WHITE PAPER ON
FEDERAL GLOBAL CLIMATE CHANGE LEGISLATION

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TABLE OF CONTENTS

No issue has dominated the international "environmental" landscape more in recent years than global climate change. The issue is intensifying, both at home and abroad. In October 2006, British economist Sir Nicholas Stern called for urgent global response to combat what he views as the overwhelming, serious risk of global climate change. Three months later, the Intergovernmental Panel on Climate Change's (IPCC) released the first of four reports it intends to publish this year, forecasting many of the potential catastrophic effects a warmer climate may bring, while stating that it is "very likely" human activities are causing global warming.

Here at home, members of Congress continue to introduce competing proposals designed to reduce greenhouse gas ("GHG") emissions. Currently, six major bills have been proposed in the 110th Congress that would impose a variety of controls on GHG emissions. The purpose of this white paper is to provide a brief background on global warming, and a summarized comparison of the six current proposals.

I. GLOSSARY

In beginning any primer on climate change policy and legislation, it is first necessary to define some key terms. This by no means a complete list of the vocabulary of climate change. Other terms are defined in the text below. But these key terms are necessary to a fundamental understanding of the legislative programs on the table today.

Allocation. Allocation refers to how, and to whom, the government will give away allowances (also referred to as "permits") to emit pollutants. The alternative to an allocation scheme is an auction scheme. All current pending legislation combines some level of "free" allocated allowances with some level of auctioned allowances.

Allowances. An allowance is an authorization from the government to emit a certain amount of pollutant. Allowances for greenhouse gases are generally referred to in terms of 1 metric ton of carbon dioxide equivalent allowed to be emitted per year. Allowances are also referred to as permits.

Auction. An auction system is a market-based way to distribute allowances. Under an auction, regulated entities must purchase allowances. Typically, a certain percentage of total allowances are auctioned. The alternative to an auction is an allocation scheme. All current pending legislation combines some level of "free" allocated allowances with some level of auctioned allowances.

Banking. Allowances, which are typically acquired on a yearly basis, may be saved (or traded to another participant who may bank or use it) to be used or traded in a future year. Banking systems prevent a "use it or lose it" effect on allowances and help lower compliance costs. Some of the current pending legislation contains banking, including the ability to bank early reduction credits (Feinstein/Carper).

Cap-and-trade program. A cap-and-trade program has two primary attributes. First, it defines a maximum level of emissions across the economy or a given sector ("cap"). The level of emissions are represented by a corresponding number of allowances or permits. Entities that reduce emissions to below the applicable cap can generate allowances. Second, it allows entities to trade these allowances among themselves ("trade"). Cap and trade programs can be mandatory or voluntary. All current pending legislation proposes mandatory cap and trade programs.

Carbon Capture. Carbon capture is the process of capturing carbon released from large sources (power plants) and storing it so that it doesn't release into the atmosphere, thereby reducing CO_2 emissions. To date, no facility operates with a full carbon capture system. Designs envision carbon being stored deep in geological formation or deep within the oceans.

Carbon Tax. A carbon tax is a tax on all energy sources that emit carbon dioxide. The tax is implemented by charging for each unit of carbon released to the air from the burning of fossil fuels (coal, oil, natural gas, gasoline, etc.). For example electric utilities would pay a carbon tax based on their smokestack emissions and everyday consumers would also pay a carbon tax when filling a car up with gasoline. Carbon taxes are distinct from cap and trade programs. None of the current pending legislation contains a carbon tax.

Coverage. Coverage, a term used in the current legislation, refers to the economic sectors covered by a particular program. For example, some legislation imposes mandatory cap and trade programs on every carbon-emitting sector in the economy ("economy-wide"), while others impose mandatory cap and trade programs on selected sectors (usually the electricity sector).

Downstream Regulation. In downstream regulation, the point of regulation (at which entities are forced to obtain and submit allowances or permits) lies at the point of actual emissions. Such a program would likely regulate electricity generators/utilities, energy-intensive industries who are large emitters of GHG's, and could conceivable regulate GHG emissions from individual vehicles. The opposite of a downstream program is an upstream program (see below).

Early Reduction Credits.[1] Early reduction credits would be given to entities that reduce GHG emissions before the law requires reductions. Early reduction credits would be exchangeable for tradable allowances if and when a mandatory cap-and-trade program is implemented.

Emissions Intensity. Emissions intensity, as opposed to absolute emissions, is another way to measure GHG emissions over time. Emissions intensity is the ratio of greenhouse gas emissions to economic output (i.e. emissions per dollar of Gross Domestic Product).

Fossil Fuels. Fossil fuels are hydrocarbons, primarily coal, fuel oil, or natural gas, formed from the remains of dead plants and animals.

Greenhouse Gasses. There are six regulated greenhouse gases: (1) carbon dioxide (CO_2); (2) Methane (CH_4); (3) Nitrous Oxide (N_20); (4) Sulfur Hexafluoride (SF_6); (5) Hydrofluorocarbons (HFC); and (6) Perfluorocarbons (PFC).

Offsets. Offsets are activities that counteract carbon emitting activities by removing carbon from the atmosphere. Examples of offsets are forestry and agricultural activities that absorb carbon dioxide. Offsets are reflected through emissions credits that can be purchased or traded to help meet emissions standards. Most of the pending legislation contain offset provisions.

Safety Valve. A safety valve is generally discussed in the context of the price of allowances in a cap and trade program. In this context, when the price of allowances goes above a certain pre-determined price (usually in terms of $/ton of CO_2), a safety valve price is triggered and allowances will be sold at the lower safety-valve price. In addition to the price of allowances, safety valves may also refer to a decrease in the tightening of an emissions cap level, or a lengthening of time allowed for compliance. Some of the pending legislation contains safety valve provisions.

Sequestration. Sequestration is the process of capturing carbon dioxide from emission streams or from the atmosphere and storing it in a way the prevents its release into the atmosphere.

Scope. Scope, under the cap and trade programs in the current legislation, refers to how allowances (i.e. emissions) will be distributed. There are two primary options: (1) across the entire economy, which is referred to "economy-wide;" or (2), across certain sectors of the economy (for example the electricity sector).

Transition Assistance. Transition assistance refers to the concept of taking the revenue generated from auctioning allowances under a cap and trade system and distributing it to either regulated entities (power plants, processing plants) or individual consumers with increased energy costs (primarily increased electricity costs). Transition assistance helps to control compliance costs. Several bills contain transition assistance provisions.

[1] *See* Thomas P. Lyon, "Voluntary Versus Mandatory Approached to Climate Change Mitigation," Resources For the Future (February 2003).

Technology Programs. Technology programs are designed to help promote the innovation and adoption of GHG-reducing technologies in addition to emissions reductions under a cap and trade or carbon tax program. Included in these programs are research and development projects, financial incentives for development of GHG-reducing technologies, and government funded demonstration projects for GHG-reducing technologies. All of the pending legislation contains advanced technology provisions.

Upstream Regulation.[2] In an upstream regulation program, the point of regulation (at which entities are forced to obtain and submit allowances or permits) is closer to energy producers and suppliers than end-use customers and GHG emitters. Examples of entities that would be regulated in an "upstream" system are mining companies, refineries, natural gas shippers or pipelines (as opposed to electric utilities or industrial plants or consumers that purchase and consume fossil fuels). Upstream allocation is premised, in part, on the idea that regulated entities will pass along the increased regulation costs to end-users (i.e. buyers and consumers).

II. WHAT IS GLOBAL CLIMATE CHANGE

A. The Greenhouse Effect

Understanding the mechanics of global warming requires a brief explanation of the greenhouse effect. The greenhouse effect is what allows the earth to stay warm enough for life to survive. When the sun's rays enter the Earth through the atmosphere, approximately 70 percent of the rays' energy is absorbed by land, oceans, plants and other objects. The remaining 30 percent of the energy is reflected back into space by clouds, snow, and other reflective surfaces.

Over time, the surfaces that initially absorbed the energy radiate a portion of the heat back out into the Earth's atmosphere. Some of this heat makes it through the atmosphere into space, but most is contained within the Earth's atmosphere. Greenhouse gas (GHG) molecules, which occur naturally in the Earth's atmosphere, are largely responsible for containing, or absorbing, this radiated heat and keeping the Earth warm. This process is known as the greenhouse effect, without which, the Earth would be too cold to be inhabited by life.

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[2] *See* "Design Elements of a Mandatory Market-Based Greenhouse Gas Regulatory System," Senators Pete V. Domenici and Jeff Bingaman, February 2006.

B. Global Warming

Over the past 100+ years, human activity, primarily industrial activity, has added GHGs to naturally occurring GHGs in the atmosphere. Increased GHG concentrations have absorbed (or kept in) more heat than many scientists consider to be normal in the Earth's atmosphere. Consequently, by most accounts, the Earth has experienced, and is experiencing, an overall increase in temperature—global warming.

Carbon dioxide (CO_2) is considered to be the primary GHG contributing to global warming. Increases in man-caused carbon dioxide largely come from the burning of fossil fuels, but changes in land-use have also increased CO_2 levels. Ice core samples indicate that atmospheric carbon dioxide levels in 2005 (379 ppm) exceed the natural carbon dioxide range over the last 250,000 years (180 to 300 ppm).[3] In addition to CO_2, other GHGs such as nitrous oxide, methane[4], and sulfur hexafluoride have also increased and are contributing to global warming. It is estimated the United States, while containing only 5 percent of the world's population, emits roughly 20 percent of the world's GHGs.

The February, 2007, report from the Intergovernmental Panel on Climate Change recently sounded alarm bells by concluding that "most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations."[5] While the report indicates that the global

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[3] *See* the Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, Summary for Policymakers, at 2.

[4] For example, the atmospheric concentrations of methane have increased from a pre-industrial value of about 715 ppb to 1,774 ppb in 2005.

[5] *See* the Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, Summary for Policymakers, at 8. Replacing the term *very likely* in place of *likely*, is statistically significant indicating that this conclusion has a 9 in 10 chance of being correct. Such a conclusion represents a departure from the IPCC's previous use of "likely."

warming trend will continue, and will continue at a significant pace, projections as to the severity of the increase remain uncertain (anywhere between 2.5 degrees Fahrenheit to 10.4 degrees Fahrenheit). The report concludes by noting that to best avoid dangerous climate change, long-term global GHG concentrations need to be stabilized at 450 ppm.[6]

There is a general consensus that the earth is warming. There is less consensus, although most scientists agree, that man-made sources are responsible for at least some of this increase. Perhaps the largest source of disagreement is on the potential impacts. Some potential consequences include rising ocean temperatures, increased melting of snow and ice, changing ecosystems, altered growing seasons and ranges, and rising global sea level. However, it must be noted that opinions on the extent and timing of these possible consequences range from dire predictions, which would affect the Earth in the near future, to relatively little concern over the long-term.

III. LEGISLATION IN THE 110TH CONGRESS

Climate change continues to be a major legislative focus for the 110th Congress. A variety of Congressional members, representing various positions, are clambering to introduce climate change legislation. The legislative landscape is in constant flux, and it is difficult to determine which committee in which body (the Senate or House), if any, will ultimately offer successful legislation. House Speaker Pelosi has said she wants to pass a climate change bill by July 4, and has recently put together a Select Committee on Energy Independence and Global Warming (without jurisdiction over legislation) to provide another forum to debate this issue. Representative John Dingell, Chairman of the House Energy and Commerce committee, has said

[6] *See* the Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, Summary for Policymakers, at 13; *see also* testimony of Michael Oppenheimer before the House Subcommittee on Energy and Air Quality, March 7, 2007, available at: http://energycommerce.house.gov/cmte_mtgs/110-eaq-hrg.030707.Oppenheimer-Testimony.pdf.

his committee intends to introduce draft legislation by this June. Senator Jeff Bingaman, chairman of the Energy and Natural Resources committee, has circulated a draft bill and is expected to introduce some version of that draft this summer. Senator Barbara Boxer, Chairman of the Environment and Public Works Committee has also voiced a goal of introducing a bill sometime this year.

There are currently six major climate change proposals upon which this white paper focuses.[7] The six proposals are sponsored by the following Congressional members:

(1) Bingaman/Specter
(2) Feinstein/Carper
(3) Lieberman/McCain[8]
(4) Kerry/Snowe
(5) Sanders/Boxer
(6) Waxman

A. Similarities

The six major climate change bills contain some identical provisions. Each one of the bills includes measures to:

- Set a *mandatory* cap on emissions
- Develop a cap and trade system
- Regulate all 6 GHG's
- Provide some level of compliance cost controls
- Encourage advanced technology

B. Differences

While the bills share many similarities, they are each different (some in subtle ways, others in more obvious respects). These differences include:

[7] Various other members of Congress have proposed legislation or resolutions. However, these six bills are the most prominent, and developed pieces of legislation at this point.

[8] Representatives John Olver and Wayne Gilchrest have introduced House Bill H.R. 620 which is a companion bill to the Lieberman/McCain bill.

- Scope of coverage (economy-wide vs. individual sectors and upstream vs. downstream allocation)
- Emissions targets (cap emissions at what level by which years)
- Allowance distribution programs
- Cost controls
- Offsets and credit provisions

The differences among proposals will be discussed in turn.

1. *Scope of Coverage and Point of Regulation*

Five of the six bills would apply across the entire economy ("economy-wide"). Reasons for this are many. Senators Domenici and Bingaman believe that because no single sector of the economy makes an overwhelming contribution to GHG emissions, therefore, no one sector should be singled out. The Feinstein/Carper bill is the only bill that singles out a sector—applying only to electricity generating entities of 25 MW or greater. Notably, the electricity sector accounts for 40 percent of total carbon dioxide emissions in the United States, the most of any sector, with transportation comprising 33 percent; manufacturing, 17 percent; residential sources (wood-burning stoves), 6 percent; and commercial business, 4 percent.[9]

The remaining five bills are economy-wide in scope. Economy-wide regulation of GHGs (and CO2 in particular) is possible, in part, because of the physical attributes of fossil fuels. Unlike "conventional pollutants," fossil fuel emissions (and CO_2 in particular) are unique due to a very important attribute: the eventual emissions from a fossil fuel (coal, oil, or natural gas) remain in constant proportion to the amount of fossil fuel burned. Put another way, if one assumes that a given amount of fossil fuel will be combusted completely, then one can know with reasonable certainty the level of carbon dioxide emissions that will result from the

[9] *See* Margaret Kriz, "Not If, But When," National Journal, February 16, 2007.

combustion of that given amount of fossil fuel.[10] Thus, it is possible to control, with reasonable certainty, the level of carbon dioxide emissions by focusing on "upstream" fossil fuels (where coal or natural gas is mined, or transported, or processed as opposed to emitted) before they are consumed/combusted, "downstream" at the point of emission, or some combination of the two.

Furthermore, unlike conventional pollutants (for example sulfur dioxide which is emitted by a few number of large sources within a small number of industries), virtually all energy-using activities emit carbon dioxide (from factories to cars) across the entire economy. Therefore, whereas emissions from conventional pollutants must be regulated at the point the pollutant is emitted (i.e. the smokestack), programs to regulate CO_2 may apply both at the point of emission (the smokestack, or a car) or at points "upstream" prior to emission. As a result, the six pieces of legislation differ, sometimes dramatically, as to their point of regulation.

The Bingaman/Specter draft is generally an "upstream allocation" bill, that places the point of regulation at coal mines, petroleum refineries, natural gas processors, carbon-intensive manufacturers (still undefined), importers of fossil fuels, and selected non-fuel entities (manufacturers of the four minor GHG's). The bill also distributes allowances to electricity generators and to States.

The Lieberman/McCain bill would regulate both "upstream" and "downstream." The bill covers all facilities that emit 10,000 tons of CO_2 equivalent per year, as well as petroleum refineries, and fossil fuel importers. The Kerry/Snowe bill remains relatively unspecific as to the exact point of regulation but is generally focused toward downstream. The bill regulates the

[10] *See* William A Pizer, "Scope and Point of Regulation in a Mandatory Climate Policy," Resources for the Future, at 2.

sources and sectors with the greatest GHG emissions as determined by the Environmental Protection Agency ("EPA").

The Waxman bill mandates that EPA develop regulations that cover sources and sectors based on the largest emissions, the most cost-effective opportunities to reduce emissions, or any other characteristic EPA deems appropriate. Finally, the Sanders/Boxer leaves the decision on point of regulation to EPA, but mandates separate, and stringent, requirements for large electricity producers.

2. *Emissions Targets*

The emissions targets of each bill generally reflect how stringent each bill is in terms of requiring GHG emission reductions. All six bills have different emissions targets. The Bingaman/Specter bill is clearly the least stringent plan. The Bingaman/Specter bill is the only bill to set emissions targets based on emissions intensity (emissions per dollar of GDP). Doing so allows emissions caps to be tied to the growth of the economy. As a result, the Bingaman bill would allow absolute GHG emissions to <u>increase</u> by 24 percent between 2004 and 2030.[11] In other words, this bill represents a "slowdown" in GHG emissions rather than an absolute reduction—a position favored by the Bush Administration. More specifically, the bill would reduce GHG emissions intensity by 2.6 percent annually between 2012 and 2021, and then 3 percent annually starting in 2022. The bill has no long-term goal for stabilization of emissions levels.

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[11] *See* EIA, "Energy Markets and Economic Impacts of a Proposal to Reduce Greenhouse Gas Intensity with a Cap and Trade System" (January 2007). Absolute GHG emissions grow between 2004 and 2021 because GDP, which emissions are tied to, is expected to grow at a rate of about 3 percent, while GHG emissions intensity is to be reduced by 2.6 percent over this same period.

On the other hand, the Sanders/Boxer bill and the Waxman bill are the most ambitious in terms of emissions targets. The Sanders/Boxer bill has been called the "gold standard" of climate change legislation. Ultimately, the bill would cut GHG emissions to 80 percent below 1990 levels by the year 2050. This bill has a long-term goal of stabilizing global GHG concentrations at 450 ppm. To accomplish these ambitious goals, the bill would reduce GHG emissions to 1990 levels by 2020 (reduction in GHG emission 2 percent per year between 2010 and 2020). By 2030, the bill would reduce GHG emissions 26.7 percent below 1990 levels, and by 2040, 57.4% below 1990 levels.

Like the Sanders/Boxer bill, the Waxman bill has an ultimate goal of capping emissions by the year 2050 at 80 percent below 1990 levels. It begins by capping GHG emission in 2010 at 2009 levels. Beginning in 2011, GHG emissions will be reduced by 2 percent per year such that in 2020, emissions do not exceed 1990 levels. In 2021, GHG emissions shall be reduced by 5 percent per year, ending in 2050 with emissions that are no more than 20 percent of 1990 levels.

The Kerry/Snowe bill and the Lieberman/McCain bill have similar emissions targets that fall in between the stringent Waxman-Sanders/Boxer and the looser Bingaman/Specter targets. Both bills set emissions targets around 65 percent below 2000 levels by the year 2050.[12] However, the mechanics of how each bill will accomplish the intended emissions targets differ. The Kerry/Snowe bill would reduce GHG emissions to 1990 levels by 2020, with a decrease in emissions of 2.5 percent per year between 2021 and 2030, and 3.5 percent per year between 2031 and 2050. The Kerry/Snowe bill, like the Sander/Boxer bill, contains a long-term goal of stabilizing global GHG concentration at 450 ppm.

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[12] *See* text of Kerry/Snowe bill; http://www.electricdrive.org/index.php?tg=articles&idx=Print&topics=189&article=1396 (McCain bill to reduce emissions to 1/3 of 2000 levels by 2050).

The Lieberman/McCain bill, is the only bill of the six discussed, to set emissions levels by reference to the quantity of CO_2 allowances.[13] This bill calls for 6,130 million metric tons of CO_2 allowances to issue for the years 2012-2019. For years 2020 through 2029, the number of CO_2 allowances would decrease to 5,239 million metric tons. For years 2030 through 2049, allowances would decrease to 4,100 million metric tons, and after 2050, remain at 2,096 million metric tons. The Lieberman bill contains no long-term GHG stabilization goal.

Finally, the Feinstein/Carper bill, which regulates only the electricity sector, would reduce projected levels of GHG emissions in this sector 25 percent by 2020.[14] The Feinstein bill would accomplish this reduction by capping GHG emissions from regulated entities at 2006 levels for 2011 through 2014. In 2015, GHG emissions from regulated entities would be capped at 2001 levels. Between 2016 and 2019, GHG emission from regulated entities would decrease 1 percent per year from the previous year, and then starting in 2020, decrease 1.5 percent per year each year. The Feinstein bill contains no long-term GHG stabilization goal.

3. *Allowance Distribution*

With respect to distributing allowances, there are two general options at either end of the spectrum: (1) give all allowances away for free; or (2) auction all allowances off. In between these two extremes lie a myriad of possible combinations, all with advantages and disadvantages. One benefit to giving away allowances is that costs to large emitters (who will require a lot of allowances), at least at the beginning of the program, are decreased. One drawback to giving away allowances is that it may be complex, especially in the beginning, to determine the best

[13] In 2003, the United States emitted 5,842 million metric tons of CO_2, 6,899 million metric tons of all GHGs. *See* Raymond J. Kopp, "Recent Trends in U.S. Greenhouse Gas Emissions," Resources for the Future, February 2006. Available at http://www.weathervane.rff.org/the_problem/basic_science/RFF-BCK-GHGTrends.pdf

[14] *See* http://www.grist.org/news/muck/2007/01/23/tipping_point/.

distribution of allowances, risking an inefficient distribution and unintended competitive advantages.

One benefit to auctioning off allowances is that the auction generates revenue, which can be applied to reduce the cost of a new program (to consumers or emissions producers—*i.e.* transition assistance) or to develop and promote new technologies. Drawbacks to auctions include the potential complexity of setting up a functional market, and the cost of purchasing allowances.

Once allowances are distributed, those entities holding the allowances can trade them. Some programs are designed to allow entities to trade allowances within their sector (i.e. electricity generators may only trade with other electricity generators) and some are designed to allow entities to trade allowance across sectors (i.e. electricity generators may trade with manufacturers).

The goal of a cap-and-trade program, of course, is to reduce GHG emissions using the efficiency of the market. Theoretically, this will be accomplished through the trading of allowances as follows. Firms that do not have enough allowances to cover their GHG emissions may either reduce emissions internally through more efficient processes or by installing emissions controls, or may purchase allowances from firms that have more than enough allowances to cover their own GHG emissions. From an economic standpoint, such a system, by placing a value, or price, on each unit of emissions creates a market that, ideally, will result in the most efficient distribution of allowances and emissions.

The Bingaman/Specter bill combines an auction with an allowance allocation, but unlike most of the other bills, provides specific parameters on how this is to be accomplished. Between 2012 and 2016, 10 percent of all allowances are to be auctioned, increasing by 2 percent per year thereafter up to a maximum of 65 percent of all allowances auctioned. The bill divides allocated allowances across different sectors. Industry (coal mines, petroleum refineries, natural gas processors, electricity generators, carbon-intensive manufacturing, selected non-fuel entities) is to be allocated 55 percent of all allowances from 2012 through 2016, decreasing by 2 percent per year thereafter. States are to be allocated 29 percent of all allowances from 2012-2021, and 30 percent each year thereafter. Agricultural Sequestration is to be allocated 5 percent of all allowances each year and early reduction allowances are to comprise 1 percent of all allowances from 2012 through 2021 and zero thereafter. The bill directs the Secretary of Energy to establish the allowance distribution system, including developing an allowance trading system.

The Sanders/Boxer, Lieberman/McCain, Waxman, and Kerry/Snowe bills each largely delegate the responsibility of developing an allowance distribution scheme, making it difficult to determine exactly how these bills envision allowance distribution.

The Sanders/Boxer bill grants the EPA authority to implement a market-based cap and trade program, and sets out several broad policies to guide the Agency. The bill permits the EPA to allocate emissions allowances to communities, individuals, and companies that suffer a disproportionate impact from the transition to a lower carbon-emitting economy ("transition assistance"). The EPA would also have authority to allocate allowances to highly energy-efficient buildings and entities, including to entities that utilize sequestration or other means of reducing net carbon dioxide emissions. The bill does not expressly contain a provision for auctioning allowances.

The Kerry/Snowe bill would assign the President the authority to develop an allowance distribution program. The bill contemplates distributing allowances through auctions and allocations. The bill establishes a Climate Reinvestment Fund with the Department of Treasury, to collect and distribute funds generated from auctioned allowances (as well as civil penalties). Finally, the bill authorizes the EPA to set up a tradable allowance program.

The Lieberman/McCain bill delegates allowance distribution authority to the EPA and the Secretary of Commerce. The bill contemplates both auctions (to be overseen by an entity called the Climate Change Credit Corporation) and allowance allocations. The Climate Change Credit Corporation would be created for the purpose of receiving, buying, and selling tradable allowances. The bill provides the EPA guidelines to consider when distributing allowances, including the ability of covered entities to pass through compliance costs and the need to maintain international competitiveness and avoid the additional loss of manufacturing jobs. It expressly provides for intersector trading of allowances.

The Waxman bill directs the President and the EPA to develop an allowance scheme. The bill contemplates distribution through both an auction and allocations (with direction that allowances allocated not create windfall profits). The proceeds of an auction would be placed in a Climate Reinvestment Fund and would be used for a variety of purposes, including to mitigate energy costs to consumers, provide transition assistance to workers and regions with high carbon-emitting energy sources, encourage the pursuit of energy efficient technology and sequestration, and mitigate impacts associated with global warming.

The Feinstein/Carper bill also distributes allowances to utilities through auctions and allocations, granting the EPA authority to develop a program. Fifteen percent of allowances are to be distributed through an auction in 2011, with the rest being allocated. Between 2012 and 2031, an additional 3 percent per year will be auctioned, increasing 5 percent per year between 2031 and 2036, ending with 100 percent of allowances being auctioned after 2036. The percentage allocated will be adjusted accordingly. Allowances will be allocated based on past electricity generation.

4. *Cost Controls*

Whether it be expenses associated with acquiring allowances, implementing more efficient manufacturing processes, investing in domestic or foreign GHG reduction projects, or installing updated control technology, increased costs are inevitable under any GHG cap-and-trade program. GHG controls will almost certainly have the largest impact on the electric industry. As the Nation's economy continues to grow, electric utilities must increase energy supply to keep ahead of rising energy demands. The cheapest, and most abundant source of fuel for electric power plants is coal. Coal-fired power plants comprise half of U.S. electricity production, and currently, more than 100 new coal-fired power plants are in different stages of development. However, in terms of carbon dioxide emissions, coal, because of its high carbon content, is a very dirty fossil fuel (tens of millions of tons of carbon dioxide are released from coal-fire power plant smokestacks each year). Thus, as caps are imposed on carbon dioxide emissions, electric utilities will be forced either to reduce coal-generated emissions (build more efficient plants or rely on carbon capture technologies), or buy/trade more allowances. Either way, the cost of producing electricity will rise under any regulation scheme.

Perhaps closer to home, caps on GHG emissions will increase energy prices for consumers primarily because electric utilities, which will either be regulated themselves or be subject to increased costs from upstream regulation, will pass along increased costs to customers in the form of higher electricity bills.[15] The severity of these increases differs under each regulatory program and is largely unknown. For example, the Department of Energy's Energy

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[15] Note that increased fuel prices will also result in increased expenses for consumers.

Information Administration forecasts that under the Bingaman/Specter draft, electricity prices could rise a modest 3.5 percent by 2020, while Resources for the Future has estimated that prices under the Lieberman/McCain bill could increase 35 percent by 2025.

Only two of the bills, the Bingaman/Specter and Sanders/Boxer bills, contain costs controls in the form of safety-valve provisions. The Bingaman draft, beginning in 2012, sets a safety-valve price per metric ton of carbon dioxide equivalent at $7, to increase approximately 5 percent per year, with provisions for amendment. In setting a safety-valve price, the Bingaman/Specter draft would allow regulated entities to pay this fee in lieu of submitting an allowance (termed "alternative emissions fee").[16] This system could result in actual aggregate emissions which exceed the cap if allowance costs reach, or exceed, this level. The bill also has a banking provision (allows allowances to be used in the year subsequent to their issuance).

The Sanders/Boxer bill includes a "declining emissions cap with a technology-indexed stop price" as a limit on the cost of allowances under the market-based program. This provision would allow the emission cap to decrease by a fixed percentage each calendar year until the annual allowance price exceeds a pre-determined stop price, then the emissions cap would remain the same, until allowance prices again fell below the stop price (or after 3 years).[17] This system is designed to prevent allowance prices, under a declining emissions cap program, from rising to prohibitive levels. The bill also requires EPA to adopt the most "cost-effective" reduction strategies, with consideration of impacts to the economy, but contains no banking provision. As noted above, the bill provides transition assistance in the form of allowances to

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[16] *See* Energy Information Administration, Economic Impacts, at 2.

[17] Technology-indexed stop price means a price per ton of GHG emissions that is not less than the average cost of preventing 1 ton of GHG emissions through low, or zero, carbon technologies (i.e. wind generation, photovoltaic generation, geothermal energy, solar, wave based energy etc.).

individuals and selected entities (both companies that suffer "disproportionate impacts" and entities that have highly energy efficient products or engage in sequestration activities), but contains no provisions for transition assistance to the more "typical" regulated entities (electricity generators, manufacturers etc.).

The Lieberman/McCain bill does not provide for a safety-valve. Rather, the bill devotes a Subtitle to controlling compliance costs, which provides for *intersector* trading of allowances, banking and borrowing of allowances, offsets, and international credits—all programs designed to help control costs.

The Kerry/Snowe bill speaks very little to any cost saving provisions and does not provide for a safety-valve. The bill allows for trading and banking of allowances, and directs EPA to adopt the most "cost-effective" strategy, but provides very little detail.

The Waxman bill does not provide a safety-valve in the traditional sense, but does allow EPA to extend compliance deadlines set in the emissions target portion of the bill if the Agency deems compliance costs to be too high. Additionally, the bill will provide various forms of transition assistance and contains a banking provision (allowances may be used in subsequent years, but details are not specified).

Finally, the Feinstein/Carper bill does not provide for a safety-valve, but does contain a provision for avoiding significant economic harm, which includes the ability to use future allowances before the calendar year for which they were intended. This provision allows banking, the use of international credits to satisfy allowance requirements, and the monitoring of allowance prices to ensure they are not causing harm. The bill also allows for the transfer of other GHG credits from any other trading program.

5. *Offsets and Credits*

Cap-and-trade programs often have provisions that allow regulated entities to meet emissions goals by means other than purchasing allowances or implementing emissions controls. Several programs allow regulated entities to offset their emissions by engaging in activities that result in a net GHG reduction (*e.g.* sequestration). Others have provisions that allow for the trading or banking of international or domestic credits. Still others contain provisions for early reduction credits, which reward regulated entities for reducing GHG emissions quickly, before they are required to under law. The following section discusses these types of provisions contained in the six pieces of climate change legislation.

The Lieberman/McCain bill has several offset and credit provisions. As part of its general allowance trading program, the bill permits banking (keeping allowances to be applied in the future) and the borrowing of credits to satisfy up to 25 percent of total allowance submission requirements per year.[18] The bill contains a "domestic offsets" provision that allows a covered entity to satisfy up to 30 percent of its yearly tradable allowance submission requirements with tradable allowances from *another nation's* GHG allowances. If a covered entity elects to satisfy more than 15 percent of its tradable allowance submission requirements with another nation's GHG allowances, that entity must satisfy 1.5 percent of its total allowance submissions by registering net increases in agricultural sequestration soils. Finally, the bill requires EPA to set up a program where covered entities can earn tradable allowances by engaging in projects in developing countries that result in certified emissions reductions.

The Bingaman/Specter bill also has provisions for offsets and credits. The bill directs the

[18] This provision includes a "penalty" for using borrowed credits by increasing the tradeable allowance requirement for the year the credit was taken.

Secretary of Energy to develop a program to distribute credits for the use of carbon dioxide as feedstock (covered fuel that has no emissions because it is used as feedstock), and for the export of covered fuels. The bill would require the Secretary of Energy to establish an offset credit program for the following GHG reduction projects, among others: geologic sequestration; landfill methane control; animal waste or municipal wastewater methane control. The Secretary of Energy must establish a program to distribute early reduction allowances to entities engaged in projects that result in emissions reductions or net sequestration before the initial allowance distribution period. The bill also allows the Secretary of Energy to promulgate regulations allowing for the use of foreign GHG credits in place of allowance submission requirements, as well as offsets for international projects that reduce GGH emissions. Finally, the bill requires the Secretary of Agriculture to develop a program for agricultural sequestration allowances to be distributed.

The Sanders/Boxer bill, contains less specific, but similar, offset and credit provisions to the Lieberman/McCain bill. As part of its renewable portfolio standard, the bill requires EPA to establish a program of renewable energy credits.[19] The bill requires the Secretary of Agriculture to establish standards for accrediting certified reductions from biological sequestration activities. Finally, the Sanders bill establishes a Task Force on International Clean, Low Carbon Energy Cooperation, for the purpose of developing a program to promote clean energy technology deployment in developing countries. Presumably, such a program would, at some point, provide covered entities in the United States with the option of trading, or using as credits, allowances

[19] However, this credit applies only to electricity generators, and their obligations under the renewable portfolio standard (as opposed to other sectors as part of a broader cap-and-trade program).

from these projects. However, the bill does not speak this issue. Notably, the bill does not contain a credit provision for the use of international GHG reductions.

The Kerry/Snowe bill, much like the Sanders/Boxer bill, contains minimal detail regarding offsets or credit provisions. The bill contains the identical renewable portfolio standard provision and biological sequestration provision as in the Sanders bill. Notably, the Kerry/Snowe bill contains a title devoted to international and corporate obligations. Provisions in this section include encouraging the United States to establish mitigation commitments by all major emitting countries and establish flexible international mechanisms to minimize costs. However, the bill is largely silent on how this international component will relate to credit or offset programs.

The Waxman bill contains no detailed credits or offsets provisions. The bill states that early reductions of GHG are to be a goal of the program, and presumably this will result in an early reduction credit system. The bill does not contain any provisions for international or domestic credits and offsets.

The Feinstein/Carper bill contains a detailed offset and credits provisions. The bill contains an entire subtitle dedicated to Offset Credits, which starts by establishing a detailed nationwide sequestration offset program for agricultural producers, foresters, and other land owners (grazing, wetlands). The bill directs the EPA to establish an offset credit program for GHG reduction projects and enumerates eligible facilities, which include landfill operations, iron and steel production, aluminum production, and magnesium production and processing (may only offset up to 5 percent of allowance submission requirements). Finally, the bill allows regulated facilities to satisfy a limited amount of allowance obligations through foreign GHG reduction credits.

6. *Renewable Standards and Energy Efficiency*

Many believe that any regulatory approach which curbs GHG emissions and slows global warming must include provisions to encourage energy efficiency and renewable energy in addition to command and control type regulations capping emissions from traditional sources. Approaches include investing in new technology research and development, providing incentives for energy efficient operations (tax rebates, prizes, allowances etc.), funding for demonstration projects which reduce GHG emissions, encouraging carbon capture and sequestration, mandating renewable portfolio standards, and encouraging efficient energy use. All of the six pieces of legislation contain various provisions for energy efficiency and renewable energy.

The McCain/Lieberman bill devotes Title III to advanced technologies and energy efficiency measures. This title establishes a variety of programs, including a government-sponsored technology investment program focusing on the commercialization of energy efficient technologies, development of a university-based research project for mitigation technologies, incentives for energy efficient technology, and research grants. The bill contains a program that would provide incentives to large users of electricity or natural gas to obtain an "energy audit," which would pinpoint potential areas for improving energy efficiency.

The Bingaman/Specter draft encourages energy efficiency through the Climate Change Trust Fund. The money in the fund would be used to establish zero or low carbon technologies (including high efficiency consumer products), advanced coal technologies, cellulosic biomass, and advanced technology vehicles.

The Kerry/Snowe measure contains extensive renewable and energy efficiency provisions. The bill requires retail electricity suppliers to achieve improvements in energy efficiency, peak load reduction, and overall reduction in electricity use. These measures, by taking pressure off the grid, will potentially improve reliability and will encourage energy efficiency. Whether savings achieved by retail electricity suppliers will be eligible for tradable credits is to be determined by EPA. The bill also includes a renewable portfolio standard, which requires an increasing percentage of the base quantity of electricity sold each year to be generated by renewable sources (5 percent in 2010 to 20 percent by 2021). Under the renewable portfolio standard, the EPA is directed to issue renewable energy credits. Finally, Title II of the Kerry/Snowe bill provides tax incentives for advanced technology vehicles (fuel cell vehicles, lean burn, and hybrid).

The Boxer/Sanders bill also contains multiple provisions to encourage renewable energy and energy efficiency. Beginning in 2015, an increasing percentage of the base quantity of electricity sold each year is to be generated by low carbon sources. The bill establishes energy efficiency performance standards with similar electricity provisions as the Kerry/Snowe bill (reductions in peak load, electricity use, and increased energy efficiency). The bill also contains the same renewable portfolio provisions as the Kerry/Snowe bill.

The Feinstein/Carper bill provides funding, through the auctioning of allowances, for a clean coal, low and zero-emitting carbon electricity generation, and energy efficiency technologies programs. The bill also provides federal funding for research into energy efficiency technologies and for the development of a program to promote the use, by small manufactures, of GHG reducing technologies and techniques. The bill does not contain an electric reliability provision.

Finally, the Waxman bill contains very little detail regarding renewable portfolio standards or energy efficiency programs. The bill indicates that one of its goals is to encourage research, development, and commercial deployment of innovative technologies to avoid, reduce, and sequester GHGs. However, the bill does not contain any specific provisions in this regard. The bill establishes a national renewable energy standard (*i.e*. renewable portfolio standard) and a national energy efficiency standard. The renewable standard would require the percentage electricity generated from renewable sources to increase every year, beginning in 2010 with 20 percent of the total electricity sold in 2020 to be from renewable sources. The energy efficiency standard would require the Secretary of Energy, in consultation with EPA, to set end-user savings targets for retail electric-energy and natural gas suppliers to be achieved through efficiency improvements at customer facilities. The targets require each electricity supplier to secure annual savings of a set percentage (to increase to 1 percent of sales by 2020) of the supplier's most recent year's sales to retail customers. The bill does not contain an electric reliability provision.

7. ***Transportation***

Carbon dioxide emissions from mobile sources pose a unique regulation problem because there are millions of mobile source emitters. The difficulty of controlling each emitter is amplified in "downstream" cap and trade programs. However, controlling carbon dioxide emissions from this sector is crucial to any climate change legislation. As Senators Domenici and Bingaman state, "failing to address the transportation sector would leave out one-third of total U.S. carbon emissions."[20] The following discusses how each bill incorporates the transportation sector.

The Lieberman/McCain bill will regulate the transportation sector using an "upstream" scheme. The bill requires the EPA to determine the amount of GHGs, in terms of carbon dioxide

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[20] *See* Design Elements of a Mandatory Market-Based Greenhouse Gas Regulatory System," Senators Pete V. Domenici and Jeff Bingaman, at 4.

equivalents, that will be emitted when petroleum products are used for transportation, and then allocates allowances within the transportation sector "upstream" to petroleum refiners or importers.

The Bingaman/Specter bill, because it is an economy-wide "upstream" program, will regulate the transportation sector through the regulation of fuel distributors and petroleum refineries.

The Kerry/Snowe bill regulates the transportation sector by directing the EPA to promulgate standards that reduce GHG emissions from passenger vehicles on an average-vehicle basis. The bill does not specify whether GHG reductions are to be achieved via tail-pipe emission or fuel economy standards, but does say the standard should be equal to or more stringent than the standard expected to be set by the California Air Resources Board. The bill also contains a renewable content of gasoline provision, similar to the Sanders bill, with a goal of 60 billion gallons of renewable fuel by 2030. The bill requires the Secretary of Energy to develop an ethanol program with a requirement that 50 percent of wholly-owned stations, and branded stations carry ethanol by 2017. The ethanol provision is accompanied by a credit trading system within the major oil company sector. The bill increases funding for fuel cell and lean burn technology vehicles, and contains other vehicle-related efficiency measures (hybrid vehicle tax credits, advanced technology vehicle manufacturing credit).

The Sanders/Boxer bill, much like the Kerry/Snowe bill, will regulate the transportation sector by directing the EPA to promulgate standards that reduce GHG emissions from each fleet of automobile sold by a manufacturer in the United States beginning in 2010. The bill provides specific carbon dioxide equivalent thresholds based on the vehicle's weight, and grants the EPA authority to increase the standards as necessary. The bill also contains a provision for the renewable content of gasoline, amending the Energy Policy Act of 2005, to require a minimum volume of low-carbon renewable fuel by 2015 of 5 billion gallons.

The Waxman bill requires EPA to establish regulations that reduce GHG emissions, on an average vehicle basis, at least as much as the standards adopted by the California Air Resources Board.

Finally, the Feinstein/Carper bill, because its point of regulation is in the electricity sector only, not surprisingly contains no provision to regulate the transportation sector. However, passing additional legislation to improve the fuel economy of passenger vehicles remains a priority to Senator Feinstein, and she and Senator Snowe have introduced legislation that would mandate an increase in the fuel economy of passenger vehicles over the next 10 years.[21]

8. *Miscellaneous*

Several notable miscellaneous provisions contained in these bills are worth mention. First, the Lieberman/McCain bill, as part of its provisions on advanced technologies, encourages development of nuclear energy. The bill requires the Secretary of Energy to establish a nuclear research and development program, and authorizes substantial funding for the construction of nuclear facilities. The only other mention of nuclear in any of the bills is in the Feinstein bill, which would allocate allowances to existing nuclear facilities.[22]

The Sanders/Boxer bill contains a separate provision for regulating new electric utilities. The measure, which represents a more stringent requirement for new electric generators, would require large facilities to meet a GHG emissions standard that is equal to, or less than, the

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[21] *See* http://feinstein.senate.gov/06speeches/s-global-warm824.htm.

[22] The Feinstein bill allocates allowances to existing nuclear facilities based on "incremental nuclear generation," which is the difference between a nuclear facility's electricity generated in a given calendar year and that same facility's electricity generated in 1990.

emission rate of a new combined cycle natural gas generating unit. This stringent standard would then apply to all facilities, regardless of when they began to operate, by 2030.

Along similar lines, the Kerry/Snowe bill requires electricity suppliers to implement programs to improve energy efficiency and reduce peak power demand and electricity use. To this end, the bill creates an electric utility-specific allowance trading program, with penalty, credit, and monitoring provisions.

IV. CONCLUSION

Federal climate change legislation is in constant flux. The bills discussed above are snapshots in time of the current legislative landscape. More bills may be introduced, and the six major bills mentioned above will certainly be modified going forward. Notably, while the six pieces of legislation discussed above all contemplate some form of mandatory cap and trade regulation, it is also possible for legislation to take other shapes such as a carbon tax (economy-wide or individual sectors) or even voluntary approaches.

Regardless of form, GHG reducing legislation will result in increased costs to American industry and consumers. While increased costs are forecasted to hit electric utilities and electric consumers the hardest, a well crafted bill can spread the costs of GHG reductions throughout the economy, ensuring that no one sector is unduly impacted. That said, climate change regulation is also likely to present opportunities for efficient industries as well as those who can reduce their net GHG emissions. To these ends, it will be important for all industries across all sectors to stay up to date with the ongoing Federal legislation so that they may influence the process and ensure their interests are protected and their opportunities are maximized.