Comments

ANALYZING CARBON EMISSIONS TRADING: A POTENTIAL COST EFFICIENT MECHANISM TO REDUCE CARBON EMISSIONS

BY

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The growing interest in emissions trading systems corresponds to a continued steady rise in greenhouse gas (GHG) emissions into the atmosphere threatening the world with dramatic climate change. The United Nations Framework Convention on Climate Change creates a possibility for global cooperation in fighting climate change and lays the framework for international efforts to reduce GHG emissions. Through the Kyoto Protocol, the international community has recognized the possible high cost associated with reducing GHG emissions and, as a result, allowed ratifying countries to use flexible mechanisms including emissions trading, joint implementation, clean development mechanism, and joint-fulfillment, in addition to domestic reduction efforts to limit compliance costs. Based on the realization that GHG emission reductions have the same effect regardless of geographic location, the flexible mechanisms allow participants to offset their own emissions by purchasing allowances from other participants.

Carbon emissions trading, one of the Kyoto Protocol's flexible mechanisms, presents a promising tool to limit global emissions of GHGs that cause climate change. Questions still remain whether carbon markets provide a cost-efficient and environmentally effective method for reducing GHG emissions. Ideally, emissions trading reduces

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the cost of meeting emissions obligations by placing a monetary value on GHG emissions and using the flexibility of the market to allow participants to decide whether it is cheaper to reduce emissions or to purchase excess allowances from others. Emissions trading holds the promise to correct a market failure that allows companies to avoid incorporating global environmental costs in the cost of production. This Comment examines the status and effectiveness of the current carbon markets and their ability to create flexible and cost efficient methods to reduce emissions. The Comment concludes that emissions trading can provide an import cost-efficient mechanism to lower the cost of reducing global GHG emissions to levels that would prevent catastrophic anthropogenic climate change. However, without the incorporation of China and the United States, the world's two largest polluters, the carbon markets may serve as a successful market tool and example of the efficiency of an open market to cost-efficiently solve environmental problems, but will do nothing to curb GHG emissions and limit the effects of climate change.

I. INTRODUCTION

The growing interest in emissions trading systems corresponds to a continued steady rise in greenhouse gas emissions that threatens the world with dramatic climate change.[1] Greenhouse gas (GHG) emissions work as "a blanket around the earth," likely increasing the earth's average temperature[2] over the next one hundred years between 1.1 and 6.4 degrees Celsius.[3] The temperature increase from climate change causes extreme weather patterns such as flooding, drought, and shifting ocean currents.[4] "Eleven of the last twelve years (1995–2006) rank among the 12 warmest years in the instrumental record of global surface temperature (since 1850)."[5] The effects of climate change are already visible at the local level. For example, Europe faces dramatic cooling caused by climate change that slows the North Atlantic Drift, the ocean current that gives Europe its warm, mild weather.[6] In the Pacific Northwest, shifts in ocean temperature off the Oregon Coast, most likely caused by climate change,[7] created a hypoxic dead zone[8] for the fifth straight year.[9] Since 2002, when the phenomenon first appeared, the dead zone has quadrupled in size to 1235 square miles.[10] These examples are only two of many and demonstrate the international effect of climate change. Climate change is a global problem and remains unsolvable at an isolated, local level. One ton of carbon emitted in New York has the same

1 *See* Intergovernmental Panel on Climate Change (IPCC), *Summary for Policymakers: A Report of Working Group I of the Intergovernmental Panel on Climate Change*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, FOURTH ASSESSMENT REPORT FOR THE IPCC 2 (S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor & H.L. Miller eds., 2007) [hereinafter IPCC] (stating that the global atmospheric concentration of carbon dioxide has increased from pre-industrial levels of 280 ppm to 379 ppm as of 2005, exceeding the natural range for the past 650,000 years).

2 United Nations Framework Convention on Climate Change (UNFCCC), The Greenhouse Effect and the Carbon Cycle, http://unfccc.int/essential_background/feeling_the_heat/items/2903.php (last visited Jan. 26, 2008). The six greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, *Kyoto Protocol*, Annex A, U.N. Doc FCCC/CP/1997/L.7/Add.1, 37 I.L.M. 22, 42 (1998) [hereinafter Kyoto Protocol].

3 IPCC, *supra* note 1, at 13.

4 IPCC, *supra* note 1, at 15; *see* UNFCCC, Current Evidence of Climate Change, http://unfccc.int/essential_background/feeling_the_heat/items/2904.php (last visited Jan. 27, 2008).

5 IPCC, *supra* note 1, at 5.

6 James Randerson, *Evidence Grows of Waning Ocean Current*, SYDNEY MORNING HERALD, Oct. 28, 2006, http://www.smh.com.au/news/world/evidence-grows-of-waning-ocean-current/2006/10/27/1161749315591.html (last visited Jan. 27, 2008).

7 Cornelia Dean, *'Dead Zone' Reappears Off the Oregon Coast*, N.Y. TIMES, Aug. 6, 2006, *available at* http://www.nytimes.com/2006/08/06/us/06coast.html.

8 Oregon State University, *New Hypoxic 'Dead Zone' Found Off Oregon Coast*, SCI. DAILY, Aug. 10, 2004, *available at* http://www.sciencedaily.com/releases/2004/08/040810091946.htm (providing that a hypoxic "dead zone" is an area of the ocean that is so low in oxygen that most marine life cannot survive within it).

9 Dean, *supra* note 7.

10 *Id.*

climate change effect in Portland, Oregon, as one ton of carbon emitted in China. As a result, the fight to prevent or limit the effects of anthropogenic climate change requires international cooperation. Climate change is a global threat and therefore only international efforts can address local problems such as the hypoxic dead zone and the slowing of the North Atlantic Current.

The United Nations Framework Convention on Climate Change (UNFCCC)[11] creates a possibility for global cooperation in fighting climate change and lays the framework for international efforts to reduce GHG emissions. The UNFCCC's goal is to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[12] This task was left to the Kyoto Protocol, which specifically calls for developed countries to reduce their emissions by five percent below 1990 levels during the commitment period 2008 to 2012.[13] The Kyoto Protocol recognizes the potentially high cost associated with reducing GHG emissions and, as a result, allows ratifying countries to use "flexible mechanisms," including emissions trading,[14] joint implementation,[15] clean development mechanism,[16] and joint-fulfillment,[17] in addition to domestic reduction efforts to limit compliance costs. Based on the realization that GHG emission reductions have the same effect regardless of geographic location, the flexible mechanisms allow participants to offset their own emissions by purchasing allowances from other participants.[18]

Carbon emissions trading, one of the Kyoto Protocol's flexible mechanisms, presents a promising tool to limit global emissions of

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[11] UNFCCC, Essential Background: The United Nations Framework Convention on Climate Change, http://unfccc.int/essential_background/convention/items/2627.php (last visited Jan. 27, 2008) ("The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change.").

[12] U.N. Framework Convention on Climate Change [UNFCCC] art. 2 (May 9, 1992), *available at* http://unfccc.int/resource/docs/convkp/conveng.pdf.

[13] Kyoto Protocol, *supra* note 2, art. 3.

[14] Kyoto Protocol, *supra* note 2, art. 17 ("The Parties included in Annex B may participate in emissions trading for the purposes of fulfilling their commitments under Article 3.").

[15] *Id.* art. 6 ("For the purpose of meeting its commitments under Article 3, any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy . . . .").

[16] *Id.* art. 12 ("The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.").

[17] *Id.* art. 4 ("Any Parties included in Annex I that have reached an agreement to fulfill their commitments under Article 3 jointly, shall be deemed to have met [Kyoto Protocol] commitments"). Joint-fulfillment, also known as bubbling, allows for the European Union to combine each members own reduction obligations into an aggregate emissions reduction target.

[18] UNFCCC, Emissions Trading, http://unfccc.int/kyoto_mechanisms/emissions_trading/items/2731.php (last visited Jan. 27, 2008).

greenhouse gases that cause climate change. Questions still remain whether carbon markets provide a cost-efficient and environmentally effective method for reducing GHG emissions. Ideally, emissions trading reduces the cost of meeting emissions obligations by placing a monetary value on GHG emissions and using the flexibility of the market to allow participants to decide whether it is cheaper to reduce emissions or to purchase excess allowances from others. Emissions trading holds the promise to correct a market failure that allows "companies [to be] rewarded financially for maximizing externalities in order to minimize costs."[19] Currently, business decisions do not incorporate the true external cost of climate change because there is no incorporated production cost for the environmental effects of emitting GHG emissions into the commons. Sir Nicholas Stern, a former chief economist of the World Bank, recognizes this market problem and estimates that if climate change goes unabated, the total cost of climate change could top $5.5 trillion, or twenty percent of the world's economic output, approximately equal to the cost to the economy suffered during the Great Depression.[20] In contrast, "an investment of one percent [$350 billion] of total world economic output would suffice to avert the direst consequences of global warming."[21] Emissions trading promises to incorporate environmental externalities and to "enable capital markets to achieve their intended purpose—to consistently allocate capital to its highest and best use for the good of the people and planet."[22] If an emissions trading system adequately limits the supply of emissions allowance through a sufficient cap to prevent anthropogenic climate change, a carbon market will force participants to find cost-efficient ways to either reduce emissions or acquire reduction credits as cheaply as possible to meet their obligation.

The implementation of emissions trading has been widely accepted by the international community as an important tool to reduce GHG emissions. The European Union and a group of private parties in the United States recently established two carbon markets, the European Union Emissions Trading Scheme (ETS) and the Chicago Climate Exchange (CCX). ETS is a mandatory cap and trade system while CCX is a voluntary program enforced through voluntary contractual obligations.[23] ETS grew dramatically and

19 Al Gore & David Blood, *For People and Planet*, WALL ST. J., Mar. 28, 2006, at A20.

20 Philip Bethge et al., *Our Warming World: The Day the Climate Changed*, DER SPIEGEL ONLINE, Nov. 6, 2006, http://www.spiegel.de/international/spiegel/0,1518,447546,00.html (last visited Jan. 27, 2008); HM Treasury, Stern Review: Frequently Asked Questions, http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_faq.cfm (last visited Jan. 26, 2008) [hereinafter Stern Review]; *see generally* HM Treasury, Stern Review on the Economics of Climate Change, http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm (last visited Jan. 27, 2008) (linking to the full report, executive summary, postscript, press notice, and other materials related to the Stern Review on the Economics of Climate Change).

21 Bethge, et al., *supra* note 20; *see* Stern Review, *supra* note 20. This estimate does not take into account policy-wide action or abatement, but only individual action. It is a reflection of the total economic loss caused by climate change, including diminished global consumption, flooded coastlines, and drought.

22 Gore & Blood, *supra* note 19.

23 INT'L EMISSIONS TRADING ASS'N & THE WORLD BANK, STATE AND TRENDS OF THE CARBON

through the first nine months of 2006 had a market value of $19 billion.[24] CCX has a market value estimated at only $2.7 million in the first quarter of 2006.[25] The value of both markets is two fold. One, they provide a test ground for emissions trading to work out its kinks, and two, they provide participants with experience in trading carbon units and incorporating the cost of carbon into daily decision making before the Kyoto Protocol compliance period begins in 2008.[26] The early emissions trading systems developed effective market tools but have not forced emissions reductions that will have a significant environmental effect. For example, despite the growth of the ETS market, the ETS price of carbon failed to meet the threshold to convince companies to switch from coal to cleaner energy during the 2005 winter.[27] In order to switch from coal to natural gas, the clean spark spread must exceed the revenue from coal power to make the change cost effective.[28] A clean spark spread "represents the difference between the price of electricity at peak hours and the price of natural gas used to generate that electricity, corrected for the energy output of the gas-fired plant."[29] Neither ETS nor CCX have altered the "clean spark spread" in favor of cleaner sources of energy. For an emissions trading market to create environmentally effective emissions reduction it must cause market shifts to less polluting energy sources or cause emissions reduction changes in current production models. Both CCX and ETS have shown dramatic promise in creating an effective market framework that allows participants flexibility in complying with their emission reduction targets.

A successful carbon market requires 1) a sufficient emissions cap, 2) ability to guarantee compliance, 3) flexibility, 4) regulatory certainty over time, and 5) transparency.[30] First, an emissions market requires a sufficient emissions cap to create market demand for allowances, maintain a carbon price, and to meet environmental targets. Second, without an ability to guarantee compliance there will be no assurance of the value of emissions credits or that reductions are occurring. Third, flexibility is required to allow companies to choose the cheapest reduction methods and therefore lower the total overall cost of reducing GHG emissions. Fourth, without regulatory certainty over at least a thirty-year period, companies are unable to

MARKET 2006, at 3–5 (2006), *available at* http://carbonfinance.org/docs/StateoftheCarbonMarket 2006.pdf [hereinafter IETA].

[24] Press Release, The World Bank, State of the Carbon Market Report Update Shows Strong Impact of Asia in the Market, Oct. 26, 2006, *available at* http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,contentMDK:21104178~menuPK:34463~pagePK:34370~piPK:34424~theSitePK:4607,00.html [hereinafter The World Bank].

[25] IETA, *supra* note 23, at 13, 20.

[26] Kyoto Protocol, *supra* note 2, art. 3.

[27] IETA, *supra* note 23, at 17.

[28] "In power generation, options include switching from coal to less-carbon-intensive natural gas. For example, 400 new gas plants, each generating 1,000 megawatts, would reduce emissions by one billion tons per year." John Browne, *Beyond Kyoto*, FOREIGN AFFAIRS 20, 26 (Jul./Aug. 2004).

[29] Caisse des Dépôts, *Methodology*, TENDANCES CARBONE (Fr.), Jan. 2007, at 1, 5, *available at* http://www.caissedesdepots.fr/IMG/pdf_Methodologie_Tendances_Carbone_EN_V2.pdf.

[30] IETA, *supra* note 23, at 5–6.

incorporate the accurate costs of GHG emissions into the cost of future production.[31] And fifth, transparency is needed to foster public and private trust in the market.[32]

The current carbon emissions trading markets do not fulfill all five of the requirements for an effective market, though the markets do show exciting promise. The growth of carbon emissions trading has demonstrated exciting growth and has a total market value estimated at $22 billion.[33] These markets have begun to teach companies how to incorporate the cost of carbon into business decisions. Despite the growth of carbon markets, GHG emissions reductions have not met the Kyoto Protocol goal of a five percent reduction below 1990 levels.[34] Even within the ETS, which has a mandatory cap, Portugal, Spain, Greece, and Ireland are expected to dramatically exceed their Kyoto Protocol emissions targets.[35] In order for the market to achieve its ultimate environmental goals, national governments must set sufficient long-term emissions caps to create demand and spur reductions. Both CCX and ETS created effective market institutions, but have not shown the political will or ability to set sufficient reduction caps. An adequate international emissions cap will only then unlock the potential for emissions trading to provide reduction cost flexibility and promote technological creativity and innovation to meet carbon emissions reduction obligations.

This Comment examines the status and effectiveness of the current carbon markets and their ability to create flexible, cost-efficient methods to reduce emissions. Part II of this Comment examines the impact of climate change and examines the necessity of global cooperation. Part III of the Comment explains the structure, framework, and adoption of emissions trading. The Kyoto Protocol lays the international legal foundation for an emissions trading system, but its ultimate structure remains uncertain. Part IV examines the emergence of carbon emissions trading, and more specifically the ETS and CCX carbon markets, their effectiveness, methods, and ultimate goals. The Comment will focus on the CCX and ETS markets. Both markets are widely accepted despite their different purposes and political support. Their differences provide insights into the future of emissions trading both in the United States and internationally. Part V concludes that emissions trading can provide an important cost-efficient mechanism to assist in reducing global GHG emissions to levels that would prevent catastrophic anthropogenic climate change. To achieve the potential

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31 S*ee* Harri Laurikka & Tiina Koljonen, *Emissions Trading and Investment Decisions in the Power Sector–A Case Study in Finland*, 34 ENERGY POL'Y 1063, 1063 (2006) (stating power plants have a lifespan of 20 to 40 years).

32 Joe Kruger & Christian Egenhofer, *Confidence Through Compliance in Emissions Trading Markets*, SUSTAINABLE DEV. L. & POL'Y 2, 3, Winter 2006.

33 The World Bank, *supra* note 24.

34 Kyoto Protocol, *supra* note 2, art. 3; *see also* UNFCCC, Kyoto Protocol, http://unfccc.int/kyoto_protocol/background/items/3145.php (last visited Jan. 27, 2008).

35 Alex Kirby, *Europe 'Can Reach Kyoto Target'*, BBC NEWS, Dec. 21, 2004, http://news.bbc.co.uk/1/hi/sci/tech/4112743.stm (last visited Jan. 27, 2008) (showing the following projected GHG emissions increases by 2010: Portugal 53.1%, Spain 48.3%, Greece 38.6%, Ireland 29.4%).

cost savings an emissions trading scheme promises, a GHG emissions reduction obligation sufficient to force participants to utilize the carbon market is required. This can be accomplished by using auctioning as the method of allowance allocation, and a long-term emissions reduction obligation to allow companies to make long-term investments.

II. CLIMATE CHANGE AND THE NEED FOR INTERNATIONAL ACTION

Climate change increasingly threatens the way of life and health of billions of people across the globe, and only international action can address its cause. Evidence of climate change is increasingly apparent in weather patterns and environmental changes experienced throughout the world. In 2006, a retreating glacier exposed a newly discovered island in Greenland.[36] Events like this render many geographic maps out of date: "Now where the maps showed only ice, a band of fast flowing seawater ran between a newly exposed shoreline and the aquamarine-blue walls of a retreating ice shelf."[37] In another example of the effects of climate change, the European Alps 2006 World Cup ski events were cancelled because of a lack of snow.[38] In the Italian Alps, only fifty percent of the ski slopes were open, in what has been called the warmest alpine temperatures in 1300 years.[39] These problems may seem small and isolated from each other, but they signal a larger, more dramatic shift that requires the cooperation of the international community. The UNFCCC "recognizes that the climate system can be a shared resource whose stability is affected by industrial and other emissions of carbon dioxide and other greenhouse gases."[40] The global effects are seen in the melting glaciers in Greenland, which is covered by 630,000 cubic miles of ice, enough water to raise global sea levels by twenty-three feet.[41] The melting of Greenland's ice corresponds to the increasing rise in ocean levels currently threatening millions of people.

Climate change endangers global food and water supply, and threatens the homes and livelihoods of humans living in coastal regions. The World Health Organization already estimates that climate change is responsible for the deaths of more than 150,000 people each year, principally caused by increases in diseases from warmer climates in the northern regions.[42] As discussed above, rising sea levels resulting from melting ice threaten coastal communities. Ocean water levels are expected to rise in the twenty-first

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[36] John Rudolf, *The Warming of Greenland*, N.Y. TIMES, Jan. 16, 2007, *available at* http://www.nytimes.com/2007/01/16/science/earth/16gree.html?_r=1&n=Top%2fNews%2fScience%2fTopics%2fGlobal%20Warming&oref=slogin.

[37] *Id.*

[38] *No Snow in the Alps: Skiers Wondering When Winter Will Come,* SPIEGEL ONLINE INT'L, Dec. 18, 2006, http://www.spiegel.de/international/0,1518,455226,00.html (last visited Jan. 27, 2008).

[39] *Id.*

[40] UNFCCC, s*upra* note 11.

[41] Rudolf, s*upra* note 36.

[42] World Health Organization, Climate and Health, Aug. 2007, http://www.who.int/mediacentre/factsheets/fs266/en/ (last visited Jan. 27, 2008).

century between eighteen and fifty-nine centimeters (cm) compared to a twentieth century rise between ten and twenty cm.[43] The rise in ocean water levels threatens low-lying coastal settlements with flooding, along with saltwater intrusion into freshwater supplies.[44] According to the UNFCCC, higher ocean levels are already contaminating underground water sources in Israel and Thailand.[45] The Netherlands pose a striking example of a country at risk to rising sea levels. Currently, seventy percent of the Netherlands is at or below sea level, protected by a series of dikes and other barriers.[46] Current flood protection measures are inadequate to protect the Netherlands from the effect of the expected rise in ocean levels. If anything, the effect of Hurricane Katrina on New Orleans was a wake up call for the Netherlands. The Netherlands has now embarked on extensive climate proof efforts to protect against future unpredictable weather patterns.[47] Across the ocean, Bangladesh faces similar problems but without the resources for the climate proof protections employed in the Netherlands. Fifteen to twenty percent of Bangladesh is within one meter of the sea and a "one meter sea level rise generally predicted if no action is taken about global warming will inundate more than fifteen percent of Bangladesh, displacing more than 13 million people and cut into the crucial rice crop."[48] However, unlike the Netherlands, Bangladesh is poor and will struggle to cope with the effects of climate change. Rising sea levels will have broad effects on people across the world, displacing millions and disrupting the food sources of many other millions of people. Higher ocean levels threaten to contaminate two of the world's most productive deltas, China's Yangtze Delta and Vietnam's Mekong Delta.[49] For either China or Vietnam to address climate change, they will have to join an international reduction effort. Alone, each country is limited in their ability to curb international GHG emissions.

International efforts to curb GHG emissions require the richer developed countries to take greater responsibility in combating climate change. Developed countries have both the resources to combat climate change and are largely responsible for the increase in human caused GHG emissions. The UNFCCC recognizes the need for developed countries to take the greatest burden in reducing emissions by placing the required GHG emissions reductions caps on these countries.[50] "The Parties should protect

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[43] UNFCCC, Feeling the Heat, http://unfccc.int/essential_background/feeling_the_heat/items/2917.php (last visited Jan. 27, 2008).

[44] UNFCCC, Future Effects, http://unfccc.int/essential_background/feeling_the_heat/items/2905.php (last visited Jan. 27, 2008).

[45] *Id.*

[46] Michael Glanz, *Global Warming and Coastal Deltas: Is the Netherlands Europe's Bangladesh?*, FRAGILECOLOGIES, Sept. 29, 2006, *available at* http://www.fragilecologies.com/sep29_06.html.

[47] *Id.*

[48] Gary Braasch, Rising Sea Levels, Tides and Global Warming, http://www.worldviewofglobalwarming.org/pages/rising-seas.html (last visited Jan. 27, 2008).

[49] UNFCCC, Climate Change Information Sheet 11, http://unfccc.int/essential_background/background_publications_htmlpdf/climate_change_information_kit/items/290.php (last visited Jan. 27, 2008).

[50] UNFCCC, *supra* note 12, art. 11, §§ 2, 3.

the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities."[51] The Kyoto Protocol furthered this policy by placing binding emissions caps on developed countries, otherwise referred to as Annex I parties.[52] The idea of "common but differentiated responsibilities" recognized the need for countries to account both for past GHG emissions that created the conditions for dramatic anthropogenic climate change and current economic ability to deal with its effects. The Kyoto Protocol codified and developed mechanisms to bring about this principle.[53] However, the United States, which emits the second most GHG emissions of all developed nations,[54] refuses to adopt binding GHG emissions caps.[55] Despite the United States' failure to take actions to combat climate change, the individual states have begun taking measures both to curb GHG emissions and limit the inevitable effects of climate change. In 2005, California Governor Arnold Schwarzenegger called for an environmental impact assessment of the effects of climate change on California to discover ways to deal with the inevitable change.[56] At the current rate of climate change, by 2050 California will face "diminished snow packs that melt too early, causing floods and water shortages; submerged coastal homes and eroded beaches as sea levels rise; crops unable to survive in longer, hotter summers; charred forests that fall victim to more intense wildfires."[57] In response, California has set a target to reduce GHG emissions by twenty-five percent by 2020.[58] Despite California's efforts, the United States has refused to ratify the Kyoto Protocol and commit to its international reduction obligation.[59] As the

[51] *Id.*

[52] In this Comment, "developed countries" refers to those countries with binding emissions targets under the Kyoto Protocol, art. 27, Annex B, also known as Annex I countries. "Developing countries" are those countries without a binding emissions target under the Kyoto Protocol, art. 27, Annex B. *See also* PAUL A.U. ALI & KANAKO YANO, ECO-FINANCE: THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 43 n.16 (2004). Annex I includes the countries in transition to a market economy in Central and Eastern Europe. Two Annex I countries do not face binding emissions cap obligations: Belarus and Turkey.

[53] *See* Kyoto Protocol, *supra* note 2, art. 2. The Clean Development Mechanism was also created to use technology and wealth to reduce emissions in developing countries. *Id.* art. 12.

[54] Brad Knickerbocker, *China Now World's Biggest Greenhouse Gas Emitter*, THE CHRISTIAN SCI. MONITOR, June 28, 2007.

[55] Andrew Revkin, *U.S. Predicting Steady Increase for Emissions*, N.Y. TIMES, Mar. 3, 2007.

[56] Cal. Climate Change Ctr., Our Changing Climate, Assessing the Risks to California: A Summary Report from the California Climate Change Center, http://www.climatechange.ca.gov/biennial_reports/2006report/index.html (last visited Jan. 27, 2008); *see also* CAL. CLIMATE CHANGE CTR., OUR CHANGING CLIMATE, ASSESSING THE RISKS TO CALIFORNIA: A SUMMARY REPORT FROM THE CALIFORNIA CLIMATE CHANGE CENTER 2, *available at* http://www.energy.ca.gov/2006publications/CEC-500-2006-077.pdf.

[57] Samantha Young, *For California, Profound Changes as Planet Warms*, SAN DIEGO UNION-TRIBUNE, Jan. 20, 2007, http://www.signonsandiego.com/news/state/20070120-1030-wst-climatechange-california.html (last visited Jan. 27, 2008).

[58] *Id.*

[59] Associated Press & Reuters, *Dismay as U.S. Drops Climate Pact*, CNN.com, Mar. 29, 2001, http://edition.cnn.com/2001/WORLD/europe/italy/03/29/environment.kyoto/ (last visited Jan. 27,

world's second biggest emitter of GHGs,[60] the United States' refusal to ratify the Kyoto Protocol seriously hinders international efforts to address the cause of climate change.

International binding emissions obligations must encompass both the developed and developing nations. Even major reductions in the developed world would fail to counteract the increase in emissions from China, India, and other developing countries. For example, England alone is limited in its efforts to combat climate change. Even if England succeeded in reducing all its GHG emissions, China would offset that reduction with an increase in emissions within one year.[61] Every year, China adds the equivalent of the entire English power grid or the equivalent of all the world's wind power.[62] Therefore, England, or any nation, is unable to combat anthropogenic climate change without international cooperation. The Kyoto Protocol creates an international regime to combat climate change through a united effort to curb GHG emissions in both developed and developing countries with binding emissions obligations on developed countries.[63] The Kyoto Protocol creates an important framework for nations to take domestic actions to curb GHG emissions and also cooperate internationally to flexibly curb GHG emissions while sharing the reduction costs. Any post-2012 international GHG emissions obligation should continue the framework established by the Kyoto Protocol but extend the GHG emissions obligations to developing nations.

III. THE STRUCTURE, FRAMEWORK, AND ADOPTION OF EMISSIONS TRADING

The Kyoto Protocol formalized the framework laid out by the UNFCCC and created legally binding individual targets to limit or reduce GHG emissions.[64] In 1997, 168 countries adopted the Kyoto Protocol, but it was not until February 16, 2005 that the required number of countries ratified the agreement.[65] The Kyoto Protocol lays out innovative methods for achieving GHG reduction commitments, referred to as the flexible

2008); Shankar Vedantam, *Kyoto Treaty Goes into Effect: Bush Kept U.S. Out of International Pact on Global Warming*, S.F. CHRON., Feb. 16, 2005, at A-3.

60 Knickerbocker, *supra* note 54.

61 Eric Redman, Gasified Coal: Key to World Climate Solutions, Lewis & Clark Law School Presentation (Oct. 22, 2006).

62 *Id.*

63 *See generally* Kyoto Protocol, *supra* note 2, art. 2 (describing the ultimate objective of the Kyoto Protocol).

64 Kyoto Protocol, *supra* note 2.

65 *See* UNFCCC, KYOTO PROTOCOL STATUS OF RATIFICATION, *available at* http://unfccc.int/files/kyoto_protocol/background/status_of_ratification/application/pdf/kp_ratification.pdf (listing status and date of ratification by nations); UNFCCC, Status of Ratification, http://unfccc.int/kyoto_protocol/background/status_of_ratification/items/2613.php (last visited Jan. 27, 2008) ("[The Kyoto Protocol] entered into force on 16 February 2005—the ninetieth day after at least 55 Parties to the Convention, incorporating Annex I Parties which accounted in total for at least 55% of the total carbon dioxide emissions for 1990 from that group, deposited their instruments of ratification, acceptance, approval or accession.").

mechanisms.[66] The flexible mechanisms are an innovative approach to reducing GHG gases that limit the overall cost of reduction efforts by providing a market for carbon emissions. The flexible mechanisms aim to reduce the cost of meeting the Kyoto Protocol reduction obligations of five percent below 1990 GHG emissions levels during the 2008 to 2012 commitment period.[67] "These mechanisms enable [p]arties to access cost-effective opportunities to reduce emissions, or to remove carbon from the atmosphere, in other countries."[68] Every country has different reduction costs depending on their economic capability to pay, the nation's level of technology, consumption of energy, and energy sources.[69]

The Kyoto Protocol binds developed countries with GHG emissions reduction targets and provides the flexible mechanisms to supplement domestic reduction efforts.[70] The four flexible mechanisms outlined in the Kyoto Protocol are 1) emissions trading, 2) the clean development mechanism, 3) joint implementation, and 4) joint fulfillment.[71] The flexible mechanisms allow for nations to take cheaper reduction measures outside their country and also allow industries to purchase cheaper GHG emission reductions from other industrial sources. Under the Kyoto Protocol, each country receives a GHG emissions reduction target measured in tons of carbon emitted, known as an assigned amount unit (AAU).[72] Countries may also receive removal units (RMU) for land use changes, emissions reduction units (ERU) for joint-implementation projects, and a certified emission reduction (CER) for clean development projects.[73] Each unit is recorded in a registry and used to meet emission reduction obligations.[74] Though carbon is not the sole GHG, all other GHGs are measured in one metric ton of carbon emissions.[75] Governments may assign units to nongovernmental participants, and obligations can be met through any combination of assigned units.[76] This allows governments and participants flexibility in deciding how to meet their obligations either through reducing emissions, trading units, or funding a reduction project.

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66 *See* Kyoto Protocol, *supra* note 2, arts. 6, 12, 17 (outlining principles for the Joint Implementation, Clean Development, and emissions trading mechanisms); UNFCCC, Kyoto Mechanisms—Background, http://unfccc.int/kyoto_protocol/mechanisms/items/2998.php (last visited Jan. 27, 2008) (referring to such mechanisms as "flexibility mechanisms").

67 Kyoto Protocol, s*upra* note 2, art. 3.

68 *See* UNFCCC, *supra* note 66.

69 *See* discussion *supra* Part II (discussing "common and differentiated responsibility").

70 The Kyoto Protocol requires that the flexible mechanisms be used in conjunction with supplemental domestic reduction efforts. Kyoto Protocol, *supra* note 2, art. 17 ("Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emissions limitation and reduction commitments under that Article.").

71 *See supra* notes 15–18.

72 UNFCCC, Emissions Trading, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited Jan. 27, 2008).

73 *Id.*

74 *Id.*

75 *Id.*

76 *See id.*

A. The Policy Behind the Flexible Mechanisms

The flexible mechanisms were meant to lower the overall expected high costs of achieving the GHG emissions reductions obligations outlined in the Kyoto Protocol. The Kyoto Protocol requires that the flexible mechanisms be "supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments . . . ."[77] The Kyoto Protocol raised concern that the flexible mechanisms had created a right for industrialized countries to emit without taking domestic actions, and as a result the Marrakesh Accords required that domestic reduction measures make up a "significant element" of GHG emissions reductions.[78] Domestic reduction efforts may include energy efficiency, promotion of public transportation, and the use of tax incentives to promote conservation. The flexible mechanisms are able to create cost-efficient alternatives to domestic GHG emission reduction opportunities because the reduction of GHG emissions has the same effect regardless of geographic location.[79] The flexible mechanisms allow participants to find the cheapest locations and means to reduce emissions. As a result, the flexible mechanisms hold the possibility to dramatically reduce the cost for nations to comply with the Kyoto Protocol.

B. Carbon Emissions Trading

1. Policy Behind Emissions Trading

Emissions trading promises to take advantage of the market's efficiencies to lower the cost of reducing emissions for participants. Emissions trading hopes to correct the current market that is "precise in its ability to account for capital goods, [but] imprecise in its ability to account for natural and human resources because it assumed them to be limitless."[80] As a result, the cost of goods and services has not reflected environmental costs and the true value of using or destroying common goods.[81] GHG emissions trading promises to force participants to incorporate the economic cost of carbon emissions into the cost of production. "These market mechanisms increasingly enable companies to calculate project returns and capital expenditures decisions with the price of carbon fully

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77 Kyoto Protocol, *supra* note 2, art. 17.

78 Conference of the Parties to the Convention on Climate Change, Oct. 29–Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session*, at 2, 3, FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) ("[T]he use of the mechanisms shall be supplemental to domestic action and [] domestic action shall thus constitute a significant element of the effort made by each Party included in Annex I to meet its quantified emission limitation and reduction commitments.").

79 *See* A. DENNY ELLERMAN ET AL., PEW CTR. ON GLOBAL CLIMATE CHANGE, EMISSIONS TRADING IN THE U.S.: EXPERIENCE, LESSONS AND CONSIDERATIONS FOR GREENHOUSE GASES vii (2003), *available at* http://www.pewclimate.org/docUploads/emissions_trading.pdf [hereinafter PEW].

80 Gore & Blood, *supra* note 19.

81 *See id.* (explaining how pollution costs are "created by industry but paid for by society.").

integrated."[82] If the emissions trading market functions properly, it will incorporate the cost of carbon and cost-efficiently allocate capital to reduction projects. An emissions source with cheap reduction options can reduce emissions and sell their excess allowances to high-cost compliance sources, resulting in more cost-efficient emissions reductions for both parties.[83]

Emissions trading is ideally suited as a flexible mechanism to combat GHG emissions. As discussed earlier, GHG emissions have global consequences regardless of the source, which allows for the "design [of] trading programs without geographic limits defined by localized environmental impacts."[84] This creates a larger market for reductions without raising local health concerns from environmental impacts. In addition, the measuring of GHG emissions can be relatively inexpensive by using fuel consumption, rather than the expensive continuous emissions monitoring required by some existing trading programs.[85] Emissions trading has demonstrated the ability to significantly reduce costs. The U.S. Acid Rain Program estimated cost savings at $20 billion, or a fifty-seven percent cost reduction below the estimated command-and-control alternative.[86] As a result, emissions trading is an important mechanism to cost-efficiently reduce global GHG emissions.

2. The Structure of the Kyoto Protocol GHG Emissions Trading Scheme

The Kyoto Protocol allows for the development of national and regional emissions trading schemes[87] and allows for the transfer of units to meet obligations as long as a reserve of units is maintained in each country.[88] Each country with a binding emissions obligation under the Kyoto Protocol will receive an allocation of AAUs.[89] Each country must maintain a national registry to record transfers and acquisitions of units.[90] In addition, parties may allow legal entities, including businesses and non-governmental organizations, to participate, with individual accounts recorded in the national registries.[91] These allowances can then be traded in national and regional level emissions trading schemes.[92] Each party must keep a 90 percent reserve of units on hand in order to meet their reduction obligation.[93] Parties can comply with their emissions obligation through four

82 *Id.*

83 PEW, *supra* note 79.

84 *Id.* at 40. *See also id.* at vii.

85 *Id.* at vii.

86 *Id.* at 16. The Acid Rain Program confirmed that cost savings can be achieved up to 50 percent, while significant trading indicates that cost savings have been achieved. *Id.* at 32.

87 Kyoto Protocol, *supra* note 2, art. 17.

88 UNFCCC, *supra* note 18.

89 UNFCCC, *supra* note 72.

90 *Id.*

91 *Id.*

92 *Id.*

93 *Id.*

options: 1) undertaking internal measures to reduce their actual output to the quantity represented by the allowances they were issued, 2) reducing emissions below their allowance level and selling or banking excess allowances, 3) purchasing additional allowances or using previously banked allowances to offset or cover any excess emissions beyond the quantity of pollutants represented by the allowances they were issued, or 4) paying a non-compliance fine imposed by the regulator.[94] As a result, participants are given flexibility in complying with their allowance obligation and can choose the most cost efficient compliance method.

3. Requirements for an Effective Emissions Trading Scheme

An effective emissions trading scheme requires 1) a sufficient emissions cap, 2) ability to guarantee compliance, 3) flexibility, 4) regulatory certainty over time and 5) transparency. In order to create a GHG market, nations must place a cap on industrial emissions that limits the supply of carbon allowances at a level sufficient to create demand for AAUs and meet environmental reduction goals. In addition, in order to guarantee the price of allowances there must be a sufficient enforcement mechanism. The costs resulting from the enforcement mechanism must exceed the cost of purchasing allowances or the emissions trading market will no longer be cost-efficient. In addition, the market must allow participants flexibility in how they achieve emissions reductions. Allowing more participants into a carbon market increases the low-cost options for reducing emissions and increases the cost savings.

Regulatory certainty over time is important for companies that make long-term emission reduction plans. Many power plants have a life span of twenty to forty years, and as a result companies make cost-benefit analyses for reducing emissions with their long-term interests and costs in mind.[95] Banking, also known as inter-temporal trading, has played an important role in improving the economic and environmental performance of emissions trading programs.[96] Banking allows parties "to reduce emissions below their requirement in one year and bank 'surplus' allowances for use or trade in future years."[97] In the U.S. Acid Rain Program, banking encouraged early emissions reductions beyond the required amount. During Phase I of the Acid Rain Program, participants reduced emissions more then required because "the prospect of higher marginal abatement costs after 2000 made abating more than required in Phase I an appealing option for smoothing the transition to the more demanding Phase II cap."[98] Banking therefore can help with regulatory uncertainty by providing an incentive for early emissions reductions and adding stability to an emissions trading scheme.

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94 ALI & YANO, *supra* note 52, at 14.

95 *See* Laurikka & Koljonen, *supra* note 31, at 1063–65 (describing how emissions trading can affect investment valuation).

96 PEW, *supra* note 79, at 14, 37.

97 *Id.* at 47.

98 *Id.* at 14.

An emissions trading market requires transparency because it allows for price stability and encourages public and private trust in the market. The allocation of emissions allowances is an important moment for creating transparency. There are two preferred methods for allocating emissions units: auctioning and grandfathering.[99] Auctioning is a more efficient allocation method of emissions units, but grandfathering has greater political support among established carbon emitters.[100] Grandfathering uses a carbon emitter's historic emissions as a benchmark for allocation. However, historic emissions are hard to prove, they limit access to markets for new entrants, and can provide windfall profits to emitters.[101] Auctioning allows for transparency in the price and allocation of allowances, and encourages public trust in the market. For example, in the Acid Rain Program, auctioning provided a transparent mechanism to reveal prices.[102] Auctioning levels the playing field between new and old entrants. Auctioning encourages the efficient allocation of AAUs, does not create windfall profits through the allocation of free AAUs, and raises money that could be used to offset the costs of compliance or to compensate consumers for price increases. Therefore, an emissions trading system should use auctioning as a way to encourage price and public transparency in the emissions market.

C. Kyoto Protocol's Project Based Mechanisms

The Kyoto Protocol's two project based mechanisms, the Clean Development Mechanism (CDM) and Joint-Implementation (JI), provide important flexible mechanisms for developed countries with Kyoto Protocol emissions caps to reduce their costs of compliance. JI and CDM projects produce reduction credits that can be used to meet emissions obligations.[103] In an emissions trading system, acquiring reduction units through CDM and JI projects may offset compliance costs when projects cost less than allowances on the market. In addition, CDM projects provide the

[99] Dallas Burtraw et al., *Allocation of CO_2 Emissions Allowances in the Regional Greenhouse Gas Cap-and-Trade Program*, Resources for the Future Discussion Paper, June 2005, *available at* http://www.rff.org/rff/News/Features/Allocation-of-CO2-Emissions-Allowances-in-the-Regional-Greenhouse-Gas-Cap-and-Trade-Program.cfm.

[100] *See id.* (describing the features and benefits of each method).

[101] PETER BOHN & FRANK CONVERY, POLICY BRIEFS NUMBER 2: ALLOCATING ALLOWANCES IN GREENHOUSE GAS EMISSIONS TRADING 3–5, 8 (2005), *available at* http://www.ucd.ie/gpep/gpepinfo/publications/policybriefs/pb-et-02.pdf; A. DENNY ELLERMAN ET AL., EMISSIONS TRADING UNDER THE U.S. ACID RAIN PROGRAM: EVALUATION OF COMPLIANCE COSTS AND ALLOWANCE MARKET PERFORMANCE 57 (1997); Michael Grubb & Karssten Neuhoff, *Allocation and Competitiveness in the EU Emissions Trading Scheme: Policy Overview*, 6 CLIMATE POL'Y 7, 22 (2006), *available at* http://www.electricitypolicy.org.uk/pubs/tsec/grubb.pdf; PEW CTR. ON GLOBAL CLIMATE CHANGE, GREENHOUSE GAS EMISSIONS ALLOWANCE ALLOCATIONS 1–4, 8 (2007), *available at* http://www.pewclimate.org/docUploads/Duke%20Policy%20Brief.pdf.

[102] ELLERMAN ET AL., *supra* note 101, at 3; Grubb & Neuhoff, *supra* note 101, at 7; PEW, *supra* note 101, at 5.

[103] UNFCCC, Joint Implementation, http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php (last visited Jan. 27, 2008) [hereinafter UNFCCC, Joint Implementation].

opportunity to reduce emissions in developing countries. The Kyoto Protocol allocates the cost of reducing emissions to developed countries because developed countries are largely responsible for climate change.[104] In fact, seventy-five percent of GHG emissions for the last 150 years have been from developed countries.[105] That is why developed countries have binding emissions obligations under the concept of 'shared but differentiated responsibility.' However, emissions are increasing in developing countries and the international community recognized the need to assist these countries "in achieving sustainable development and in contributing to the ultimate objective of the Convention."[106] CDM projects allow the developed countries to sponsor GHG emission reduction projects in developing nations and receive reduction credits to meet their Kyoto Protocol obligation.[107] This is intended to promote sustainable development in developing countries and promote the spread of clean technology, while lowering the cost for developed countries to meet their emissions obligation.[108]

CDM and JI projects provide an important tool for participants to offset their GHG emissions obligations by receiving credits for emission reduction projects. CDM projects provide developed countries with Kyoto Protocol obligations certified emission reduction units (CERs) for reduction projects implemented in developing countries.[109] JI, like CDM, is also a project-based mechanism that gives sponsors emission reduction units (ERUs) for reducing emissions.[110] CERs and ERUs are measured in one metric ton of carbon dioxide equivalent, and can be freely traded under Article 17 of the Kyoto Protocol.[111] In contrast to CDM, JI allows developed countries with a reduction obligation under the Kyoto Protocol to receive ERUs for reduction projects in other developed countries.[112] Both the CDM and JI mechanisms require that a project must reduce carbon emissions that would not otherwise, absent either mechanism, have been reduced.[113] JI projects

104 UNFCCC, The Kyoto Protocol, http://unfccc.int/kyoto_protocol/items/2830.php (last visited Jan. 27, 2008); *see also* Earth Summit +5, Special Session of the General Assembly to Review and Appraise the Implementation of Agenda 21, New York, June 23–27, 1997, *Combating Global Warming: The Climate Change Convention*, http://www.un.org/ecosocdev/geninfo/sustdev/climate.htm (last visited Jan. 27, 2008) (stating that developed countries are responsible for over two-thirds of past emissions and some 75% of current emissions).

105 Earth Summit +5, *supra* note 104.

106 UNFCCC, Clean Development Mechanism, http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php (last visited Jan. 27, 2008) [hereinafter UNFCCC, Clean Development Mechanism].

107 *Id.*; UNFCCC, Parties and Observers, http://unfccc.int/parties_and_observers/items/2704.php (last visited Jan. 27, 2008).

108 UNFCCC, Clean Development Mechanism, *supra* note 106; UNFCCC, The Mechanisms under the Kyoto Protocol: The Clean Development Mechanism, Joint Implementation and Emissions Trading, http://unfccc.int/kyoto_protocol/mechanisms/items/1673.php (last visited Jan. 27, 2008).

109 UNFCCC, Clean Development Mechanism, *supra* note 106.

110 UNFCCC, Joint Implementation, *supra* note 103.

111 UNFCCC, Emissions Trading, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited Jan. 27, 2008).

112 UNFCCC, Joint Implementation, *supra* note 103.

113 *Id.*; UNFCCC, Clean Development Mechanism, *supra* note 106.

require "the approval of the Parties involved and provide a reduction in emissions by sources, or an enhancement of removals by sinks" and require that they meet the JI eligibility requirements set out by the UNFCCC.[114] CDM projects also require the approval of all parties involved and are supervised by the CDM Executive Board.[115] Both mechanisms are expected to reduce the cost for developed countries to comply with emissions cap obligations set out in the Kyoto Protocol.[116]

In addition to reducing the cost of meeting Kyoto Protocol emissions obligations, CDM promises to promote the transfer of environmentally friendly technology, and promote sustainable investment in developing countries.[117] Current CDM projects include wastewater treatment, manure, and solar energy in rural areas.[118] There are currently 819 registered CDM projects, expected to produce by 2012, about one billion CERs.[119] Currently, seventy-one percent of CDM projects are in China, Brazil and South Korea.[120] CDM projects are unequally distributed across the developing world, with Asia and the Pacific accounting for sixty percent of registered projects, Latin America and the Caribbean thirty-six percent, while Africa makes up less than three percent of projects.[121] Currently China makes up around thirty percent of CDM projects.[122] In China, CDM has not fully lived up to its potential to reduce emissions in developing countries. All CDM projects in China face a tax that is supposed to go into reducing GHG emissions, but instead often goes into infrastructure.[123] In effect, the CDM projects partially subsidize Chinese infrastructure and growth instead of promoting sustainable development. In addition, carbon offset trading poses problems with "establishing a baseline inventory and monitoring and verification of claimed reductions, especially with regard to afforestation projects due to scientific uncertainty over how to gauge GHG removal capacity by carbon sinks."[124] For example, Dell donates two dollars to plant a tree for every

114 UNFCCC, Joint Implementation, *supra* note 103. *See also* UNFCCC, Addendum: Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol at its First Session, Montreal, Can., Nov. 28–Dec. 10, 2005, *Decision 10 CMP/.1: Implementation of Article 6 of the Kyoto Protocol*, U.N. Doc. FCCC/KP/CMP/2005/8/Add.2, at 14 (Mar. 30, 2006).

115 UNFCCC, Clean Development Mechanism, *supra* note 106.

116 UNFCCC, Joint Implementation, http://unfccc.int/kyoto_protocol/background/items/2882.php (last visited Jan. 27, 2008); UNFCCC, Clean Development Mechanism, http://unfccc.int/kyoto_protocol/background/items/2881.php (last visited Jan. 27, 2008).

117 UNFCCC, Clean Development Mechanism, http://unfccc.int/kyoto_protocol/background/items/2881.php (last visited Jan. 27, 2008).

118 UNFCCC, Clean Development Mechanism: Project Search, http://cdm.unfccc.int/Projects/projsearch.html (last visited Jan. 27, 2008).

119 UNFCCC, CDM Statistics, http://cdm.unfccc.int/Statistics/index.html (last visited Jan. 27, 2008).

120 *Carbon Offsets - The Facts*, NEW INTERNATIONALIST, Jul. 2006, *available at* http://www.newint.org/features/2006/07/01/carbon-offsets-facts/.

121 UNFCCC, Registered Projects by Region, http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByRegionPieChart.html (last visited Jan. 27, 2008).

122 *Carbon Offsets*, *supra* note 120.

123 *Selling Hot Air*, *in* THE HEAT IS ON: A SURVEY OF CLIMATE CHANGE, THE ECONOMIST, Sept. 9, 2006, at 17, 18.

124 Inho Choi, *Global Climate Change and the Use of Economic Approaches: The Ideal*

computer sold to offset the carbon emissions created during the computer's production.[125] But questions remain as to the effectiveness of planting trees to compensate for the increase in GHG emissions from the building of a computer. "New scientific studies are concluding that preservation and restoration of forests outside the tropics will do little or nothing to help slow climate change."[126] Forests do remove carbon dioxide from the air, but trees can also absorb more heat and reflect less light back then snow, causing a warming effect.[127] These are issues that can be overcome, and to date CDM has shown exciting promise and growth as a flexible mechanism.

IV. THE EMERGENCE OF CARBON EMISSIONS TRADING

The ratification of the Kyoto Protocol has encouraged the creation of new carbon emissions trading systems. The markets show promise in becoming an effective, flexible mechanism for the reduction of GHG emissions. The most important new carbon market is the European Union Emissions Trading Scheme (ETS). The ETS began on January 1, 2005 and includes all EU member states, encompassing over 8900 installations.[128] In 2005, the ETS issued over 320 million allowances.[129] By May 2006, over 300 million allowances were reported with a monthly trading volume for May alone approaching 100 million allowances.[130] The ETS is by far the biggest carbon market, encompassing over eighty percent of the monetary value and sixty percent of the total volume of global carbon trades.[131] There have been several other carbon markets that emerged internationally over the past few years. One is the New South Wales Greenhouse Gas Reduction Scheme (GGAS). GGAS is a mandatory GHG emissions trading scheme that "requires retail suppliers of electricity . . . to ensure that their emissions of GHGs in any year do not exceed the greenhouse gas benchmark applicable to that particular party."[132] Participants can comply with their benchmarks either by reducing GHG emissions or by abating emissions.[133] Abatement projects can occur through "undertaking low GHG-emission production of electricity, carbon sink projects that result in the removal of GHGs from the

Design Features of Domestic Greenhouse Gas Emissions Trading with an Analysis of the European Union's CO_2 Emissions Trading Directive and the Climate Stewardship Act, 45 NAT. RESOURCES J. 865, 935 (2005).

125 Ken Caldeira, *When Being Green Raises the Heat*, N.Y. TIMES, Jan. 16, 2007, at A21 (analyzing effects of planting trees to offset carbon dioxide emissions to combat global warming).

126 *Id.*

127 *Id.*

128 Comm'n of the European Communities, Building a Global Carbon Market—Report Pursuant to Article 30 of Directive 2003/87/EC, *Commission Report for Building a Global Carbon Market*, at 2, 3, COM (2006) 676 final (Nov. 13, 2006), *available at* http://ec.europa.eu/environment/climat/emission/pdf/com2006_676final_en.pdf.

129 *Id.* at 3, 4.

130 *Id.* at 4.

131 *Id.*

132 ALI & YANO, *supra* note 52, at 53.

133 *Id.*

atmosphere and activities that result in reductions in the consumption of electricity."[134] In addition, Japan began a volunteer emissions trading system in 2005,[135] while Canada is in the process of designing and implementing a possible future carbon emissions trading scheme.[136]

The United States has failed to develop a national carbon emissions trading scheme or ratify the Kyoto Protocol. The United States has witnessed the proposal for a state run carbon market, the Regional Greenhouse Gas Initiative (RGGI) and the growth of a volunteer carbon emissions trading program, Chicago Climate Exchange (CCX). The RGGI is a cooperative effort by nine Northeast and Mid-Atlantic states to create a regional emissions trading scheme.[137] The RGGI is in its design stages and will initially cover carbon dioxide emissions from power plants in the region.[138] CCX is "the world's first and North America's only legally binding rules-based greenhouse gas emissions allowance trading system."[139] CCX provides a vehicle for companies to learn to operate in a carbon-constrained market. Companies agree to binding commitments, but these commitments are taken on through voluntary action.[140] CCX is up and running in the United States.[141]

A. European Union Emissions Trading Scheme

ETS is the largest multi-nation, multi-sector cap-and-trade emissions trading program in the world.[142] Each member state is required to create a National Allocation Plan (NAP) that conforms to each nation's Kyoto Protocol target, which must then be approved by the EU Commission.[143]

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134 *Id.* at 53–54; *see also* New South Wales Greenhouse Gas Abatement Scheme, Overview, http://www.greenhousegas.nsw.gov.au/overview/scheme_overview/overview.asp (last visited Jan. 27, 2007) (explaining how abatement certificate providers achieve abatement of greenhouse gases).

135 Japan for Sustainability, Japan Launches Voluntary Emissions Trading Scheme (Sept. 28, 2005), http://www.greenbiz.com/news/news_third.cfm?NewsID=28866 (last visited Jan. 27, 2008).

136 National Round Table on the Environment and the Economy, Canada: Progress on Greenhouse Gas Emissions Trading, http://www.nrtee-trnee.ca/eng/programs/Past-Programs/emission-trading/DET-Countries-Canada-eng.html (last visited Jan. 27, 2008).

137 Regional Greenhouse Gas Initiative, About RGGI, http://www.rggi.org/about.htm (last visited Jan. 26, 2008).

138 *Id.*; *see generally* Regional Greenhouse Gas Initiative, Participating States, http://www.rggi.org/states.htm (last visited Jan. 27, 2008) (seven states have joined: Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont).

139 Chicago Climate Exchange, Overview, http://www.chicagoclimatex.com/content.jsf?id=821 (last visited Jan. 27, 2008).

140 *Id.*

141 *Id.*

142 Europa, Environment—Emission Trading Scheme, http://ec.europa.eu/environment/climat/emission.htm (last visited Jan. 27, 2008).

143 Press Release, Europa, EU Emissions Trading Scheme Delivers First Verified Emissions Data For Installations (May 15, 2006), *available at* http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/612&format=HTML&aged=1&language=EN&guiLanguage=en [hereinafter EU Press Release, May 15, 2006].

NAPs determine the "total amount of [carbon] that can be emitted by all the installations in their country covered by the scheme as well as the number of emission allowances allocated to each individual installation."[144] Once the NAPs are approved, allowances are issued to each participating installation.[145] Currently, ETS covers power generation, iron and steel, glass, cement, pottery, and bricks.[146] At the end of each year, each installation must turn in a number of allowances equivalent to the total amount of emissions.[147] ETS allows participants to either reduce emissions or to purchase emissions allowances from other participants.[148] Allowances can be transferred between others through carbon trading exchanges.[149] In addition, CDM projects can limit liability by allowing participants to purchase ERUs to meet their obligation.[150] All allowances are registered in a Central Transaction Log, which "records the issuance, transfer, surrender and cancellation of allowances . . . ."[151] ETS phase I ran from 2005 to 2007 and phase II runs from 2008 to 2012.[152] ETS has shown remarkable growth in phase I and with stricter NAPs covering more installations the ETS should become a more cost-effective tool to reduce GHG emissions.

B. Effectiveness of the EU ETS

1. Emissions Cap and Flexibility

The ETS sets a cap on emissions sufficient to create liquidity in the market but insufficient to be environmentally effective and to create price stability in the carbon market. The EU's size submits member states to intense lobbying by economically strategic industries.[153] Due to political pressure, the EU failed to create sufficient caps that would force companies to significantly reduce GHG emissions. Each member state decides on the number of allowances to grant along with needing approval of the EU.[154] As

144 Press Release, Europa, Emissions Trading: Commission Sets Out Guidance On National Allocations For 2008–2012 (Jan. 9, 2006), *available at* http://europa.eu/rapid/pressReleases Action.do?reference=IP/06/9&format=HTML&aged=0&language=EN&guiLanguage=en.

145 Europa, *supra* note 142.

146 Euractiv, EU Emissions Trading Scheme, http://www.euractiv.com/en/sustainability/eu-emissions-trading-scheme/article-133629?_print (last visited Jan. 27, 2008).

147 EU Press Release, May 15, 2006, *supra* note 143.

148 *Id.*

149 Press Release, Europa Questions and Answers on the Commission's Proposal to revise the EU Emissions Trading System (Jan. 23, 2008), available at http://europa.eu/rapid/ pressReleasesAction.do?reference=MEMO/8/35&format=PDF&aged=0&languange=EN&guiLan guage=en.

150 Euractiv, *supra* note 146.

151 Europa, *supra* note 142.

152 *Id.*

153 Mathew Lockwood, *A Rough Guide to Carbon Trading*, PROSPECT MAG., Feb. 2007, *available at* http://www.prospect-magazine.co.uk/article_details.php?id=8220.

154 Ahmed ElAmin, FoodProductionDaily.com, *Commission Takes Tough Line on Greenhouse Gas Emissions*, Jan. 17, 2007, http://www.foodproductiondaily.com/news/ ng.asp?id=73433 (last visited Jan. 27, 2008). ETS is a decentralized system. The member states

a result of the over-allocation of allowances, the price of carbon crumbled, destroying the market incentive to reduce emissions. During phase I of the ETS, the NAPs set allocation limits at too high a level, creating 44 million excess tons of permits in May 2006.[155] As a result of the excess allowances, the price of EU emission allowances (EUAs) crumbled. EUA prices reached a high of $35.70 on April 18, 2006,[156] but since April of 2006 the allowance price has fallen significantly. "In April 2006, when it became clear that 20 of the 25 member states had set caps for 2005 that were so generous that they were above actual emissions the carbon price immediately collapsed."[157] In January of 2007, the price of an EUA hit a low at $5.52, reflecting excess supply of EUAs as a result of countries granting too many allowances.[158] The quick reaction of the EUA market to the change in the expected stringency of the cap reflects a strong liquidity in the market. The EUA price reacted quickly with heavy trading to reflect the latest supply and demand data. In addition, in the first nine months of 2006 ETS had a market value of $19 billion, reflecting a strong market foundation for carbon allowances.[159]

Despite creating a strong market framework, ETS failed to accurately set market caps at a level that is environmentally effective in spurring widespread emissions reductions and encouraging market stability. Demand for EUAs in the ETS is a "direct consequence of the stringency of Member States national allocation plans set out by governments for phase I (2005-2007) and subsequently approved by the EU commission."[160] Without stricter caps on emissions and reform of the allocation process, the EU market will not provide a financial incentive for companies to reduce emissions and choose cleaner forms of energy. Only the UK was forced to purchase over 30 million tons of allowances on the EU carbon market to meet its obligation.[161] In addition, the price of EUAs was insufficient to raise the price of carbon above the clean spark spread. In the abnormally cold European winter of 2005 to 2006, the price of EUAs still did not make the shift to natural gas cost effective in the EU.[162] The price of an EUA allowance would have to be

set the individual targets, council ministers and the European Parliament agree on a framework, and member states enjoy a high level of discretion in implementing the plan in the respective jurisdictions. A commission is then responsible for harmonizing emissions, and an independent body must then verify emissions, which is often an NGO. Kruger & Egenhofer, *supra* note 32, at 3, 6–7.

155 ElAmin, *supra* note 154.

156 IETA, s*upra* note 23, at 14.

157 Lockwood, *supra* note 153.

158 Tim Webb, *Slide in Carbon Prices Gives Firms Less Reason to Reduce Emissions,* INDEPENDENT, Jan. 21, 2007, *available at* http://news.independent.co.uk/business/news/business/news/slide-in-carbon-prices-gives-firms-less-reason-to-reduce-emissions-432965.html.

159 Press Release, The World Bank, 'State of the Carbon Market Report Update' Shows Strong Impact of Asia in the Market (Oct. 26, 2006), *available at* http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21104178~pagePK:64257043~piPK:437376~theSitePK:4607,00.html.

160 IETA, *supra* note 23, at 16.

161 Euractiv, *supra* note 146.

162 IETA, *supra* note 23, at 17.

around $48 in February 2006, much higher than the current EUA price.[163] As a result, the price of EUAs does not meet the clean spark spread for dispatching power from coal after adjusting for the price of carbon required to cover the extra emissions.[164] The price of EUAs must be great enough to force companies to reevaluate their use of high carbon emission technologies. In order for phase II of the ETS to be environmentally effective, the EU commission must require nations to restrict their NAPs to a level sufficient to create a market price for EUAs that makes alternative energy production and emission reductions cost effective.

2. Regulatory Certainty Over Time

ETS also necessitates long-term allocation plans to allow companies to incorporate the cost of carbon into the construction of new power plants.[165] Currently, the volatility of long-term emission allowance prices makes planning new power plants difficult because most power plant "investments must be planned over 30-year periods."[166] As long as the price of carbon remains below €33 ($48.42) it remains more financially rewarding to replace retiring plants with coal plants rather than with cleaner energy sources.[167] At current prices, companies will construct coal-powered plants. The current ETS phase II allocation is not yet completed and phase II only runs from 2008 to 2012.[168] There is political talk of drastic post 2012 emissions cuts, but the EU has not given a clear signal as to the stringency of future emissions obligations after phase II.[169] This absence of long-term strict emissions caps encourages the construction of high polluting coal power plants because the cost of carbon emissions plays a less significant role in future planning. One solution is for the ETS market to allow for the banking of emissions reduction credits to be used in later phases of the ETS. Banking would encourage and reward installations that take dramatic reduction efforts early by allowing those credits to be banked and used at a later time. After 2012, the ETS and Kyoto Protocol need to outline long-term caps on emissions that will allow the market to plan and make long-term investments.

163 *Id.*, *see also* Bill Baue, *Costs of Carbon and Coal: Examining Emissions Trading Scheme Impact on Shareowner Value*, Dec. 22, 2006, http://www.socialfunds.com/news/print.cgi?sfArticleId=2191 (last visited Jan. 27, 2008) (arguing that it is financially rewarding to change from coal to gas at an EUA price of €33). The current EUA price is "around €21.50," IDEAcarbon, Carbon Market Survey Analysis 1 (Oct. 2007), *available at* www.ideacarbon.com/October_survey_analysis.pdf, which was $31.55 on January 26, 2008 at the exchange rate of $1 = €.68. *See* X-rates.com, http://www.x-rates.com/calculator.html# (last visited Jan. 27, 2008).

164 IETA, s*upra* note 23, at 17.

165 *Id.* at 19 (discussing the need for using "appropriate time horizons" in planning energy infrastructure investments).

166 Lockwood, *supra* note 153.

167 Baue, *supra* note 163. *See* x-rates.com, http://www.x-rates.com/calculator.html# (last visited Jan. 27, 2008).

168 IETA, *supra* note 23, at 41–45 (discussing the outlook for ETS phase II pricing and allocation).

169 *Id.* at 44–45 (noting "continued market uncertainty about Phase II allocations").

3. Transparency and Enforcement

ETS suffers from transparency issues as a result of the allocation of emissions under the NAPs. ETS does a good job of making market and regulatory documents and NAPs available to the public. The individual NAPs are available online and ETS market data is widely available with current EUA pricing information.[170] In addition, there is a clear enforcement mechanism. A participant's failure to turn in sufficient allowances to meet their carbon emissions obligation results in a fine for every ton of excess carbon emitted.[171] For phase I there was a fine of €40 and for phase II there will be a fine of €100.[172] The €40 fine was in excess of the price of EUAs and therefore the purchasing of EUAs remained more cost-efficient then paying the ETS fine for failing to meet an installation's emissions obligation.

As a result of allocating emissions allowances in the ETS through grandfathering rather then auctioning, the EU limited the effectiveness of the ETS to the financial benefit of companies, and lost the public confidence that a transparent auctioning system would create. "Giving the ETS allowances away (rather than auctioning them) . . . in effect, handed [power generators and other polluters] wads of cash: they simply passed the extra costs on to consumers and pocketed the money."[173] Some historic emitters in the ETS factored the value of their free allocated emissions units into the cost of energy, adding to their overall earnings without cutting emissions.[174] Consumer anger may change this in the future, as high prices prompted outrage among consumers who were angry at power companies' windfall profits gained through AAU grandfathering allocation methods in the ETS.[175] Grandfathering causes unfair distribution effects because historic company emissions are hard to prove and therefore favor current power generators, and many companies incorporate the value of the EUA into their profits and cost of production.[176] This creates unfair competition by giving inefficient polluters more valuable free carbon permits than their more efficient competition. For example, an Irish cement manufacturer produces cement in a blast furnace producing 1/16 of the total GHG emissions of the current cement manufacturing process.[177] A

170 Europa, Community Independent Transaction Log, http://ec.europa.eu/environment/climat/emission/citl_en.htm (last visited Jan. 27, 2008) (providing NAPs); *see also* EU ETS, http://www.euets.com (last visited Jan. 27, 2008) (providing EUA pricing data and internet based trading on the spot EUA market); Point Carbon, http://www.pointcarbon.com (last visited Jan. 27, 2008) (providing EUA market and pricing analysis).

171 Euractiv, *supra* note 146.

172 *Id.*

173 *Selling Hot Air*, *supra* note 123, at 19.

174 Comm'n of the European Communities, *supra* note 128; *see* Lockwood, *supra* note 153, at 51 (noting that DTI consultants said the British electricity generators were expected to make windfall profits of around 800 million pounds in 2005).

175 David Gow, *Power Tool*, GUARDIAN UNLIMITED, May 17, 2006.

176 Choi, *supra* note 124, at 920.

177 FOUND. FOR THE ECON. OF SUSTAINABILITY & NEW ECON. FOUND., THE GREAT EMISSIONS RIGHTS GIVE-AWAY 2 (Mar. 2006), *available at* http://www.feasta.org/documents/energy/

ton of cement traditionally costs €75 ($110.05) and produces one ton of carbon emissions.[178] As a result of grandfathering, the Irish company receives fewer permits than its rivals and its competition can switch to the more efficient process, and sell their excess units for a substantial profit.[179] Meanwhile, because the Irish company acted first, it suffered the loss of selling its excess allowances it had converted to the less carbon intensive production methodology and therefore remains at a competitive disadvantage with its more polluting competition.[180] Not only does grandfathering provide financial windfalls to polluting companies, it financially punishes current efficient energy generators.

In contrast to grandfathering, auctioning allows for greater price transparency, levels the playing field between old and new entrants, encourages the cost-effective allocation of permits,[181] does not create windfall profits for participants through the free allocation of allowances, and raises money that can be used to further conservation efforts.[182] During ETS phase I, only five percent of allowances can be auctioned and ETS phase II will only allow ten percent auctioning.[183] To increase ETS market efficiency, ETS should allow and encourage the use of auctioning to allocate a majority of allowances. Though the consumer would pay higher costs reflecting the purchase of allowances, the higher consumer prices would not result in windfall profits because the higher price profits would go to the national government. Auctioning would raise money the EU could use to offset costs for key industries, fund non-emissions trading conservation efforts, and offset the increased cost of power for consumers through tax breaks.

4. Conclusion

The ETS has been successful in creating a strong framework for a multi-national emissions trading scheme and allowing companies to learn how to operate in a carbon-restricted economy. Many of the ETS's weaknesses, including insufficient caps, grandfathering, and small fines for non-compliance, are arguably "politically necessary to get the scheme launched."[184] In addition, the ETS has taken important steps to incorporate other markets into their system. The EU is in talks with California to link California's future emissions trading scheme with ETS.[185] The process will

emissions2006.pdf.

178 *Id.*

179 *Id.*

180 *Id.*

181 *See* Choi, *supra* note 124, at 917 (discussing the cost effectiveness of auctioning and finding that 100% auctioning would be 50% more cost effective than grandfathering).

182 *Id.*

183 UK DEP'T FOR ENV'T, FOOD & RURAL AFFAIRS, EMISSIONS TRADING: THE UK'S EXPERIENCE 25 (2006), *available at* http://www.arb.ca.gov/research/seminars/uk1/uk.pdf.

184 Lockwood, *supra* note 153, at 50.

185 Power Engineering, EU Wants California To Join EU Emission Plan, Jan. 29, 2007, http://pepei.pennnet.com/display_article/283208/6/ARTCL/none/none/EU-Wants-California-to-

take at least two years, but would provide much greater flexibility for both a future California market and the ETS system. In addition, ETS has linked its program with CCX.[186] This further broadens the ETS market and encourages compatibility with future markets.

C. Chicago Climate Exchange

CCX is a voluntary emissions trading system and is North America's only system that trades in all six GHGs. Its members govern CCX and all CCX participants make a voluntary and legally binding GHG reduction commitment.[187] Currently CCX phase II requires all members to reduce emissions 6 percent below a baseline period from 1998 to 2001 by 2010. The goal of CCX is to facilitate GHG allowance trading, and gain experience operating in a carbon constrained business environment.[188] CCX is composed of big businesses like Ford Motor Company, U.S. cities like Portland, Oregon, and major universities.[189] CCX has witnessed remarkable growth, including the addition of New Mexico as a member.[190] Each member of CCX is issued allowances that are recorded in the CCX registry.[191] In addition, carbon offsets are acquired through such projects as methane destruction, alternative agricultural practices, CDM and renewable energy.[192] As a test ground for carbon emissions trading CCX has been very successful, but as an ultimate environmental tool to curb emissions CCX will have to be adopted as a binding cap-and-trade emissions trading program.

Join-EU-Emission-Plan/ (last visited Jan. 27, 2008).

186 *See* Press Release, Chicago Climate Exchange, Chicago Climate Exchange Announces Demonstration Linkage with European Union Emissions Trading Scheme (Apr. 4, 2006), *available at* http://www.envtn.org/docs/ccx/CCXLinkage.pdf (discussing how a CCX member would be able to transfer batches of 100 tons of EU allowances from its EU allowance account into an account CCX has established in an EU registry, retire the EU allowances, and receive an equivalent allowance in the member's CCX registry).

187 Chicago Climate Exchange, About CCX: Overview, http://www.chicagoclimatex.com/content.jsf?id=821 (last visited Jan. 27, 2008) (listing City of Portland as a member under "Municipalities").

188 *Id.*

189 Chicago Climate Exchange, Current Members of CCX, http://www.chicagoclimatex.com/content.jsf?id=64 (last visited Jan. 27, 2008).

190 Press Release, Chicago Climate Exchange, Chicago Climate Exchange Announces First State to Join, as well as Other Major Landmarks (Sept. 21, 2005), *available at* http://www.chicagoclimatex.com/newsAndPressReleaseList.jsf (in "Time Period" pull-down menu select "2005").

191 Chicago Climate Exchange, Frequently Asked Questions, http://chicagoclimatex.com/content.jsf?id=74 (last visited Jan. 27, 2008).

192 Chicago Climate Exchange, CCX Offsets Program, http://www.chicagoclimatex.com/content.jsf?id=23 (last visited Jan. 27, 2008) (for descriptions of various programs follow individual links).

D. Effectiveness of CCX

1. Emissions Cap and Flexibility

CCX has been successful in creating a sufficient cap to spur market trade, but insufficient to comply with Kyoto Protocol environmental reduction targets. The price of CCX allowances has ranged from $3.35 to $4.05 with a February 2007 trading volume of 3,712,100 metric tons of carbon.[193] A CCX allowance represents 100 metric tons of carbon equivalents.[194] The market volume and changes in price reflect active trading of emission allowances. In addition, the market has allowed participants flexibility in deciding how to comply with CCX reduction targets. CCX incorporated emissions credits for reduction projects that can be sold on CCX, including CDM and domestic reduction projects.[195] For example, a dairy farmer in Minnesota who captures methane from his pond to power a generator for milling machines may sell carbon credits for $10,000.[196] This is a sizable sum for someone making $55,000 to $65,000 per year.[197] These are reductions that would not otherwise occur and only occur because CCX has created GHG emissions reduction targets for participants. However, some of the projects would have occurred without CCX. A farmer in North Dakota who uses no-till farming to keep his costs down and conserve oil now gets additional money for reduction contracts sold on CCX.[198] GHG reduction projects must find a way to reduce emissions in ways that would not occur absent the project.

2. Regulatory Certainty Over Time

CCX is a voluntary market and therefore has different requirements than a government regulated emissions trading program. CCX is not regulated by a government authority and therefore regulatory certainty over time is not essential for the market to function optimally. The growth of CCX reflects the awareness that a national carbon emissions trading program may emerge in the United States. The United States faces increasing economic and political pressure to ratify the Kyoto Protocol and create a binding emissions trading scheme. Emissions are being converted into economic terms, and CCX's increasing acceptance suggests that investors

193 Chicago Climate Exchange, CCX CFI Monthly Summary, http://www.chicagoclimatex.com/market/data/monthly.jsf (last visited Jan. 27, 2008) (select Feb. 2007 from pull-down menu).

194 Chicago Climate Exchange, *supra* note 191.

195 Chicago Climate Exchange, Clean Development Mechanism & Renewable Energy Credit (REC) Tracking, http://www.chicagoclimatex.com/content.jsf?id=247 (last visited Jan. 27, 2008).

196 Russell Wassendorf, *A Capitalist Cure for Pollution*, SFO-STOCKS, FUTURES & OPTIONS MAGAZINE, May 2006.

197 *Id.*

198 *Farmers Signing Up for Carbon Dioxide Credits*, BISMARCK TRIB., Oct. 16, 2006, *available at* http://www.bismarcktribune.com/articles/2006/10/16/news/state/122396.txt.

view the regulation of greenhouse gas emissions as inevitable.[199] Big businesses that have consistently refused to recognize climate change, such as Exxon Mobil, concede now that there is a problem and that their products contribute to it.[200] In addition, "last year four-fifths of utility executives . . . expected mandatory emissions caps within a decade."[201] In 2006, United States companies invested over $30 billion in alternative energy, seven times more then their European counterparts, reflecting industry recognition of the growing market for cleaner energy.[202] In addition, international pressure may result in the United States joining or creating an emissions trading scheme. Currently, Kyoto Protocol parties are imposing higher costs on their GHG emissions because the competition does not have to incorporate the extra cost of GHG emissions into production.[203] The EU has proposed a carbon tax on the import of industrial products from countries that refuse to commit themselves to the Kyoto Protocol after 2012.[204] If the EU acts on its threat to impose a green tax, American industry will face higher export prices, reducing trade, while also being denied access to possibly lucrative markets for new energy technology. CCX plays a crucial role in these developments by allowing businesses and cities to learn to operate in a carbon market, while increasing political awareness and acceptance of carbon markets. The ability of CCX, in conjunction with international and domestic pressure, to join the Kyoto Protocol and create a carbon emissions trading system will determine the regulatory certainty of a U.S. emissions trading scheme.

3. Transparency and Enforcement

CCX has a done a good job of creating a transparent emissions trading market with ample enforcement to require participants to comply with their voluntary obligation. All members' emissions and compliance data is available to the public through the CCX website.[205] In addition, all requirements and market data is available to the public, which allows for transparency in the CCX market.[206] Though the CCX market is voluntary, CCX members sign a contract adopting the emissions reduction target and by doing so, each CCX member is bound through contract remedies.[207]

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199 *See* Shari Diener, *Ratification of Kyoto Aside: How International Law and Market Uncertainty Obviate the Current U.S. Approach to Climate Change Emissions*, 47 WM. MARY L. REV. 2089, 2100–05 (2005–06) (discussing the economic impact of greenhouse gas emissions).

200 *Waking Up and Catching Up*, THE ECONOMIST, Jan. 27, 2007, at 23.

201 *Id.*

202 *Id.* at 24.

203 *See* Diener, *supra* note 199, at 2102–05 (discussing free-riders in European markets).

204 Bus. Council for Sustainable Dev., *Europe Sends Message on Climate Change* (Jan. 11, 2007), http://www.scoop.co.nz/stories/PO0701/S00030.htm (last visited Jan. 27, 2008).

205 *See* Chicago Climate Exchange, Program-Wide Baseline & Compliance Reports, http://www.chicagoclimatex.com/content.jsf?id=250 (last visited Jan. 27, 2008).

206 *See* Chicago Climate Exchange, CCX CFI Market Data Charting Tool, http://www.chicagoclimatex.com/market/data/summary.jsf (last visited Jan. 27, 2008).

207 *See* Chicago Climate Exchange, Emission Reduction Commitment, http://www.chicagoclimatex.com/content.jsf?id=72 (last visited Jan. 27, 2008).

Members must either meet their reduction obligation or purchase sufficient carbon offsets to negate their increase in carbon emissions.[208] The enforcement mechanism is sufficient to force companies to comply with their emissions reduction obligations.[209]

4. Conclusion

CCX has made substantial progress in establishing an emissions trading system in the United States. In the end, a successful emissions trading system in the United States requires a national cap on emissions to effectively curb carbon emissions. Richard Sandor, the Chairman and CEO of CCX, calls it the "engine of an environmental revolution."[210] Sandor envisions a future world that is driven by public goods such as air and water.[211] He assumes that a U.S. emissions trading system is inevitable and hopes that his market will provide the backbone for any future U.S. emissions trading system.[212] At this point the CCX is more form over substance and ultimately requires a U.S. emissions trading scheme. Many U.S. companies realize that a future U.S. emissions trading scheme is likely and therefore have joined CCX in order to get a head start on their competition and hopefully receive credit for reductions. Therefore, as a training ground and publicity for the need for emissions trading in the U.S., CCX has been successful.

E. Conclusion

As the threat of climate change becomes increasingly accepted by the international community, emissions trading will grow in importance in creating a flexible and cost effective means to curb international carbon emissions. As evidence of business's growing acceptance of climate change, insurers are starting to factor in the cost of climate change.[213] In Florida, insurance rates for homes have increased up to forty percent because of 2005's hurricanes.[214] Power companies are increasingly aware of the cost of emissions in creating long term energy plans and are looking to power generation technologies with the flexibility to reduce negative impacts of emissions trading.[215] In addition, some companies are realizing that reducing

208 *Id.*

209 *See* CHI. CLIMATE EXCH., 2005 PROGRAM-WIDE TRUE-UP SUMMARY REPORT 1 (2006), *available at* http://www.chicagoclimatex.com/compliance/pdf/2005_Program-wide_True-up_Summary_Report.pdf (indicating that in 2005 all members were in compliance with direct emissions reduction commitments).

210 Jeff Goodell, *Capital Pollution Solution?*, N.Y. TIMES, July 3, 2006, § 6 (Magazine) at 34, 36.

211 *See* Daniel P. Collins, *Managing Risk in All Seasons*, FUTURES, Fall 2005, at 6 (providing an interview with Richard Sandor discussing the challenges of pricing air and water).

212 Goodell, *supra* note 210, at 37.

213 Climate Change News, *Increasing Climate Risk a Concern for Insurance Industry and Business*, 6 SUSTAINABLE DEV. L. & POL'Y 61, 61 (2006).

214 *Id.*

215 *See* Laurikka & Koljonen, *supra* note 31, at 1068, 1072–73.

carbon emissions can also mean dramatic savings through eliminating waste. BP, a major oil and energy company, "added around $650 million of shareholder value because the bulk of the reductions came from the elimination of leaks and waste."[216] WalMart has also decided to clean up its image by promoting better environmental practices. However, the motives are not purely altruistic and rather reflect soaring energy costs and increased expenses. WalMart now has their truckers shut off their engines when stopping for a break, resulting in an estimated $25 million per year in savings.[217] In addition, WalMart has significantly increased the gas mileage of its fleet of trucks through better aerodynamics and lower friction tires, resulting in expected savings of $310 million year.[218]

As firms hope to capitalize on reductions and receive substantial assets in the form of emissions permits they will become concerned over the integrity of the market to protect their property interest. As the emissions trading markets begin to take hold, their financial investment will only increase the risk companies will face from "widespread cheating and uncertainty . . . and a wholesale change in regulatory policy."[219] Companies will gain a financial incentive to protect their emission reductions value and strengthen the emissions trading systems.

V. CONCLUSION

International awareness of the growing threat of climate change is increasing the call for governments to take action to limit GHG emissions and limit its effects. The Kyoto Protocol provides an important framework for future international action to combat climate change by providing international binding carbon emission reduction obligations and the framework for a cost-efficient means to reduce emissions. Reducing carbon emissions to meet the current Kyoto Protocol obligations is expensive, and post-2012 requirements could be even stricter. The larger the post-2012 carbon market is, the more flexibility participants will have in seeking out the most efficient means of reducing emissions. Both ETS and CCX markets show great promise in allowing countries to cost-efficiently reduce emissions, though both markets still must make changes in order to make a sizable impact on reducing emissions.

ETS presents the most promising example of an emissions trading system. The market combines the entire EU, has been linked to the CCX market, and is also in talks with California to join the ETS market in the future.[220] ETS has created a flexible means to reduce emissions by enlarging

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216 Scott J. Stone, *Comment on COP 11 to the UNFCCC*, 6 SUSTAINABLE DEV. L. & POL'Y 45, 46 (2006).

217 Unmesh Kher et al., *How to Seize the Initiative*, TIME, Mar. 26, 2006, *available at* http://www.time.com/time/magazine/article/0,9171,1176989,00.html.

218 *Id.*

219 Kruger & Egenhofer, *supra* note 32, at 8.

220 UK DEP'T FOR ENV'T, FOOD & RURAL AFFAIRS, *supra* note 183; Press Release, Chicago Climate Exchange, *supra* note 190; Power Engineering, *supra* note 185.

each participant's allowance market and allowing participants to find the cheapest reduction options. However, ETS has failed to force companies to incorporate the long-term cost of carbon emissions into their business plans. Most energy plants have a thirty-year life span, but the reduction obligations for phase II last only until 2012.[221] The EU must make clear which reduction obligations will be required thirty years into the future to allow participants the opportunity to make long-term plans. Without a clear sign of continued strict caps on GHG emissions, participants will not incorporate the high cost of carbon reduction into long-term business decisions. This hurts the EU in the short run because it increases the construction of coal power plants and perpetuates the reliance on cheap carbon pollution. In addition, the absence of long term reduction obligations hurts the EU because it increases the cost of reducing emissions if new energy plants need to be retrofitted or decommissioned. Despite these concerns, participation in the ETS is high. With a few changes, it could become an important means to reduce global carbon emissions.

CCX shows political potential but has not made any significant progress to reduce carbon emissions. The ultimate success of the CCX should not be measured in the amount of reductions that result from the market but in whether the market encourages the adoption of a national carbon market in the U.S. The market has already had success politically and has grown to include many companies and cities. Those involved in CCX now will most likely run the future Regional Greenhouse Gas Initiative market for the northeastern U.S. states. However, without legally binding obligations imposed by the United States on all carbon emitters, the CCX will fail to substantially reduce emissions.

Carbon emissions trading has the potential to efficiently reduce emissions, but to reach its potential and effectively reduce emissions will require an international emissions trading scheme that reduces global GHG emissions with the involvement of the United States[222] and China. China produced 6200 million tons of CO_2 in 2006, and the US produced 5,800 million tons.[223] Neither has taken on international binding emissions caps through the Kyoto Protocol. In the United States, the political climate shows some promise. With the 2006 mid-term election and a political shift in Washington, D.C. to the Democratic Party, with 2008 Presidential candidates from both parties who have already supported legislation to create an emissions trading system in the United States, and with increasing state and city action to address climate change, the future of emissions trading in the United States has dramatically improved. China, meanwhile, is "choking on

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221 Laurikka & Koljonen, *supra* note 31; EU Press Release, May 15, 2006, *supra* note 143.

222 *See* CAMILLA BAUSCH & MARKUS KNIGGE, ECOLOGIC, DISCUSSION PAPER: CLIMATE CHANGE POLICIES AT THE U.S. SUBNATIONAL LEVEL—EVIDENCE AND IMPLICATIONS 5 (2006), *available at* http://www.ecologic.de/modules.php?name=News&file=article&sid=1609 ("the GHG reduction needed for a successful climate protection regime requires the U.S. to participate").

223 John Vidal & David Adam, *China Overtakes US as World's Biggest CO_2 Emitter*, GUARDIAN UNLIMITED, June 19, 2007, *available at* http://www.guardian.co.uk/environment/2007/jun/19/china.usnews.

growth," and though China sets environmental targets, the targets have gone mostly unmet.[224] The future success of an international emission trading system and international GHG emissions reduction efforts hang on whether the United States and China will eventually make the political shift to recognizing the growing threat of climate change and accepting binding international reduction obligations. The incorporation of the United States and China into an international binding carbon emissions trading program would substantially contribute to cost-efficient and environmentally effective reductions of GHG emissions through a global carbon market to meet Kyoto obligations and to help prevent global catastrophic anthropogenic climate change. The carbon markets will not be effective in preventing or even limiting climate change without incorporating the world's two biggest polluters. As a result, the carbon markets may serve as a successful market tool and an example of the efficiency of an open market to cost efficiently solve environmental problems, but without China and the United States, they will do nothing to curb GHG emissions and limit the effects of climate change.

[224] Joseph Kahn & Jim Yardley, *As China Roars, Pollution Reaches Deadly Extremes*, N.Y. TIMES, Aug. 26, 2007, at A1.