

STATE OF CALIFORNIA'S ACTIONS TO ADDRESS GLOBAL CLIMATE CHANGE

The State of California has been a pioneer in efforts to reduce air pollution, starting 1963 when the California New Motor Vehicle Pollution Control Board adopted the nation's first motor vehicle emission standards. California also has a long history of taking action to analyze and address the threat posed by climate change. In 1988 the Legislature directed the California Energy Commission (CEC), in consultation with the California Air Resources Board (ARB) and other agencies, to study the implications of global warming on California's environment, economy, and water supply. Since that time, California state government has consistently recognized the necessity for action on climate change to protect California's interests. Most notably, Governor Schwarzenegger issued a June 2005 Executive Order establishing his greenhouse gas leadership initiative and setting statewide greenhouse gas reduction targets.

1. Chronology of California Activities

This section is a chronology of major California activities to address climate change. The activities illustrate the depth and breadth of California's commitment to protecting the environment. The sections that follow provide more detail on major activities, including state legislation and administrative initiatives.

1988

- AB 4420—Directs the CEC, in consultation with the ARB and other agencies, to study and report on how global warming trends may affect California's energy supply and demand, economy, environment, agriculture, and water supplies

1989

- CEC issues two reports, *Comparing the Impacts of Different Transportation Fuels on the Greenhouse Effect*, and; *The Impacts of Global Warming on California*
- ARB—Board agenda item on global warming

1990

- The CEC releases *1988 Inventory of California Greenhouse Gas Emissions*

1991

- CEC issues two reports, *1991 Global Climate Change Report*, and; *Global Climate Change: Potential Impacts and Policy Recommendations*
- The CEC sponsors *Symposium on Global Climate Change*

1998

- CEC issues report, *1997 Global Climate Change Report: Greenhouse Gas Emission Reduction Strategies for California*
- The CEC initiates the Renewable Energy Incentive Program

1999

- CEC sponsors *Global Climate Change Science Workshop*
- California Fuel Cell Partnership established

2000

- CEC sponsors *Global Climate Change Strategies Workshop*
- SB 1771 establishes California Climate Action Registry, and designates CEC and ARB with advisory functions
- Executive Order D-16-00—directs Secretary for State and Consumer Services to facilitate sustainable building practices
- ARB sponsors a Public Meeting to Consider an Informational Report on Air Pollution Trends: Past Progress and Future Challenges, including a discussion of global warming

2001

- SB 1170 requires the CEC, the ARB and the Department of General Services to develop and adopt fuel-efficiency specifications for state motor vehicles and replacement tires to mitigate public health and environmental problems, including global warming
- California Stationary Fuel Cell Collaborative established
- CEC adopts Building Efficiency Standards
- The California Public Utilities Commission (CPUC) implements the Self Generation Incentive Program to provide incentives for the deployment of renewable and clean distributed generation technologies

2002

- CEC issues three reports entitled, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999*; *Guidance to the California Climate Action Registry: General Reporting Protocol*, and; *Guidance to the California Climate Action Registry: Certification Protocol*
- CEC adopts Appliance Efficiency Standards
- California Climate Action Registry launched
- AB 1493 directs ARB to adopt regulations that achieve the maximum feasible and cost effective reduction of GHG emissions from motor vehicles
- SB 812—directs California Climate Action Registry to include forest management practices

- SB 1078—establishes *California Renewable Portfolio Standard Program*
- SB 1389—directs CEC to adopt *Integrated Energy Policy Report* every two years
- AB 857 directs Governor to prepare comprehensive *State Environmental Goals and Policy Report*

2003

- CEC, PUC and California Power Authority issue *The Energy Action Plan for the State of California* identifying energy efficiency and demand response as the state's preferred energy resource and accelerates the 20% renewable resource goal from 2017 to 2010
- West Coast Governors adopt Global Warming Initiative
- Office of Planning and Research issues *Governor's Environmental Goals and Policy Report*, which included discussion of climate change impacts
- CEC submits first *Integrated Energy Policy Report* to Governor, including supporting document entitled *Climate Change and California*
- CEC Public Interest Energy Research Program (PIER) creates *California Climate Change Research Center*
- CEC adopts Building Efficiency Standards
- CEC issues PIER reports entitled, *Global Climate Change and California: Potential Implications for Ecosystems, Health and the Economy; Climate Change Research, Development and Demonstration Plan*

2004

- CalTrans issues *California Transportation Plan (DRAFT)*
- Governor Schwarzenegger issues Executive Order S-7-04 outlining his vision for the *California Hydrogen Highway Network*
- CEC adopts Appliance Efficiency Standards
- CEC establishes its Climate Change Advisory Committee
- Draft action plans released for five project topics in West Coast Governor's Global Warming Initiative results in commitment to adopt common motor vehicle and appliance efficiency standards
- ARB adopts regulations to reduce greenhouse gas emissions from new motor vehicles, pursuant to AB 1493
- CPUC adopts the nation's most aggressive energy efficiency goals for the state's investor owned utilities
- CPUC orders investor owned utilities to describe their greenhouse gas emissions profile, actions taken to mitigate greenhouse gas emissions, and position on the optimal policy response to the threat of climate change
- CPUC requires investor owned utilities to use a carbon adder in evaluating procurement bids to reflect the financial risk of future carbon regulation

2005

- Governor Schwarzenegger adopts greenhouse gas reduction targets for the state and establishes the Climate Action Team
- CEC adopts its 2005 Integrated Energy Policy Report

- The CPUC and CEC adopt the *Energy Action Plan II* reaffirming the state's loading order of preferred energy resources and recommending accelerating the State Renewable Portfolio Standard to 20 percent by 2010 and to 33 percent by 2020
- Renewable projects contracted for under SB 1078 in 2005 produce over 24,000 GWh of electricity
- CPUC consultant prepares report entitled *Achieving A 33% Renewable Energy Target*
- CPUC adopts a Policy Statement directing the CPUC staff to investigate the implementation of a greenhouse gas performance standard for the investor owned utilities' long-term procurement contracts and new generation that is no higher than the emissions from a combined cycle natural gas plant
- CPUC holds an en banc hearing on climate change to begin to identify best practices for all CPUC regulated companies (electric, natural gas, telecommunications, water, and transportation) including opportunities to reduce greenhouse gas emissions related to business operations such as fleet vehicle efficiency, building efficiencies, and overall reduction of energy consumption
- CEC and Cal EPA host first-ever regional climate science conference
- AB 1007 directs the CEC, in partnership with the ARB and in consultation with other relevant state agencies, to develop and adopt a state plan to increase the use of alternative transportation fuels including a full fuel-cycle assessment of emissions of greenhouse gases from the use of alternative fuels

2. Legislation

This section provides a brief description of significant legislative actions taken to address climate change in California.

- **AB 4420** (Chapter 1506, Statutes of 1988, Sher)
Assembly Bill 4420 was signed on September 28, 1988 and directed the CEC, in consultation with the ARB and other agencies, to “study and report...on how global warming trends may affect California’s energy supply and demand, economy, environment, agriculture, and water supplies”. Furthermore, “the study shall include recommendations for avoiding, reducing, and addressing the impacts.” In approving the bill the Legislature declared that “recent projections regarding global warming trends raise long-range energy, economic, environmental planning issues for the State of California.”

- **SB 1771** (Chapter 1018, Statutes of 2000, Sher)
Senate Bill 1771 was signed on September 30, 2000. This bill established the California Climate Action Registry and gave the CEC and the ARB with advisory functions. It also required the CEC to periodically update the State’s GHG inventory, to “acquire and develop information on global climate change,” to “convene an interagency task force consisting of state agencies with jurisdiction

over matters affecting climate change to ensure policy coordination at the state level for those activities,” and to “establish a climate change advisory committee.” The Legislature stated that “it is in the best interest of the State of California, the United States of America, and the earth as a whole, to encourage voluntary actions to achieve all economically beneficial reductions of greenhouse gas emissions from California sources.” The purpose of SB 1771 was to “encourage voluntary actions to increase energy efficiency and reduce greenhouse gas emissions.”

- **SB 527** (Chapter 769, Statutes of 2001, Sher)

Senate Bill 527, which amended SB 1771, was signed on October 11, 2001. This clean-up legislation authorized administrative penalties for certain violations of air pollution laws and clarified and added language to SB 1771. The Legislature repeated its statement that it “finds and declares [that it] is in the best interest of the State of California, the United States of America, and the earth as a whole, to encourage voluntary actions to achieve all economically beneficial reductions of greenhouse gas emissions from California sources.”

- **SB 1170** (Chapter 912, Statutes of 2001, Sher)

Senate Bill 1170 was signed on October 14, 2001. The bill cited global warming as one of the “public health and environmental problems” associated with petroleum use. Specifically, the bill mentioned “air pollution, acid rain, global warming, and the degradation of California’s marine environment and fisheries.” To mitigate such effects, the bill required the CEC, the ARB and the Department of General Services to develop and adopt fuel-efficiency specifications governing the purchase by the state of motor vehicles and replacement tires.

- **AB 1493** (Chapter 200, Statutes of 2002, Pavley)

Assembly Bill 1493 was signed on July 22, 2002. It required that the ARB “develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gases from motor vehicles”. The Legislature declared that “global warming is a matter of increasing concern for public health and the environment in the state” and that “the control and reduction of emissions of greenhouse gases are critical to slow the effects of global warming”. The bill also directed the California Climate Action Registry to adopt protocols for reporting “reductions in greenhouse gas emissions from mobile sources”.

- **SB 812** (Chapter 423, Statutes of 2002, Sher)

Senate Bill 812 was signed on September 7, 2002. It instructed the California Climate Action Registry to include forest management practices as a mechanism to achieve emission reductions and “to adopt procedures and protocols for the reporting and certification of greenhouse gas emission reductions resulting from a project” and for “the monitoring, estimating, calculating, reporting, and certifying of carbon stores and carbon dioxide emissions resulting from the conservation and conservation-based management of native forest reservoirs in California”.

- **SB 1078** (Chapter 516, Statutes of 2002, Sher)
 Senate Bill 1078 was signed on September 12, 2002. It established the California Renewable Portfolio Standard Program requiring investor owned utilities and other load serving entities under the jurisdiction of the CPUC to meet 20% of their resource needs with renewable power by 2017. The Legislature stated that “[t]he development of renewable energy resources may ameliorate air quality problems throughout the state and improve health by reducing the burning of fossil fuels and the associated environmental impacts.”
- **SB 1389** (Chapter 568, Statutes of 2002, Bowen)
 Senate Bill 1389 was signed on September 14, 2002. The bill required that the CEC compile and “adopt an integrated energy policy report” every two years. In the report the CEC shall develop public interest energy strategies that include “reducing statewide greenhouse gas emissions and addressing the impacts of climate change on California”.
- **AB 857** (Chapter 1016, Statutes of 2002, Wiggins)
 Assembly Bill 857 was signed on September 28, 2002. It instructed the Governor to prepare a “comprehensive State Environmental Goals and Policy Report” to guide state expenditures. The bill sets out the State’s planning priorities as being “to promote equity, strengthen the economy, protect the environment, and promote public health and safety”.
- **AB 1007** (Chapter 371, Statutes of 2005 , Pavley)
 AB 1007 directs the CEC, in partnership with the ARB and in consultation with other relevant state agencies, to develop and adopt a state plan to increase the use of alternative transportation fuels. The plan must include an evaluation of alternative fuels on a full fuel-cycle assessment of emissions of criteria air pollutants, air toxics, greenhouse gases, water pollutants, and other substances that are know to damage human health, impacts on petroleum consumption, and other matters that the ARB deems necessary.

3. Administrative Initiatives

This section provides more detail on climate change initiatives that have been undertaken by state agencies.

3.1 Governor’s Office

- Sustainable Building Practices. In 2000 Governor Gray Davis signed Executive Order D-16-00, which directed the Secretary for State and Consumer Services to facilitate the incorporation of sustainable building practices into the planning, operations, policymaking, and regulatory functions of state entities.

- West Coast Governor's Global Warming Initiative. On September 22, 2003 Governor Davis announced the formation of the West Coast Governor's Global Warming Initiative in cooperation with the governors of Oregon and Washington. The three states agreed to reduce GHG emissions through joint state efforts in five initial project areas. These areas include (1) using the states' purchasing power to purchase fuel-efficient vehicles and low-rolling resistance tires for motor pool fleets, (2) reducing emissions from diesel generators in ships at west coast ports, and create a system of emission-free truck stops along the Interstate 5 corridor, (3) encouraging the development of renewable electricity generation resources and technologies, (4) improving efficiency standards, (5) developing consistent and coordinated GHG emission inventories, protocols for standard accounting and reporting methods for GHG emissions, and (6) promoting a hydrogen fuel infrastructure for transportation.

In November 2004 the staff of the three states submitted recommendations to their three Governors covering these first five project areas. During 2005, Oregon and Washington adopted motor vehicle and appliance efficiency standards modeled after the California programs.

- Environmental Goals and Policy Report. In November of 2003 the *Governor's Environmental Goals and Policy Report* was published by the Governor's Office of Planning and Research. The report details the significant impact of potential climate change on California's public health, agriculture, water supply, ecosystems, and economy. The report encouraged the establishment of "achievable targets for greenhouse gas emissions that are incorporated into regulatory programs and reflected in subsequent investments in greenhouse gas reduction." Analyses to estimate the "cumulative effects of proposed government actions on total greenhouse gas emissions and require feasible mitigation measures that would achieve greenhouse gas emission and fossil fuel use reduction targets" should also be undertaken.

- California Hydrogen Highway Network. Governor Arnold Schwarzenegger signed Executive Order (EO) S-7-04 on April 20, 2004. This EO acknowledged that hydrogen, a non-carbon energy carrier, is ideally suited to address global, regional and local energy and environmental challenges. The EO designated California's 21 interstate freeways as the "California Hydrogen Highway Network". The EO directed the California Environmental Protection Agency (Cal/EPA), in concert with the State Legislature, and in consultation with the CEC and other relevant state and local agencies, to develop the California Hydrogen Economy Blueprint Plan (Blueprint Plan) for the rapid transition to a hydrogen economy. The Blueprint Plan is due to the Governor and the Legislature in January 2005 and must include recommendations that promote environmental benefits, including global climate change benefits.

Cal/EPA has established a Hydrogen Highways Implementation Advisory Panel (Panel) to direct the Blueprint Plan effort. The Panel Chair will be chaired by

Cal/EPA Agency Secretary Terry Tamminen and is made of up high-level executives from the public and private sector, including representatives from environmental organizations, the California Fuel Cell Partnership, the California Stationary Fuel Cell Collaborative, and a representative of environmental justice organizations. The Panel will be advised by Topic Teams that include experts in specific hydrogen-related issues. The Blueprint Plan will undergo review by a Senior Review Committee that includes Cabinet members and Legislators prior to going to the Governor and the full Legislature.

- Green Buildings Initiative. Governor Arnold Schwarzenegger signed Executive Order S-20-04 regarding Green Buildings on December 14, 2004. It established the State of California's priority for energy and resource-efficient high performance buildings. The Executive Order sets a goal of reducing energy use in state-owned buildings by 20 percent by 2015 (from a 2003 baseline) and encourages the private commercial sector to set the same goal. The order also directs compliance to the Green Building Action Plan which details the measures the state will take to meet these goals. The Executive Order and Green Building Action Plan requires the CEC to:
 - Develop and propose by July 2005, a simple building efficiency benchmarking system for all commercial buildings in the state
 - Develop commissioning and retro-commissioning guidelines for commercial buildings
 - Further develop and refine (Title 24) building standards applicable to commercial building sector to result in 20 percent savings by 2015 using standards adopted in 2003 as the baseline
 - Consult and collaborate with Department of General Services, Department of Finance and the PUC on a variety of other tasks

3.2 California Energy Commission

- AB 4420 Reports. The CEC initiated several research efforts to clarify the consequences of global warming on California. In April of 1989 a report entitled, *Comparing the Impacts of Different Transportation Fuels on the Greenhouse Effect* surveyed how crude oil, compressed natural gas, natural gas and coal transportation fuels affected GHG emissions. In August of the same year another report, *The Impacts of Global Warming on California* examined the risk of significant global warming upon water resources, electrical energy, agriculture, forestry, rising ocean level, natural habitat, regional air quality and human health, and the California economy.

The efforts to complete an inventory of California's GHG emissions were concluded in October of 1990 with the release of the *1988 Inventory of California Greenhouse Gas Emissions*. It inventoried emissions of CO₂, CH₄, N₂O and halocarbons, and included estimates of emissions from some out-of-state electricity fuel supplies.

In January of 1991 the CEC reported to the Governor and Legislature with the *1991 Global Climate Change Report* detailing the GHG emissions inventory, GHG reduction strategies and recommended policies to avoid and reduce global warming impacts. The following month leading climate scientists presented information on climate change science, global climate change models, and the importance of California public policy at *A Symposium on Global Climate Change*. At the end of 1991 the CEC compiled the findings of the earlier reports and recommended actions to reduce GHG emissions and adapt to potential global climate change in the *Global Climate Change: Potential Impacts & Policy Recommendations*.

In January of 1998 the emissions inventory was updated, and emission forecasts were presented along with an overview of the progress of the policies recommended in 1991. A follow-up to the global climate change symposium was conducted in 1999 with presentations by ten of the nation's leading climate scientists on the latest scientific data and information on global climate change potential impacts at the *Global Climate Change Science Workshop*.

In June of 2000 a *Global Climate Change Strategies Workshop* included presentations by California, national and international businesses who have adopted "early actions" to reduce GHG emissions and elicited suggestions for strategies that could be cooperatively undertaken by the State government and the private sector.

The *Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999* was first presented in 2002 and updated in 2005. In addition to emission estimates it included an examination of trends in GHG emissions over the decade of the 1990s.

- Integrated Energy Policy Report. The CEC adopted the 2003 Integrated Energy Policy Report on November 12, 2003. This document contains numerous recommendations to the Governor about current and potential energy issues confronting the state. Recommendations on the topic of climate change focused on the need to partner with neighboring states to take leadership positions in addressing global warming. Specific actions mentioned include required reporting of GHG emissions as a condition of state licensing of new electric generating facilities; use of sustainable energy and environmental designs in all state buildings; and a requirement for all state agencies to incorporate climate change mitigation and adaptation strategies in planning and policy documents.

In July 2004 the CEC formed a Climate Change Advisory Committee which provided advice and input for the 2005 Energy Report. The Advisory Committee was composed of a diverse set of high level stakeholders and concluded its work in July 2005.

The 2005 Energy Report concluded that climate change can significantly impact energy supply and demand in California, by reducing water flows for hydroelectricity and by increasing cooling loads for residential and commercial building. The Report further recognizes the need for greenhouse gas reductions from multiple sectors of the California economy to achieve the Governor's targets. One of the key recommendations involved setting a greenhouse gas performance standard for electricity utility resource procurement.

- Public Interest Energy Research Program. The CEC's Public Interest Energy Research Environmental Area (PIER-EA) is engaged in a variety of activities to address both the causes and impacts of global climate change. These collaborative activities leverage public and private research expertise and funding, from within California and throughout the world.

In 2003, the CEC's PIER Staff created the California Climate Change Research Center (CCCRC) to initiate and implement climate-related research, development, and demonstration projects. The CCCRC has three components. The first, located at Scripps Institution of Oceanography, concentrates on scientific research related to climate variability and change. The second, located at the University of California at Berkeley, focuses on the economic and social aspects of climate change. The third, located at the University of California's Office of the President (UCOP), manages a competitive grant program that funds research related to climate change.

Also, in 2003, PIER-EA released two major climate-related reports. *Global Climate Change and California: Potential Implications for Ecosystems, Health, and the Economy* discusses various affects of climate change on the state. The *Climate Change Research, Development, and Demonstration Plan* outlines the need for state-sponsored climate change research, identifies research gaps, and prioritizes research activities to address climate change and its impacts in a number of disciplines.

These interrelated programs and projects are building a strong foundation that enables PIER-EA to collaborate with other organizations to address climate change issues that are affecting the environmental and economic health of the state and the region. Ongoing research projects are underway during 2005 to improve analytical tools and models to assess the impacts of climate change on California's economy and ecosystems. A first-ever regional science conference was held in Sacramento during September 2005 to share scientific findings and research results.

- Energy Efficiency Activities. The CEC adopted 2005 building energy efficiency standards in November 2003. These standards have growing positive effects. The savings that these standards are expected to yield for each year of construction are 180 megawatts of electric demand, 475 giga-watt hours of electric energy and 8.8 million therms of natural gas. These energy savings will

yield significant reductions in criteria pollutant and GHG emissions. The CEC is preparing for the next cycle of building standards, which are expected to become effective in 2008.

The CEC also adopted appliance efficiency standards in 2002 and 2004 for those products not covered by federal standards.

- Renewable Portfolio Standard. The CEC and the PUC have established a collaborative process to implement the state's RPS. Legislation currently requires retail sellers of electricity to increase the percentage of renewable energy sources in their portfolio by 1% of sales per year, up to 20% by the year 2017. Additional legislation provides up to \$135 million per year for incentives to help in achieving the objectives of the RPS. The CEC provides supplemental energy payments to qualifying renewable energy projects to support costs above a market price referent. In addition, the state's Energy Action Plan calls for an accelerated RPS goal of 20 % renewable energy electricity by 2010, and 33% by 2020.

Proceedings and workshops have been held to discuss implementation topics. A final document entitled "Renewable Resources Development Report" was prepared for the Legislature that describes the renewable resource potential in California and other states in the Western Electricity Coordinating Council.

- CO₂ Reporting in Power Plant Licensing. CEC staff is examining the feasibility and advisability of CO₂ reporting in power plant licensing. This information would allow staff to estimate the amount of GHG emissions that will be emitted by the project, and would prove useful in establishing a more comprehensive and accurate inventory of GHG emissions from the electric generation sector within the state. In addition, by identifying and quantifying these emissions strategies can be developed, if appropriate, addressing the feasibility and cost-effectiveness of potential mitigation measures. The staff will also examine whether it should recommend that the CEC require power plant applicants, as a condition of certification, to submit actual monthly operational emissions data for GHGs.

The staff also expects to study the issue of whether it would be advisable to require power plant applicants to obtain carbon dioxide (CO₂) emission offsets, as is currently done in Oregon. If it were decided that a California CO₂ emission offset market had merit, this issue would be reviewed in cooperation with the ARB and local air districts and would be the subject of public hearings.

3.3 California Air Resources Board

Prior to being designated as lead role for implementation of AB 1493, the ARB had already taken a number of actions to better understand climate change

mechanisms and effects and encourage low GHG emission technologies. The ARBs's focus on the issue dates back to 1989, when staff provided to the ARB a presentation on the emerging science. At an ARB hearing in 2000 staff updated the scientific evidence and highlighted ARB and state actions on global climate change as an air pollution challenge. Specific initiatives are summarized below.

- Zero Emission Vehicle Regulation. This regulation, first adopted in 1990 and most recently modified in 2003, requires manufacturers to offer for sale in California specified numbers of zero and near-zero emitting vehicles. Although the regulation focuses most directly on criteria pollutants, the emerging technologies encouraged by the regulation, such as battery electric, fuel cell and hybrid electric vehicles, also offer significant GHG benefits.
- California Fuel Cell Partnership. The California Fuel Cell Partnership, established in 1999, is a unique collaborative of auto manufacturers, energy companies, fuel cell technology companies, and government agencies. The Partnership is committed to promoting fuel cell vehicle commercialization as a means of moving towards a sustainable energy future, increasing energy efficiency and reducing or eliminating criteria pollutants and GHG emissions.
- California Stationary Fuel Cell Collaborative. The mission of the California Stationary Fuel Cell Collaborative, which was established in 2001, is to promote stationary fuel cell commercialization. One of the Collaborative's key objectives to be achieved through commercialization of stationary fuel cell technology is the reduction or elimination of air pollutants and GHG emissions. The Collaborative envisions fuel cell installations pursued by state, local and public organizations as well as private entities. The Collaborative will take specific actions to promote a wide variety of fuel cell technologies, sizes and applications for installation in California.
- Greenhouse Gas Reduction Regulation. This regulation, adopted by the ARB in September 2004 pursuant to AB 1493, establishes fleet average standards for greenhouse gas emissions from new motor vehicles. The standards, which phase in beginning in 2009, will achieve reductions of 22 percent in 2012 and 30 percent in 2016 as compared to a model year 2002 average vehicle.
- Research. Global air pollution issues are specifically highlighted in the 10-year research strategy adopted by the ARB in 2001. The purpose of the ARB's global climate research program is to assess the effects of GHG emissions, global climate change, and global transport of pollutants, especially as they impact the public health and environment of California. This comprehensive scientific research and assessment will help policymakers design the most appropriate control strategies to deal with these very complex issues. Important research questions concerning global air pollution and global climate change include the following:

- How can the GHG emission inventory be improved?
- What is the true contribution of motor vehicles to N₂O emissions?
- What is the role of aerosols in climate change?
- What will be the effects of global climate change on human health?
- What are the possible economic impacts of global climate change on California?

One example of climate change related research is a study entitled *Global Radiative Effect of Particulate Black Carbon*. The goal of this project, which is underway, is to provide the ARB with state-of-the-science global radiative forcing estimates for black carbon (BC) and other aerosols. Quantitative understanding of the absorbing aerosol's role in the climate change is required to accurately evaluate the radiative forcing impacts of PM emissions. Such information is needed in order to determine whether PM should at some point be incorporated into climate change regulations.

A second study, entitled *Climate Change - Characterization of Black Carbon and Organic Carbon Air Pollution Emissions and Evaluation of Measurement Methods*, is under consideration. This project will result in an improved understanding of the effect of different combustion sources and their particle emissions, in particular black carbon and organic carbon, on air pollution and climate change.

ARB staff is currently reviewing climate change research proposals as part of the 2004/2005 research solicitation. The climate change proposals as well as those addressing other air quality-related needs will be considered by the Research Screening Committee. It is expected that the highest-ranking proposals will be presented to the ARB with the recommendation that they be funded.

- Innovative Clean Air Technologies Program. The Innovative Clean Air Technologies (ICAT) program provides co-funding for companies that are developing technologies supporting ARB's clean air objectives for California. This program has funded several projects on hydrogen, fuel cells, and hybrids, primarily for their GHG emission reductions.

3.4 California Department of Transportation

- Transportation Plan. The California Department of Transportation (CalTrans) is currently working on the *California Transportation Plan* which "is a policy plan designed to guide transportation investments and decisions at all levels of government and the private sector to enhance [California's] economy...and safeguard [California's] environment for the benefit of all." In a draft version of the plan CalTrans stated that "the use of fossil fuels to transport people and goods leads to air emissions that contribute to the warming of earth's atmosphere". The report cites "potential adverse impacts to public health,

agriculture, forest, and other systems, storm frequency and intensity, mountain snow pack, smog, and rising sea levels resulting from climate change.”

- Director’s Policy. CalTrans has a Director’s Policy entitled "Energy Efficiency and Conservation Policy." This policy promotes environmental stewardship, sustainable transportation, reductions in GHG emissions, and educational programs.

3.5 California Department of Water Resources

- Data Collection and Modeling. The California Department of Water Resources (DWR) has recognized that climate change and variability can have important consequences for the state’s water resource systems. As a result the Scripps Institution of Oceanography is partnering with DWR and the PIER Program to improve data collection and regional climate modeling in an effort to reduce the uncertainty surrounding predictions of how precipitation patterns may change in California. DWR has also been documenting sea levels that dates back to the mid-1800s measured at San Francisco Bay. DWR is evaluating these risks and considering adaptive measures as part of the state’s planning process related to water resources.

3.6 Department of General Services

- Green Procurement Policies. SB 1170 highlighted global warming as one of the public health and environmental problems associated with petroleum use. In response to the bill the Department of General Services (DGS) has developed “green” specifications for the procurement of all new passenger and light duty vehicles. The DGS solicits bids and publishes annual purchasing contracts for new passenger cars, pickups, passenger and cargo vans, and utility vehicles. Currently, all new passenger and light duty vehicles offered for purchase by state and local governmental fleets meet and in some cases exceed the Ultra Low Emission Vehicle (ULEV) requirements as established by the CARB.

3.7 California Public Utilities Commission

Through its authority over the state’s investor owned utilities (IOUs), the PUC has taken action on a variety of fronts to reduce the GHG emissions associated with meeting the state’s electricity demand. Although not all of the actions summarized below were motivated initially by concerns related to global warming per se, all of them encourage greater reliance on sources of energy characterized by fewer CO2 emissions. These activities are consistent with the loading order adopted by the PUC, the CEC, and the California Power Authority in the 2003 Energy Action Plan and reaffirmed in the 2005 Energy Action Plan II, which emphasizes above all other energy sources, demand side solutions, including energy efficiency and demand response programs, followed by

renewable energy and clean distributed generation, and finally, clean, fossil-fuel, central-station generation.

- Energy Efficiency. The EAP identified reduction of energy use per capita as one of six sets of actions that are of critical importance. By significantly reducing energy demand, energy efficiency programs can greatly reduce the carbon footprint of the state. The PUC has identified explicit, numerical goals for electricity and natural gas savings achieved via energy efficiency programs for the four largest IOUs. In D.04-09-060, the PUC established electricity savings targets for the years 2006-2013, representing an estimated 55% to 59% of the utilities' incremental electric energy needs between 2004 and 2013. Savings goals in the same decision for natural gas represent an increase in expected savings of 116% relative to the status quo, increasing from the base case of 210 Mth to 454 Mth. In addition to setting aggressive efficiency targets, D.04-09-060 also authorized a three-year program implementation and funding cycle for electric and natural gas energy efficiency efforts. Consistent with this three-year program cycle, in D.05-09-043, the PUC approved the 2006-2008 energy efficiency portfolio plans and funding levels of the IOUs. Authorized expenditures on energy efficiency programs are on the order of \$2 billion. The GHG emissions savings associated with these plans are projected to be 3.4 million tons in 2008, equivalent to taking approximately 650,000 cars off the road.
- Renewable Portfolio Standard. SB 1078 established a Renewables Portfolio Standard (RPS), requiring the state's IOUs, energy service providers, and community choice aggregators to increase the share of renewable energy to 20% of total load served by 2017. Responsibility for implementing the program is shared by the PUC and CEC. An RPS, by increasing the state's reliance on less carbon intensive generation, can greatly reduce the GHG emissions that would otherwise occur. The PUC has made significant progress in fulfilling its responsibilities pursuant to SB 1078 in implementing the state's RPS by establishing the regulatory framework governing the program and overseeing the IOU's RPS solicitations.¹ In 2005 to date, RPS projects have produced 24,216 GWh of electricity. Furthermore, as articulated in the EAP, the PUC is committed to achieving the 20% renewable energy target by 2010. To further encourage and accelerate renewable energy development, the PUC recently initiated an Investigation (I.05-09-005) to facilitate proactive deployment of transmission infrastructure to access renewable energy resources for California.
- Carbon Cost Adder. In recognition of the potential and likely financial risk associated with carbon intensive energy generation, in D.05-04-024 the PUC adopted an approach to calculating utility avoided costs that includes an estimate of the cost per ton of carbon emissions. While these costs are not actually passed on to ratepayers, they are used for rank-ordering purposes as the utilities

¹ See footnote 32 in "Achieving a 33% Renewable Energy Target", Center for Resource Solutions, November 15, 2005, for a more detailed overview of CPUC actions to implement the RPS program.

evaluate how to meet electricity demand. To the extent that this "carbon adder" increases the costs of conventional generation relative to less carbon intensive sources of energy in the ranking process, this approach will militate toward greater reliance on renewables and energy efficiency, thereby reducing GHG emissions associated with the energy services provided by the IOUs.

- Self Generation Incentive Program. The Self Generation Incentive Program, established in March of 2001 by the PUC in response to AB 970, provides incentives to encourage the deployment of renewable and clean distributed generation technologies. These technologies can offset all or part of a facility's electricity needs. Though originally set to end in 2003, AB 1685, signed into law in October 2003, extended the program through December 31, 2007. The annual budget authorized by the PUC to support the program from 2001 thru 2005 is \$125 million per year. By increasing reliance on clean distributed generation technologies the program yields GHG savings, both by reducing demand for more carbon intensive IOU generation as well as eliminating line losses associated with electricity delivered over the grid. Currently, the PUC is considering the implementation of a Solar Initiative that will fund incentives for solar installations on residential and commercial buildings.
- Greenhouse Gas Performance Standard. As the largest electricity consumer in the western region, the PUC recognizes that California has an obligation to provide clear guidance to the investment community on California's policies regarding new electricity generation resources. In October 2005, the PUC adopted a policy statement directing the staff to investigate the establishment of a greenhouse gas performance standard that is no higher than the GHG emissions levels of a state-of-the-art, combined-cycle natural gas turbine for all procurement contracts that exceed three years in length and for all new IOU owned generation. In the case of coal-fired generation, the capacity to capture and store carbon dioxide safely and inexpensively is necessary to meeting the standard.

3.7 The Integrated Waste Management Board

- Emissions Mitigation. The Integrated Waste Management Board mitigates emissions through actions contained in the "Sustainable Building Implementation Plan."

3.8 Multi-Agency Initiatives

- The Energy Action Plans. As described above, the PUC and CEC adopted an Energy Action Plan in 2003 (EAP) and an updated Energy Action Plan (EAP II) in 2005. The EAP proposed that "California decrease its per capita electricity use through increased energy conservation and efficiency measures. This would

minimize the need for new generation, reduce emissions of toxic and criteria pollutants and greenhouse gases, avoid environmental concerns, improve energy reliability and contribute to price stability.” The EAP also argued that the state should “encourage companies that invest in energy conservation and resource efficiency to register with the state’s Climate Change Registry.” The EAP states that “the agencies will each take into account the effect the action will have on energy expenditures, the environment and climate change, and the overall economy.” The EAP also calls for an accelerated RPS goal of 20% renewable energy electricity by the year 2010.

In EAP II, the PUC and the CEC continued the emphasis on demand reduction and renewable resources established in the EAP and added a section to directly address the threat of climate change stating, “Climate change is the most serious threat to our environmental future, and demands immediate action. Its symptoms are already evident in California.” The EAP II sets forth 13 key actions for the state to reduce its emissions of greenhouse gases.

- West Coast Regional Carbon Sequestration Partnership. In August 2003, the U. S. Department of Energy selected the West Coast Regional Carbon Sequestration Partnership as one of seven regional groups to evaluate a range of carbon sequestration options. The partnership (which consists of the Western Governor’s Association; various state agencies in California, Oregon, and Washington; and oil and gas companies) is focusing on terrestrial and geological sequestration. California and neighboring states will examine opportunities to capture and store CO₂, including issues related to transport, permitting, monitoring, verification, and public outreach. This regional partnership approach is a cooperative effort between federal, state, and private organizations and described as “the centerpiece” of federal efforts to understand the potential of carbon sequestration to help mitigate GHG emissions.

The CEC is managing the task-related working groups that are addressing issues relating to CO₂ transport, permitting, monitoring, verification, and public outreach. Phase I projects are developing the framework, tools, and methods for a regional assessment and identifying regional sequestration options and candidate projects. In Phase II, participants will conduct terrestrial and geologic sequestration pilot demonstrations to provide information for full-scale demonstrations.

- Forest Management Practices. In response to SB 812, the CEC and the Department of Forestry and Fire Protection are participating in the Registry’s efforts to develop guidance for protocols estimating emissions storage in forests. The CEC, the Department of Forestry and Fire Protection and the Department of Food and Agriculture are also working to improve methods of establishing an extensive inventory of carbon currently stored within California’s landscapes.

3.9 The California Climate Action Registry

Legislation passed in 2000 called for creation of the California Climate Action Registry (CCAR), a non-profit organization with the primary function of promoting voluntary annual reporting of GHG emissions inventories by California entities. In 2002 the California Climate Action Registry was launched and several recommendations were provided by the CEC to the Registry's Board of Directors. These included the *Guidance to the California Climate Action Registry: General Reporting Protocol* and *Guidance to the California Climate Action Registry: Certification Protocol*. The Registry has over 35 participants from business, industry, government, and other types of organizations. Emissions data by Registry members are reported at the facility level, and are verified by state approved certifiers.

Under the enabling legislation, the State of California agrees to provide “appropriate consideration” of certified emissions that result in the future, when possible regulatory regimes may be implemented to reduce GHG emissions at the international, national, or state level. A forestry protocols workgroup has been convened and a power generator/utility sector workgroup is currently being formed to draft industry-specific GHG reporting and certification protocols. In addition, there is an effort underway to establish oil and gas industry reporting protocols. Lastly, there is an effort underway to quantify the “asset value” of GHG emissions reductions and move toward a market-based system for recording actual emissions savings. The Oregon Climate Trust has been instrumental in this effort.