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Climate Change, Cap-and-Trade and the Outlook for U.S. Policy

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Cover Page Footnote
International Law; Commercial Law; Law
I. The Source of the Climate Change Problem

Global atmospheric concentrations of greenhouse gases – carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbon gases (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆) – have increased considerably in the last 150 years.¹ CO₂ concentrations have risen from pre-industrial levels of approximately 280 parts per million (ppm measured in CO₂-equivalent or CO₂e)² to approximately 380 ppm in 2005.³
These levels far exceed 180 ppm to 300 ppm, the natural range of CO₂ over the last 650,000 years. The 2007 Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report indicates that atmospheric increases in CO₂ concentrations since the industrial era is largely driven by human activities. Fossil fuel combustion to support electric power generation, transportation, cement manufacturing, and other sectors of the global economy are responsible for approximately 75% of human-caused CO₂ emissions. This accounts for approximately 56.6% of all greenhouse gas emissions. Land use change, particularly deforestation, is a significant, but lesser source of emissions (17.3% of greenhouse gas emissions). Emissions from CH₄ and N₂O, primarily from agricultural activities, contribute approximately 14.3% and 7.9% to greenhouse gas emissions, respectively.

Radiative forcing as a given weight of another radiatively active gas. Carbon dioxide equivalents are computed by multiplying the weight of the gas being measured (for example, methane) by its estimated global warming potential (which is 21 for methane). "Carbon equivalent units" are defined as carbon dioxide equivalents multiplied by the carbon content of carbon dioxide." For example, if one ton of a greenhouse gas is twenty-one times more potent than CO₂ (such as methane), then it would be measured as twenty-one tons CO₂e.

3 IPCC Group I, supra note 1, at 137.
4 Id. at 2; see also id. at 143-44 (Methane (CH₄) has increased from pre-industrial values of approximately 715 parts per billion (ppb) to approximately 1774 ppb in 2005, far exceeding the natural range of CH₄ (320 ppb to 790 ppb). Observed increases in CH₄ are most likely due to anthropogenic activities, particularly agriculture. N₂O has increased from approximately 270 ppm during the pre-industrial era to approximately 320 ppm in 2005, mainly due to agricultural activities. Fluorinated gases, manufactured by humans, were not present before the industrial era.).
5 IPCC Group I, supra note 1, at 135.
6 Id. at 131 ("[E]missions of fossil fuels and cement production have likely contributed about three-quarters . . . with the remainder caused by land use changes.").
8 Id.
9 CO₂ emissions associated with fossil fuel have increased from approximately 6.4 gigatons of carbon (GtC) per year in the 1990s to approximately 7.2 GtC per year in the years 2000 to 2005 and emissions. See IPCC GROUP III, supra note 7, at 138.
Rising average surface temperatures are a result of growing concentrations of greenhouse gases from human activities. The rate of warming over the past fifty years is about twice that of the last 100 years. Warming has also occurred in the oceans; however, surface air temperatures have increased at a higher rate than ocean temperatures. This is an increase of 0.27°C per decade for surface air temperatures versus 0.13°C per decade for ocean temperatures since 1979.

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10 IPCC GROUP III, supra note 7, at 103 (Figure 1.1b Global anthropogenic greenhouse gas emissions in 2004).

11 IPCC GROUP I, supra note 1, at 135; see also id. at 465 (Temperature change is more difficult to assess than greenhouse gas emissions. There is only 150 years of sufficient data collection on temperature. Previous temperature recordings used proxy ice core and tree ring data. Temperature also varies regionally, with local climate conditions affecting the outcome of regional temperature data.).

12 Id. at 137 ("During this period, the absolute growth rate of CO₂ in the atmosphere increased substantially: the first fifty ppm increase above the pre-industrial value was reached in the 1970s after more than 200 years, whereas the second fifty ppm was achieved in about thirty years. In the ten years from 1995 to 2005 atmospheric CO₂ increased by about nineteen ppm; the highest average growth rate recorded for any decade since direct atmospheric CO₂ measurements began in the 1950s.").

13 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2007: SYNTHESIS REPORT, SUMMARY FOR POLICYMAKERS 2 (2007) [hereinafter IPCC SYNTHESIS REPORT] ("Rising sea level is consistent with warming.").

14 Id. at 6.
Higher temperatures have numerous global impacts including shifts in precipitation patterns, melting snow caps and glaciers, and rising sea levels.\textsuperscript{15} Greater warming and precipitation generally has occurred in the northern latitudes, increasing the incidence of flooding events. Meanwhile, cooling and drying has been experienced in the tropics and subtropics, increasing the intensity of droughts.\textsuperscript{16} Glaciers and snow cover have also been decreasing worldwide.\textsuperscript{17} Since the 1920s, and particularly since the 1970s, snow cover area has decreased in the Northern Hemisphere during the spring and summer months.\textsuperscript{18} In the last thirty years, the spring melt has shifted, starting nearly two weeks earlier.\textsuperscript{19} Higher ocean temperatures, which cause thermal expansion, as well as widespread melting of glacial and ice sheets, have contributed to a rise in sea levels.\textsuperscript{20} From 1961 to 2003, the global average sea level rose at an average rate of 1.8 millimeter per year, with an increased rate from 1993 to 2003.\textsuperscript{21}

Projections for the next two decades indicate a warming of approximately 0.2°C per decade.\textsuperscript{22} The best estimate for global average surface warming for the end of the twenty-first century (2090 – 2099) relative to 1980 to 1999 range from approximately 1.8°C (1.1°C to 2.9°C) to 4.0°C (2.4°C to 6.4°C).\textsuperscript{23} Even if emissions were held constant at 2000-year levels, there would be a warming trend of approximately 0.1°C per decade.\textsuperscript{24} This trend is

\textsuperscript{15} Id. at 2.
\textsuperscript{16} Id. at 7-8.
\textsuperscript{17} Id. at 2.
\textsuperscript{18} Id. at 3.
\textsuperscript{19} INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2007 – IMPACTS, ADAPTATION & VULNERABILITY, CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE IPCC 88 (2007) [hereinafter IPCC GROUP II].
\textsuperscript{20} Id. at 7-8.
\textsuperscript{24} Climate Change: Are Greenhouse Gas Emissions from Human Activities
largely due to the slow feedback response of oceans. Projected changes in the climate are likely to intensify shifts in precipitation patterns, reduce snow cover area, increase glacial melt, and rapidly increase the rate of sea level rise.

Given these trends, the United Nations Framework Convention on Climate Change (UNFCCC) has indicated that greenhouse gas concentrations must be stabilized at a level that avoids “dangerous anthropogenic interference” with the climate system. Many scientists have indicated that stabilization of atmospheric CO₂ at 450 ppm is necessary to avoid dangerous levels of global warming. More than 200 leading climate scientists issued a declaration (the 2007 Bali Climate Declaration) to cut greenhouse gas emission in half by 2050:

The next round of focused negotiations for a new global climate treaty (within the 1992 UNFCCC process) needs to begin in December 2007 and be completed by 2009. The prime goal of this new regime must be to limit global warming to no more than 2°C above the pre-industrial temperature, a limit that has already been formally adopted by the European Union and a number of other countries. Based on current scientific understanding, this requires that global greenhouse gas emissions need to be reduced by at least 50% below their 1990 levels by the year 2050. In the long run, greenhouse gas concentrations need to be stabilised at a level well below 450 ppm (parts per million; measured in CO₂e concentration). In order to stay below 2°C, global emissions must peak and decline in the next 10 to 15 years, so there is no time to lose.


In December of 2007, the Bali Convention (Conference of the Parties 13 or
The premise of the declaration is that greenhouse gas concentrations above 450 ppm may dramatically change climate systems. This could result in dangerous impacts on human health, ecosystems, food production, and economic security.

II. Broad Policy Options

With scientific consensus that human activities have resulted in dramatic and unprecedented changes to our climate, discussions have shifted to consideration of the policy options available for reducing greenhouse gas emissions. There are two types of broad domestic policy options for controlling greenhouse gas emissions: proscriptive instruments and economic instruments.\(^\text{28}\)

Proscriptive instruments, commonly referred to as the "command-and-control" approach, have been widely employed to address environmental problems to date.\(^\text{29}\) A proscriptive approach can take the form of technology-based standards or performance-based standards.\(^\text{30}\) Technology-based standards generally require a specific type of equipment, process, or procedure.\(^\text{31}\) In the case of climate change policy, technology-based standards may require the creation of energy efficiency standards for commercial and residential buildings, fuel economy standards for vehicles, or technologies for landfill or livestock gas collection.\(^\text{32}\) Performance-based standards allow for more flexibility than technology-based standards.\(^\text{33}\) Performance-based standards specify the desired level of pollution emissions and allow the regulated entity to determine the technology or specific method for achieving the emissions standard.\(^\text{34}\) For instance, a


\(^{29}\) Id.

\(^{30}\) Id. at 297-300.

\(^{31}\) Id. at 300.

\(^{32}\) Id.

\(^{33}\) Id.

\(^{34}\) Stavins, supra note 28, at 300.
performance-based standard could mandate a firm’s maximum allowable level of CO₂ emissions to 1990 levels by 2020, while allowing the firm to employ its preferred method or technology in order to meet the standard.⁴⁵

Proscriptive instruments⁴⁶ are capable of achieving the desired emissions reductions; however, they may be more costly to firms and governmental or program administrators than alternative approaches.⁴⁷ Effective proscriptive instruments often require a high level of information, such as sufficient knowledge of available technologies, pollution control costs for firms, social costs associated with the pollutants (e.g., health care costs), as well as sufficient monitoring to verify that the standards are met.

Economic instruments are advocated as a cost-effective policy approach to controlling greenhouse gas emissions.⁴⁸ These instruments place a monetary value on carbon, creating a financial incentive for technology to change to low carbon solutions such as renewable energy sources. These instruments also motivate substituting lower emitting and energy-efficient products such as compact fluorescent light bulbs and energy-efficient automobiles. Assigning monetary value to carbon can also provide a source of revenue for funding basic research and development, network development (e.g., smart grid, transmission, and CCS pipelines), and deployment from pilot projects to commercial scale projects. Two market-based approaches have been debated as the most appropriate method for correcting the emissions externality: carbon taxes and cap-and-trade systems.⁴⁹ The use of taxes versus cap-and-trade programs to control emissions is largely a choice of using a price-based approach or a quantity-based approach.

In the case of a carbon tax, the government would impose a price on the quantity of CO₂ emitted. The tax would likely start

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⁴⁶ Stavins, supra note 28, at 300 (the term “proscriptive instruments” refers to performance-based standards).

⁴⁷ Id. at 300-02.

⁴⁸ Id. at 312.

Some economists favor a carbon tax because it is perceived as a more predictable, long-term price on emissions, encouraging carbon users to act accordingly. Moreover, revenue generated through a carbon tax could offset high energy bills and fuel prices for lower income households. The higher costs of carbon-intensive actions associated with a carbon tax will increase motivation to move towards low carbon solutions. There is concern, however, that governments will neither have sufficient information, nor the political capacity to set the price at a level that would stabilize emissions.

In 1993, the Clinton administration proposed a broad-based energy tax (BTU tax) to encourage conservation and reduce pollution in an economically and regionally equitable manner. The proposed tax was to be directed towards producers, such as refineries and transportation, and then passed on to consumers in the form of higher prices. The tax level was to depend on the carbon output, so that oil would be taxed more than natural gas; renewable energy sources, including wind, solar, and geothermal, would be exempt from the tax. The proposed BTU tax narrowly passed in the House, but failed in the Senate, largely due to widespread opposition within the business community, which ultimately forced the Clinton administration to consider alternatives. Opponents indicate that if a carbon tax was incorporated into legislation today it would face similar political opposition as Clinton’s BTU tax experienced in the early 1990s.

Cap-and-trade systems, on the other hand, are considered politically favorable and may possess economic efficiency advantages over a tax. These systems control the quantity of

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43 Id.
44 Id.; see also Paul Horvitz, Clinton Retreats on Energy Tax in Fight Over Budget, Int’l Herald Trib., June 9, 1993 (stating possible changes to the energy tax).
45 See Kenneth P. Green et al., Climate Change: Caps vs. Taxes, Envtl. Pol’y Outlook, 1, 4 (2007) (“Many economists believe a carbon tax . . . would be a superior policy alternative to an emissions-trading regime. The irony is that there is a broad consensus in favor of a carbon tax everywhere but on Capitol Hill, where the ‘T’ word is anathema.”).
46 See generally Nathaniel O. Keohane, Cap and Trade, Rehabilitated: Using Tradable Permits to Control United States Greenhouse Gases, 3 Rev. Envtl. Econ. &
emissions, allowing the market to determine the price. Proponents indicate that a cap-and-trade approach allows science to identify the level of emissions reduction necessary to achieve climate stabilization. The cap is then set at that scientifically sound level, ensuring the desired emissions reductions are achieved. At its core, a cap-and-trade program provides more certain protection from environmental damage. In practice, stabilizing greenhouse gas emissions is likely to be a mix of both prescriptive and economic policy instruments, and may have a mix of cap-and-trade and tax features, as recent legislation has shown.

III. Cap-and-Trade: How it Works

A cap-and-trade system establishes a fixed quantity of allowable emissions for a period of time. This fixed quantity is referred to as the "cap" or emissions ceiling. The government then distributes a limited number of tradable emissions "allowances" (i.e., the right to emit) through an allocation or auction system. Entities that are required to meet the cap can

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48 See Stavins, supra note 46, at 7 ("The system should target all fossil fuel-related CO2 emissions through an economy-wide cap on those emissions . . . . The system should set a trajectory of caps over time that begin modestly and gradually become more stringent, establishing a long-run price signal to encourage investment in emission-reducing technology.").

49 Id.

50 See Lieberman-Warner's Climate Security Act § 2191, 101st Cong. (2007) ("The Climate Security Act controls compliance costs by allowing companies to trade, save, and borrow emission allowances, and by allowing them to generate allowances when they induce non-covered businesses, farms, and others to reduce their greenhouse gas emissions or capture and store greenhouse gases."); Bingaman-Specter "Low Carbon Economy Act" of 2007, § 1766, 101st Cong. (2007) ("The Act creates a cap and trade program for U.S. greenhouse gases . . . . The program is designed to elicit the most cost-effective reductions across the economy. The target is set to avoid harm to the economic and promote a gradual but decisive transition to new, lower-carbon technologies.").

51 Keohane, supra note 46, at 43.

52 Id.
choose to purchase or sell emissions allowances depending on their pollution abatement costs and the market price of the emissions allowance. Those who can cut their emissions at a lower cost than the allowance’s market value will abate more and purchase fewer (or sell extra) allowances, while entities that cannot cut their emissions below the allowance’s market value will purchase more allowances. Given that the aggregate emissions target must be met, a cap-and-trade system provides the incentive necessary for entities to meet their targets in a more cost-effective manner.

A. Cap-and-Trade Versus Command-and-Control

The efficiency gains of a cap-and-trade program have been compared to proscriptive or “command-and-control” policy instruments. In a simplified two plant scenario for instance, a proscriptive policy may require each plant to reduce emissions by 20% (e.g., reducing uncontrolled emissions of 500 tons CO$_2$e to 400 tons CO$_2$e). If the two plants had different abatement costs (e.g., $20.00 per ton of CO$_2$e and $10.00 per ton of CO$_2$e, respectively) the total costs of the mandate would vary by plant. Costs for Plant A would be $2,000.00 ($20.00 per ton of CO$_2$e abated times the mandated emissions cut of 100 tons of CO$_2$e), while costs for Plant B would be $1,000.00 ($10.00 per ton of CO$_2$e abatement costs times 100 CO$_2$e mandated emissions cut). In aggregate, a 20% emissions reduction, equal to 200 tons of CO$_2$e emissions, would cost $3,000.00 with a proscriptive policy.

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53 Id.
54 Id. ("[A] cap and trade program for [greenhouse gases] would allow firms to bank allowances or even borrow them from future periods . . . equat[ing] the marginal costs of abatement across time . . . [which] is crucial, since the damages from climate change are driven by cumulative emissions of greenhouse gases over long periods of time.").
55 Id. ("[I]n theory, cap-and-trade programs are cost-effective: they achieve the required amount of emissions reduction at the lowest possible total abatement costs.").
57 See Table 2, infra Part III.a.
Table 2: Efficiency Gains of Cap-and-Trade Policy versus Proscriptive Policy

<table>
<thead>
<tr>
<th>Plant</th>
<th>Uncontrolled Emissions</th>
<th>Mandated 20% Cut</th>
<th>Cost per ton to reduce Emissions</th>
<th>Total Cost for Mandate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500</td>
<td>400</td>
<td>$20</td>
<td>($2,000)</td>
</tr>
<tr>
<td>B</td>
<td>500</td>
<td>400</td>
<td>$10</td>
<td>($1,000)</td>
</tr>
<tr>
<td>Total</td>
<td>1,000</td>
<td>800</td>
<td>$15</td>
<td>($3,000)</td>
</tr>
</tbody>
</table>

Proscriptive

<table>
<thead>
<tr>
<th>Plant</th>
<th>Emissions if Trading Allowed</th>
<th>Total Emission Reduction Cost after Trading</th>
<th>Allowance Transfer at price of $15/ton</th>
<th>Net cost after trading</th>
<th>Efficiency gains from Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500</td>
<td>$0</td>
<td>($1,500)</td>
<td>($1,500)</td>
<td>$500</td>
</tr>
<tr>
<td>B</td>
<td>300</td>
<td>($2,000)</td>
<td>$1,500</td>
<td>($500)</td>
<td>$500</td>
</tr>
<tr>
<td>800</td>
<td>($2,000)</td>
<td>$0</td>
<td>($2,000)</td>
<td>($2,000)</td>
<td>$1000</td>
</tr>
</tbody>
</table>

Cap-and-Trade

A cap-and-trade policy would cap the total emissions at 800 tons of CO$_2$e, for the same 20% reduction. Plant A and B would be subject to the cap. These capped entities would weigh their plant's pollution abatement costs against the market price for emissions allowances to determine the most cost-effective method to meet the cap. The two plants could agree on an exchange price for the allowances of $15 per ton of CO$_2$e. In this scenario, pollution abatement costs for Plant A ($20.00 per ton of CO$_2$e) are more expensive than the market price of allowances ($15). Plant B, on the other hand, can abate pollution at a cheaper price ($10 per ton of CO$_2$e) than the market price of allowances. As such, Plant B will abate 200 tons of CO$_2$e and sell its extra 100 emissions allowances (below its allotment of 400) to Plant A for $15 per allowance. In aggregate, the cap-and-trade policy will cost Plant A $1,500 (purchase of 100 emissions allowances at a cost of $15 per allowance) and it will cost Plant B $500 (abatement of 200 tons of CO$_2$e at a cost of $10 per ton minus the sale of its 100 emission allowances at a value of $15 per allowance). Overall, the cap-and-trade policy approach is more efficient than the proscriptive approach at achieving the same
target. Both plants save $500 in the cap-and-trade program, with a savings of $1,000 for the economy as a whole.

B. Cap-and-Trade: Historical Perspective

Cap-and-trade is not a new economic policy option. The sulfur dioxide (SO_2) emissions trading system established under Title IV of the 1990 Clean Air Act capped the amount of SO_2 emitted into the atmosphere at ten million tons less than 1980 levels, a fifty percent reduction, and established a trading system that distributed allowance permits to electric power plants. The SO_2 emissions trading system has been considered environmentally and economically successful. Targeted emissions reductions have been achieved faster, and at lower costs than they would have in the absence of a trading scheme. This success of the SO_2 emissions trading system has demonstrated that market-based instruments can be cost-effective while achieving environmental objectives.

Conceptions of cap-and-trade programs and environmental markets have shifted; once considered pejoratively as “licenses to pollute,” these programs have had proven success at reducing pollution economically. The market for CO_2 has grown primarily through cap-and-trade programs. Domestically, the Chicago Climate Exchange (CCX) and the Regional Greenhouse Gas Initiative (RGGI) have emerged as voluntary and mandatory cap-and-trade programs.

- Chicago Climate Exchange (CCX). The CCX was launched in 2003 as the first voluntary U.S. cap-and-trade system. CCX is a multinational multi-sector market that trades all six greenhouse gases.

- Regional Greenhouse Gas Initiative (RGGI). RGGI is the first mandatory U.S. cap-and-trade system for reducing emissions from power plants. Ten states participate in

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59 Id.
60 Id.
61 Id.
RGGI: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Pennsylvania, a large coal state, is an observer to RGGI. Emissions trading permits are auctioned quarterly; the first auction was held in September of 2008. The first three-year compliance period began in January, 2009. Proceeds of RGGI will be used to promote renewable energy.63

The Kyoto Protocol, a 1997 treaty to the United Nations Framework Convention on Climate Change (UNFCCC) that came into force in 2005, developed an international CO2 cap-and-trade system that legally bound signatory countries to reduce emissions below 1990 levels.64 Developed to meet the targets set by the Kyoto Protocol, the European Union Emissions Trading Scheme (EU ETS) is the largest, multi-nation emissions trading system.65 Other signatory countries to the Kyoto Protocol have also begun to implement CO2 emissions trading systems, including Australia and New Zealand.66 The United States is not a signatory country and therefore is not subject to the Protocol’s commitments.67

IV. Role of Offsets

Climate change policy can be designed to reduce greenhouse gas emissions (or increase carbon storage) in “uncapped” or unregulated sectors of the economy, such as agriculture, forestry, landfills, and livestock.68 In a cap-and-trade system, uncapped entities may be able to voluntarily reduce their emissions (or increase carbon storage) to offset the emissions of another entity.69

66 Kyoto Protocol, supra note 64.
covered by the cap. An offset is the agreement by two entities in which the uncapped entity agrees to reduce emissions in exchange for payment by the capped entity. The transaction would only take place if the seller can cut emissions less expensively than the buyer. The seller will do so if they are paid more than the cost of the emissions reduction activity.

For example, a cap may be set at 200,000 tons of CO$_2$e, with each capped entity trying to achieve an emissions target of 100,000 tons of CO$_2$e. Each capped entity will determine the most cost effective means to meet its emissions target, including reducing emissions through investments in better technology, trading of emissions allowances, and/or purchasing offset credits. If a capped entity (e.g., Plant B) can acquire 5,000 tons of offsets from a forestry or agricultural sequestration project (e.g., Farm Y) less expensively than it can reduce 5,000 tons itself, it will purchase the offsets. This allows Plant B to emit 105,000 tons of CO$_2$e, while still achieving net emissions of 100,000 tons of CO$_2$e (105,000 emission tons less 5,000 sequestration tons). This offset allows capped entities to cost-effectively meet the total cap of 200,000 tons of CO$_2$e without compromising the environmental integrity of the cap.

Figure 2: Meeting the Cap of 200,000 ton of CO$_2$e Through the Use of Offsets

\[
\text{Cap} = 200,000 \text{tons/yr CO}_2
\]

\[\text{Plant A Total Emission: 100,000 tons of CO}_2\text{e}\]

\[\text{Plant B Total Emission: 105,000 tons of CO}_2\text{e}\]

\[\text{Total Emissions of Plant A + Plant B = 205,000 tons of CO}_2\text{e}\]

\[\text{Farm Y Reduced emissions or Increased sequestration relative to the baseline by 5,000 tons of CO}_2\text{e}\]

\[\text{Total Emissions of Farm Y: -5,000 tons of CO}_2\text{e}\]

\[\text{5,000 tons of offset credits}\]

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69 Id.
70 See Table 2, infra Part III.a.
71 Figure 2 was created by the author. The figure is derived from numeric figures used in the preceding paragraph.
To date, key international and domestic cap-and-trade policies have included emissions offset provisions. The Clean Development Mechanisms (CDM) under the Kyoto Protocol allowed signatory countries to meet their targets using emissions reduction credits generated through offsets projects in developing countries not bound to Kyoto targets, in addition to using internal emissions reductions and trading credits with other signatory countries. Domestically, the Regional Greenhouse Gas Initiative (RGGI) has included an offset provision in its cap-and-trade program. The Lieberman-Warner America’s Climate Security Act of 2008 proposed to cut emissions by seventy percent from 2005 levels by 2050, with domestic and international offsets as a significant component of the policy’s cost-containment design. Although the bill did not pass, it did provide the foundation for offset provisions in future climate change legislation.

Offsets can provide a number of benefits to both capped and uncapped entities. For instance, offsets can increase the flexibility of a cap-and-trade system by allowing new sectors to enter the market and can reduce the costs of meeting the cap. Offsets can also stimulate parts of the economy, delivering needed resources and efficient technologies to sectors and countries outside of the cap that are economically disadvantaged. Furthermore, offsets projects can be mutually beneficial for environmental and social purposes. For instance, a forestry project that increases carbons storage by planting trees may also increase habitats for endangered or threatened wildlife species, create recreational opportunities for the public, and/or improve water quality for downstream users.

Although offsets can provide a number of economic, environmental, and social benefits, there are a number of critical

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72 See Murray, supra note 68.
75 See Lydia Olander et al., Developing Offset Policy in the US (Nicholas Inst. for Envtl. Pol’y. Solutions, Report NI R 08-01 May 2008, available at http://www.nicholas.duke.edu/institute/offsetspolicy.pdf (discussing that under the Lieberman-Warner bill (section 2191), fifteen percent of a capped entities’ emissions obligations can be meet with domestic offsets and fifteen percent can be meet with international offsets, allowing a capped entity to meet thirty percent of their total emissions with domestic and international offsets).
issues in ensuring the environmental integrity of the offset policy. Specific concerns include additionality, leakage, and permanence.

- **Additionality** is a necessary condition for offsets to perform their intended role. Offset projects must result in an overall reduction of greenhouse gas emissions, which would not have occurred without the offset project (i.e., the baseline). Baselines for offset projects are unobservable counterfactuals, calling into question the validity of using offsets in a mandatory cap-and-trade program. Additionality tests have been used to ensure emissions reductions are below (or above for carbon sequestration) the baseline. For instance, under the legal or regulatory additionality test, if the project is better than the action required by law or regulation, it is considered additional and, therefore, a valid offset project. Under financial additionality, the project activity would be unprofitable without project finances and presumably would not be carried out as part of normal business practices. Some additionality tests work off industry performance standards, with any emissions performance better than the industry deemed additional and creditable.

- **Leakage** occurs when emissions reductions from an offset project results in activities that increase emissions from a source not governed by the cap or offset program, thereby counteracting the project's emissions reductions.

- **Permanence** is associated with offsets generated from biological sequestration of carbon in agricultural and forestry projects. Forestry and agricultural soil are subject to a loss of sequestered carbon from natural disturbances such as fires, wind, and disease or pest outbreak, or intentional management actions such as cutting down forests or reversing agricultural management

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76 See Mark C. Trexler et al., *A Statistically-Driven Approach to Offset-Based GHG Additionality Determinations: What Can We Learn?*, 6 SUSTAINABLE DEV. L. & POL'Y. 30, 31 (2006) (discussing that the additionality tests are designed to see whether the reductions are additional to the reductions that would have occurred even in the absence of an emissions trading system).

77 *Id.*

78 Murray, supra note 47.

79 *Id.*
practices from conservation or no-till to conventional tillage. Mechanisms can be used to reduce the risk associated with the reversal of permanence. For instance, the Clean Development Mechanism requires all biological sequestration projects to use temporary credits (i.e., credits that represent the finite carbon storage of biological sources and assign liability to the appropriate party) instead of risking impermanence. Other approaches include the establishment of risk buffers and insurance. Additionality, leakage, and permanence are valid concerns. However, well-designed and properly implemented offset protocols can reduce the costs associated with meeting the cap and ensure the system's integrity.

V. Policy Outlook for the United States

Climate change policy is moving quickly. Domestic action is well underway at the state and regional level. A number of voluntary and mandatory cap-and-trade programs are now trading emissions allowances. At the federal level, there is more than five years worth of momentum on cap-and-trade proposals, starting with action in the Senate, including the McCain-Lieberman bill (section 139) that was introduced and voted down in 2003, the Bingaman-Specter bill (section 1766) that was proposed in 2007, and the Boxer-Lieberman-Warner bill (section 3036) that was proposed, introduced to the Senate, then withdrawn prior to a full vote in mid 2008. Toward the end of 2008, the co-chairman of the House Energy and Commerce committee, Representatives Dingell and Boucher circulated a draft cap-and-

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trade for discussion. These various initiatives are in somewhat of a holding pattern at the time of this writing, because of changes in the composition of both houses of Congress following the 2008 elections.

The incoming Obama administration has pledged to enact a federal cap-and-trade system that will reduce emissions to 1990 levels by 2020 and reduce them an additional eighty percent by 2050. It has indicated interest in reinvigorating international engagement, which is likely to be built around a cap-and-trade system. As such, it appears at the time this paper was written that a cap-and-trade system will remain the dominant approach to tackling climate change.

Although political momentum has been growing, the economic crisis of 2008 has caused some concern regarding the large economic undertaking of climate change. In light of the collapse of securitized asset markets globally, this crisis has also raised questions about the creation of an entirely new market in greenhouse allowances that are tradable, risky and complex. Some have renewed the debate about a carbon tax as an alternative to cap-and-trade.

A. Sticking Points in Climate Change Policy

There are currently a number of issues that must be solved before a carbon emissions trading program can be adopted and implemented, including:


85 See Liz Sidoti, Obama Promises Leadership on Climate Change, ASSOCIATED PRESS, Nov. 18, 2008.


• **Cap stringency.** Policy-makers must determine the appropriate level at which to set the emissions cap.\(^{88}\)

• **Scope.** Policy-makers must decide the breadth of a cap-and-trade system to address U.S. greenhouse gas emissions. Programs may cover all sectors of the economy, the main emitting sectors (e.g., electric power, transportation, and industrial sources), or perhaps stationary sources at the beginning of the program. Trade-offs in broad coverage, ease of administration, and the measurability of emissions must be considered in determining the scope of the cap-and-trade system.

• **Allowance allocation procedures.** Allowances may be allocated freely to regulated entities or may be auctioned. Both approaches provide a monetary incentive to reduce emissions and do not adversely affect the environmental integrity of the cap. Allocating allowances without charge is seen by some as politically advantageous because allowances can be distributed directly to parties likely to be most negatively affected (e.g., high emitting sectors, those at a globally competitive disadvantage, low income households facing higher energy bills, etc.). Auctioning allowances, on the other hand, yields revenue that may be used for these same purposes or to publicly finance the development of low-carbon technologies necessary to meet the long-term challenges.\(^{89}\)

• **International engagement.** Because climate change is a global problem a global solution is needed. There is a compelling case for the United States, as one of the world’s largest emitters, to take a strong leadership role. Another large emitter, China, does not appear poised to accept binding GHG restrictions in the near future. Therefore, some sort of framework or series of side agreements will likely be necessary to ensure that U.S.

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efforts are matched ultimately by other major emitters of the world, including China.  

- **Cost-containment provisions.** One of the consequences of a cap-and-trade program is that the carbon price is unknown in advance. Due to concerns about the possibility of extremely high and volatile carbon prices, various legislative provisions have been proposed, ranging from capping prices at a fixed level (a "safety valve") or introducing new allowances into the market from a carbon reserve account.

- **Market transparency.** A cap-and-trade-driven carbon market could have transaction value in the hundreds of billions of dollars. Because this market is being created by government fiat, and especially due to the financial market's meltdown starting in 2008, it is particularly important that the carbon market be subject to strict rules and oversight in order to ensure transparency, efficiency, and equity.

- **Transitioning from state to federal mandates.** Congress is considering various state and regional greenhouse gas initiatives as foundational proposals for greenhouse cap-and-trade legislation. Federal climate policy will need to specify the role of states and regions in a national cap-and-trade program, including whether or not state and federal mandates can coexist and how this impacts the distribution of emissions allowances issued at the state and federal level.

In addition to a cap-and-trade system, there is a need to consider additional policies that reduce greenhouse gas emissions

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90 See architectures for agreement: addressing global climate change in the post-kyoto world 107 (Joseph E. Aldy & Robert N. Stavins eds., Cambridge University Press 2007) (observing the need for both U.S. and Chinese cooperation in future attempts to limit GHG emissions).

91 See Murray et al., supra note 47, for a review of various cost containment options.

92 Jillian Button, carbon: commodity or currency? the case for an international carbon market based on the currency model, 32 harv. env'tl. L. rev. 571, 581 (2008) (observing that "the underlying economic justification for emissions trading brings into relief the importance of optimal regulatory design. A poorly designed system will lead to inefficiency, potentially cancelling out any potential cost-reduction goals.").

that can either supplement cap-and-trade by addressing uncapped sectors or complement cap-and-trade by expanding technologies deployed in capped sectors. Funding for complementary policies is a key policy question. An economic policy approach, such as a cap-and-trade program, may provide revenue that can be used to fund complementary policies. These policies include:

- **Carbon capture and sequestration (CCS).** Carbon capture and sequestration is the mitigation of emissions through capturing CO₂ from large emitting point sources and permanently storing the CO₂ in geological formations (i.e., depleted oil and gas reservoirs and deep aquifers). The cost of capture and geological storage of CO₂ varies by technology and location and remains highly uncertain. But given the nation's relative abundance of coal, the costs of CCS may be economically viable in the United States under a cap-and-trade program that prices carbon if the capacity for moving and storing CO₂ can be developed in an economic manner.

- **Research and development (R&D).** Research and Development on technologies and policy options that result in reduced greenhouse gas emissions.

- **Technology transfer to developing countries.** International participation in greenhouse gas mitigation is required to limit global climate change; however, developing countries often do not have the technological resources needed to make the necessary technological changes. International and domestic policies must be established to transfer technologies to rapidly growing countries.

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95 See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, Costs and Economic Potential, in IPCC SPECIAL REPORT ON CARBON DIOXIDE CAPTURE AND STORAGE, 345-48 (Bert Metz et al. eds., Cambridge University Press 2005) (examining costs of geological storage).
96 See Lorelyn Hall, Technology Transfers Under the United Nations Framework Convention on Climate Change, COLO. J. INT’L ENVTL. L. & POL’Y 59, 62 (2005) (emphasizing the need for technology transfers from developed to developing countries in order to combat climate change).
VI. Conclusion

Global warming can severely change the climate system. Shifts in precipitation patterns, melting of snow caps and glaciers, and rising sea levels create an urgent need for a comprehensive climate change policy. In the United States, a federal cap-and-trade system has emerged as the most politically viable approach, which if designed correctly, can cost-effectively achieving the desired emissions reductions. To date, cap-and-trade programs have been under development at the regional and state level, and the U.S. Congress has considered proposals for federal cap-and-trade legislation. With the incoming Obama administration, momentum for a federal cap-and-trade system has increased. Nevertheless, the adoption and implementation of a federal cap-and-trade system must be carefully developed. Resolutions must come in the form of offset provisions, increased cost containment mechanisms, transitioning the state and regional cap-and-trade systems to a federal system, and engaging the international system to assist in the process. By considering complementary policies such as CCS development, R&D, and technology transfers to developing countries, Congress and the Obama administration can produce a federal cap-and-trade system that is efficient, flexible and integrated with global efforts to mitigate climate change.

97 See James Ruhl, Quicksilver Alchemy: New England’s Mercury Control Programs and the Clean Air Mercury Rule, 32 VT. L. REV. 525, 539 (2008) (arguing that “Cap-and-trade programs’ greatest contribution to the cause of environmental protection is political, not regulatory . . . . [M]arket based control regimes may be the only politically viable mechanism to reduce pollution.”).


99 See Sidoti, supra note 85 (reporting President Obama’s support for a cap-and-trade approach during a video message to attendees of the 2008 Governors’ Global Climate Summit).