

# 2014 Connecticut Greenhouse Gas Emissions Inventory

This summary provides an overview of the state’s greenhouse gas (GHG) emissions from 1990 to 2014, the most recent year for which full data are available.<sup>1</sup> The statewide GHG emission inventory is an important tool for tracking Connecticut’s progress toward the goals set by the Global Warming Solutions Act of 2008. This law set targets of reducing GHG emissions 10 percent below 1990 levels by 2020 and 80 percent below 2001 levels by 2050.

## Inventory Methodology

A federal standard for economy-wide GHG accounting does not currently exist. In the absence of a federal standard, Connecticut DEEP is committed to continuous improvement of its

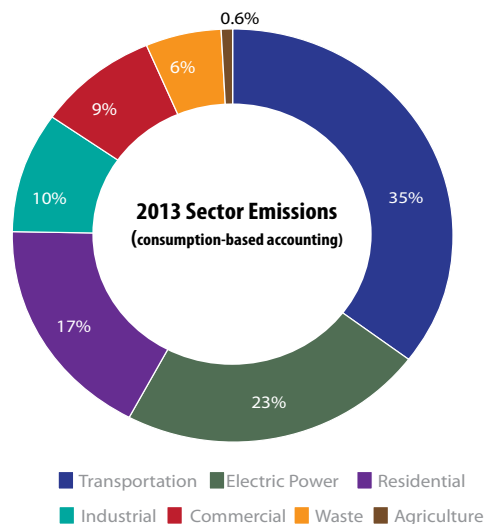
accounting methodology. This includes identifying improvements in both the quality of data and methods utilized to calculate annual GHG emissions.

Like several states across the country that regularly perform economy-wide GHG inventories, Connecticut relies heavily on the U.S. Environmental Protection Agency’s State Inventory Tool (SIT). The tool calculates sector-by-sector GHG emissions based on numerous state-level data sets (e.g., number of gallons of fuel oil sold in CT), including energy-related data provided by the Energy Information Administration. EPA recommends that states employ their own data when these are likely to be more reliable than the tool’s default figures. CT’s inventory uses SIT default data, with three exceptions. First, beginning with the 2013 inventory, CT has drawn on solid-waste data collected by the Department of

<sup>1</sup> The Department of Energy and Environmental Protection (DEEP) greenhouse gas inventory relies in part on emissions data from U.S. EPA’s State Inventory Tool. EPA released data from January-December 2014 in February 2017.

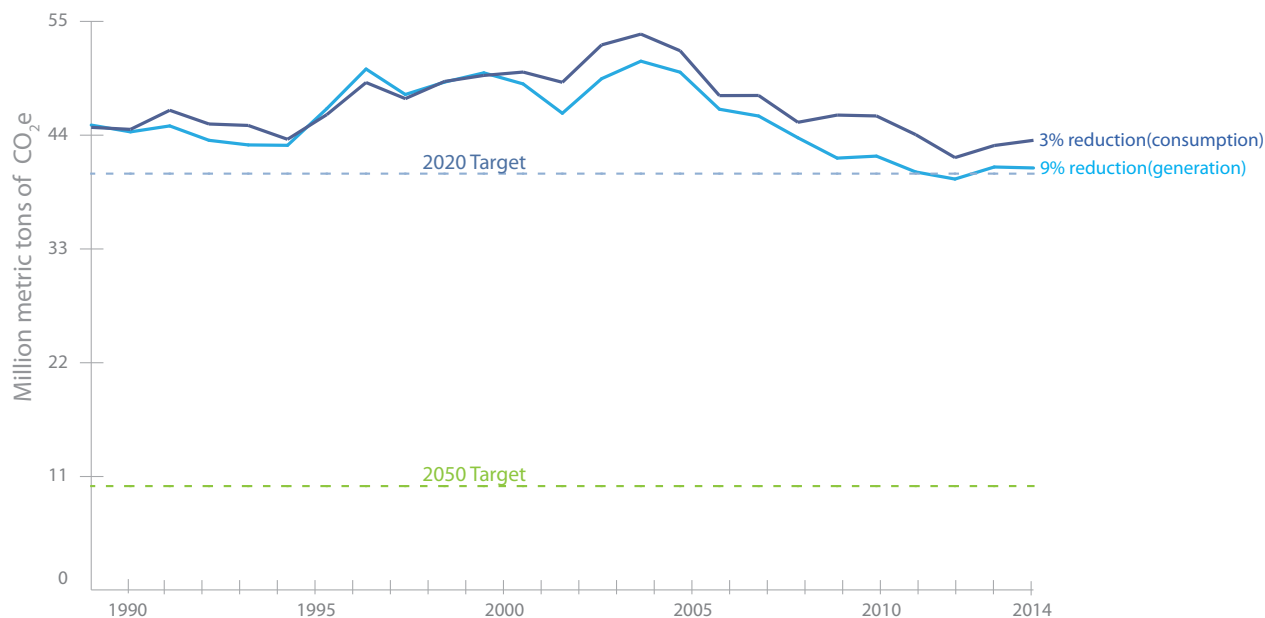
Connecticut Emissions by Sector (MMTCO<sub>2</sub>e)

	1990	2001	2013	2014
Transportation	15.6	17.8	15.5	15.4
<b>Electric Power</b>				
Consumption	11.9	12.3	9.5	9.8
Generation	12.1	11.2	7.4	7.1
Residential	8.3	8.5	7.4	7.6
Industrial	3.3	4.4	4.3	4.2
Commercial	3.8	4.3	3.6	3.8
Waste	1.5	2.4	2.5	2.5
Agriculture	0.3	0.3	0.3	0.3
<b>Consumption-based Accounting Total</b>	<b>44.7</b>	<b>50.1</b>	<b>43.0</b>	<b>43.5</b>
<b>Generation-base Accounting Total</b>	<b>44.9</b>	<b>48.9</b>	<b>40.9</b>	<b>40.8</b>
<b>Consumption-based Accounting</b> 3% reduction from 1990 13% reduction from 2001				
<b>Generation-based Accounting</b> 9% reduction from 1990 17% reduction from 2001				



### Connecticut Statewide Greenhouse Gas Emissions 1990-2014

Comparison of Electricity Sector Generation and Consumption-based Accounting



\* Targets shown in this graph utilize the consumption-based approach 1990 baseline of 44.7 MMTCO<sub>2</sub>e. The generation-based approach 1990 baseline is 44.9 MMTCO<sub>2</sub>e.

Energy and Environmental Protection's municipal waste program. Second, because SIT data on land use, land use change, and forestry appear unreliable, they have not been included in the state's recent inventories. The state aims to develop an alternative means to estimate GHG impacts of land use and forestry for use in preparing future inventories. Third, this analysis continues to present both a consumption and generation based accounting approach for the electricity sector from 1990 to 2014.

Based on best practices among states reporting state-wide GHG emissions, and reflecting the regional nature of the electric grid, the consumption-based accounting for the electric power sector was first applied in the 2013 inventory analysis. In prior GHG inventories, emissions from the electric power sector had been based entirely on direct emissions from the generation of electricity by power plants operating within the state. A consumption-based approach calculates emissions based on Connecticut's share of electricity consumption in New England, using the emissions profile of the regional electric grid's generation fuel mix.<sup>2</sup>

## 2014 GHG Emissions

Using the consumption-based accounting approach for electricity, Connecticut's economy-wide GHG emissions in 2014 were 43 million metric tons (MMT) of carbon dioxide equivalent (CO<sub>2</sub>e), 3 percent below 1990 levels and 13 percent below 2001 levels.<sup>3</sup> In comparison, emissions using the generation-based accounting approach were 41 MMT CO<sub>2</sub>e, or 9 percent below 1990 levels

<sup>2</sup> For further explanation of the two methodological approaches, see the 2013 inventory report, [http://www.ct.gov/deep/lib/deep/climatechange/2012\\_ghg\\_inventory\\_2015/ct\\_2013\\_ghg\\_inventory.pdf](http://www.ct.gov/deep/lib/deep/climatechange/2012_ghg_inventory_2015/ct_2013_ghg_inventory.pdf).

<sup>3</sup> Emissions are reported in terms of carbon dioxide equivalence (CO<sub>2</sub>e). Carbon dioxide is the primary GHG. Emissions of other GHGs are expressed on the basis of their potential to contribute to global warming, relative to carbon dioxide's potential.

and 17 percent below 2001 levels. Under both accounting approaches for electricity, overall emissions peaked in 2004 and trended downward until 2012.

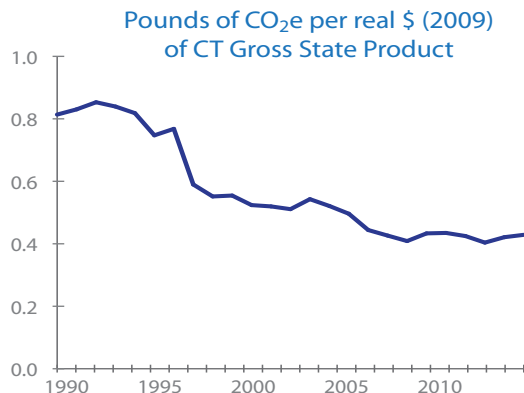
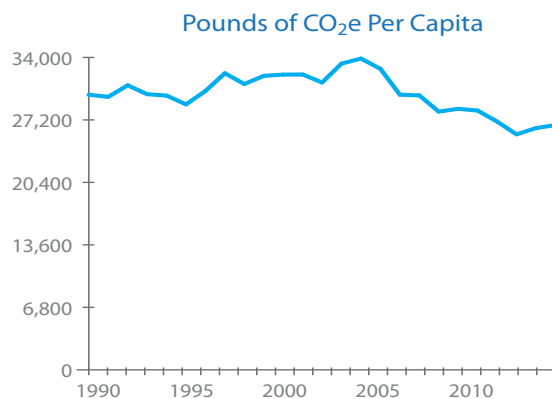
Connecticut's largest reduction since 1990 has occurred in the electric power sector — 18 percent under consumption-based accounting and 41 percent under generation-based accounting. This reduction correlates with state and regional policies and programs that encourage investment in energy efficiency in homes and businesses, a shift from dirtier fossil fuels such as coal and oil to natural gas, and increased deployment of renewable energy sources.

Additional emissions reductions in this sector will come from further reducing reliance on oil and coal during periods of peak electricity demand, from continuing expansion of renewable energy, and from the mainstreaming of energy efficiency in homes, businesses, and industry.

The transportation sector continues to be the single largest source of emissions in the state, contributing 35 percent, principally from the use of fossil fuels in passenger cars and light trucks. These emissions have remained mostly stagnant since 1990, dropping only 1 percent. Although national fuel economy standards have improved vehicle efficiency, the number of vehicle miles driven in Connecticut have increased, which is likely the contributing factor for not attaining greater emissions reductions in the transportation sector.<sup>45</sup> Significantly reducing transportation emissions in the coming decades will require continued improvements in vehicle fuel economy for all class sizes, in-

4 The average fuel efficiency of U.S. light-duty vehicles (mpg) (calendar year) have increased 14% between 1990-2014. Bureau of Transportation Statistics.

5 Vehicle miles traveled have increased 19% in CT. CT Department of Transportation, "Transportation data set 2\_29\_16."



creased deployment of zero-emission vehicles, and through the utilization of strategies that reduce vehicle miles traveled.

While the overall emissions trend is downward, there was a small uptick in economy-wide emissions between 2013 and 2014 (43 MMT CO<sub>2</sub>e to 43.4 MMT CO<sub>2</sub>e). This is attributable primarily to increases in the residential, commercial, and electric power sectors. Emissions from the residential and commercial sector emissions are predominantly from burning fossil fuels for space heating and are strongly influenced by winter weather. The early months of 2014 were marked by extended periods of bitterly cold weather that resulted in large spikes in consumption of natural gas and fuel oil. This intensely cold weather indirectly affected the electric power sector resulting in increased emissions. Because the intensely cold weather in the first few months of the year prompted homes and businesses to burn more natural gas



for space heating, regional electricity generators faced constrained access to natural gas and were required to burn larger quantities of more carbon-intensive fuel oil and coal.<sup>6</sup>

Overall trends in the inventory demonstrate that the carbon intensity of Connecticut's economy has declined dramatically. The carbon intensity of the economy fell from 0.8 pound of CO<sub>2</sub>e per dollar of state gross domestic product in 1990 to 0.4 pounds per dollar in 2014. This demonstrates significant long-term decoupling of economic growth and carbon pollution.

Intensity also has declined dramatically on a per-capita basis. Connecticut's 2014 per capita emissions were 26,637 pounds per person, well below the national average of 47,512 pounds per person.<sup>7</sup> Connecticut's per capita emissions have declined an average of 0.5 percent per year since 1990. The state's commitment to cutting carbon pollution through energy efficiency, switching to low-carbon fuels, increasing use of renewable energy, and other means is transitioning the state to a low-carbon economy.

### **GHG Emission Reduction Strategies Currently Underway**

Connecticut is implementing a suite of complementary strategies to ensure that the state is on a course to achieve its near-term 2020 reduction goal. The range of GHG reduction actions include direct regulations, monetary and non-monetary incentives, market-based mecha-

<sup>6</sup> "2014 ISO New England Electric Generator Air Emissions Report"

[https://www.iso-ne.com/static-assets/documents/2016/01/2014\\_emissions\\_report.pdf](https://www.iso-ne.com/static-assets/documents/2016/01/2014_emissions_report.pdf)

<sup>7</sup> U.S. figure based on U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014 – Executive Summary," <https://www.epa.gov/sites/production/files/2017-04/documents/us-ghg-inventory-2016-chapter-executive-summary.pdf>, p. ES-4.

nisms, and recognition for voluntary actions.

The following programs, strategies, and policy initiatives are just a few examples of current efforts driving the state's emissions down between now and 2020. These initiatives offer a foundational framework to build upon as additional strategies are developed to further reduce emissions beyond 2020.

#### ***2017 Comprehensive Energy Strategy***

Connecticut will need to continue to scale investments that drive down GHG emissions in order to meet the ambitious requirements of the Global Warming Solutions Act, both in the near- and long-term (2020 and 2050), particularly in light of the updated 2013 Summary showing an uptick in 2013 emissions. The 2016 Comprehensive Energy Strategy will evaluate GHG mitigation options on all of these time horizons, and will emphasize any additional near term strategies that may be needed to ensure compliance with the 2020 goal.

#### ***Energy Efficiency***

The Connecticut Energy Efficiency Fund supports a variety of programs that provide financial incentives to help Connecticut consumers reduce the amount of energy used in their homes and businesses. Investment in energy efficiency programs has doubled since 2013, implementing a key recommendation of the 2013 Comprehensive Energy Strategy. At this increased level of investment, expected lifetime GHG reductions from the state's energy efficiency programs will be 3.2 MMTCO<sub>2</sub>e.

#### ***Connecticut Hydrogen and Electric Automobile Purchase Rebate (CHEAPR)***

Through the CHEAPR program, DEEP offers rebates of up to \$5,000 for Connecticut residents who purchase or lease a new eligible battery electric, plug-in hybrid electric, or fuel cell elec-

tric vehicle. In just over a year's time, these rebates have supported purchases of more than 750 vehicles.<sup>7</sup>

### ***Zero Emission Vehicle (ZEV) Memorandum of Understanding***

Connecticut is one of seven states committed to putting 3.3 million ZEVs on the road by 2025. Connecticut is implementing the steps laid out in the Multi-State Action Plan which focuses on developing ZEV infrastructure and supporting policies, codes, and standards to advance the deployment of ZEVs. With the implementation of the revised travel provision, ZEV sales in Connecticut and other New England states are expected to increase beginning in 2017.<sup>8</sup>

### ***Renewable Portfolio Standard (RPS)***

The Malloy Administration has embraced the use of open, competitive procurements of renewables and large-scale hydropower through long-term contracts as the best way to secure investment in new clean generation at the least cost to the state's ratepayers. A new, 20 MW solar facility in Sprague, CT, that was contracted under Section 6 of Public Act 13-303 is expected to come online in January 2017. Currently, DEEP is considering more than 100 bids submitted in two historic RFPs for clean energy projects of different size classes that could be selected for long-term contracts pursuant to Public Acts 13-303 and 15-107. Under those statutes, CT DEEP has the authority to contract for up to 4,250 GWh, or approximately 15% of the state's electricity demand, from clean energy resources. Bid selections are expected in the fall of 2016, and winning projects must be online by 2020.

### ***Rooftop Solar Deployment***

The Connecticut Green Bank, established in 2011, has pioneered multiple programs to expand the deployment of rooftop solar photovoltaics (PV) in Connecticut, while driving down

installed costs and ratepayer incentives. A program goal of installing 30 MW of rooftop solar PV under the Residential Solar Incentive Program was met in 2015, 8 years early. Public Act 15-194 requires the Connecticut Green Bank to offer incentives to support the deployment of 300 MW of residential solar by 2022. The Green Bank is partnering with the state's electric utilities in the Solar Homes Renewable Energy Credit program to enable purchase of long-term contracts for Renewable Energy Credits produced from a homeowners' solar system, making solar more accessible and affordable to ratepayers throughout the state.

### ***Shared Clean Energy Facilities***

Public Act 15-113 requires DEEP to establish a two-year pilot program for shared clean energy facilities, including solar, fuel cells, geothermal, hydroelectric and other renewables. Multiple customers will be able to contract a percentage or set amount of the electricity produced from these facilities. Projects selected in this pilot program must be online by 2019.

### ***Clean Energy Communities***

The Clean Energy Communities program encourages and supports municipal efforts to promote and adopt energy efficiency strategies and clean energy technologies. Through the implementation of three simple steps, community leaders, households, and local businesses work together to set clean energy goals and are rewarded for their achievements.





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**Connecticut Department of Energy and Environmental Protection**  
Office of Climate Change, Technology and Research