A GUIDE TO UNDERSTANDING CLIMATE CHANGE LEGISLATION

Committee on Environmental Law

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Section 1 -- Introduction

The Earth's climate has varied throughout the planet's history, with events ranging from ice ages to periods of long warmth. These variations typically are the result of natural forces such as volcanic eruptions, changes in the Earth's orbit, and changes in the amount of energy released from the sun. However, human activities, especially those resulting in release of greenhouse gases, have also had dramatic effects on the Earth's climate.

Greenhouse gases are necessary to life as we know it. They trap heat in the atmosphere –preventing it from escaping to space – and keep the Earth's surface warmer than it would be without them. But as the concentrations of these gases have consistently increased over the last 200 years, they have caused an "enhanced greenhouse effect,"[1] and Earth's temperature has climbed above normal levels. Between 1900 and 2005, temperatures have increased by an estimated 1.4°F (0.8°C),[2] and eleven of the last twelve years are among the warmest twelve years since 1850.[3]

This warming cannot be adequately explained by natural phenomena, and the international scientific community now agrees that it is primarily the result of human activities.[4] In 2007, the Intergovernmental Panel on Climate Change (IPCC) concluded that "human activity is the 'main driver'" of global warming,[5] especially activities such as fossil fuel combustion and land-use changes. The IPCC's finding was supported by 113 countries, including the United States[6] and the IPCC was awarded the 2007 Nobel Peace Prize for its work to raise awareness about global warming.

Changes made today to the atmosphere will affect the climate decades or centuries into the future, and efforts made now to reduce future change will likely have an effect on a similar timescale. Some effects of climate change are already inevitable, and even if greenhouse gas concentrations could be maintained at current levels, the heat already contained in the ocean will continue to warm the atmosphere 1°F by the end of the 21st century.[7] If the rise in greenhouse gas emissions continues unchanged, however, predictions suggest that temperatures may rise by as much as 10°F by the year 2100.[8] "Most projections of future impacts do not address what could happen if warming continues beyond 2100, which is inevitable if steps to reduce emissions are not taken, or if the rate of change accelerates."[9]

The effects of climate change will be widespread and diverse. Snow and ice will melt, causing water sources to shrink or disappear. Coastal areas and their populations will be threatened by rising sea

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[1] PEW CENTER ON GLOBAL CLIMATE CHANGE, CLIMATE CHANGE 101: UNDERSTANDING AND RESPONDING TO GLOBAL CLIMATE CHANGE, OVERVIEW 1, http://www.pewclimate.org/docUploads/1114_OverviewFinal.pdf.
[2] PEW CENTER ON GLOBAL CLIMATE CHANGE, *Basic Science*, http://www.pewclimate.org/global-warming-basics/basic_science (last visited Mar. 12, 2008).
[3] U.S. Environmental Protection Agency, *Climate Change, Basic Information*, http://www.epa.gov/climatechange/basicinfo.html (last visited Mar. 12, 2008).
[4] PEW CENTER ON GLOBAL CLIMATE CHANGE, CLIMATE CHANGE 101: UNDERSTANDING AND RESPONDING TO GLOBAL CLIMATE CHANGE, THE SCIENCE AND IMPACTS 3, http://www.pewclimate.org/docUploads/101_Science_Impacts.pdf ("There is no doubt among scientists that the recent spike in carbon dioxide and other greenhouse gases in the atmosphere is the result of human activities.").
[5] Elisabeth Rosenthal & Andrew C. Revkin, *Science Panel Says Global Warming is "Unequivocal,"* N.Y. TIMES, Feb. 3, 2007, at A1.
[6] *Id.*; *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT, CLIMATE CHANGE 2007: SYNTHESIS REPORT (subject to final copy-edit) (2007), *available at* http://www.ipcc.ch/ipccreports/ar4-syr.htm. The scientific underpinning of global warming is assumed to be as described by the Intergovernmental Panel on Climate Change for the purposes of this report. *See also* MICHAEL B. GERRARD, GLOBAL CLIMATE CHANGE AND U.S. LAW (American Bar Association 2007).
[7] PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 4, at 1.
[8] PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 1, at 1.
[9] PEW CENTER ON GLOBAL CLIMATE CHANGE, *What's at Stake*, http://www.pewclimate.org/about/stake.cfm (last visited Mar. 12, 2008).

levels. Droughts and floods could become more frequent and more severe. Weather patterns could change, and hurricanes and other storms will become more severe. Climate change will also affect human health by impacting agricultural production and the spread of disease, as well as inflict severe damage to ecosystems that support all forms of life.[10] Some estimate that greenhouse gas emissions must be reduced 50%-80% by 2050 to avoid the worst of these effects.[11] Addressing global climate change is an unprecedented challenge that will require extraordinary cooperation at the local, national, and international levels, and while no single solution will completely solve the problem of climate change, many tools already exist that can be used to address the issue.

In the absence of a strong federal policy, U.S. leaders of business and government have begun taking steps to address climate change. Businesses have begun voluntary measures to reduce their impact on climate change. Additionally, many states have sought their own solutions, implementing a broad spectrum of regional initiatives, such as the West Coast Governors' Initiative and the Regional Greenhouse Gas Initiative. On a local level, cities are working to implement their own solutions to reduce greenhouse gas emissions, which range from implementing transportation policies, adding green measures to building codes, to tree planting.

In the U.S., energy-related activities account for three-quarters of human-generated greenhouse gas emissions, mostly in the form of carbon dioxide emissions from burning fossil fuels.[12] More than half the energy-related emissions come from large stationary sources such as power plants, while about a third comes from transportation.[13] Industrial processes (such as the production of cement, steel, and aluminum), agriculture, forestry, other land use, and waste management are also important sources of greenhouse gas emissions.[14] While these sources, and others, produce a number of species of greenhouse gases, carbon dioxide accounts for approximately 85% warming effect of these gases,[15] and reducing emissions of that gas will be the focus of this Report.

This Report will present ways to reduce the emissions of greenhouse gases, with a focus on legislation that will impose either a cap-and-trade approach or a carbon tax approach. Section 2 of this Report will introduce the concepts of cap-and-trade and carbon tax in non-technical terms. Section 3 will discuss the criteria by which legislation can be evaluated.[16] Section 4 will introduce and summarize various pieces of climate change legislation pending in the 110th Congress. Some of these bills would establish a mandatory cap-and-trade program for multiple sectors of the economy, while others would reduce greenhouse gas emissions by imposing a carbon tax. Still other bills would address climate change through conventional regulatory approaches. Section 5 will introduce the Regional Greenhouse Gas Initiative and discuss the practical experience that the European Union has gained with its Emissions Trading Scheme. Section 6 will present local-level initiatives that can be part of a comprehensive climate change portfolio. In Section 7, the Report concludes by embracing a portfolio approach to greenhouse gas emissions reduction and suggests that such a comprehensive approach will be most effective in achieving the necessary emissions reductions, without making recommendations on any of the pending bills.

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[10] PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 4, at 6-7.
[11] PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 1, at 1.
[12] U.S. Environmental Protection Agency, *supra* note 3.
[13] *Id*.
[14] *Id*.
[15] Michael P. Vandenbergh & Anne C. Steinemann, *The Carbon-Neutral Individual*, 82. N.Y.U. L. REV. 1673, 1675 (2007).
[16] On November 13, 2007, the New York City Bar Association, with the support of the Sallan Foundation, American Bar Association, New York State Bar Association and Environmental Law Institute, hosted a debate on *Should Climate Change Legislation Be In The Form Of Emissions Cap And Trade Or A Carbon Tax?* The panelists that took the position that federal legislation should be in the form of an emissions cap and trade included Jon A. Anda, President of Environmental Markets of Environmental Defense, and Billy Pizer, Senior Fellow with Resources for the Future. The panelists that took the position that federal legislation should be in the form of a carbon tax included Daniel Rosenblum, Co-founder of the Carbon Tax Center, and James P. Barrett, Executive Director of Redefining Progress.

Section 2 -- In Plain English: Cap-and-Trade and Carbon Tax Summarized

Most of the pending federal bills call for a cap-and-trade system of regulating carbon dioxide and greenhouse gas emissions, and the legislative momentum appears to support a cap-and-trade system over a carbon tax system. Both schemes deserve careful consideration. Proponents of a carbon tax system assert that it is simpler and results in a more stable energy price, while proponents of a cap-and-trade system contend that it is a less costly way to ensure emissions reductions.

Both systems involve complex concepts relating to the science of global warming, and both have economic policy implications. Therefore, a basic introduction is required before comparing the two systems.

2.1 Cap-and-Trade

Cap-and-trade is a market-based policy tool to reduce emissions of carbon in a cost-effective and flexible manner. Under a cap-and-trade program, the environmental regulator establishes a cap that limits the total tons of emissions that can be emitted. The emissions allowed under the cap, sometimes called allowances, are divided among emitting sources by a number of different formulas, including auction or sale by the entity that documents and tracks the allowances. The allowances represent the right to emit a certain amount of pollution. One allowance typically equals one metric ton of carbon dioxide (CO_2) emissions. Because the cap restricts the amount of a pollutant emitted into the air, the allowances take on financial value.

If a source reduces its emissions below its allowance level, it may sell its extra allowances to another source.[17] Alternatively, if a source finds it expensive to reduce the amount of its emissions to its allowance level, it may purchase allowances from another source. Thus, while the emissions cap is set by a regulatory agency, individual sources are free to choose how or if they will reduce their emissions. The Union of Concerned Scientists (UCS) presents a good, small-scale example of how a cap-and-trade system works.[18] Let's say that Plant A emits 600 tons per year (tpy) of CO_2 and Plant B emits 400 tpy for a combined total of 1,000 tpy. A government agency establishes an annual CO_2 emissions cap of 700 tpy, resulting in a 30 percent reduction of CO_2.

Under traditional command and control permitting requirements,[19] both plants may be ordered to reduce emissions by 30 percent to realize the 300 tpy reduction that the agency seeks. Since the cost for each plant to make emission reductions varies (based on fuel type and equipment efficiency), imagine that it would cost Plant A $50 per ton and Plant B $25 per ton of reductions. The total cost for the 300 tpy reductions under the command and control approach would be $12,000.[20]

In a cap-and-trade system, each plant seeks out the most economical way to reduce emissions. Since Plant B would be able to reduce its emissions at a lower cost than Plant A, Plant B can sell some of its allowances to A. However, the more Plant B reduces its emissions, the more expensive it becomes to reduce emissions further and so Plant B will not be likely to make all of the 300 tpy reductions itself. In theory, both plants will reach a point where their costs to reduce an additional ton of emissions are equal. Under the cap-and-trade system, the two plants are able to reach the total 300 tpy reductions at a lower

[17] Buyers and sellers can bank their unused allowances for future use.
[18] Jason Mathers & Michelle Manion, *How it Works: Cap-and-Trade Systems*, CATALYST, Spring 2005, *available at* http://www.ucsusa.org/publications/catalyst/page.jsp?itemID=27226959.
[19] Many environmental laws, like the Clean Water Act and Clean Air Act, are considered "command and control" legislation, which means that they impose specific numeric limitations on pollution sources.
[20] Plant A's 180 tpy reduction at $50 per ton would cost $9,000 and Plant B's 120 tpy reduction at $25 per ton would cost $3,000.

cost than command and control permitting. In the UCS's example, one result may be that total cost of cap-and-trade control is $9,000 – a 25 percent savings.[21]

Some of the key concepts in implementing a cap-and-trade program include:

Emission reduction targets. These are the regulatory caps that limit the total tons of carbon dioxide that can be emitted.

Carbon Dioxide Equivalents. There are six gases that are generally recognized as contributing to global warming. The United Nations Framework Convention on Climate Change identifies the greenhouse gases as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorcarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). Each of these gases contribute differently to global warming. For greenhouse gases, the term "carbon dioxide equivalent" generally is defined as the amount of the greenhouse gas that makes the same contribution to global warming as one metric ton of carbon dioxide.

Allocation and Distribution of Allowances. The terms "allowance" or "emission allowance" generally mean authorization to emit one metric ton of carbon dioxide or an amount of another greenhouse gas that causes the same warming effect as one metric ton of carbon dioxide. Allowances may be distributed either through auctions or without charge.

Upstream vs. Downstream. These terms refer to the point in the distribution process where emissions are measured and regulated. For cap-and-trade programs, upstream generally refers to a program in which emissions are capped and allowances are required at the point of production, importation or sale of a greenhouse-gas-producing product. Downstream generally refers to a program in which emissions are capped and allowances are required at the point of emissions.

Safety Valves. The term "safety valve" generally refers to a cost control mechanism designed to control the price of reducing greenhouse gas emissions under a cap-and-trade program. If the market price for allowances becomes too high, the cap is broken and allowances can be purchased for a fixed price. An example is a provision allowing a greenhouse gas emitter to buy allowances at a set price rather than reduce emissions. Another example is a provision allowing the government to extend compliance deadlines.

Banking. The term "banking" generally refers to allowing a covered entity with unused allowances to sell, exchange or use the allowance in the future. Banking is an integral part of all cap-and-trade programs.

Borrowing. The term "borrowing" generally refers to allowing a covered entity to borrow allowances or credits from the government, use the borrowed allowances or credits to satisfy compliance obligations in the current year, and repay the borrowed allowances or credits in a future year.

Offsets. The term "offset" generally refers to allowing a covered entity to satisfy allowance requirements by using emission credits or other alternatives based on activities not directly related to reducing emissions at the source. An example is allowing the use of carbon sequestration to satisfy the allowances required for emissions from a stationary source.

International Reserve Allowances. The term "international reserve allowance" generally refers to an allowance purchased from a special reserve of allowances and used to meet requirements for imports of certain goods from certain foreign countries. Programs that incorporate them are

[21] In one plausible scenario, Plant A would reduce 60 tpy at $50 per ton, costing $3,000, and Plant B would reduce 240 tpy at $25 per ton, costing $6,000. Assume that Plant B would sell some of its allowances to Plant A to offset its emissions reductions costs.

designed to ensure that emissions from foreign countries do not undermine the objectives of the United States in addressing global climate change.

2.2 Carbon Tax

A carbon tax is a tax on a source that emits CO_2 based on the amount of CO_2 that it emits. Or, as the Carbon Tax Center describes it, "A carbon tax is a tax on the carbon content of fuels – effectively a tax on the carbon dioxide emissions of burning fossil fuels."[22] The theory behind a carbon tax is that by setting a price for CO_2 emissions, emitting large quantities of it will be uneconomical. Since the carbon content of every form of fossil fuel is known, a carbon tax may be levied with some precision and without the volatility that may accompany a cap-and-trade program. A carbon tax would probably be assessed "upstream," or at the point where the fuel is extracted and enters the commerce stream. Thus, fossil fuel suppliers would pass along the cost to consumers to the extent that market conditions allow.

The UCS example is simpler when considered under a carbon tax system. No emissions targets, like a 300 tpy reduction, would be set under a carbon tax. A carbon tax law would provide uniform fees for burning fossil fuels without the need for an allowance bank. Thus, if Plants A and B burned the same fuel in generating their product, let's say they both burn oil, they would be subject to the same tax. However, if either plant burns a "dirtier" fuel, like coal, that emits more CO_2 per unit of energy produced, or a "cleaner" fuel like natural gas that emits less CO_2 per unit of energy produced, the tax would be proportionate to the amount of CO_2 emitted per unit of energy produced. The carbon tax would encourage the plants to maximize efficiency and consider alternate fuels, including "cleaner" fossil fuels, to reduce the amount of the tax and CO_2 emissions to the atmosphere.

There is some overlap between the key concepts used for cap-and-trade systems and the key concepts used in carbon tax systems. Carbon tax systems can incorporate carbon dioxide equivalents, upstream v. downstream imposition of taxes, and offsets.

Section 3 -- Criteria for a Solution

The criteria by which cap-and-trade systems and carbon tax systems can be evaluated fall into broad categories of efficiency and equity.

3.1 Efficiency

3.1.1 Meaningful reductions in greenhouse gases

Efficiency requires that there be a meaningful reduction in greenhouse gas emissions. All the money spent on controlling greenhouse gases is wasted if there are not sufficient reductions to combat climate degradation. For example, money spent cost-effectively in the early years of a cap-and-trade program will not be effectively spent if the emissions control program is abandoned before it can achieve enough of an effect to avoid a catastrophe.[23] As climate change science matures, we may develop a better understanding of what reductions are adequate. Thus, there must be some periodic review to ensure that the carbon control system consistently applies the best science.[24]

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[22] Carbon Tax Center, *What's A Carbon Tax?*, http://www.carbontax.org/introduction (last visited Mar. 24, 2008).

[23] The US produces 25 percent of all greenhouse gas emissions. NATIONAL RESEARCH COUNCIL, COMMITTEE ON THE EFFECTIVENESS AND IMPACT OF CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS, EFFECTIVENESS AND IMPACT OF CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS 9 (2002), *available at* www.regulations.gov (search "Document ID 2005-22223-14"). As a result, even small percentage reductions in the US are likely to be incrementally meaningful on a global scale.

[24] The Superfund program provides a good example of a requirement to update regulatory responses to take new scientific developments into account. If a site is cleaned up, but hazardous substances remain on the site and the site is not subject to a use restriction, then the Environmental Protection Agency

3.1.2 Effective use of money

Tremendous societal resources will be required to forestall or combat climate change, and those resources must be used efficiently to maximize the return on those resources and ensure that adequate resources are available to reach the objective. To be fiscally efficient, a carbon control system must have breadth, flexibility and continuity.[25]

3.1.2.1 Breadth

Breadth is having a system that reaches the entire economy. If carbon control modifies behavior in only a segment of the economy, that segment will shoulder a disproportionate share of the burden and will suffer relative to the unburdened segments. Purchasers will look to markets where the activity is not regulated and the costs are lower. When purchasers obtain products from a jurisdiction that does not regulate the activity, leakage occurs. For example, when coal-fired power plants in states that participate in a cap-and-trade program must purchase emissions allowances to operate, it may be relatively less expensive for utilities to purchase power from coal-fired power plants in states such as Pennsylvania that are not participating in any regional compacts. Greenhouse gas emissions are not curbed when there is leakage; they are merely shifted to a new location. The leakage problem is fixed when the entire industry is regulated.

3.1.2.2 Flexibility

An efficient system must also provide flexibility for industry to manage how it will achieve the emissions reductions. Each industry will have its own sui generis energy issues, and is in the best position to cost-effectively reduce emissions from its own sources. A trading program will allow this same cost-effective allocation to take place across industries, and if the trading is international the allocation can be made even more effectively. No matter where the cheapest savings can be achieved, a flexible system will seek out those savings first. Flexibility is also needed to ensure that any emissions control program can be adjusted to increase reductions or decrease the cost to the economy depending on cumulative experience with the program.

Another aspect of flexibility requires implementing the low cost solutions first. That would allow capital intensive actions to be taken in the future, when more efficient technologies may be available and the same expenditure may have a greater emissions reduction impact.[26]

("EPA") must review the remedy every five years to ensure that the remedy is still protective of human health and the environment. 42 U.S.C. § 121(c); 40 C.F.R. 300.430(f)(4)(ii).
New Jersey Department of Environmental Protection Commissioner Lisa P. Jackson advocated a periodic review in her testimony to the US House of Representatives Committee on Energy and Commerce, Subcommittee on Energy and Air Quality on March 15, 2007 at a hearing entitled *Climate Change: State and Local Perspectives*, available at http://www.nj.gov/dep/commissioner/031507_testimony.pdf.

[25] John Anda, *A Bet on Climate*, EUROMONEY, Sept. 2007.

[26] Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 875 (2006) (noting that people may be "extremely averse" to incurring costs to address a problem that will present threats in the distant future, and that politicians have an incentive to delay expenditures to combat global warming because the people who are expected to benefit are not today's voters).

3.1.2.3 Continuity

Continuity of gradual annual reductions is also an element of an efficient system. In the early years, the lowest cost emissions reductions will be implemented. Early reductions are important given the cumulative effect of greenhouse gas emissions and their long residence time in the atmosphere. Continued reductions are also important to achieve the ultimate goals, and before greenhouse gas emitters should be expected to invest in the higher cost emissions reductions, they should have the assurance that the program will continue, and will justify those more capital intensive expenditures.

3.2 Equity

The hardships caused by rising fuel prices have been widely documented in the press. Any system of controlling greenhouse gas emissions will necessarily raise prices even further. While it is reasonable, and required, to raise prices to encourage people to reduce their energy consumption, there are many people who cannot afford to pay the increased prices. That group of people needs assistance to pay for higher energy costs, and to minimize the risk of losing jobs or basic services.

The assistance need not be in the form of a direct energy subsidy, which would work against the emissions reductions objectives. New York City Mayor Michael R. Bloomberg has praised the concept of using the proceeds of a carbon control system to reduce payroll taxes[27], which would not only reward working but also direct the carbon control revenues to those who will be more affected by increased energy costs.

3.3 Ease of Implementation

Another objective for any system of carbon emissions control is that it be feasible to implement. Any system that will be effective must be capable of being implemented in a reasonable time, and without so much political opposition that it cannot be implemented at all.

3.4 International Cooperation

As mentioned earlier, global warming is a pressing problem affecting the future of the planet. To address the global nature of this problem, it will be critical for nations to work together for solutions. When adopting a program to reduce CO_2 emissions, it will be important to consider the extent to which a program can work with other systems in the world and allow nations to coordinate their efforts, share best practices, leverage their resources to reduce emissions and minimize leakage.

3.5 Convergence – either system can meet many of the goals, and there are some differences

3.5.1 Similarities

There are several areas in which the elements of a cap-and-trade system and a carbon tax system converge, and in those areas both systems will have the same potentials and the same drawbacks when it comes to achieving the performance criteria discussed above.

Both a cap-and-trade system and a carbon tax system can be designed to have sufficient breadth to avoid leakage, assuming there is action on a national and international scale instead of the regional responses that the US has implemented to date.

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[27] Michael R. Bloomberg, Mayor, City of New York, Keynote Addres at the United States Conference of Mayors Climate Protection Summit: Accelerating Local Leadership (Nov. 2, 2007), *available at* http://www.nyc.gov (follow “News and Press Releases” hyperlink; then follow “2007 Events” hyperlink; then follow “November 2007” hyperlink).

Both a cap-and-trade system and a carbon tax system can incorporate periodic review to ensure that the best science is applied to the problem. In either system, that would entail a flexible regulatory scheme that incorporates a framework for analyzing and applying scientific advances.[28]

Both a cap-and-trade system and a carbon tax system can be designed to generate revenue for the government to use for beneficial purposes. In a carbon tax system, all taxes collected go to the government.[29] In a cap-and-trade system, either some or all allowances can be given to industry without charge, or some or all emissions allowances can be auctioned and the revenue paid to the government.[30] It is then up to the government to determine whether the money is used for general funds, to reduce other taxes, or for environmental purposes.[31] In either system it is feasible to allocate a portion of the revenue for relief to people who cannot afford increased energy costs. This criterion does not distinguish cap-and-trade from a carbon tax because revenue can be generated by either system, and can be put to any use.

On first glance, it would appear that the cost of carbon emissions would vary widely from year to year in a cap-and-trade system, but not in a carbon tax system. In fact, this is another area in which the two systems converge, and both have the same drawbacks. As part of ensuring continuity and efficiency to encourage long term capital investments, the costs of carbon emissions should remain predictable. As discussed in Section 5.1 below, the European experience with its cap-and-trade program demonstrates that auction prices can be quite volatile if complete and accurate baseline emissions data is not available by the time trading begins. In a carbon tax system, the tax per unit of carbon does equal a set price, but only for a limited time. The value of the tax should be reset often or the system will not be able to maintain a balance between over-taxation and achieving enough emissions reductions. As a result, both systems have the drawback of price volatility, although in a cap-and-trade system the management challenge is to even out the volatility and in a tax system the management challenge is to permit enough variation.[32]

In either a cap-and-trade or carbon tax system, some activities will be specifically encouraged to further reduce carbon emissions. In a cap-and-trade system, those activities will be encouraged through offsets. In a carbon tax system, those activities can be encouraged through tax credits. Both paradigms can be designed to achieve further reductions by directing behavior towards favored activities, and the two systems converge on this point also.[33]

Both a cap-and-trade system and a carbon tax system can be designed to be transparent and permit clear tracking of the costs and benefits involved.

3.5.2 Differences

There remain some differences between cap-and-trade and carbon tax programs, where the two systems do not converge.

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[28] It may be more politically difficult to continually adjust a tax program than to adjust a cap-and-trade program.

[29] Ian W.H. Parry & William A. Pizer, *Combating Global Warming*, REGULATION, Fall 2007, at 20.

[30] RGGI states have an option of auctioning any percentage of the available carbon emissions allowances. New York has proposed auctioning almost 100% of the allowances, guaranteeing that all of the value of the allowances will be collected by the state. New York State Department of Environmental Coservation, Notice of Pre-Proposal of New York RGGI Rule, Notice of Release and Call for Comments, (Dec. 5, 2006), http://www.dec.ny.gov/regulations/26450.html. *See also* Section 5.2 *infra*. This is an area in which US regulators have an opportunity to build upon and improve the EU experience.

[31] Some commentators have suggested that a carbon tax should be revenue neutral, meaning that the revenue generated should not be put into the general fund, but should be either returned by way of lower taxes or used to subsidize individuals who are adversely affected by rising fuel prices.

[32] Various forms of safety valves have been proposed to level out the volatility of a cap-and-trade program. Many environmentalists and economists do not endorse this concept because it has the effect of removing the caps that are an integral part of ensuring that emissions are reduced over time.

[33] Parry & Pizer, *supra* note 29, at 20-21.

Although both systems have the potential to reduce carbon emissions, cap-and-trade sets an environmental cap on emissions unlike carbon tax programs, assuming there are no safety valves that permit breaking the cap. Having a cap on how much carbon can be emitted provides a clear environmental goal for all emitters, promotes transparency and could help companies in their long-term planning for capital investments.

Proponents of carbon tax systems point out that taxes can be imposed relatively quickly and the infrastructure for collecting taxes already exists. The states' experience with cap-and-trade programs shows that they require a lead time of several years and the establishment of regulatory structures and markets that do not currently exist.

Carbon tax systems are widely perceived to have more significant political barriers than cap-and-trade programs.[34]

Both a cap-and-trade system and a carbon tax system can allow for flexibility to implement the low cost solutions first, if they require price increases phased in over time. However, cap-and-trade systems are generally recognized as more economically flexible than tax systems.

With respect to international cooperation, a cap-and-trade program has a definite edge over a carbon tax system. Clearly, there is a growing consensus in the international community to implement cap-and-trade programs. Not only has the European Union with its 25 member states adopted the world's largest greenhouse gas cap-and-trade program (see Section 5.1), but Canada, Australia, and Japan are also moving towards cap-and-trade systems.[35] Furthermore, the International Carbon Action Partnership (ICAP) is developing into a large international network of governments that have either adopted or are pursuing cap-and-trade programs. Members of ICAP include the European Commission, several EU members (i.e., France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom), New Zealand, Norway and 12 U.S. States which are members of the Regional Greenhouse Gas Initiative (RGGI) and the Western Climate Initiative (WCI). As members of ICAP, these governments are able to share knowledge, best practices and explore opportunities to link their cap-and-trade program with compatible trading schemes of other countries.[36] Finally, it is worth noting that six pending bills in Congress propose "economy-wide" or "multi-sector" cap-and-trade programs, versus only two carbon tax bills.

Section 4 -- Legislation Pending in Congress

This section discusses climate change legislation pending in the 110th Congress.[37] Subsection 4.1 discusses six specific bills that would establish a mandatory cap-and-trade program for multiple sectors of the economy. Subsection 4.2 compares two bills designed to reduce greenhouse gas emissions by imposing a carbon tax on fuels. Subsection 4.3 discusses bills that address climate change through conventional regulatory approaches, such as performance standards and technology-based emission requirements. We note that the bills described below continue to evolve and thus the summaries below reflect such bills as of March 2008.

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[34] *See* Mayor Bloomberg's Keynote Address, *supra* note 27.

[35] Robert N. Stavins, *Cap-and-Trade or a Carbon Tax?*, THE ENVIRONMENTAL FORUM, January/February 2008, at 16.

[36] For example, the EU is working to link Norway to the European Trading Scheme.

[37] As of November 1, 2007, Members of Congress had introduced 67 bills that directly address climate change as one of their primary purposes. These bills are reviewed in Congressional Research Service (CRS) Report RL34067, *Climate Change Legislation in the 110th Congress*, by Jonathan L. Ramseur and Brent D. Yacobucci, updated November 1, 2007. Other bills addressing climate change issues as part of energy legislation are discussed in CRS Report RL33831, *Energy Efficiency and Renewable Energy Legislation in the 100th Congress*, by Fred Sissine, Anne Giills and Mark Gurevits, updated October 5, 2007. CRS Reports are available from the National Council for Science and the Environment (NCSE) at http://www.ncseonline.org/NLE/CRS/.

4.1 Cap-and-Trade Bills

4.1.1 Overview

The following bills in the 110th Congress are designed to reduce greenhouse gas emissions by setting emissions caps for multiple sectors of the economy and mandating a market-based system of tradeable allowances:

Bill	Sponsors	Date Introduced
S.280	Lieberman-McCain	1/12/2007
S.485	Kerry-Snowe	2/1/2007
S.1766	Bingaman-Specter	7/11/2007
S.2191	Lieberman-Warner	10/18/2007
H.R. 620	Oliver-Gilcrest	1/22/2007
H.R.1590	Waxman	3/20/2007

Each of these bills has much in common, and each by definition permits banking and trading allowances. Each covers all six greenhouse gases identified in the United Nations Framework Convention on Climate Change.[38] Each bill sets emission reduction targets, but the targets differ in their start dates and levels and rates of emission reductions.

They differ in other areas.[39] Some but not all establish emission reduction targets in units of carbon dioxide equivalents. Some bills apply emission caps upstream for some sectors and downstream for other sectors. Other bills require EPA to establish the best approach for implementing a cap-and-trade program either upstream or downstream. Some of the bills have safety valves and others do not.

Some bills permit borrowing of allowances and some bills permit the use of offsets or offset allowances. Only some of them establish international reserve allowance programs.

The bills contain different enforcement provisions and some bills require revenues from penalties to be deposited in restricted-use funds.

4.1.2 Comparison of Specific Bills

S.2191 was introduced by Senator Lieberman and cosponsored by Senator Warner. This bill passed the Senate Committee on Environment and Public Works by a vote of 11 to 8 on December 5, 2007 and will be considered by the full Senate in 2008. The bill's emission reduction provisions apply downstream for stationary sources and upstream for fuels and specific chemicals. Covered facilities consist of (i) any facility that uses more than 5,000 tons of coal in a year; (ii) any facility that produces or imports petroleum or coal-based liquid or gaseous fuel that emits certain greenhouse gases, assuming no capture and sequestration of that gas; (iii) any facility that produces or imports more than 10,000 carbon dioxide equivalents of certain greenhouse gases, assuming no capture and sequestration of that gas; and (iv) any facility that emits 10,000 carbon dioxide equivalents of hydrochlorofluorocarbons as a byproduct of the

[38] As stated *supra*, Section 2.1, these are carbon dioxide, methane, nitrous oxide, hydrofluorcarbons, perfluorocarbons and sulfur hexafluoride.

[39] Two other bills would permit or require a cap-and-trade system. S. 309, introduced by Senator Sanders, would allow but not require EPA to establish a cap-and-trade system. S. 317, introduced by Senator Feinstein, would require EPA to establish a cap-and-trade system for certain electricity generating facilities, but not for other sectors of the economy. These bills are omitted from this discussion to provide a more in depth discussion of bills that mandate a cap-and-trade system for multiple sectors of the economy. All eight cap-and-trade bills in the 110th Congress are reviewed in CRS Report RL33846, Greenhouse Gas Reduction: Cap-and-Trade bills in the 110th Congress, by Larry Parker and Brent D. Yacobucci, updated November 5, 2007.

manufacture of hydrofluorocarbons. EPA would have discretion to add additional covered facilities, including vehicle fleets with more than 10,000 carbon dioxide equivalents. Emission allowances would begin in 2012 and the number of emission allowances would be reduced annually until 2050. The bill is projected to reduce greenhouse gas emissions in the United States to between 81 and 85% of 2005 levels by 2020 (4% below the 1990 level in 2020), and to between 30% and 37% of 2005 levels by 2050.[40] EPA would be required to issue regulations to implement the issuance and trading of emission allowances. The bill provides for a detailed allocation scheme (including specific percent of allocations to the states, mass transit, electric customers, natural gas consumers, etc.) with increasing auctions over time, beginning with the auctioning of 21.5% of allowances in 2012 and reaching the auctioning of 69.5% of the allowances in 2050. Facilities would also be able to buy or earn offsets in several different ways, including by reducing greenhouse gas emissions associated with agriculture, preventing international deforestation and other land-use products such as altered tillage practices, winter cover cropping, conversion of cropland to rangeland or grassland, reduction of nitrogen fertilizer use and forest management, among others. Up to 15 percent of allowances could also be obtained on a foreign greenhouse gas emissions trading market where EPA has certified such market. The bill would establish a Carbon Market Efficiency Board to monitor allowance trading and potential impacts to the economy.

S. 280 was introduced by Senator Lieberman and co-sponsored by Senator McCain. Some of the bill's cap-and-trade provisions resemble the provisions of S. 2191. These include provisions establishing the Climate Change Credit Corporation (CCCC), providing the CCCC with the authority to buy and sell tradeable allowances, using revenues from the sale of allowances for new technology, adaptation programs and mitigation assistance programs, and permitting the banking and borrowing of allowances. The bill differs from S. 2191 in other areas, including the scope of coverage, the emission targets, the nature and extent of the authority delegated to EPA, the use of offsets, and enforcement. Covered entities would include: (i) stationary sources in the electric power, industrial or commercial sectors of the economy which emits over 10,000 metric tons of greenhouse gases per year; (ii) refiners or importers of petroleum or petroleum products which when combusted will emit over 10,000 metric tons of greenhouse gases per year; and (iii) producers and importers of fluorinated gases and other gases which when used will emit over 10,000 metric tons of greenhouse gases per year. The emissions cap and the emissions allowance requirements would take effect in 2012. The number of allowances would be reduced in 2020, 2030 and 2050. The bill covers about 85% of U.S. greenhouse gas emissions and is projected to reduce emissions to 2004 levels by 2012, 1990 levels by 2020, 78% of 1990 levels by 2030, and 40% of the 1990 emission level by 2050.[41] EPA would determine the number of allowances to be allocated to each covered sector and to the CCCC. Up to 30 percent of the allowances could be satisfied by offsets based on carbon sequestration or certain other greenhouse gas reduction activities. Entities that fail to submit sufficient allowances are liable for civil penalties equal to three times the market price for the necessary allowances on the last day of the violation year.

S. 485 was introduced by Senator Kerry and co-sponsored by Senator Snowe. The bill would amend the Clean Air Act to direct EPA to issue regulations necessary to achieve emission reduction targets through emission caps and a cap-and-trade program. Emission reduction targets or caps would begin in 2010 and would be established by EPA so as to reduce emissions to 1990 levels by 2020, and then to further reduce emissions by at least an additional 2.5% annually from 2021 to 2030 and 3.5% annually from 2031 to 2050. The bill is projected to reduce total emissions to between 35% and 40% of 1990 levels by 2050.[42] EPA would determine the number of allowances to be issued and the sectors and sources that

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[40] *See* Press Release, Senator Joe Lieberman, Lieberman and Warner Introduce Bipartisan Climate Legislation (October 18, 2007), *available at* http://lieberman.senate.gov/newsroom/cfm?id=285619 (last visited Mar. 24, 2008); *see also* CRS Report RL34067, Climate Change Legislation in the 110th Congress, Appendix 2, by Jonathan L. Ramseur and Brent Yacobucci, updated November 1, 2007.

[41] ENERGY INFORMATION ADMINISTRATION, ENERGY MARKET AND ECONOMIC IMPACTS OF S. 280, THE CLIMATE STEWARDSHIP AND INNOVATION ACT OF 2007 vi (July 2007), *available at* http://tonto.eia.doe.gov/ftproot/service/sroiaf(2007)04.pdf; *see also* CRS Report RL34067, *supra* note 40.

[42] *See* U.S. EPA, Office of Atmospheric Programs, EPA Analysis of Bingaman-Specter Request on Global CO_2 Concentrations (Oct. 1, 2007), http://www.epa.gov/climatechange/downloads/s1766analysispart1.pdf.

would be subject to the emission caps and allowance requirements. The President would be required to provide Congress with a plan for distributing allowances through auctions and would be allowed to issue allowances without charge under certain conditions. Entities with excess emissions would be required to submit allowances for the excess emissions during the following year and to pay a civil penalty equal to twice the market price for allowances on the last day of the violation year without demand by EPA. Penalties paid to EPA and amounts collected from auctioning of allowances would be deposited in a special fund established in the Treasury and used to carry out the emission reduction goals of the bill.

S. 1766 was introduced by Senator Bingaman and co-sponsored by Senator Specter. Emissions would be controlled upstream for petroleum, natural gas and non-carbon dioxide greenhouse gases, and downstream for coal facilities that use over 5,000 tons of coal per year. Covered entities would be required to submit allowances or credits to the President based on the amount of their greenhouse gas emissions or make a payment at a fixed price in lieu of submitting allowances or credits. The price of the fixed payment, known as the Technology Accelerator Payment (TAP), begins at $12 per metric ton of greenhouse gas emissions in 2012 and increases annually. Emissions targets begin in 2012 and decline each year until 2030. The bill is projected to reduce greenhouse gas emissions to 2006 levels by 2020 and to 1990 levels by 2030.[43] Further reductions to at least 40% of 2006 levels by 2050 would be contingent on international cooperation. This bill provides for smaller emission reductions for covered sectors than are proposed by S. 280, but it has broader coverage. As a result, EPA projects that the net effect of these two bills will be similar.[44] The two bills also differ with respect to the role of EPA. While S. 280 directs EPA to issue allowances, S. 1766 provides for the allowances to be issued by the President. Auctioning of allowances would increase over time, beginning with the auctioning of 24% of allowances in 2012 and reaching 53% of the allowances in 2030. Nine percent of the allowances would be distributed to States, which would be required to use a portion of their allowances or the revenues from the sale of their allowances to mitigate impacts of climate change, promote technology or energy efficiency, and enhance energy security. Five percent of the allowances would be reserved for farmers and entities that carry out agricultural sequestration projects and another eight percent of the allowances would be reserved for entities that implement geological sequestration projects. Credits would be issued for carbon sequestration projects, activities that take greenhouse gas precursors out of commerce, and other specified offset projects. Revenue generated by auctioning of allowance or submissions of fixed payments in lieu of allowances would be used to fund new technologies. Auction revenues also would be used to fund climate change adaptation measures and assistance programs for low-income households. Starting in 2020, importers of goods from countries that do not have comparable emission reduction programs may be required to purchase special international reserve allowances to cover the carbon content of their products. Entities that fail to submit allowances or credits or make the necessary payments in lieu of allowances or credits for the calendar year are required to make a payment in the subsequent year equal to three times the TAP price. The enforcement provisions also include civil penalties of up to $25,000 per day for any violation and criminal penalties for willful violations.

H.R. 620 was introduced by Representative Oliver of Massachusetts and is sometimes referred to as the Oliver-Gilcrest bill. Most of the key cap-and-trade provisions of this bill are similar to the provisions of S. 280, except that the emissions cap in 2050 decline to 70% below 1990 levels under H.R. 620, compared to 60% below 1990 levels under S. 280.[45]

H.R. 1590 was introduced by Representative Waxman of California. Emission reduction targets would begin in 2010. They would be reduced by 2% each year until 2020 and then reduced by 5% each year until 2050. The bill caps total greenhouse gas emissions in the United States at 1990 emission levels by 2020 and 20% of 1990 levels by 2050. EPA would be allowed to extend the compliance deadlines falling

[43] ENERGY INFORMATION ADMINISTRATION, ENERGY MARKET AND ECONOMIC IMPACTS OF S. 1766, THE LOW CARBON ECONOMY ACT OF 2007 v, 1 (Jan. 2008), *available at* http://www.eia.doe.gov/oiaf/servicerpt/lcea/pdf/sroiaf(2007)06.pdf.
[44] U.S. EPA, Office of Atmospheric Programs, *supra* note 42.
[45] CRS Report RL34067, *supra* note 40.

in or before 2011 by one or two additional years. The other key provisions of the cap-and-trade program are similar to the provisions described above for S. 485.

4.2 Carbon Tax Bills

The following bills in the 110th Congress are designed to reduce greenhouse gas emissions by imposing a carbon tax on fossil fuels based on the fuel's carbon content:

Bill	Sponsors	Date Introduced
H.R. 2069	Stark-McDermott	4/26/2007
H.R. 3416	Larson	8/3/2007

Both bills cover coal, natural gas, petroleum and petroleum products which are extracted, manufactured or produced in the United States or imported for consumption, use or warehousing. Under both bills, the tax would be imposed on fuel manufacturers, producers and importers. Tax credits or refund would be provided for qualifying carbon sequestration projects. The bills differ on issues such as tax rates and the use of the tax revenues.

H.R. 2069, introduced by Congressman Stark of California and cosponsored by Congressman McDermott, would impose a tax beginning at a rate of $10 per metric ton of carbon content of the fuel. Tax rates would increase annually by an additional $10 per ton until the total carbon dioxide emissions in the United States are reduced to no more than 20 percent of emissions level in 1990. All tax revenues would be paid to the U.S. Treasury. The bill does not contain specific programs for promoting technology or assisting impacted segments of the economy.

H.R. 3416, introduced by Congressman Larson of Connecticut, would impose a tax beginning at a rate of $15 per metric ton of carbon dioxide content of the fuel and increasing annually at a rate of 10 percent plus a cost of living adjustment. The bill would allow tax refunds for carbon sequestration projects in the United States and for other domestic projects that reduce greenhouse gas emissions or destroy hydrofluorocarbons (HFCs). Revenues received from the tax would be available for tax credits for clean energy technology, industry transition assistance, and payroll tax rebates.

4.3 Bills and Legislation with Conventional Regulatory Programs

The cap-and-trade bills discussed above also contain a variety of provisions that reflect conventional regulatory approaches for reducing greenhouse gas emissions:

- *Renewable Electricity Standards*. S. 485 and H.R.1590 would require retail electricity suppliers to generate certain minimum quantities of electricity from renewable energy.
- *Energy Efficiency Performance Standards for Utilities*. S. 485 would require retail electricity suppliers to achieve statutory targets for reductions in electricity use and peak demands. H.R. 1590 would establish end-user targets for both retail electricity suppliers and natural gas suppliers. Both bills would allow suppliers to achieve the targets through a market-based trading system.
- *Building Energy Efficiency Codes*. S. 2191[46] would require the States to review and update the provisions of their residential and commercial building codes regarding energy efficiency.
- Appliance *Efficiency Standards.* S. 2191[47] would require that boilers manufactured after September 2012 to meet certain standards. This bill would likewise provide additional standards to space heating and air conditioning products.

[46] Section 5201 of S. 2191, sponsored by Senators Lieberman and Warner, would amend Section 304 of the Energy Conservation and Production Act, 42 U.S.C. § 6833.
[47] Section 5101 of S. 2191 would amend Section 325(f) of the Energy Policy and Conservation Act.

- *Vehicle Emissions Standards.* S. 485 and H.R. 1590 would direct EPA to issue greenhouse gas vehicle emissions standards that equal or exceed the standards adopted in 2004 by the California Air Resources Board.
- *Biofuels Infrastructure*. S. 485 would require major oil companies to install pumps for dispensing E-85 fuel (a blend of gasoline with 85% of its contents derived from ethanol).
- Additional environmental *regulations and standards.* S. 485 and H.R. 1590 would allow EPA to issue additional regulations to reduce greenhouse gas emissions from any source or sector, regardless of whether the source or sector is covered by the cap-and-trade program, through emission performance standards, efficiency performance standards, best management practices and technology-based requirements.
- *Securities Regulations*. S. 485[48] would require issuers of certain securities to inform investors of financial and economic risks from global warming.

New legislation designed to reduce global warming through conventional regulatory approaches also became law on December 19, 2007. This newly enacted law, known as The Energy Independence and Security Act of 2007: (i) increases Corporate Average Fuel Economy (CAFE) standards for vehicles by 40 percent to 35 miles per gallon by 2020; (ii) amends the Energy Policy and Conservation Act of 2005 to set new energy efficiency standards for lighting and strengthen energy efficiency standards for numerous consumer products; and (iii) amends the Clean Air Act to require increased amounts of renewable biofuels used in motor vehicles. The renewable fuel standards also require the use of specific amounts of advanced biofuels that reduce greenhouse gas emission by at least 50 percent compared to gasoline or diesel. It also includes a grant program for local governments.[49] Renewable energy requirements for electric utilities were initially included but later removed from this legislation. Congressman Dingell has predicted that renewable electricity standards and low carbon fuel standards will be addressed in 2008 under comprehensive climate change legislation.[50]

Section 5 – Established Cap-and-Trade Programs

This section describes international programs and programs by the states here at home.

5.1 The European Union Emissions Trading Scheme

On January 1, 2005, the European Union Emission Trading Scheme (hereinafter ETS) began operating in 25 EU member states as the world's largest greenhouse gas emission trading scheme.[51] Designed as a mandatory cap-and-trade program to implement emission cuts committed under the Kyoto Protocol, the ETS requires member states to set caps for CO_2 emissions and allocate these emissions to various sectors through national allocation plans (NAPs). Currently, the ETS covers about 11,500 installations, mainly large emitters such as power and heat generation industries and selected energy-intensive sectors.[52] These emitters represent approximately 45 percent of EU's total CO_2 emissions – or 30

[48] *See* S. 2191, 110th Cong. § 9002 (2007).
[49] Local governments may qualify for funding under various federal grant programs, including an Energy Efficiency and Conservation Block Grant (EECBG) Program established by the Energy Independence and Security Act of 2007. The purpose of the EECBG Program is to assist States, eligible local governments and Indian tribes in implementing energy efficiency and conservation strategies. Additional information on the EECGB Program is available from the U.S. Conference of Mayor's Climate Protection Center at http://www.usmayors.org/climateprotection/documents/eecbghandout.pdf. Other grant and loan programs are administered by the U.S. Department of Energy and the U.S. Environmental Protection Agency.
[50] 153 CONG. REC. H16740 (daily ed. Dec. 18, 2007) (statement of Rep. Dingell).
[51] Directive 2003/87/EC of the European Parliament and of the Council established the ETS.
[52] For example, combustion plants, oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp and paper. EUROPEAN COMMISSION, EU ACTION AGAINST CLIMATE CHANGE: EU EMISSIONS TRADING-AN OPEN SCHEME PROMOTING GLOBAL INNOVATION 7 (2005).

percent of EU's overall greenhouse gas emissions.[53] Each sector can satisfy its commitments either by reducing its emissions, buying credits from other companies, or earning credits through Kyoto's project-based mechanisms (i.e. joint implementation (JI), the clean development mechanism (CDM)).

Although the ETS has already been criticized for being inefficient in reducing CO_2 emissions, these complaints are premature given the scheme's implementation timeline. The ETS has two implementation phases, Phase I (2005-2007) and Phase II (2008-2012). Phase I was intended to be a trial period to work out various issues in this new system and prepare the EU to meet its Kyoto commitments during Phase II.[54] At the end of 2006, the EU Commission reviewed how well the ETS was working and projected that the glitches during Phase I would be resolved for Phase II.[55] The following outlines some of the key issues that the U.S. can learn from if it develops a national cap-and-trade program.

5.1.1 Baseline Emissions Data

When the ETS came online in 2005, member states drastically improved reporting of their 2005 emissions with the release of verified emissions data in May 2006.[56] However, Phase I caps and NAPs were based on pre-ETS data, which, for many nations, proved incomplete and distorted.[57] With such lack of reliable baseline data, speculation on the price of allowances was high. Once the 2005 emissions data became public mid-2006 and indicated lower emission levels than anticipated, the market was flooded with allowances. This caused the price of allowances to decline significantly, fueling concerns about price volatility.[58] Although volatility was an issue during Phase I, the EU is better prepared for Phase II. Verified emissions data for 2005 and electronic registries active in all member states provided a solid basis to determine Phase II allowances and a higher price for allowances.[59]

5.1.2 Timing of Allocation Plans

Another reason for excessive price volatility in Phase I was that the NAPs were not all approved before the ETS came online. Many NAPs continued to enter the market during 2005 and well into 2006, causing uncertainty as to the total level of allowances available. To avoid this in Phase II, the EU required that states submit their NAPs by June 30, 2006, more than a year before the second trading period.

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[53] *Id*. at 7.

[54] Benjamin Goldstein, *Learning from Europe: Designing Cap-and-Trade Programs that Work*, Center for American Progress, June 1, 2007, http://www.americanprogress.org/issues/2007/06/g8_cap_and_trade.html.

[55] COMMISSION OF EUROPEAN COMMUNITIES, COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS: BUILDING A GLOBAL CARBON MARKET, REPORT OF THE COMMISSION OF THE EUROPEAN COMMUNITIES (2006) .

[56] *Id*. at 3. The Commission indicated that 8,980 installations fulfilled their reporting obligations regarding 2005 emissions by the compliance deadline of April 30, 2006. It notes that "[t]hese installations account for more than 99% of allowances allocated to installations in the 21 member states with functioning electronic registries." *Id*.

[57] RAYMOND KOPP, AN OVERVIEW OF THE EUROPEAN UNION EMISSIONS TRADING SCHEME 3, (2007).

[58] The price for an allowance (1 metric ton of CO_2) fell from 30 euros during mid-2006 to less than 2 euros in March 2007. Goldstein, *supra* note 54.

[59] The price for a Phase II allowance on the futures market is € 16.35, or $21.75. KOPP, *supra* note 57, at 3.

5.1.3 Auctioning Allowances

Perhaps the only true flaw of the ETS is that it gave away the vast majority of allowances to polluters.[60] This represents a lost opportunity to raise revenues for beneficial purposes such as energy innovation and efficiency programs, tax cuts to offset higher energy prices and transitional assistance for workers in affected industries.

5.1.4 Trading

Trading under the ETS has grown steadily from 6.5 billion euros in 2005 to 14.7 billion euros of traded volume by mid-2007.[61] New businesses are developing rapidly from carbon traders, carbon finance specialists, carbon management specialists, carbon auditors and verifiers.[62] A valuable lesson for the U.S. is that adopting a cap-and-trade program will create thousands of new jobs.

5.1.5 Compliance

The ETS incorporates a robust compliance framework, including monitoring and reporting guidelines, a standardized and secured system of registries, independent verification of emissions, and dissuasive fines.[63] The system of registries is overseen by a central administrator at EU level who can check each transaction through an independent transaction log. To further enhance compliance with the Kyoto Protocol, a recent Commission regulation urges the EU to connect its log with the independent transaction log of the UN Framework Convention on Climate Change by December 1, 2007.[64]

5.1.6 The European Blended Approach

The EU ETS is one of the components of the Second European Climate Change Program (ECCP II).[65] The ECCP II includes other work groups dealing with the aviation sector (to be integrated in the ETS in 2011), fuel efficiency standards for passenger cars and light commercial vehicles, technology for carbon capture and geological storage, and adaptation to climate change. While the EU is considering expanding the ETS to other greenhouse gases and other sectors (i.e. combustion installations and small installations) after 2012, it recognizes the need for a "policy mix" to address climate change.[66] In a recent Green Paper,[67] the EU Commission is seriously considering the use of other complimentary market-based approaches, particularly energy taxation, which some countries have reportedly begun implementing to meet their Kyoto commitments. The EU perspective clearly demonstrates that carbon taxation and cap-and-trade need not be mutually exclusive for an effective climate change policy.

5.2 The Regional Greenhouse Gas Initiative

In the absence of a mandatory Federal climate change program and based on the European Union Emissions Trading Scheme, many states have begun to take the lead in developing their own programs to reduce greenhouse gas emissions. The most advanced program is the Regional Greenhouse Gas Initiative (RGGI), sponsored by ten northeastern and mid-Atlantic states, that proposes to reduce carbon dioxide emissions from the member states ten percent below current levels by 2019.

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[60] In Phase II, the ETS increased the auction limit to 10% of allowances (compared to 5% in Phase I). KOPP, *supra* note 57, at 2.
[61] Denny Ellerman, *Review of Pilot Phase of European Union Emissions Trading Scheme Finds It to be Successful*, May 28, 2007, http://www.oxfordjournals.org/our_journals/reep/press_releases/may07.pdf.
[62] EUROPEAN COMMISSION, *supra* note 52, at 4.
[63] *Id*. at 12-13.
[64] Commission Regulation (EC) No. 916/2007 of July 31, 2007.
[65] For more information on the European Climate Change Program, see http://ec.europa.eu/environment/climat/eccpii.htm.
[66] COMMISSION OF EUROPEAN COMMUNITIES, *supra* note 55, at 7, 9.
[67] EUROPEAN COMMISSION, COMMISSION GREEN PAPER: MARKET-BASED INSTRUMENTS FOR ENVIRONMENT AND RELATED POLICY PURPOSES (Mar. 28, 2007), http://europa.eu/scadplus/leg/en/lvb/l28191.htm.

The member states include Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Rhode Island and Vermont. The collective carbon dioxide emission cap for the states is 188 million metric tons per year. New York will have an initial emissions cap of 64.3 million tons. Maryland, which only joined RGGI on April 20, 2007, will have an initial cap of 37.5 million tons. While the member states have all signed a memorandum of understanding and have prepared a model RGGI rule, each state is still responsible for developing its own set of regulations to implement the program.[68]

The New York State Department of Environmental Conservation (NYSDEC) released its draft RGGI regulations along with a draft generic environmental impact statement last fall and the comment period ended December 24, 2007.[69] There are few surprises in the regulations since they reflect the model RGGI rule. If the regulations are adopted, power plants that produce 25 megawatts of electricity or more will need to annually acquire sufficient emissions allowances to cover their carbon dioxide emissions, beginning on January 1, 2009. The New York State Energy Research and Development Authority (NYSERDA) will annually auction allowances for most of the state's emissions cap of 64.3 million tons. The available allowances will slowly decrease between 2009 and 2019, when New York's emissions cap will drop to approximately 57.9 million tons. NYSERDA will use revenue generated by the auctions to promote energy efficiency and renewable energy. At the end of each three-year compliance period (the initial period is 2009 through 2011) regulated power plants will need to possess enough allowances to cover their emissions. As New York's carbon dioxide emissions cap decreases, regulated sources will need to reduce their carbon dioxide emissions, compete for a reduced number of allowances or, potentially, reduce or end operations.

As the regulations are drafted, regulated entities may cover as much as 3.3 percent of their emissions using offsets in the following categories:

> landfill methane capture and destruction projects (methane can be burned to produce energy or used in place of natural gas in homes);
> reductions in sulfur hexafluoride emissions (often contained in electronic equipment);
> sequestration of carbon dioxide due to afforestation (on land that has not been forested for at least ten years);
> reduction or avoidance of carbon dioxide emissions from natural gas, oil or propane end-use combustion due to increased end-use energy efficiency (in existing buildings, new buildings that will replace existing buildings, or zero net energy buildings); and
> avoided methane emissions from agricultural manure management operations (capturing methane, including for energy production).

If the price of emissions allowances rises to seven dollars per ton, regulated entities may cover five percent of their emissions with offsets. If the price rises to ten dollars per ton, regulated sources may cover up to ten percent of their emission with offsets. Offset projects may be located in any RGGI state or other U.S. jurisdiction that has executed an agreement with the RGGI states to comply with certain regulatory requirements. If the price of RGGI allowance reaches ten dollars per ton, however, NYSDEC may award allowances for the "retirement" of emissions credits issued pursuant to the United Nations Framework Convention on Climate Change.

Other members of RGGI have proposed or plan to propose regulations. Maryland, for example, has released a lengthy draft rule to implement a cap-and-trade program. Unlike New York and other states, Maryland would require only 25 percent of emissions allowances to be auctioned, although this level may rise.[70] Funds from the auction will support energy efficiency programs, renewable energy and possible mitigation of increased rates.

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[68] Information on RGGI is available at www.rggi.org.
[69] Information on NYSDEC's proposed regulations is available at http://www.dec.ny.gov/regulations/26402.html#ProposedPart242.
[70] Information on Maryland's RGGI program is available at http://www.mde.state.md.us/Air/RGGI.asp.

Section 6 - Local Action

The focus of this report has been on federal climate change legislation. Cities and local governments also are playing a crucial role in responding to the challenges of global warming. This section summarizes some of the actions underway at the local level to reduce greenhouse gas emissions and respond to the challenges of climate change.

6.1 Mayors Encourage Congress to Adopt Federal Legislation

A common initial step for local communities wishing to address climate change is to become a signatory to the Mayor's Climate Change Protection Agreement. This agreement was drafted by Seattle's Mayor Greg Nickels and was announced on February 16, 2005, the day the Kyoto Protocol took effect in 141 counties. The U.S. Conference of Mayors administers and tracks the agreement. Participating cities commit to urge the U.S. Congress to pass bipartisan greenhouse gas reduction legislation that includes clear timetables and emission limits and a flexible, market-based system of tradeable allowances. In addition, participating cities commit to taking action in their own operations and communities to meet or exceed the Kyoto Protocol targets for reducing greenhouse gas emissions in the United States to 7% below 1990 levels by 2012. As of February 22, 2008, 800 United States mayors had signed the Mayor's Climate Change Protection Agreement. New York City Mayor Michael Bloomberg is one of thirty mayors in the State of New York to sign the agreement.

The U.S. Conference of Mayors Climate Protection Summits have provided a forum for mayors and local governments to debate the merits of a cap-and-trade system and a carbon tax approach. While the Mayor's Climate Change Protection Agreement endorses federal cap-and trade legislation, Mayor Bloomberg has encouraged both Congress and the U.S. Conference of Mayors to consider a direct fee or carbon tax approach.[71]

In December of 2007, several organizations at the United Nations Climate Change Conference in Bali, Indonesia announced a new agreement known as the World Mayors and Local Governments Climate Protection Agreement. Mayors and local governments that sign this agreement commit to taking additional action to address climate change, including: (i) working to reduce greenhouse gas emissions worldwide by 60% from 1990 levels and in industrial countries by 80% from 1990 levels; and (ii) encouraging their national governments to adopt binding carbon limits to reduce greenhouse gas

[71] On November 2, 2007, Mayor Bloomberg provided the following testimony at a hearing of the House Select Committee of Energy and Global Warming: "The primary flaw of cap-and-trade is economic – price uncertainty, which could have harmful economic effects; while the primary flaw of a pollution fee is political – because proposing new fees is unpopular. But make no mistake: The costs are the same under either system – and if anything, costs might be higher under cap-and-trade, because middlemen would make money off the trades. By charging a direct fee, we could use that revenue to offer a tax cut – for instance, by cutting the payroll tax. I've never been one to let short-term politics get in the way of long-term success, and I hope that this committee, as it considers the indirect cap-and-trade approach, will also consider the direct fee approach." The Mayor's entire testimony before Congress is available on the Mayor's Climate Protection web page at:
http://www.usmayors.org/climateprotection/documents/testimony/20071102-bloomberg.pdf.
At the U.S. Conference of Mayors Climate Protection Summit, also held on November 2, 2007, Mayor Bloomberg stated: "From where I sit, having spent 15 years on Wall Street and 20 years running my own company, the certainty of a pollution fee – coupled with a tax cut for all Americans – is a much better deal. It would be better for the economy, better for taxpayers, and – given the experiences so far in Europe – it would be better for the environment. The costs are the same under either plan – and if anything, they will be higher under cap-and-trade, because middle-men will be making money off the trades. For the money, a direct fee will generate more long-term savings for consumers, and greater carbon reductions for the environment ." The Mayor's entire testimony at the Climate Protection Summit is available on the Mayors Climate Protection web page at:
http://www.usmayors.org/climateprotection/documents/20071102-bloomberg-speech.pdf.

emissions by at least 60% worldwide below 1990 levels by 2050. Salt Lake City's Mayor Ross C. "Rocky" Anderson has become the first U.S. mayor to sign this agreement. [72]

6.2 Preparing a Local Greenhouse Gas Inventory

Another initial step for cities and local governments wishing to take action to address climate change is to perform a local greenhouse gas inventory. Local inventories are intended to identify the largest local sources of greenhouse gases, show trends that may need corrections at the local level, and show impacts of actions taken by local governments.

Over 800 local governments worldwide, including New York City, participate in the Cities for Climate Change Campaign (CCC), a program of the International Council for Local Environmental Initiatives (ICLEI). Among other things, this program provides technical assistance to local governments for conducting community-wide greenhouse gas emission inventories, measuring the impacts of local actions, and developing community strategies for further reducing greenhouse gas emissions. ICLEI reports that greenhouse gas emissions have been reduced by more than 23 million metric tons annually as a result of local climate protection plans and initiatives.[73]

New York City completed a comprehensive inventory of greenhouse gas emissions for both the city as a whole and government operations. The City published the results in April 2007.[74] In 2005 the total emission of greenhouse gases in the City equaled 58.3 million metric tons of carbon dioxide equivalents. Although on a per capita basis city residents produce less than one third of the emissions of the average American, the total emissions in the city exceed the emissions of countries such as Norway and Switzerland and represent almost 0.25% of the world's total greenhouse gases. Between 2000 and 2005, the total emissions in the city increased by almost five percent. Buildings in the city account for 69% of the total emissions, compared to 32% nationally. Transportation accounts for 23% of the total emissions city-wide.

6.3 Planning and Implementing Local Initiatives

Local initiatives to address climate change generally fall into one or more of the following categories: (i) controlling sprawl through land use plans and zoning rules; (ii) influencing energy supplies through control of utilities or negotiations of energy supply agreements; (iii) improving energy efficiency through building codes, grant programs and procurement policies; and (iv) reducing emissions from transportation through investments in public transportation systems, transportation infrastructure, and advanced vehicle technologies.

The Mayors Climate Change Protection Agreement lists twelve specific actions that local governments can take to reduce global warming pollution levels:

1. Inventory global warming emissions in the community, set reduction targets and create an action plan.
2. Adopt and enforce land-use policies that reduce sprawl, preserve open space and create compact, workable urban communities.

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[72] The sponsoring organizations are the International Council for Local Environmental Initiatives (ICLEI), the World Mayors Conference on Climate Change, the C40 Climate Change Leadership Group and the United Cities and Local Governments (UCLG). Additional information on this agreement is available from the ICLEI USA home page at http://www.iclei.org/index.php?id=392.

[73] The ICLEI web page is at http://www.iclei.org/. *See also* PEW CENTER ON GLOBAL CLIMATE CHANGE, CLIMATE CHANGE 101: LOCAL ACTION, http://www.pewclimate.org/docUploads/Climate-101-LocalBlueline.pdf.

[74] The Inventory of New York City Greenhouse Gas Emissions is available at http://www.nyc.gov/html/planyc2030/html/plan/emissions.shtml or at www.nyc/gov/html/planyc2030/dlownloads/pdf/emissions_inventory.pdf.

3. Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit.
4. Increase the use of clean, alternative energy by, for example, investing in "green tags," advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology.
5. Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money.
6. Purchase only Energy Star equipment and appliances for City use.
7. Practice and promote sustainable building practices using U.S. Green Building Council's LEED[75] program or a similar system.
8. Increase the average fuel economy of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; and convert diesel vehicles to biodiesel.
9. Evaluate opportunities to increase pump efficiency in water and wastewater systems, and recover wastewater treatment methane for energy production.
10. Increase recycling rates in City operations and in the community.
11. Maintain healthy urban forests and promote tree planting to increase shading and to absorb carbon dioxide.
12. Help educate the public, schools, other jurisdictions, professional associations, businesses and industry about reducing global warming pollution.

New York City's Plan for reducing greenhouse gas emissions is part of the broader plan announced for the City by Mayor Bloomberg in April 2007. Known as PlaNYC, the plan includes initiatives for both reducing greenhouse gas and adapting to climate change. Because buildings were the largest single category of greenhouse gas emitters, much of the City's plan for reducing emissions focuses on buildings. Approximately 50% of the reductions under the City's plan will come from efficiencies in buildings. The plan also seeks to reduce emissions by 32% from improved power generation and 18% from sustainable transportation programs. The overall goal of New York City's plan is to reduce citywide carbon emissions by 30% below 2005 levels by 2030. The specific elements of the plan to reduce greenhouse gas emissions are:

1. Avoid Sprawl
    - Create sustainable, affordable housing
    - Provide parks near all New Yorkers
    - Expand and improve mass transit
    - Reclaim contaminated land
    - Open waterways to recreation
    - Ensure a reliable water and energy supply
    - Plant trees to create a healthier and more beautiful public realm

2. Clean Power
    - Replace inefficient power plants with state-of-the-art technology
    - Expand Clean Distributed Generation
    - Promote Renewable Power

3. Efficient Buildings
    - Improve energy efficiency of existing buildings
    - Require efficient new buildings
    - Increase efficiency in appliances
    - Green the City's building and energy codes
    - Increase energy awareness through education and training

[75] LEED stands for the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System™. For information on LEED, listen to the New York City Bar Association's podcast *Green Buildings and NYC Local Law 86*, July 17, 2007, available at http://www.nycbar.org/Committees/index.htm.

4. Sustainable Transportation
    - Reduce vehicle use by improved public transit
    - Improve the efficiency of private vehicles, taxis, and black cars
    - Decrease carbon dioxide intensity of fuels

New York City also is one of five U.S. cities participating in the Clinton Climate Change Initiative (CCI), which was launched by Former President Clinton in August 2006. CCI applies a business-oriented approach to respond to climate change in practical, measurable, and significant ways. Other participating U.S. cities include Los Angeles, Chicago, Philadelphia and Houston. Initially CCI has focused on: (1) creating purchasing consortiums to pool the buying power of cities in order to lower the price of energy-efficient products and to accelerate the development of new energy-saving technologies; (ii) mobilizing experts and creating local capacity to develop and implement programs to reduce energy use and greenhouse gas emissions; and (iii) developing common measurements and information tools that will enable cities to track the effectiveness of their programs. In May of 2007 CCI launched its Energy Efficient Building Retrofit Program. This program is a joint effort of city governments, major financial institutions, energy service companies, product suppliers, and green building organizations aimed at significantly reducing energy use in buildings. CCI has partnered with the New York City Housing Authority to retrofit public housing units in order to make them more energy efficient.[76]

Actions taken in other cities to address climate changes are described in the U.S. Conference of Mayor's *Climate Protection Strategies and Best Practices Guide, 2007 Mayors Climate Protection Summit Edition,*[77]and in publications by the Pew Center on Climate Change.[78]

Section 7 - Conclusions

Although momentum in the U.S. as well as other countries seems to favor cap-and-trade programs as a market-based mechanism, experiences with many U.S. states and local governments, as well as the European Union demonstrate that a portfolio of carbon control initiatives is necessary to reduce greenhouse gas emissions. Any future federal climate change policy will need to recognize this and allow a blended approach. For example, cap-and-trade and carbon taxation can play an integral role with cap-and-trade programs limited to upstream energy producers while carbon taxes could be imposed downstream on a different sector of the economy. Further, the inherent gaps in any one system could be addressed by another system and inequalities in any one system could be corrected by making all market sectors bear their fair share of a response to climate change. For example, if emissions limits in a cap-and-trade system are not reduced quickly enough, those shortfalls in achieving objectives may be addressed by a renewable energy requirement or by lowered CAFE standards.

While Congress debates appropriate legislation on climate change, it is important that it builds on the successes of U.S. states and local governments, as well as the lessons to be learned from the rest of the international community. For instance, the European experience can inform our design of a federal cap-and-trade program to avoid price volatility. The ETS price volatility that resulted from distorted information could be avoided by collecting complete and accurate baseline emissions data well before trading begins. Price volatility could also be contained if the total number of allowances reflecting reduction targets are finalized and known before trading begins. Another factor affecting market stability includes the length of the trading period which should be as long-term as possible.[79] Most if not all allowances in a cap-and-trade program should be auctioned as proposed in the RGGI system, in which New York, Massachusetts, Maine and Vermont committed to auctioning almost 100% of allowances. Given that many U.S. states

[76] Additional information is available from the home page of the William J. Clinton Foundation at http://www.clintonfoundation.org/, and the home page of C40 at http://www.c40cities.org/.
[77] U.S. Conference of Mayor's Reports referenced in this chapter are available from the Mayor's Climate Protection Center's web page at http://www.usmayors.org/climateprotection/.
[78] See PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 73.
[79] This view is shared by several U.S. climate policy experts, including Resources for the Future and the Center for American Progress.

and local governments have led the way to reduce emissions, through such measures as renewable portfolio standards in effect in 25 states,[80] research into new carbon control methods, and the use of offsets such as carbon sequestration and reforestation, Congress should examine how it can build on and support promising state and local efforts.

Other pollutants are currently regulated under a command and control system of traditional regulations that mandate the emissions limits or technologies that must be used to limit emissions. The drawback of a command and control system is that some industry sectors are required to use expensive control methods while other industry sectors are not required to implement even inexpensive methods.[81] As a result, a command and control system is widely viewed as the least cost effective way of reducing carbon emissions. However, command and control systems are easily understood and have public support. In a poll conducted in 2007, Stanford University, New Scientist and Resources for the Future researchers found that the American public has a preference for command and control regulation rather than either cap-and-trade or carbon taxation.[82] While the study did not confirm the reasons, it suggests that command and control solutions should not be ignored.

While we make no recommendation on the use of nuclear energy, it is worth noting that there is renewed interest in nuclear generation because it does not result in greenhouse gas emissions.

[80] *See* PETITION FOR INTERPRETIVE GUIDANCE ON CLIMATE RISK DISCLOSURE 23-24 (Sept. 18, 2007) (asking the Securities and Exchange Commission to require publicly-traded companies to assess and fully disclose their financial risks from climate change), *available at* http://www.incr.com/NETCOMMUNITY/Document.Doc?id=187.

[81] Council on Foreign Relations, *Online Debate: Regulating American Greenhouse Gases*, June 23, 2007, http://blogs.cfr.org/campaign2008/2007/06/26/online-debate-regulating-american-greenhouse-gases/ (remarks of William A. Pizer).

[82] Peter Aldhous, *Global Warming: The Buck Stops Here*, NEW SCIENTIST, June 23, 2007, at 16.; *see also* U.S. Public on Addressing Climate Change: Regulate Industry, and Don't Hit Our Pocketbooks Too Hard (Aug. 30, 2007) (posted by Stanford University on iTunes under Law and Politics).

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