

## A PRIMER ON THE GLOBAL CARBON MARKETS

The value of the global carbon market in 2011 was reported by World Bank to be \$176 billion, an 11% increase from the previous year.<sup>1</sup> This growth was accompanied by a 1.5 billion ton increase in the trade of carbon dioxide allowances between 2010 and 2011. As a result of the economic recession and resulting oversupply of CO<sub>2</sub> allowances in the market, the price of carbon in the EU reached a record low of €6 (\$8) in April 2012 and is currently (as of July 31, 2012) valued at approximately €7 (\$8). These low prices may persist unless the supply of carbon allowances is scaled back or emission limits are tightened, thereby stimulating the demand for allowances.<sup>2</sup> The European Commission is continuing to discuss possible actions for invigorating its carbon market (see p.7). One such action is the agreement of the Commission to work with top-emitter China in reducing China's greenhouse gases through a variety of projects. The EU will contribute 25 million Euros to China to help implement an emissions trading scheme in China, while also hoping to boost Europe's own ETS.<sup>3</sup>

As discussed below, a recent controversy pitting the United States, China, Japan, and thirteen other countries against the EU has arisen in response to the EU's requirement, as of January 2012, that all aircraft landing in or departing from the EU obtain carbon credits to cover the greenhouse gases emitted during the course of their journeys (see pp.7-9). In addition to describing the latest developments in global carbon markets, this memorandum will outline the two most prevalent types of emissions-control systems ("cap-and-trade" and "baseline-and-credit" systems) and provide detailed overviews of two such programs: the European Union's Emission Trading System (EU-ETS) and the Clean Development Mechanism (CDM) used in developing countries. This memorandum then summarizes the U.S regional efforts at climate regulation and concludes by summarizing the outcomes of the December 2011 UN climate talks in Durban, South Africa, and the May 2012 follow-up talks in Bonn, Germany. A glossary of terms is included at the end of this memorandum.

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<sup>1</sup> *State and Trends of the Carbon Market 2012*. Alexandre Kossoy and Pierre Guigon. World Bank. May 2012.

<sup>2</sup> "EU carbon falls to new record low below 6 euros." Reuters. 4 April 2012.  
<<http://www.reuters.com/article/2012/04/04/carbon-price-idUSL6E8F4BZU20120404>>.

<sup>3</sup> "Top emitter China agrees to work with EU to cut carbon." Reuters. 20 September 2012.  
<<http://www.reuters.com/article/2012/09/20/us-eu-china-carbon-idUSBRE88J0D820120920>>.

## Background

The trading of carbon allowances is a key component of EU climate change policy that has been implemented since the negotiation of the Kyoto Protocol in December 1997. Members of the United Nations Framework Convention on Climate Change (UNFCCC) that ratified the Protocol committed to reducing greenhouse gases (GHGs) during the period 2008 to 2012 to levels 5% below 1990 levels by 2020. The Kyoto Protocol regulates emissions of the six main greenhouse gases.<sup>4</sup> Developed countries that ratified the Protocol are legally bound to meet individual targets within the established reductions goals, while developing countries are not legally constrained to reduction targets.<sup>5</sup> The Protocol came into force in February 2005 after Russia's ratification in November 2004.<sup>6</sup> In a notable abstention, the U.S. did not ratify the Protocol because it did not agree with the lack of emission limits for developing nations including rapidly growing China, India, and Brazil. Additionally, Canada has decided to withdraw from the Protocol, effective December 15, 2012.<sup>7</sup>

The Kyoto Protocol was slated to expire at the end of 2012, but all countries that were a party to the Protocol agreed at the UN climate talks in Durban in December 2011 to extend it for at least five years. This extension is consistent with the parties' commitments to meeting the 2020 emission reduction goals set out in the Copenhagen Accord of 2009.<sup>8</sup> The UN member countries present at the Durban conference also agreed to negotiate a legally enforceable treaty governing emissions for all 194 countries by 2015.<sup>9</sup>

Although the U.S. is not bound by the Kyoto Protocol and does not have a formal federal emissions reductions system in place, a range of voluntary and state initiatives have emerged in this country. These include: a pact among ten northeastern states called the Regional Greenhouse Gas Initiative (RGGI); a California statute-based program called AB 32; and the Western Climate Initiative adopted by four Canadian provinces and the state of California. The voluntary Chicago Climate Exchange (the principal effort at a voluntary emissions-control program in the U.S.) saw its carbon prices collapse from a high of \$7.40 per ton in May of 2008

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<sup>4</sup> The Kyoto Protocol regulates emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

<sup>5</sup> The developed countries that are party to the UNFCCC are called Annex I Countries, and developing countries are called non-Annex I Countries. For a list of Annex I and Annex II countries, see Table 1 attached.

<sup>6</sup> With its ratification, Russia satisfied the clause stating that the Protocol would go into effect once the ratifying countries accounted for "55 percent of 1990 carbon dioxide emissions of the Parties included in Annex I."

<sup>7</sup> "Status of Ratification of the Kyoto Protocol." UNFCCC. Accessed 13 March 2012. <[http://unfccc.int/kyoto\\_protocol/background/items/6603.php](http://unfccc.int/kyoto_protocol/background/items/6603.php)>.

<sup>8</sup> The EU intends to cut emissions by 20% from 1990 levels, and the U.S. plans to cut emissions by 4% from 1990 levels. (Alister Doyle. "Major emitters set carbon goals after Copenhagen." Reuters. 1 February 2010. <<http://www.reuters.com/article/2010/02/01/us-climate-idUSTRE61053Q20100201>>.)

<sup>9</sup> "Durban climate conference ends with deal for more deal-making." Darren Samuelsohn. *Politico*. 11 December 2011. <<http://www.politico.com/news/stories/1211/70252.html>>.

to about \$0.10 per ton November 2009. It finally closed in January 2011 – illustrating that absent government mandates, there is little demand for carbon emission allowances.<sup>10</sup>

## **An Overview of How the Carbon Markets Work**

Today's global carbon markets include compliance markets based on a cap-and-trade system whereby emissions are capped, emission rights are freely traded, and the emission cap is gradually reduced over time. A related but separate emission credit system is commonly known as a baseline-and-credit system, whereby reductions achieved in third-world countries are available for sale under the EU cap-and-trade system. The principal example of the cap-and-trade system is the EU-ETS. The principal examples of the baseline-and-credit system are the CDM used for voluntary projects in China, India, and Africa, and the Joint Implementation (JI) system, used primarily in Eastern Europe and the countries of the former Soviet Union.

### **Cap-and-Trade**

Under a cap-and-trade system, an overall cap is set on carbon dioxide emissions and a finite number of emission allowances are either auctioned off or handed out by governments starting from an agreed base.<sup>11</sup> Each year fewer allowances are available and thus over time carbon emissions are reduced.

In such a system, carbon emission allowances are freely tradable until they are turned in by a company to the government to cover the company's carbon emissions for a given year. Companies not achieving sufficient emission reductions in any one year (i.e., needing credits) can buy emission credits either from companies that exceed required reductions (i.e., have excess credits), from brokers, or from others on the open market. The largest such market presently is the European Climate Exchange (ECX) in London.

### **Baseline-and-Credit**

Under the baseline-and-credit system, credits are generated by new construction of a carbon emission control project in a developing country. In order to generate credits, the project must achieve emissions reductions that are "additional," meaning that they would not have happened in the absence of the project. The host country in which the project is carried out must support the claim and an independent third party approved by a U.N. body must verify and certify the amount of emissions reduction attained by the project. The executive U.N. body then approves the project to receive credits equivalent to the amount of emissions reductions achieved.

The baseline-and-credit system can be used in conjunction with a cap-and-trade system. For example, the CDM mechanism which was established under the Kyoto Protocol allows companies to implement projects in developing countries (e.g., China, India, etc.) that emit less

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<sup>10</sup> EPA's efforts at controlling greenhouse gas emissions do not involve the creation of carbon markets.

<sup>11</sup> In addition to the EU-ETS, other examples of cap-and-trade systems include the New South Wales GHG Abatement Scheme, the Regional Greenhouse Gas Initiative (RGGI), and the Chicago Climate Exchange.

than would otherwise be the case under local law. The sponsor must also show that the project would not have been built “but for” the credits. When the additionality has been confirmed, the sponsor (or a buyer of the credits) may sell the carbon credits in the EU-ETS. The CDM mechanism is discussed in more detail below.

The idea behind the CDM is that emission reductions achieved in developing countries benefit the global environment as much as emission reductions in more developed nations and may be cheaper to implement. However, the ETS limits the number of CDM allowances that can be used for compliance in order to encourage domestic emissions reductions projects. Furthermore, as discussed in the section about CDM, there are significant risks associated with these projects.

### **The EU-ETS**

Under the EU-ETS, the European Union (EU) is committed to achieving a reduction in greenhouse gas (GHG) emissions of 20% relative to 1990 levels by 2020, a 20% improvement in energy efficiency, and the consumption of 20% of all primary energy in 2020 from renewable resources. (These goals are collectively known as the 20-20-20 targets.) The EU has offered to increase its reductions to 30% relative to 1990 levels by 2020 provided that “other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.”<sup>12</sup> The Durban Platform agreed to in the recent UN climate talks marks a shift toward an increased commitment to emission reductions on the part of other UN Member countries, but given that it is not a concrete plan, it is not likely by itself to prompt the EU to adopt the 30% goal.

Although the European Commission published a report indicating that changing to a 30% target would create long-term economic benefits for the EU, center-right members of the European Parliament’s environment committee resisted a bid to support the more stringent goal.<sup>13</sup> Polish Environment Minister Marcin Korolec similarly vetoed the March 2012 attempt by European Commission members to implement an EU-wide plan to cut CO<sub>2</sub> levels by 80% from 1990 levels by 2050.<sup>14</sup> These setbacks aside, members backing the more stringent emissions reductions target continue to appeal for wider support in future European votes.

The EU-ETS is divided into three allocation phases: Phase I began in 2005 and ended in 2007, Phase II started January 1, 2008 and continues through 2012, and Phase III begins in 2013 and continues through 2020. According to the European Commission, approximately 10,000 installations are covered by the EU-ETS and account for approximately half of the EU’s carbon dioxide emissions. They include power generation plants using fossil fuels, oil refineries, coke

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<sup>12</sup> “European Council 10/11 December 2009 Conclusions.” European Council. 11 December 2009. <[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/ec/111877.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/111877.pdf)>.

<sup>13</sup> “MEPs back away from 30% emissions target.” Dave Keating. EuropeanVoice.com. 31 January 2012. <<http://www.europeanvoice.com/article/2012/january/meps-back-away-from-30-emissions-target/73378.aspx>>.

<sup>14</sup> “Bright Lights in Warsaw.” *The Wall Street Journal*—Opinion. 15 March 2012. p. A14.

ovens, iron and steel plants, and factories making cement, glass, lime, brick, ceramics and pulp and paper. Over the next several years (2012 and beyond), several new sectors are expected to be added by the EU-ETS. The emissions cap for 2013 has been set at just under 2.04 billion allowances. The cap will decrease each year by 1.74% of the average annual total quantity of allowances issues by Member States in 2008-2012, or 37,435,387 allowances per year.

### **National Allocation Plans (NAPs)**

Because of the complex nature of EU governance, under the EU-ETS, each Member State (except as to the aviation industry) establishes a National Allocation Plan (NAP) to determine the total quantity of carbon dioxide allowances available in its country for each phase.<sup>15</sup> The European Commission then has to evaluate the NAPs based on criteria laid out in Annex III to the Emission Trading Directive.<sup>16</sup> These criteria include ensuring that the proposed total quantity of allowances meets Member States' Kyoto targets and that Member States have assessed the potential for emissions reductions in all sectors. After NAPs are approved by the European Commission, Member States can make final allocation decisions.

During Phase I (2005-2007) of the EU-ETS, Member States distributed 95% of the allowances free of charge. The penalty for non-compliance in Phase I was \$62 per excess ton. In Phase II (2008-2012), 90% of allowances are allocated free of charge. The remainder of allowances (i.e., 10%) may be auctioned off by the Member State. Registries keep track of the issuance of the allowances, as well as the holding, transfer, and cancellation of allowances. The penalty for non-compliance in Phase II is \$155 per excess ton. Also in Phase II, companies are able to bank EUAs for use in future compliance periods.

During Phase III (2013-2020), there will be one EU-wide cap on emission allowances, instead of 27 national caps, so NAPs will no longer be needed. The cap for 2013 has been set at just under 2.04 billion allowances. Each subsequent year, the cap will decrease by 37,435,387 allowances.<sup>17</sup> Additionally, the proportion of allowances auctioned will increase in subsequent years to 70% in 2020 with a view of reaching 100% by 2027. Ten percent of auction allowances

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<sup>15</sup> In the European Union each Member State has incentive to misrepresent the number of carbon dioxide credits needed. By April 2006, it was clear that companies had been over-allocated carbon credits by each country attempting to protect local industry. Over-allocation resulted in a temporary collapse of prices in Leipzig's spot market (EEX) in December 2007. As a result of observations of Phase I of the EU-ETS, the European Commission (EC) has created stricter guidelines for how to monitor and report emissions reductions as the complexities of the carbon market are better understood. During Phase II, companies face new rules in the EC's "Guidelines for Monitoring and Reporting of Greenhouse Gas Emissions Decision 2007/589/EC." More specifically, there will be a shift from "grandfathering" as a basis for allocation to benchmarking. Instead of allocating allowances to industrial plants, etc. based on their past emissions, benchmarks are to be established for each type of emission-generating unit.

<sup>16</sup> Six Member States are suing the European Commission over the decisions regarding their NAPs. As noted below, in September 2009 Poland and Estonia received a favorable ruling.

<sup>17</sup> "Cap." European Commission—Climate Action. Accessed 13 March 2012. <[http://ec.europa.eu/clima/policies/ets/cap/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/cap/index_en.htm)>.

will be redistributed from the Member States with high per capita income to those with low per capita income.<sup>18</sup>

The authority of the European Commission in overseeing NAPs was called into question in a September 2009 ruling by the EU General Court, which held that the European Commission was not justified in its attempt to compel Poland to cut its proposed allowances by nearly 27% and Estonia by nearly 48% and had “very restricted” power to review NAPs. The European Commission filed an appeal on December 3, 2009 and once again rejected Poland and Estonia’s NAPs on the basis that the quantity of allowances those countries proposed to allocate was too high. On March 29, 2012, the EU Court of Justice upheld the prior ruling in favor of Poland and Estonia, thereby confirming the European Commission’s limited oversight powers for establishing ceilings on the number of allowances allocated in a country’s NAP.<sup>19</sup> Although this ruling undercuts the European Commission’s authority in interpreting the ETS Directive, it will carry little direct relevance after Phase III begins in 2013, when NAPS will no longer be utilized and the European Commission will have the right to decide on the allocation of carbon allowances for each industry sector across the EU.

### **EUAs and CERs**

For all regulated sectors in the ETS, carbon dioxide emissions permits are quantified in EU allowances (EUAs). Carbon is also traded in Certified Emission Reductions (CERs) for CDM projects and Emission Reduction Units (ERUs) for JI projects. Each EUA or CER equals one metric ton of carbon dioxide (or its equivalent).

The price of EUAs traded on the European Climate Exchange (ECX) has varied over time. (See the below graph which tracks prices for the first trading day of each month from January 2008 to August 2012.)<sup>20</sup> The price of carbon has dropped dramatically amidst the global financial crisis and incipient EU recession. Valued at \$47 a ton at its high point in 2008, the price of EU allowances reached a record low nearing \$8 a ton on April 4, 2012.<sup>21</sup> The price has remained below \$11 since then.

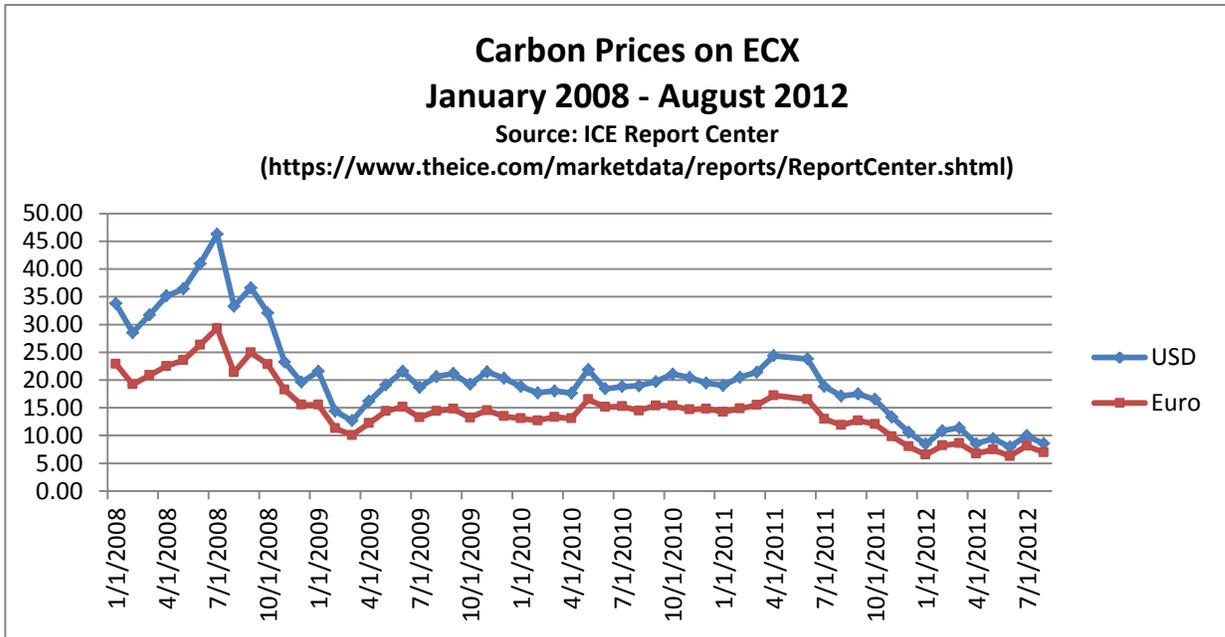
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<sup>18</sup> Initially, the NAP process was abused by individual countries to protect local industry (as was the case when individual states could print money under the U.S.’s Articles of Confederation). The EU largely corrected that problem by tightening the review of NAP issued credits and the price of those credits rebounded in 2007. The Lieberman-Warner-Boxer bill and the Waxman-Markey bill avoid the problem by centralizing the issuance of credits in EPA and legislatively mandating exactly how many credits are to be issued by EPA in the U.S. in each year between 2012 and 2050.

<sup>19</sup> “EU Court of Justice rules in favor of Poland, Estonia in CO2 cap case.” 29 March 2012. <[http://www.consus.eu/en/world\\_news/eu\\_court\\_of\\_justice\\_rules\\_in\\_favour\\_of\\_poland\\_estonia\\_in\\_co2\\_cap\\_case/](http://www.consus.eu/en/world_news/eu_court_of_justice_rules_in_favour_of_poland_estonia_in_co2_cap_case/)>.

<sup>20</sup> ICE Report—ICE Futures Europe, ECX EUA. Accessed 10 August 2012. <<https://www.theice.com/marketdata/reports/ReportCenter.shtml>>.

<sup>21</sup> “As Carbon Prices Sink, Unease Rises.” Selina Williams and Alessandro Torello. *The Wall Street Journal*. 4 April 2012. <<http://online.wsj.com/article/SB10001424052702304072004577323890893009020.html>>.



In response to the current surplus of EUAs, which totals more than 900 million tons and is driving down the market price of carbon, the EU Commission on July 25, 2012, published a draft proposal that would alter the auctioning schedule of ETS permits if it gets passed later in the year.<sup>22</sup> Under the proposal, an unspecified number of allowances slated to be auctioned in the years 2013-2015 would be withheld from auction until possibly being offered again in the three years preceding 2020. The commission is considering withholding as many as 1.2 billion carbon permits starting in 2013. If such a plan is passed, according to Portugal’s Espirito Santo Investment Bank, the price of EUAs could potentially double in value by the end of the year.<sup>23</sup> In accordance with current ETS policy for tightening emission limits, the number of available EUAs will also gradually decrease over time as fewer will be made available in each upcoming year.

### Aviation Sector

As of January 1, 2012, all airlines that used airports in the EU were required to obtain allowances covering their carbon emissions for flights to, from, or between airports in the EU, affecting nearly 4,000 aircraft operators worldwide.<sup>24</sup> The EU’s

<sup>22</sup> “EU May Cut More Than Half of Carbon Permits Sold in 2013.” Mathew Carr and Alessandro Vitelli. Bloomberg. 25 July 2012. <<http://www.bloomberg.com/news/print/2012-07-25/eu-may-cut-more-than-half-of-carbon-permits-sold-in-2013.html>>.

<sup>23</sup> “EU carbon price could double this year- Espirito.” Reuters. 2 March 2012. <<http://www.reuters.com/article/2012/03/02/carbon-espirito-santo-idUSL5E8E21I220120302>>.

<sup>24</sup> The following categories of flights will be exempt: very light aircraft, military, police, customs, rescue, training, testing, and state and governmental business. “Questions & Answers on historic aviation emissions and the inclusion of aviation in the EU’s emission trading system (EU ETS).” European Commission (online). 09 March 2011. <[http://ec.europa.eu/clima/policies/transport/aviation/faq\\_en.htm](http://ec.europa.eu/clima/policies/transport/aviation/faq_en.htm)>.

extension of its ETS allowance scheme to the aviation sector was met with opposition. Both China and India prohibited their airlines from participating in the EU-ETS scheme and refused to provide the EU with reports of their airlines' emissions data by the March 31, 2012 deadline.<sup>25</sup> In March 2012, China also withheld approval on contracts with the European-based Airbus for 45 jetliners, worth \$12 billion, and indicated that it might turn instead to planes from the American company Boeing.<sup>26</sup> On November 27, 2012, President Obama signed into law a bill prohibiting U.S. airlines from participating in the EU-ETS.

On November 12, 2012, the EU suspended its efforts to subject the aviation sector to the EU-ETS system. European Commission officials stated that the decision does not reflect a backing down to international pressures, but rather, arises from the potential for an international agreement for aviation carbon emissions to be set by the International Civil Aviation Organization ("ICAO"). At discussions in early November, the ICAO established a group to organize a global, market-based mechanism to address carbon emissions from airlines. The aim is to have this system developed at the time of its next General Assembly meeting in September 2013. If the ICAO cannot implement a system, the EU carbon tax will be reactivated automatically in one year.<sup>27</sup> After the announcement that the EU suspended its efforts to subject the aviation sector to the EU-ETS system, on November 23, 2012 China Eastern Airlines Corp. ordered 60 A320 planes from Airbus SAS.<sup>28</sup>

### **Australia's New Carbon Market**

On September, 27 2012 the Australian government issued the first permits under its carbon price. An aluminum firm, Alcoa, and Queensland Nitrates received a combined total of nearly \$150 million in permits.<sup>29</sup> This marked the official beginning of carbon trading in the country, about two and a half months after the establishment of the carbon market.

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<sup>25</sup> "New Delhi rejects EU ETS, joins China in boycott." Anne Eckstein. *Europolitics.info*. 26 March 2012. <<http://www.europolitics.info/sectorial-policies/new-delhi-rejects-eu-ets-joins-china-in-boycott-art330014-46.html>>.

<sup>26</sup> "China Envoy Backs Shunning of Airbus." Daniel Michaels. *The Wall Street Journal*. 10-11 March 2012.

<sup>27</sup> "EU freezes foreign airline carbon charge," Joshua Chaffin and Andrew Parker, *The Financial Times*. 12 November 2012. <<http://www.ft.com/cms/s/0/52716c10-2cc8-11e2-9211-00144feabdc0.html#axzz2DLL4toWF>>.

<sup>28</sup> "Airbus wins 60-Plane China Order After EU Retreat on CO2 Charges," Neil Denslow, *Bloomberg Businessweek*. 23 November 2012. <<http://www.businessweek.com/news/2012-11-23/china-eastern-orders-60-a320s-sells-18-regional-jets-to-airbus>>.

<sup>29</sup> Wroe, David. "National carbon permits issued as emissions market dawns." *National Times*. 28 September 2012. <<http://www.smh.com.au/opinion/political-news/first-carbon-permits-issued-as-emissions-market-dawns-20120927-26o0w.html>>.

The road to the carbon market in Australia was not the easiest nor was it welcomed by all. A carbon market in Australia had been under serious consideration beginning in 2006 with the creation of the National Emissions Trading Taskforce. In 2008, the Government proposed a cap-and-trade system in its “Carbon Pollution Reduction Scheme,” (CPRS). After legislation to implement the CPRS was rejected twice, the scheme was reintroduced into Parliament with two amendments on February 2, 2010. However, the implementation was further delayed until the current commitment period of the Kyoto Protocol ended. In the following months, the Government established the Multi-Party Climate Change Committee (MPCCC) to research Australia’s practical options for pricing carbon while exploring how Australia could continue to tackle the challenge of climate change in general. The MPCCC released a broad outline for a carbon pricing mechanism in February, 2011. Their framework became officially realized on July 10, 2011 when the Australian government released its Clean Energy Plan.<sup>30</sup>

The Clean Energy Plan came into effect this past July 1, introducing a two-stage approach to the Australian carbon market. For the next three years, the price of carbon will be set at a fixed price. This current price is \$23 per ton and will increase at a rate of 2.5% each year. About 300 businesses will be affected by the introduction of the carbon market. The agricultural sector, however, is exempt, and “trade-exposed” industries (like steel) will receive compensation on the price of its permits. The second stage of the scheme will begin on July 1, 2015. This phase will transition the country into a cap-and-trade system, allowing the market to set the price. Australia anticipates reducing emissions by 5% by 2020 and 80% by 2050 based on levels in 2000.<sup>31</sup>

### **Australia and the EU-ETS**

In August, Australia and the EU announced a deal that will connect the two international carbon markets in 2015, the beginning of Australia’s second phase. This deal will effectively create the world’s biggest ETS. Australian businesses will be able to purchase up to 50% of their carbon permits from the European market at the start in July 2015. In 2018, full two-way trade will commence with European businesses able to purchase credits from Australia. This deal gets rid of the floor price for carbon in Australia which was set to come into action in 2015 when the cap-and-trade phase commenced. Both countries believe this will be a mutually beneficial link and hope that it will encourage more international cooperation in fighting climate change. The European Commission states that this link will create a more liquid market, which will help countries cut their carbon dioxide emissions more cheaply.<sup>32</sup>

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<sup>30</sup> “Carbon Pricing – Considering of carbon pricing issues.” Dept of Climate Change & Energy Efficiency. 07 November 2011.  
<<http://www.climatechange.gov.au/government/reduce/carbon-pricing.aspx>>.

<sup>31</sup> “Uncertainty hangs over Australia on eve of carbon tax introduction” The Guardian. 29 June 2012.  
<<http://www.guardian.co.uk/environment/2012/jun/29/australia-carbon-tax>>.

<sup>32</sup> “Australian and EU carbon markets to be linked.” The Guardian. 28 August 2012.  
<<http://www.guardian.co.uk/environment/2012/aug/28/australia-eu-carbon-markets>>.

## The CDM Baseline-and-Credit System

The Clean Development Mechanism (CDM) offers a way for companies subject to EU-ETS to earn Certified Emission Reductions (CERs) for projects implemented in developing countries. As of mid-June 2012, CERs were selling for around \$4.50 a ton.<sup>33</sup> There are several types of projects that can generate CERs, including biological sequestration, destruction of industrial gases with high global warming potentials, methane capture, projects that increase energy efficiency, and renewable energy projects. However, not all types of projects are accepted in each trading system. For example, nuclear and forestry projects, as well as some hydropower projects are not eligible for EU-ETS compliance credits. In addition, companies that finance CDM projects take on the risk that approval of the projects might be denied by the UN's CDM Executive Board or that the completed project might fail to achieve the emissions reductions called for in the planning documents.

During the planning phase of a CDM project, a feasibility study is conducted and a methodology is established to determine a project's baseline and additionality. A Project Design Document is completed that describes the project in detail, and then the project must be validated by an independent UN-approved third-party auditor, called a Designated Operational Entity (DOE). There are currently 41 DOEs that have been accredited by the CDM Executive Board.<sup>34</sup> After a project is validated by a DOE, it must be approved by the host country as well as by the CDM Executive Board.

According to the UNFCCC's CDM website, there are currently 4,233 registered CDM projects and 102 additional projects requesting registration. Thus far, 953,399,523 CERs have been issued.<sup>35</sup> After a CDM project is approved, it is implemented and monitored. Once the construction of a project is completed, verification and certification by a DOE is required to confirm that the planned carbon emissions reductions are taking place. Usually, the DOE that performs verification and certification is not the same one that validated the project.<sup>36</sup> If it is clear from the verification report that emissions were reduced, then the CDM Executive Board issues the appropriate number of CERs to the project participant.<sup>37</sup>

The CDM mechanism involves certain risks for purchasers of carbon credits. For example, the buyer may not receive credits if project failure occurs (i.e., the project does not get built, it fails once built to produce the additionality required for certification of the carbon credits, or it produces fewer certifiable credits than expected). There is also the credit risk that

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<sup>34</sup> ICE Report Center. Accessed 15 June 2012. <<https://www.theice.com/marketdata/reports/ReportCenter/shtml?reportId=10>>.

<sup>34</sup> "List of DOEs." Accessed 15 June 2012. <<http://cdm.unfccc.int/DOE/list/index.html>>.

<sup>35</sup> "CDM in Numbers." Accessed 15 June 2012. <<http://cdm.unfccc.int/Statistics/index.html>>.

<sup>36</sup> "Designated Operational Entity." Accessed 13 March 2012. <<http://cdmrulebook.org/62>>.

<sup>37</sup> "CDM Project Cycle." Accessed 13 March 2012. <<http://cdm.unfccc.int/Projects/diagram.html>>.

the seller will become insolvent before the date of delivery or will otherwise default on the delivery of the agreed-upon quantity of certified credits when due. The level of risk typically depends on the type of contract involved-- some contracts relate to credits already generated, while others relate to credits expected to be generated and may be either "guaranteed" (i.e., involve risk to the seller) or not guaranteed (i.e., involve risk to the buyer). Although some effort is being made to develop more uniform contracting, wide variations currently exist in contracts' allocations of risk. A buyer should therefore closely examine the exact terms on which a specific set of CDM credits are being offered. Other options for managing risk include having a portfolio of projects, employing independent experts to oversee projects, buying more credits than are actually needed on the assumption that the delivery of some will fail, and taking out an insurance policy. However, each of these ways of managing risk involves additional cost.

Investors in CDM may also face increasing challenges in Phase III of the EU-ETS. The ETS Directive limits the number of CERs that can be used for compliance in the second and third compliance periods to 50% of the total reduction amount in these two periods, and it also limits the types of projects that qualify for approval.<sup>38</sup> Only CDM projects undertaken in Least Developed Countries (LDCs) will be able to generate CERs beginning in 2013, ruling out projects in robust developing nations like China, India, and Brazil.<sup>39</sup> Additionally, CERs must first be exchanged for EUAs before being used to meet compliance measures before March 2015.<sup>40</sup>

### **Challenges Facing the EU Carbon Markets**

We are advised by our European colleagues that the EU carbon markets face a number of challenges to carbon emission reductions, including those noted below.

- The Kyoto Protocol uses 1990 as its base year from which reductions are measured. The carbon emission reductions that the EU has thus far achieved since that base year have been largely due to deindustrialization in the countries of the former Soviet Union (including what was formerly East Germany) and a slowdown in the EU economy. As a result, once economic conditions improve, further emission reductions in the EU as a whole, and in those countries in particular, will be more difficult to achieve.
- Companies seeking to determine the number of carbon emission credits they need to hold or apply for typically hire private engineering firms to quantify their emissions and make the related calculations regarding the credits they will need.

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<sup>38</sup> Starting from January 1, 2013, the EU ETS will prohibit CERs and ERUs from projects involving the destruction of trifluoromethane (HFC-23) and nitrous oxide (N<sub>2</sub>O) emissions from adipic acid production. Since 2005, CERs from projects at nuclear facilities and from projects in agriculture and forestry have already been restricted.

<sup>39</sup> See Attachment 1 for list of Least Developed Countries.

<sup>40</sup> "Questions and answers on use of international credits in the third trading phase of the EU ETS." European Commission. 14 November 2011.

<[http://ec.europa.eu/clima/policies/ets/linking/docs/q\\_a\\_20111114\\_en.pdf](http://ec.europa.eu/clima/policies/ets/linking/docs/q_a_20111114_en.pdf)>.

There is, however, relatively weak oversight by governmental bodies of this process. Consequently, oversight of the process needs to be strengthened to better assure the integrity of emissions computations.

- Currently, when a purchase and sale transaction takes place, it must be reported at multiple levels, including to registries maintained at the EU and at each of the member states where the buyer and seller are located. Additionally, each cross-border transaction must be reported to a United Nations body that converts EUAs into Assigned Allowance Units (AAUs). AAUs are the international mechanism used to track the emission balances of the respective Kyoto states. These databases should be better integrated in order to provide increased assurance that the transaction reporting system is running properly (for example, that the same credit is not sold more than once by an originating company). The unification of the EU NAPs into a single Union registry for the aviation industry is a significant first step toward addressing this problem.

## **U.S. State and Regional Efforts at Carbon Market Creation**

### **RGGI**

Established in 2003, the Regional Greenhouse Gas Initiative (RGGI) currently has 9 participating states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New York, Delaware, and Maryland. These states have established limited CO<sub>2</sub> emission reduction targets and have implemented a market based mandatory cap-and-trade system applicable to fossil fuel-fired electric generating units (EGUs) operating in each state.<sup>41</sup> The RGGI participating states have agreed to stabilize carbon dioxide emissions from power plants from 2009 to 2014 at 188 million short tons per year and then to reduce emissions by 2.5% per year during the next four years (i.e., a 10% total reduction by 2018). Each regulated EGU must hold and surrender allowances equal to its emissions in the prior year.<sup>42</sup>

Notably, the industrial state of Pennsylvania declined to participate in the program, and on May 26, 2011, Governor Chris Christie withdrew New Jersey from the initiative. The governor stated that the program failed to meaningfully reduce GHG emissions but that it increased the tax burden on residents and businesses relying on electricity in the state. He also suggested that carbon taxes might have forced power plants in the state to close, only to have been replaced by “dirty” coal plants in neighboring Pennsylvania.<sup>43</sup>

In support for a bid to re-enter RGGI, Environment New Jersey released a report in February 2012 asserting that significant economic and environmental successes would result

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<sup>41</sup> “Program Overview.” RGGI, Inc. <<http://www.rggi.org/design/overview>>.

<sup>42</sup> *Ibid.*

<sup>43</sup> “Gov. Christie announces N.J. pulling out of regional environmental initiative.” Christopher Baxter/Statehouse Bureau. 26 May 2011. <[http://www.nj.com/politics/index.ssf/2011/05/gov\\_christie\\_to\\_announce\\_nj\\_pu.html](http://www.nj.com/politics/index.ssf/2011/05/gov_christie_to_announce_nj_pu.html)>.

from the state's participation in the program.<sup>44</sup> The consulting firm Analysis Group, for one, reports that the initiative has garnered \$1.6 billion for member states, reducing utility costs for customers by increasing energy efficiency, and creating 16,000 jobs to date.<sup>45</sup> The New Jersey legislature has voted twice to re-enter the program, but Governor Christie already vetoed one of the bills. On June 6, 2012, the Natural Resources Defense Council and Environment New Jersey filed a lawsuit against the New Jersey Department of Environmental Protection for re-entry into RGGI, claiming that the state's withdrawal from the program was illegal because the public had not been given an opportunity to comment, as mandated by state administrative laws.<sup>46</sup>

The RGGI held its sixteenth quarterly auction of carbon dioxide emissions allowances on June 6, 2012. The price of the winning allowance bids in that auction for the current control period of 2012-2014 was \$1.93 per ton, and 57% of the total available allowances were sold.<sup>47</sup> Future control period allowances (2015–2017) will not be offered at 2012 auctions.<sup>48</sup> In January 2012, RGGI announced its intention to retire 87 million CO<sub>2</sub> allowances that remained unsold from the previous control period (2009 to 2011). The low price of allowances and the surplus from the last control period indicate that it was relatively cheap and easy for plants to meet modest emission reduction requirements, likely due in part to the recent recession and to a sharp drop in natural gas prices. As a result, there is some speculation that RGGI will lower the emissions cap for the upcoming years.<sup>49</sup>

### **California's AB 32 Program**

At the start of 2012, California by statute implemented a program requiring certain emitters of Greenhouse gases (GHGs) to obtain and surrender at the end of each year permits covering the GHGs emitted in the preceding year. The program in its initial stage applies to EGUs, imports of electricity, and large industrial facilities emitting greater than 25,000 metric tons carbon dioxide equivalent per year. Each allowance will cover one metric ton of carbon dioxide emission equivalent. Starting in 2015, distributors of transportation fuels, natural gas

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<sup>44</sup> "RGGI Withdrawal Could Cost New Jersey \$680 Million in Future Revenue." Silvio Marcacci. CleanTechnica.com. 21 February 2012. <<http://cleantechnica.com/2012/02/21/rggi-withdrawal-could-cost-new-jersey-680-million-in-future-revenue/>>.

<sup>45</sup> "Northeast Cap-and-Trade Program Adds \$1.6 Billion to Regional Economy." 18 November 2011. SustainableBusiness.com News. <<http://www.sustainablebusiness.com/index.cfm/go/news.display/id/23169>>.

<sup>46</sup> "New Jersey is Sued Over Cap-and-Trade Reversal." Mireya Navarro. The New York Times (online). 7 June 2012. <<http://green.blogs.nytimes.com/2012/06/07/new-jersey-sued-over-cap-and-trade-reversal/?src=recg>>.

<sup>47</sup> "RGGI Prices Remain Flat, 57% of Allowances Sold." Environmental Leader. 11 June 2012. <<http://www.environmentalleader.com/2012/06/11/rggi-prices-remain-flat-57-of-allowances-sold/>>.

<sup>48</sup> "Auction 15." RGGI, Inc. <[http://www.rggi.org/market/co2\\_auctions/results/Auction-15](http://www.rggi.org/market/co2_auctions/results/Auction-15)>.

<sup>49</sup> "RGGI States Retiring Unsold Allowances, Signaling Possible Tightening of Carbon Cap." Gerald B. Silverman. *Environment Reporter*, Vol. 43, No. 5. Bloomberg BNA. 03 February 2012. p. 269.

and other fuels will be required to obtain GHG allowances. These sources are said to account in total for 80% of GHG emissions in the state.<sup>50</sup>

The permits may be obtained from state awarded allowances or may be purchased at state conducted quarterly auctions or in a market to be established. Award of emission allowances will focus on EGUs and industrial sources. EGUs will be required to sell awarded allowances for the benefit of rate-payers (thereby reducing the impact of the cap and trade system on the retail price for electricity). The total number of emission allowances issued each year will decline with a goal of reducing emissions by 2020 to what they were in 1990.<sup>51</sup> Only 8% of an entity's obligations may be fulfilled by offsets, which can fall into one of four initial categories: forestry; urban forestry; livestock (manure/methane) management, and removing existing stock of ozone-depleting substances.<sup>52</sup>

On December 16, 2010, the California Air Resources Board (CARB) approved draft AB 32 regulations to be implemented beginning in 2012, subject to public notice and comment and a hearing on staff proposed modifications to the program.<sup>53</sup> On March 18, 2011, the San Francisco Superior Court issued an injunction prohibiting CARB from further rulemaking under AB 32 because CARB failed to consider alternatives to a cap-and-trade system (for example, a carbon tax) or allow public comment on such alternatives.<sup>54</sup> CARB appealed the injunction and the First Appellate District of the California Court of Appeal stayed the lower court's decision on June 3, 2011, clearing the way for CARB to finalize the cap-and-trade regulation on October 20, 2011.<sup>55</sup> The final rule went into effect on January 1, 2012, and the first compliance period for affected parties begins on January 1, 2013. On November 14, 2012, California sold all 23.1 million of its 2013 GHG allowances during its online auction.<sup>56</sup>

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<sup>50</sup> "Cap-and Trade." California Environmental Protection Agency – Air Resources Board. <<http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>>, updated 20 December 2010.

<sup>51</sup> CARB estimates this will amount to a 15% reduction from current emissions. The regulations cover emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.

<sup>52</sup> "CARB Emissions Trading Program Overview." California Environmental Protection Agency – Air Resources Board. <[http://www.arb.ca.gov/cc/factsheets/emissions\\_trading\\_program.pdf](http://www.arb.ca.gov/cc/factsheets/emissions_trading_program.pdf)>, revised 21 January 2011.

<sup>53</sup> "Cap-and Trade." California Environmental Protection Agency – Air Resources Board. <<http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>>, updated 20 December 2010.

<sup>54</sup> "California's Climate Change Law Suffers Legal Setback." Georgetown International Environmental Law Review. <<http://gielr.wordpress.com/2011/03/25/californias-climate-change-law-suffers-legal-setback/>>.

<sup>55</sup> "CARB Approves Final Revised AB 32 Cap-and-Trade Regulation." Bingham. 27 October 2011. <<http://www.bingham.com/Media.aspx?MediaId=13054>>.

<sup>56</sup> "Air Board Sells All 2013 Allowances in First Emissions Cap-and-Trade Auction," Carolyn Whetzel. *Environment Reporter*, Vol. 43, No. 46. Bloomberg BNA. 23 November 2012. p. 3002.

On May 29, 2012, the California Assembly passed the related bill 1532, which regulates how the funds generated at auctions for cap-and-trade credits can be spent. Authorized investments under this bill include projects promoting clean energy, low-carbon transportation, natural resource protection, and innovative clean air technologies.<sup>57</sup>

### **The Western Climate Initiative (WCI)**

The WCI was established in February 2007 to explore methods for participating states to reduce GHG emissions. California and the Canadian Provinces of British Columbia, Manitoba, Ontario and Quebec are the only participants remaining in the regional cap and trade program, which has a stated goal of reducing GHG emissions by 15% by 2020. In November 2011, the states of Arizona, Montana, New Mexico, Oregon, Utah and Washington withdrew from the initiative, instead looking to join a new program called the North America 2050 Initiative, which is said to provide states with more options for addressing emissions and environmental issues.<sup>58</sup>

Quebec officially adopted a regulation for a cap-and-trade program based on the WCI's recommendations on December 15, 2011. It is the second participating body in the WCI, after California, to formally implement cap-and-trade regulation with clearly established emissions limits and compliance periods. On February 22, 2012, the WCI jurisdictions released final recommendations for offset projects and credit creation protocols in provincial and state GHG emissions trading programs.<sup>59</sup>

### **The Future**

At the December 2011 conference in Durban, South Africa, 194 member countries agreed to finalize the “Durban Platform for Enhanced Action” by 2015, with the intent that the resulting agreement would go into effect by the year 2020. Importantly, the agreement resulting from these negotiations is meant to carry “legal force” (presumably from an international enforcement body like the one outlined in the Kyoto Protocol's Compliance Mechanism). This treaty would apply to all member countries, including developing countries like India and China that were not subject to emissions limits in the Kyoto Protocol, as well as the United States, which had signed but not ratified the Kyoto Protocol. This development is a step forward from the Copenhagen Accord of 2009 and the Cancun Agreements of 2010, which laid out similar

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<sup>57</sup> “Assembly passes controversial ‘cap-and-trade’ auction measure.” The Sacramento Bee. 29 May 2012. <<http://blogs.sacbee.com/capitolalert/latest/2012/05/california-assembly-passes-controversial-cap-and-trade-auction-bill.html#storylink=cpy>>.

<sup>58</sup> “6 States Pull Out of Western Climate Initiative.” 22 November 2011. SustainableBusiness.com News. <<http://www.sustainablebusiness.com/index.cfm/go/news.display/id/23178>>.

<sup>59</sup> “Final Recommendations Offset System Project Available.” 22 February 2012. Western Climate Initiative—News and Updates. <<http://www.westernclimateinitiative.org/news-and-updates>>.

plans for staying below a two degree Celsius temperature rise but did not carry legal standing.<sup>60</sup>

In addition to the Durban Platform, the conference also established a new \$100 billion Green Climate Fund to help poorer countries reduce emissions and adapt to climate change. Additionally, all 194 members present agreed to extend their various commitments to the goals of the Kyoto Protocol (which was due to end this year) for at least another five years. Countries will have to report their emissions targets for this next phase to the UN by May 1, 2012. The exact length of the Protocol's extension will be determined at the next round of year-end UN climate talks, taking place in Qatar from November 26 to December 7, 2012.

The Ad Hoc Working Group on the Durban Platform for Enhanced Action (AWG-ADP) met for its first round of negotiations at the Bonn Climate Change Conference in May 2012. The group approved an agenda outline on the issues of cutting emissions before 2020 and negotiating a new global agreement for reducing greenhouse gases that would become effective in 2020. The AWG-ADP selected Harald Dovland of Norway and Jayant Moreshwar Mauskar of India to serve as co-chairs for one year. The Bonn talks settled some procedural concerns, but the specifics in the plan to negotiate a new climate change agreement still need to be fleshed out before the Qatar talks at the end of the year.<sup>61</sup>

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<sup>60</sup> "UN Climate Change Conference in Cancun delivers balanced package of decisions, restores faith in multilateral process." UN press release, 11 December 2010. <<http://unfccc.int/2860.php>>.

<sup>61</sup> "Bonn Talks Conclude With Agenda Outline, Selection of Chairs for New Negotiating Track." Eric J. Lyman. *Environment Reporter*, Vol. 43, No. 22. Bloomberg BNA. 01 June 2012. p. 1400-1401.

## GLOSSARY OF KEY TERMS

**AB 32 Program** – A program beginning in 2012 by statute that will require certain emitters of GHGs to obtain and surrender at the end of each year permits covering the GHGs emitted in the preceding year.

**Additionality** – The extent to which reductions or avoidance of greenhouse gas emissions would not have occurred anyway.

**AAUs** – Assigned Allowance Units are the international mechanism used to track the emission balances of the respective Kyoto Protocol states

**Baseline-and-credit** – A system in which greenhouse gas reductions achieved in third-world countries are available for sale under the EU’s cap-and-trade system.

**Cap-and-trade** – A system in which greenhouse gas emissions are “capped” and then emission rights are freely “traded.”

**Carbon dioxide equivalent** – A measure for describing how much [global warming](#) a given type and amount of [greenhouse gas](#) may cause, using the functionally equivalent amount or concentration of [carbon dioxide](#) as a reference.

**Carbon shares** – Under the CLEAR Act, a carbon share is a permit required to accompany each ton of fossil carbon in the fuel of an upstream fossil fuel producer or importer.

**Covered entities** – Sources of greenhouse gases under the Waxman-Markey bill required to hold credits for their greenhouse gas emissions. Each year a covered entity must prove that it holds a sufficient number of emission allowances to cover its emissions.

**CDM** – The Clean Development Mechanism is a system for allowing companies under the EU-ETS the possibility of earning CERs for projects implemented in developing countries which reduce greenhouse gases.

**CERs** – Certified Emissions Reductions are a form of carbon dioxide emissions from CDM projects that are traded on the open market.

**Emission Allowances** – Under the Waxman-Markey and Kerry-Boxer bills, emission allowances are carbon dioxide equivalent allowances, or credits. Each allowance gives an entity the right to emit one metric ton of CO<sub>2</sub> equivalent. They will be distributed by EPA for grant or auction for each year between 2012 and 2050.

**EPA** – The Environmental Protection Agency is the U.S. government agency whose mission is to protect human health and the environment.

**EU-ETS** – The European Union Emissions Trading Scheme is a cap-and-trade system in the EU.

**EUAs** – European Union Allowances are a form of carbon dioxide emissions traded on the open market.

**ERUs** – Emission Reduction Units are a form of carbon dioxide emissions from Joint Implementation (JI) system projects traded on the open market.

**ECX** – The European Climate Exchange in London is currently the largest carbon market where emission credits can be traded.

**Greenhouse gases (GHG)** – Greenhouse gases are gases that trap heat in the atmosphere. The six main greenhouse gases are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

**JI** – The Joint Implementation System is a type of baseline-and-credit system used primarily in Eastern Europe and the countries of the former Soviet Union.

**Kyoto Protocol** – An international agreement (under the UNFCCC) that sets targets for thirty-seven industrialized countries and the European community for reducing GHG emissions.

**NAP** – A National Allocation Plan must be established by each EU member state to determine the total number of allowances that will be allocated in each phase. NAPs are then evaluated by the European Commission.

**RGGI** – The Regional Greenhouse Gas Initiative is a voluntary cap-and-trade system in the U.S. applicable only to electric generating units (EGUs). The participating states are Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New York, New Jersey, Delaware, and Maryland.

**UNFCCC** – The United Nations Framework Convention on Climate Change is a treaty which sets an overall framework for governments to address the issue of climate change. It was entered into force in 1994 and has been ratified by 192 countries.

**Western Climate Initiative (WCI)** - A regional cap and trade program to be phased in beginning in 2012. Participating states are Arizona, California, Montana, New Mexico, Oregon, Utah and Washington and the Canadian Provinces of British Columbia, Manitoba, Ontario and Quebec.

## Attachment 1

### **Annex I, Annex II, and Non-Annex I Parties to the UN Framework Convention on Climate Change (UNFCCC)**

(Source: UNFCCC, [http://unfccc.int/parties\\_and\\_observers/items/2704.php](http://unfccc.int/parties_and_observers/items/2704.php))

The Convention divides countries into three main groups according to differing commitments:

**Annex I** Parties include the industrialized countries that were members of the OECD (Organisation for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States.

Australia	Liechtenstein*
Austria	Lithuania *
Belarus *	Luxembourg
Belgium	Monaco*
Bulgaria *	Netherlands
Canada	New Zealand
Croatia *	Norway
Czech Republic *	Poland *
Denmark	Portugal
European Union	Romania *
Estonia *	Russian Federation *
Finland	Slovakia *
France	Slovenia *
Germany	Spain
Greece	Sweden
Hungary *	Switzerland
Iceland	Turkey
Ireland	Ukraine *
Italy	United Kingdom of Great Britain and Northern Ireland
Japan	United States of America
Latvia *	

\*Denotes countries with economies in transition (the EIT Parties)

**Annex II** Parties consist of the OECD members of Annex I, but not the EIT Parties. They are required to provide financial resources to enable developing countries to undertake emissions reduction activities under the Convention and to help them adapt to adverse effects of climate change. In addition, they have to "take all practicable steps" to promote the development and transfer of environmentally friendly technologies to EIT Parties and developing countries. Funding provided by Annex II Parties is channeled mostly through the Convention's financial mechanism.

**Non-Annex I** Parties are mostly developing countries. Certain groups of developing countries are recognized by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought. Others (such as countries that rely heavily on income from fossil fuel production and commerce) feel more vulnerable to the potential economic impacts of climate change response measures. The Convention emphasizes activities that promise to answer the special needs and concerns of these vulnerable countries, such as investment, insurance and technology transfer.

The 48 Parties classified as **least developed countries** (LDCs) by the United Nations are given special consideration under the Convention on account of their limited capacity to respond to climate change and adapt to its adverse effects. Parties are urged to take full account of the special situation of LDCs when considering funding and technology-transfer activities.

Afghanistan	Madagascar
Angola	Malawi
Bangladesh	Mali
Benin	Mauritania
Bhutan	Mozambique
Burkina Faso	Myanmar
Burundi	Nepal
Cambodia	Niger
Central African Republic	Rwanda
Chad	Samoa
Comoros	Sao Tome and Principe
Democratic Republic of the Congo	Senegal
Djibouti	Sierra Leone
Equatorial Guinea	Solomon Islands
Eritrea	Somalia
Ethiopia	Sudan
Gambia	Timor Leste
Guinea	Togo
Guinea Bissau	Tuvalu
Haiti	United Republic of Tanzania
Kiribati	Uganda
Lao People's Democratic Republic	Vanuatu
Lesotho	Yemen
Liberia	Zambia