization of NAPs by the EC. Besides the issue of new entrants and definition of affected units specifically identified by the EC survey, harmonization issues include allocation methods and the use of auctions, the degree to which JI and CDM credits may be used for compliance, and monitoring, verification, and reporting rules. **Table 5** illustrates the scope of potential harmonization issues facing the EU-ETS.

Table 5: NAP Harmonization Issues

Subject	Source of Member Differences
Definition of allowances	Financial and tax treatment of allowances
Reliable emissions inventories	Inventory standards
Banking of allowances	Whether and how much banking permitted
Emissions caps	Stringency of caps and the extent of JI and CDM credits permitted
Monitoring, verification and reporting	Procedures and processes
Allocation	Allocation methods and whether and how much auctioning permitted
National registries	Design details
Voluntary participants	Whether to allow pooling or opt-in/opt-out
Definition of mandatory participants	Definition of sectors, size, installation, new entrant, and treatment of closures

Source: Adapted from Fiona Mullins, *EU ETS Implementation: Room for Harmonisation* (The Royal Institute of International Affairs, 2005).

One issue of particular interest is the effort to increase the use of "benchmarking" standards in setting allocations. Benchmarking generally involves allocating allowances based on best available technology and practices, rather than on historical emissions. However, the EC does not have the authority to scrutinize allocations at the facility level, so any allocation harmonization would be on a voluntary basis ("soft harmonization"). Also, allocation schemes, such as benchmarking, may not be suitable for some industries.[37] The EC's survey of ETS stakeholders revealed that although more than two-thirds of the respondents from the

[37] For more, see Michael Grubb and Karsten Neuhoff, "Allocation and Competitiveness in the EU Emissions Trading Scheme: Policy Overview," 6 *Climate Policy* (2006) pp. 7-30.

cement, aluminum, and chemical industries thought benchmarking was an "interesting alternative," less than a third of the respondents from the pulp and paper industry and refineries thought so.[38]

In many ways, diversity between Member countries with respect to the ETS is inevitable. As stated by Grubb and Neuhoff with respect to allocation:

> The final way in which the EU ETS differs from many other trading systems is in the devolution of allocation responsibilities, in this case to its 25 Member States. This was an essential part of the deal that enabled the adoption of the Directive: Member States would have never ceded to the European Commission the power to distribute valuable assets to their industries. Nor is the EU ETS unique in devolving powers of allocation: it is typical in a number of US systems. Moreover, there are different degrees of harmonization, applicable to different aspects of the EU ETS, and the Commission can and does seek to increase the degree of harmonization through guidance notes.[39] [footnote omitted]

New Entrants

The economic value of allowances is nowhere more evident than in discussions of new entrants. Indeed, as noted above, Germany is proposing to permit new coal-fired powerplants built between 2008-2012 to opt-out of the ETS for the first 14 years of operation in order to encourage construction. In its survey of ETS stakeholders, the EC found that 85% of all respondents favor a harmonized approach to new entrants and closures. Nearly 75% believed that those allowances should be provided free.[40] Likewise, an EU questionnaire conducted by the European Environmental Agency's Topic Centre on Air and Climate Change indicated that most Member States would welcome harmonization of the treatment of new entrants and closures across the EU.[41]

Analogous to the U.S. acid rain program, EU states have set up reserves to provide allowances to new entrants. In general, these allowances are provided free, as that is widely seen as helping boost new investment. However, the allocation methods developed by the Member States differ. Most states have yet to dip into their reserves for new entrants; however, the importance of the reserve will increase as the ETS enters its second, and eventually third, trading period. The manner in which new entrants receive allowances may have a significant effect on the long-term direction of investment — whether it is directed toward low-carbon opportunities or used to support continuation of current economic development irrespective of its

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[38] European Commission, *Review of EU Emissions Trading Scheme: Survey Highlights* (November 2005), p. 15.

[39] Michael Grubb and Karsten Neuhoff, "Allocation and Competitiveness in the EU Emissions Trading Scheme: Policy Overview," 6 *Climate Policy* (2006), p. 17.

[40] European Commission, *Review of EU Emissions Trading Scheme: Survey Highlights* (November 2005), pp. 18-19.

[41] European Environment Agency's Topic Centre for Air and Climate Change, *Application of the Emissions Trading Directive by EU Member States*, (EEA Technical Report No. 2/2006, 2006), p. 30.

carbon intensity. Allocating allowances according to output and not differentiating according to the carbon intensity of the project would provide an incentive to develop low carbon alternatives. An example provided by Grubb and Neuhoff:

> New entrant reserves should be based on output or capacity, and avoid differentiating according to the CO_2-intensity of the new investment. In particular, giving more to coal than gas plants rewards investment in new coal facilities, which would conflict with objectives to tackle climate change, increase the cost of future emissions reductions, and in the long run could lead to higher electricity prices. The damaging effects would be amplified if carbon-intensive new entrants not only receive free allowances for the period 2008-2012 but also receive promises for subsequent periods.[42]

The proposed treatment of coal-fired powerplants by the German Government indicates how difficult it will be to direct future investment toward low-carbon projects. However, it could be argued that the long-term success of the ETS and the EU's commitment to Kyoto and any subsequent agreements rests on such a redirection with respect to new entrants and long-term investment.

Definition of Affected Units

Another area in which several Member States would like more harmonization across the EU is the definition of a combustion installation.[43] Concerns revolve around ambiguity in the current definition of a combustion installation and the number of small installations covered under the ETS. The ETS applies to energy activities for all sectors with combustion installations above 20 MW of thermal rated input, oil refineries, coke ovens, and, subject to size criteria, iron and steel, cement, lime, glass, ceramics, and pulp and paper facilities. However, Finland and Sweden opted to include small district heating installations with a rated thermal input below 20 MW.[44] In contrast, as noted previously, Germany is attempting to have some planned coal-fired powerplants, which will be large producers of CO_2, able to opt-out of the ETS for 14 years.

In addition to the consistency issue, small installations (between 20MW and 50MW) account for 30% (about 3,000) of the total facilities covered under the ETS, but a very small percentage of total CO_2 emissions.[45] Surveying 22 Member States,

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[42] Michael Grubb and Karsten Neuhoff, "Allocation and Competitiveness in the EU Emissions Trading Scheme: Policy Overview" 6 *Climate Policy* (2006), p. 22.

[43] European Environment Agency's Topic Centre for Air and Climate Change, *Application of the Emissions Trading Directive by EU Member States* (EEA Technical Report No. 2/2006, 2006), p. 30.

[44] These are generally owned by larger facilities which operate several installations covered by the ETS. See European Environment Agency's Topic Centre for Air and Climate Change, *Application of the Emissions Trading Directive by EU Member States* (EEA Technical Report No. 2/2006, 2006), p. 16.

[45] The installation number is for 22 Member States (Poland did not provide sufficient data). Emissions estimates were provided by only 14 States. Based on those 14 States, the

(continued...)

36% of the covered installations produced less than 10,000 metric tons of CO_2 annually.[46] The somewhat weak emissions data available at the time of the EU questionnaire suggest that while three-quarters of all emissions are produced by the largest 7.5% of installations, the small installations (under 10,000 metric tons) are responsible for less than 1%. Whether the ETS should continue to cover the roughly 3,500 facilities under 10,000 metric tons annually remains a hotly debated issue.

Expansion of Coverage

In choosing a gradual, incremental approach to emissions trading, the EU is relying on other programs to control greenhouse gas emissions in other sectors, such as transportation. The difficulties the EC may encounter in not choosing a comprehensive approach to begin with is suggested by its survey of stakeholders.

The survey suggests that the future direction of the ETS in terms of increasing coverage is toward incrementally adding more economic sectors, rather than addressing the more complex issue of a comprehensive system. Based on the survey, the focus is currently on the chemical, aviation, and aluminum industries.[47] Given that the number-one recommendation for future implementation of the ETS is to provide participants with a longer time frame for implementation, it is unclear when the ETS will become as comprehensive as the European Commission would like.

Conclusion

At first glance, the ETS would appear an effective vehicle for the EU to meet its Kyoto Protocol obligations 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 newer Member States that anticipate a surplus. In addition, potential CERs and ERUs from the CDM and JI respectively may help maintain limits on allowance costs. **Table 6** provides one series of estimates of available allowances for the Kyoto Protocol's five-year compliance period. Obviously, not all these allowances may be available to the EU alone; other countries, such as Japan and Canada, may decide to incorporate emissions trading into their implementation strategies and acquire allowances from these sources. Yet, the totals suggest that all else being equal, the supply of allowances would be adequate.

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[45] (...continued)
allowance allocations to small installation accounted for about 2% of the total. See European Environment Agency's Topic Centre for Air and Climate Change, *Application of the Emissions Trading Directive by EU Member States* (EEA Technical Report No. 2/2006, 2006), p. 15.

[46] European Environment Agency's Topic Centre for Air and Climate Change, *Application of the Emissions Trading Directive by EU Member States* (EEA Technical Report No. 2/2006, 2006).

[47] European Commission, *Review of EU Emissions Trading Scheme* (November 2005), p. 11.

Table 6: International Supply of Emissions Credits and Allowances

(cumulative total 2008-2012, million metric tons CO_2)

Source of Supply	Low Estimate	High Estimate
Clean Development Mechanism (CERs)	680	1,200
Joint Implementation (ERUs	120	980
Surplus Kyoto Allowances from Eastern Europe, Russia, and the Ukraine (AAUs)	<1,000-3,000	8,000

Source: Compiled by Grubb and Neuhoff, "Allocation and Competitiveness in the EU Emissions Trading Scheme: Policy Overview," p. 20.

However, there are other considerations. The availability of surplus credits created via JI and CDM is restricted by the EC linking directive that requires that such credits be "supplemental" to a country's domestic efforts. Each country is to spell out what "supplemental" means in its NAP 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 only covers 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 the ETS, creating difficulties for compliance. In particular, the transportation area is already a major 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 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 from the ETS make the long-term effect of the ETS uncertain.

Appendix: Norway's Trading System

Norway, a non-EU country, also has an emissions trading system that began operating on January 1, 2005. Norway's system covers 51 facilities in the energy and process sectors such as oil refining and iron and steel processing, and has several features in common with the EU ETS.[48] These sectors account for about 10-15% of the country's emissions. Other parts of Norway's industry, particularly its offshore oil and gas sector, are covered by the country's carbon tax of almost 40 euro per metric tonne of CO_2 — much higher than the anticipated allowance price under the trading program. The carbon tax is levied on about 64% of the country's CO_2 emissions — about half the country's total greenhouse gas emissions.[49] The first phase of the trading program covers the period 2005-2007, with a second, expanded phase to begin in 2008.

Developing its initial trading scheme independently of the EU, Norway's "Quota Commission" (created in 1998) stressed that the 2008 program be as comprehensive as possible, suggesting that the system could include close to 90% of the country's greenhouse gas emissions.[50] To achieve this coverage, the Commission envisioned a hybrid system of quotas, depending on cost-effectiveness and practicality considerations. Arguing in favor of regulating CO_2 emissions at the producer (upstream) level from mobile sources and some stationary sources, the Quota Commission states:

> For these emissions, regulation at the producer level will not create weaker incentives for reducing emissions than regulation at the consumer level, because the volume of emissions from a particular commodity is not dependent on technology. For those process emissions which are recommended for inclusion in the system, regulation by quotas should be imposed at the end-user level in cases where the processes originate with major industrial companies. For process emissions stemming from a series of small sources, e.g. emissions of N_2O from commercial fertilizers, regulation by quotas should be imposed on retailers, or importers in order to avoid unacceptably high system costs.[51]

The Commission's recommendation that "regulation by quotas be imposed in part on the producer, in part on the sales or import chain, and in part on the end-user"[52] may be overtaken by development of the EU ETS, which is likely to influence

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[48] International Energy Agency, *Act Locally, Trade Globally* (2005), p. 102.

[49] Ministry of the Environment, *Report 54 to the Storting (2000-2001): Norwegian Climate Policy*, at [http://odin.dep.no/md/engelsk/publ/stmeld/022001-040012/index-dok000-b-n-a.html]

[50] Ministry of the Environment, Trading in Greenhouse Gases (press release, Dec. 17, 1999), at [http://www.odin.no/odinarkiv/english/bondevik_I/md/022001-990070/dok-bn.html].

[51] The Quota Commission, *A Quota System for Greenhouse Gases* (Dec. 17, 1999), p.7, at [http://odin.dep.no/odinarkiv/norsk/dep/md/1999/eng/022021-220003/index-dok000-b-n-a.html]

[52] Ibid., p. 19.

the future direction of Norway's trading system. The International Energy Agency (IEA) states:

> The government had indicated earlier that it would consider expanding the [trading] system from 2008 to include as many sources of emissions as practical through an upstream system allocating allowances to fossil fuel producers and importers. With the adoption of the EU ETS design features, Norway seems to move away from this option.[53]

[53] International Energy Agency, *Act Locally, Trade Globally* (2005), p. 103.