



OLR RESEARCH REPORT

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CLIMATE CHANGE ISSUES

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You asked:

1. What is Connecticut's statutory obligation for reducing greenhouse gas (GHG) emissions?
2. How is Connecticut doing in meeting that obligation? Is it on track?
3. What are other states and the federal government doing to reduce GHG emissions?
4. What are the best practices adopted in other states?

SUMMARY

State law requires Connecticut to reduce the level of emissions of carbon dioxide (CO₂) and other greenhouse gases (GHG) to a level at least (1) 10% below the level emitted in 1990 by January 1, 2020 and (2) 80% below the level emitted in 2001 by January 1, 2050. The law also requires the Department of Energy and Environmental Protection (DEEP) to adopt regulations to implement the Regional Greenhouse Gas Initiative (RGGI), a cap and trade program that limits CO₂ emissions from power plants.

DEEP has not submitted the statutorily-required report on progress towards these targets to date. However, DEEP staff believe that the state will achieve its 2020 goal, based in part on progress already achieved in reducing CO₂ in the power generation sector. Connecticut is also implementing a variety of energy efficiency and renewable energy programs that will reduce GHG emissions.

The federal government has taken several steps to reduce GHG emissions. Most notably, the Environmental Protection Agency's (EPA) vehicle GHG rules are projected to eliminate six billion metric tons of GHG pollution. EPA has proposed rules limiting CO₂ emissions from new power plants (which are being revised) and will issue rules governing emissions from existing power plants. It also collects various types of GHG emissions data.

We have not found any entity that identifies "best practices" in reducing GHG emissions. But among the states that have been most aggressive in addressing GHG emissions are California, Massachusetts, and New York. California has adopted a cap-and-trade program that applies to power plants and other major CO₂ emitters. It has also (1) issued executive orders setting long-term GHG reductions goals and promoting zero-emission vehicles, (2) taken steps to reduce GHG emissions by government agencies and nonprofit organizations, and (3) issued a report card on actions by state agencies to reduce GHG emissions. Massachusetts has established a "dashboard" website that provides information on, among other things, the sources of the state's GHG emissions and the state's progress in addressing climate change. New York has established an Office of Climate Change which assists local governments and other entities address climate change. New York has also issued regulations setting CO₂ limits for new power plants and established a program to reduce electricity usage 15% below forecast levels by 2015, with comparable results in natural gas conservation.

In addition, several states have taken steps to adapt to the impacts of climate change, most notably rising sea levels. OLR report [2012-R-0418](#) describes sea-level rise adaptation policies in ten states (Florida, Louisiana, Maryland, Massachusetts, New Jersey, New York, North Carolina, Rhode Island, South Carolina, and Virginia).

EPA has a [webpage](#) that describes state and regional climate change initiatives as does the [Center for Climate and Energy Solutions](#) (formerly the Pew Center on Climate Change).

CONNECTICUT'S OBLIGATIONS AND PROGRESS

Obligations

[CGS § 22a-200a](#) requires the state to reduce the level of GHG emissions to a level at least (1) 10% below the level emitted in 1990 by January 1, 2020 and (2) 80% below the level emitted in 2001 by January 1, 2050.

By January 1, 2010 and biannually thereafter, the state agencies on the governor's Steering Committee on Climate Change must report to the Office of Policy and Management (OPM) secretary and the DEEP commissioner. The report must identify (1) existing and proposed activities and improvements to agency facilities that are designed to meet state agency energy savings goals established by the governor and (2) policies and regulations that could be adopted in the near future by the agencies to reduce GHG emissions in accordance with the targets.

By January 1, 2012 and every three years thereafter, the DEEP commissioner must, in consultation with the OPM secretary and the steering committee, report to the Environment, Energy and Technology, and Transportation committees on the quantifiable emissions reductions achieved. The report must include a schedule of proposed regulations, policies, and strategies designed to achieve the limits of GHG emissions, an assessment of the latest scientific information and relevant data regarding global climate change, and the status of GHG emission reduction efforts in other states and countries.

[CGS § 22a-200c](#) requires the commissioner to adopt regulations to implement RGGI. RGGI and other cap-and-trade programs use market forces to reduce emissions, with firms buying and selling allowances to emit CO₂ or other pollutants. Further information about RGGI is available at <http://rggi.org>.

By law, DEEP must auction all RGGI emissions allowances and use the proceeds for energy efficiency and renewable energy programs. In making these investments, the DEEP commissioner must consider strategies that maximize cost effective reductions in GHG emissions.

Progress and State Initiatives to Reduce GHG Emissions

Neither of the reports required by [CGS § 22a-200a](#) have been issued to date, although DEEP anticipates reporting to the committees of cognizance regarding emissions reductions achieved later this year.

Jessie Stratton, DEEP's director of policy, believes that the state is on track to meet the 2020 target. She notes that CO₂ emissions from power plants in the state are 40% below the cap established by RGGI (5.9 million tons annually versus 10.6 million tons).

DEEP believes that implementation of its 2012 comprehensive energy strategy will measurably reduce Connecticut's GHG emissions and put the state on a trajectory toward progress on climate change. The strategy offers recommendations in five areas: energy efficiency; industrial energy needs; electricity supply, including renewable energy; natural gas; and transportation. But significant additional measures and new technologies will be required to achieve the goal of an 80% emissions reduction by 2050 as spelled out in the state's 2008 Global Warming Solutions Act.

OLR report [2011-R-0313](#) describes the state's energy efficiency and renewable energy initiatives, many of which reduce GHG emissions. More recently, [PA 13-298](#):

1. potentially doubles funding for energy efficiency programs;
2. establishes a program to encourage people to replace their heating equipment with more energy-efficient equipment;
3. establishes a program to finance residential energy efficiency and renewable energy measures using private capital, with loans repaid on the electric or gas bills of participating customers;
4. requires the gas companies to develop an expansion plan designed to provide gas service to customers currently on and off distribution lines, to facilitate people switching from heating oil to gas, which produces less CO₂; and
5. expands the types of resources that count towards the renewable portfolio standard.

In addition, [PA 13-239](#) authorizes \$25 million in general obligation bonds for DEEP energy efficiency and renewable energy projects in state-owned buildings in FY 15.

Connecticut, like many other states, is also taking steps to address climate change by state agency actions. These include installing clean energy systems in state buildings, purchasing renewable energy, constructing green state buildings, benchmarking and reducing energy consumption in state buildings, reducing vehicle miles traveled by state vehicles, and purchasing hybrid vehicles.

FEDERAL INITIATIVES

The U.S. Supreme Court determined in *Massachusetts v. EPA*, 549 U.S. 497 (2007) that (1) GHGs, including CO₂, are air pollutants under the Clean Air Act and (2) EPA was required to determine if they threaten public health and welfare. In December 2009, EPA determined that they do and began the process of adopting GHG regulations.

The administration's climate change action plan is available at <http://www.whitehouse.gov/sites/default/files/image/president27climateactionplan.pdf>.

Vehicles

Light-duty vehicles (e.g., cars and sports utility vehicles) are responsible for nearly 60% of U.S. GHG emissions and transportation-related petroleum use. In 2010, EPA and the National Highway Traffic Safety Administration (NHTSA) issued rules to establish new standards for model year 2012 through 2016 light-duty vehicles to reduce GHG emissions and improve fuel economy. EPA established GHG emissions standards under the Clean Air Act and NHTSA modified Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act.

In 2012, EPA and NHTSA issued final rules extending these provisions to 2017 through 2025 light-duty vehicles to further reduce GHG emissions and improve fuel economy. The emission standards are based on CO₂ emissions-footprint curves, where each vehicle has a different emissions compliance target depending on its footprint (related to the size of the vehicle). Generally, the larger the vehicle footprint, the higher the corresponding vehicle emissions target. As a result, the burden of compliance is distributed across all vehicles and all manufacturers. Manufacturers need not build vehicles of any particular size or type nor does the rule create an incentive to do so, and no single vehicle is required to meet its individual target. Each manufacturer will have its own fleet-wide standard that reflects the vehicles it chooses to produce, and the GHG program provides a wide range of credit programs and flexibility for manufacturers to meet the standards.

EPA projects that the final standards will result in an average industry fleet-wide level of 163 grams/mile of CO₂ in model year 2025, which is equivalent to 54.5 miles per gallon if achieved solely through fuel economy improvements. EPA projects that manufacturers will, in practice, comply with the standards by using a wide range of technologies. These include advances in gasoline engines and

transmissions, vehicle weight reduction, lower tire rolling resistance, vehicle aerodynamics, increased use of diesel engines, and more efficient vehicle accessories. EPA expects that most of the improvements will come from advanced internal combustion engines, although it expects to see somewhat greater sales of hybrid vehicles and electric vehicles. EPA also expects that vehicle air conditioning systems will continue to become more efficient and use alternative refrigerants with lower hydrofluorocarbon emissions (these chemicals are particularly potent GHGs). EPA projects that the light-duty vehicle rules will eliminate six billion metric tons of GHG pollution over their lifetime.

The agencies also adopted GHG regulations in 2011 for heavy-duty engines and vehicles. These standards will reduce GHG emissions by approximately 300 million tons and save 530 million barrels of oil.

Power Plants

Power plants account for roughly one-third of all domestic GHG emissions. In April 2012, the EPA published a proposed regulation regarding GHG emissions from new power plants. It proposed

establishing a standard of 1,000 pounds of CO₂ per megawatt-hour

(MWh) of electric output. EPA believes that new natural gas plants would be able to meet the proposed standard without added controls. On the other hand, coal-fired plants would need to incorporate technology, such as carbon capture and storage (CCS), to reduce CO₂ emissions to meet the standard. New power plants that use CCS would have the option to

use a 30-year average of CO₂ emissions to meet the proposed standard,

rather than meeting the annual standard each year. The proposal prompted more than two million comments and the administration directed EPA to issue a new proposal by September 20, 2013.

EPA expects to issue proposed carbon pollution standards, regulations, or guidelines, as appropriate, for modified and existing power plants by June 1, 2014 and issue final standards, regulations, or guidelines, as appropriate, by June 1, 2015.

In 2012 President Obama set a goal to issue permits for 10 gigawatts of renewable generation on federal lands by the end of the year (for comparison, the Millstone nuclear power plants have a combined capacity of about two gigawatts). The Department of the Interior achieved this goal ahead of schedule and the president has directed it to permit an additional 10 gigawatts by 2020.

Data Collection

EPA collects various types of GHG emissions data. The inventory of U.S. GHG emissions provides the official estimate of total national-level GHG emissions. This report tracks annual U.S. GHG emissions since 1990. The GHG Reporting Program collects and publishes emissions data from individual facilities in nine industry groups that directly emit large quantities of GHGs, as well as suppliers of certain fossil fuels and industrial gases.

INITIATIVES IN OTHER STATES

California

Legislation. The Global Warming Solutions Act of 2006 sets a goal of reducing 2020 GHG emissions to their 1990 levels. (SJR 17, adopted in 2011, reaffirmed this goal.) The act directed the California Air Resources Board (ARB) to begin developing early actions to reduce GHGs. It also required ARB to prepare and approve a scoping plan to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions by 2020 (Cal. Health and Safety Code § 38561).

The scoping plan, approved by ARB in December 2008, outlines actions to reduce GHGs in California. The approved plan indicates how these emission reductions will be achieved from significant GHG sources via regulations, market mechanisms, and other actions.

The act requires ARB to develop and maintain an inventory emission of CO₂ and other GHG. It requires major emitters of GHG to report their emissions. The reporting requirement applies industrial facilities, suppliers of transportation fuels, gas utilities, and electricity providers and marketers. The latter must report GHG emissions associated with power that is generated outside of California but sold inside the state.

Cap and Trade Program. ARB decided to pursue a cap-and-trade program to implement the act. The program places a GHG limit that will decrease by 2% each year from 2013 through 2015 and by 3% from 2015 through 2020. The cap-and-trade rules first apply to utilities and large industrial plants. In 2015, they will apply to fuel distributors as well.

The program began with a distribution of free allowances to regulated businesses. The portion of emissions covered by these allowances will vary by industry, but generally will account for approximately 90% of the business's overall emissions, with this percentage declining over time. For any additional emissions, the business must purchase the necessary allowances at a quarterly auction or from an entity that has excess allowances.

California's first quarterly cap-and-trade allowance auction took place on November 14, 2012. Nearly 22 million GHG allowance was auctioned then, each representing one ton of CO₂, to over 600 approved industrial facilities and utilities. The next auction will take place on September 27, 2013.

Recent legislation directs how the auction proceeds are spent. [AB 1532](#) (2012) requires that the revenue from the auctions be spent for environmental purposes, with an emphasis on improving air quality. [SB 535](#) (2012) requires that at least 25% of the revenue be spent on programs that benefit disadvantaged communities, which tend to suffer disproportionately from air pollution. The California Environmental Protection Agency will identify disadvantaged communities for investment opportunities, while the Department of Finance will develop a 3-year investment plan and oversee the expenditures of this revenue to mitigate direct health impacts of climate change. The program's website is <http://arb.ca.gov/cc/capandtrade/capandtrade.htm>.

Executive Orders. Executive Orders [S-3-05](#) and [B-16-2012](#) establish post-2020 goals for GHG emission reductions. The former order sets a goal of reducing GHG emissions by 2050 to 80% below 1990 levels. The latter deals with zero-emission vehicles (ZEVs). Among other things, it requires state agencies to help ensure that the state's major metropolitan areas will be able to accommodate ZEVs, with infrastructure plans and streamlined permitting for each area. It requires that the state vehicle fleet increase the number of its ZEVs through the normal course of fleet replacement so that at least 10% of fleet purchases of light-duty vehicles (other than those used for public safety) be zero-emission by 2015, with this proportion rising to 25% by 2020. It sets a number of goals, including that state vehicle infrastructure be able to support up to one million ZEVs, the costs of ZEVs become competitive with conventional combustion vehicles, and integrating electric vehicle charging into the electricity grid.

GHG Report Card. In January 2013, the state's Environmental Protection Agency released its most recent [State Agency Greenhouse Gas Reduction Report Card](#). Among the initiatives it describes are:

1. an ARB regulation that sets fleet-average GHG standards for new passenger vehicles, phasing in from 2009 to 2016, that will reduce GHG emissions by the equivalent of 26 million tons of CO₂ in 2020;
2. an ARB regulation that decreases the amount of carbon contained in vehicle fuels (described in OLR report [2009-R-0197](#));
3. changes in pavement materials specifications adopted by Caltrans (the state transportation agency) to reduce the amount of CO₂ used in production of these materials;
4. appliance and building energy efficiency standards adopted by the Energy Commission; and
5. utility energy efficiency programs mandated by the Public Utilities Commission.

Further information about the state's climate change initiatives is available at <http://www.climatechange.ca.gov/>.

GHG Reductions in Government and Nonprofit Organizations.

California has also taken steps to reduce the GHG emissions associated with state buildings and agency operations. The report card noted above describes initiatives by the Department of General Services to reduce GHG emissions associated with designing and constructing state buildings. Executive Order S-20-04 established a goal of reducing grid-based energy purchases for these buildings by 20% by 2015, compared to a 2003 baseline. Overall, the state estimates that the strategies described in the Green Building Action Plan that implements the order, including developing on-site renewable energy resources, will reduce the state's CO₂ emissions by nearly 2 million tons by 2020.

In addition, the California Energy Commission's Energy Partnership Program offers technical assistance to cities, counties, and hospitals to help them identify opportunities to improve energy efficiency in buildings. The program provides technical services such as conducting energy audits, preparing feasibility studies, developing equipment performance specifications, reviewing existing proposals and designs,

reviewing equipment bid specifications, and assisting with contractor selection and commissioning. The commission helps identify state loans and other financing sources for project installation.

In addition, the commission's Energy Efficiency Financing Program provides low-interest loans to schools, hospitals, and local governments to fund energy audits, feasibility studies, and energy efficiency measures. The interest rate is 4.5% and the maximum loan per application is \$3 million. Recipients who complete their projects within 12 months and meet all requirements specified in the loan application receive a reduced interest rate of 4.1%. The repayment schedule is negotiable up to 15 years and is based on the annual projected energy cost savings from the aggregated projects.

Massachusetts

The 2008 [Global Warming Solutions Act](#) creates a framework for reducing GHG emissions to a level that proponents believe will provide a reasonable chance of avoiding the worst effects of global warming. It requires reductions from all sectors of the economy to reach a target of a 25% reduction of GHG emissions by 2020 and an 80% reduction by 2050.

Massachusetts has a “dashboard” website that provides information on, among other things:

1. where the state's greenhouse gas come from,
2. the types of fuels used to produce electricity,
3. transportation sector fuel consumption, and
4. the state's progress in addressing climate change.

Transportation, electricity use, and building systems produce 91% of the state's emissions. The largest emission sources are gasoline and diesel fuel burned for road and other forms of transportation (39% of emissions) and the fuel used to heat commercial buildings and homes and for industrial processes (28%). The coal, natural gas, and oil used to generate electricity emitted 24% and the remaining 9% came from sources including agriculture, waste, wastewater, landfill gas, and chemicals used for refrigeration and fire suppression.

The website notes that GHG emissions from homes, businesses, vehicles, and other sources were 11% less in 2010 than in 1990. It attributes this trend to state policies and programs to provide cleaner and more efficient energy, cleaner cars, as well as relative changes in fuel prices and the global economic downturn. Since 1990, total electric

consumption increased by 18% but associated emissions dropped 27% because higher carbon fuels like coal and oil were replaced with cleaner fuels like natural gas and renewable sources.

The website is available at <http://www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/global-warming-solutions-act-dashboard.html>

New York

Office of Climate Change. The Office of Climate Change in the Department of Environmental Conservation (DEC) was created to lead the development, in concert with other DEC programs and state agencies, of programs and policies that mitigate GHG emissions and help New York communities and individuals adapt when changes in the climate cannot be avoided.

The office is organized into two bureaus. The Climate Science and Technology bureau (1) uses scientific, engineering, and economic principles to design solutions that will help stabilize atmospheric GHG concentrations at acceptable levels; (2) supports the development of climate impact analyses to help New York respond to the impacts of climate change; and (3) contributes to state energy and climate planning. The Climate Programs and Partnerships bureau works with state agencies, local governments, non-governmental organizations, institutions, businesses, and individuals as they reduce carbon emissions and adapt to unavoidable impacts. Its Climate Smart Communities program works with local governments to (1) develop local climate plans and GHG emission inventories, (2) reduce GHG emissions and taxpayer costs for electricity and fossil fuel in municipal facilities and operations, and (3) encourage renewable energy for local government operations.

The office's website is <http://www.dec.ny.gov/about/43166.html>.

CO₂ Standards for New Power Plants. The Power New York Act, adopted in 2011, directs DEC to establish CO₂ emission standards for new power plants. In 2012, DEC adopted regulations (6 NYCRR Part 251) setting limits of (1) 925 pounds of CO₂/MWh for baseload combined-cycle or internal combustion fossil fuel-fired plants and (2) 1,450 pounds of CO₂/MWh for new and expanded single-cycle combustion turbines, which generally provide electricity for peak demand periods. Alternatively, the plant owner can choose to comply with comparable standards based on the CO₂ content of the fuel the plant uses. The

standards, which went into effect in June 2012, apply to new plants of 25 megawatts or more or existing plants that expand by this amount (a typical power plant has a capacity of 500 to 1,000 megawatts).

Energy Efficiency Programs. In June 2008, the Public Service Commission established the Energy Efficiency Portfolio Standard (EEPS) proceeding. As part of a statewide program to reduce New Yorkers' electricity usage by 15% of forecast levels by 2015, with comparable results in natural gas conservation, the commission established interim targets and funding through 2011. The state's utilities were required to file energy efficiency programs and the New York State Energy Research and Development Authority and independent parties were invited to submit proposals for commission approval. Since June 2009, the commission has approved over 90 electric and gas energy efficiency programs, along with rules to guide implementation and measure results.

In July 2011, staff issued a white paper addressing numerous issues related to the continuation of EEPS programs beyond December 31, 2011. In October 2011, the commission reauthorized most of the efficiency programs for the four-year period ending December 31, 2015, with revised targets and budgets where appropriate. The commission believes that taken in the aggregate, the EEPS electric programs are on a trajectory to achieve the commission's goal of reducing electricity use by 11.2 million MWhs by the end of 2015. The 2011 order noted that energy efficiency, even if it costs slightly more than today's fossil energy supply sources, represents a low cost strategy for achieving CO₂ reductions.

Further information about EEPS is available at <https://www3.dps.ny.gov/W/PSCWeb.nsf/All/06F2FEE55575BD8A852576E4006F9AF7?OpenDocument>.

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