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Climate Change: Action by States To Address Greenhouse Gas Emissions

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Summary

In the absence of a federal climate change program, a number of states have taken actions that directly address greenhouse gases (GHGs). States' efforts cover a wide range of policies. Although much of the early activity was largely symbolic, the more recent state actions have been more pragmatic. The states' motivations may be as diverse as the actions themselves. Some states are motivated by projections of climatic changes, while others expect their policies to provide economic opportunities or other co-benefits, such as improvements in air quality, traffic congestion, and energy security. Another driver behind state action is the possibility of catalyzing federal legislation.

Three states — California, Hawaii, and New Jersey — have passed laws establishing mandatory, statewide GHG emission limits. However, the critical elements of these programs are still being developed. The Regional Greenhouse Gas Initiative (RGGI), a partnership of nine Northeast and Mid-Atlantic states, sets up a cap-and-trade system aimed at limiting carbon dioxide emissions from power plants. RGGI takes effect in 2009. Six western states (and two Canadian provinces) have formed the Western Climate Initiative, and are in the early stages of developing a regional GHG emission reduction program.

California has addressed GHG emissions on several fronts. To complement its statewide emissions reduction regime, California established GHG performance standards that would effectively limit the use of coal-generated electricity in California (Washington passed similar legislation in 2007). In 2004, California issued regulations to reduce greenhouse gases from motor vehicles. At least 12 other states have indicated they intend to follow California's new vehicle requirements. In addition, the state has also taken action to reduce the carbon intensity in its transportation fuels.

Predicting the precise consequences of the state-led climate change actions is difficult. Some actions, particularly the mandatory emission reductions, may create economic effects, especially in the automotive manufacturing and electricity-generating sectors. Many observers suggest that the quantity and range of state actions will catalyze federal activity. Industry stakeholders are especially concerned that the states will create a patchwork of climate change regulations across the nation. This prospect is causing some industry leaders to call for a federal climate change program. If Congress seeks to establish a federal program, the experiences and lessons learned in the states may be instructive.

Although some states are taking aggressive action, their possible emission reductions may be offset by increased emissions in states without mandatory reduction requirements. This is perhaps the central limitation of state climate change programs in actually affecting total greenhouse gas emissions. Legal challenges represent another obstacle for state programs, particularly for the more aggressive, mandatory programs.

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Introduction

Over the past century, particularly in recent decades, scientists have documented increases in global temperature and sea levels, decreases of sea ice in the Arctic, and melting of continental ice sheets and mountain glaciers. There is increasing evidence that human activities are at least partially responsible for some of these effects.[1] This is based upon the combination of two conclusions. First, global temperature increases are linked in some manner to the measurable increases of greenhouse gas (GHG) concentrations in the atmosphere.[2] Second, human activities (e.g., fossil fuel combustion, industrial processes, and deforestation) have contributed to the increased concentration of GHG emissions in the earth's atmosphere.

The link between GHG emissions and climate change has motivated efforts to achieve reductions of emissions. In 1992, the United States ratified the United Nations' Framework Convention on Climate Change (UNFCCC), which called on industrialized countries to initiate GHG reduction.[3] However, in early 2001, President George W. Bush rejected the UNFCCC 1997 Kyoto Protocol, which called for legally binding commitments by developed countries to reduce their GHG emissions.

Over the past decade, the federal government has promulgated or proposed a variety of voluntary and regulatory actions that, while not specifically seeking to reduce GHG emissions, may have yielded emission reductions as a byproduct.[4] In the 110th Congress, Members have proposed multiple bills that would address climate change issues in some fashion. For more details regarding this legislation, see CRS Report RL34067, *Climate Change Legislation in the 110th Congress*, by Jonathan L. Ramseur and Brent D. Yacobucci.

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[1] This report does not address the debates associated with the climate change science nor the role of human activity.

[2] For example, carbon dioxide, the primary GHG, has risen worldwide from 280 parts per million (ppm) to over 380 ppm over the past 150 years.

[3] The United Nations Framework Convention on Climate Change (UNFCCC) defines GHGs to include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluorane.

[4] For example, federal programs that promote energy efficiency or the use of renewable energy sources have the potential to reduce GHG emissions.

In recent years, there has been some congressional support for a mandatory reduction program. For example, the Senate version of the Energy Policy Act of 2005 included a "sense of the Senate" Resolution[5] stating:

> It is the sense of the Senate that Congress should enact a comprehensive and effective national program of mandatory, market-based limits and incentives on emissions of greenhouse gases that slow, stop, and reverse the growth of such emissions at a rate and in a manner that, No. 1, will not significantly harm the U.S. economy and, No. 2, will encourage other action and key contributors to global emissions.

Members in the 110th Congress have introduced several bills that would establish some type of a mandatory emissions reductions program. None of these bills has been reported out of committee. For more information on the progress and details regarding this legislation, see CRS Report RL33846, *Climate Change: Greenhouse Gas Reduction Bills in the 110th Congress*, by Larry Parker and Brent D. Yacobucci.

In the absence of action by the federal government to establish a national program that directly addresses GHG emissions, a number of states (and local governments, whose activities are not covered in this report[6]) have taken action in this arena. States' efforts cover a wide spectrum, from developing climate action plans to setting mandatory GHG emission standards. While state action is not a new development — some states set GHG reduction goals as early as 1989, and many states completed action plans in the 1990s — much of the early activity was focused mostly on rhetoric outlining preferable actions rather than on regulatory requirements. However, recent state action has been more significant. A growing number of states now have regulatory programs that limit GHG emissions from particular sources.

The motivating factors for the various states' actions may be as diverse as the actions themselves. Some actions are motivated by projections of climatic changes, such as sea level rise or agricultural impacts. Some states view their GHG policies as economic opportunities. States want to position themselves for a "less-carbonized" future,[7] by promoting, for example, alternative energy supplies, particularly sources available in-state. Other states champion GHG reduction policies because of the possible co-benefits: improved air quality, reduced traffic congestion, and less reliance on foreign energy supplies. Another motivating factor for state action is the possibility of catalyzing federal legislation.

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[5] Senate Amendment No. 866 to H.R. 6, passed by voice vote June 22, 2005. A motion to table the amendment was rejected by a roll call vote (44 - 53).

[6] A number of local governments are pursuing activities that may directly or indirectly reduce GHG emissions. For example, numerous local governments (cities, counties) in at least 35 states have joined the Cities for Climate Protection (CCP). Participating entities commit to reduce local emissions that contribute to global warming. For more information on this program, see [http://www.iclei.org/index.php?id=1118].

[7] See Rabe, Barry, 2006, "Second Generation Climate Policies in American States: Proliferation, Diffusion, and Regionalization," *Issues in Governance Studies*, The Brookings Institution, August 2006.

This report covers state actions that directly and explicitly address GHG emissions. First, the report describes the different types of state actions, both individual and cooperative efforts, that are either proposed or under way, and highlights several of the more significant developments. Second, the report examines state actions from a federal policymaking perspective, including both the potential effects of state-led actions and their limitations.

Direct Action Versus Indirect Action

Direct state actions that address GHG emissions include laws, regulations, or policies that are established explicitly to reduce GHG emissions. In some cases, it is difficult to draw a line between direct and indirect actions, because a specific policy may be undertaken for multiple purposes, including GHG reduction. One of the best examples of this ambiguity is a Renewable Portfolio Standard (RPS). An RPS requires that a certain amount or percentage of electricity is generated from renewable energy resources (e.g., solar, biomass). Twenty-eight states have implemented or are developing some type of RPS.[8] Although GHG reduction is not the primary driver for an RPS in most states, some states list their RPS as part of a comprehensive strategy to reduce GHG emissions.

Indirect actions are often characterized as "no regrets" approaches, providing net benefits regardless of the magnitude of their impacts on climate change. For the purposes of this report, indirect actions are those developed primarily to address other concerns, such as improvements in energy efficiency, energy security, or air quality. Examples of indirect actions include:

- Building codes: A majority of states have building codes that promote energy efficiency in commercial and residential structures; many of these states' standards are more stringent than federal policy.[9]

- Appliance Standards: Twelve states have set energy efficiency standards for appliances that are not covered under the federal program.[10]

- Agricultural policies: Several states promote agricultural practices that may indirectly reduce GHG emissions. For example, a "no-till"

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[8] See EPA, Summary of State Clean Energy-Environment Policy Data Table (current as of 1/1/2007), at [http://www.epa.gov/cleanenergy/stateandlocal/activities.htm]. Additional states identified by the Pew Center on Global Climate Change, Map: States with Renewable Portfolio Standards, at [http://www.pewclimate.org].

[9] EPA data indicate that 26 states have commercial codes more stringent than federal energy efficiency standards; 22 states have residential codes more stringent than federal energy efficiency standards. See EPA, Summary of State Clean Energy-Environment Policy Data Table (current as of 1/1/2007).

[10] See EPA, Map: State Energy Efficiency Actions - State Appliance Efficiency Standards (as of 1/1/2007), at [http://www.epa.gov/cleanenergy/stateandlocal/activities.htm].

farming technique saves fuel and man hours, while keeping carbon stored in the soil.[11]

This report, however, does not attempt to discuss the extremely wide variety of such indirect actions.

Direct Actions by States

States are implementing a range of direct actions to address GHG emissions. States' efforts have progressed recently in both quantity and substance. Arguably, early state actions were largely symbolic. In the late 1980s, Vermont[12] and Oregon[13] were the first states to set GHG reductions goals, but during the subsequent decade (1990-2001), both states increased their GHG emissions: Vermont by 18% and Oregon by 30%.[14] However, a majority of states have more recently begun to develop their own climate change strategies or policies, with a smaller but increasing number of states adopting or proposing more significant provisions, including mandatory GHG reductions.

States have developed and are crafting climate change policies both individually and in cooperation with other states. This section describes the spectrum of direct state actions, identifies the level of participation in various activities, and highlights individual and cooperative state programs when appropriate.

State Action Plans

At least 35 states have either completed or are in the process of preparing climate change action plans (see **Figure 1**). Typically, state action plans are drafted by a climate change task force, composed of members with diverse backgrounds and expertise. In general, task force members examine their state's sources of GHG emissions, and identify and rank the policy options that are most appropriate (i.e., cost-effective, politically feasible, etc.) for controlling emissions in their state. Often the state action plan is made available for public comment, revised if necessary, and then submitted for approval to state officials.

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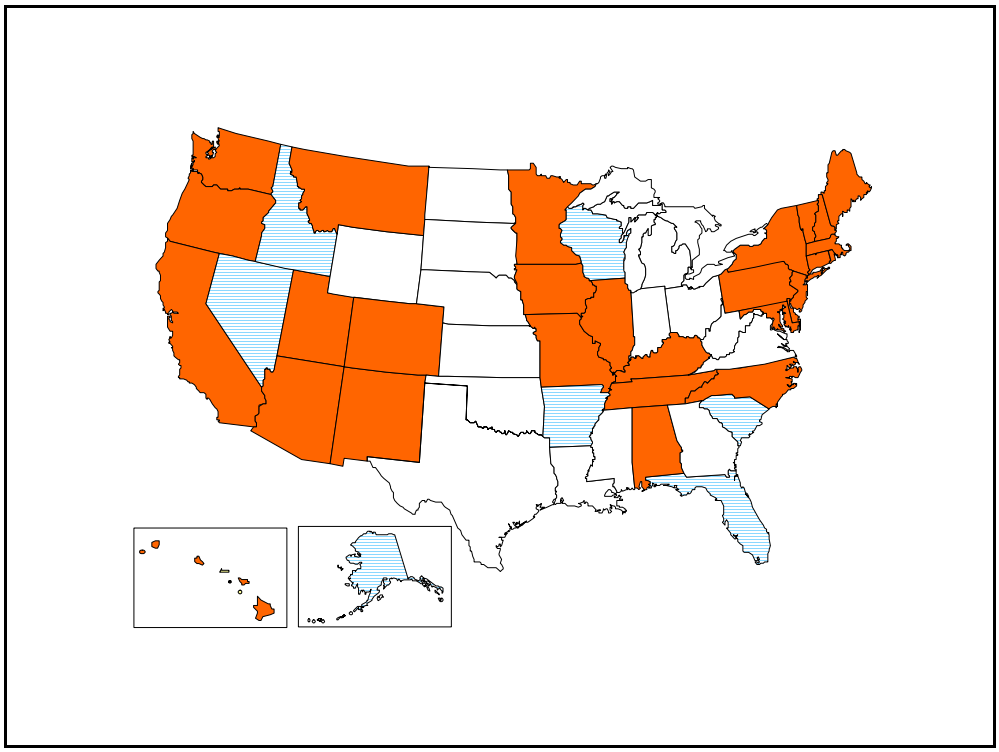
[11] Georgia promotes this technique through its No-Tillage Assistance Program (NTAP), which provides equipment and funding assistance. See Pew Center on Global Climate Change, State and Local Net Greenhouse Gas Emissions Reduction Programs, at [http://www.pewclimate.org].

[12] Vermont Executive Order 79 (October 23, 1989) called for a 15% reduction below 1989 levels by 2000. See U.S. Congress, Office of Technology Assessment, 1991, *Changing by Degrees: Steps to Reduce Greenhouse Gases*, p. 327.

[13] Oregon Senate Bill 576 (1989) set a goal of 20% reduction of 1988 levels by 2005. See U.S. Congress, Office of Technology Assessment, 1991, *Changing by Degrees: Steps to Reduce Greenhouse Gases*, p. 327.

[14] See World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/].

Figure 1. States with Completed (Orange) and Under-Development (Blue Lines) Climate Change Action Plans



Source: Prepared by the Congressional Research Service with data from U.S. EPA Climate Change Division and Pew Center on Global Climate. Online links to individual state action plans are available through EPA's website, at [http://www.epa.gov/climatechange].

Reflecting the fact that states have different economic sectors, natural resources, and political structures, state climate change action plans can vary substantially. Some state action plans focus more on indirect, "no regrets" strategies, such as improved energy efficiency, which will likely yield benefits irrespective of climate change effects. Other state action plans are more comprehensive and recommend a portfolio of direct efforts that address GHG emissions. Although the state climate change action plans may *recommend* an array of policy options, the plans do not necessarily result in direct actions to reduce GHG emissions. However, the number of completed state plans indicates the interest that a majority of states have in addressing climate change mitigation on some level.

Greenhouse Gas Emissions Targets

State emissions targets are goals by which a state can measure its progress in achieving GHG emissions reduction. By themselves, state emissions targets do not directly reduce GHG emissions. The targets are often established by the executive branch of state government (e.g., through an executive order) and may not have the support of state's legislative branch. However, a target signals that state officials, at least from one branch of the government, consider climate change an important issue.

Seventeen states have established *statewide* targets for GHG emissions (see **Table 1**).[15] Three of the state targets — California, Hawaii, and New Jersey — are mandatory (discussed below). Considering the GHG limits and targets set on the international stage in past years, the state targets are relatively modest.[16] Nearly all of the states with targets are in either the Northeast or on the west coast of the United States. The New England states' targets are similar, if not identical, because they are part of a cooperative plan developed in 2001.[17] Of the 17 states in **Table 1**, New Mexico and Illinois stand out because they have substantial coal production.[18]

Table 1 compares the states' GHG emissions in 1990 with emissions from the most recent years of available data.[19] The emissions data show the reductions states would need to make to meet their established targets. Although some of the states appear within reach of their 2010 targets, the most recent data from many of these states suggest that emissions are not decreasing, but at best are leveling off. More years of data are needed to evaluate progress, primarily because many of the states issued their GHG targets after 2003, and state-level data after 2003 are not yet available. Moreover, the emissions targets were typically created in conjunction with GHG reduction policies — some of them mandatory limits on specific industries or segments of state activities — whose implementation is not reflected in the available emissions data.

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[15] Several states have also developed more narrow targets, either for industry or electricity generation or only for carbon dioxide emissions.

[16] The U.S. Kyoto target was 7% below 1990 levels, averaged over the commitment period 2008 to 2012. For more on international climate agreements and U.S. involvement, see CRS Report RL33826, *Climate Change: The Kyoto Protocol and International Actions*, by Susan R. Fletcher and Larry Parker.

[17] New England Governors/Eastern Canadian Premiers, *Climate Change Action Plan 2001*, August 2001, at [http://www.negc.org].

[18] In 2005, Illinois and New Mexico ranked 9th and 11th, respectively, in coal production. New Mexico ranked 3rd in natural gas production, a fuel that releases significantly less GHG than coal or oil when burned. See U.S. Department of Energy, Energy Information Administration Statistics, at [http://www.eia.doe.gov/].

[19] The emissions data in Table 1, particularly the 1990 levels, may differ from the official estimates provided by individual states. The objective of the table is to compare emission levels over time, and assess the challenge of meeting emissions targets. Because some states only have estimates for 1990 levels, this report uses data from the World Resources Institute for a consistent comparison.

Table 1. Statewide Greenhouse Gas Targets Compared with Emissions Data from 1990 and Recent Years of Available Data

State	Greenhouse Gases Target(s)	Greenhouse Gas Emissions (million metric tons of CO_2 equivalent)				
		1990	2000	2001	2002	2003
AZ[20]	2000 levels by 2020; 50% below 2000 levels by 2050	70	93	95	94	96
CA[21]	2000 levels by 2010; 1990 levels by 2020; 80% below 1990 levels by 2050	412	442	449	447	453
CT[22]	1990 levels by 2010; 10% below 1990 levels by 2020	44	47	45	44	46
FL[23]	2000 levels by 2017; 1990 levels by 2025; 80% below 1990 levels by 2050	208	264	263	267	271
HI[24]	1990 levels by 2020	23	21	21	22	23
IL[25]	1990 levels by 2020; 60% below 1990 levels by 2050	231	277	266	268	269
MA[26]	1990 levels by 2010; 10% below 1990 levels by 2020	89	88	88	89	92
ME[27]	1990 levels by 2010; 10% below 1990 levels by 2020	21	25	25	26	26
MN[28]	15% below 2005 levels by 2015; 30% below 2005 levels by 2025; 80% below 2005 levels by 2050	99	118	114	117	120

[20] Arizona Executive Order 2006-13 (September 7, 2006).

[21] California Executive Order S-3-05 (June 1, 2005) set the 2010 and 2020 targets; AB 32 (discussed below) made the 2020 target mandatory.

[22] Connecticut Public Act No. 04-252 (June 14, 2004).

[23] Florida Executive Order 07-127 (July 13, 2007).

[24] Hawaii Governor Lingle signed the Global Warming Solutions Act of 2007 (Act 234) into law June 30, 2007. The act mandates statewide GHG emission reductions.

[25] Announcement from Illinois Governor Blagojevich (February 13, 2007), related to Executive Order 2006-11 (October 5, 2006).

[26] Massachusetts Climate Protection Plan of 2004 (Spring 2004).

[27] Maine LD 845 (HP 622) (effective September 13, 2003).

[28] Minnesota Governor Pawlenty , signed into law the Next Generation Energy Act May 25, 2007.

State	Greenhouse Gases Target(s)	Greenhouse Gas Emissions (million metric tons of CO_2 equivalent)				
		1990	2000	2001	2002	2003
NH[29]	1990 levels by 2010; 10% below 1990 levels by 2020	16	19	18	19	22
NJ[30]	1990 levels by 2020; 80% below 2006 levels by 2050	124	137	135	135	137
NM[31]	2000 levels by 2012; 10% below 2000 levels by 2020; 75% below 2000 levels by 2050	58	66	66	64	66
NY[32]	5% below 1990 by 2010; 10% below 1990 levels by 2020	233	244	236	230	244
OR[33]	Stabilize by 2010; 10% below 1990 levels by 2020; 75% below 1990 levels by 2050	39	52	52	50	51
RI[34]	1990 levels by 2010; 10% below 1990 levels by 2020	10	13	14	13	13
VT[35]	1990 levels by 2010; 10% below 1990 levels by 2020	7	8	8	8	8
WA[36]	1990 levels by 2020; 25% below 1990 levels by 2035; 50% below 1990 levels by 2050	84	99	100	93	95

Source: Prepared by the CRS with data from the following: state targets compiled by Pew Center on Global Climate Change, at [http://www.pewclimate.org]; GHG emissions data from World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/] (GHG data excludes land use changes).

In addition to the individual state targets, a group of six Western states — Arizona, California, New Mexico, Oregon, Utah, and Washington — set a regional, economy-wide target to reduce GHG emissions to15% below 2005 levels by 2020. This initiative is discussed further below.

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[29] The Climate Change Challenge (December 2001).

[30] New Jersey Governor Corzine signed into law the Global Warming Response Act (A3301) July 6, 2007, which requires mandatory emission reductions.

[31] New Mexico Executive Order 05-033 (June 9, 2005).

[32] New York State Energy Plan (June 2002).

[33] Oregon Governor Kulongoski signed HB 3543 into law August 6, 2007.

[34] Rhode Island Greenhouse Gas Action Plan (July 2002).

[35] This target is discussed in Vermont's state plan, *Fueling Vermont's Future: Vermont Comprehensive Energy Plan and Vermont Greenhouse Gas Action Plan* (July 1998).

[36] Washington Governor Gregoire signed SB 6001 into law May 3, 2007.

Greenhouse Gas Emissions Tracking

Reliable GHG emissions data are a keystone component of any climate change program. To implement effective solutions to climate change, policymakers need up-to-date and accurate information detailing the volume and sources of GHG emissions in their states. Precise monitoring is particularly vital for market-oriented approaches to GHG control. Whether a market-oriented program is based on tradeable emissions credits or a carbon tax, reliable and transparent emissions data would be the foundation for developing the allocation systems, reduction targets, and enforcement provisions.

The federal government has several programs in place that either track or estimate GHG emissions:

- Power plants subject to the 1990 Clean Air Act acid rain program must monitor and report to EPA various air pollutants, including carbon dioxide.[37]

- The Department of Energy administers a voluntary GHG reduction registry. This program started in 1994, pursuant to Section 1605(b) of the Energy Policy Act of 1992 (P.L. 102-486).[38]

- The EPA prepares an annual inventory of the nation's GHG emissions and sinks, which is submitted to the United Nations in accordance with the Framework Convention on Climate Change.

Many states have developed, or begun to develop, their own GHG tracking programs. Although tracking programs may overlap in purpose and terminology, for this report, tracking programs are divided into three categories: inventories, registries, and mandatory reporting.

Greenhouse Gas Inventories. At least 42 states have developed GHG inventories. Inventories typically provide estimates of emissions for various categories: economic sector (e.g., energy, agriculture), emissions source (e.g., automobiles, power plants), GHGs (e.g., carbon dioxide, methane). In general, states create their inventories by following guidelines developed by the Environmental Protection Agency (EPA) that are based on internationally recognized standards. Inventories are often used to obtain an overall assessment of a state's emissions levels and sources, and are perhaps best suited for monitoring trends and/or developing comprehensive strategies. Although some states have performed inventory updates, most of the states' inventories only cover 1990 emission levels.

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[37] Section 821, 1990 Clean Air Act Amendments (P.L. 101-549, 42 USC 7651k). For more information regarding federal programs see CRS Report RL31931, *Climate Change: Federal Laws and Policies Related to Greenhouse Gas Reductions*, by Brent D. Yacobucci and Larry Parker.

[38] For more information on this program, see [http://www.eia.doe.gov/oiaf/1605/frntvrgg.html].

Greenhouse Gas Registries. A state GHG registry is a further step in GHG tracking. In general, state GHG registries are voluntary programs that allow facilities to submit and officially record emissions data. The states' voluntary registry programs encourage participation through incentives. Perhaps the primary incentive is the opportunity for participants to create an official record of emissions reductions, which the parties hope will count as emissions credits in future mandatory reduction programs. At a minimum, participants typically receive some public recognition for their efforts, which may help promote a company's environmental stewardship profile. Five states have passed legislation to establish GHG registries, of which three are now under way:[39]

- New Hampshire: The New Hampshire GHG Registry went into effect in 2001. The registry is intended to record emissions reductions in a state database that can be used in addressing possible future requirements.

- California: The California Climate Action Registry began operations in 2002. This state registry is arguably the most comprehensive, as participants register all of their GHG emissions for operations in California; other state (and federal) registries cover only emission reductions. The registry has over 100 participants.

- Wisconsin: The Wisconsin Voluntary Emission Reduction Registry, a registry of voluntary reductions of GHG emissions, went online in 2003.

Other states are joining forces to establish a national registry, which may link with regional registries that were previously created.[40] In May 2007, 30 states formed the Climate Registry, which aims to establish a standard system for GHG emissions reporting. As of August 2007, 40 states have joined the Climate Registry, which supports both voluntary and mandatory reporting schemes in the participating states.[41]

Mandatory Greenhouse Gas Reporting. Mandatory reporting programs allow states to monitor GHG emissions from precise sources. Although the primary purpose of mandatory reporting is typically to support an emission reduction program, a reporting program can potentially provide benefits without an accompanying reduction requirement. For example, if companies' GHG emissions were made publicly-available and thus comparable, the companies might have an

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[39] The other two states are Maine and Georgia. Maine's registry is not yet operational, but the state does have a mandatory reporting requirement (discussed below). Georgia, instead of tracking GHG emissions, established a registry for counting the offsetting reductions in GHG emissions obtained by carbon sequestration. Not counted as one of the five states, New Jersey repealed a previously enacted registry program in 2004.

[40] New England and Mid-Atlantic states are developing the Eastern Climate Registry. In addition, the Lake Michigan Air Directors Consortium (LADCO) is working on a registry for several states in the Midwest

[41] For more information see [http://www.theclimateregistry.org].

incentive to reduce emissions voluntarily.[42] However, there is some concern that emissions may increase under a mandatory reporting program, especially if companies suspect that the state will establish a mandatory reduction regime in later years. For instance, facilities may attempt to "game" the system by deliberately increasing emissions (or over-reporting them) in order to gain additional allowances once a reduction program is established.[43]

A few states already require, and others are in the process of developing, GHG emissions reporting as part of an emissions reduction program (discussed in the next section). Four states currently have a mandatory reporting program that is not linked with an emissions reduction requirement:

- Wisconsin: In 1993, the state established a mandatory reporting program that includes carbon dioxide reporting for facilities generating over 100,000 tons annually.[44]

- New Jersey: Certain facilities in New Jersey that report air pollutant emissions must also submit emission data for carbon dioxide and methane. This requirement went into effect in 2003.[45] New Jersey is developing a mandatory reduction program (discussed below) that will entail a more comprehensive reporting regime.

- Maine: Facilities in Maine that emit any criteria pollutant over a specific reporting threshold must also report GHG emissions. This provision went into effect July 2004.[46]

- Connecticut: Starting in 2006, facilities subject to federal reporting under Title V of the Clean Air Act must submit GHG emissions data on an annual basis.[47]

Mandatory Programs to Reduce Greenhouse Gases

Mandatory programs to require GHG reductions represent the most aggressive end of the state action spectrum. As with state actions overall, these programs can

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[42] This notion is analogous to the arguments in support of EPA's Toxic Release Inventory (TRI) Program, which requires facilities to submit annual data concerning their releases of chemicals to the environment. The TRI program is generally considered a success, as releases have decreased since the program's inception. Rabe, Barry, 2002, *Greenhouse & Statehouse: The Evolving State Government Role in Climate Change*, Prepared for the Pew Center on Global Climate Change.

[43] This notion assumes that allowances would be allocated based upon past performance, instead of sold through an auction process.

[44] Wisconsin Chapter NR 438.03.

[45] New Jersey Administrative Code 7:27-21.3.

[46] Maine Department of Environmental Protection Rules, Chapter 137 (per 38 MRSA, Section 575).

[47] Connecticut Public Act No. 04-252 (June 14, 2004).

vary significantly in scope, stringency, and design. Mandatory programs are generating considerable interest and some controversy. This section discusses the different types of mandatory programs and highlights particular state actions that are currently in effect or under development.

Statewide Greenhouse Gas Emissions Reduction Programs. Statewide (often described as economy-wide) GHG emission reductions programs seek to control and reduce emissions from multiple economic sectors. In general, a statewide program covers sectors — e.g., electricity generation, industry, and transportation — that account for the vast majority of a state's emissions. Depending on the design of the program, some sectors (e.g., agricultural or residential) may be excluded. Three states — California, Hawaii, and New Jersey — have passed legislation that would establish statewide reduction programs. However, each of the three state statutes lacks critical details regarding the design of the reduction program. Instead, the statutes direct state agencies to develop the logistical elements that would implement the reduction requirements. In addition to individual state action, several western states are developing a regional, economy-wide reduction program. These programs are described below.

California. In September 2006, California enacted landmark legislation that would establish a comprehensive GHG reduction regime. The legislation — AB 32 or the Global Warming Solutions Act[48] — directs the California Air Resources Board (CARB) to develop and implement a statewide program that would reduce the state's GHG emissions to 1990 levels by 2020.

The statute grants considerable authority to CARB, which is charged with determining critical details concerning the framework and applicability of the program. For example, the law does not specifically require the use of a market-based system, such as a cap-and-trade program, to reduce GHG emissions. Instead, AB 32 authorizes CARB to develop regulations to "achieve the maximum technologically feasible and cost-effective GHG emission reductions...." Moreover, the statute does not include a list of regulated emission sources or categories,[49] but instructs CARB to determine which sources are necessary to meet the statewide target.[50]

The law establishes a schedule for various agency deadlines. By June 30, 2007, AB 32 instructs CARB to identify the early reduction options, which can be implemented prior to the mandatory program, and for which a facility will receive emissions credit. The law requires CARB to set up a mandatory reporting scheme by January 1, 2008. Data from the reporting program will be used to establish baselines for emissions sources, which will be subject to emission reductions starting in 2012.

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[48] California Governor Schwarzenegger signed the legislation September 27, 2006.

[49] Earlier drafts of the legislation specifically cited the electric power, oil/gas, and cement industries, and landfills as significant emitters.

[50] The statute instructs CARB to regulate mobile sources if the 2004 mobile sources regulatory program (described above) does not remain in effect (presumably due to legal challenges).

For a more in-depth discussion of California's program, see CRS Report RL33962, *Greenhouse Gas Reductions: California Action and the Regional Greenhouse Gas Initiative*, by Jonathan L. Ramseur.

Hawaii. In June 2007, Hawaii enacted the Global Warming Solutions Act of 2007, mandating statewide GHG emissions reduction to 1990 levels by 2020. The statute establishes a GHG emissions reduction task force, which is directed to offer policy recommendations by January 1, 2009. Before December 31, 2011, the Department of Health is instructed to adopt implementing regulations that would take effect January 1, 2012. Similar to California's statute, Hawaii's act does not specify details, but gives considerable responsibility to the Department of Health. The act does require the Department of Health "to endeavor to make the requirements consistent with the requirements of international, federal, and other states' greenhouse gas emission reporting programs, as necessary."[51]

New Jersey. In July 2007, New Jersey enacted the Global Warming Response Act, which states that GHG emissions shall be reduced to 1990 levels by 2020 and to 80% below 2006 levels by 2050. The statute instructs the Department of Environmental Protection (DEP) to develop a GHG emissions inventory for the baseline years — 1990 and 2006 — and a system for monitoring and reporting GHG emissions from specific sources (e.g., electricity generators), as well as entities deemed to be significant emitters by the DEP. The law does not specify how the reductions will be met, but directs the DEP, in coordination with other agencies, to submit recommendations to the governor and state legislature by June 30, 2008. Unlike the California and Hawaii statutes, the New Jersey act does not grant specific authority to DEP to implement the reduction program through regulation. Although not specifically stated, further legislative action would likely be required to implement the reduction program.[52]

Western Climate Initiative. In 2007, the governors of six western states — Arizona, California, Oregon, New Mexico, Utah, and Washington — formed the Western Climate Initiative (WCI)[53] to reduce GHG emissions in their region.[54] In addition, two Canadian provinces — Manitoba and British Columbia — have joined the initiative.[55] In August 2007, the states and provinces set a regional, economy-wide target to reduce GHG emissions to15% below 2005 levels by 2020.

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[51] Section 8 of the act, revising Hawaii Revised Statute § 342B.

[52] According to an official with the NJ DEP, existing statutory authorities may allow some regulations to move forward without additional legislative action. However, subsequent legislative action is most likely necessary to implement the reduction regime in full (per telephone conversation, August 28, 2007).

[53] For the text of the agreement see [http://www.westernclimateinitiative.org/].

[54] Utah joined the initiative May 21, 2007; the five other states were charter members, signing the agreement February 26, 2007.

[55] British Columbia signed April 2007 and Manitoba signed June 2007. Press Release from the Office of the Premier of British Columbia (April 24, 2007), at [http://www.mediaroom.gov.bc.ca/]; Press Release from Manitoba Province (June 12, 2007), at [http://news.gov.mb.ca/news/].

In order to implement this target, the participants agreed to develop a market-based program, such as a "load-based cap and trade program," by August 2008.

Although the WCI is still in early development, there are several issues that may hinder its implementation. As noted, the WCI is an agreement between the states' governors. To implement the program, the states' legislatures would need to enact laws to carry out the initiative's objectives. This may present an obstacle if a state's legislative branch finds fault with the reduction program developed by states' executive branch officials.

The inclusion of British Columbia and Manitoba may raise legal issues, particularly constitutional concerns. Article I, Section 10, Clause 3 of the U.S. Constitution states that "[n]o State shall, without the Consent of Congress ... enter into any Agreement or Compact with another State, or with a foreign Power...." It is uncertain whether this clause (the "compact clause") will create legal hurdles for the WCI.

Emission Reduction from Power Plants. A sector-specific approach that focuses on carbon dioxide is relatively easier to implement than an economy-wide program that includes multiple GHGs. The electricity-generating sector is often considered a primary candidate for emission reduction, because in most states electric power plants account for the highest percentage of carbon dioxide emissions.[56] Many of these facilities are already tracking their carbon dioxide emissions as required by the 1990 Clean Air Act.

Regional Greenhouse Gas Initiative.[57] One of the more significant climate change developments at the state level is the Regional Greenhouse Gas Initiative (RGGI). RGGI is a market-oriented effort of nine states — Connecticut, Delaware, Maine, Maryland,[58] Massachusetts,[59] New Hampshire, New Jersey, New York, and Vermont — to reduce carbon dioxide emissions from power plants. RGGI would set up the nation's first mandatory cap-and-trade program for carbon dioxide.[60]

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[56] Based on 2001 data. Energy Information Administration, Emissions of Greenhouse Gases in the United States 2004 (Table C2).

[57] For a more in-depth analysis, see CRS Report RL33962, *Greenhouse Gas Reductions: California Action and the Regional Greenhouse Gas Initiative*, by Jonathan L. Ramseur.

[58] Maryland Governor O'Malley signed RGGI's Memorandum of Understanding on April 20, 2007, making Maryland the first state that was not an original RGGI participant to join the regional initiative.

[59] Massachusetts and Rhode Island were involved in RGGI's development since its inception in 2003. However, both states' governors declined to sign the Memorandum of Understanding in 2005, citing costs as their primary rationale for not participating. Under a new governor, Massachusetts joined RGGI as a participant in January 2007.

[60] In a cap-and-trade system, regulators set a cap (or limit) on the overall emissions of a given gas from a specified group of sources, such as power plants. The emissions allowed under the new cap are then allocated in the form of credits (or permits) to individual sources. Sources that emit more than their allowance must buy credits from those who emit less than

(continued...)

The initial objective of RGGI is to stabilize current carbon dioxide emissions from power plants in RGGI states, starting in January 2009, followed by a 10% reduction by 2019. A primary strategy of RGGI is to create a program with flexibility, so that in the future other emission sources/sectors, GHGs, or states could be included. Rhode Island is expected to join RGGI in 2007.[61]

Some observers consider RGGI to be a possible test-case for a federal cap-and-trade program, and thus several of RGGI's design elements are generating interest and debate. For example, one specific feature — the emission allocation scheme — is drawing both praise and criticism. In both RGGI's Memorandum of Understanding and its Model Rule, states agreed that at least 25% of emission allowances will be allocated for a "consumer benefit or strategic energy purpose."[62] Several states have indicated that they intend to allocate 100% of their states' allowances for that purpose. This action would require power plants to purchase the set-aside allowances, most likely through an auction, instead of receiving them at no charge.[63]

Although RGGI is one of the more aggressive state programs addressing climate change, the program will likely face several obstacles. For example, RGGI proponents expect the program to face legal challenges, which could delay program initiation. In addition, a critical design detail — electricity imports from non-RGGI states — is unresolved. This is often described as the "leakage" problem. Leakage can occur when an emissions reduction program does not include all sources contributing to the environmental problem. For example, if a RGGI state lowers its emissions by importing more power from a non-RGGI state, the emissions reductions in the RGGI state may be offset by an emission increase in the exporting state.

Individual State Efforts. Two states have already established emission reduction requirements at *existing* power plants:

- Massachusetts: In 2001, Massachusetts became the first state to take formal action on carbon dioxide emissions at operational power plants. As part of a multi-pollutant strategy, which went into effect in 2006, the state's six largest power plants must reduce carbon dioxide to levels consistent with those produced in the late 1990s.

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[60] (...continued)
their allowance, thus creating a financial incentive for sources to reduce their own emissions. For more information on cap-and-trade systems, see EPA's website at [http://www.epa.gov/airmarkets/capandtrade].

[61] Rhode Island Governor Donald Carcieri announced (January 30, 2007) that his state plans to join the initiative.

[62] See RGGI Model Rule, issued August 15, 2006, p. 42; and RGGI Memorandum of Understanding, Section G(1), signed by participating state governors December 20, 2005, both available at [http://www.rggi.org/modelrule.htm].

[63] For more discussion regarding these issues, see CRS Report RL33799, *Climate Change: Design Approaches for a Greenhouse Gas Reduction Program*, by Larry Parker.

In 2008, this cap is lowered further.[64] The program allows the plants to either make the reductions, demonstrate offsite reductions, or purchase emissions credits from other verifiable sources.

- New Hampshire: In 2002, the state enacted multi-pollutant legislation[65] requiring its three fossil fuel power plants to reduce carbon dioxide to 1990 levels by the end of 2006. In order the meet the cap, the law allows sources to bank early reductions or buy credits through other programs deemed acceptable by state officials.

Both Oregon and Washington have programs that require *new* power plants to reduce carbon dioxide emissions or purchase offsets. In 1997, Oregon became the first state to regulate carbon dioxide emissions by passing legislation[66] requiring new power plants to equal or exceed carbon dioxide levels that are 17% below the best natural gas-fired plant in the nation. Plants can either reduce emissions directly or purchase offsets from a nonprofit organization (the Oregon Climate Trust) that was established with the 1997 law. This organization helps develop various projects that will reduce or sequester GHG emissions. These projects generate the pool of offsets available (by purchase) to the power plants. So far, all of the new facilities have chosen to purchase offsets instead of reducing onsite emissions.[67] Washington passed similar legislation in 2004, requiring new power plants to offset 20% of their carbon dioxide emissions.[68]

Emission Reduction from Motor Vehicles. The U.S. transportation sector accounts for a substantial percentage — 28% in 2004[69] — of the nation's GHG emissions. Automobiles and light-duty trucks (fueled by gasoline or diesel) generate the majority — 63% in 2004 — of the nation's transportation-related GHG emissions.[70] The transportation sector is the single largest source of the primary GHG, carbon dioxide, in 14 states.

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[64] 310 Massachusetts Code of Regulations 7.29.

[65] New Hampshire Clean Power Act (May 9, 2002), codified in New Hampshire Statute, Title X, Chapter 125-O (Multiple Pollutant Reduction Program).

[66] HB 3283, codified in Oregon Administrative Rules, Chapter 345, Division 24.

[67] Point Carbon, 2006, "Carbon Trading in the US: The Hibernating Giant," *Carbon Market Analyst*, September 13, 2006.

[68] HB 3141 (signed into law on March 31, 2004).

[69] EPA, 2006, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2004, Executive Summary*, p. ES-13, at [http://epa.gov/climatechange/emissions/usinventoryreport.html].

[70] The transportation sector also includes emissions (in descending order) from heavy-duty trucks, aircraft, boats, and trains. EPA, 2006, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2004*, pp. 3-8, at [http://epa.gov/climatechange/emissions/usinventory report.html].

California's transportation sector, in particular, generates almost 41% of the state's annual greenhouse emissions.[71] California is in a unique position regarding the regulation of air emissions from motor vehicles. It is the only state with conditional authority (i.e., the state needs a waiver from EPA) to develop motor vehicle pollution standards that are more stringent than federal requirements.[72] The law permits other states to choose to follow California's more stringent provisions,[73] and states have adopted California standards in the past.

In 2002, California enacted the first state law (AB 1493) requiring GHG limits from motor vehicles.[74] As directed by the statute, the California Air Resources Board (CARB) issued regulations in September 2004, limiting the "fleet average GHG exhaust mass emission values from passenger cars, light-duty trucks, and medium-duty passenger vehicles."[75] The fleet average caps first apply to model year 2009 vehicles. The caps become more stringent annually, so that by 2016, the fleet average would be 30% below the 2009 level.

At least 14 states have formally adopted or announced plans to follow the California regulation.[76] In order for the states to implement this standard, California must receive a waiver from the EPA. California requested a waiver (as required by Section 209 of the Clean Air Act) in December 2005, but the EPA has yet to respond. Although the EPA has approved every California waiver request since 1975, it has displayed a reluctance to use the Clean Air Act to control GHG emissions, arguing in federal court that the Clean Air Act does not authorize the EPA to regulate GHG emissions for the purpose of addressing climate change.

However, an April 2, 2007, Supreme Court decision (*Massachusetts v. EPA*)[77] provided clarification on this issue. The Court found no doubt that the Clean Air Act gives EPA the authority to regulate GHG emissions (in this case, from new motor vehicles). Although the specifics of such regulation might be subject to agency discretion, the decision should at least improve the possibility that the EPA will grant a waiver to California. Some observers have suggested that the Clean Air Act waiver may be the most direct impact of the decision. For more discussion regarding this issue, see CRS Report RL34099, *California's Waiver Request to Control Greenhouse Gases Under the Clean Air Act*, by James E. McCarthy.

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[71] California Energy Commission, 2006, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*, p. 8.

[72] See Clean Air Act Section § 209, codified at 42 U.S.C. § 7543.

[73] Clean Air Act § 177, codified at 42 U.S.C. § 7507.

[74] AB 1493 (or the California Vehicle Global Warming Law) was signed into law by Governor Gray Davis on July 22, 2002.

[75] Title 13, California Code of Regulations § 1961.1.

[76] The 14 states are Arizona, Connecticut, Florida, Maine, Maryland, Massachusetts, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington.

[77] The ruling is available at [http://www.supremecourtus.gov/opinions/06pdf/05-1120.pdf].

There are already several lawsuits against state actions that seek to regulate GHG emissions from motor vehicles. Car dealers and trade associations have filed suits in California, Vermont, and Rhode Island seeking to halt the regulations on various grounds. For example, the plaintiffs contend that California's regulations are preempted by the Energy Policy and Conservation Act (P.L. 94-163), which directs states not to regulate fuel economy standards. It is uncertain what role the *Massachusetts* decision may play in these proceedings, because some of the arguments in these cases (e.g., the relationship between conflicting federal and state policing concerning climate change) were not addressed in the *Massachusetts* case.[78]

Other Mandatory Programs. Although they do not require emission reductions or offsets from specific facilities or sources, other mandatory programs may have an impact on GHG emissions. A few states, California in particular, have recently developed requirements that aim to influence investment in long-term power generation. These state actions may impact GHG levels by influencing which energy sources — coal, oil, natural gas, etc. — are used to generate electricity for consumers.

Greenhouse Gas Emissions Performance Standard. Two states — California and Washington — have enacted laws requiring a GHG emissions performance standard for applicable power plants. In September 2006, California passed legislation (SB 1368)[79] that will forbid "load-serving entities"[80] from entering into new "long-term financial commitments"[81] with power plants unless a plant's GHG emissions are as low or lower than those of a new, combined-cycle natural gas facility. This emissions performance standard will apply to both in-state power plants and out-of-state facilities that seek to export electricity to California. Washington passed similar legislation (SB 6001) in May 2007.

The new performance standards complement the emissions reductions programs being developed in California and Washington. As discussed above, California is developing a mandatory reduction program, and Washington has a statewide emissions reduction target; both states are participants in a regional emissions reduction program (WCI). The implementation of California's emissions reduction program and the WCI is several years away (irrespective of legal challenges). The performance standards act as a stop-gap measure, preventing further utility investment in carbon-intensive fuels while the states develop broader reduction regimes.

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[78] For further discussion of these legal issues, see CRS Report RL32764, *Climate Change Litigation: A Growing Phenomenon*, by Robert Meltz.

[79] SB 1368 was signed by the governor on September 29, 2006.

[80] Defined as "every electrical corporation, electric service provider, or community choice aggregator serving end-use customers in the state." SB 1368 (codified in Public Utilities Code, Section 8340(h)).

[81] Defined as a "new ownership investment in baseload generation or a new or renewed contract with a term of five or more years, which includes procurement of baseload generation." SB 1368 (codified in Public Utilities Code, Section 8340(j)).

Once the new performance standards are applicable (and previous commitments expire), they will effectively prohibit California and Washington consumers from using electricity generated by conventional coal-fired power plants. Compared with a combined-cycle natural gas plant, a conventional coal-fired power plant emits more than twice the amount of carbon dioxide. Using current technologies, coal-fired generators would fail to meet the new emissions standards.[82]

From 2002 through 2005, approximately 20% of California's electricity was generated from coal;[83] approximately 10% of Washington's electricity came from coal generation facilities over the same period.[84] As the laws take effect, California and Washington will likely need to reduce/conserve a comparable amount of energy or replace the coal-generated electricity with alternative sources of power.

The new emissions standards will impact not only California and Washington, but also other states in the West. For example, California's electricity imports generally fall between 22% and 32% of the state's total electricity consumption, but its imports are responsible for 39% to 57% of the total GHG emissions linked with electricity.[85] This is due to the fact that most of California's in-state electricity is produced from sources other than coal, while most of the state's imported electricity is generated through coal combustion. Once the standard takes effect, the coal-fired plants in neighboring states, which previously provided electricity to California, will need to look elsewhere for customers. The same goes for coal-fired power plants still in development in western states, which may have been designed, at least in part, to serve California consumers.[86]

Arguably, the GHG performance standards disproportionately affect the neighboring states that have historically exported coal-generated electricity to California and Washington consumers. This possible consequence may raise legal issues, such as a state's general inability to regulate interstate commerce.

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[82] As technology advances, coal-fired plants might be able to reduce GHG emissions through carbon capture and sequestration (CCS). However, "there is relatively little experience in combining CO_2 capture, transport and storage into a fully integrated CCS system. The utilization of CCS for large-scale power plants (the application of major interest) still remains to be implemented." Intergovernmental Panel on Climate Change (IPCC), 2005, *IPCC Special Report Carbon Dioxide Capture and Storage, Summary for Policymakers*.

[83] The percentage of California's electricity generated from coal should decrease, because a large coal-fired plant (Mohave facility) was shut down at the end of 2005. California Energy Commission, Gross System Electricity Production, at [http://www.energy.ca.gov/electricity].

[84] Washington State Department of Community, Trade and Economic Development, 2007, *2007 Biennial Energy Report: Issues and Analysis for the Washington State Legislature and Governor*, p. 7, at [http://www.cted.wa.gov/].

[85] California Energy Commission, 2006, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*, Draft Staff Report, p. 12.

[86] See Holly, Chris, "California PUC Issues IOU Greenhouse Rules; Muni Nixes Coal Deal," *The Energy Daily*, December 15, 2006.

Low Carbon Fuel Standard. To complement California's statewide GHG reduction program, the governor issued an executive order (signed January 18, 2007) establishing a low carbon fuel standard (LCFS). The LCFS aims to reduce the carbon intensity of California's transportation fuels by 10% by 2020. California currently relies on petroleum-based fuels for 96% of its transportation needs.[87] Achieving the carbon intensity reduction is expected to replace 20% of the state's gasoline consumption with less carbon-intensive fuels.[88] The LCFS would apply to all refiners, blenders, producers, and importers of transport fuels.

The order states that transportation fuels shall be measured on a full fuel cycle basis. Thus, regulators must factor in all of the energy used and potential GHGs emitted during the fuel's development (extraction or production), delivery (via vehicle or pipeline), and final use (combustion). Corn-based ethanol, for example, is expected to play a role in meeting California's LCFS. To comply with the full fuel cycle assessment, regulators must consider the energy needed to produce fertilizers, operate farm equipment, transport corn, convert corn to ethanol, and distribute the final product. For more information on these issues, see CRS Report RL33290, *Fuel Ethanol: Background and Public Policy Issues*, by Brent Yacobucci.

The LCFS executive order enhances alternative fuel legislation (AB 1007) that California passed in 2005.[89] AB 1007 requires the California Energy Commission (CEC), in partnership with other agencies, including CARB, to develop and adopt a State Alternative Fuels Plan by June 20, 2007. The executive order directs CEC to supplement this plan with a compliance schedule for meeting the 2020 LCFS target.

Greenhouse Gas "Adders." Another state action that may affect a state's sources of electricity generation is the adoption of a GHG (or carbon) adder. In general, adders require utilities to weigh the future costs of GHG emissions when considering different energy investment options (e.g., fossil fuels, renewable energy supplies). For example, California's Public Utilities Commission requires investor-owned-utilities to include a value of $8/ton of carbon dioxide emissions when conducting long-term planning or procurement activities.[90] The agency stated that this requirement "will serve to internalize the significant and under-recognized cost of [GHG] emissions, [and] help protect customers from the financial risk of future climate regulation...."[91] Only a few other states[92] require some type of GHG adder, and California's adder may be rendered less relevant due to its new emission

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[87] Executive Order S-01-07, signed January 18, 2007.

[88] California Office of the Governor, *The Role of a Low Carbon Fuel Standard in Reducing Greenhouse Gas Emissions and Protecting Our Economy*, January 18, 2007.

[89] The governor signed AB 1007 September 29, 2005.

[90] California Public Utilities Commission, Decision 05-04-024, April 7, 2005.

[91] California Public Utilities Commission, Decision 04-12-048, December 16, 2004.

[92] Oregon and Colorado. See Pew Center on Global Climate Change website, at [http://www.pewclimate.org/states.cfm].

performance standard (discussed above). At this stage, the adders have not been credited with changing any procurement decisions.[93]

Issues for Congress

The climate change activity in the states raises several issues that may be of interest to Congress. This section discusses some of the potential effects of state action in lieu of federal legislation. This section also examines the limitations of state actions, both from a climate change policy perspective and in the context of legal challenges.

Potential Effects of State Actions

Many states generate significant emissions of GHGs. If individual U.S. states were classified as sovereign nations, 18 U.S. states would rank in the top 50 for nations that annually emit the primary GHG: carbon dioxide.[94] Compared with other nations, Texas, the combined WCI and RGGI states, and California rank as top carbon dioxide emitters (**see Table 2**).

Table 2. Top-Ranked Carbon Dioxide Emissions by Nation, U.S. States, and U.S. Regional Partnerships (2003 data)

Country, State, or Group	CO_2 Emissions (million metric tons)	Country, State, or Group	CO_2 Emissions (million metric tons)
United States	5,778	Texas	719
China	4,497	RGGI states	606
European Union	4,003	United Kingdom	553
Russian Federation	1,581	Canada	544
Japan	1,258	South Korea	489
India	1,148	Italy	468
Germany	865	Mexico	400
WCI states	730	California	395

Source: Prepared by CRS with data from World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/] Note that the carbon dioxide data excludes land use changes.

Note: WCI states include Arizona, California, New Mexico, Oregon, Utah, and Washington. RGGI states include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, and Vermont. Rhode Island is expected to soon join, and its emissions are included above.

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[93] Pew Center on Global Climate Change, "California PUC Carbon Adder" (case-study).

[94] This is based on 2003 data from the World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/].

Although the states developing mandatory reduction programs — WCI (which includes California) and RGGI participants — account for an appreciable percentage of U.S. carbon dioxide emissions (about 23%), most of the states are pursuing considerably less aggressive climate change policies. Unless the more aggressive state actions foster greater participation or catalyze a federal program, the current state actions are unlikely to impact global climate change. With this range of state activity, it is difficult to predict the precise consequences of state-led climate change actions. This section highlights possible effects from state actions.

States as Policy Laboratories. A central argument in support of state climate change action is that states can serve as laboratories for policymaking. States can test different ideas and policies on a smaller scale, and help determine which climate change solutions are most effective. For example, there has been some debate regarding how a cap-and-trade program might work on a national level. Although the federal acid rain program, which involves sulfur dioxide emissions trading, is generally considered a success, emissions trading programs for other purposes have encountered problems during implementation.[95] State programs offer the opportunity to iron out logistical details that are crucial in a cap-and-trade system:

- How high to set the emissions cap.
- Which sources to regulate.
- How to allocate emissions allowances.
- When to allow offsets instead of actual reductions.
- Whether to include a safety valve and, if so, how high to set it.

State programs can inform federal policymakers in other ways. The political process by which states create climate change policy can be enlightening and perhaps adaptable on the federal level. For instance, by examining the development and passage of state legislation, federal policymakers may better understand the motivations of different stakeholders and learn how best to frame the issues.

Possible Economic Effects. Emission reduction programs will likely have economic effects on consumers, businesses and manufacturers, and possibly interstate commerce.[96] The most immediate effects of the emissions programs (at least the ones furthest along in development) will be on the automotive manufacturing and electricity generation sectors.

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[95] For example, the Southern California's Regional Clean Air Incentives Market (RECLAIM), which was implemented in 1994 to reduce emissions of nitrogen oxides (NOx) and sulfur dioxide (SO_2), saw a 50-fold increase in NOx allowance prices during the 2000-2001 California energy crisis. The European Union's GHG trading system has also experienced drastic swings in allowance prices during its start-up years, making planning and decision-making difficult for participating entities. For additional information on the EU trading system, see CRS Report RL33581, *Climate Change: The European Union's Emissions Trading System (EU-ETS)*, by Larry Parker.

[96] The question of whether and in what circumstances states can regulate interstate commerce may raise legal questions, which are briefly discussed below.

For automotive manufacturers, the California motor vehicle regulations — which at least 12 states have indicated they plan to implement — will likely have the effect of dividing the market, potentially requiring the manufacture of a different class of cars to meet the new standards (scheduled to apply in 2009). For automotive companies, this raises the issues of the technical means of meeting the standard, marketing, ensuring compliance, and pricing. Depending on how the emission limits are to be met, they may also influence fueling infrastructure. State governments will need resources to enforce the standards. Consumers in regulated states may face higher prices for vehicles.

Regarding the electric power industry, the mandatory reduction requirements will likely promote generation from low carbon-intensive fuels, while curtailing generation from high carbon-intensive fuels, such as coal. The GHG performance standards in California and Washington will reach into neighboring states as well, effectively barring electricity imports generated by conventional coal-fired power plants. Because coal-fired plants tend to produce lower-cost electricity, the result of these requirements may be to increase electricity prices within the states that limit emissions, and possibly lower prices in states without such emission standards.

If the GHG limitations on motor vehicles and electricity increase prices in the regulated states, businesses and manufacturers may factor this cost into location decisions. There is some concern that regulated industries will have a financial incentive to move (and thus transfer jobs) to states (or nations) that do not limit GHG emissions.[97] Others fear that emission limits will raise the cost of living and doing business within those states, although in theory such effects can be at least partially addressed through the design of the emissions reduction program.[98]

Patchwork of Regulations. One concern shared by many observers, particularly industry stakeholders, is that state climate change programs (in lieu of a federal program) will create a patchwork of regulations across the nation. A patchwork system of standards may hinder a company's efficiency and possibly create economic burdens for firms that operate in multiple states. The prospect of regulations that vary from state to state is driving some companies to support a federal climate change program with comparable requirements across the entire United States.

Limitations of State Actions

Climate change has been described as the "ultimate global commons problem."[99] The global warming and climate impacts associated with increased GHG emissions

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[97] This is also a central argument against having federal emission limits without cooperation with other large economies (e.g., China and India).

[98] A cap-and-trade program with an auction system (as discussed above), for instance, would generate revenues that could be funneled to parties who bear an unfair percentage of the program's costs. See, for example, National Commission on Energy Policy, 2007, *Allocating Allowances in a Greenhouse Gas Trading System*.

[99] Stavins, Robert, 2006, "A Utility Safety Valve for Cutting CO2," *The Environmental Forum*, Volume 23, Number 2, March/April, 2006, p. 14.

in the atmosphere cannot be linked with specific emission sources. Unlike localized reductions in other air pollutants (e.g., sulfur dioxide, particulate matter), when an emissions source reduces its carbon dioxide emissions, it does not generate a corresponding local climate change benefit unless there are similar widespread reductions globally or at least in wide areas.

From a practical standpoint, the actions of one or a group of states or nations cannot by themselves reduce the global accumulation of GHG emissions in the atmosphere. However, as discussed above, actions now under way by many states in the United States may create examples and/or models that will prove instructive in more widespread applications. Moreover, when business and industry have confronted a growing patchwork of state requirements, these sectors have historically begun to favor a national policy — as has begun to happen in the case of state-level actions on climate change. However, the lack of a national program or a truly global approach to GHG emissions reductions does limit what individual states can accomplish in actually reducing GHG emissions and accumulations.

Legal challenges may further limit the effectiveness of state action. The possibility of legal challenges creates considerable uncertainty regarding the future of state climate change actions, particularly the more aggressive programs. There are already several lawsuits against state actions that seek to regulate GHG emissions from motor vehicles. As discussed above, the April 2007 Supreme Court decision (*Massachusetts v. EPA*) did not specifically address all of the plaintiffs' arguments, so uncertainty remains as to the resolutions of these cases.

Further litigation confronting other types of state action is anticipated. For example, many expect a legal challenge against the RGGI program when the first state's rule is officially issued.[100] In addition, there is some question as to whether California's recently enacted GHG performance standards are constitutional.[101] Arguably, the standards disproportionately impact the neighboring states that have historically exported coal-generated electricity to California consumers. The legal arguments in these cases are beyond the scope of this report, but many observers conclude that it is difficult to predict how the courts will interpret and decide upon these issues. For a more in-depth analysis of various legal issues regarding climate change, see CRS Report RL32764, *Climate Change Litigation: A Growing Phenomenon*, by Robert Meltz.

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[100] New York state is expected to be the first state to issue its rule implementing RGGI, according to statements made from state officials at a climate change workshop: Pew Center on Climate Change, Innovative Approaches to Climate Change: A State and Regional Workshop, Washington, DC, October 10-11, 2006.

[101] See Potts, Brian, 2006, "Regulating Greenhouse Gas Leakage: How California Can Evade the Impending Constitutional Attacks," *Electricity Journal*, Vol. 19, Issue 5, June 2006.