



# Climate Change and the EU Emissions Trading Scheme (ETS): Looking to 2020

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## Summary

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 10,000 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. A Phase 3 will begin in 2013 designed to reduce emissions by 21% from 2005 levels.

Several positive results 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 implemented Phase 2, including allocation schemes and new entrant reserves, and others. A more comprehensive and coordinated response has been designed for Phase 3 with harmonized and coordinated rules being developed by the European Commission.

The United States is not a party to the Kyoto Protocol. However, six 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 as the United States debates the issue and some states and regions implement their own programs.

- The EU-ETS experience illustrates the importance of having reliable emissions data for all facilities covered under a cap-and-trade scheme; data that are pivotal for developing allocation systems, reduction targets, and enforcement provisions.
- In the United States debate continues 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 and/or states 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. The EU will examine the matter in preparation for Phase 3. Congress may consider whether the government currently has sufficient regulatory and oversight authority over such instruments.

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## Overview<sup>1</sup>

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 implementing strategies to begin reducing their emissions of greenhouse gases.<sup>2</sup> 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.<sup>3</sup> 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 Air Amendments.<sup>4</sup>

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. In addition, aviation is currently being phased into the ETS. These covered entities emit about 40%-45% of the EU’s total greenhouse gas emissions, and almost two-thirds of them are combustion installations. The trading program does not cover either carbon dioxide (CO<sub>2</sub>) emissions from the transportation sector (except aviation), which account for about 25% of the EU’s total greenhouse gas emissions, or emissions of non-CO<sub>2</sub> greenhouse gases, which account for about 20% of the EU’s total greenhouse gas emissions. A Phase 1 trading period ran between January 1, 2005, and December 31, 2007.<sup>5</sup> A Phase 2 trading period began January 1, 2008, covering the period of the Kyoto Protocol, and a Phase 3 has been finalized to begin in 2013.<sup>6</sup>

Under the Kyoto Protocol, the then-existing 15 nations of the EU agreed to reduce their aggregate annual average emissions for 2008-2012 by 8% from the Protocol’s baseline level (mostly 1990 levels) under a collective arrangement called a “bubble.” In light of the Kyoto Protocol targets, the EU adopted a directive establishing the EU-ETS that entered into force October 13, 2003.<sup>7</sup>

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<sup>1</sup> Readers unfamiliar with the workings of the European Union may want to read CRS Report RS21372, *The European Union: Questions and Answers*, by (name redacted) and (name redacted).

<sup>2</sup> 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 RL33826, *Climate Change: The Kyoto Protocol, Bali “Action Plan,” and International Actions*, by (name redacted).

<sup>3</sup> Norway, a non-EU country, also has instituted a CO<sub>2</sub> trading system which is currently linked with the EU-ETS. Various other countries and a state-sponsored regional initiative located in the northeastern United States involving several states have developed a mandatory cap-and-trade system programs. For a review of these emerging programs, along with other voluntary efforts, see CRS Report RL33812, *Climate Change: Action by States to Address Greenhouse Gas Emissions*, by (name redacted).

<sup>4</sup> P.L. 101-549, Title IV (November 15, 1990).

<sup>5</sup> For further background on the ETS, see CRS Report RL34150, *Climate Change and the EU Emissions Trading Scheme (ETS): Kyoto and Beyond*, by (name redacted).

<sup>6</sup> 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>.

<sup>7</sup> 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.

One objective of the second phase of the ETS is to achieve 3.3 percentage points of the 8.0% reduction required by the EU-15 under the Protocol.<sup>8</sup>

The importance of emissions trading was elevated by the accession of 12 additional central and eastern European countries to EU membership from May 2004 through January 2007. For the new EU-27, the overall ETS emissions cap is set at 2.08 billion metric tons of carbon dioxide (CO<sub>2</sub>) annually for the Kyoto compliance period (2008-2012).

The second phase Kyoto compliance stage of the ETS is built on the experience the EU gained from its preliminary Phase 1. The European Commission (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 positive results from the Phase 1 experience 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 difficulty the ETS experienced early in the first phase can be traced to inadequate emissions data infrastructure.<sup>9</sup> Phase 1 significantly improved those critical elements 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.<sup>10</sup> 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 CO<sub>2</sub> 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.<sup>11</sup>

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 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.<sup>12</sup>

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<sup>8</sup> Commission of the European Communities, *Communication from the Commission: Progress towards Achieving the Kyoto Objectives* (November 19, 2008). Other reductions are to be achieved through regulatory measures, such as a CO<sub>2</sub> emissions standard for automobiles.

<sup>9</sup> A. Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” *Environmental Economics and Policy* (Winter 2007), pp. 69-70; and International Emissions Trading Association, “IETA Position Paper on EU ETS Market Functioning,” (no date), p. 3.

<sup>10</sup> For more on the effect of the ETS on Kyoto mechanisms, see A. Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” *Environmental Economics and Policy* (Winter 2007), p. 84; and International Emissions Trading Association, “IETA Position Paper on EU ETS Market Functioning” (no date), p. 2. For more information on the Kyoto Protocol mechanisms, see CRS Report RL33826, *Climate Change: The Kyoto Protocol, Bali “Action Plan,” and International Actions*, by (name redacted).

<sup>11</sup> A Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” *Environmental Economics and Policy* (Winter 2007), p. 84.

<sup>12</sup> European Commission, Directorate General for Environment, *Review of EU Emissions Trading Scheme: Survey Highlights*, (November 2005), pp. 5-7.

However, several issues that arose during the first phase remained contentious as the ETS implemented Phase 2, including allocation (including use of auctions and reliance on model projections), new entrant reserves, and others. In addition, the expansion of the EU and the implementation of the linking directives created new issues to which Phase 2 has had to respond.<sup>13</sup> Based on lessons learned in Phase 1 and Phase 2, the EU has taken a substantially different approach to these issues in Phase 3 that is discussed later.

## Results from Phase 1 and 2

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.<sup>14</sup> To capture these dynamics, each Member State of the EU developed an emissions baseline from models that project future trends in the country's emissions based on these and other factors, such as anticipated energy and greenhouse gas policies.<sup>15</sup> 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.<sup>16</sup>

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.<sup>17</sup> This result 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

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<sup>13</sup> For a further discussion of Phase 2 implementation issues, see CRS Report RL34150, *Climate Change and the EU Emissions Trading Scheme (ETS): Kyoto and Beyond*, by (name redacted).

<sup>14</sup> For more information, see CRS Report RL33970, *Greenhouse Gas Emission Drivers: Population, Economic Development and Growth, and Energy Use*, by (name redacted) and (name redacted).

<sup>15</sup> On the role of modeling in the first phase, see A Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” 1 *Environmental Economics and Policy* 1 (Winter 2007), pp. 72-73.

<sup>16</sup> Regina Betz and Misato Sato, “Emissions Trading: Lessons Learnt from the 1<sup>st</sup> Phase of the EU ETS and Prospects for the 2<sup>nd</sup> Phase,” 6 *Climate Policy* (2006), p. 354.

<sup>17</sup> For a further discussion, see CRS Report RL33581, *Climate Change: The European Union's Emissions Trading System (EU-ETS)*, by (name redacted).

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.<sup>18</sup>

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 implementation plans (called National Allocation Plans (NAPs)). The EC further restricted use of Phase 1 EUAs in Phase 2 with a ruling in November 2006.<sup>19</sup> As a result, excess Phase 1 EUAs were worthless at the end of 2007.<sup>20</sup>

One consequence of the non-transferability of Phase 1 EUAs is that prices for Phase 2 EUAs remained relatively firm until the 2008-2009 recession reduced demand, as indicated by **Figure 1**.<sup>21</sup> Scarcity is critical for the proper functioning of an allowance market. As further indicated by **Figure 1**, during 2009, the market firmed up at a much lower level as participants assessed the impact of the recession on the demand for EUAs. Looking at 2010 data for Phase 2 allowances (December 2010 settlement date) indicate prices staying in the range of 13-16 euro as the European economy slowly recovers from the recession. This is a different response than the market had during Phase 1, and may reflect Phase 2 improvements in the system. In particular, the more predictable 2009-2010 response may reflect the ability of the EC to certify Phase 2 NAPs using more verifiable baseline data than were available for Phase 1.<sup>22</sup> A major reason the EC rejected *ex post* adjustments<sup>23</sup> was fear that such adjustments would have a disruptive effect on the marketplace.<sup>24</sup> Phase 1 did not firmly establish this foundation of markets;<sup>25</sup> based on the Phase 2 EUA future's market, further market development appears to be occurring, although, like most commodity markets, it remains somewhat volatile at times.

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<sup>18</sup> A Denny Ellerman and Barbara K. Buchner, "The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results," 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 83.

<sup>19</sup> European Commission, *Communication from the Commission to the Council and to the European Parliament on the assessment of national allocation plans for the allocation of greenhouse gas emission allowances in the second period of the EU Emissions Trading Scheme*, COM(2006) 725 final (November 29, 2006), p. 11.

<sup>20</sup> For a further discussion, see Joseph Kruger, Wallace E. Oates, and William A. Pizer, "Decentralization in the EU Emissions Trading Scheme and Lessons for Global Policy," 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 126; and, Frank J. Convery and Luke Redmond, "Market and Price Development in the European Union Emissions Trading Scheme," 1 *Environmental Economics and Policy* 1 (Winter 2007), pp. 96-7, 107.

<sup>21</sup> Data for Phase 2 allowances with a settlement date of December, 2009.

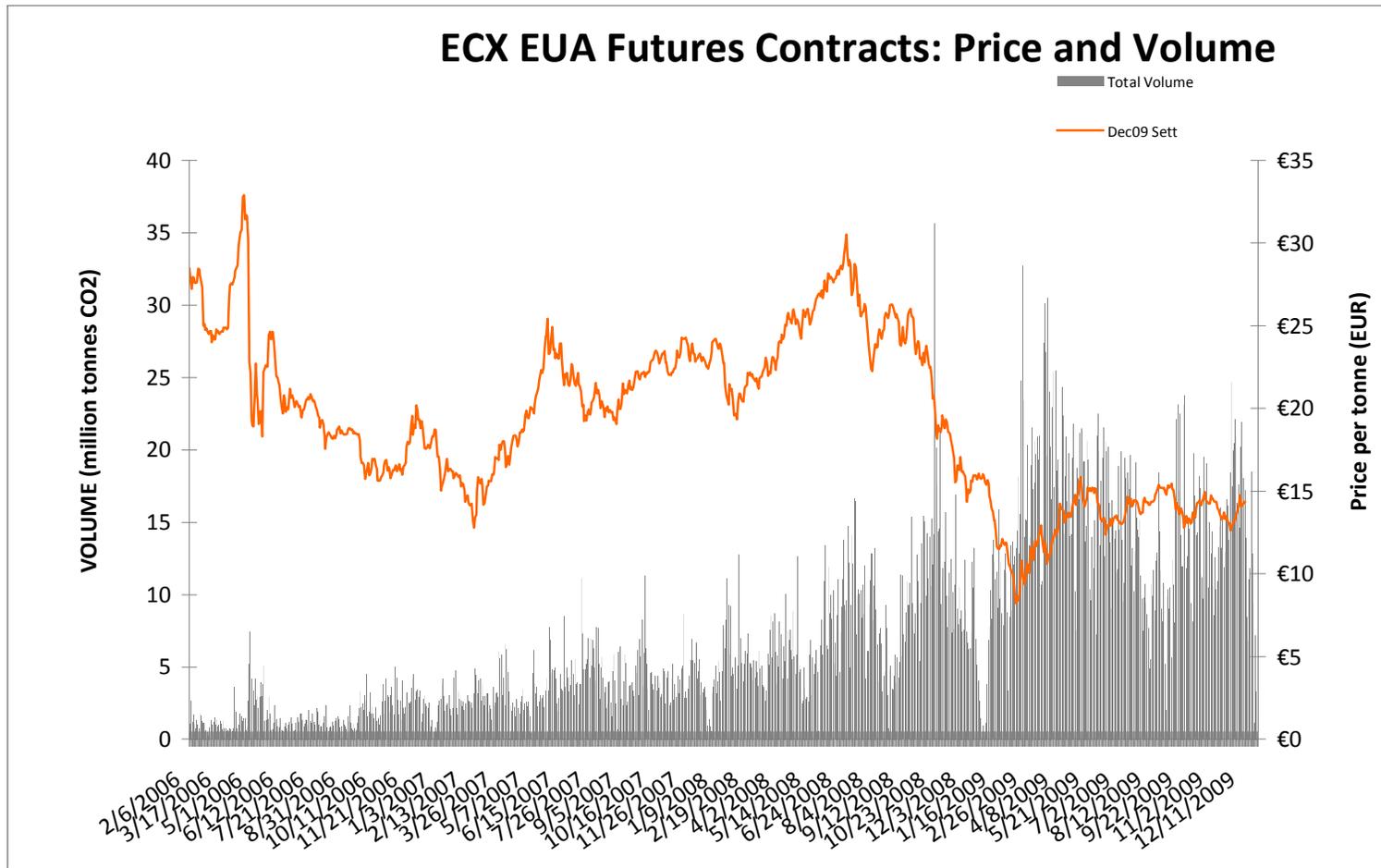
<sup>22</sup> International Emissions Trading Association, "IETA Position Paper on EU ETS Market Functioning," (no date), p. 2.

<sup>23</sup> Once the EC has approved a country's NAP, including the total number of allowances and the allocation to each covered entity, the allocations can not be re-visited. Attempts to include provisions permitting such post-approval adjustments to a facility's allocation have been uniformly rejected by the EC.

<sup>24</sup> European Commission, *Communication from the Commission to the Council and to the European Parliament on the assessment of national allocation plans for the allocation of greenhouse gas emission allowances in the second period of the EU Emissions Trading Scheme*, COM(2006) 725 final (November 29, 2006), p. 8; and, A Denny Ellerman and Barbara K. Buchner, "The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results," 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 71.

<sup>25</sup> On the mixed record of the EU-ETS and the need for allowance scarcity to a functioning emissions market, see Eric Haymann, *EU Emission Trading: Allocation Battles Intensifying*, Deutsche Bank Research (March 6, 2007). For a generally positive view of ETS market development, see Frank J. Convery and Luke Redmond, "Market and Price Development in the European Union Emissions Trading Scheme," 1 *Environmental Economics and Policy* 1 (Winter 2007), pp. 97-106. For a more negative view, see Karsten Neuhoff, Federico Ferrario, Michael Grubb, Etienne Gabel, and Kim Keats, "Emissions Projections 2008-2012 Versus NAPs II," 6 *Climate Policy* 5 (2006), pp. 395-410.

Figure 1. ECX CFI Futures Contracts: Price and Volume

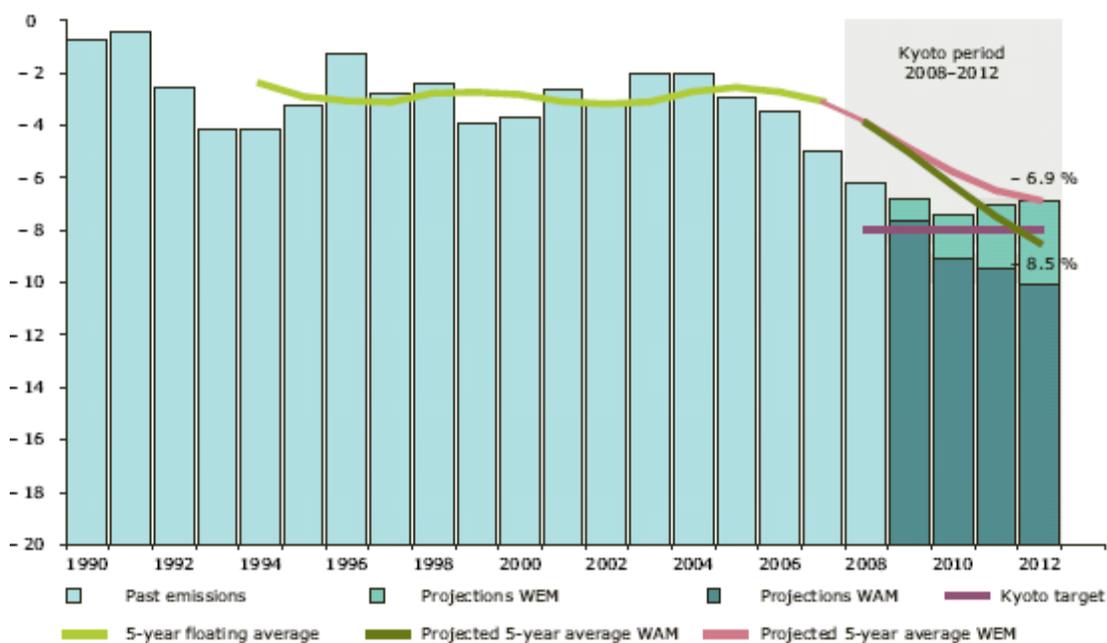


Source: ECX Exchange.

Note: Dec09 Sett: Future contracts with a settlement date of December, 2009.

While the environmental performance of Phase 1 may be disputed, the need for additional reductions to achieve Kyoto is not. Projections conducted by the European Environment Agency (EEA) in 2009 indicated that for 2008, the EU-15 was 6.2% below its base-year emissions, compared with an 8% five-year average reduction commitment under the Kyoto Protocol.<sup>26</sup> As indicated by **Figure 2**, this represents a continuation of reductions by EU-15 over the past five years. However, as indicated by the pink line, the EEA projects that the EU-15 existing measures are insufficient to reduce EU-15 emissions to their Kyoto requirements (represented by the purple line), resulting in a projected 6.9% reduction from baseline levels. To achieve the Kyoto target the EU projects further reduction actions planned by EU-15 countries (represented by the green line in **Figure 2**), resulting in an overall reduction of 8.5% compared with baseline levels.

**Figure 2. EU-15 Greenhouse Gas Emissions and Projections for the Kyoto Period: 1990-2012**



**Source:** European Environment Agency, *Greenhouse Gas Emissions Trends and Projections in Europe 2009*, (2009) p. 10.

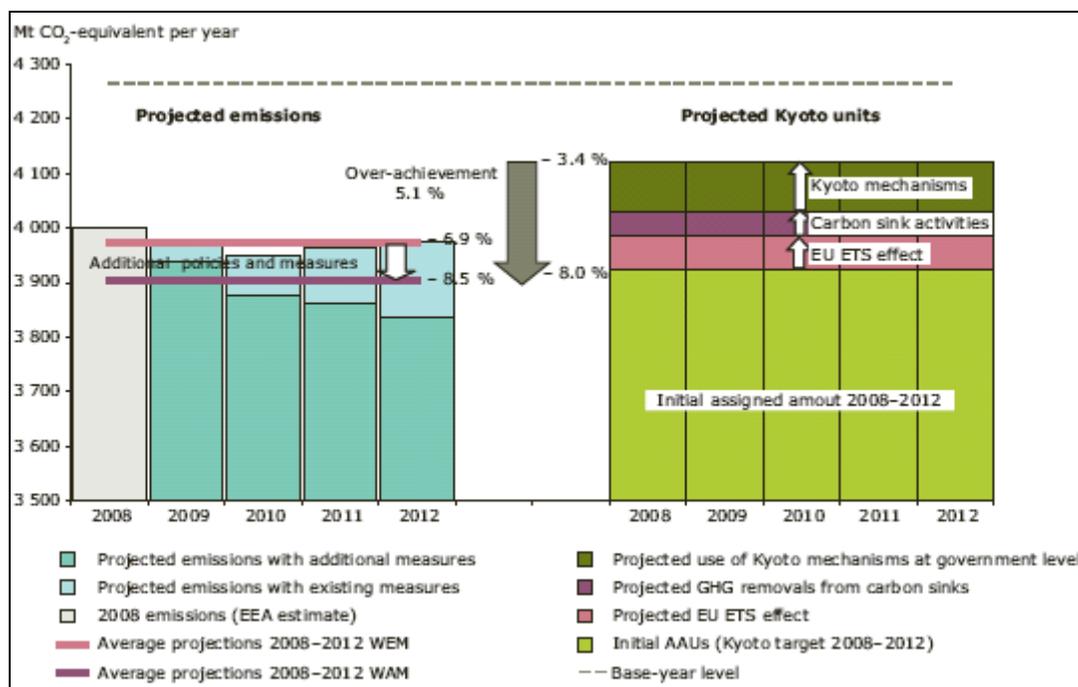
**Note:** WEM: with existing measures (measures implemented or adopted). WAM: with additional measures (planned measures).

In addition to domestic emission reductions, the EU has also projected additional reduction credits received by activities permitted under the Kyoto Protocol: (1) purchase of project-based credits by ETS participants and EU governments (e.g., Joint Implementation (JI) and Clean Development Mechanism (CDM) projects); and, (2) the use of carbon sinks. As indicated in **Figure 3**, these activities provide a credit on the EU-15 baseline of 4.6 percentage points. Thus, if the EU-15 maintains its current path, it would exceed its Kyoto commitment by about 3.5 percentage points (6.9% minus 3.4%). If its planned measures result in the projected 8.5%

<sup>26</sup> Actual 2008 data published by the European Environment Agency in 2010 estimated that the EU-15 were 6.9% below its Kyoto baseline. See European Environment Agency, *Annual European Union Greenhouse Gas Inventory 1990-2008 and Inventory Report 2010*. EEA Technical Report No. 6/2010 (2010), p. 10.

reduction below baseline levels, the overachievement of its Kyoto commitment would be 5.1 percentage points (8.5% minus 3.4%).<sup>27</sup>

**Figure 3. Summary of EU-15 Emissions Projection Compared to Projected Kyoto Protocol Credits**



**Source:** European Environment Agency, *Greenhouse Gas Emissions Trends and Projections in Europe 2009*, (2009) p. 11.

**Notes:** The left section shows the projected emissions considering only domestic measures (existing and additional) and is showing them as average 2008-2012 emissions (lines) and annual emissions (bars). The right section shows the projected amount of Kyoto credits accumulated by the end of the commitment period, including the initial EC assigned amount under the Protocol, the purchase of Kyoto project credits by EU ETS participants and EU governments, and carbon sink activities.

The EU-27 as a whole does not have an emissions target comparable to the EU-15 bubble. By 2010, EU-27 emissions are projected at 9.6% below Kyoto baseline levels assuming current policies. This reduction is projected at 11.3% if additional measures are included.

Based on EEA's 2009 projections, 24 of the 25 countries with reduction requirements are projected to meet their commitments under the Kyoto Protocol.<sup>28</sup> Only Austria is not projected to meet its requirements even with additional planned measures and the use of Kyoto mechanisms.<sup>29</sup> After the first year of the Kyoto compliance period, seven EU-15 member countries are already in compliance with their 2008-2012 target: Belgium, Finland, France, Germany, Greece, Sweden, and the United Kingdom. For the ten of EU-12 member countries with Kyoto obligations, only

<sup>27</sup> European Environment Agency, *Greenhouse Gas Emissions Trends and Projections in Europe 2009*, (2009) p. 11.

<sup>28</sup> Cyprus and Malta are not Annex 1 countries.

<sup>29</sup> European Environment Agency, *Greenhouse Gas Emission Trends and Projections in Europe 2009* (2009), p. 12.

Slovenia was not in compliance in 2008.<sup>30</sup> Total EU-27 greenhouse gas emissions in 2008 were 4.94 billion metric tons, compared with 5.57 billion metric tons in 1990 – a drop of 11.3%.

## Phase 3

The European Union is committed to achieving a 20% reduction in greenhouse gas emissions by 2020 from 1990 levels (or more depending on the actions of other countries). A strategic component of the effort to achieve this target is a revised ETS that will achieve a 21% reduction from covered entities from 2005 levels. **Table 1** indicates the proposed EU-wide ETS cap for the next Phase of EU greenhouse gas program (Phase 3) assuming no further international commitments. As indicated, the EC envisions a linear reduction in the ETS cap to match the reduction target under the overall 20% reduction program. These numbers will change as individual countries decide to include more facilities under the ETS and as the EC expands ETS coverage to include other sectors and non-CO<sub>2</sub> greenhouse gases.

**Table 1. Proposed Annual ETS Cap Figures for Phase 3**

Year	Billion metric tons of CO <sub>2</sub> e
Annual limit for Kyoto compliance period (2008-2012)	2.083
2013	1.974
2014	1.937
2015	1.901
2016	1.865
2017	1.829
2018	1.792
2019	1.756
2020	1.720

**Source:** European Commission, *Questions and Answers on the Commission's Proposal to revise the EU Emissions Trading System* (Brussels, January 23, 2009), response to question 12.

**Note:** Figures are based on the current Phase 2 scope of the ETS. These need to be adjusted for three reasons: (1) extensions of ETS scope during phase 2 by Member states; (2) extensions of ETS scope by the EC for third trading period, and (3) the figures do not include inclusion of aviation, nor the emissions from Norway, Iceland, and Liechtenstein—non-EU countries that have linked their programs to the ETS.

In July, 2010, the EC issued a decision on the EU emissions allowance cap under the EU-ETS for 2013. Set at 2,032,998,912 allowances, the cap is subject to further revisions if additional relevant information warrants a change and when a separate decision on allocations to aircraft operators is made.<sup>31</sup>

<sup>30</sup> European Environment Agency, *Annual European Union Greenhouse Gas Inventory 1990-2008 and Inventory Report 2010*. EEA Technical Report No. 6/2010 (2010), p. 10.

<sup>31</sup> European Commission, *Commission Decision of 9 July 2010 on the Community-wide quantity of allowances to be issued under the EU Emission Trading Scheme for 2013*, C(2010) 4658 final, (July 7, 2010).

For Phase 3, the EU is re-shaping the ETS to improve its efficiency and eliminate some of the problems identified during Phase 1 and 2.<sup>32</sup> For Phase 2, the improved emissions inventories resulting from Phase 1 allowed the EC to harmonize the types of installations covered by the ETS across the various Member States.<sup>33</sup> In addition, the EC imposed a uniform rule on the Member States preventing the use of *ex-post* adjustments. However, Phase 2 made little advancement in harmonizing individual countries' allocations schemes.<sup>34</sup> As with Phase 1, countries continue to differ widely on several key points.

The critical structural change the EU would make in Phase 3 is eliminating National Allocation Plans (NAPs), and replacing them with EU-wide rules with respect to allowance availability, allocations, and auctions. NAPs are central to the EU's effort to achieve its Kyoto obligations under Phase 2. Each Member of the EU submitted a NAP that lays out its allocation scheme under the ETS, including individual allocations to each affected unit. These NAPs were assessed by the EC to determine compliance with 12 criteria delineated in an annex to the emissions trading directive.<sup>35</sup> 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, and 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 had to guarantee Kyoto compliance.

This NAP structure will be replaced under Phase 3. There will be one EU-wide cap instead of the 27 national caps under Phase 1 and 2. Allowances will be allocated under EU-wide, fully harmonized rules, including those governing: (1) auctions, (2) transitional free allocations for greenhouse gas intensive, trade-exposed industries, (3) new entrants, and (4) coverage. The EC proposed a Directive to alter the EU-ETS structure for Phase 3 in January, 2008,<sup>36</sup> and the Directive was amended and adopted by the European Parliament (EP) and of the Council of the European Union in April 2009.<sup>37</sup>

## **Auctions**

Under Phases 1 and 2, allowances generally were and are allocated free to participating entities under the ETS. During Phase 1, The 2003 EU-ETS Directive allowed countries to auction up to

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<sup>32</sup> European Commission, *Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community* (Brussels, April 23, 2009). Hereinafter referred to as the Directive.

<sup>33</sup> European Commission, *Limiting Global Change to 2 degrees Celsius: The Way Ahead for 2020 and Beyond* (Brussels, January 10, 2007), p. 23.

<sup>34</sup> Joachim Schleich, Regina Betz, and Karoline Rogge, *EU Emissions Trading—Better Job Second Time Around?* Fraunhofer Institute System and Innovation Research (February 2007), p. 23.

<sup>35</sup> Commission of the European Communities, *Directive 2003/87/EC*, available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:275:0032:0046:EN:PDF>.

<sup>36</sup> European Commission, *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community* (Brussels, January 23, 2008).

<sup>37</sup> European Commission, *Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community* (Brussels, April 23, 2009).

5% of allowance allocations, rising to 10% under Phase 2.<sup>38</sup> Under Phase 1, only 4 of 25 countries used auctions at all, and only Denmark auctioned the full 5%. The political difficulty in instituting significant auctioning into ETS allowance allocations is the almost universal agreement by covered entities in favor of free allocation of allowances and opposition to auctions.<sup>39</sup> Free allocation of allowances represents a one-time transfer of wealth to the entities receiving them from the government issuing them.<sup>40</sup> The resulting transfer of wealth has been described by several analysts as “windfall profits.”<sup>41</sup> As summarized by Ellerman and Buchner: “Allocation in the EU ETS provides one more example that, notwithstanding the advice of economists, the free allocation of allowances is not to be easily set aside.”<sup>42</sup>

Despite concerns about windfall profits and economic distortions resulting from the free allocation of allowances, there was little change in basic allocation philosophy for Phase 2. No country proposed auctioning the maximum percentage of allowances allowed (10%). Most do not include auctions at all.<sup>43</sup> The unwillingness of governments to employ auctions as an allocating mechanism revolve around equity considerations, including: (1) inability of some covered entities to pass through cost because of regulation or exposure to international competition; (2) potential drag on a sector’s economic performance from the up-front cost of auctioned allowances; and (3) the potential that government will not recycle revenues to alleviate compliance costs, international competitiveness impacts, or other equity concerns, resulting in the auction costs being the same as a tax.<sup>44</sup>

This opposition is mostly overcome for Phase 3 through an EU-wide set of harmonized rules for allowance allocations and auctions. Under Phase 3, the Directive states:

Auctioning should ... be the basic principle for allocation, as it is the simplest, and generally considered to be the most economic efficient system. This should also eliminate windfall profits and put new entrants and economies growing faster than average on the same competitive footing as existing installations. (paragraph 15)

After nine eastern European Member States threatened to veto an initial proposal to auction 100% of all allowances, the EU compromised to provide for some free allocation of allowances during Phase 3 that will begin in 2013.<sup>45</sup> Most covered industries will be eligible for some free allocation

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<sup>38</sup> For a further discussion of auctioning and the ETS, see Cameron Hepburn, *et. al.*, “Auctioning of EU ETS phase II allowances: how and why?” 6 *Climate Policy* (2006), pp. 137-160.

<sup>39</sup> A Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 73.

<sup>40</sup> Joseph Kruger, Wallace E. Oates, and William A. Pizer, “Decentralization in the EU Emissions Trading Scheme and Lessons for Global Policy,” 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 114.

<sup>41</sup> E.g., Deutsche Bank Research, *EU Emission Trading: Allocation Battles Intensifying*, (March 6, 2007) pp. 2-3; and Regina Betz and Misato Sato, “Emissions Trading: Lessons Learnt from the 1<sup>st</sup> Phase of the EU ETS and Prospects for the 2<sup>nd</sup> Phase,” 6 *Climate Policy* (2006), p. 353.

<sup>42</sup> A Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 85.

<sup>43</sup> For more information, see CRS Report RL34150, *Climate Change and the EU Emissions Trading Scheme (ETS): Kyoto and Beyond*, by (name redacted).

<sup>44</sup> Martina Priebe, *Distributional Effect of Carbon-allowance Trading* (Cambridge, January 12, 2007). Also, see Eurochambres, *Review of the EU Emission Trading System* (June 2007), p. 5.

<sup>45</sup> See *Position of the European Parliament adopted at the first reading on 17 December 2008 with a view to the adoption of Directive 2009/.../EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community* (December 17, (continued...))

of allowances to cover direct emissions under the Phase 3 agreement. The introduction of auction would be differentiated by sector. In general, for the power sector, full auctioning will begin in 2013. For electric powerplants, most will receive no free allocation of allowances during Phase 3. However, in a concession to certain eastern European Member States, an optional and temporary derogation from the no-free-allocation requirement for powerplants is provided to countries that meet specific energy and economic criteria. Under the optional allocation scheme, the Member State can allocate allowances equal to 70% of the powerplant's Phase 1 emissions free; this allocation declines to zero in 2020.

The auction schedule for most other covered entities is more gradual with 80% of a sector's allocation provided free in 2013, declining linearly to 30% by 2020, and zero by 2027. As stated in the Directive:

For other sectors covered by the Community scheme, a transitional system should be foreseen for which free allocation in 2013 would be 80% of the amount that corresponded to the percentage of the overall Community-wide emissions throughout the period 2005 to 2007 that those installations emitted as a proportion of the annual Community-wide total quantity of allowances. Thereafter, the free allocation should decrease each year by equal amounts resulting in 30% free allocation in 2020, with a view to reaching no free allocation in 2027. (paragraph 21)

Because of concern that stringent EU carbon policies may encourage production and related greenhouse gas emissions to shift to countries without carbon policies (i.e., carbon leakage), exceptions to this phase-out of free allowances will be made in sectors where carbon leakage may occur, as discussed later.

Distribution of allowances to be auctioned by the Member States will be determined by a three-part formula (Article 10(2)). Eighty-eight percent of the allowances to be auctioned by each Member State is distributed to States according to their historic emissions under Phase 1 of the EU-ETS. Ten percent of the total is distributed to States mostly based in their comparative GDP per capita within the EU (Annex IIa). Two percent of the total is distributed to nine former eastern-bloc countries based on the substantial greenhouse gas reductions they have already achieved (Annex IIb).

In November 2010, the EC finalized an Auction Regulation to provide for coordinated auctions of allowances during Phase 3.<sup>46</sup> The rule creates a central platform to auction off the majority of allowances, beginning in 2013. While the EC would have preferred to have a single platform, some members insisted on having the option of opting out of the central platform and setting up their own platforms under specified conditions. Allowances will be auctioned on a spot basis, avoiding potential conflicts with established secondary markets (such as the ECX). The format will be a single-round, sealed bid, uniform price auction. Auctions will be held at least weekly.

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(...continued)  
2008).

<sup>46</sup> European Commission, *Commission Regulation No 1031/2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community*. (November 12, 2010)

Auctions will be open to facility operators, and regulated investment firms and credit institutions, along with “intermediaries (such as fuel traders). The rule also includes provisions to address potential anti-competitive behavior and market abuse.

Beyond the allocation of allowances, the EU Directive also provides guidelines for the allocation of revenues from allowance auctions. The Directive states that at least 50% of the proceeds should be used to fund a variety of climate change related activities, including emission reductions, adaptation activities, renewable energy, carbon capture and storage (CCS), the Global Energy Efficiency and Renewable Energy Fund, and assisting developing countries to avoid deforestation and increase afforestation and reforestation (Article 10(3)).

## **New Entrant Reserves**

Unlike previous cap-and-trade programs, the EU-ETS includes provisions for allocating free allowances to new entrants to the system.<sup>47</sup> The reasoning behind this decision is based on equity: (1) it isn’t fair to allocate allowances free to existing entities while requiring new entrants to purchase them, and (2) the EU doesn’t want to put Member States at a disadvantage in competing for new investments.<sup>48</sup> These equity concerns trumped concerns about economic efficiency.

As is the case for existing entities, the free allocation of allowances to new entrants is a subsidy. Under Phase 1 and Phase 2, the size and distribution of this subsidy is left to the individual Member States. For Phase 1, the reserve varied widely from the average of 3% of total allowances: Poland set aside only 0.4% of its allocation for new entrants while Malta set aside 26%. For Phase 2, the spread continues with Poland reserving 3.2% of its allowances for new entrants in contrast to 45% reserved by Latvia.<sup>49</sup>

The decision to employ a new entrant reserve adds complexity to Member States’ allocation plans and influences the investment decisions of covered entities. Rules had to be promulgated with respect to the reserve’s size, manner in which the allowances are dispensed, and how to proceed if the demand either exceeds the supply, or vice versa. As indicated, countries did not harmonize new entrant reserve rules with respect to size during Phase 1 or 2. Likewise, there is no standardization on dispensing allowances and replenishing the reserve: first-come, first-serve with no replenishment is one approach used, but a variety of procedures have been developed both to dispense allowances and to replenish the reserve if supply is inadequate. Member States also have different formulas for determining how many allowances a new entrant should receive. Member States claim to use a form of “benchmarking” to determine allowance allocations—an approach based on a standard of “best practices” or “best technology” that is applied to the new entrant’s anticipated production or capacity. However, the definitions and application of the benchmarks used by the Member States are not uniform.

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<sup>47</sup> For example, the U.S. acid rain program provides no allocation of allowances to new entrants; instead, an EPA sanctioned auction is held annually to ensure that allowances are available to new entrants. New entrants can also obtain allowances from existing sources willing to sell them, either directly, through the EPA auction, or via a broker.

<sup>48</sup> A Denny Ellerman and Barbara K. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocations, and Early Results,” 1 *Environmental Economics and Policy* 1 (Winter 2007), p. 75.

<sup>49</sup> Karoline Rogge, Joachim Schleich, and Regina Betz, *An Early Assessment of National Allocation Plans for Phase 2 of EU Emission Trading*, Fraunhofer Institute System and Innovation Research (January 2006).

This will change under Phase 3. Under Phase 3, the Directive sets an EU-wide cap of 5% of the total allowance cap for a new entrant reserve, and requires the harmonization of allocation rules. The EC is to adopt a harmonized rule for applying a new entrant definition contained in the Directive by December 31, 2010; the Directive expressly excludes any new electricity production from being defined as a new entrant. The EC is also to determine EU-wide benchmarks for the allocation of all free allowances. The Directive states that the starting point for setting those benchmarks shall be the average performance of the 10% most efficient installations in a sector or subsector in the EU in the years 2007-2008 (Article 10a(2)).

In an attempt to stimulate development of CCS, the Directive also provides that up to 300 million allowances in the new entrants' reserve shall be available through 2015 for aiding construction and operation of up to 12 demonstration projects. No one project can receive more than 15% of the allowances allocated for this purpose (Article 10a(8)).

Draft rules to harmonized free allocation of allocations through benchmarks was proposed by the EC on December 15<sup>th</sup>, 2010.<sup>50</sup> As drafted, a benchmark represents the threshold for receiving free allocations for a specific facility; it does not represent an emission limit or even an emission reduction target. The benchmarks are to be developed per product, to the extent feasible. As noted in the Directive, a product benchmark generally is based on the average greenhouse gas performance of the 10 % best performing installations in the EU producing that product. As explained by the EC: “The benchmarks are established on the basis of the principle ‘one product = one benchmark’, which means that the benchmark methodology does not differentiate by technology or fuel used, nor the size of an installation or its geographical location.”

### **EC Phase 3 Decision on Eligible Industries<sup>51</sup>**

Most studies of the competitiveness impacts of the ETS during Phase 1 have found no impact. The International Energy Agency (IEA) cites several reasons for this situation:

Experience to date with the EU-ETS does not reveal leakage for the sectors concerned—analysis of steel, cement, aluminum and refineries sectors reveals that no significant changes in trade flows and production patterns were evident during the first phase (2005-2007) of the EU-ETS. This is mostly due to the free allocation of allowances, sometimes in generous quantities, and to the still functioning long-term electricity contracts, which softened the blow of rising electricity prices. Further, the general boom in prices for most traded products subject to carbon costs—whether direct or indirect—has blurred any effects of the latter. Finally, the relatively short time span of these policies does not allow observation of the full potential effects on industry via changes in investment location decisions.<sup>52</sup>

This conclusion is echoed by Carbon Trust, which states that currently, free allocation of emissions allowances offset almost all of the additional costs of the ETS; and that conclusion is echoed by The Climate Group for The German Marshall Fund, which states that companies

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<sup>50</sup> European Commission. *Draft Commission Decision determining transitional Union-wide rules for the harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC* (December 15, 2010).

<sup>51</sup> For more information on climate change and competitiveness issues, see CRS Report R40914, *Climate Change: EU and Proposed U.S. Approaches to Carbon Leakage and WTO Implications*, by (name redacted) and (name redacted)

<sup>52</sup> Julia Reinaud, *Issues Behind Competitiveness and Carbon Leakage: Focus on Heavy Industry* (October 2008), p. 6.

surveyed found it difficult to quantify effects on their bottom line in the first phase, or found no effect at all.<sup>53</sup>

For energy-intensive, trade-exposed industries, Phase 3 has provisions to provide assistance to eligible installations to address the direct and indirect impact of emissions control costs. With respect to direct emissions costs, the EC published a list of installations exposed to a significant risk of carbon leakage on December 24, 2009, as required under the Directive.<sup>54</sup> The list is identical to the draft list released in September 2009.<sup>55</sup> The decision lists 164 industrial sectors and subsectors deemed to be exposed sectors under the appropriate European Parliament and Council directives. Eligible installations will receive allowances sufficient to cover 100% of their direct emissions, provided they are using the most efficient technology available (based on the benchmarks provided in the draft rules discussed above). This 100% allocation contrasts with the 80% distribution of free allowances to non-carbon leakage exposed industries in 2013. Reflecting the fluid nature of the competitive situation and international negotiations, the EC was to review its decision June 30, 2010, and provide the European Parliament and Council with any appropriate proposals to respond to the situation. Consultations made by the EC with interested parties suggest the international situation has not changed sufficiently for the EC to propose changes to its Directive.

Assistance for the impact of indirect emissions control costs on exposed industries from higher electricity prices would be determined by Member States. As stated by the Directive:

Member States may deem it necessary to compensate temporarily certain installations which have been determined to be exposed to a significant risk of carbon leakage related to greenhouse gas emissions passed on in electricity prices for these costs. Such support should only be granted where it is necessary and proportionate and should ensure that the Community scheme incentives to save energy and to stimulate a shift in demand from grey to green electricity are maintained. (paragraph 27)

## **Flexibility Mechanisms and Price Volatility Control**

The major flexibility mechanism developed under the EU-ETS has been the Clean Development Mechanism (CDM) and Joint Implementation (JI) credits permitted under the Kyoto Protocol; however, this development has proven a controversial process. A major part of the controversy has been the “supplementarity” requirement of the Kyoto Protocol to use its flexibility mechanisms. Supplementarity requires that developed countries, such as most EU countries, ensure that their use of JI/CDM credits is supplemental to their own domestic control efforts. In defining supplementarity for Phase 2, the EC used 10% of a country’s allowance allocation as a rule of thumb in approving NAPs—with a greater limit possible based on a country’s domestic efforts to reduce emissions. This process resulted in some significant reductions in some countries’ proposed limits (e.g., Ireland, Poland, Spain), but some increase in others (e.g., Italy,

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<sup>53</sup> Carbon Trust, *EU ETS Impacts on Profitability and Trade* (January 2008), p. 4; and The Climate Group, *The Effects of EU Climate Legislation on Business Competitiveness: A Survey and Analysis* (September 2009), p. 8.

<sup>54</sup> European Commission, *Commission Decision of 24 December 2009 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage* (Brussels, 2009).

<sup>55</sup> European Commission, *Draft Commission Decision of 18 September 2009 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage* (Brussels, 2009).

Latvia, Lithuania). Although these reductions appear substantial in individual cases, most analysts agree that they do not represent a major barrier to the cost-effective use of JI/CDM. However, the EU-ETS does not accept credits from land use, land-use change and forestry (LULUCF) projects.

For Phase 3, the EU maintains its ban on using LULUCF credits within the ETS. In addition, in November 2010, the EC proposed rules to ban the use of credits from two industrial gases—a rule likely to be adopted formally by the EC in Spring 2011. The ban will apply to projects which destroy trifluoromethane (HFC-23) produced as a by-product of chlorodifluoromethane (HCFC-22) production, and nitrous oxide (N<sub>2</sub>O) from adipic acid production. According to the EC, just 23 such industrial gas projects account for two-thirds of all the credits generated through the CDM; most are in China and other advanced developing countries. The ban on the use of such credits in the EU ETS will apply to all such projects undertaken under the CDM as well as any undertaken in developed countries through the JI mechanism. Essentially, the ban allows companies to use for 2012 compliance under the EU ETS, but not thereafter.<sup>56</sup>

However, Phase 3 will permit up to 50% of the required reductions mandated under Phase 3 to be achieved through CDM or JI credits. For existing installations, this represents a total of 1.6 billion credits over the eight-year compliance period. Limits on use of Kyoto credits will be based on a facility's 2008-2012 allocation (for an existing facilities) or its verified emissions during Phase 3 (for a new entrant or sector). The EC estimates that the minimum amount of Kyoto credits an existing facility will be able to use to comply with Phase 3 will be 11% of its 2008-2012 allocation, while new entrants and sectors will be able to use a minimum of 4.5% of their verified emissions during 2013-2020 (article 11a(8)). The precise percentages will be determined later.

Another flexibility mechanism, banking, is extended by the Directive from Phase 2 to Phase 3 in order to prevent a Phase 1 style collapse of allowance prices when the ETS transitions into Phase 3. In addition, the EU hopes that extending the trading period from five years to eight years, along with the steady, linear emissions reduction schedule, will increase certainty and stability in the allowance markets.

Phase 3 will introduce two other mechanisms designed to address price volatility. First, the EC is required under the Directive to examine whether the market for emission allowances is sufficiently protected from insider dealing or market manipulation. If not, the EC is to present proposals to ensure such protection to the EP and the Council (article 12(a)).

Second, the Directive provides that if the allowance price is more than three times the preceding two-year average for more than six consecutive months and the price is not based on market fundamentals, one of two measures may be taken. The first would allow Member States to shift forward the auctioning of some of its auctionable allowances. The second would allow Member States to auction up to 25% of the remaining allowances in the new entrants reserve (article 29(a)).

## **Expanding Coverage**

Despite the EC's interest in expanding the ETS, its coverage in terms of industries included for Phase 2 is essentially the same as for Phase 1. The exception is for aviation. In December, 2006,

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<sup>56</sup> European Commission, *Emissions trading: Commission welcomes vote to ban certain industrial gas credits* (January 21, 2011).

the EC proposed bringing greenhouse gas emissions from civil aviation into the ETS in two phases.<sup>57</sup> As agreed to by the European Parliament in July 2008, all intra-EU and international flights will be included under the ETS beginning in 2012. Emissions would be capped at 97% of average 2004-2006 emissions with 85% of the allowances being allocated free to operators. The cap would be reduced to 95% in 2013. The cap and auctioning of allowances would be reviewed as a part of Phase 3 implementation.

Annex I of the Directive identifies three CO<sub>2</sub> emitting sectors for inclusion under the ETS: petrochemicals, ammonia, and aluminum. The ETS will also expand beyond CO<sub>2</sub> to include nitrous oxide (N<sub>2</sub>O) emissions from nitric, adipic, and glyoxalic acid production, and perfluorocarbon (PFC) emissions from the aluminum sector. This would expand ETS covered emissions by 4.6% over Phase 2 allowance allocations, or about 100 million metric tons.<sup>58</sup> The harmonization and codification of eligibility criteria for combustion installations is expected to increase the coverage by a further 40-50 million metric tons.

To improve the cost-effectiveness of the ETS and reduce administrative costs, the Directive provides that small installations may be subject to other control regimes (such as carbon taxes) rather than included under the EU-ETS. Currently, the smallest 1,400 (10% of total installations covered) installations emit only 0.14% of total emissions covered. The Directive provides that Member States may opt to exclude installations that emit less than 25,000 metric tons annually from the EU-ETS (paragraph 11).

## **Summary and Considerations for U.S. Cap-and-Trade Proposals**

The United States is not a party to the Kyoto Protocol and no legislative proposal before the Congress would impose as stringent or rapid an emission reduction regime on the United States as Kyoto would have. Likewise, U.S. proposals to reduce emissions through 2020 are not as stringent as that provided in the EU Directive. However, through five years of carbon emissions trading, the EU has gained valuable experience. This experience, along with the process of developing Phase 3, may provide some insight into current cap-and-trade design issues in the United States.

### **Emission Inventories and Target Setting**

The ETS experience with market trading and target setting confirms once again the central importance of a credible emissions inventory to a functioning cap-and-trade program.<sup>59</sup> The lack

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<sup>57</sup> European Commission, *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community* (Brussels, December 12, 2006).

<sup>58</sup> European Commission, *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community* (Brussels, January 23, 2008), p. 4.

<sup>59</sup> As stated by CRS in 1992: "For an economic incentive system to be effective, several preconditions are necessary. Perhaps the most important is data about the emissions being controlled. Such data are important to levy any tax, allocate any permits, and enforce any limit." CRS Issue Brief IB92125, *Global Climate: Proposed Economic* (continued...)

of credible EU-wide data on emissions was a direct cause of the ETS Phase 1 allowance market collapse in 2006. Arguably, the most important result of Phase 1 was the development of a credible inventory on which to base future targets and allocations.

In the United States, Section 821 of the 1990 Clean Air Act Amendments requires electric generating facilities affected by the acid rain provisions of Title IV to monitor carbon dioxide in accordance with EPA regulations.<sup>60</sup> This provision was enacted for the stated purpose of establishing a national carbon dioxide monitoring system.<sup>61</sup> As promulgated by EPA, regulations permit owners and operators of affected facilities to monitor their carbon dioxide emissions through either continuous emission monitoring (CEM) or fuel analysis.<sup>62</sup> The CEM regulations for carbon dioxide are similar to those for the acid rain program's sulfur dioxide CEM regulations. Those choosing fuel analysis must calculate mass emissions on a daily, quarterly, and annual basis, based on amounts and types of fuel used.

As suggested by the EU-ETS experience, expanding equivalent data requirements to all facilities covered under a cap-and-trade program would be the foundation for developing allocation systems, reduction targets, and enforcement provisions. In response to FY2008 Consolidated Appropriations Act,<sup>63</sup> EPA promulgated the Greenhouse Gas Reporting Rule in 2009 to expand the facilities required to report greenhouse gas emission data to EPA annually.<sup>64</sup> Under the rule, 31 categories of sources begin reporting their emissions in 2011 if a source within a designated category emits 25,000 metric tons or more of carbon dioxide equivalents annually. Since promulgation, four additional categories have been added and others proposed.

## Coverage

Despite economic analysis to the contrary, the EU decided to restrict Phase 1 ETS coverage to six sectors that represented about 40%-45% of the EU's CO<sub>2</sub> emissions.<sup>65</sup> This restriction was estimated to raise the cost of complying with Kyoto from 6 billion euro annually to 6.9 billion euro (1999 euro) compared with a comprehensive trading program. A variety of practical, political, and scientific reasons were given by the EC for the decision.<sup>66</sup>

The experience of the ETS up to now suggests that adding new sectors to an existing trading program is a difficult process. As noted above, a stated goal of the EC is to expand the coverage of the ETS. However, the experience of Phase 1 did not result in the addition of any new sector until the last year of Phase 2 when aviation will be included. The EU will expand its coverage with Phase 3, but the ETS will still cover fewer sectors emitting greenhouse gases than provided under most U.S. proposals.

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*Mechanisms for Reducing CO<sub>2</sub>*, by (name redacted) (archived November 16, 1994), p. 9.

<sup>60</sup> Section 821, *1990 Clean Air Act Amendments* (P.L. 101-549, 42 USC 7651k).

<sup>61</sup> S.Rept. 101-952.

<sup>62</sup> See 40 CFR 75.13, along with appendix G (for CEMs specifications) and appendix F (for fuel analysis specifications).

<sup>63</sup> P.L. 110-161

<sup>64</sup> 40 CFR Part 98 (effective December 29, 2009).

<sup>65</sup> For more background, see CRS Report RL33581, *Climate Change: The European Union's Emissions Trading System (EU-ETS)*, by (name redacted).

<sup>66</sup> *Ibid.*, p 3.

U.S. cap-and-trade proposals generally fall into one of two categories. Most bills are more comprehensive than the ETS, covering 80% to 100% of the country's greenhouse gas emissions. At a minimum, they include the electric utility, transportation, and industrial sectors; disagreement among the bills center on the agricultural sector and smaller commercial and residential sources. In some cases discretion is provided EPA to exempt sources if serious data, economic, or other considerations dictate such a resolution.

A second category of bills focuses on the electric utility industry, representing about 33% of U.S. greenhouse gases and therefore less comprehensive than the ETS. Sometimes including additional controls on non-greenhouse gas pollutants, such as mercury, these bills focus on the sources with the most experience with emission trading and the best emissions data. Other sources could be added as circumstances dictate.

As noted, the EU's experience with the ETS suggests that adding sectors to an emission trading scheme can be a slow and contentious process. If one believes that the electric utility sector is a cost-effective place to start addressing greenhouse gas emissions and that there is sufficient time to do the necessary groundwork to eventually add other sectors, then a phased-in approach may be reasonable. If one believes that the economy as a whole needs to begin adjusting to a carbon-constrained environment to meet long term goals, then a more comprehensive approach may be justified. The ETS experience suggests the process doesn't necessarily get any easier if you wait.

## **Allocation Schemes**

Setting up a tradeable allowance system is a lot like setting up a new currency.<sup>67</sup> Allocating allowances is essentially allocating money with the marketplace determining the exchange rate. As noted above, the free allocation scheme used in the ETS has resulted in "windfall profits" being received by allowance recipients. As stated quite forcefully by Deutsche Bank Research:

The most striking market outcome of emissions trading to date has been the power industry's windfall profits, which have sparked controversy. We are all familiar with the background: emissions allowances were handed out free of charge to those plant operators participating in the emissions trading scheme. Nevertheless, in particular the producers of electricity succeeded in marking up the market price of electricity to include the opportunity-cost value of the allowances. This is correct from an accounting point of view, since the allowances do have a value and could otherwise be sold. Moreover, emissions trading cannot work without price signals.<sup>68</sup>

The free allocation of allowances in Phase 1 and 2 of the ETS incorporates two other mechanisms that create perverse incentives and significant distortions in the emissions markets: new entrant reserves and closure policy. Combined with an uncoordinated and spotty benchmarking approach for both new and existing sources, the result is a greenhouse gas reduction scheme that is influenced as much or more by national policy than by the emissions marketplace.

The expansion of auctions for Phase 3 of the ETS could simplify allocations and permit market forces to influence compliance strategies more fully. Most countries did not employ auctions at all during Phase 1 and auctions continue to be limited under Phase 2. No country combined an

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<sup>67</sup> Unlike a carbon tax which uses the existing currency system to control emissions—be it euro or dollars.

<sup>68</sup> Deutsche Bank Research, *EU Emission Trading: Allocation Battles Intensifying* (March 6, 2007), p. 2.

auction with a reserve price to encourage development of new technology. The EC limited the amount of auctioned allowances to 10% in Phase 2: a limit no country chose to meet. Efforts to expand auctions met opposition from industry groups, but attracted support from environmental groups and economists. The Phase 3 increased use of auctioning through 2020 will represent a major development for the scheme.

Currently, all U.S. cap-and-trade proposals have some provisions for auctions, although the amount involved is sometimes left to EPA discretion. Most specify a schedule that provides increasing use of auctions from 2012 through the mid-2030s with a final target of 66%-100% of total allowances auctioned. Funds would be used for a variety of purposes, including programs to encourage new technologies. Some proposals include a reserve price on some auctions to create a price floor for new technology.

Like the situation in the ETS, most U.S. industry groups either oppose auctions outright or want them to be supplemental to a base free allocation. Given the experience with the ETS where the EC and individual governments have been unwilling or unable to move away from free allocation, the Congress, like the EU, may ultimately be asked to consider specifying any auction requirement if it wishes to incorporate market economics more fully into compliance decisions.

## **Flexibility and Price Volatility**

Despite EU rhetoric during the Kyoto Protocol negotiations, it moved into Phase 2 without a significant restriction on the use of CDM and JI credits. This embracing of project credits will significantly increase the flexibility facilities have in meeting their reduction targets. In addition, Phase 2 includes the use of banking to increase flexibility across time by allowing banked allowances to be used in Phase 3. Each of these market mechanisms is projected to reduce both the EU's Kyoto compliance costs and allowance price volatility. These flexibility mechanisms will be extended into Phase 3 with modifications.

Unfortunately, Phase 1 experience with the ETS did not provide much useful information on the value of market mechanisms or financial instruments in reducing costs or price volatility. The combination of poor emissions inventories, non-use of project credits, and time-limited allowances with effectively no banking resulted in extreme price volatility in Spring 2006, and virtually worthless allowances by mid-2007. The real test for the mechanisms employed by the ETS to create a stable allowance market is Phase 2. Initial indications are that a mature market for allowances appears to be developing, although, like most commodities markets, the allowance market can still be volatile at times.

Phase 3 is introducing two new mechanisms in the ETS to further respond to volatility not based on market fundamentals. However, the actual effectiveness of these mechanisms is yet to be proven.

Like the ETS, U.S. cap-and-trade proposals would employ a combination of devices to create a stable allowance market and encourage flexible, cost-effective compliance strategies by participating entities. All include banking. All include use of offsets, although some would place substantial restrictions on their use. Some proposals have incorporated a "safety valve" that would effectively place a ceiling on allowance prices, while others would create a Carbon Market Efficiency Board to observe the allowance market and implement cost-relief measures if necessary. Finally, some incorporate strategic reserves auctions, similar in concept to the EU forward auctioning mechanism, to increase allowance supply without busting the emission cap.

Some see this as a more flexible response with the potential for avoiding or mitigating the environmental impacts of a safety valve (i.e., increased emissions).

Additionally, concern has been expressed in the United States about the regulation of allowance markets and instruments. Based on experience with the ETS, the potential for speculation and manipulation could extend beyond the emission markets. Analysis of ETS allowance prices during Phase 1 suggests the most important variables in determining allowance price changes were oil and natural gas price changes.<sup>69</sup> This apparent linkage between allowance price changes and price changes in two commodities markets raises the possibility of market manipulation, particularly with the inclusion of financial instruments such as options and futures contracts. The concern is sufficient for the Directive to require the EC to examine the situation and the current protections against such activities. Congress may ultimately be asked to consider whether the Securities and Exchange Commission, Federal Energy Regulatory Commission, the Commodities Futures Trading Commission, or other body should have enhanced regulatory and oversight authority over such instruments.<sup>70</sup>

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<sup>69</sup> Maria Mansanet-Bataller, Angel Pardo, and Enric Valor, “CO<sub>2</sub> Prices, Energy and Weather,” 28 *The Energy Journal* 3 (2007), pp. 73-92.

<sup>70</sup> For a discussion of regulation of allowances as a commodity and implications for a greenhouse gas emissions market, see CRS Report RL34488, *Regulating a Carbon Market: Issues Raised By the European Carbon and U.S. Sulfur Dioxide Allowance Markets*, by (name redacted) and (name redacted).

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