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## Climate Change: Action by States To Address Greenhouse Gas Emissions

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# Climate Change: Action by States To Address Greenhouse Gas Emissions

## Summary

In the absence of a federal climate change program, a number of states have taken actions that directly address greenhouse gases. States' efforts cover a wide range of policies, from outlining possible strategies to setting mandatory greenhouse gas emission standards. 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 view their policies as economic opportunities. States also point to the potential co-benefits of reducing greenhouse gases: improvements in air quality, traffic congestion, and energy security. Another driver behind state action is the possibility of catalyzing federal legislation.

Most of the states have shown at least a basic interest in climate change issues. Forty-two states have conducted greenhouse gas inventories; 30 states have either completed or are in the process of preparing climate change action plans; 12 states have set statewide greenhouse gas targets. However, only a small number of states have implemented or are creating mandatory emission reduction programs.

The most significant developments have come from California and from a group of states in the Northeast. The Regional Greenhouse Gas Initiative (RGGI), a partnership of seven northeastern states, sets up a cap-and-trade system aimed at limiting carbon dioxide emissions from power plants. This is scheduled to take effect in 2009. California has made several notable steps. In 2004, the state issued regulations to reduce greenhouse gases from motor vehicles. Ten other states have formally adopted California's new vehicle requirements. In 2006, California passed two milestone climate change statutes. The first would establish a state-wide cap on greenhouse gases. The second would effectively limit the use of coal-generated electricity in California.

Predicting the precise consequences of the state-led climate change actions is difficult. Some actions, particularly the recent California legislation, may impact energy markets to some degree. 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 concentrations in the atmosphere.[2] Second, human activities (e.g., fossil fuel combustion, industrial processes, and deforestation) have contributed to the increased concentration of greenhouse gases in the earth's atmosphere.

The link between greenhouse gas 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 greenhouse gas 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 greenhouse gas 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 greenhouse gases, may have yielded emission reductions as a byproduct.[4] In recent years, there has been some congressional support for a mandatory reduction

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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 greenhouse gas, 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 greenhouse gases 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 greenhouse gas emissions.

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.

In the 109th Congress, members introduced several bills that would have established a mandatory greenhouse gas reduction program, but none of the proposals were reported out of committee.[6]

In the absence of action by the federal government to establish a national program that directly addresses greenhouse gas emissions, a number of states (and local governments, whose actions are not covered in this report[7]) have taken action in this arena. States' efforts cover a wide spectrum, from developing climate action plans to setting mandatory greenhouse gas emission standards. While state action is not a new development — some states set greenhouse gas 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. Several states now have regulatory programs that limit greenhouse gases from particular sources. A partnership of northeastern states is in the process of setting up a cap-and-trade system aimed at limiting carbon dioxide emissions from power plants.[8] California has recently enacted legislation and regulations limiting greenhouse gas emissions. In 2004, the state issued requirements to reduce greenhouse gases from motor vehicles, a large source of carbon dioxide emissions in the state. In 2006, California passed two significant laws. The first establishes a mandatory state-wide cap on greenhouse gases; the second sets a greenhouse gas

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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] For a more thorough discussion regarding federal climate change legislation and policy, see CRS Report RL31931, *Climate Change: Federal Laws and Policies Related to Greenhouse Gas Reductions*, by Brent D. Yacobucci and Larry Parker, and CRS Report RL32955, *Climate Change Legislation in the 109th Congress*, by Brent D. Yacobucci.

[7] A number of local governments are pursuing activities that may directly or indirectly reduce greenhouse gas emissions. For example, 171 local governments (cities, counties) in 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].

[8] 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 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].

performance standard for power plants that applies to both in-state facilities and facilities exporting electricity to California.

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 greenhouse gas policies as economic opportunities. States want to position themselves for a "less-carbonized" future,[9] by promoting, for example, alternative energy supplies, particularly sources available in-state. Other states champion greenhouse gas 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.

This report covers state actions that directly and explicitly address greenhouse gas emissions. First, the report describes the different types of state actions, both individual and cooperative efforts, that are either proposed or underway, 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 greenhouse gas emissions include laws, regulations, or policies that are established explicitly to reduce greenhouse gas 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 greenhouse gas 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-one states have implemented an RPS.[10] Although greenhouse gas 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 greenhouse gases.

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:

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

[10] Two additional states are considering an RPS. See EPA, Summary of State Clean Energy-Environment Policy Data Table (current as of 11/21/2005), at [http://www.epa.gov/cleanenergy/stateandlocal/activities.htm]. See also the Pew Center on Global Climate Change, Map: States with Renewable Portfolio Standards, at [http://www.pewclimate.org]. This map identifies Illinois and the District of Columbia as also having established an RPS.

- Building codes: A majority of states have building codes that promote energy efficiency in commercial and residential structures.[11]
- Appliance Standards: Twelve states have set energy efficiency standards for appliances that are not covered under the federal program.[12]

- Agricultural policies: Several states promote agricultural practices that may indirectly reduce greenhouse gas emissions. For example, a "no-till" farming technique saves fuel and man hours, while keeping carbon stored in the soil.[13]

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 greenhouse gas emissions. States' efforts have progressed recently in both quantity and substance. Arguably, early state actions were largely symbolic. In the late 1980s, Vermont[14] and Oregon[15] were the first states to set greenhouse gas reductions goals, but during the subsequent decade (1990-2001), both states increased their greenhouse gas emissions: Vermont by 18% and Oregon by 30%.[16] However, a majority of states have more recently begun to develop their own climate change strategies or policies, with a small but increasing number of states adopting or proposing more significant provisions, including mandatory greenhouse gas 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.

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[11] EPA data indicates 35 states have commercial codes and 31 states have residential codes for energy efficiency. See EPA, Summary of State Clean Energy-Environment Policy Data Table (current as of 11/21/2005).

[12] See EPA, Map: State Energy Efficiency Actions - State Appliance Efficiency Standards (as of 6/23/06), at [http://www.epa.gov/cleanenergy/stateandlocal/activities.htm].

[13] 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].

[14] 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.

[15] 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.

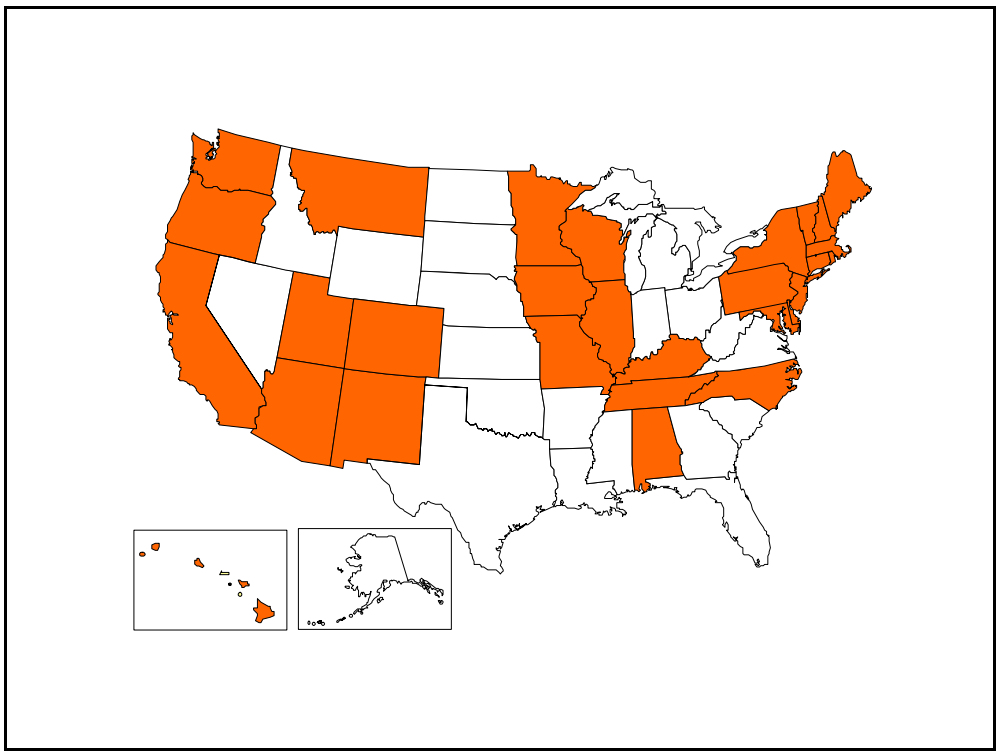
[16] See World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/].

## State Action Plans

Thirty 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 greenhouse gases, 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.

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 greenhouse gases. 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 greenhouse gases. However, the number of completed state plans indicates the interest that a majority of states have in addressing climate change mitigation on some level.

**Figure 1: States with Climate Change Action Plans**



**Source:** Prepared by the Congressional Research Service with data from U.S. EPA Climate Change Division. Florida (not shaded) is developing an action plan. Online links to individual state action plans are available through EPA's website, at [http://www.epa.gov/climatechange].

## Greenhouse Gas Emissions Targets

State emissions targets are goals by which a state can measure its progress in achieving greenhouse gas emissions reduction. By themselves, state emissions targets do not directly reduce greenhouse gases, but a target signals that state officials consider climate change an important issue.

Twelve states have established *statewide* targets for greenhouse gas emissions (see **Table 1**).[17] Other than California's 2020 target (discussed later), the statewide targets do not constitute legally binding requirements. Nearly all of these states are either in the Northeast or on the west coast of the United States. The New England states' targets are identical, because they are part of a cooperative plan developed in 2001.[18] Of the 12 states in **Table 1**, New Mexico stands out, because it is the first state with substantial coal and petroleum resources to set an overall emissions target.[19]

Considering the greenhouse gas limits and targets set on the international stage in past years, these state targets are relatively modest. Only New Jersey's greenhouse gas target — 3.5% below 1990 levels by 2005 — was comparable to the U.S. target set by the Kyoto Protocol.[20] However, New Jersey did not meet its 2005 target.[21]

**Table 1** compares the states' emissions in 1990 with emissions from the most recent three years of available data (overall greenhouse gases and carbon dioxide). The emissions data show the reductions states would need to make to meet their established targets. Although some of the 12 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 greenhouse gas targets after 2003, and state-level data after 2003 are not yet available. Moreover, the emissions targets were typically created in conjunction with greenhouse gas 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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[17] Several states have also developed more narrow targets, either for industry or electricity generation or only for carbon dioxide emissions.

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

[19] In 2005, New Mexico ranked 11th in coal production and 6th in crude oil production. The state also ranked 3rd in natural gas production, a fuel that releases significantly less greenhouse gas than coal or oil when burned. See U.S. Department of Energy, Energy Information Administration Statistics, at [http://www.eia.doe.gov/].

[20] 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 RL33602, *Global Climate Change: Major Scientific and Policy Issues*.

[21] Per telephone discussion with New Jersey state official (January 5, 2007).

## Table 1: Statewide Greenhouse Gas Targets Compared with Emissions Data from 1990 and Recent Years

| State | Greenhouse Gases Target | Greenhouse Gas Emissions (million metric tons of CO2 equivalent) | | | | Carbon Dioxide Emissions from Fossil Fuel Combustion (million metric tons) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 1999 | 2000 | 2001 | 1990 | 2001 | 2002 | 2003 |
| AZ[22] | 2000 levels by 2020 | 70 | 87 | 91 | 94 | 62 | 87 | 87 | 88 |
| CA[23] | 2000 levels by 2010; 1990 levels by 2020 | 415 | 417 | 434 | 451 | 359 | 383 | 380 | 384 |
| CT[24] | 1990 levels by 2010; 10% below 1990 by 2020 | 43 | 44 | 45 | 44 | 41 | 41 | 40 | 42 |
| ME[25] | 1990 levels by 2010; 10% below 1990 by 2020 | 21 | 21 | 23 | 23 | 19 | 22 | 23 | 23 |
| MA[26] | 1990 levels by 2010; 10% below 1990 by 2020 | 89 | 85 | 86 | 87 | 83 | 81 | 82 | 86 |
| NH[27] | 1990 levels by 2010; 10% below 1990 by 2020 | 16 | 18 | 18 | 18 | 15 | 17 | 17 | 20 |
| NJ[28] | 3.5% below 1990 by 2005 | 123 | 132 | 133 | 132 | 114 | 123 | 123 | 124 |

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

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

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

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

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

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

[28] New Jersey Administrative Order 1998-09 (March 17, 1998).

| State | Greenhouse Gases Target | Greenhouse Gas Emissions (million metric tons of CO2 equivalent) | | | | Carbon Dioxide Emissions from Fossil Fuel Combustion (million metric tons) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 1999 | 2000 | 2001 | 1990 | 2001 | 2002 | 2003 |
| NM[29] | 2000 levels by 2012; 10% below 2000 by 2020 | 59 | 64 | 66 | 67 | 52 | 57 | 55 | 57 |
| NY[30] | 5% below 1990 by 2010; 10% below 1990 by 2020 | 234 | 236 | 239 | 239 | 208 | 207 | 200 | 214 |
| OR[31] | Stabilize by 2010; 10% below 1990 by 2020 | 39 | 52 | 50 | 51 | 31 | 42 | 40 | 40 |
| RI[32] | 1990 levels by 2010; 10% below 1990 by 2020 | 10 | 14 | 12 | 13 | 9 | 12 | 12 | 11 |
| VT[33] | 1990 levels by 2010; 10% below 1990 by 2020 | 7 | 8 | 8 | 8 | 5 | 7 | 6 | 6 |

**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]; greenhouse gas emissions data from World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/] (this website notes that the greenhouse gas data excludes land use changes); carbon dioxide data from EPA's Climate Change, State Emissions website, at [http://epa.gov/climatechange/emissions/state.html].

**Note:** The states' targets are for all greenhouse gases. Carbon dioxide emissions from fossil fuel combustion are also included, because (1) this is the primary source of greenhouse gases in most states and (2) the carbon dioxide data provide two additional years of information.

## Greenhouse Gas Emissions Tracking

Reliable greenhouse gas emissions data are a keystone component of any climate change program. To implement effective solutions to climate change,

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

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

[31] Oregon Strategy for Greenhouse Gas Reductions (December 2004).

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

[33] 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).

policymakers need up-to-date and accurate information detailing the volume and sources of greenhouse gases in their states. Precise monitoring is particularly vital for market-oriented approaches to greenhouse gas 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 greenhouse gas 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.[34]

- The Department of Energy administers a voluntary greenhouse gas reduction registry. This program started in 1994, pursuant to Section 1605(b) of the Energy Policy Act of 1992 (P.L. 102-486).[35]

- The EPA prepares an annual inventory of the nation's greenhouse gas 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 greenhouse gas 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.** Forty-two states have developed greenhouse gas inventories. Inventories typically provide estimates of emissions for various categories: economic sector (e.g., energy, agriculture), emissions source (e.g., automobiles, power plants), greenhouse gases (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.

**Greenhouse Gas Registries.** A state greenhouse gas registry is a further step in greenhouse gas tracking. In general, state greenhouse gas registries are voluntary programs that allow facilities to submit and officially record emissions

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[34] 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.

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

data. Five states have passed legislation to establish greenhouse gas registries, of which three are now underway:[36]

- New Hampshire: The New Hampshire Greenhouse Gas 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 greenhouse gases, went online in 2003.

Other states are joining forces to establish regional registries. Ten New England and Mid-Atlantic states are developing the Eastern Climate Registry.[37] In addition, the Lake Michigan Air Directors Consortium (LADCO) is working on a registry for several states in the Midwest.[38]

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.

**Mandatory Greenhouse Gas Reporting.** Mandatory reporting programs allow states to monitor greenhouse gas 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' greenhouse gas emissions were made publicly-available and thus comparable, the companies might

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[36] The other two states are Maine and Georgia. Maine's registry is not yet operational. Georgia, instead of tracking greenhouse gas emissions, established a registry for counting the offsetting reductions in greenhouse gases obtained by carbon sequestration. Not counted as one of the five states, New Jersey repealed a previously enacted registry program in 2004.

[37] These states include Connecticut, Delaware, Maine, Massachusetts, New York, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Vermont. For more information on this partnership, see [http://www.easternclimateregistry.org/].

[38] Illinois, Indiana, Michigan, Ohio, and Wisconsin. For more on this registry, see [http://www.ladco.org/regional_greenhouse.htm].

have an incentive to reduce emissions voluntarily.[39] 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.

A few states already require, and others are in the process of developing, greenhouse gas 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.[40]

- 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.[41]

- Maine: Facilities in Maine that emit any criteria pollutant over a specific reporting threshold must also report greenhouse gas emissions. This provision went into effect July 2004.[42]

- Connecticut: Starting in 2006, facilities subject to federal reporting under Title V of the Clean Air Act must submit greenhouse gas emissions data on an annual basis.[43]

## Mandatory Programs to Reduce Greenhouse Gases

Mandatory programs to require greenhouse gas reductions represent the most aggressive end of the state action spectrum.[44] As with state actions overall, these programs can vary significantly in scope, stringency, and design. Mandatory programs are generating considerable interest and some controversy. This section

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[39] 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.

[40] Wisconsin Chapter NR 438.03.

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

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

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

[44] Several states have voluntary reduction programs. Most of these were discussed earlier in the context of state emissions registries.

discusses the different types of mandatory programs and highlights particular state actions that are currently in effect or under development.

**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 greenhouse gases. 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.[45] Many of these facilities are already tracking their carbon dioxide emissions as required by the 1990 Clean Air Act.

***Regional Greenhouse Gas Initiative.*** 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 seven states — Connecticut, Delaware, Maine, 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. 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, greenhouse gases, or states could be included. Maryland and Massachusetts are expected to join RGGI in 2007.

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."[46] Some states (e.g., Vermont, New York) 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.[47]

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

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

[46] 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].

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

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. In 2008, this cap is lowered further.[48] 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[49] 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[50] 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 greenhouse gases. 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.[51] Washington passed similar legislation in 2004, requiring new power plants to offset 20% of their carbon dioxide emissions.[52]

**Emission Reductions from Motor Vehicles.** The U.S. transportation sector accounts for a substantial percentage — 33% in 2005[53] — of the nation's carbon dioxide emissions. In 14 states, the transportation sector is the single largest

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[48] 310 Massachusetts Code of Regulations 7.29.

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

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

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

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

[53] Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2005*, at [http://www.eia.doe.gov/].

source of carbon dioxide emissions.[54] California's transportation sector, in particular, generates almost 60% of the state's carbon dioxide emissions.[55]

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.[56] The law permits other states to choose to follow California's more stringent provisions,[57] and many states have adopted California standards in the past.

In 2002, California enacted the first state law (AB 1493) requiring greenhouse gas limits from motor vehicles.[58] As directed by the statute, the California Air Resources Board (CARB) issued regulations in September 2004, limiting the "fleet average greenhouse gas exhaust mass emission values from passenger cars, light-duty trucks, and medium-duty passenger vehicles."[59] 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 10 states (Oregon, Washington, and eight states in the Northeast) have formally adopted the California regulation. However, whether the more stringent standard goes into effect remains uncertain. California requested a waiver (as required by Section 209 of the Clean Air Act) in December 2005, but EPA has yet to respond. Although EPA has approved every California waiver request since 1975, this waiver request may not follow the same pattern. EPA has generally displayed a resistance to use the Clean Air Act to control greenhouse gases.[60] A second hurdle involves several legal challenges from automotive industry groups. 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. For more

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

[55] Only Vermont had a higher percentage from its transportation sector, but Vermont transportation emissions (3.7 million metric tons of carbon dioxide) are minor compared to California (210 million metric tons of carbon dioxide). Based on 2001 data. Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2004 (Table C2).*

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

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

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

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

[60] In an EPA General Counsel memorandum (August 28, 2003), EPA took the position that the Clean Air Act does not authorize EPA to regulate greenhouse gases for the purpose of addressing climate change, and the agency has argued this position in court. See CRS Report RL32764, *Global Warming: The Litigation Heats Up*, by Robert Meltz.

discussion concerning these legal issues, see CRS Report RL32764, *Global Warming: The Litigation Heats Up*, by Robert Meltz.

**California's Statewide Emission Reductions Law.** In September 2006, California enacted landmark legislation that would establish a comprehensive greenhouse gas reduction regime. The legislation — AB 32 or the Global Warming Solutions Act[61] — directs the California Air Resources Board (CARB) to develop and implement a statewide program that would reduce the state's greenhouse gas 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 greenhouse gases. Instead, AB 32 authorizes CARB to develop regulations to "achieve the maximum technologically feasible and cost-effective greenhouse gas emission reductions...." Moreover, the statute does not include a list of regulated emission sources or categories,[62] but instructs CARB to determine which sources are necessary to meet the statewide target.[63]

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.

The statute requires the program to account for greenhouse gas emissions from all electricity consumed in California. The agency will need to count emissions connected with electricity that is generated from outside the state. This provision is significant, because it addresses the "leakage" issue. Without this provision, California utilities might have a financial incentive to import more electricity from out-of-state generators, who are not subject to the cap. In such a scenario, California emissions would decrease, but the benefit would be negated by increased emissions in neighboring states.

When developing the emission reduction program in California, AB 32 instructs CARB to consider other greenhouse gas reduction regimes, including RGGI and the European Union's emission trading program. This instruction might open the door for future emissions trading between California and other states.

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

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

[63] 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).

**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 greenhouse gas 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 greenhouse gas levels by influencing which energy sources — coal, oil, natural gas, etc. — are used to generate electricity for consumers.

***California's Greenhouse Gas Emissions Performance Standard.*** The most significant state action in this regard is California's greenhouse gas performance standard. In September 2006, the state passed legislation that will forbid "load-serving entities"[64] from entering into new "long-term financial commitments"[65] with power plants unless the plant's greenhouse gas emissions are as low or lower than those of a new, combined-cycle natural gas facility.[66] This emissions performance standard will apply to both in-state power plants and out-of-state facilities that seek to export electricity to California. The law directs the California Public Utilities Commission (PUC) to develop the performance standard by February 1, 2007.

Once the new performance standard is applicable (and previous commitments expire), it will effectively prohibit California 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 standard.[67] As the law takes effect, California will likely need to replace its coal-generated electricity with alternative sources of power.

The new emissions standards will impact not only California, but also other states in the West. Although California's electricity imports generally fall between 22% and 32% of the state's total electricity consumption, its imports are responsible for 39% to 57% of the total greenhouse gas emissions linked with electricity.[68] This

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[64] 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)).

[65] 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)).

[66] SB 1368 was signed by the Governor on September 29, 2006.

[67] As technology advances, coal-fired plants might be able to reduce greenhouse gas emissions through carbon capture and sequestration (CCS). However, "there is relatively little experience in combining CO2 capture, transport and storage into a fully integrated CCS system. The utilization of CCS for large-scale power plants (the potential 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*, p. 8.

[68] California Energy Commission, 2006, *Inventory of California Greenhouse Gas Emissions* (continued...)

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.[69]

***Greenhouse Gas "Adders."*** Another state action that may affect a state's sources of electricity generation is the adoption of a greenhouse gas (or carbon) adder. In general, adders require utilities to weigh the future costs of greenhouse gas 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.[70] The agency stated that this requirement "will serve to internalize the significant and under-recognized cost of [greenhouse gas] emissions, [and] help protect customers from the financial risk of future climate regulation...."[71] Only a few other states[72] require some type of greenhouse gas adder, and California's adder may be rendered less relevant due to its new emission performance standard (discussed above). At this stage, the adders have not been credited with changing any procurement decisions.[73]

# 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 greenhouse gases. If individual U.S. states were classified as sovereign nations, 21 states would rank in the top 60

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[68] (...continued)
*and Sinks: 1990 to 2004*, Draft Staff Report, p. 12.

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

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

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

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

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

for nations that annually emit the most carbon dioxide.[74] Compared with other nations, Texas, the combined RGGI states, and California rank as top carbon dioxide emitters (see **Table 2**).

## Table 2: Top Carbon Dioxide Emissions by Nation and U.S. States (2001 data)

| Country, State, or Group | Carbon Dioxide Emissions (million metric tons) |
|---|---|
| United States | 5,728 |
| European Union | 3,928 |
| China | 3,452 |
| Russian Federation | 1,544 |
| Japan | 1,221 |
| India | 1,068 |
| Germany | 884 |
| **Texas** | 678 |
| **RGGI states**[75] | 594 |
| United Kingdom | 562 |
| Canada | 522 |
| South Korea | 473 |
| Italy | 448 |
| France | 389 |
| Mexico | 388 |
| **California** | 386 |

**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.

Although the states developing mandatory reduction programs — California and the RGGI participants — account for an appreciable percentage of U.S. carbon dioxide emissions (almost 20%), 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

[74] This is based on 2001 data from the World Resources Institute, Climate Analysis Indicators Tool, at [http://cait.wri.org/].

[75] The RGGI states are Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. Maryland and Massachusetts are expected to join in 2007, and their emissions are included above.

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. State programs offer the opportunity to iron out logistical details that are crucial in a cap-and-trade system: for example, which sources to regulate; how to allocate emissions allowances; how high to set the emissions cap; when to allow offsets instead of actual reductions.

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 Market Influences.** Mandatory emission reduction programs may have some effect on energy markets. For example, California's recently enacted greenhouse gas performance standards, once underway, will effectively bar California consumers from using electricity generated by conventional coal-fired power plants. In general, states with emission reduction requirements might see an increase in the use and support of less carbon-intensive fuels. This increase in carbon-regulated states may shift more carbon-intensive fuel use to states without emissions regulations. The increased supply of more carbon-intensive fuels (primarily coal) could result in lower electricity prices in states without greenhouse gas emissions requirements. Federal policymakers may consider whether these possible outcomes coincide with federal energy priorities.

**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."[76] The global warming and climate impacts associated with increased greenhouse gases

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[76] 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 greenhouse gases in the atmosphere. However, as discussed above, actions now underway 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 greenhouse gas emissions reductions does limit what individual states can accomplish in actually reducing greenhouse gas 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 progressive programs. There are already several lawsuits (discussed above) against state actions that seek to regulate greenhouse gas emissions from motor vehicles. 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.[77] There is some question as to whether California's recently enacted greenhouse gas performance standards are constitutional.[78] 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.

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[77] 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.

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