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HARTFORD-EAST HARTFORD-MIDDLETOWN COMPREHENSIVE CLIMATE ACTION PLAN

CRCOG

RIVERCOG
Lower Connecticut River Valley Council of Governments

Dewberry

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ACRONYMS AND INITIALISMS

ACS	American Community Survey
AFC	Alternative Fuel Corridor
APA	American Planning Association
AVERT	AVoided Emissions and geneRation Tool
BRT	Bus Rapid Transit
BTTI	Connecticut Building Trades Training Institute
CCA	Community Choice Aggregation
CCAP	Comprehensive Climate Action Plan
CCGP	Community Connective Grant Funding
CGS	Connective General Statute
CNG	Compressed Natural Gas
CO_2e	Carbon Dioxide Equivalents
CPRG	Climate Pollution Reduction Grant
CRCOG	Capitol Region Council of Governments
CREST	Community Renewable Energy Siting Tool
CSCU	Connecticut State Colleges and Universities
CT DEEP	Connecticut Department of Energy and Environmental Protection
CT DOAG	Connecticut Department of Agriculture
CT DOL	Connecticut Department of Labor
CT OPM	Connecticut Office of Policy and Management
CTAC	Climate Technical Advisory Committee
CT DOT	Connecticut Department of Transportation
CTE	Career Technical Education
CTECS	Connecticut Technical Education and Career System
US DOT	United States Department of Transportation
EFs	Emissions Factors
EIA	Energy Information Administration
EJ	Environmental Justice
EPA	Environmental Protection Agency
EPR	Extended Producer Responsibility
EUI	Energy Use Index (Btu/ft^2/yr)
EV	Electric Vehicle
FHWA	Federal Highway Administration
FLIGHT	Facility Level Information on GreenHouse gases Tool
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program
GWP	Global Warming Potential
HUD	United States Department of Housing and Urban Development
IGWG	Inter-governmental Working Group

kW	Kilowatt
LGGIT	Local Government Greenhouse Gas Inventory Tool
LMA	Labor Market Area
LOTCIP	Local Transportation Capital Improvement Program
MMTCO$_2$e	Million Metric Tons of Carbon Dioxide Equivalents
MPG	Miles per Gallon
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MW	Megawatt
NPDES	National Pollutant Discharge Elimination System
NVCOG	Naugatuck Valley Council of Governments
PCAP	Priority Climate Action Plan
PM	Particulate Matter
PURA	Public Utilities Regulatory Authority
RiverCOG	Lower Connecticut River Council of Governments
SIT	State Inventory Tool
SOV	Single-Occupancy Vehicle
TIP	Transportation Improvement Program
TOD	Transit-Oriented Development
TRIP	Transportation Rural Improvement Program
US DOC	United States Department of Commerce
US DOE	United States Department of Energy
USDA	United States Department of Agriculture
USEER	United States Energy and Employment Report
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The US Environmental Protection Agency's (EPA's) Climate Pollution Reduction Grant (CPRG) program provides funding for states, local governments, tribes, and territories to develop plans to meaningfully reduce greenhouse gas (GHG) emissions and other air pollutants. The CPRG has two components: planning grants and competitive implementation grants.

The CPRG planning work has three phases:

- **Priority Climate Action Plan** (PCAP, submitted to the EPA in March 2024),
- **Comprehensive Climate Action Plan** (CCAP, this document, due in 2025); and
- **Status Report** (due in 2027).

This document, the Capitol Region Council of Governments' (CRCOG's) and the Lower Connecticut River Valley Council of Governments' (RiverCOG's) CCAP for the Hartford-East Hartford-Middletown Municipal Statistical Area (MSA), builds off the stakeholder engagement and analysis work completed in the region's PCAP.

About the Region

The Hartford-East Hartford-Middletown MSA comprises two of the State's nine councils of governments (COGs): CRCOG and RiverCOG (**Figure 1**). With 38 municipalities and 1,027.3 square miles of land, CRCOG is the State's largest COG by area. Based on US Census Bureau 5-year 2019-2023 American Community Survey (ACS) data, CRCOG's total population is 969,029, representing roughly 27 percent of the State's population. RiverCOG is made up of 443 square miles of land and contains 17 municipalities. Based on the US Census Bureau 5-year 2019-2023 ACS data, RiverCOG has a total population of 175,244, representing roughly five percent of the State's population.

CCAP SECTIONS

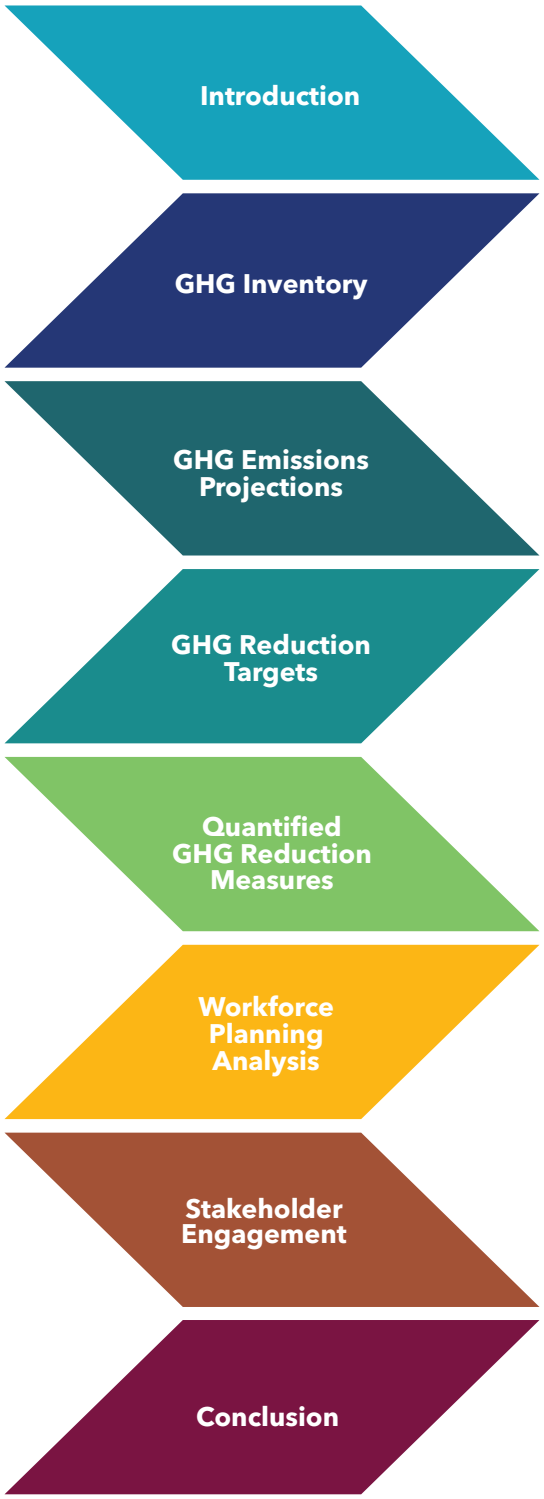

Figure 1: Boundary of the Hartford-East Hartford-Middletown MSA (blue). All of CRCOG and nearly all of RiverCOG are included in the MSA. Additionally, several municipalities from four other COGs are also included in this MSA.

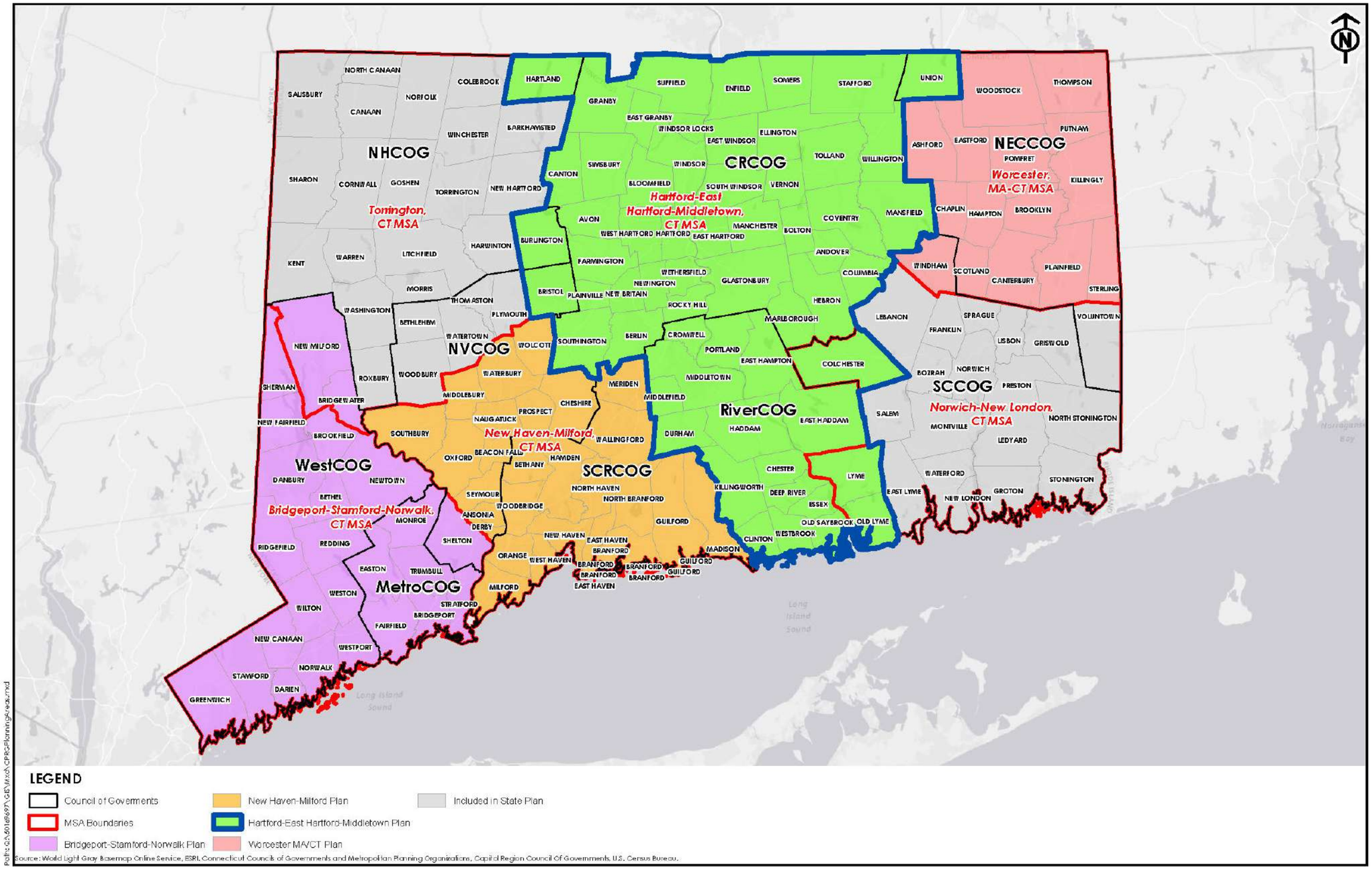

Figure 2: Freshwater marshes at Whalebone Cove in Hadlyme.

Moving from Priority Measures to Comprehensive Measures

The region's PCAP highlighted 12 priority measures in all sectors except the industrial sector. To develop the CCAP's measures, CRCOG and RiverCOG:

- Reviewed the PCAP GHG inventory to see the region's largest contributors to GHG emissions and undertook a GHG inventory using more up-to-date data;
- Reviewed all measures proposed during the creation of the PCAP;
- Undertook engagement with the public; agency representatives; local government representatives and nonprofit representatives, including engaging early in the process with a wide number of Connecticut-based stakeholders in a multi-COG public engagement event;
- Reviewed the State's GHG emission goals; and
- Continually refined measures to make them actionable, quantifiable, and meaningful, until the CCAP measures were chosen.

Table 1 shows the CCAP's eight measures and how these measures relate to the measures either in the PCAP or discussed during the development of the PCAP.

Table 1: Relationship between PCAP and CCAP GHG Emissions Reduction Measures

Sector	Measures Reviewed During PCAP	CCAP Measures
AGRICULTURAL/ NATURAL & WORKING LANDS	• Increase urban tree canopy in municipalities across the region	N1 Increase Urban Tree Canopy in Municipalities Across the Region
ELECTRICITY GENERATION	• Install solar panels, add battery storage, and develop microgrids on buildings and properties owned by municipalities • Explore community/shared solar projects 100 kW to 2 MW in size across the region • Expand deployment of agrivoltaics	E1 Support an Increase in Solar Projects in the Region, Creating 900 Megawatts Across the Region
COMMERCIAL/ RESIDENTIAL BUILDINGS	• Expand and enhance the region's commercial and residential energy audit programs and provide support for implementation • Undertake energy efficiency upgrades to municipal buildings	B1 Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent
TRANSPORTATION	• Install public electric vehicle (EV) charging infrastructure and fund maintenance of EV charging infrastructure	T1 Install Public Electric Vehicle Charging Stations
	• Encourage mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users • Promote transit-oriented development (TOD) by providing funding opportunities • Promote TOD by updating zoning; install train and bus improvements • Expand bus rapid transit; increase micromobility options	T2 Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles
	• Convert light-duty municipal fleets to EV/hybrids, install municipal charging infrastructure, and switch municipal gas-powered equipment, such as leaf blowers, to electric	T3 Switch Lawn and Garden Equipment to Electric T4 Convert Light-duty Municipal Fleets to EVs/Hybrids. Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures
WASTE & MATERIALS MANAGEMENT	• Establish and expand residential and academic food waste diversion programs and examine ways to increase utilization of anaerobic digestion	W1 Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

GHG Inventory Findings

The PCAP's GHG inventory (2021 inventory) was updated for the CCAP (2022 inventory), and a new total number of emissions was found for the region. The 2022 inventory found that the region emits approximately **10.90 million metric tons** of carbon dioxide equivalents ($MMTCO_2e$). This is an increase from the 8.67 $MMTCO_2e$ reported in the 2021 GHG inventory. The observed increase in emissions between 2021 and 2022 is primarily attributed to changing societal behaviors and increased economic activity as COVID-19-related business closures and restrictions eased.

Near-term (2030) and Long-term (2050) Projections

Despite the increase in GHG emissions from 2021 to 2022, results of a near-term and long-term projections analysis show that the region is on a path to significantly reduce its GHG output, with a projected 26 percent decrease in total emissions, from 13.72 $MMTCO_2e$ in 2025 to 10.12 $MMTCO_2e$ in 2050.

Table 2 shows each sector's current and anticipated GHG projections.

Table 2: GHG Emissions Projections by Sector

SECTOR	PROJECTED EMISSIONS ($MMTCO_2E$)			2025 TO 2050 PERCENT CHANGE
	2025	2030	2050	
Agriculture and Land Use	-1.31	-1.31	-1.31	-0.4%
Industrial	1.38	1.31	1.35	-2.3%
Electricity	3.52	3.31	2.84	-19.5%
Transportation	4.67	4.15	2.15	-54.0%
Residential and Commercial Buildings	3.66	3.65	3.28	-10.5%
Waste	0.48	0.48	0.50	4.7%
Total	**12.41**	**11.60**	**8.81**	**-29.0%**

Source: RPI EPS

The Region's Climate Targets

For the purposes of this CCAP, the region adopts the State's GHG reduction goals, as outlined in the ambitious and forward-thinking Public Act 21-125, signed into law by the Governor on July 1, 2025. These goals are centered on the State becoming net zero by 2050. Prior to Public Act 21-125, Connecticut's climate goals were primarily defined by the Global Warming Solutions Act (Public Act 08-98) and subsequent legislation.

These targets use 2001 emissions levels as the primary baseline for reduction. The key milestones are:

- By 2030: Achieve a 45 percent reduction in GHG emissions below 2001 levels.
- By 2040: Achieve a 65 percent reduction in GHG emissions below 2001 levels and attain a 100 percent zero-carbon electricity grid.
- By 2050: Achieve an economy-wide net zero level of emissions, provided direct and indirect GHG emissions are at least 80 percent below 2001 levels.

Statewide, Connecticut met the statutory target of 10 percent emissions reductions between 1990 and 2020, with a decrease of 13.9 percent. The Connecticut Department of Energy and Environmental Protection (CT DEEP) estimates that 2022 emissions were 28 percent below 2001 levels. CT DEEP also states the pace of reductions must increase to meet the 2030 and 2050 goals.

CCAP Measures

Compared to business-as-usual projections, implementation of the CCAP GHG reduction measures would reduce emissions by 0.62 $MMTCO_2e$ annually in the short term by 2030. Long term, these GHG reduction measures combined would reduce emissions by 2.5 $MMTCO_2e$ annually by 2050.

While these measures alone will not get the region to the State's ambitious climate goals, their implementation is an **important step in targeting key emissions sources** in the region.

Table 3 provides the CCAP measures and their definitions.

Long term, these GHG reduction measures combined would reduce emissions by **2.5 $MMTCO_2e$** annually by 2050.

This is the equivalent of taking nearly **600,000** gasoline-powered cars off the road.

Figure 3: Boaters at the mouth of Hamburg Cove on the Eight-Mile River in Lyme *(Jerry Roberts)*

Table 3: CCAP GHG Reduction Measures

Sector	Measure	Description
AGRICULTURAL/ NATURAL & WORKING LANDS	N1 Increase Urban Tree Canopy in Municipalities Across the Region	N1 This measure aims to increase tree canopy coverage across the region to match the city of Hartford's goal of 35 percent coverage.
ELECTRICITY GENERATION	E1 Support an Increase in Solar Projects in the Region, Creating 900 Megawatts Across the Region	E1 This measure seeks to expand solar generation across the region by supporting a variety of strategies.
COMMERCIAL/ RESIDENTIAL BUILDINGS	B1 Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent	B1 This measure focuses on decreasing the region's reliance on heating oil by five percent by switching to electric heat pumps, or, as interim measures, natural gas, or propane.
TRANSPORTATION	T1 Install Public Electric Vehicle Charging Stations T2 Pursue 1-2 Percent Mode Shift Away from SOVs T3 Switch Lawn and Garden Equipment to Electric T4 Convert Light-duty Municipal Fleets to EVs/ Hybrids. Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or CNG as Interim Measures	T1 This measure seeks to incentivize individuals to switch to EVs and plug-in hybrids by providing a framework for municipalities to collaborate in public EV charging infrastructure installation. T2 This measure seeks to achieve a 1-2 percent mode shift away from SOVs by using a variety of strategies from increased transit availability to reinvesting in the built environment to facilitate an increase in walking and biking. T3 This measure seeks to promote the switch to electric equipment by working with municipalities across the region to promote the use of electric equipment. T4 This measure encourages municipalities to convert their light-duty fleets to EV/hybrids and encourages municipality-owned and privately owned school buses to go electric. As an interim measure, these buses could be switched to renewable diesel (R-99), propane, and/or CNG.
WASTE & MATERIALS MANAGEMENT	W1 Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/ Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion	W1 This measure aims to divert 23 percent of the region's food and organics waste by 2030 through the expansion and support of food diversion efforts that are currently underway, while developing new programs and services across the region.

Figure 4: CRCOG staff tabling at an Off-Main Manchester event.

Workforce Planning Analysis

The measures identified in this plan will require a range of workers, from entry-level to those requiring advanced training. To provide a comprehensive look at the feasibility of enacting these measures, a workforce planning analysis has been conducted.

The 2024 Connecticut Clean Energy Industry Report,[1] a state-level subset of the US Department of Energy's US Energy and Employment Report (USEER), noted significant growth in the State's clean energy workforce, outpacing overall employment growth and reversing previous trends of slower regional progress in the Northeast. However, the CCAP's workforce analysis highlights a concerning shortage of the following: construction laborers and managers, farm and agricultural workers, foresters, and environmental technicians.

To address workforce needs, academic education and apprenticeships are needed. To support Connecticut's ambitious clean energy goals, support for these types of programs should continue at all levels.

Stakeholder Engagement

Stakeholder engagement centered on transparent communication, stakeholder representation, and early, frequent involvement is critical to advance the GHG emission reduction measures outlined in this plan. In addition, the CCAP sought to advance the robust and meaningful engagement that was fostered during the PCAP planning process. CRCOG and RiverCOG facilitated a wide range of engagement and outreach activities in Fall 2024 and Spring 2025. Engagement opportunities included an in-person ColleCTive Climate Action Forum in October 2024 with sector-based experts, a hybrid climate technical advisory committee (CTAC) meeting in January 2025, and community-led Table Talk sessions throughout Fall 2024 and Spring 2025. The inter-governmental working group (IGWG), comprising all COGs involved in CPRG planning in Connecticut, was crucial to the coordinated CCAP engagement efforts. Public outreach and engagement broadened as CCAP planning progressed, with targeted outreach being emphasized earlier and general engagement expanding later in the process via tabling events and a public meeting.

INTRODUCTION

Background

The United States EPA's CPRG program provides funding for states, local governments, tribes, and territories to develop plans to meaningfully reduce GHG emissions and other air pollutants. The CPRG has two components: planning grants and competitive implementation grants.

The CPRG planning work has three phases:

- **PCAP** (submitted to the EPA in March 2024),
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This document, CRCOG's and RiverCOG's CCAP, builds off the stakeholder engagement and analysis work completed in the greater Hartford region's PCAP.

Climate Change in Connecticut and New England

As detailed in the *Hartford-East Hartford-Middletown Priority Climate Action Plan*, the region has felt the impacts of climate change through more frequent and intense precipitation, sea-level rise, and extreme temperatures, including heat waves. Other impacts of a changing climate include impacts to ecosystems and agriculture, the increased risk of forest fires, and degraded air quality.

About the MSA

The Hartford-East Hartford-Middletown MSA is comprised of two of the State's nine councils of governments (COGs), CRCOG and RiverCOG (**Figure 1**). Each COG provides services for municipalities within its jurisduction such as transportation planning, administration and finance, regional planning/development, and public safety. CRCOG contains 38 municipalities at is the State's largest COG by area at 1,027.3 square miles of land. Based on US Census Bureau 5-year 2019-2023 American Community Survey (ACS) data, CRCOG's total population is 969,029, representing roughly 27 percent of the State's population.

RiverCOG is the result of the merger of the Connecticut River Estuary and Midstate

Past Initiatives

The State has undertaken three key steps to address climate change:

- **The Governor's Council on Climate Change (GC3)**, established in 2015 and re-established in 2019, oversees the State's implementation of greenhouse gas (GHG) reduction strategies and develops and implements additional strategies. The GC3's 23 members come from state agencies, quasi-public agencies, local governments, and nonprofits.
- **GreenerGovCT** charges State agencies to reduce GHG emissions, lower water usage, and reduce waste, having these agencies lead by example.
- **Executive Order 21-3** details 23 actions that will require State agencies to reduce GHG emissions. In addition, "The Executive Order advances affordable heating and cooling for State residents and businesses, energy efficient and resilient building codes, a statewide battery electric bus fleet, shovel-ready resilience projects, the first state government assets and operation climate vulnerability assessment, and increasing resilience and carbon sequestration in forests and agriculture. It also establishes the first Connecticut Equity and Environmental Justice Advisory Council, Connecticut's first Office of Climate and Public Health, and the first Connecticut Clean Economy Council, and continues the work of the Governor's Council on Climate Change."[2]

Regional Planning Organizations. This joint effort arose from the desire to maintain the scenic lower Connecticut River as the core of the region. RiverCOG is made up of 443 square miles of land and contains 17 municipalities. Based on the U.S. Census Bureau 5-year 2019-2023 ACS data, RiverCOG has a total population of 175,244, representing roughly five percent of the State's population.

Low-Income Populations

The region is home to residents who fall within a broad income range from low-income to wealthy. CT DEEP defines the cities of Hartford, East Hartford, Mansfield, and New Britain as distressed municipalities. CT DEEP uses the Connecticut Department of Economic and Community Development's (CTDECD's) definition of distressed municipalities in their Environmental Justice (EJ) mapping tool. (The significant share of University of Connecticut students residing in Mansfield who are temporarily low-income typically tends to skew income figures in such definitions.) Per Connecticut General Statute (CGS) Sec. 32-9p(b), "distressed municipality" refers to any municipality in Connecticut that, according to the United States Department of Housing and Urban Development (HUD), meets the necessary number of quantitative physical and economic distress thresholds to qualify as eligible for the urban development action grant program under the Housing and Community Development Act of 1977, as amended. This definition also includes any town located in an unconsolidated city or borough that also meets the aforementioned distress thresholds.

Within these municipalities, EJ block groups are identified (**Figure 5**). CT DEEP defines an EJ block group as a block group where at least 30 percent of the population lives below 200 percent of the federal poverty level. Outside of the distressed municipalities mentioned above, there are EJ block groups identified in Southington, Plainville, New Britain, West Hartford, Hartford, East Hartford, Manchester, Windsor, Enfield, Vernon, Ellington, Coventry, Tolland, Mansfield, Willington, Columbia, East Haddam, Cromwell, Essex, Deep River, Chester, Windsor Locks, Simsbury, Glastonbury, Wethersfield, Newington, Rocky Hill, East Hampton, Middletown, Portland, Haddam, Killingworth, and Clinton. When developing this CCAP, GHG emission reduction measures that benefit residents of the entire region were considered. However, the specific benefits that low-income populations may receive from the implementation of these measures are also noted.

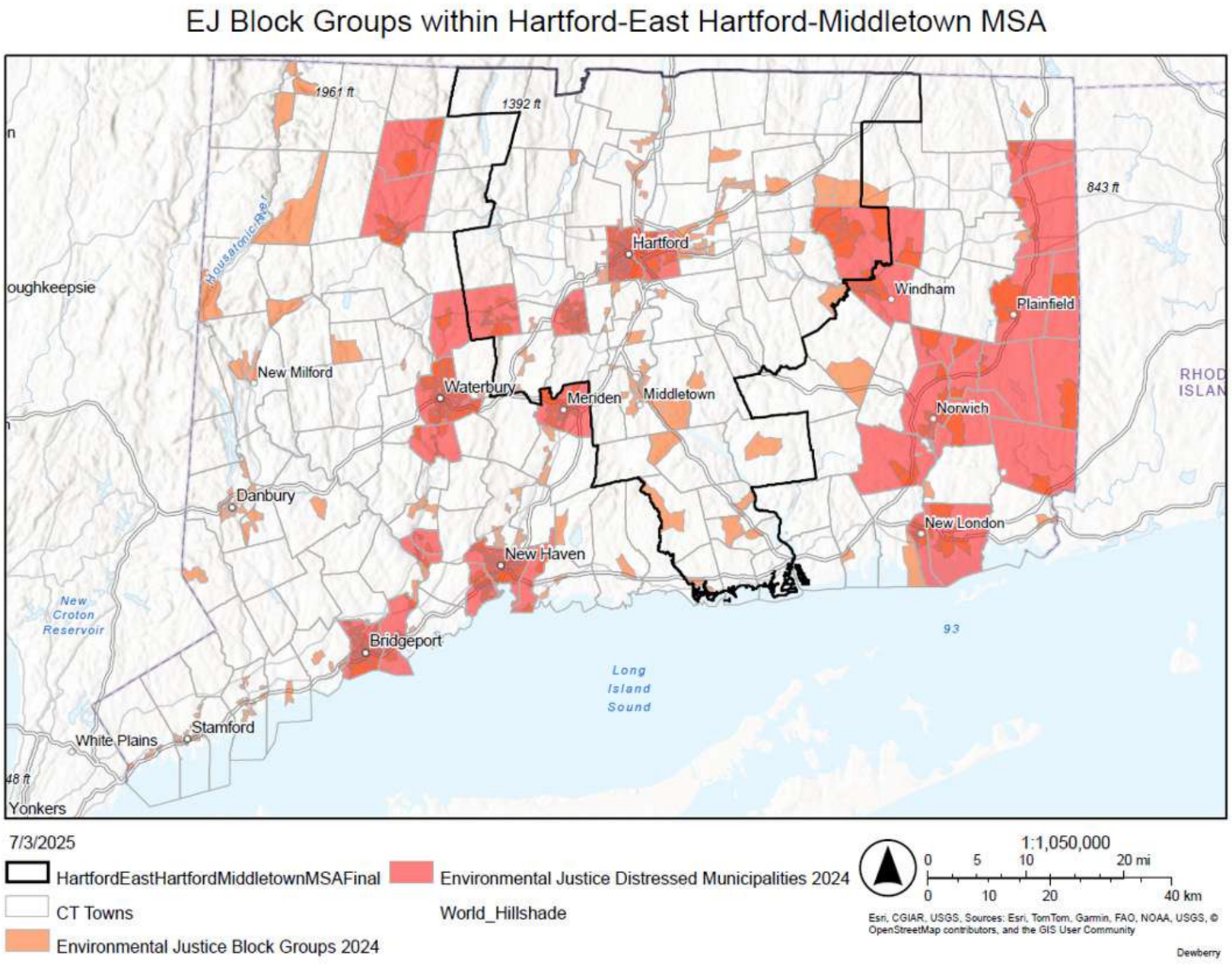
ENERGY BURDEN

Low-income households in the State of Connecticut spend a disproportionate amount of their income on energy costs. The Connecticut Green Bank has estimated that on average, households in Connecticut consume 8,400 kWh of electricity per year. This equates to $2,500 in annual electricity costs. Increasing the supply of renewable energy – particularly solar or wind power – would provide Connecticut residents with less costly, local, and state-produced energy. Renewable energy will make the State's supply more resilient, reduce the State's dependence on energy imported from other parts of the country, and potentially help lower electricity costs for Connecticut residents.

FALLING COSTS OF RENEWABLE ENERGY

Historically, the costs for producing solar and wind power have continued to decline. However, new generation can be dependent on subsidies that can change in different political climates. Connecticut's ambitious GHG reduction goals necessitate deployment, and scaling up, of clean energy. In order for the State to achieve its goals, additional subsidies at the local, regional, and State levels may be needed.

Figure 5: Map of CT DEEP-Defined EJ Block Groups



CPRG Overview

PCAP

CRCOG and RiverCOG's PCAP was submitted to the US EPA in March 2024. The PCAP highlighted 12 GHG reduction measures in all sectors except the industrial sector (**Table 4**). Outreach during PCAP development included in-person and virtual public meetings, engagement with low-income community residents, coordination with other COGs, and engagement with the Climate Technical Advisory Committee (CTAC).

NOTABLE ADVANCES IN STATE POLICY AND CAPITAL PROJECTS SINCE THE PCAP

There have been several notable advances in State policy and capital projects since the PCAP. Public Act 25-125, An Act Concerning the Protection of the Environment and the Development of Renewable Energy Sources and Associated Job Sectors, increased the State's GHG reduction goal to net zero by 2050.[2] An Act Concerning Energy Affordability, Access and Accountability, signed by the Governor on July 1, 2025, aims to reduce the cost of electricity bills. As noted in the CTMirror, the law "is expected

Table 4: PCAP GHG Reduction Measures by Sector

Sector	PCAP GHG Reduction Measure
ELECTRICITY GENERATION	• Install renewable energy (solar and battery) on residences owned by municipal housing authorities and municipality-owned affordable housing • Install solar panels, add battery storage and develop microgrids on buildings and properties owned by municipalities (e.g. schools, town halls, parking lots)
TRANSPORTATION	• Convert light duty municipal fleets to electric vehicles (EV)/hybrids, install municipal changing infrastructure, and switch municipal gas-powered equipment, such as leaf blowers, to electric • Install public EV charging infrastructure and fund maintenance of EV charging infrastructure • Encourage municipality-owned and privately-owned school buses switch to 20 percent biodiesel (B20) as an interim measure with a long-term focus on converting light duty municipal fleets to electric vehicles (EV)/hybrids • Pursue recommended improvements for at least one of the six transit corridors highlighted in *Metro Hartford RapidRoutes Transit Priority Corridors Study* • Develop and implement roundabout projects across the region • Encourage mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users
AGRICULTURAL/ NATURAL & WORKING LANDS	• Increase urban tree canopy in municipalities across the region
WASTE & MATERIALS MANAGEMENT	• Establish and expand residential and academic food waste diversion programs and examine ways to increase utilization of anaerobic digestion
COMMERCIAL/ RESIDENTIAL BUILDINGS	• Expand the region's commercial and residential energy audit programs and provide support for implementation • Undertake energy efficiency upgrades to municipal buildings

to save utility customers between $325 million and $350 million annually over each of the next two years [. . .]. Those numbers amount to about 1 to 2 cents per kilowatt-hour off current electric rates, potentially adding up to a $100 or more a year for many customers."[3]

CCAP

PURPOSE

The US EPA defines the CCAP as:[4]

- "The culmination of a rigorous, sustained process that involves working across multiple levels of government, gathering meaningful community input, and conducting addition stakeholder outreach"; and
- "An actionable roadmap for climate action that reflects local contexts."

The CCAP includes additional analyses (such as workforce development) and calls for the establishment of near- and long-term GHG emission reduction targets.

PROCESS AND APPROACH FOR DEVELOPING THE CCAP

CRCOG and RiverCOG's process for development of the CCAP included reviewing the GHG inventories undertaken for both the PCAP and the CCAP to understand the region's largest contributors to GHG emissions, reviewing all GHG reduction measures proposed during the creation of the PCAP, and engaging early with a large number of Connecticut-based stakeholders in different engagement contexts from small-group meetings to large events. (Engagement is discussed in the **Stakeholder Engagement** Section.)

Refinement of Measures

A major step in the development of the CCAP was the refinement of measures. In order to create actionable, quantifiable, and meaningful measures, CRCOG and RiverCOG focused on combining measures where possible and distilling measures, as shown in **Table 1**. Ultimately, eight measures were developed. Many of the measures highlight a variety of strategies, offering the COGs and municipalities a number of flexible pathways towards reducing emissions.

As noted in the **Quantified GHG Reduction Measures** Section, there are no industrial measures in this CCAP. While CRCOG and RiverCOG are supportive of the State's industrial CCAP measures should the State determine any industrial measures, it was determined that no industrial measure would be included in this CCAP due to the COGs' and municipalities' limited oversight of this sector.

More about Public Act 25-125: Accelerating the Path to Net-Zero

Public Act 25-125, "An Act Concerning the Protection of the Environment and the Development of Renewable Energy Sources and Associated Job Sectors," significantly enhances Connecticut's climate action framework. The bill codifies a more aggressive primary goal and introduces numerous programs and studies designed to ensure that the State meets its objectives.

Key aspects of this law include:

- **Net-Zero by 2050:** The bill formally requires the State to achieve **net-zero GHG emissions by 2050.** This raises the bar from the previous 80 percent reduction target to a goal of full carbon neutrality.
- **New 2040 Interim Target:** It establishes a new, economy-wide interim emissions reduction target for **2040**.

Project Status Report

The final planning document of the CPRG is the Project Status Report. This document is due to the US EPA in 2027.

GHG INVENTORY

Findings

This CCAP builds on the work completed in the PCAP in numerous ways, including by providing an updated GHG inventory. The CRCOG and RiverCOG region produces 10.90 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) annually, with Transportation being the largest sector, accounting for 40% of all emissions. The updated inventory utilizes 2022 data (the latest data available at the time of writing in 2025). This section details the findings of the GHG inventory. **Appendix F** details the GHG inventory undertaken for the CCAP.

In 2022, CRCOG and RiverCOG emissions totaled **10.90 $MMTCO_2e$**, the equivalent of driving from Hartford to New Haven and back **over 360 million times**.

GHG Emissions Inventory Approach

The purpose of the 2022 inventory is to quantify GHG emissions in a manner comparable to that of the 2021 inventory in order to show trends over time. The approach and scope are as follows:

- **Approach:** The 2022 inventory utilized the EPA's State Inventory Tool (SIT), which is designed to rely on various data sources to allow state, local, and tribal governments to estimate emissions across sectors. In contrast, the 2021 inventory, prepared by the University of Massachusetts Amherst (UMass Amherst), involved manual calculations based on datasets and emissions factors sourced from various federal agencies. These datasets and factors are also used in the SIT. Since the SIT is listed as a recommended tool under CPRG guidance and the data and methodology are similar to those of the UMass Amherst approach for the 2021 inventory, the SIT was chosen to calculate the emissions for the 2022 inventory.
- **Normalization of Emissions:** The SIT calculates emissions at a state level. The 2022 inventory employed a per capita normalization approach to estimate emissions specifically for the CRCOG and RiverCOG region. The 2021 inventory normalized data by either land area or population, depending on the specific emissions sector, to provide emissions for the CRCOG and RiverCOG region.
- **Data Period:** While both inventories drew upon the same underlying datasets, the 2022 inventory incorporates data through the calendar year 2022, the most recent year available. In contrast, the 2021 inventory used data up to the calendar year 2021.

Assumptions and Methodology

The EPA's SIT is a suite of Microsoft Excel-based spreadsheet models designed to help states and regional entities develop comprehensive GHG inventories. It provides a standardized and replicable framework for estimating emissions across all major anthropogenic sources and sinks.

Key features and workings of the SIT include:

- **Modular Structure:** The SIT is composed of distinct modules, each addressing a specific emissions source category (e.g., Energy, Industrial Processes, Agriculture, Land Use, Land-Use Change, and Forestry (LULUCF), Waste, Mobile Combustion, Stationary Combustion). This modularity allows for focused data input and calculation for each sector.
- **Standardized Methodologies:** The tool employs methodologies consistent with national and international GHG inventory guidelines, ensuring comparability and transparency. CT DEEP also utilizes this SIT module set and methodology.
- **Data Input:** Users input state-specific activity

data (e.g., fuel consumption, industrial production levels, livestock populations, waste generation rates) into the relevant modules. The SIT also includes default data and emissions factors derived from national datasets, which can be used when local data are unavailable or less robust.

- **Emissions Calculation:** Based on the input activity data and selected emissions factors, the SIT automatically calculates GHG emissions (carbon dioxide, methane, nitrous oxide, etc.) for each source category. These are then converted to carbon dioxide equivalents (CO_2e) using global warming potentials (GWPs).
- **Synthesis:** A "Synthesis Tool" within the SIT aggregates emissions from all modules to provide a total state-level inventory.

Inventory Trend and Analysis

The EPA's SIT was used to generate this inventory for the calendar year 2022. Since the SIT modules provide an analysis of GHG emissions for the entire state of Connecticut, the emissions were normalized by population to determine the total emissions for the CRCOG and RiverCOG area.

Of the total 10.90 $MMTCO_2e$ for the region, CRCOG communities account for 9.23 $MMTCO_2e$ and RiverCOG communities account for 1.66 $MMTCO_2e$. **Table 5** below shows emissions by sector, with Transportation being the largest source, accounting for 40 percent of all emissions.

Sector Sources

RESIDENTIAL

GHG emissions in the Residential sector result from the on-site combustion of fuels such as natural gas, heating oil, propane, and wood for space heating, water heating, and cooking.

COMMERCIAL

The Commercial sector generates emissions through the use of similar fuels in buildings like offices, schools, and hospitals, primarily for heating, hot water, and other operational energy needs.

INDUSTRIAL

Industrial emissions stem from fuel combustion to power equipment, generate process heat, and support facility operations, often involving high energy demands and a wide range of fuel types.

TRANSPORTATION

This sector includes emissions from gasoline, diesel, and other fuels used in on-road vehicles, aircraft, rail, marine vessels, and non-road equipment, making it one of the largest sources of energy-related emissions.

OTHER ENERGY GENERATION

Emissions in this category come from small-scale or non-utility energy systems such as combined heat and power units, backup generators, and district energy systems, typically using fossil fuels or biomass.

Table 5: 2022 CCAP GHG Emissions by Sector

SECTOR	ESTIMATED EMISSIONS ($MMTCO_2E$)	ESTIMATED EMISSIONS (PERCENT SHARE)
Residential	1.96	18%
Commercial	1.20	11%
Industrial	0.76	7%
Transportation	4.36	40%
Other Energy Generation	2.62	24%
Total	**10.90**	**--**

Source: EPA SIT

Figure 6 shows GHG emissions by sector for both the 2021 PCAP GHG Inventory and the 2022 CCAP GHG Inventory. The region's GHG emissions total approximately 10.90 $MMTCO_2e$. This is an increase from the 8.67 $MMTCO_2e$ reported in the 2021 GHG inventory. The observed increase in emissions between 2021 and 2022 is primarily attributed to changing societal behaviors from increased economic activity as COVID-19-related business closures and restrictions eased.

With only two years of GHG emissions inventories conducted for the CRCOG and RiverCOG region, it is difficult to assess trends in emissions over time. This is especially challenging given the impact of the COVID-19 pandemic in 2020 on reducing emissions and the subsequent rebound. However, the emissions trends for CRCOG and RiverCOG broadly follow State emissions trends. **Figure 7** shows emissions by sector from CT DEEP's 1990-2021 Connecticut Greenhouse Gas Inventory report.[5]

Since inventories began in 1990, emissions generally peaked in 2004 and have been stable or slightly declining since then. Transportation has the most pronounced decline, with the introduction of more fuel-efficient vehicles and EVs. Electricity consumption has also declined. While this is in part due to increasing energy efficiency and the introduction of renewables, the large drop is due to changes in generation sources within Connecticut such as the closure of fossil-fuel plants and the continued operation of nuclear plants. The COVID-19 pandemic caused a temporary dip in emissions, especially in the transportation sector. Inventories from 2022 and beyond should show a return to emissions from normal economic activity.

Figure 6: GHG Inventory Emissions by Sector

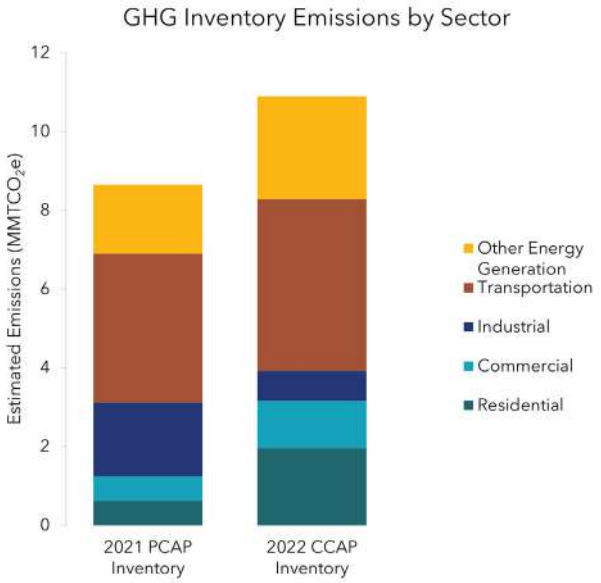
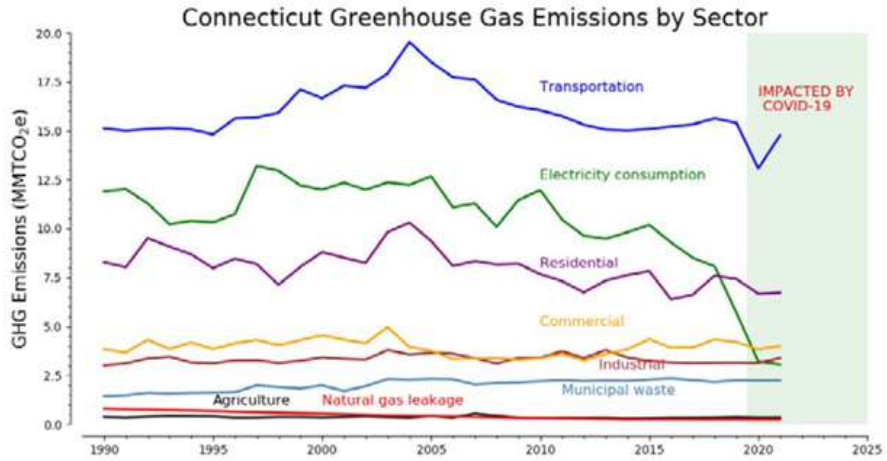


Figure 7: Connecticut Greenhouse Gas Emissions by Sector



Source: CT DEEP – 1990-2021 Connecticut Greenhouse Gas Inventory

GHG EMISSIONS PROJECTIONS

To determine GHG emissions projections in the near-term (2030-2035) and long-term (2035-2050), the Project Team utilized the RMI (formerly Rocky Mountain Institute) Energy Policy Simulator (EPS). The EPS is a powerful, open-source modeling tool designed to project the long-term environmental, economic, and public health impacts of various climate and energy policies. The tool operates based on a set of core assumptions, establishing a "business as usual" baseline scenario that projects future emissions based on existing federal and state policies (as of 2024) using publicly available data from reputable sources like the US Energy Information Administration (EIA) and the EPA.

Assumptions and Methodology

Baseline Emissions Scenario

Under the baseline, or "business as usual," scenario, statewide GHG emissions were calculated for the State of Connecticut and then disaggregated to the population of CRCOG and RiverCOG. The total GHG emissions under the baseline scenario for the EPS is 12.41 $MMTCO_2e$ for 2025.

Near-term (2030) and Long-term (2050) Projections

Based on the provided 2030 and 2050 emissions projections, the CRCOG and RiverCOG region is on a path to reduce its GHG output, with a projected six percent decrease in near-term emissions, to 11.60 $MMTCO_2e$ by 2030, and a 29 percent reduction in long-term emissions to 8.81 $MMTCO_2e$ by 2050.

Agriculture and Land Use

Emissions from agriculture and land use are projected to be -1.31 $MMTCO_2e$ in 2030 (i.e., a net carbon sink absorbing carbon emissions). Emissions will remain level through 2050 at -1.31 $MMTCO_2e$, with only a 0.4 percent decrease in carbon absorbed from 2025 levels. This shows that the natural areas of the region will remain an important carbon sink, mitigating emissions from other sources.

Industrial

The industrial sector is projected to have emissions of 1.31 $MMTCO_2e$ in 2030, and its emissions are expected to slightly increase to 1.35 $MMTCO_2e$ by 2050. This is a reduction of 0.03 $MMTCO_2e$ from 2025 levels, representing a 2.3 percent decrease over time. This suggests that industrial processes may be more challenging to decarbonize compared to those in other sectors, especially considering the use of specialty equipment and logistics within the industrial sector.

Electricity

In 2030, the electricity sector is projected to emit 3.31 $MMTCO_2e$. These emissions are expected to decrease to 2.84 $MMTCO_2e$ by 2050 as the grid incorporates more renewable energy. This is a decrease of 0.69 $MMTCO_2e$ as compared to 2025, representing a 19.5 percent reduction. This decrease reflects continuing decarbonization of the power supply.

Increasing the role of nuclear power in the State could also have profound impact on emissions from this sector. While it can serve as a large source of carbon-free electricity, nuclear power comes with many other environmental and safety considerations that the region and State must take into account while developing policy regarding its increased adoption.

Transportation

The transportation sector is projected to be the largest source of emissions in 2030, with 4.15 $MMTCO_2e$. However, it is also expected to see the most significant reduction. By 2050, emissions are projected to decrease to 2.15 $MMTCO_2e$. This is a decrease of 2.52 $MMTCO_2e$ as compared to 2025,

representing a 54.0 percent reduction. This indicates a strong downward trend, likely driven by the adoption of EVs and other low-carbon transportation options such as the wider adoption of mass transit.

Residential and Commercial Buildings

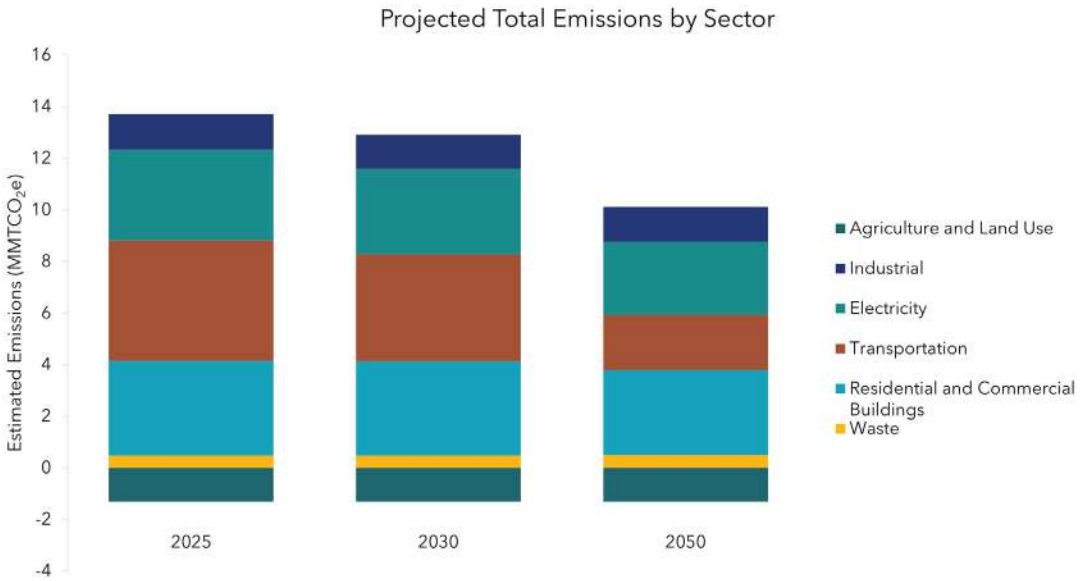
Emissions from buildings are projected to be 3.65 $MMTCO_2e$ in 2030. A steady decline is expected, with emissions falling to 3.28 $MMTCO_2e$ by 2050. This is a decrease of 0.38 $MMTCO_2e$ as compared to 2025, representing a 10.5 percent reduction. This reduction comes from a variety of sources including increases in building efficiency, electrification of heating, and cleaner energy sources.

Waste

Emissions from waste are projected to be 0.48 $MMTCO_2e$ in 2030 and are expected to see a slight increase, reaching 0.50 $MMTCO_2e$ by 2050. This is an increase of 0.02 $MMTCO_2e$, representing a 4.7 percent rise. Addressing emissions from waste is a challenge. Methane (CH_4) is the primary GHG produced by waste landfills. Methane production continues for years even after the waste is buried, so even if waste disposal methods are modified, emissions may not immediately decrease.

Figure 8 and **Table 2** (previously) show GHG emissions projections for 2030 and 2050. Most of the reduction in emissions comes from the transportation and electricity generation sectors. This is due to the increasing use of renewable energy and the electrification of vehicles. The impact of EVs is further compounded by the use of renewables to produce carbon-free electricity to replace conventional fossil fuels. While Transportation is currently the largest source of emissions, it will be overtaken after 2030 by emissions from the residential and commercial buildings sector.

Figure 8: Near-Term (2030) and Long-Term (2050) GHG Emissions Projections Gas Emissions by Sector



Source: RPI EPS

GHG REDUCTION TARGETS

Connecticut Climate Targets

Prior to recent 2025 legislative updates, such as Public Act 21-125, Connecticut's climate goals were primarily defined by the Global Warming Solutions Act of 2008 (Public Act 08-98). These foundational targets use 2001 emissions levels as the primary baseline for reduction. As noted in the **Introduction**, the ambitious Public Act 21-125: Accelerating the Path to Net-Zero bill requires the State to reach net-zero GHG emissions by 2050 and establishes a new interim emissions reduction target for 2040. The key milestones include:

- **By 2030:** Achieve a **45 percent reduction** in GHG emissions below 2001 levels.
- **By 2040:** Achieve a **65 percent reduction** in GHG emissions below 2001 levels and attain a **100 percent** zero-carbon electricity grid.
- **By 2050:** Achieve an economy-wide **net zero** level of emissions, provided direct and indirect GHG emissions are at least **80 percent** below 2001 levels.

This CCAP adopts the Public Act 21-125 emissions reduction target of net zero by 2050 (long-term target) and a 45 percent reduction in GHG emissions below 2001 levels by 2030 (near-term target). While the GHG reduction measures discussed within this document alone won't meet these targets, they were developed as feasible, implementable, yet ambitious actions that CRCOG and RiverCOG can take to do their part to meet the State's goals.

GHG Reduction Strategies for Emissions Reductions

Achieving Connecticut's ambitious targets will require a portfolio of solutions that address emissions across all sectors of the economy. The following strategies identified in this CCAP are critical to this effort:

- **Increase Urban Tree Canopy in Municipalities Across the Region:** Trees act as natural carbon sinks, sequestering CO_2 from the atmosphere. They also mitigate the urban heat island effect, reducing energy demand for air conditioning in the summer.
- **Support an Increase in Solar Projects in the Region, Creating 900 MW Across the Region:** Expanding rooftop and utility-scale solar installations directly contributes to the 2040 zero-carbon electricity grid target by displacing fossil fuel-based power generation.
- **Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent:** Shifting residential and commercial buildings from carbon-intensive heating oil to high-efficiency electric heat pumps significantly cuts emissions from the building sector, especially as the electricity grid becomes cleaner. Weatherization and energy efficiency improvements can also reduce the need for heating oil.
- **Install Public EV Charging Stations:** A robust public charging network is essential for overcoming range anxiety and encouraging the widespread adoption of electric passenger vehicles, thereby reducing emissions from personal transportation.
- **Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles (SOVs):** Reducing the number of SOVs on the road by investing in and promoting the use of public transit, along with making walking and biking safer and more widely accessible is a highly effective way to lower per-capita transportation emissions.
- **Switch Lawn and Garden Equipment to Electric:** Gasoline-powered lawn mowers and leaf blowers are significant sources of GHG emissions. Encouraging a switch to electric alternatives helps eliminate this source of pollution.
- **Convert Light-Duty Municipal Fleets to EVs/hybrids:** Municipal and commercial fleets represent a significant source of transportation emissions. Transitioning these high-mileage vehicles to electric alternatives yields substantial reductions in GHGs and other air pollutants.

- **Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase the Utilization of Anaerobic Digestion:** Diverting organic waste from landfills reduces emissions of methane, a potent GHG. Furthermore, recycling materials reduces the energy-intensive process of manufacturing goods from virgin resources. Finally, up-cycling organic waste locally can reduce emissions from the fuel needed to transport the material, with the added benefit of increasing local composting efforts.

These measures, and the projected GHG emissions savings from the implementation of these measures, are discussed in detail in the following **Quantified GHG Reduction Measures** section.

Figure 10: Cattle at Sycamore Farm Meats in Higganum.

QUANTIFIED GHG REDUCTION MEASURES

The eight regionally relevant GHG reduction measures outlined in this report were developed through the PCAP and CCAP process and refined through extensive coordination among stakeholders and agencies throughout the development of the plans. The final CCAP GHG reduction measures were selected based on impact, feasibility, and alignment with local priorities.

The CCAP GHG reduction measures cover all sectors included in the PCAP, with the exception of the industrial sector. While CRCOG and RiverCOG would be supportive of the State's industrial CCAP measure(s), should the State pursue a measure(s), it was determined that no industrial measure would be included in this CCAP due to the COG's and municipalities limited oversight of this sector.

Table 6 on the following page shows the GHG reduction measures.

The GHG reduction measures are detailed in individual sections below and anticipated costs are provided.

- **$** indicates a **low cost** and may be reflective of a policy change or staff time to further a measure.
- **$$** indicates a **medium cost**, such as a small capital project. Medium cost projects may be included in a municipal capital budget.
- **$$$** indicates a **high cost**, such as a large capital project. High cost projects may require bonding.

Table 6: CCAP GHG Reduction Measures

Sector	Measure	Description
p. 23-29 **AGRICULTURAL/ NATURAL & WORKING LANDS**	N1 Increase Urban Tree Canopy in Municipalities Across the Region	N1 This measure aims to increase tree canopy coverage across the region to match the city of Hartford's goal of 35 percent coverage.
p. 30-35 **ELECTRICITY GENERATION**	E1 Support an Increase in Solar Projects in the Region, Creating 900 Megawatts Across the Region	E1 This measure seeks to expand solar generation across the region by supporting a variety of strategies.
p. 36-41 **COMMERCIAL/ RESIDENTIAL BUILDINGS**	B1 Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent	B1 This measure focuses on decreasing the region's reliance on heating oil by five percent by switching to electric heat pumps, or, as interim measures, natural gas, or propane.
p. 42-68 **TRANSPORTATION**	T1 Install Public Electric Vehicle Charging Stations T2 Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles (SOVs) T3 Switch Lawn and Garden Equipment to Electric T4 Convert Light-duty Municipal Fleets to EVs/ Hybrids. Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or CNG as Interim Measures	T1 This measure seeks to incentivize individuals to switch to EVs and plug-in hybrids by providing a framework for municipalities to collaborate in public EV charging infrastructure installation. T2 This measure seeks to achieve a 1-2 percent mode shift away from SOVs by using a variety of strategies from increased transit availability to reinvesting in the built environment to facilitate an increase in walking and biking. T3 This measure seeks to promote the switch to electric equipment by working with municipalities across the region to promote the use of electric equipment. T4 This measure encourages municipalities to convert their light-duty fleets to EV/hybrids and encourages municipality-owned and privately owned school buses to go electric. As an interim measure, these buses could be switched to renewable diesel (R-99), propane, and/or CNG.
p. 69-77 **WASTE & MATERIALS MANAGEMENT**	W1 Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/ Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion	W1 This measure aims to divert 23 percent of the region's food and organics waste by 2030 through the expansion and support of food diversion efforts that are currently underway, while developing new programs and services across the region.

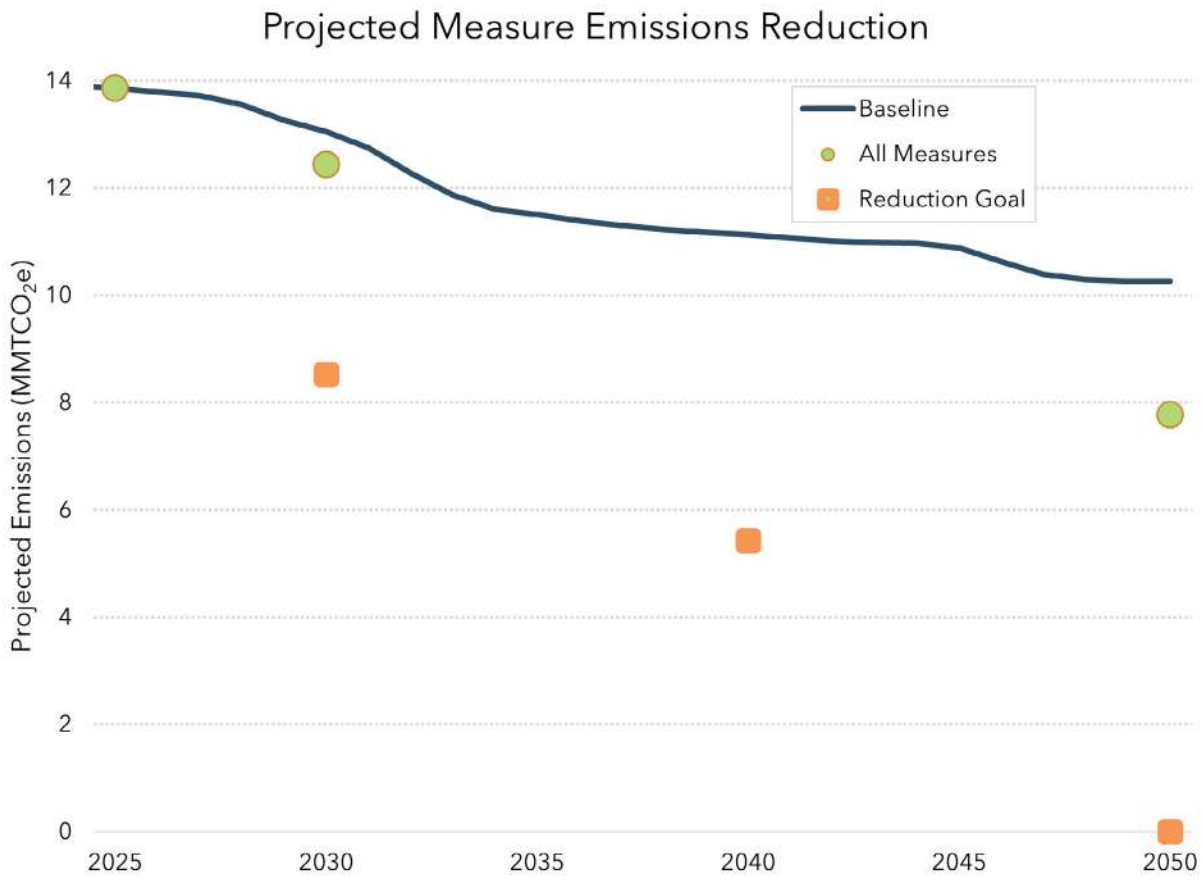
Implementation Scenario Projections

Compared to business-as-usual projections, implementation of these GHG reduction measures would reduce emissions by 0.62 $MMTCO_2e$ annually in the short term by 2030. Long term, these GHG reduction measures combined would reduce emissions by 2.49 $MMTCO_2e$ annually by 2050, as detailed in **Table 7** and **Figure 11**.

Table 7: Projected Annual GHG Emissions Reductions - All Measures

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	**2050**
0.62	2.49

Figure 11: Projected Annual GHG Emissions Reductions - All Measures



Note: The 2050 GHG net-zero reduction goal is based on the State's target to achieve an economy-wide net-zero level of emissions, provided that actual GHG emissions have been reduced to at least 80 percent below 2001 levels.

N1: Increase Urban Tree Canopy in Municipalities Across the Region

Measure Description
This measure aims to increase tree canopy coverage across the region to match the City of Hartford's goal of 35 percent coverage, up from 25 percent in 2020. Strategies to achieve this goal include:

- Working with municipalities to plant more trees (along street rights-of-way, on municipal property, including city-/town-owned rights-of-way, creating green corridors);
- Giving homeowners trees to plant on their property;
- Encouraging municipalities to adopt tree preservation ordinances that address clearcutting;
- Supporting the existing urban canopy through expanding municipal tree warden programs (CRCOG and RiverCOG can assist municipalities in the region by exploring potential tree warden positions or developing shared services agreements);
- Explore potential tree warden positions or shared services agreements through regional COGs;and
- Supporting urban forestry program initiatives to plant trees, including fruit trees.

These strategies could be undertaken by the public sector or private sector (e.g., nonprofits could give homeowners trees to plant).

Expected Geographic Location
Regionwide

Implementation Authority and Responsibilities
CRCOG and RiverCOG do not have the statutory or regulatory authority to implement the measure. Expanding the number of urban trees will require buy-in from residents, municipal officials, nonprofit organizations, and local public works departments, all working together to care for existing urban trees, and planting in additional spaces where possible and where needed. Along prime corridors owned by the State, buy-in and promotion from the Connecticut Department of Transportation (CT DOT) will also be key.

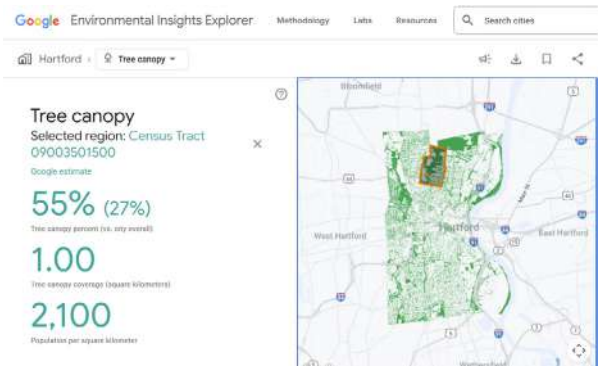
Tree wardens can be the key to this push. While every municipality in the State is required to have a tree warden per State statute 23-58, not all municipalities have the same need to grow and develop their urban tree population. Tree canopy growth efforts should coincide with each municipality's population density, overlayed with data on the density and health of existing tree canopies. Tools such as Davey's "TreeKeeper", a "resources management software" for urban foresters, can be deployed at a regional scale and provide policy-makers with the insights needed to direct funding and efforts towards the gaps in the existing canopy.[6] COGs can be the host of shared service agreements to help negotiate lower prices for such tools. By partnering with associations—like the Tree Warden's Association of Connecticut—municipalities can engage with residents and build support for the growth of their community's urban canopy.

N1: Increase Urban Tree Canopy in Municipalities Across the Region

Metrics for Tracking Progress

Progress will be measured on a municipality level by examining each municipality's progress made to increase their tree cover. Municipalities such as Hartford and West Hartford have already completed tree canopy studies, providing a baseline. Other tools that are useful for determining municipalities' baselines and progress include Google's Environmental Insights Explorer, as shown in **Figure 12**.

Figure 12: Screenshot of Google Environmental Insights Explorer Showing Estimated Tree Canopy



Implementation Timeline and Milestones

2025-2029	2030-2039	2040-2050
Implementation Begins *25% Progress*	**Implementation Ongoing** *75% Progress*	**Measure Complete** *100% Progress*
• Work with municipalities begins to encourage municipalities to plant more trees • Support of urban forestry programs and encouragement of municipalities to appoint municipal tree wardens begins • Support urban forestry inventories to assess the health of the existing urban canopy • Partner with local non-profit, non-governmental stakeholders, and local institutions to sponsor new tree plantings	• Giving trees to homeowners begins • Work with municipalities to adopt tree preservation ordinances begins • Expand tree warden programs	

N1: Increase Urban Tree Canopy in Municipalities Across the Region

Quantifiable GHG Emissions Reductions
Based on a study that evaluated the impacts of the urban tree canopy in Hartford and extrapolating to the entire CRCOG and RiverCOG region, this measure is projected to reduce GHG emissions by 0.02 $MMTCO_2e$ by 2030 and 0.08 $MMTCO_2e$ by 2050, as shown below in **Table 8** and **Figure 13**. These reductions include carbon sequestered by the urban tree canopy and do not include potential energy savings. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

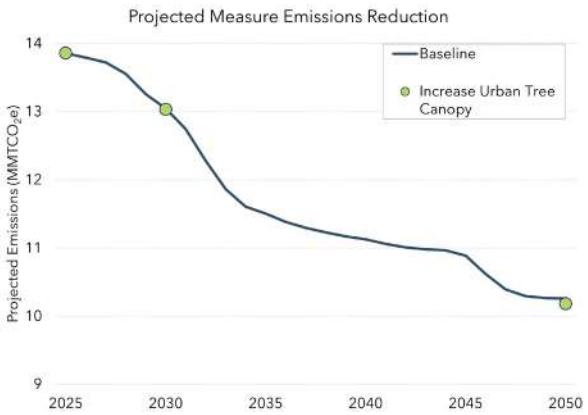
Measure Costs
Because this GHG reduction measure is composed of small capital projects and programs as well as policy changes, this measure is anticipated to cost $-$$.

Table 8: Projected Annual GHG Emissions Reduction – Increase Urban Tree Canopy

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.02	0.08

Source: Dewberry calculation

Figure 13: Projected Annual GHG Emissions Reduction – Increase Urban Tree Canopy



N1: Increase Urban Tree Canopy in Municipalities Across the Region

Intersection with Other Funding Available
This section provides a partial list of potential funding sources to support the implementation of this measure, as noted in **Table 9**. The following list is a selection of federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list below is a snapshot captured at the time of writing.

Table 9: Potential Funding Sources - Increase Urban Tree Canopy in Municipalities Across the Region

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Climate Smart Land Stewardship Grant Program (Implementation)	To increase the number of acres in Connecticut that are managed using climate-smart land stewardship practices and encourage the use of climate-smart practices among Connecticut's land trusts.	Connecticut Department of Agriculture (CT DOAG)	Nonprofits
2	Climate Smart Land Stewardship Grant Program (Planning)	To increase the number of acres in Connecticut that are managed using climate-smart land stewardship practices and encourage the use of climate-smart practices among Connecticut's land trusts.	CT DOAG	Nonprofits
3	Community Forestry Small Grants Program (Program A)	Projects funded by this grant program could include tree planting, efforts to protect existing trees, development and distribution of plant stewardship material, implementation of an event that engages students with the outdoors, or training of community stewards.	CT DEEP	Municipalities, nonprofits, community-based organizations
4	Community Forestry Small Grants Program (Program B)	Priorities include (1) teaching about urban forestry and the tools used to manage urban trees and forests and (2) increasing public awareness of opportunities to protect urban forestland and urban trees, emphasizing public benefits.	CT DEEP	Municipalities, nonprofits, community-based organizations
5	Government-to-Government Program	Provides funding to support government activities that lead to measurable environmental or public health impacts in communities.	US EPA	COGs, municipalities, native/tribal entities (in partnership with a nonprofit)

N1: Increase Urban Tree Canopy in Municipalities Across the Region

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
6	Healthy Urban Communities Grant Program	Program for EPA New England to fund work directly with communities to support the EPA's mission to reduce environmental risks, protect and improve human health, and improve the quality of life.	US EPA	States, COGs, municipalities, native/tribal entities, nonprofits, for-profits, educational institutions, utilities, community-based organizations
7	Healthy Watersheds Consortium Grant Program	This grant program advances the protection of healthy watersheds by supporting an array of projects to build watershed protection capacity and support actions to protect healthy watersheds.	US EPA	Nonprofits, community-based organizations
8	Long Island Sound Futures Fund (LISFF)	The LISFF supports efforts to test innovative approaches to conservation, deliver transformative projects, and support people and communities who value the Sound and want to take a role in its future.	National Fish and Wildlife Foundation (NFWF), USEPA, LISFF	State, COGs, municipalities, native/ tribal entities, nonprofits, education institutions (*Applicable only to RiverCOG communities)
9	Urban and Community Forestry Planning Program	Funding for planning projects such as tree inventories and management plans.	CT DEEP	Municipalities, nonprofits
10	Urban Forest Equity Grant Program	Support for urban forestry projects that will increase equitable access to trees and the benefits they provide in disadvantaged communities throughout Connecticut.	CT DEEP	Municipalities, nonprofits (*Applicable only to organizations working in disadvantaged communities)
11	Urban Forest Resilience Grant Program	Supports tree removal and tree planting in response to forest pests and diseases.	CT DEEP	Municipalities, nonprofits
12	Urban Forested Natural Areas and Riparian Corridor Restoration Grant Program	Supports invasive species control and restoration along riparian corridors and in urban forested natural areas.	CT DEEP	Municipalities, nonprofits
13	Urban Green and Community Gardens Grant Program	Provides funding assistance to develop or enhance urban green spaces for public enjoyment and/or environmental education.	CT DEEP	Municipalities

N1: Increase Urban Tree Canopy in Municipalities Across the Region

Benefits Analysis

Qualitative

Enhancing the urban tree canopy can offer numerous benefits to residents and communities at large, including but not limited to reducing the urban heat island effect, improving air quality, contributing to flood reduction, and supporting biodiversity. As noted in the study *Satellite-based evidence highlights a considerable increase of urban tree cooling benefits from 2000 to 2015*, "tree planting is a prevalent strategy to mitigate urban heat. Tree cooling efficiency (TCE), defined as the temperature reduction for a 1 percent tree cover increase, plays an important role in urban climate as it regulates the capacity of trees to alter the surface energy and water budget."[7] Within the region, the benefits of tree planting are already noted. According to the *2020 Hartford Tree Canopy Action Plan*, expanding the City's urban tree canopy led to improvements in air and water quality, stormwater management, temperature regulation, energy savings, and property value, among other benefits.[8]

Other benefits of expanding the urban tree canopy are improved mental and physical health of residents in surrounding areas. For example, a multilevel longitudinal study that surveyed 46,786 Australians revealed that urban areas with at least 30 percent tree canopy had much lower rates of incident diabetes (31 percent reduction), hypertension (17 percent reduction), and cardiovascular disease (22 percent reduction) than areas with much lower canopy coverage (0-9 percent).[9]

Quantitative

Based on a study that evaluated the impacts of the urban tree canopy in Hartford and extrapolating to the entire CRCOG and RiverCOG region, this measure is projected to reduce co-pollutant emissions, as shown below in **Table 10**. Additionally, increasing the urban tree canopy will also reduce stormwater runoff. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Table 10: Projected Annual Co-Pollutant Emissions Reduction – Increase Tree Canopy

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
CO (lbs)	7,947	40,459
NO_2 (lbs)	22,459	114,334
O_3 (lbs)	160,447	816,823
SO_2 (lbs)	4,297	21,878
PM (lbs)	22,341	113,735
Reduction in stormwater runoff (gal)	869,821,853	4,428,183,977

Source: Dewberry calculation

Disbenefits

There are certain disbenefits associated with increased tree planting. A study conducted in New York City revealed that higher tree canopy coverage was associated with a higher rate of allergic sensitization to tree pollen by age seven (43 percent increase). There was also a 17 percent increase in the risk of asthma development by age seven.[10]

N1: Increase Urban Tree Canopy in Municipalities Across the Region

In addition, tree planting can result in additional costs to municipalities for maintenance of the trees. High maintenance costs are associated with urban trees due to regular maintenance and care requirements, including pest control, regular pruning, and removal of dead or hazardous trees, which can be costly. For example, the city of Cleveland, Ohio allocates one-third of their urban tree budget to maintenance costs.[11] Tree roots and fallen trees can cause infrastructure issues such as damage to roads and sidewalks and other disruptions. This can be hazardous to pedestrians and vehicles and costly to maintain and repair. This disbenefit can be addressed by budgeting funds for tree planting as well as tree maintenance.

Benefits to Low-income Communities
Expanding the tree canopy can help low-income communities by lowering cooling costs. Properly placed trees can reduce cooling costs by a significant percentage. For example, in Minneapolis, Minnesota, tree coverage results in an annual energy cost savings of $5.8 million, which is equivalent to the needs of 4,350 homes.[12]

Figure 14: Juneteenth parade along a tree-lined Main Street in Middletown *(Bill De Kine)*

E1: Support an Increase in Solar Projects in the Region, Creating 900 Megawatts Across the Region

Measure Description
This measure seeks to expand solar generation across the region with a goal of 900 MW of new solar that can be achieved via a multifaceted approach, including projects such as:

- Developing community/shared solar projects of various sizes across the region;
- Installing renewable energy on both municipal and commercially-owned property, prioritizing building rooftops and parking lot canopies/carports and de-prioritizing locating renewable energy on agricultural land or land better suited for residential development;
- Expanding deployment of agrivoltaics/dual-use solar in appropriate locations, prioritizing previously disturbed or marginal/non-prime farmland.

Shifting from fossil fuels to renewable energy such as solar for electricity generation is an essential strategy for both emissions reduction and affordability, particularly given the rapidly declining costs of solar technology. There is broad municipal consensus to initially prioritize rooftop solar (both commercial and residential properties) as well as developed sites with existing impervious area (IA) coverage that cater well to adding solar, such as solar canopies over existing parking lots. Finally, dual-use agrivoltaics, ideally on marginal or non-prime farmland (as defined in the Code of Federal Regulations) will also play an important role.

There are significant obstacles to implementing solar projects for municipalities in the State, including the cost of replacing building roofs and the State's caps on commercial solar development. CRCOG and RiverCOG support lifting the solar caps on commercial rooftop solar in order to increase solar production and encourage continued discussion about solar caps more generally, recognizing existing grid constraints and other tradeoffs.

Expected Geographic Location
Regionwide.

Nearly every community across the region can likely introduce some form of solar project. The exact type of solar deployment will depend on community context – more urbanized and suburban communities have more residential and commercial rooftops available for rooftop solar and more large-scale parking lots for solar canopies. Conversely, more rural communities may have more land available for utility-scale solar but also need to balance use of land for solar with preserving valuable forested land (a carbon sink strategy listed N1: Increase Urban Tree Canopy in Municipalities Across the Region), farmland, open space, wildlife habitat, and even the strategic

Municipalities may use CT DEEP's online tool to evaluate the siting of solar. The tool, called the Community Renewable Energy Siting Tool (CREST), was developed in partnership with the University of Connecticut's Center for Land Use Education and Research. CREST can be accessed here: Community Renewable Energy Siting Tool.

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placement of much needed housing in every community.

As discussed in more detail below under Authority to Implement, the Connecticut Siting Council is almost exclusively in control of siting large scale solar projects (over 1 MW) across the state. The majority of approvals to date for large-scale solar projects in the CRCOG region have typically been located in a handful of communities that have the necessary land available, without meaningful input from host municipalities. Efforts are needed to examine statewide siting factors that take into consideration existing MW facilities in a community as well as site suitability. Recognizing the need for solar energy and the need for a more thoughtful and transparent siting process, municipalities and their regions are calling for changes to the state process. For example, per the 2026 CRCOG Legislative Agenda:

> CRCOG supports legislation establishing a fair share threshold, inclusive of all solar generation (grid-scale, roof-top, car ports, etc.) for a maximum megawatt capacity cap per municipality for renewable energy developments. This threshold would set a maximum megawatt capacity per municipality, scaled to factors such as available land area and energy consumption. This cap would promote regional equity in the distribution of renewable energy infrastructure, prevent over-concentration of large-scale facilities in only a few certain towns, and encourage shared responsibility for achieving the state's clean energy goals.
>
> Once a municipality has achieved their fair share threshold, purview over additional renewable energy projects would shift from the Connecticut Siting Council to local review and approval, ensuring that future siting decisions are reflective of both state and local priorities.

In summary, the siting of 900 MW (and grid-scale solar, in general) needs to be distributed around the region and state equitably. 900 MW represents an important GHG reduction strategy, but it also represents the region's portion of *a statewide goal and priority*; as such every town in the state should be sharing the responsibility in reaching that goal.

Hartford Landfill Solar

The City of Hartford is adding ground mount PV solar to the Hartford Landfill. This ambitious project is expected to generate 6.3 million kWh of energy, almost 14 percent of the City's energy consumption, for 20 years. The project is expected to reduce GHG emissions by 0.002 $MMTCO_2e$, equivalent to taking nearly 500 gasoline-powered cars off the road each year.

Source: City of Hartford/Bridge Energy Services

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Implementation Authority and Responsibilities

CRCOG and RiverCOG do not have the statutory or regulatory authority to implement this measure. COGs, however, are excellent catalysts for helping connect residents and local governments with the resources necessary to encourage wider solar adoption. Funding solar arrays and educating the public with targeted outreach are challenges to the wider growth of solar. Solar adoption is supported by a web of existing Connecticut programs, which combine public and private partnerships in coordination with key stakeholders. These programs help fund solar installations and help residents make informed decisions on whether solar is right for them. Many of these outreach and education efforts are partnerships with COGs, such as Eversource's Community Partnership Initiative grant program; municipalities; utilities, such as Eversource; underwriting partners, like the CT Green Bank; and regulatory agencies like CT DEEP.

When discussing implementation, the role of the Connecticut Siting Council is important to include, as the agency has jurisdiction over the siting of electric generation and storage facilities with capacities greater than 1 MW. Municipalities across the state are requesting greater transparency and consistency of Council siting decisions and the need for municipal representation. This issue is now being raised by the Connecticut Conference of Municipalities (CCM) - the state's largest, nonpartisan organization of municipal leaders, with membership from 168 of the state's 169 cities and towns – and is included in their 2026 Legislative Agenda. CCM's Agenda requests that state statute ensures the appointment of a member on the Council with municipal experience (e.g. a former CEO, mayor, or first selectperson) and to require a public hearing on a Siting Council application at the request of a municipality. Adding local government voices would ensure that community perspectives are considered in the evaluation of renewable energy, telecommunications, and large-scale infrastructure projects. This representation would align state goals for clean energy with local land use, zoning, and infrastructure capacities.

Implementation Timeline and Milestones

2025-2029	2030-2039	2040-2050
Implementation Begins	**Implementation Ongoing**	**Measure Complete**
33% Progress	*99% Progress*	*100% Progress*

Note: To calculate the GHG reduction benefits, it was assumed that installed capacity would increase linearly: 300 MW installed by 2030, and all 900 MW installed by 2040.

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Solar is growing fast in Connecticut. When the 2020 Integrated Resource Plan (IRP) was published by CT DEEP in 2021, Connecticut had approximately 600 MW of solar capacity statewide (including all solar generation). As of June 2025, that had grown to approximately 1,600 MW.
To achieve the State's ambitious goal of 100% zero-carbon electricity supply by 2040, the IRP estimates that 2,200 to 3,500 MW of additional solar must be deployed. Assuming a mid-point of 2,850 MW and "assigning" a proportion of that based on population, with CRCOG and RiverCOG comprising nearly 31% of Connecticut's population, the region would need to deploy 900 MW of additional solar to fulfill our proportion of the state's goal. This measure specifically recommends all types of solar installations to meet the 900 MW goal for the region. For context, the best available current data from the Solar Energy Industries Association (SEIA) on solar installations in the State provides the following breakdown:

- 50% residential
- 22% commercial
- 2% community solar
- 26% utility scale

This 900 MW goal may be achieved through the variety of strategies outlined above as well as other strategies. For example, the average residential rooftop solar array is between 6-10 KW, while a typical commercial rooftop solar installation is 100 KW in size. Parking lot canopies are another opportunity. One study found that installing solar canopies over a typical Walmart supercenter parking lot (average size around five acres) could support a 3 MW array, while another study found that solar canopies could produce 37% of current electricity demand in Connecticut. Rather than a singular, 'silver bullet' project, a region-wide 'all of the above' strategy is most realistic for increasing solar capacity in the region, and enables municipalities to select the approach(es) that work best for their community context.

Figure 15: Roof-mounted solar panels at Verplanck Elementary School in Manchester.

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Municipalities are also key to encouraging solar adoption. With support from COGs, the State, and non-profit organizations, municipalities could evaluate local regulatory barriers and restrictions to the installation of solar, as well as integrating renewable energy projects into capital improvement projects such as upgrades to municipal and Board of Education buildings.

In coordination with COGs, and through regional pricing, municipalities could explore installing solar on municipally owned property.

Further adoption of new strategies, such as incentivizing and appropriately sited community solar, will require even greater coordination between funding sources, regulatory agencies, the utilities, and stakeholders.

Metrics for Tracking Progress

Progress will be measured on a regional level by aggregating each town or city's progress made to increase solar production, recognizing recent efforts prior to the adoption of this CCAP. This information can be collected at the municipality level and provided to CRCOG and RiverCOG to track progress for the Greater Hartford region.

Quantifiable GHG Emissions Reductions

To quantify the emissions reduction from adding 900 MW of solar in the CRCOG and RiverCOG region, the EPA's Avoided Emissions and geneRation Tool (AVERT) v4.3 was used. AVERT is designed to model the impact of policies and programs on emissions from the electrical grid. This measure is projected to reduce GHG emissions by 0.24 $MMTCO_2e$ by 2030 and 0.72 $MMTCO_2e$ by 2050, as shown below in **Table 11** and **Figure 16**. See **Appendix E** for methodology used to quantify GHG emissions reductions.

Measure Costs

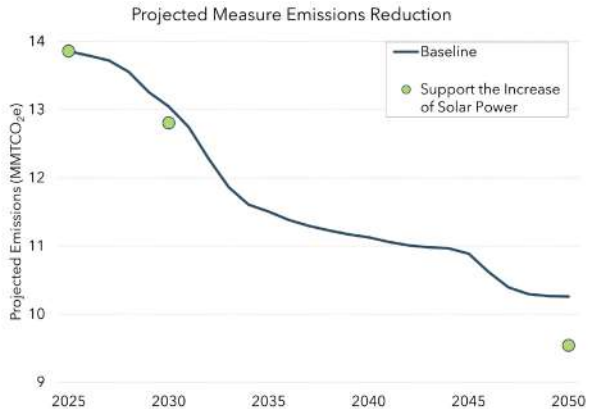
Because this GHG reduction measure comprises strategies that range from small capital projects to large capital projects, the cost associated with this measure is $$ - $$$.

Table 11: Projected Annual GHG Emissions Reduction - Support an Increase in Solar Power

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.24	0.72

Source: EPA AVERT

Figure 16: Projected Annual GHG Emissions Reduction - Support an Increase in Solar Power



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Intersection with Other Funding Available
This section provides a partial list of potential funding sources that can be tapped to implement this GHG reduction measure, as noted in **Table 12**. The following list provides some federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the federal and state legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list presented below provides a snapshot of the options at the time of writing.

Table 12: Potential Funding Sources - Supporting an Increase in Solar Projects in the Region, Creating 900 MW Across the Region

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Climate Resilience Fund (Planning)	Support for Connecticut communities to initiate planning and develop projects that will help communities become more resilient to the effects of climate change.	CT DEEP	COGs, municipalities, native/tribal entities, nonprofits, for-profits, educational institutions, utilities
2	Climate Smart Agriculture Grant (Tier 1)	To implement, support, or expand climate-smart agricultural practices related to on-farm energy (energy efficiency and renewable energy) and/or soil health equipment and practices.	CT DOAG	Municipalities, nonprofits, for-profits
3	CT SEAGRANT: Track One: Long Island Sound Resilience Planning Support Program	This program aims to help communities assess local climate risks, conceptualize project ideas, and conduct preliminary planning efforts/steps in order to be well positioned to access funding to design and implement successful sustainability- and resilience-focused projects.	US EPA	COGs, municipalities, native/tribal entities, nonprofits, for-profits, community-based organizations (*Applicable only to RiverCOG communities)
4	CT SEAGRANT: Track Two: Long Island Sound Resilience Grant Writing Assistance Program	This program aims to help communities develop successful sustainability- and resilience-focused project grant proposals and to help municipalities and community organizations develop capacity for navigating the funding landscape.	US EPA	COGs, municipalities, native/tribal entities, nonprofits, for-profits, community-based organizations (*Applicable only to RiverCOG communities)
5	Public Works and Economic Adjustment Assistance	To help distressed communities build, design, or engineer critical infrastructure and facilities that will help implement regional development strategies and advance bottom-up economic development goals to promote regional prosperity.	United States Department of Commerce (US DOC)	States, COGs, municipalities, native/tribal entities, nonprofits, educational institutions

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Benefits Analysis

Qualitative

There are many benefits associated with expanded solar production such as short term, construction-related job creation, energy resiliency, and improved air quality. As one study notes, "In North America, a 2013 study of state-level climate policies in the United States finds that local clean energy policies have a statistically positive impact on green job creation. For example, a gas-fired plant averages around 1 job-year [one job per one year]/installed MW while solar PV projects create over 20 job-years per installed MW largely due to the higher labor intensity during the installation phase."[13] When combined with battery storage and microgrids, local/regional production of solar energy offers security and resilience by producing a reliable power supply is accessible to communities during broader grid disruptions.[14]

Quantitative

This measure is projected to provide co-pollutant emissions reductions, as shown in **Table 13**, based on an analysis using EPA AVERT. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Disbenefits

One prominent disbenefit to the siting of agrivoltaics is the tension between large scale solar projects siting and preserving prime agricultural land. The Connecticut Siting Council has jurisdiction over the permitting and siting of large solar installations. The siting of large solar installations, particularly in farmland and open space areas, is often controversial.

Table 13: Projected Annual Co-Pollutant Emissions Reduction - Support an Increase in Solar Power

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
SO_2 (lbs)	38,240	100,510
NO_x (lbs)	94,490	261,460
$PM_{2.5}$ (lbs)	18,300	53,260
VOCs (lbs)	6,580	18,950
NH_3 (lbs)	9,090	26,660

Source: EPA AVERT

Municipal officials have found that they need to file as a party or as an intervenor to participate in the permitting process in any meaningful way. Both party status and intervenor status requires financial resources that many small towns lack. As noted above, municipalities across the state and in the region are advocating for legislation to expand membership of the Connecticut Siting Council to include municipal representation. In addition to proposed membership changes, CRCOG supports legislation to prioritize the siting of renewable energy projects on previously developed, disturbed, or contaminated brownfield land not eligible for use as farmland and to discourage development on prime farmland, forested tracts, and designated open space.

The Connecticut Department of Agriculture currently requires agrivoltaics projects

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that impact prime farmland, in whole or part, and that are 2 MW or more in size, to not interfere with the continued use of land beneath the canopy for agricultural purposes, and requires an Agrivoltaics Farm Plan be developed for the lifetime of the solar project. While prime farmland should be avoided for agrivoltaics projects to the extent possible in favor of disturbed or marginal (roughly defined as land not suitable for growing crops for one reason or another) farmland, this 'dual-use' requirement helps preserve the underlying agricultural benefits of the land.

The potential marring of scenic views is another possible disbenefit, although such concerns can admittedly be subjective. Nevertheless, best practices for large scale solar, such as buffering requirements, site design, and utilizing existing topography for screening purposes, can help mitigate aesthetic concerns from adjacent residents.

Additional disbenefits to solar projects may include high initial costs, particularly around installation of solar technology and infrastructure, posing a barrier to implementation. Funding and financial incentives for solar can vary; at time of writing, there is uncertainty around federal tax credits. Grid integration issues may also arise, especially in areas with significant amounts of aging infrastructure. The integration of distributed solar energy may result in voltage fluctuations and reverse power flow, which may require infrastructure upgrades – another significant upfront cost. Another disbenefit is increasing impervious surfaces which can impact stormwater management and water quality. However, to address this particular disbenefit, solar can be installed on surfaces such as roofs and canopies, areas that are already impervious. The disposal of solar panels at the end of the product life cycle may be considered a disbenefit because they can generate hazardous waste and may require specialized disposal or recycling practices that may not be readily available in all communities, and is especially rare in the state of Connecticut.

A final disbenefit worth noting is the limited municipal control in determining where or whether grid-scale solar energy projects are sited. As noted previously, that authority is vested in the Connecticut Siting Council for any projects over 1MW. In the absence of local control, municipalities have no means of preserving their community's rural character or open space as may be defined through scenic road designations or through local Plans of Conservation and Development. Furthermore, there is currently no meaningful mechanism or clearly-defined process for the Siting Council to consider the cumulative impact of overdevelopment of renewable energy projects in any particular community or region. This oversight effectively penalizes municipalities that have already sited a significant portion of renewable energy projects (with limited to no local input) while unintentionally disincentivizing equitable project siting throughout the state.

Benefits to Low-income Communities
The implementation of solar systems may also result in improved air quality when replacing their fossil fuel-based counterparts due to the reduction of local air pollutants.

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This may lead to subsequent positive public health outcomes like improved respiratory health for residents, as quantified in **Table 13**: Projected Annual Co-Pollutant Emissions Reduction. Deploying rooftop and canopy solar systems also stands to help bolster local economies and create job opportunities related to installation and maintenance of the technology, once again contributing to community resilience and wellbeing by improving the quality of life or residents in surrounding areas.

Solar Expansion in CT

Towns across the State are already embracing solar expansion and seeing the benefits. The **Town of Manchester** is leading the way with their Net Zero Energy K-12 initiative, in collaboration with Buckley Elementary. As noted in the Town of Manchester's press release, "Buckley Elementary School Attains First Net Zero Energy Verification":

> "The renovation of this 1940s school exemplifies a commitment to sustainability saving an estimated 75 percent of embodied carbon compared to new construction... [and] operational carbon (zero fossil fuels). The design prioritizes passive strategies, complemented by active systems such as photovoltaics and geothermal."

Other great examples can be observed in the communities of **Deep River**, **Middletown**, and **Montville**, where solar energy developer Verogy has obtained permits from DEEP "to convert former landfills in Deep River, Middletown, and Montville into sites that will host solar energy projects. The three projects will collectively generate 2.15 MW."[15]

B1: Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

Measure Description
This measure seeks to decrease the region's reliance on heating oil by five percent by switching to electric heat pumps. As temporary interim measures to assist the region in moving away from heating oil, switching to natural gas and propane energy sources may be considered. Other strategies to achieve this goal include expanding the region's commercial and residential energy audit programs to assist households in the transition to heat pumps.

Expected Geographic Location
Regionwide

Implementation Authority and Responsibilities
CRCOG and RiverCOG do not have the statutory or regulatory authority to implement this measure. COGs, however, are an excellent catalyst for helping connect residents with resources to encourage wider adoption of energy-saving measures necessary for the displacement of and reduction in use of heating oil.

Retrofitting existing buildings is crucial to reducing energy use in the sector. Much of the building stock in Connecticut is aging and fails to meet modern standards of weatherization, leading to energy loss in heating and cooling. Home energy efficiency and weatherization programs through local utilities, like Eversource and Avangrid, and in partnership with local sustainability committees, are key to reducing the region's annual consumption of heating oil.

Municipalities are also key to encouraging weatherization and replacement of heating oil systems with newer, more efficient heating options. With support from COGs, and through local sustainability committees, municipalities can help conduct outreach and education that connect residents with resources provided by CT DEEP, Public Utilities Regulatory Authority (PURA), and Eversource. Underwriters, such as the CT Green Bank, offer financing that makes these home upgrades more accessible. Through their COGs, municipalities can work to further incentivize residential participation with support of multi-town drives and regional service contracts that lower costs for residents.

Municipalities should work with these same partners to make municipal buildings more efficient, weatherized, and less reliant on heating oil.

While municipalities cannot ban the use of heating oil outright, they can evaluate local building codes and ordinances as well as regulate the size and location of where heating oil fuel tanks are installed in order to encourage the use of other fuels.

Using biofuels, such as bioheat, is another alternative to the use of heating oil. Biofuel use can be implemented by private partners, such as heating oil producers and distributors, and their use is already mandated by the State. The State's Public Action Number 21-181, An Act Concerning A Low-Carbon Fuel Blend of Heating Oil (CT PA 21-181), mandates that B50 (a blend of 50 percent biodiesel and 50 percent petroleum diesel) be the standard for home heating oil sold in the State by 2035.

B1: Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

Implementation Timeline and Milestones

2025-2029	2030-2039	2040-2050
Implementation Begins *20% Progress*	**Implementation Ongoing** *60% Progress*	**Measure Complete** *100% Progress*

Metrics for Tracking Progress
Progress will be measured on a municipality level by examining the progress of households in each municipality in switching from heating oil to electric heat pumps, natural gas, and propane. EnergizeConnecticut tracks heat pump and heat pump water data by municipality, which will aid in seeing the change over time (**Figure 17**). The US Census also provides data for household fuel usage, which will help provide a picture of the region's progress.

Figure 17: Screenshot of EnergizeConnecticut Dashboard

B1: Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

Quantifiable GHG Emissions Reductions
Using the RMI EPS to simulate a policy for reducing heating oil consumption by five percent by 2030, and completely eliminating it by 2050, this measure is projected to reduce GHG emissions by 0.01 $MMTCO_2e$ by 2030 and 0.48 $MMTCO_2e$ by 2050, as shown in **Table 14** and **Figure 18**. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

Measure Costs
Because this GHG reduction measure is composed of small capital projects (the cost of home renovations) and energy audit programs, the cost associated with this measure is $$.

Intersection with Other Funding Available
This section provides a partial list of potential funding sources that can be tapped to implement this measure, as noted in **Table 15**. The following list provides examples of federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, this list provides a snapshot at the time of writing.

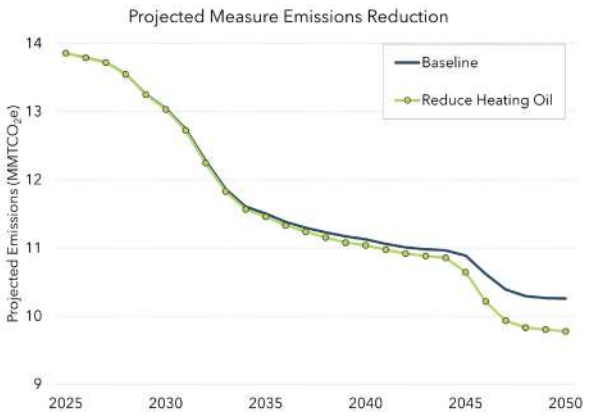
Incentives for these changes can be accomplished through a combination of tax credits, rebates, grants, and low/no-interest loans for both homeowners and contractors. They can be administered by partners like the CT Green Bank. Municipal land use authorities can also play a significant role in incentivizing efficient construction through siting/design guidelines and streamlining.

Table 14: Projected Annual GHG Emissions Reduction - Reduce Heating Oil

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.01	0.48

Source: RMI EPS

Figure 18: Projected Annual GHG Emissions Reduction - Reduce Heating Oil



B1: Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

Table 15: Potential Funding Sources - Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Community Development Block Grant Small Cities Program	Provides funding and technical support for projects that achieve local community and economic development objectives.	US HUD and Connecticut Department of Housing (CT DOH)	CT municipalities with populations of less than 50,000
2	Climate Resilience Fund (Project Development)	Helps Connecticut communities initiate planning and develop projects that will help them become more resilient to the effects of climate change.	CT DEEP	COGs, municipalities, native/tribal entities, nonprofits, for-profits, educational institutions, utilities
3	Community Change Grant Program Community-Driven Investments for Change (Track 1)	Funding to meaningfully improve the environmental, climate, and resilience conditions affecting disadvantaged communities through climate action and pollution reduction strategies.	United States Department of Transportation (US DOT)	A partnership between two community-based organizations (CBOs) or a partnership between a CBO and one of the following: state, COG, municipality, native/tribal entity, or educational institution
4	Energy Efficiency and Clean Energy Grants	Various loans, RFPs, prizes and rebates for infrastructure and manufacturing.	United States Department of Energy (US DOE)	Varies
5	Industrial Assessment Centers (IAC) Implementation Grant Program	Grants to bolster the American manufacturing base by supporting projects to improve energy and material efficiency, to increase productivity, and to reduce emissions at small and medium-sized manufacturers.	US DOE	For-profits
6	Weatherization Assistance Program	Federal grant from the US DOE to address weatherization and health and safety issues in homes for low-income residents.	US DOE/CT DEEP	Eligibility for individuals is 60 percent state median income

B1: Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

Benefits Analysis

Qualitative

Reducing the use of residential heating oil will benefit the region's residents financially as well as environmentally. Significant energy cost savings may be observed when switching from heating oil.[16] As shown in one study, "In Michigan, for homes that are currently heating with propane or electricity the best heat pump option is a different model type designed for cold climates and could save households $1,500 annually on average."[17] In addition, transitioning to high-efficiency alternatives from heating oil may have positive economic impacts by creating jobs in the HVAC installation and energy industries.

Environmentally, heating oil combustion emits know air pollutants such as $PM_{2.5}$, SO_2, and NO_x. Reducing oil-reliant heating in urban areas may result in significant reductions in ambient air pollution and related chronic health conditions like cancer and cardiovascular disease.[18] Switching from heating oil to electricity also reduces the risk of public health hazards related to heating oil spills, which can be extremely toxic and can result in adverse public health outcomes like water and soil contamination. Significant odor can also be an adverse outcome of heating oil use, and subsequent disturbances to quality of life for nearby residents can occur if spills are not properly cleaned.

Quantitative

This measure is projected to provide co-pollutant emissions reductions, as shown in **Table 16**, based on annual heating oil consumption data from the US EIA and published emissions factors from the US EPA. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Table 16: Projected Annual Co-Pollutant Emissions Reduction - Reduce Heating Oil

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
SO_2 (lbs)	1,413	28,252
NO_x (lbs)	132,640	2,652,800
CO (lbs)	33,160	663,200
PM (lbs)	13,264	265,280
VOCs (lbs)	2,255	45,098

Source: Dewberry calculations

Disbenefits

Disbenefits include significant upfront costs related to switching to new heating systems. The cost difference between natural gas and electric heating systems can be significant, and an electric heating system may be several thousand dollars more expensive upfront than a natural gas system.[19] This disbenefit can be addressed by providing state funding to help cover the costs. Heating oil systems also have a long service history in Connecticut. Encouraging a shift toward the alternative may have adverse impacts on small and local businesses who install, repair, and service heating oil systems. In addition, workforce limitations may make implementation a challenge. There is a potential added cost to build and train the workforce.

B1: Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent

Benefits to Low-income Communities
This measure will benefit the region's low-income population, both those who switch to electricity and those who remain on heating oil. Heating oil is volatile, and prices fluctuate seasonally, making it especially expensive in winter months. Replacing a percentage of heating oil systems may reduce volatility and reduce annual costs for households that remain on heating oil. For households that are able to switch to electric heating systems, heating costs may be lower.

Figure 19: Winter in Essex

T1: Install Public Electric Vehicle Charging Stations

Measure Description
This measure seeks to incentivize individuals switching to EVs and plug-in hybrids by providing a framework for municipalities to collaborate on public EV charging infrastructure installation.

To meet Connecticut's goal of electrifying 25 percent of the light-duty vehicle fleet, based on data from the EValuateCT Dashboard and the Alternative Fuels Data Center's (AFDC's) Electric Vehicle Infrastructure (EVI) EVI-X Tool, it is estimated that the CRCOG and RiverCOG region would need to help incentivize the installation of approximately 3,800 public level 2 chargers (from approximately 1,100 pubic level 2 chargers in place in 2024).

Expected Geographic Location
Regionwide

Implementation Authority and Responsibilities
CRCOG and RiverCOG do not have the statutory or regulatory authority to implement this measure directly. However, through their capacity as an MPO, they can allocate state and federal funding to implement complete street projects in conjunction with transportation improvements. Funding sources include the Transportation Improvement Program (TIP), the Local Transportation Capital Improvement Program (LOTCIP), the Community Connectivity Grant Funding (CCGP), and the Transportation Rural Improvement Program (TRIP).

The State has implemented a plan to expand EV charging along key transportation corridors in support of the Federal Highway Administration (FHWA) Alternative Fuel Corridors; municipalities should support efforts that advance this expansion while growing their own local network of EV chargers.

CRCOG and RiverCOG can coordinate with CT DOT, and CT DOT and municipalities have the necessary authority to implement most projects pertaining to the built environment/land use and infrastructure, such as the installation of EV chargers. Sufficient funding from the State and federal government is typically the limiting factor, as many local governments struggle to contribute a 20 percent match for some infrastructure projects.

COGs can create the framework for municipalities to support the installation of EV charging, identify the best locations for EV charging hubs, and through shared service agreements, work with private partners to install and maintain EV charging. COGs can also work with municipalities to develop incentives that foster public/private partnerships. Municipalities have several powerful tools they can use to drive this measure, such as requiring EV charging at new developments or bonding for energy upgrades as part of CIP or POCD planning. They could also tap into the COG's capacity for grant-writing.

T1: Install Public Electric Vehicle Charging Stations

Implementation Timeline and Milestones

2025-2029

Implementation Begins and is Completed
100% Progress

Metrics for Tracking Progress

Progress will be measured at the municipal level by examining each municipality's number of EV charging stations. Other data associated with public charging that could be tracked include the number of users of this infrastructure as well as the number of new EVs on the road. The EV Club of Connecticut provides information about the number of registered EVs in the State. The region can also work with Capitol Clean Cities of Connecticut, a local US DOE-funded organization that promotes alternative fuels and energy independence.

Quantifiable GHG Emissions Reductions

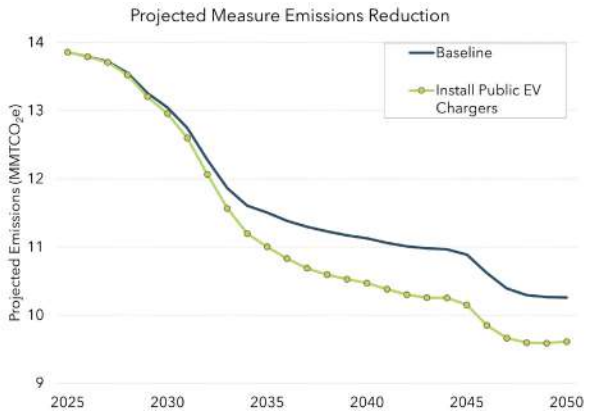
To estimate the impact of installing public EV chargers, this measure was translated into how many EVs chargers could support, and then the RMI EPS was used to calculate the emissions reductions based on EV sales as the fleet transitions. This measure is projected to reduce GHG emissions by 0.09 $MMTCO_2e$ by 2030 and 0.44 $MMTCO_2e$ by 2050, as shown below in **Table 17** and **Figure 20**. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

Table 17: Projected Annual GHG Emissions Reduction - Install Public EV Chargers

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.09	0.44

Source: RMI EPS

Figure 20: Projected Annual GHG Emissions Reduction - Install Public EV Chargers



T1: Install Public Electric Vehicle Charging Stations

Measure Costs
Because this GHG reduction measure involves CRCOG and RiverCOG staff helping develop frameworks for collaboration, the cost associated with this measure is $.

Intersection with Other Funding Available
This section provides a partial list of potential funding sources that can be used to implement this measure, as noted in **Table 18**. The following list includes examples of federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list is a snapshot available at the time of writing.

Table 18: Potential Funding Sources - Install Public Electric Vehicle Charging Stations

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Charging and Fueling Infrastructure (CFI) Community Charging	Funding to install EV charging and alternative fuel in locations on public roads, at schools, at parks, and in publicly accessible parking facilities.	US DOT	States, COGs, municipalities, native/tribal entities, transit operators
2	Charging and Fueling Infrastructure (CFI) Corridor Charging	Funding to deploy electric vehicle charging and hydrogen/propane/natural gas fueling infrastructure along designated alternative fuel corridors.	CT DOAG	Municipalities, nonprofits, for-profits
3	Charging and Fueling Infrastructure Grants Program	US DOT	States, COGs, municipalities, native/tribal entities, nonprofits, for-profits, educational institutions, utilities, community-based organizations, labor unions, individuals, transit operators	COGs, municipalities, native/tribal entities, nonprofits, for-profits, community-based organizations (*Applicable only to RiverCOG communities)
4	Electric Vehicle Charger Reliability and Accessibility Accelerator Program	Funding to strategically deploy publicly accessible EV charging and alternative fueling infrastructure in the places where people live and work and urban and rural areas, in addition to along designated Alternative Fuel Corridors (AFCs).	US DOT	States, COGs, municipalities, native/tribal entities, educational institutions, public housing authorities, port authorities, transit authorities

T1: Install Public Electric Vehicle Charging Stations

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
5	Electric Vehicle Charger Reliability and Accessibility Accelerator Program (NEVI set-aside)	To improve the reliability of existing EV infrastructure by repairing and replacing existing chargers that are broken or non-operational.	US DOT	States, COGs, municipalities
6	Local Capital Improvement Program (LoCIP)	LoCIP provides financial assistance to municipalities for eligible capital projects that have been approved by the municipality's legislative body.	Connecticut Office of Policy and Management (CT OPM)	Municipalities
7	Small Town Economic Assistance Program	The Small Town Economic Assistance Program funds economic development, community conservation and quality-of-life capital, projects for localities that are ineligible to receive Urban Action bonds.	CT OPM	Eligible CT municipalities

Benefits Analysis

Qualitative

Increasing the number of charging stations available reduces the amount of anxiety that drivers feel in relation to locating chargers. By reducing the distance between chargers, the overall distance that drivers are able to travel increases. This encourages the purchase of EVs among drivers. The benefits of increasing EV use in the region are both environmental and economic.

Environmentally, EVs do not produce tailpipe emissions like traditional cars and therefore emit fewer pollutants, even when the electricity that they use is produced from fossil fuels. Increasing the number of EV charging facilities available in a particular location has the potential to reduce local air pollutants and, as a result, lower the incidence of respiratory issues in urban areas.[20]

The economic benefits of EV usage include the support of local businesses. As noted in one study, "As EV drivers park their vehicles to recharge, they often find themselves with spare time, creating an opportunity in activities such as shopping or dining in nearby establishments. In addition, since people often have flexibility where they shop, having charging facilities available can make businesses more attractive to potential customers. This increased foot traffic can breathe new life into local businesses and may offer a substantial boost to their customer base and revenue".[21] The same study noted that "A 2019 study suggests a 2.7 percent increase in consumer spending was observed at businesses within 100 meters of public EV charging infrastructure, and an additional increase by 3.2 percent between 2021 and 2023."

T1: Install Public Electric Vehicle Charging Stations

Benefits Analysis

Quantitative

This measure is projected to provide co-pollutant emissions reductions, as shown in **Table 19**, based on the avoided emissions produced by an average non-EV vehicle using EPA mobile emissions guidance. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Disbenefits

The disbenefits of increasing public EV charging stations are primarily the upfront and maintenance costs to municipalities. However, given the positive economic benefits to local businesses, municipalities may be able to recoup these costs.

Another disbenefit of increasing public EV charging stations is that an increased demand for EV charging infrastructure may strain local electric grids, which may require infrastructure upgrades by utilities to be able to support future growth.[22]

Benefits to Low-income Communities

While the upfront costs of EVs may be higher than those of traditional cars, electric cars cost owners less long term in terms of charging cost and maintenance costs.[23] In this way, increasing public EV charging stations can help low-income residents of the region.

Table 19: Projected Annual Co-Pollutant Emissions Reduction - Install Public EV Chargers

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
SO_2 (lbs)	47,534	190,134
NO_X (lbs	808,070	3,232,279
CO (lbs)	3,565,014	14,260,056
VOCs (lbs)	808,070	3,232,279
$PM_{2.5}$ (lbs)	76,054	304,215
PM_{10} (lbs)	95,067	380,268

Source: Dewberry calculation

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Measure Description
This measure seeks a 1-2 percent mode shift away from SOVs in the region. Several strategies have been identified to facilitate this mode shift:

- Expanding bus rapid transit;
- Pursuing recommended public transit and rail improvements (enhanced passenger amenities (e.g., Tap to Pay), stop consolidation, etc.);
- Increasing the supply of residential transit-oriented development (TOD);
- Expanding micromobility (electric scooters); and
- Pursuing complete streets projects.

Expected Geographic Location
Regionwide

Implementation Authority and Responsibilities
CRCOG and RiverCOG, through their capacity as the MPO, do have some statutory or regulatory authority to implement this measure. As an MPO, COGs allocate State and Federal funding, which can be used to implement complete street projects in conjunction with transportation improvements. Funding sources include the Transportation Improvement Program (TIP), the Local Transportation Capital Improvement Program (LOTCIP), the Community Connectivity Grant Funding (CCGP), and the Transportation Rural Improvement Program (TRIP).

CT DOT and transit districts, with consistent State and Federal funding, are also key to expanding public transit options, growing routes, modernizing key amenities, and streamlining operations that make mode shift preferable. These providers should work with employers and local anchor institutions to help increase ridership through frictionless payment options, discounted fares, and flexible transit models—like River Valley Transit's XtraMile program.

Municipalities, with the assistance of the COGs, could review and amend zoning regulations and local ordinances as appropriate to:

- Allow for denser housing, lower parking minimums, and increased TOD.
- Review and amend local ordinances related to micro-mobility as appropriate and engage with private partners to expand access to transit options that help with first- and last-mile trips. And, review and update complete street design guidelines, and coordinate with CT DOT to install complete street projects on State-owned roads.

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Implementation Timeline and Milestones

2025-2029	2030-2039	2040-2050
Implementation Begins *20% Progress*	**Implementation Ongoing** *60% Progress*	**Measure Complete** *100% Progress*
• Pursue public transit and rail improvements (such as enhanced passenger amenities and stop consolidation) • Expand micromobility programs • Develop complete streets projects • Expand sidewalk networks	• Continue with previous activities • Study ways to expand bus rapid transit in region • Engage with local developers for residential TOD • Empower quasi-governmental organizations, like a redevelopment authority, to create public-private partnerships that expand TOD	• Pursue ways to expand bus rapid transit • Encourage residential TOD

Figure 21: Bicycle infrastructure near Hillside Road in Mansfield.

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Metrics for Tracking Progress

Progress will be measured at the municipality level as well as the state and regionwide levels. Through CRCOG and RiverCOG's transportation planning responsibilities, the number of complete streets projects can be examined. Expanded bus rapid transit, as well as bus and rail improvements, will need to be tracked through CT DOT and regional transit authorities, which oversee the region's train and bus networks. Increases in the supply of TOD will be tracked at the municipality level. Data from the US Census on travel to work can be compared to determine the amount of mode shift.

Quantifiable GHG Emissions Reductions

To estimate the impact of mode-shifting away from single-occupancy vehicles (SOVs), the RMI EPS was used to calculate the emissions reductions based on the reduction in vehicle miles traveled. This measure is projected to reduce GHG emissions by 0.08 $MMTCO_2e$ by 2030 and 0.43 $MMTCO_2e$ by 2050, as shown below in **Table 20** and **Figure 22**. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

Measure Costs

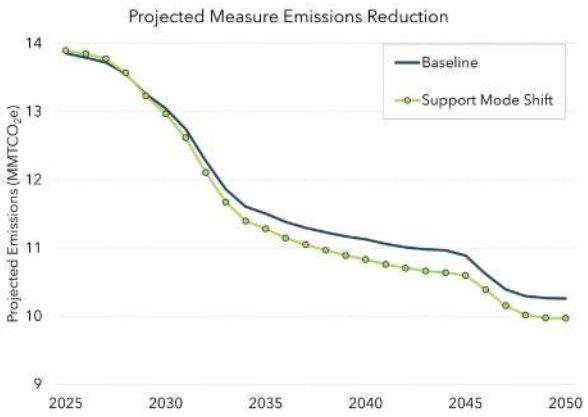
The anticipated costs range from $ (stop consolidation or zoning changes to encourage TOD) to $$ (enhanced passenger amenities) to $$$ (increasing TOD, expanding BRT).

Table 20: Projected Annual GHG Emissions Reduction - Support Mode Shift

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.08	0.43

Source: RMI EPS

Figure 22: Projected Annual GHG Emissions Reduction - Support Mode Shift



T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Intersection with Other Funding Available
This section provides a partial list of potential funding sources to support the implementation of this measure, as noted in **Table 21.** The following list includes federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list below is a snapshot taken at the time of writing.

Table 21: Potential Funding Sources - Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Accelerated Innovation Deployment Demonstration Program	To support the pilot/demonstration of innovations, in areas such as planning, financing, operations, pavements, structures, materials, environment, and construction.	US DOT	States, native/tribal entities, MPOs, and local governments. The CT DOT must be the grant subrecipient.
2	Active Transportation Infrastructure Investment Program	Grants will allow communities to identify, prioritize, and implement improvements to the largest barriers to safe, accessible, and equitable pedestrian and bicycle network connectivity through the development of infrastructure that will provide substantial additional opportunities for walking and bicycling.	US DOT	States, COGs, municipalities, native/tribal entities, MPOs
3	Active Transportation Microgrant	Provides funding for eligible items that contribute to equitable, safe, accessible, and sustainable active transportation for vulnerable road users.	CT DOT	Municipalities, nonprofits, educational institutions
4	Advanced Transportation Technology and Innovation	To deploy, install, and operate advanced transportation technologies to improve safety, mobility, efficiency, system performance, intermodal connectivity, and infrastructure return on investment.	US DOT	States, COGs, municipalities, educational institutions, port authorities, transit authorities, MPOs

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
5	All Stations Accessibility Program	To help finance capital projects to upgrade the accessibility of legacy rail fixed guideway public transportation systems for people with disabilities, including those who use wheelchairs, by increasing the number of existing stations or facilities, such as outdoor light-rail boarding and alighting areas, that are fully accessible.	US DOT	State governments and local governmental entities that operate or financially support: • legacy rail; • fixed guideway public transportation systems; • corresponding legacy stations/facilities.
6	Better Utilizing Investments to Leverage Development (BUILD)	Funds surface transportation infrastructure projects with significant local or regional impacts.	US DOT	States, COGs, municipalities
7	Buses and Bus Facilities Program	To assist in the financing of buses and bus facility capital projects, including replacing, rehabilitating, purchasing or leasing buses or related equipment, and rehabilitating, purchasing, constructing, or leasing bus-related facilities.	US DOT	States, COGs, municipalities, native/tribal entities, transit operators
8	Community Connectivity Program	To make conditions safer for people of all ages to walk, bike, and use transit, thereby encouraging more people to use these healthy and environmentally sustainable modes of travel.	CT DOT	Municipalities
9	Congestion Relief Grant Program	To advance innovative, integrated, and multimodal solutions to congestion relief in the most congested metropolitan areas of the United States with an urbanized area population greater than 1million.	US DOT	States, COGs, or municipalities; Project must be in an urbanized area with a population greater than 1 million
10	CT Recreational Trails Grants Program	To provide funding in support of trail projects	CT DEEP	States, COGs, municipalities, native/tribal entities, nonprofits
11	FTA Sec. 5310	Program intended to improve mobility for seniors and individuals with disabilities by removing barriers to transportation service and expanding transportation mobility options.	US DOT/CT DOT	States, COGs, municipalities, nonprofits, port authorities, transit authorities
12	Incentive Housing Zone Program/ Housing for Economic Growth (HEG) Program	Providing technical assistance and pre-development funds in the planning of incentive housing zones, the adoption of incentive housing zone regulations and design standards, and the review and revision as needed of applicable subdivision regulations.	CT DOH	Municipalities

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
13	Innovative Coordinated Access and Mobility	To finance innovative capital projects for the transportation-disadvantaged, with the goal to improve the coordination of transportation services and non-emergency medical transportation services for older adults, people with disabilities, and people of low income.	US DOT	States, nonprofits, local governmental entities that operate a public transportation service
14	Local Transportation Capital Improvement Program	To provide funding for infrastructure capital improvements.	CT DOT	Municipalities, COGs
15	National Infrastructure Project Assistance Program	Provides funding for major projects that are too complex for traditional funding programs.	US DOT	States, COGs, municipalities, native/tribal entities, port authorities, transit authorities
16	Neighborhood Access and Equity Grant Program: Capital Construction	To advance community-centered transportation connection projects that improve access to daily needs such as jobs, education, healthcare, food, nature, and recreation, to foster equitable development and restoration, and to provide technical assistance to further these goals.	US DOT	States, COGs, municipalities, native/tribal entities, nonprofits, educational institutions, port authorities, transit authorities, MPOs
17	Neighborhood Access and Equity Grant Program: Community Planning	To advance community-centered transportation connection projects that improve access to daily needs such as jobs, education, healthcare, food, nature, and recreation, to foster equitable development and restoration, and to provide technical assistance to further these goals.	US DOT	States, COGs, municipalities, native/tribal entities, nonprofits, educational institutions, port authorities, transit authorities, MPOs
18	Pilot Program for TOD Planning	Providing funding to local communities to integrate land use and transportation planning with a new fixed guideway or core capacity transit capital investment.	US DOT	States, COGs, municipalities
19	Prioritization Process Pilot Program	The program provides funding to develop and implement a publicly accessible, transparent prioritization process for the ranking and selection of projects for inclusion in short-range and long-range transportation plans for state or metropolitan areas, Statewide Transportation Improvement Programs (STIPs), and Transportation Improvement Programs (TIPs) in metropolitan areas.	US DOT	States, MPOs serving a census-delineated urban area with a population of over 200,000

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
20	Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT)	To help make surface transportation more resilient to natural hazards, including climate change, sea-level rise, flooding, extreme weather events, and other natural disasters through the support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk costal infrastructure.	US DOT	States, COGs, municipalities, native/tribal entities
21	Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Discretionary Grants	To fund projects that address the climate crisis by improving the resilience of the surface transportation system, including highways, public transportation, ports, and intercity passenger rail.	US DOT	States, COGs, municipalities, native/tribal entities, MPOs
22	Railroad Crossing Elimination (RCE)	Provides funding for highway-rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods.	US DOT	States, COGs, municipalities, native/tribal entities, port authorities, MPOs
23	Reconnecting Communities and Neighborhoods (RCN) Grant Program: Capital Construction	To advance community-centered transportation connection projects that improve access to daily needs such as jobs, education, healthcare, food, nature, and recreation, to foster equitable development and restoration, and to provide technical assistance to further these goals.	US DOT	RCP Capital Construction Grants: owner(s) of the eligible facility proposed in the project for which adequate planning activities such as public involvement, user data evaluation, and conceptual design have been completed, or a partnership between a facility owner and any eligible RCP Community Planning Grant applicant.
24	Reconnecting Communities and Neighborhoods (RCN) Grant Program: Community Planning	To advance community-centered transportation connection projects that improve access to daily needs such as jobs, education, healthcare, food, nature, and recreation, to foster equitable development and restoration, and to provide technical assistance to further these goals.	US DOT	States, COGs, municipalities, native/tribal entities, nonprofits, MPOs
25	Responsible Growth/Transit Oriented Development	This program provides grants for shovel-ready capital projects located within one-half (1/2) mile of existing public transportation facilities.	CT OPM	COGs, municipalities; Joint applications/partnerships with developers, nonprofits, and other outside entities generally encouraged

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
26	Rural Surface Transportation Grant Program	Provides grants for projects to improve and expand the surface transportation infrastructure in rural areas to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth and improve the quality of life.	US DOT	States, COGs, municipalities, native/tribal entities
27	Safe Streets and Roads for All	The SS4A program funds initiatives through grants to prevent roadway deaths and serious injuries. Grants for comprehensive safety action plans, including supplemental safety planning, and/or safety demonstration activities.	US DOT	COGs, municipalities, native/tribal entities, transit agencies, MPOs
28	Safe Streets and Roads for All: Implementation Grant	Provides funds to prevent roadway deaths and serious injuries.	US DOT	COGs, municipalities, native/tribal entities, transit agencies, MPOs
29	Strengthening Mobility and Revolutionizing Transportation (SMART)	To provide grants to eligible public sector agencies to conduct demonstration projects focused on advanced smart community technologies and systems in order to improve transportation efficiency and safety.	US DOT	States, COGs, municipalities, native/tribal entities, port authorities, transit authorities, MPOs
30	Thriving Communities Program	Deep-dive technical assistance, planning, and capacity building support	US DOT	Nonprofits, educational institutions, CBOs
31	Thriving Communities Program	Support to advance transformative infrastructure in communities that face barriers to infrastructure advancement and implementation.	US DOT	Nonprofits, educational institutions, CBOs
32	Transportation Alternatives (TA) Program	Funding opportunities to help expand transportation choices and enhance the transportation experience.	US DOT	COGs, municipalities
33	Transportation Rural Assistance Program	Funding for infrastructure improvements in rural areas.	CT DOT	COGs, municipalities

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Benefits Analysis

Qualitative

A mode shift from SOV use to alternative modes of transportation offers a wide range of benefits to individuals as well as the community. Importantly, the benefits from mode shift are not only for the "mode shifters" – those who choose to bike, walk, or use micromobility products (such as scooters). With some choosing to not use their cars, the resulting reduced congestion benefits those who continue to choose to drive.

Significant public health benefits may occur with the replacement of short automobile trips with bicycle trips (or other non-SOV transportation methods). One study revealed that by encouraging micro-mobility and active transportation, a mode shift encourages a less sedentary lifestyle and promotes fitness. This study notes that according to the World Health Organization (WHO), transport-related inactivity was found to be correlated with increased mortality and decreases in healthy years, with significant impacts observed in the form of chronic diseases such as heart disease, stroke, colon cancer, type 2 diabetes, breast cancer, and osteoporosis, according to the World Health Organization.[24] Complete streets projects encourage the shift away from SOVs by focusing on the safety of all road users. By advancing complete streets projects, this measure would reduce the numbers of vehicle-on-vehicle and vehicle-on-pedestrian collisions, potentially reducing the number of road fatalities.

Shifting away from SOVs also promotes noise reduction and better air quality. These outcomes are made possible by a reduced number of engines running, less traffic congestion and subsequent noise like revving engines and car horns, and a shift toward quieter alternatives like electric micromobility. According to one study, "by eliminating…short automobile trips, annual average urban $PM_{2.5}$ would decline by 0.1 μg/m^3 and that summer ozone (O_3) would increase slightly in cities but decline regionally, resulting in net health benefits of $4.94 billion/year [...], with 25 percent of $PM_{2.5}$ and most O_3 benefits to populations outside metropolitan areas. Across the study region of approximately 31.3 million people and 37,000 total square miles, mortality would decline by approximately 1,295 deaths/year [...] because of improved air quality and increased exercise".[25]

Finally, a shift from SOVs to public or bus rapid transit options may result in a significant decrease in traffic congestion, as public transit systems can replace many individual trips during peak congestion hours. Expanding public transit availability could improve transit systems' overall capacity by increasing public transit availability, making it a preferred option over SOV travel.[26]

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Focus on Micromobility in Hartford

Although Hartford is a dense urban community that is home to various major modes of transit (including the largest bus system in the State), micromobility helps fill in critical gaps in the City's transportation system. Since 2021, there have been over **half a million** scootershare rides to date. Each launch of shared micromobility has seen immediate adoption and ridership. In the last ten months (including the winter season), there have been over 140,000 new rides and over 16,000 unique riders.

Participation is not limited to downtown; the majority of rides (as much as **80 percent**) start and end in the City's neighborhoods. Survey responses from riders participating in the 2021 program noted that they were largely using the system to ride to activities, meet friends and family, and go to work. **Over a third** used scooters to replace trips that would have otherwise been taken with a car.

Notably, the presence of the system itself has increased visibility and awareness of riding and cycling. Over **70 percent** of the 2021 rider respondents noted that they joined because they saw a scooter on the street and wanted to try it out. Ridership numbers have also helped build the case for bicycle and scooter infrastructure.

Quantitative

This measure is projected to provide co-pollutant emissions reductions, as shown in **Table 22**, based on the avoided emissions produced by an average non-EV vehicle. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Table 22: Projected Annual Co-Pollutant Emissions Reduction - Support Mode Shift

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
SO_2 (lbs)	3,803	49,435
NO_X (lbs)	64,646	840,393
CO (lbs)	285,201	3,707,615
VOCs (lbs)	64,646	840,393
$PM_{2.5}$ (lbs)	6,084	79,096
PM_{10} (lbs)	7,605	98,870

Source: Dewberry calculation

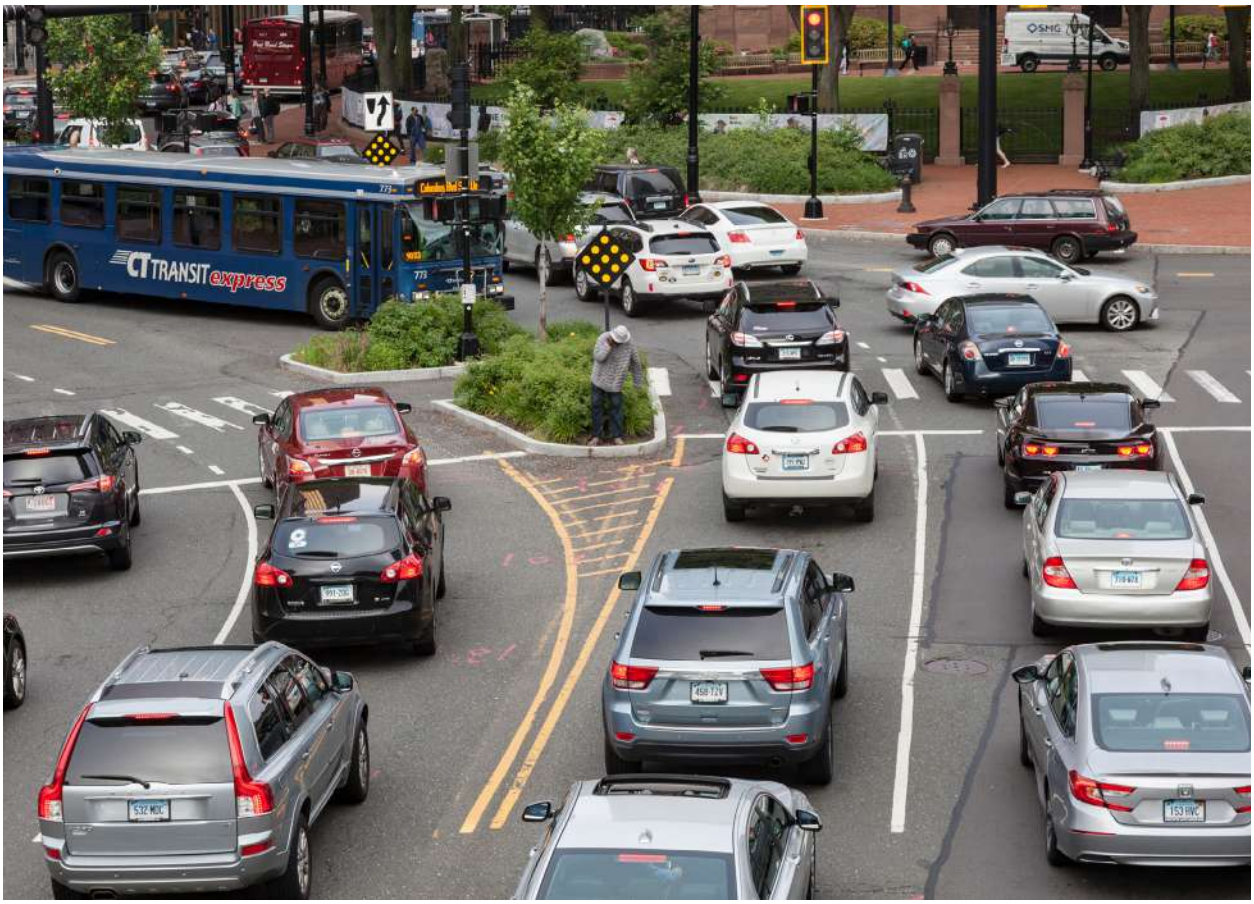
Disbenefits

Safety concerns may arise from active transportation methods, especially in areas without proper infrastructure (e.g, non-walkable neighborhoods, incomplete sidewalk networks, lack of bike lanes) and may result in an increase in vehicle-pedestrian or vehicle-bicyclist collisions. However, this disbenefit can be addressed through the measure's focus on complete streets projects. Complete streets projects seek to make roads safer for all users – drivers, pedestrians, and bicyclists.

T2: Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles

Benefits to Low-income Communities
Upgrades in public transit infrastructure and micromobility may prove especially beneficial to the region's low-income population and to the region's elderly population, as these two groups tend to be less car-dependent. Improvements to non-SOV mobility can increase the ability of low-income populations to get to work, school, shops, doctor appointments, and other daily activities.

Figure 23: Car traffic during morning rush in Hartford.



T3: Switch Lawn and Garden Equipment to Electric

Measure Description
This measure entails working with municipalities across the region to promote the use of electric equipment for landscaping maintenance. Lawn and garden equipment are included in the transportation sector due to the mobile nature of their emissions, as such equipment moves around a community or region, in comparison with purely stationary sources of emissions such as buildings.

A bill was proposed in early 2025 by the Connecticut General Assembly to ban the use of gas-powered leaf blowers fully by 2029 with a phase-out beginning in 2027. While there was widespread support for "responsible and measured transition to battery-powered equipment, there are too many details and hurdles that must be addressed before any statewide ban or restriction should be enacted".[27] As a result, this measure will instead focus on encouraging the change through incentives such as education campaigns, facilitating shared electric equipment, and voluntary buybacks.

Expected Geographic Location
Regionwide

Implementation Authority and Responsibilities
CRCOG and RiverCOG do not have the statutory or regulatory authority to implement the measure. However, COGs can support municipalities' reviews and amend local ordinances and limit the use of certain lawn equipment. Also, with support of the COG, municipalities could emphasize the use of battery-powered lawn equipment in their request for proposals (RFPs) for contracted services, with regional shared service agreements leveraging greater impacts for overall emissions reduction. A statewide mandate, coupled with extensive public outreach and education, would be required to facilitate a full transition away from gas-powered lawn equipment to battery alternatives.

Implementation Timeline and Milestones

2025-2029

Implementation Begins
50% Progress

- Development and use of incentives and education campaigns

2030-2039

Measure Complete
100% Progress

T3: Switch Lawn and Garden Equipment to Electric

Metrics for Tracking Progress

Progress will be measured at the regional level by examining the public education undertaken as well as at the municipality level by examining whether municipalities in the region have pursued bans or participated in equipment buybacks. While it may not be possible to estimate the number of privately owned pieces of lawn equipment, the number of pieces of electric equipment owned by municipalities can be measured across the region to track progress.

Quantifiable GHG Emissions Reductions

Based on data from the US EPA's National Emissions Inventory (NEI) of gas-powered lawn and garden equipment in the CRCOG and RiverCOG region, this measure is projected to reduce GHG emissions by 0.03 $MMTCO_2e$ by 2030 and 0.09 $MMTCO_2e$ by 2050, as shown below in **Table 23** and **Figure 24**. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

Measure Costs

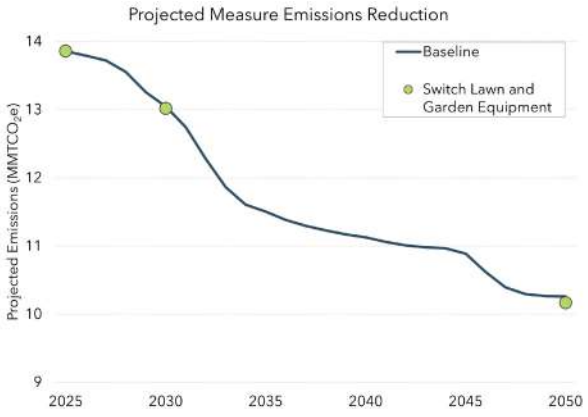
Because this GHG reduction measure is composed of strategies that range from public education to a buyback program, the cost associated with this measure is $ - $$.

Table 23: Projected Annual GHG Emissions Reduction - Switch Lawn and Garden Equipment

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.03	0.09

Source: EPA NEI

Figure 24: Projected Annual GHG Emissions Reduction - Switch Lawn and Garden Equipment



T3: Switch Lawn and Garden Equipment to Electric

Intersection with Other Funding Available
This section provides a partial list of potential funding sources to support this measure, as noted in **Table 24**. The following list consists of examples of federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list represents a snapshot from the time of writing.

Table 24: Potential Funding Sources - Switch Lawn and Garden Equipment to Electric

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Lawn Equipment Exchange Fund (LEEF)	Launched in 2010, LEEF incentivized municipalities and regional school districts to exchange their old, high-polluting lawn and grounds maintenance equipment for new, lower-polluting machines. The project reimbursed municipalities for 80 percent of the purchase price for the equipment exchanges found to provide the most cost-effective pollution reductions. This program has since been phased out, but the framework should be considered for future funding opportunities.	CT DEEP	Municipalities and regional school districts

Benefits Analysis
Qualitative
Benefits of switching from gas powered-leaf blowers to electric equipment are centered around significant emissions and contaminant reductions and noise reductions. Importantly, these benefits are tied to both individual and community health.

According to a publication of the Penn Program on Regulation from The Regulatory Review, "engineers at the car company Edmunds estimated that driving a Ford F-150 Raptor truck from Texas to Alaska would emit the same amount of air pollution as a mere half-hour of yard work with a two-stroke, gas-powered leaf blower. Indeed, Edmunds estimated that some gas leaf- blowers generate 23 times the carbon dioxide of the Raptor and 300 times more non-methane hydrocarbons. Both contribute to climate change and harm public health. Worse yet, gas-powered leaf blowers also emit nitrous oxide. The EPA estimates that the impact of one pound of nitrous oxide on warming the atmosphere is almost 300 times that of an equivalent pound of carbon dioxide. Professor Karen Jubanyik at Yale School of Medicine has noted that lawn

T3: Switch Lawn and Garden Equipment to Electric

Figure 25: A person using an electric leaf blower.

equipment may become one of the country's largest sources of pollution."[28] Switching to electric leaf blowers would reduce not only emissions but also air and noise pollution, as a typical leaf blower reportedly burns just 60 percent of its fuel—the rest is spewed into the atmosphere.

Electrification may result in fewer instances of adverse health outcomes related to contaminants from gas-powered lawn and garden equipment. Health concerns from gas-powered equipment include but are not limited to breathing problems, asthma attacks and other lung health issues, cardiovascular issues, and even premature deaths.

The noise from gas-powered leaf blowers adversely impacts both the workers using the equipment and the communities in which the equipment is used. Typical leaf blowers may also be associated with hearing loss for those frequently exposed to their sound. The loudness of gas-powered leaf blowers' sound at the point of operation is especially concerning for the auditory and non-auditory health of workers and others regularly exposed in close proximity. The ability of this sound - in particular its lower-frequency components - to travel over long distances suggests that it has a wide-ranging impact on surrounding communities and raises concerns over its adverse health impacts. The persistent, high-decibel noise generated by these machines not only affects human well-being, causing stress and hearing issues, but also has a detrimental impact on wildlife, interfering with their communication, breeding, and natural behaviors.

A review of seven popular commercial gas-powered leaf blowers by OPE (Outdoor Power Equipment) Reviews found that all produce noise greater than 100 decibels at the user's ear, with sound levels at 50 feet ranging from 76 to 83 decibels of these gas-powered leaf blowers. Often, if the equipment is used outside the homeowner's or office worker's window, the distance is much closer than 50 feet, and the sound level is therefore greater than that at 50 feet.[29]

T3: Switch Lawn and Garden Equipment to Electric

Quantitative
This measure is projected to provide co-pollutant emissions reductions, as shown in **Table 25**, based on the US EPA's NEI. See **Appendix E** for the methodology used to quantify co-pollutant GHG emissions reductions.

Table 25: Projected Annual Co-Pollutant Emissions Reduction - Switch Lawn and Garden Equipment to Electric

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
NH_3 (lbs)	844	2,559
CO (lbs)	13,247,487	40,143,899
NO_x (lbs)	168,067	509,295
$PM_{2.5}$ (lbs)	58,885	178,440
PM_{10} (lbs)	54,346	164,686
SO_2 (lbs)	380	1,151
VOCs (lbs)	809,849	2,454,088

Source: EPA NEI

Disbenefits
Three disbenefits were identified: 1) the cost of electric equipment, 2) the functionality/operability of electric equipment, and 3) concerns over the disposal of lithium batteries.

One of the primary challenges of the switch to electric equipment is the initial investment required for electric blowers. These devices, although increasingly efficient and eco-friendly, can be significantly more expensive upfront compared to their gas-powered counterparts.[30] This cost factor poses a substantial hurdle for many municipalities and business owners. This disbenefit, however, can be addressed by partial subsidizing of the equipment cost.
There are also operational constraints. As noted in one article, the practicality of using electric blowers in a professional setting raises concerns. "Electric blowers, depending on their design and battery life, may not always match the power and endurance of gas blowers. This can affect the efficiency and productivity of landscaping work, as electric blowers might need frequent recharging or battery replacements throughout the day. Such operational constraints could potentially increase the time and labor required to complete landscaping tasks".[31] In addition, another operational constraint is the lack of repair availability for electric equipment, which may result in more expensive repairs or the inability to repair.

One final disbenefit is concerns over the disposal of lithium batteries where a community does not have the proper waste infrastructure.

Benefits for Low-income Communities
Switching to electric leaf blowers and other maintenance equipment may have the most positive impacts for the region's low-income populations as these populations may account for the largest share of maintenance workers, both in private companies and at the municipal level.

T4: Convert Light-Duty Municipal Fleets to Electric Vehicles/Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures

Measure Description

This measure will encourage municipalities to convert their light-duty fleets to EVs/hybrids and encourage the conversion of municipality-owned and privately owned school buses to electric. As an interim measure, these buses could be switched to renewable diesel (R-99), propane, and/or CNG. Strategies to achieve this measure include:

- Promoting and educating municipalities and private school bus operators on the benefits of EVs;
- Sharing resources with municipalities and private school bus operations relating to EVs;
- Working with municipalities to develop grant applications to secure funding for EVs; and
- Regional service agreements to purchase alternative fuels (such for existing fleets).

By encouraging switching of the region's school buses to EVs and/or R-99, propane, or CNG, this measure builds off Connecticut's Public Act 22-25: An Act Concerning the Connecticut Clear Air Act, which mandates that:

> (b) Except as provided in subsection (c) of this section, (1) on and after January 1, 2035, **one hundred per cent** of the school buses that provide transportation for all school districts in the state shall be **zero-emission school buses or alternative fuel school buses**, and (2) on and after January 1, 2040, one hundred per cent of the school buses that provide transportation for all school districts in the state shall be zero-emission school buses.
>
> (c) On and after January 1, 2030, one hundred per cent of the school buses that provide transportation for school districts entirely within an environmental justice community as of July 1, 2022, or in an area that encompasses at least one environmental justice community as of July 1, 2022, shall be zero-emission school buses.

The region already has a few successful examples of electric or CNG fleets. RVT, the transit operator in the RiverCOG area, has two battery-powered electric buses. The City of Hartford has 12 CNG garbage trucks. In total, as of 2024, the State had 50 electric buses.[32] Moreover, there are examples of school districts in the State becoming fully electric. While not in the region, Branford public schools have recently signed a contract for all electric buses.[33]

Expected Geographic Location

Regionwide

Implementation Authority and Responsibilities

CRCOG and RiverCOG do not have the statutory or regulatory authority to implement the measure. The Connecticut legislature has enacted a statewide mandate to electrify school buses through Public Act No. 22-25 by the year 2040. School districts are key to this effort and should prioritize school bus electrification in their bidding documents when hiring a new provider. Municipalities, with support of COGs, should continue to seek grant funding to aid in the replacement of equipment with EV alternatives as appropriate. Transit authorities should partner with COGs and

T4: Convert Light-Duty Municipal Fleets to Electric Vehicles/Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures

the CT DOT to transition their fleets toward electrification. CT DEEP is paramount to implementing this act.

Public Act No. 22-25 (discussed above) offers a series of interim steps, which help provide flexibility for fleet providers through 2035. These steps help ease the transition away from traditional fossil fuels and towards electrification and include the expanded use of alternative fuels, such as renewable diesel (R99) and renewable CNG. R-99 is a drop-in-ready substitute for conventional petroleum diesel that is made from organic waste materials and can power current diesel equipment, and CNG or biogas is a fuel that is currently collected within the State through anerobic digestion of organic waste material. As the region moves toward full electrification, expanding access to R99 and CNG to fuel existing vehicles is a key strategy that addresses the pollution of conventional fuels. School districts and COGs can help increase supply by mandating the use of these fuels in their bidding documents (such as RFPs) and shared service agreements.

Implementation Timeline and Milestones

2025-2029

Implementation Begins
40% Progress

- Promoting and educating municipalities and private school bus operators on the benefits of EVs;
- Sharing resources with municipalities and private school bus operations relating to EVs; and
- Working with municipalities to develop grant applications to secure funding for EVs.

2030-2039

Measure Complete
100% Progress

- Strategies underway continue

T4: Convert Light-Duty Municipal Fleets to Electric Vehicles/Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures

Metrics for Tracking Progress
Progress will be measured at the municipality level by examining the fleet changes for each municipality. In addition, the school bus fleet composition of private operators can be measured to determine progress.

Quantifiable GHG Emissions Reductions
Based on analysis of fleet vehicle usage data from the Town of Manchester and extrapolation to the CRCOG and RiverCOG region, this measure is projected to reduce GHG emissions by 0.01 $MMTCO_2e$ by 2030 and 0.04 $MMTCO_2e$ by 2050, as shown below in **Table 26** and **Figure 27**. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

Measure Costs
Because this GHG reduction measure comprises strategies that range from small capital projects to large capital projects, the cost associated with this measure is $$ - $$$.

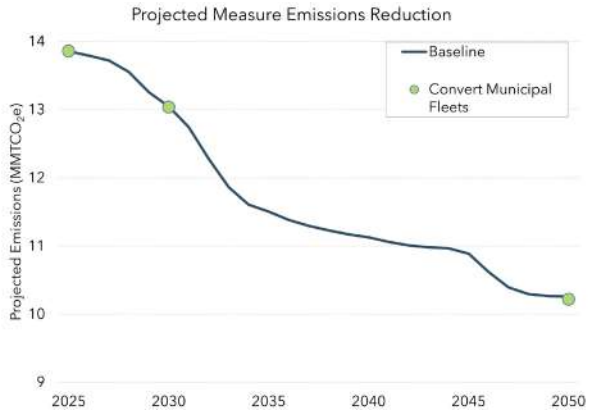
Intersection with Other Funding Available
This section provides a partial list of potential funding sources to support this measure, as noted in **Table 27**. The following list includes examples of Federal and State funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list below is a snapshot for the time of writing.

Table 26: Projected Annual GHG Emissions Reduction - Convert Municipal Fleets

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.01	0.04

Source: Dewberry calculation

Figure 27: Projected Annual GHG Emissions Reduction - Convert Municipal Fleets



T4: Convert Light-Duty Municipal Fleets to Electric Vehicles/Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures

Table 27: Potential Funding Sources - Convert Light-Duty Municipal Fleets to Electric Vehicles (EVs)/ Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Diesel Emissions Reduction Act (DERA) Tribal and Territory Grants	Program for eligible applicants in an effort to incentivize and accelerate the upgrading or retirement of the nation's legacy diesel engine fleet.	US EPA	Native/tribal entities, eligible US territories
2	Clean Heavy-Duty Vehicles Grant Program	Program funds the replacement of existing internal combustion engine heavy-duty vehicles with zero-emission vehicles.	US EPA	States, municipalities, public school districts, Indian Tribes, nonprofit school transportation associations
3	Clean School Bus Grant Program	Funds the replacement of existing school buses with zero-emission and clean school buses.	US EPA	Local or state governments; tribes; eligible contractors
4	Clean School Bus Rebate Program	Funds the replacement of existing school buses with zero-emission and clean school buses.	US EPA	Local or state governments; tribes; eligible contractors
5	Grants for Buses and Bus Facilities Competitive Program (Bus Program)	The Bus Program funds capital projects to purchase, lease, or rehabilitate buses and related equipment; and acquire, construct, lease, or rehabilitate bus-related facilities.	US DOT	States, local government entities, tribes
6	Low or No Emission Grant Program (Low-No)	For the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities.	US DOT	State, COGs, municipalities, native/tribal entities

T4: Convert Light-Duty Municipal Fleets to Electric Vehicles/Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures

Benefits Analysis

Qualitative

Benefits associated with encouraging a move to EVs for light-duty municipal vehicles and EV school buses include a lessening of air pollutant emissions, noise reduction, and a decrease in operational costs.

Electrification has the potential to reduce air pollutant emissions from the demand sector, which may, in turn, result in long-term public health outcomes.[34] Air quality will improve due to a decrease in air pollutants and in turn improve public health. A reduction in chronic conditions such as asthma may be observed. Noise reduction may result from fleet electrification, as electrical equipment operates more quietly than machinery relying on internal combustion engines, which may ultimately improve quality of life for residents in nearby communities.

Fleet electrification may result in a considerable decrease in operational costs. EVs typically have lower fuel and maintenance costs than internal combustion engine-powered vehicles. According to the Electrification Coalition, the cost savings related to operations and maintenance are so significant that the EVs are actually the more cost-effective option.[35]

Quantitative

Based on analysis of fleet vehicle usage data from the Town of Manchester and extrapolation to the CRCOG and RiverCOG region, this measure is projected to provide co-pollutant emissions reductions, as shown in **Table 28**. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Table 28: Projected Annual Co-Pollutant Emissions Reduction - Convert Municipal Fleets

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
SO_2 (lbs)	706	2,822
NO_x (lbs)	11,994	47,976
CO (lbs)	52,914	211,657
VOCs (lbs)	11,994	47,976
$PM_{2.5}$ (lbs)	11,288	45,153
PM_{10} (lbs)	1,411	5,644

Source: Dewberry calculation

Disbenefits

Disbenefits associated with the electrification of light-duty fleets and school buses include the high initial purchase costs and costs associated with the need for EV charging infrastructure.[36]

For example, in 2022, Pittsburgh Regional Transit (PRT) began a fleet transition that aims to operate entirely on zero-emission electric buses by 2045. Over the 20-year timeline, PRT expects to spend $1 billion on the transition, as the average cost of a 40-foot electric bus is about $950,000, 60 percent higher than that of diesel buses.[37]

T4: Convert Light-Duty Municipal Fleets to Electric Vehicles/Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets or Renewable Diesel (R-99), Propane, and/or Compressed Natural Gas as Interim Measures

Facility upgrades necessary to facilitate electric bus charging are variable based on what the grid can supply and can be expensive, potentially adding an additional financial constraint. Similar to the constraint for electrifying municipal equipment, the limited workforce trained to repair an electrified fleet may result in additional barriers to successful implementation. However, these disbenefits can be overcome with financial planning for the requirements of an electric fleet as well as investment into workforce training.

Benefits to Low-income Communities
Transportation electrification can result in an up to 60-80 percent reduction in the emission of air pollutants like NO_X and $PM_{2.5}$, which may ultimately help reduce chronic conditions like asthma and cardiovascular disease, which are observed at higher rates in urban low-income communities. These benefits can be observed in the calculations highlighted in **Table 28**, above.

Figure 26: River Valley Transit electric bus in the City of Middletown.

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

Measure Description
This measure aims to divert 23 percent of the region's food and organic waste by 2030 by expanding and supporting food diversion efforts that are currently underway while developing new programs and services across the region. Strategies to do this include:

- Expanding food composting programs to include all State university system, public and private school/university, residential curbside, and multi-family dwelling locations;
- Expanding or developing food rescue/food banks/food tables in schools, community and senior centers, and commercial businesses;
- Initiating a composting public education program;
- Recycling of textiles and construction debris;
- Increasing the use of fully operational anaerobic digestors in the region by converting unused calories into biogas; and
- Supporting food scrap collection infrastructure to encourage the use of operational anaerobic digestors in the region.

Expected Geographic Location
Regionwide

Implementation Authority and Responsibilities
CRCOG and RiverCOG do not have the statutory or regulatory authority to implement the measure. The State has the authority to make legislative advances in waste reduction and diversion, supporting and mandating municipalities and private entities in making improvements to their current methods of waste disposal. Statewide mandates that divert organic waste, and compel institutions to participate, are key to collecting and repurposing the region's organic waste materials. These efforts should be expanded to include smaller organizations and help fund municipal efforts. A statewide vision for waste in general, but specifically for organics diversion, is key. Dedicated leadership,

ReCONNstruction Center

Founded in 2003, the ReCONNstruction Center, a federally recognized 501(c)(3) non-profit "Green Charitable" organization centrally located in New Britain, Connecticut disposes of approximately 2.2 million tons per year of municipal solid waste (MSW), with a significant tonnage of that MSW being construction and demolition (C&D) waste. In the State, over 1.5M tons of bulky waste/construction and demolition materials were collected and disposed of, while only approximately 43,000 tons were recovered for recycling.

Since 2016, the ReCONNstruction Center has diverted over 343 tons of bulky waste items from the municipal solid waste stream and provided sustainable, low-cost opportunities for the public to purchase items at an affordable price. The ReCONNstruction Center's building material reuse program has also allowed residents and others in economically disadvantaged communities and those with limited income access to working appliances and other items which may not have been affordable otherwise.

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

consistent funding, and streamlined permitting are current obstacles to the development of waste management infrastructure—including the timely siting of new organic waste facilities.
Fortunately, the State is making progress towards this vision. Connecticut's food waste diversion law:

> requires certain facilities that generate a large amount of organic material to (1) separate the material from other solid waste and (2) have it recycled at an authorized source separated organic material composting facility, such as an anaerobic digester that can convert food waste to energy.[. . .] By March 1, 2025, the entities subject to the law's requirements generally must begin electronically submitting to the Department of Energy and Environmental Protection (DEEP) an annual summary of its amount of (1) donated edible food and (2) food scraps recycled, and the organics recyclers and associated collectors used.[38]

While not signed into law at time of drafting this report, there is further legislative interest in managing solid waste in the State as evidenced by H.B. Number 6917. Public Act (PA) 25-174 and Section 12 of Public Act Number 25-49 are further evidence of this and were signed into law in June 2025.

- **HB No. 6917** provides funding for enforcement concerning certain food waste diversion requirements, study[ing] the need and viability of extended producer responsibility programs for consumer packaging, provide[ing] for increased food waste diversion from certain entities, create[ing] source funding for food waste diversion infrastructure projects and authorize[ing] municipal and regional waste coordinators.[39]
- **PA No. 25-124** includes $15 million for renovations, expansion, and equipment for solid waste facilities.[40]
- **PA No. 25-49 (Section 12)** increases the grant amount each COG can receive that could be used to fund a regional municipal solid waste and recycling coordinator.[41]

Coordination with private haulers or commercial food waste recycling facilities could be a challenging, but effective way to reduce organic waste. Public education and outreach are paramount to affecting local behavioral change. Partnerships with regional nonprofits, such as Sustainable CT, and with regulatory support of CT DEEP, municipalities can implement reduction measures, such as unit-based-pricing, and diversion programs, such as organic waste collection. Getting food scraps from residents' kitchen counters to the organic waste streams has proven difficult but represents a promising opportunity to significantly reduce emissions.

While the COGs can help municipalities negotiate with private haulers through shared service agreements, the formation of inter-municipal organizations, such as regional waste authorities, would create a dedicated institution to help reduce costs, expand access, and implement innovations.

Increasing the demand for the final products of organic waste – biogas and local compost – is a factor that should be explored further Connecticut currently has two Anaerobic Digestion (AD) facilities that convert biogas to energy. Biogas produced by Quantum Organics' AD facility is converted to electricity, which is sold to

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

the Town of Southington under a 20-year power purchase agreement. Quantum Organics has been operating since 2016 and also produces organic soils and compost. Fort Hill Ag-Grid (FHAG), a special purpose company formed from Fort Hill Farm and Ag-Grid Energy, own and operate a farm anaerobic digester and combined heat and power (CHP) system. Their systems have been operational since 2021.

Municipalities, supported by the COGs, and regional waste authorities should collaborate in expanding market demand, up-cycling material, and connecting with end consumers (such as gas utilities for biogas and local farmers for compost).

Implementation Timeline and Milestones

2025-2029

Implementation Begins
90% Progress

- Expanding or developing food rescue/food banks/food tables in schools, community and senior centers, and commercial businesses
- Expanding food composting programs to include all State university system, public and private school/university, residential curbside, and multi-family dwelling locations
- Initiating a composting public education program
- Increasing the use of fully operational anaerobic digestors in the region by converting unused calories into biogas
- Supporting food scrap collection infrastructure to encourage the use of operational anaerobic digestors in the region
- Supporting textile recycling and construction debris recycling

2030-2039

Measure Complete
100% Progress

Food rescue/diversion is considered in the US EPA's Food Recovery and Hierarchy a higher use value than composting and thus is an ideal place to start progress on this GHG reduction measure. This work could build off successful initiatives in the region, such as the Magic Food Bus (link: Magic Food Bus – MxCC Foundation) at Middlesex Community College, which has served about 1,848 students, aided 5,909 household members, and distributed 30,523 units of food from 2016 - 2021.

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

Metrics for Tracking Progress

Progress will be measured at the municipality level by examining the growth of food diversion efforts. The amount of food waste by weight diverted by each municipality can also provide insight into the progress of this measure.

Quantifiable GHG Emissions Reductions

Based on Connecticut waste data and the EPA's Waste Reduction Model (WARM), this measure is projected to reduce GHG emissions by 0.14 $MMTCO_2e$ by 2030 and 0.21 $MMTCO_2e$ by 2050, as shown below in **Table 29** and **Figure 28**. See **Appendix E** for the methodology used to quantify GHG emissions reductions.

Measure Costs

Because this GHG reduction measure is composed of strategies that range from small programmatic work (expanding existing food diversion programs and expanding or establishing new compost programs) to large capital projects (developing new anaerobic digestors), the cost associated with this measure is $$ - $$$.

Intersection with Other Funding Available

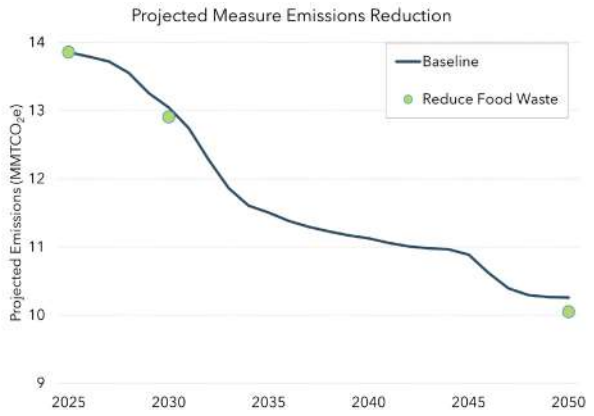
This section provides a partial list of potential funding sources for implementing this measure, as noted in **Table 30**. The following list includes some federal and state funding sources – local and philanthropic funds are another potential source not included here. It must also be emphasized that funding can be highly cyclical in nature, dependent on the legislative appropriations process, which itself is downstream of shifting political priorities. Therefore, the list is a snapshot captured at the time of writing.

Table 29: Projected Annual GHG Emissions Reduction - Reduce Food Waste

PROJECTED ANNUAL GHG EMISSIONS REDUCTION ($MMTCO_2E$)	
2030	2050
0.14	0.21

Source: EPA WARM

Figure 28: Projected Annual GHG Emissions Reduction - Reduce Food Waste



W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

Table 30: Potential Funding Sources - Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
1	Waste Analysis and Strategies for Transportation End-Topic 1: Feasibility Study Development	Funding to aid communities with resource and energy recovery strategies associated with their organic waste streams.	US DOE	States, COGs, municipalities, native/ tribal entities, nonprofits, for-profits, educational institutions, MPOs
2	Waste Analysis and Strategies for Transportation End-Topic 2/ Phase 1: Design Work and Experimental Validation	Funding to aid communities with resource and energy recovery strategies associated with their organic waste streams.	US DOE	States, COGs, municipalities, native/ tribal entities, nonprofits, for-profits, educational institutions, MPOs
3	Waste Analysis and Strategies for Transportation End- Topic 2/ Phase 2: Final Design	Funding to aid communities with resource and energy recovery strategies associated with their organic waste streams.	US DOE	States, COGs, municipalities, native/tribal entities, nonprofits, for-profits, educational institutions, MPOs
4	Food System Capacity Building Grant	Grant provides funds to organizations/groups involved in food system policy or creating innovative, localized, programming in their respective communities to increase food access and address food insecurity.	USDA/CT DOAG	For-profits, community-based organizations
5	Sustainable Materials Management Grant Program	Funding to help initiate and scale up unit-based pricing and/ or food scraps collection program	CT DEEP	Municipalities, regional waste authorities
6	Regional Waste Authority Grant Program	Funds to help municipalities and regional waste authorities evaluate interest and identify governance to form new or expand existing Regional Waste authorities.	CT DEEP	COGs, municipalities, regional waste authorities
7	Regional Food System Partnership (Planning and Design)	Supports partnerships that connect public and private resources to plan and develop local or regional food systems.	USDA	COGs, municipalities, native/ tribal entities, nonprofits, for-profits, community-based organizations
8	Regional Food System Partnership (Implementation and Expansion)	Supports partnerships that connect public and private resources to plan and develop local or regional food systems.	USDA	COGs, municipalities, native/ tribal entities, nonprofits, for-profits, community-based organizations

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
9	Farmers Market Promotion Program: Type 1 (Capacity Building)	Supports the development of long-term organizational capacity of direct producer-to-consumer markets and improve and expand existing markets.	USDA	COGs, municipalities, native/tribal entities, nonprofits, for-profits, community-based organizations
10	Climate Smart Agriculture Grant (Tier 1)	Funding to implement, support, or expand climate smart agricultural practices related to on-farm energy (energy efficiency and renewable energy) and/or soil health equipment and practices.	CT DOAG	Municipalities, nonprofits, for-profits
11	Climate Smart Agriculture Grant (Tier 2)	Funding to implement, support, or expand climate smart agricultural practices related to on-farm energy (energy efficiency and renewable energy) and/or soil health equipment and practices.	CT DOAG	Municipalities, nonprofits, for-profits
12	Farmers Market Promotion Program: Type 2 (Community Development Training and Technical Assistance (CTA))	Supports outreach, training and technical assistance to farm and ranch operations serving local markets.	USDA	COGs, municipalities, native/tribal entities, nonprofits, community-based organizations
13	Farmers Market Promotion Program: Type 3 (Turnkey Marketing and Promotion)	Supports marketing and promotion activities.	USDA	COGs, municipalities, native/tribal entities, nonprofits, community-based organizations
14	Farmers Market Promotion Program: Type 4 (Turnkey Recruitment and Training)	Supports vendor and producer recruitment and training activities.	USDA	COGs, municipalities, native/tribal entities, nonprofits, community-based organizations
15	Value-Added Producer Grants	Assists in starting or expanding value-added activities related to the processing and/or marketing of Value-Added Agricultural Products.	USDA	For-profits
16	Urban Agriculture and Innovative Production Competitive Grants Program	Supports the development of urban agriculture and innovative production.	USDA	States, COGs, municipalities, native/tribal entities, nonprofits, educational institutions
17	Local Food Promotion Program: Type 1 (Planning)	Supports the planning stages of a food business that supports the development, coordination or expansion of local and regional food system.	USDA	COGs, municipalities, native/tribal entities, nonprofits, for-profits, community-based organizations

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

#	GRANT NAME	DESCRIPTION OF GRANT FUNDING	FUNDING AGENCY	ELIGIBLE APPLICANT(S)
18	Local Food Promotion Program: Type 2 (Implementation)	To establish, improve, or expand a new or existing local and regional food business enterprise that benefits the local and regional food system.	USDA	COGs, municipalities, native/ tribal entities, nonprofits, for-profits, community-based organizations
19	Local Food Promotion Program: Type 3 (Turnkey Marketing and Promotion)	Supports marketing and promotion activities.	USDA	COGs, municipalities, native/ tribal entities, nonprofits, for-profits, community-based organizations
20	Local Food Promotion Program: Type 4 (Turnkey Recruitment and Training)	Supports vendor and producer recruitment and training activities.	USDA	COGs, municipalities, native/ tribal entities, nonprofits, for-profits, community-based organizations
21	Solid Waste Infrastructure for Recycling Grant Program (SWIFR)	The Solid Waste Infrastructure for Recycling program provides grants to implement the National Recycling Strategy to improve post-consumer materials management and infrastructure; support improvements to local post-consumer materials management and recycling programs; and assist local waste management authorities in making improvements to local waste management systems.	US EPA	States, COGs, municipalities, tribes, other political subdivisions
22	Consumer Recycling Education and Outreach Grant Program (REO)	The programs seeks to fund projects that will: 1) Decrease wasted food from households; 2) Expand markets for and sales of compost; and 3) Inform the public about new or existing residential food waste composting programs; provide information about the materials that are accepted as part of a residential food waste composting program; and increase collection rates and decrease physical contamination in residential food waste composting programs.	US EPA	Coalitions led by a state, units of local government (COGs, municipalities), Tribes, nonprofit organization; public-private partnerships
23	Sustainable Materials Management Grant Program (Round 2)	This program seeks to fund waste reduction and/ or diversion initiatives spanning programmatic, operational, and technical assistance	CT DEEP	CT municipalities, COGs, RPAs, regional waste authorities

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

Benefits Analysis

Qualitative

One benefit associated with this measure includes renewable energy production via anaerobic digestion.[42] Anaerobic digestors can also be used to produce water, which can be applied to urban agricultural practices and to produce air conditioning through absorption cooling, a process that leverages a combination of water and chemicals to create a cooling effect. Anaerobic digestate (byproduct of anaerobic digestion) can be leveraged in agriculture as a nutrient-rich fertilizer (compost), reducing the need for chemical fertilizers and thus reducing related environmental harm and adverse public health impacts.[43] Biofuel, a byproduct of anaerobic digestion, can also be sold and used locally, which may provide cost savings.

In addition, composting reduces the municipal waste load, potentially allowing for a smaller waste fleet and fewer vehicle miles traveled (VMT) from waste vehicles. In turn, this change may result in improved air quality for neighborhoods. A smaller waste load could also translate to lower municipal tipping costs and potentially lower costs for waste disposal for residents.

Widespread support for the implementation of regional anaerobic digestors has already been observed in the Southeastern Connecticut Council of Governments (SECOG) by the Southeastern Connecticut Regional Resources Recovery Authority, Gales Ferry, CT.

Quantitative

Accounting only for avoided landfill emissions of the waste reduced, this measure is projected to provide co-pollutant emissions reductions, as shown in **Table 31**. See **Appendix E** for the methodology used to quantify co-pollutant emissions reductions.

Table 31: Projected Annual Co-Pollutant Emissions Reduction - Reduce Food Waste

PROJECTED ANNUAL CO-POLLUTANT EMISSIONS REDUCTION		
Co-Pollutant	2030	2050
CO (lb)	1,164	1,567
VOCs (lb)	9,896	13,322

Source: Dewberry calculation

W1: Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

Figure 29: Fresh produce at the Chester Sunday Market.

Disbenefits
While the use of anaerobic digestors is positive for the region, some disbenefits associated with increased anaerobic digestor use include high initial costs and siting opposition should additional digestors be needed. However, it should be noted that the State supports the use of anaerobic digestors, which may help manage siting concerns.[44]

Disbenefits associated with compost can include the public perception that compost will increase local rodent populations. However, curbside composting is underway in many US cities and internationally with minimal additional rodent issues. This disbenefit can be lowered or eliminated through rodent-proof bins and a public education program, as well as public education campaigns to increase positive public perception and dispel this notion.

Benefits to Low-income Communities
This measure may provide benefits to the region's low-income population through increased available green jobs associated with anaerobic digestors and increased food composting programs. In addition, through anaerobic digestion, this measure produces local energy, which may improve local energy security. Food diversion programs such as the Magic Food Bus, a mobile food pantry for students and staff at the region's Middlesex Community College, are also integral in helping low-income populations with food security.

WORKFORCE PLANNING ANALYSIS

The implementation of the GHG emission reduction measures identified in this plan will require a range of workers, from entry-level workers to those requiring advanced training. Connecticut is fortunate to have already begun work on identifying critical workforce needs for the green energy sector and related emission-reduction initiatives. Sections below detail some of these preexisting initiatives from the Connecticut Department of Labor (CTDOL).

Recent reports indicate positive signs for the State's clean energy sector. The 2024 Connecticut Clean Energy Industry Report, a state-level subset of the US Energy Department's US Energy and Employment Report (USEER), noted significant growth in the State's clean energy workforce, outpacing overall employment growth and reversing previous trends of slower regional progress in the Northeast. The report noted that Connecticut's clean energy employment grew by 3.9 percent between 2022 and 2023, adding over 1,700 jobs and reaching nearly 46,000 total jobs. Over this period, clean energy job growth was nearly three percentage points higher than from 2021 to 2022, outpacing the state's overall employment growth of 1.4 percent.

The Hartford-West Hartford-East Hartford Labor Market Area (LMA) is largely coterminous with the CPRG planning area. The LMA consists of 54 municipalities, as shown in **Figure 30** below.

Figure 30: Connecticut Labor Market Areas

Source: Connecticut Department of Labor

Figure 31: A demonstration at a technical manufacturing facility in Durham.

Figure 32: Workers at the All American Materials Recovery Facility (MRF) in Berlin.

Key Industries and Priority Occupations

In 2020, the CT DOL's Office of Workforce Competitiveness published a dataset outlining opportunities in the State's green technology sector. These data, colloquially referred to as the "Connecticut Green Jobs Career Lattices", were intended to link employers in the green jobs sector with technical education and career schools and institutions of higher education to foster coordination and grow the workforce in the green technology sector.

The dataset covers nine sectors that directly or indirectly include many of the workforce sectors necessary to implement the CCAP measures, including:

- Agricultural and Forestry
- Energy Efficiency and Storage
- Environmental Protection and Waste Reduction
- Government and Regulatory Administration
- Green Construction
- Manufacturing
- Renewable Energy Generation
- Research, Design, Consulting, and Support Services
- Transportation

Within these broad sectors, a subset of over 130 occupations were identified, ranging from entry-level positions to those requiring advanced training. For this CCAP workforce analysis, selected occupations from the Green Jobs Career Lattice were then identified, specifically focusing on the particular measures in this CCAP. The occupations are listed in **Table 32** below.

Table 32: CCAP Measures and Workforce Needs

#	MEASURE	WORKFORCE NEED
1	Increase Urban Tree Canopy in Municipalities Across the Region	• Foresters • Tree Fellers • Laborers – Crops, Nursery, and Greenhouse
2	Support an Increase in Solar Projects in the Region, Creating 900 Megawatts Across the Region	• Electrical Engineers • Solar Photovoltaic Installers • Construction Managers • General and Operations Managers
3	Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by Five Percent	• HVAC Mechanics and Installers • Electricians • Insulation Workers • General and Operations Managers • Sales Representatives
4	Install Public Electric Vehicle (EV) Charging Stations	• Electrical Engineers • Electricians • Construction Laborers • Construction Managers • Civil Engineers
5	Pursue 1-2 Percent Mode Shift Away from Single-Occupancy Vehicles (SOV)	• Civil Engineers • Construction Laborers • Construction Managers • Transportation Planners • Transportation Engineers
6	Switch Lawn and Garden Equipment to Electric	• General and Operations Managers • Landscapers
7	Convert Light-Duty Municipal Fleets to Electric Vehicles (EVs)/ Hybrids; Encourage Switching of Municipality-Owned and Privately Owned School Buses to Electric Fleets, Renewable Diesel (R-99), and/or Compressed Natural Gas (CNG)	• Automobile Mechanics • General and Operations Managers
8	Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion	• General and Operations Managers • Agricultural Laborers • Environmental Science and Protection Technicians • Environmental Scientists and Specialists • Construction Laborers • Construction Managers

Figure 33: Construction workers building a roundabout in New Britain.

In addition to the measures identified above, the CT DOL and Connecticut Green Bank also identified 10 general occupations that are likely to be critical for implementing clean energy and emission reduction projects.[45] These occupations include:

1. Heating, Air Conditioning, Refrigeration Mechanics, and Installers
2. General and Operations Managers
3. Construction Managers
4. Bookkeeping, Accounting, and Auditing Clerks
5. Engineers
6. Sales Representatives
7. Construction Laborers
8. Electricians
9. Insulation Workers, Floor, Ceiling, and Wall
10. Solar Photovoltaic Installers

Future clean energy technologies are difficult to predict, making projections challenging. However, the 10 "CT Green Bank Career Profiles" listed above represent a likely cross-section of the varied skills and tasks needed among the workforce to successfully implement the identified CCAP measures.

Workforce Supply and Projections

Table 34 on the following page details the current and projected employment for the selected occupations relevant to CCAP measures. The data include the occupations listed in the Green Jobs Career Lattices as well as the CT DOL's projections through 2030. Every two years, the CT DOL's Office of Research economists create 10-year industry employment forecasts, examining historical trends and other organizations' forecasts to help project Connecticut's employment changes. The CT DOL is careful to emphasize that the occupational employment projections are meant to provide a broad view of future employment conditions, showing job growth and decline in various occupations over the entire decade. The forecasts do not intend to imply a smooth trend between the start and end of a given period.

Table 33: 10-Year Industry Employment Forecast

CT CAREER LADDER	OCCUPATION	STANDARD OCCUPATIONAL CLASSIFICATION CODE	BASE EMPLOYMENT 2020	PROJECTED EMPLOYMENT 2030	ANNUAL CHANGE	ANNUAL EXITS	ANNUAL TRANSFERS	ANNUAL TOTAL OPENINGS	CT LQ* (2024 USDOL BLS DATA)
Agriculture and Forestry	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	45-2092	738	946	21	36	96	153	0.19
	Foresters* (Statewide Data 2022, 2032)	19-1032	52	54	-	1	3	4	0.75
	General and Operations Managers	11-1021	10,763	11,974	121	227	705	1,053	1.2
Energy Efficiency and Storage	Engineers, All Other	17-2199	285	315	3	6	12	21	0.98
	General and Operations Managers	11-1021	10,763	11,974	121	227	705	1,053	1.2
	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	49-9021	2,009	2,249	24	55	145	224	1.03
Environmental Protection and Waste Reduction	Construction Managers	11-9021	1,379	1,697	32	32	78	142	0.73
	Environmental Science and Protection Technicians, Including Health	19-4042	56	64	1	2	6	9	0.27
Government and Regulatory Administration	Urban and Regional Planners	19-3051	65	73	1	1	5	7	0.82
Green Construction	Civil Engineers	17-2051	941	1,048	11	20	50	81	1.07
	Construction Laborers	47-2061	2,568	3,052	48	83	190	321	0.73
	Electrical Engineers	17-2071	575	628	5	14	24	43	1.42
	Electricians	47-2111	2,732	3,216	48	86	218	352	0.93
	Engineers, All Other	17-2199	285	315	3	6	12	21	0.98
	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	49-9021	2,009	2,249	24	55	145	224	1.03
Manufacturing	Engineers, All Other	17-2199	285	315	3	6	12	21	0.98
	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	41-4012	4,564	4,931	37	140	321	498	0.94
Renewable Energy	Civil Engineers	17-2051	941	1,048	11	20	50	81	1.07
	Electrical Engineers	17-2071	575	628	5	14	24	43	1.42
	Engineers, All Other	17-2199	285	315	3	6	12	21	0.98
	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	41-4012	4,564	4,931	37	140	321	498	0.94
	Solar Photovoltaic Installers* (Statewide Data 2022, 2032)	47-2231	185	261	8	5	15	28	N/A
Research, Design, Consulting, and Support Services	Urban and Regional Planners	19-3051	65	73	1	1	5	7	0.82
Transportation	Automotive Service Technicians and Mechanics	49-3023	2,667	2,785	12	81	185	278	0.88
	Civil Engineers	17-2051	941	1,048	11	20	50	81	1.07
Total	Total, All Occupations* (Does not include Foresters, Solar Photovoltaic Installers)	00-0000	564,637	627,204	6,257	24,322	37,681	68,260	N/A

Source: CRCOG analysis of CT DOL occupational projections

Potential Workforce Shortages and Challenges

Potential workforce shortages were identified through a location quotient analysis as shown in the last column of **Table 33** above. The analysis uses all of Connecticut, instead of a smaller geographic area, due to better availability of published data as well as the fact that the designated geographic areas that contain CRCOG and RiverCOG are different in data published by the CTDOL and United States Department of Labor (USDOL). As a proportion of total employment, key occupational categories in Connecticut generally track or appear slightly below national trends. Modest growth targets in these categories, both in real and proportional terms, would close the gap.

As shown by the location quotients significantly less than one, there is a concerning shortage of the following:

- Construction laborers and managers
- Farm and agricultural workers
- Foresters
- Environmental technicians

Although not included in the location quotient analysis due to data incompleteness, *tree fellers* (trained and specialized arborists who cut down trees) and *solar photovoltaic installers* are also foreseen to be in greater demand.

Additionally, significant numbers of automotive mechanics, electricians, and salespersons for technological equipment and services are also needed, although their rates of employment in Connecticut are similar to national trends.

Potential Actions, Solutions, and Key Partners

A combination of on-the-job training, internships, apprenticeships, and formal degree programs are necessary to train the workforce needed for CCAP implementation. This section will touch upon two important pieces – apprenticeships for skilled blue-collar occupations and higher education programs for positions requiring advanced education.

Figure 34: Construction workers repairing a segment of Route 85.

Apprenticeships

The State of Connecticut plays a key role in developing the future workforce, including apprenticeships for skilled blue-collar occupations. Apprenticeships are administered by the CTDOL Office of Apprenticeship Training. Skilled consultants provide technical assistance, monitoring, and consulting services to qualified employers willing to take on the responsibilities and obligations of program sponsorship. The CTDOL is the State's only federally authorized entity for Registered Apprenticeship Programs and currently works with more than 1,800 businesses that employ approximately 7,000 Registered Apprentices. Many of the various apprenticeship programs would likely be key pipelines for occupations critical for implementing the CCAP measures.

A featured apprenticeship opportunity of particular relevance to many CCAP measures pertaining to electrification is the Hartford Electricians Joint Apprenticeship and Training Committee. Other apprenticeships include carpentry, photovoltaic electrician, heating-cooling mechanic, pump servicer and installer, and solar mechanic apprenticeships, to name a few.

Figure 35: A worker at Whelen Engineering in Chester.

Other existing programs and initiatives of note include:

- **Connecticut Building Trades Training Institute (BTTI):** Founded by the Connecticut State Building Trades Council in 2022, the Connecticut Building Trades Training Institute (BTTI) is a construction readiness program that will prepare residents interested in applying for and/or entering a registered union apprenticeship, especially those from historically marginalized populations such as people of color, women, and opportunity youth. BTTI offers training in generalized apprenticeship readiness, a "Women Can Weld" course, and training in drywall finishing.
- **Connecticut Technical Education and Career System (CTECS):** CTECS is a leading Career Technical Education (CTE) provider in the State, operating 17 diploma-granting technical high schools, one technical education center, and two airframe mechanic and aircraft maintenance programs. The school system provides a direct employment pipeline for high school students and adult learners and serves approximately 11,200 full-time high school students, offering 31 career technical education programs. CTECS apprenticeship programs specifically relating to CCAP workforce development needs include training in electrical, heating/cooling, plumbing, and sheet metal trades.

Higher Education - University of Connecticut and Connecticut State Colleges and Universities

While a comprehensive inventory and analysis of Connecticut's higher education sector is beyond the scope of this section, a few critical programs are noted. Worth highlighting is the role of Connecticut State Colleges and Universities (CSCU) and the University of Connecticut (UConn) system.

CSCU consists of six public colleges and universities – four state universities, Connecticut State Community College (with 12 campuses), and Charter Oak State College (online). CSCU enrolls roughly 85,000 students. Between 2012-2023 and 2023-2024, the CSCU system conferred roughly 66,000 bachelor's degrees and 16,000 master's degrees.

As the State's flagship public university, UConn plays an indispensable role in developing a highly skilled workforce, and the clean energy sector is no exception. With a total enrollment of 33,554 students (including 25,304 undergraduates and 6,883 graduate students), UConn educates a large percentage of Connecticut's future workers and leaders across an array of fields, awarding 5,739 bachelor's degrees and 1,797 graduate degrees in 2023-2024.

While UConn does not offer an accredited regional planning program to assist in

Figure 36: Students crossing a road at the Hartford UConn campus.

the training of planning professionals, UConn does offer multiple programs with curriculum relevant to other CCAP workforce needs. A partial listing and summary are provided below.

UNDERGRADUATE PROGRAMS

College of Agriculture, Health and Natural Resources

- Agriculture, Health and Natural Resources (BS) - An interdisciplinary major designed for students who want broad training in agricultural, environmental, and/or health sciences.
- Economics of Sustainable Development and Management (BS) - Prepares students to use economic analysis and quantitative methods to understand and evaluate decision problems faced by individuals, firms, and public agencies.
- Environmental and Natural Resource Economics (BS) - Prepares students to use economic analysis and quantitative methods to understand and evaluate complex interactions between economic markets, societal values, human needs and wants, and government policies. The curriculum incorporates economics into the study of pollution (air, water, and land), waste disposal and recycling, business and consumer behavior, sustainable development, climate change and adaptation, pollution control, energy, renewable resources, EJ, poverty, economic valuation of environmental protection, benefit-cost analysis, and policy evaluation.
- Environmental Sciences (BS) and (BA) - Curriculum offers a comprehensive approach to the study of environmental problems, including not only a rigorous scientific background but also detailed analyses of the social and economic implications of environmental issues.
- Landscape Architecture (BS) – This program includes instruction in histories and theories of landscape, construction techniques, plant and soil science, and other skills necessary for a career in landscape architecture.
- Natural Resources (BS) - Prepares students for careers related to the management of natural resources. Students develop skills in applying modern technology, concepts and principles dealing with sustainable development, environmental protection, and resource conservation.
- Plant Science (BS) - Focuses on the science and practices associated with sustainable plant production and/or use within managed systems. Courses emphasize practices and concepts related to reducing environmental impacts during production and in managed land use systems.

College of Engineering
UConn's College of Engineering provides education and training for the highly skilled engineers necessary for the successful implementation of clean energy and emission reduction projects. Relevant engineering degrees offered include:

- Civil Engineering (BSE)
- Electrical Engineering (BSE)
- Environmental Engineering (BSE)
- Management and Engineering for Manufacturing (BS)
- Materials Science and Engineering (BSE)
- Mechanical Engineering (BSE)
- Multidisciplinary Engineering (BSE)

Ratcliffe Hicks School of Agriculture
The Ratcliffe Hicks School of Agriculture confers Associate of Applied Science degrees in Animal Science, Plant Science, and Urban Forestry and Arboriculture. Students include recent high school graduates as well as adults who are interested in continuing their education or a career change. Coursework offers a balance between technical and theoretical aspects of each subject, with an emphasis on hands-on learning.

- Plant Science (AAS) - Plant Science majors may concentrate in ornamental horticulture, turfgrass management, or sustainable crop production. Graduates pursue careers in golf course management, sports turf management, floriculture, landscape and grounds maintenance, greenhouse and garden center operations, nursery management, interiorscaping, park and land management, public horticulture, or various positions within the entire food crop production chain from field to fork.
- Urban Forestry and Arboriculture (AAS) - Urban Forestry and Arboriculture majors focus on the care and maintenance of individual trees and urban forest tracts near buildings, roads, and other developments. This major provides students with the vocational skills needed to pursue a career in arboriculture and urban forest management, including the knowledge required to sit for the CT Arborist license exam.

Graduate Programs
As noted above, UConn does not offer accredited regional planning programs for undergraduate or graduate study. This is a potential area for growth. However, UConn offers multiple graduate degree programs and post-graduate certificates relevant to developing the workforce necessary for successful CCAP implementation. These programs include:

- Advanced Manufacturing for Energy Systems (MS)
- Agricultural and Resource Economics (PhD)
- Applied and Resource Economics (MS)
- Biodiversity and Conservation Biology (MS)
- Civil Engineering (MS, PhD)
- Electrical Engineering (MS, PhD)
- Energy and Environmental Management (MS)
- Environmental Engineering (MS, PhD)
- Natural Resources: Land, Water, and Air (MS, PhD)
- Plant Science (MS, PhD)
- Power Engineering (Certificate)
- Power Grid Modernization (Certificate)
- Sustainable Environmental Planning and Management (Certificate)

Summary
Institutions and stakeholders across Connecticut have demonstrated consistent interest in developing a more robust clean energy sector, including training the necessary workforce. The State appears to be roughly on par with overall national trends in terms of workforce readiness and supply for the selected CCAP measures. Continued investment in traditional K-12 schooling, apprenticeships, and higher education will be critical to ensuring that the pipeline of necessary workers is adequate.

STAKEHOLDER ENGAGEMENT

Process and Approach

Recognizing the importance of transparent communication, stakeholder representation, and early, frequent involvement, the CCAP engagement effort sought to advance the robust and meaningful engagement that was fostered during the PCAP planning process. CRCOG facilitated a wide range of engagement and outreach activities in Fall 2024 and Spring 2025. Engagement opportunities included an in-person ColleCTive Climate Action Forum in October 2024 with sector-based experts, a hybrid CTAC meeting in January 2025, and community-led Table Talk sessions throughout Winter 2024-2025.

The IGWG, comprising all COGs involved with CPRG planning in Connecticut, was crucial to the coordinated CCAP engagement efforts implemented. Public outreach and engagement broadened as CCAP planning progressed, with targeted outreach being emphasized earlier and general engagement expanding later in the process via tabling events and a public meeting. This section summarizes the various paths of public engagement pursued throughout the CCAP planning process, highlighting the feedback received and how that feedback has shaped the plan's development.

CRCOG and RiverCOG aimed to build on information gathered during the PCAP phase. Identified stakeholders and key agencies for intergovernmental coordination were carried over from the PCAP into the CCAP, as were many of the engagement strategies. The CCAP engagement approach prioritized scaling up stakeholder involvement through coordination with the IGWG. This strategy recognizes that multiple MSAs across the State were seeking information from many of the same stakeholders, given significant COG overlap. By collaborating with other MSAs on public meetings and engagement sessions, the region achieved broader outreach for events, minimized meeting fatigue, and used comprehensive stakeholder feedback to align CCAP priorities across the MSAs.

Figure 37: Presenter at the ColleCTive Climate Action Forum meeting.

Overview of Engagement Completed

Sector-Based Meetings – October 2024 Climate Forum

CRCOG and RiverCOG worked with the IGWG throughout Summer and Fall 2024 to organize a sector-based meeting, known as the ColleCTive Climate Action Forum, to engage local, regional, and statewide sector-based experts. The ColleCTive Climate Action Forum was a day-long event hosted on October 23, 2024, at Middlesex Community College. The event convened over 80 representatives from State agencies, municipalities, utilities, and nonprofit organizations and other interested stakeholders to discuss the feasibility of various emissions reduction strategies and pathways. Attendees split into four groups based on their interest and area of

expertise to provide feedback on proposed CCAP measures: Clean Transportation, Decarbonizing Buildings, Towards a Zero Carbon Electric Grid, and Waste Management.

Small, facilitator-led conversations with 10-12 participants at each table were held within these groups to encourage all participants to share their thoughts on which GHG reduction measures align best with existing policies, programs, and funding. Facilitators rotated through three distinct subtopics in each sector group to maximize input on different aspects of the Transportation, Buildings, Electricity Generation, and Waste sectors.

Session 1 asked attendees to identify:

1. Any proposed GHG reduction measures that overlap;
2. Strategies to improve collaboration or coordination in enacting the GHG reduction measures; and
3. Current implementation gaps for the proposed measures.

Session 2 built on Session 1 by having participants prioritize a list of GHG reduction measures and develop an implementation action plan from the selected measures.

Notetakers were present at each table to capture the information shared. These notes were compiled and used to prepare a ColleCTive Climate Action Forum Final Report, which was then emailed to all participants and published online for the public to view (**Appendix B**).

Cross-cutting takeaways from the forum event included the need to increase workforce development. Experts in multiple sectors cited low wages, high turnover rates, and lack of access to certifications as common barriers to expanding the workforce. Job training programs and apprenticeships with certification pathways are pivotal for people to enter clean energy, transportation, and other green job industries to fill workforce gaps. Funding and high upfront costs were also consistently named as implementation barriers, with every sector-based group noting the high financial costs to increase sustainable technologies and infrastructure. Participants emphasized how decarbonization goals could be reached over time with increased coordination, communication, and shared investment among key actors within each sector.

Figure 38: Community meeting in West Hartford.

Authority to implement, barriers to implementation, and other collected feedback from this event have been integrated into many aspects of the CCAP. The priority measures identified by Clean Transportation, Decarbonizing Buildings, Towards a Zero-Carbon Electric Grid, and Waste Management sector groups influenced which GHG reduction measures were included in the final plan. Input from sector experts on which measures support existing programs helped CRCOG and RiverCOG discern which measures to prioritize based on shovel-readiness or likelihood of successful implementation. Policies discussed at the forum, such as food recovery and product upcycling/repair in the waste sector and free or low-fare trips on priority transit routes, helped broaden the thinking towards the region's waste sector and transportation measures. In this way, the ColleCTive Climate Action Forum shaped much of the CCAP's development while raising the bar for future engagement and cross-COG regional collaboration.

Table Talks (Fall 2024 to Spring 2025)

CRCOG has used the Table Talk format for other planning products for the region. The COG notes that:

> Table Talk is based on the simple idea that smaller, intimate conversations often generate more candid discussion of important issues. The Table Talk format is intended to bring together friends, colleagues, neighbors and fellow community members in a comfortable setting (whatever that means for your group) to discuss the issues most important to them. We believe the format of traditional public meetings or more recent platforms such as social media do not always encourage thoughtful discussion or allow everyone to participate. [. . .] The Table Talk format is intended to help create a respectful and comfortable environment for people to share experiences and ideas with one another.[46]

For the CCAP, CRCOG worked with three Table Talks groups. Three sessions were held between Fall 2024 and Spring 2025.

All three Table Talks focused on transportation, with increased public transportation infrastructure supported across the board. Two Table Talks touched on intersections between transportation and food access, revealing how transportation and food issues cannot be separated. Food access remains a challenge in many places, especially for people with dietary restrictions or those without a car. Lastly, the need for ongoing public education was central to all Table Talks held. The section below summarizes each Table Talk.

Figure 39: Community meeting held by Kamora's Corner in Hartford.

TABLE TALK ONE

Eight students in a sustainability club at UConn held a Table Talk, discussing extreme weather, transportation, energy, and food systems. Student members acknowledged that they did not know about hazard mitigation resources or how to protect themselves in a weather-related emergency. They expressed strong support for expanding bicycle, pedestrian, and public transit infrastructure, preferring trains to EVs. While the group indicated that high energy costs are a barrier, everyone present had experience participating in energy incentive programs and/or utilizing cooling centers. Members recognized food accessibility

gaps for students off campus without a car and students with dietary restrictions and concluded by discussing programs, policies, and incentives available to produce less food waste on campus.

TABLE TALK TWO

A Hartford-based community leader and Sustainable CT Equity Coach led Table Talk discussions about food access and transportation with 29 participants during an annual Kwanzaa celebration. While speaking about food access, all participants confirmed they had faced food insecurity at certain points and accessed "free food" from food banks within the past few months. Conversation about local food deserts progressed, and one participant reframed the food (in)access landscape as more akin to food apartheid. Participants shared about where they buy and forage for food, realizing that a diversity of food options is pivotal since there is not one food outlet that serves everyone's needs. In addition to discussing food insecurity, the group also discussed transportation. Free, widely available bus services and public transportation options mitigate the consequences of paying high ridesharing costs and navigating limited transit routes.

TABLE TALK THREE

The third Table Talk, held by a Sustainable CT Equity Coach, was focused on several topics, including community engagement, waste management, industrial processes, and transportation. Participants explored the feasibility of various actions based on community feedback, and many GHG reduction strategies were generated from the discussion. Recycling, zero-waste initiatives, and waste-to-energy projects emerged as key interventions in the waste management sector. Cleaner technologies, emissions reduction incentives, and circular economy systems were suggested for the industrial sector. EV infrastructure, carpooling/ridesharing, and cleaner fuels were supported for transportation. While discussing community engagement, public awareness campaigns, local involvement, and public-private partnerships were emphasized.

Climate Technical Advisory Committee (CTAC)

CRCOG and RiverCOG established a Climate Technical Advisory Committee (CTAC) to help guide the CPRG planning process. The CTAC includes municipal staff in Hartford, East Hartford, New Britain, Manchester, Middletown, and West Hartford as well as representatives from State offices and the CT Green Bank and Sustainable CT. CTAC has continued to meet as needed to advise CRCOG and RiverCOG on key CCAP deliverables.

CRCOG and RiverCOG hosted a hybrid CTAC meeting on January 23, 2025, to review and finalize the proposed GHG reduction measures. CTAC members assessed the feasibility of the proposed CCAP measures, providing detailed input on the municipal appetite for various GHG reduction measures. Members indicated which measures are already being implemented, what case studies could be featured in the chapter text, and potential data sources for proposed measures. Discussion also addressed how the CCAP emphasis should be on developing measures that are actionable for local governments and organizations and planning for future funding sources.

CTAC feedback on the proposed CCAP measures was crucial to ensure that the measures align with local capabilities. Specific measure language and metrics were amended, added, removed, or combined based on feedback received at this CTAC meeting. For instance, CNG and R-99 were included in the detailed text for "Converting light municipal fleets to EVs/hybrids and encourage switching of municipality-owned and privately owned school buses to electric fleets or renewable diesel (R-99) and/or CNG as interim measures" per input from a couple of CTAC members. Meanwhile, a measure

Figure 40: Community meeting in West Hartford.

regarding municipality/community choice aggregation (CCA) for alternative energy sources was not pursued due to CTAC insight into consumer protection issues, the lack of State support, and the limited potential for GHG emissions reductions from CCA.

An invaluable forum for discussing CCAP planning milestones and development, the CTAC will continue to be engaged in CPRG activities leading up to the Status Report as applicable.

Intergovernmental Meetings

The multi-COG IGWG was a central component of the CCAP engagement phase, guiding the CCAP engagement strategy and impacting CCAP measure priorities and outcomes. The ColleCTive Climate Action Forum would not have been possible without the shared efforts of the IGWG members. IGWG members met once every two weeks in the months following the PCAP submission leading up to the October event to discuss CCAP progress, next steps for each MSA, and opportunities for collaboration.

In addition to the IGWG, CT DEEP convened bi-monthly CT DEEP/COG coordination meetings with all COGs starting in February 2025. These meetings have resulted in robust conversations, providing a direct line of communication between staff working on the State CCAP and the three MSA CCAPs. Measure-specific feedback, general CCAP information/data sharing, and expectation setting have all been exchanged during these sessions, with CT DEEP providing statewide waste measure analysis that informed the GHG reduction measure Reduce the region's waste by establishing and expanding residential and academic food waste/food rescue diversion programs and increase utilization of anaerobic digestion.

Other Public Outreach and Materials

The region undertook both targeted and widespread public outreach. Focused outreach included presenting on CCAP progress during a Sustainable CT Coffee Hour in November 2024 and at the American Planning Association (APA) National Conference Session in April 2025. The Sustainable CT Coffee Hour: "A Summary of State Climate Action Planning Efforts" event took place on November 21, 2024. Kyle Shiel (CRCOG) and Christine O'Neill (Naugatuck Valley COG, NVCOG) provided an overview of climate action planning

efforts underway across the State, describing how local governments could amplify these efforts. In the "Lowering GHG Emissions: Views from the Nutmeg State" APA National Conference Session on April 24, 2025, Kyle Shiel highlighted and discussed the CPRG program. For more details on these engagements, please see the Outreach and Coordination Log (**Appendix C**).

The region also focused on widespread public engagement, tabling at a few pop-up events in the region to spread information about the CCAP draft release date and public comment period. A public hearing was held on July 30, 2025, for interested residents to learn more about the CCAP draft and provide feedback. CPRG website materials were refreshed to include CCAP web content during the public comment period.

As discussed in Quantified GHG Reduction Measures, CCAP GHG reduction measures were developed with PCAP public comments in mind. Some of these comments include:

1. Food systems and agriculture – PCAP commentators highlighted wanting more development on food system projects, sustainable agricultural food systems, and regenerative farming policies. These ideas were incorporated into "Reduce the region's waste by establishing and expanding residential and academic food waste/food rescue diversion programs and increase utilization of anaerobic digestion."
2. Tree planting on private property – This solution is discussed as a possibility under "Increase urban tree canopy in municipalities across the region."

Engagement Limitations and Conclusion

Building on momentum from the PCAP, CCAP engagement utilized PCAP engagement "lessons learned" and optimized PCAP outreach strategies that worked (for example, soliciting feedback with many different audiences through small group sessions) while dropping engagement methods that did not yield results, such as an online public survey. Engagement leveraged existing knowledge, networks, and relationships fostered both as the Hartford-East Hartford-Middletown planning bodies, as well as the relationships developed and deepened during the PCAP process, as opposed to starting from the ground up for this planning document. Feedback gathered during each stage of the CCAP engagement process underpinned the development and refinement of CCAP GHG reduction measures, guiding the prioritization of measures and benefits and mitigation of any anticipated disbenefits.

No stakeholder engagement process is perfect; it is important to acknowledge some high-level issues faced during the engagement process that impacted engagement outcomes. Limited staff time and capacity to complete public engagement was a significant barrier faced. This was especially true in Fall 2024 when planning for the in-person ColleCTive Climate Action Forum event coincided with Table Talk outreach and recruitment, leading to limited Table Talk programming. These and other limitations highlight lessons learned from the CCAP engagement process, such as the importance of staggering engagement activities or increasing staff capacity during busy engagement months.

Figure 41: A sailboat moored in Back River in Old Lyme *(Kathleen DeMeo)*

CONCLUSION

AUGUST 1, 2023
EPA planning grant awarded to CRCOG and RiverCOG

MARCH 1, 2024
PCAP submittal to EPA

AUGUST 1, 2025
CCAP submittal to EPA

2025-2030
Priority measure implementation

2027
Status report submittal to EPA

2030-2050
Long-term emissions reduction horizon

CRCOG and RiverCOG's CCAP is the second deliverable under the CPRG program. The CCAP builds off the work undertaken in the PCAP by:

- Reviewing progress towards lower GHG emissions by updating the GHG inventory;
- Developing GHG emission targets and GHG emission projections;
- Examining developments in State and local policy and land use decisions, such as the State's move to zero-emission school buses;
- Developing GHG emissions reduction measures that build off the PCAP measures, the GHG emissions projections and targets, and the robust public feedback generated during the PCAP process;
- Undertaking quantitative and qualitative analyses of these measures, focusing on GHG emission reductions, air pollution reductions, and other benefits;
- Engaging new stakeholders throughout the region as well as reengaging with the CTAC to offer expected, on-the-ground advice; and
- Providing useful analyses such as the authority to implement, workforce analysis, and funding available to help make these measures a reality.

With this plan in place, CRCOG and RiverCOG can begin the implementation of the measures by pursuing funding options and coordinating with key stakeholders. The next deliverable, the Status Report, will provide an update on the progress and is due in 2027.

If you have questions about this CCAP or suggestions for the upcoming status report, please contact Kyle Shiel, Principal Planner, at kshiel@crcog.org.

APPENDIX A: ALL MEASURES CONSIDERED

Below lists all measures considered throughout the PCAP and CCAP process. Many of these measures were consolidated or revised for inclusion in the CCAP. Many of these measures not included are still worthwhile initiatives and should be pursued as opportunities present themselves.

#	SECTOR	MEASURE NAME
A1	Agricultural/Natural and Working Lands	Increase urban tree canopy in municipalities across the region
A2	Agricultural/Natural and Working Lands	EBT farm-to-table program
A3	Agricultural/Natural and Working Lands	Establish regional food distribution centers to streamline distribution of local produce
A4	Agricultural/Natural and Working Lands	Collaborate with grocery chains to redirect close-to-expiration produce
A5	Agricultural/Natural and Working Lands	Develop educational programs to inform EBT recipients of benefits of locally sourced, fresh produce
A6	Agricultural/Natural and Working Lands	Promote regenerative farming and ranching
A7	Agricultural/Natural and Working Lands	Local and sustainable food systems
A8	Agricultural/Natural and Working Lands	Convert brownfields to open space
A9	Agricultural/Natural and Working Lands	Community engagement and empowerment
A10	Agricultural/Natural and Working Lands	Advanced carbon sequestration (saline aquifers, giant air filters, ionic liquids) and job training
A11	Agricultural/Natural and Working Lands	Increase open space across the region (forests, farmland and land trusts)
A12	Agricultural/Natural and Working Lands	Expansion of Farmers Market Nutrition Program
A13	Agricultural/Natural and Working Lands	Electrification of commercial and governmental-owned lawn maintenance equipment
A14	Agricultural/Natural and Working Lands	Maintaining forest health and forest structure
A15	Agricultural/Natural and Working Lands	Support urban agriculture
A16	Agricultural/Natural and Working Lands	Develop sustainable municipal gardens
E1	Electricity Generation	Support an increase in solar projects across the region, creating 900 megawatts across the region
E2	Electricity Generation	Offshore wind
E3	Electricity Generation	Hydropower

#	SECTOR	MEASURE NAME
E4	Electricity Generation	Install renewable energy (solar and battery) on residences owned by municipal housing authorities and municipality-owned affordable housing
E5	Electricity Generation	Install solar panels, add battery storage and develop microgrids on buildings and properties owned by municipalities
E6	Electricity Generation	Add solar panels to remediated brownfield sites
E7	Electricity Generation	Undertake Energy Efficiency Upgrades to Municipal Buildings
E8	Electricity Generation	Undertake energy modeling survey
E9	Electricity Generation	Expand and enhance the region's commercial and residential energy audit programs and provide support for implementation
E10	Electricity Generation	Expand industrial energy efficiency
E11	Electricity Generation	Promote the use of renewable energy for industrial buildings
E12	Electricity Generation	Promote solarize energy for farms
E13	Electricity Generation	Explore community/shared solar projects 100 kW- 2 MW in size across the region
E14	Electricity Generation	Expand deployment of agrivoltaics
E15	Electricity Generation	Support solar projects, creating 900 megawatts across the region
E16	Electricity Generation	Reduce municipal, residential, and commercial reliance on heating fuel (2-5 percent reduction in heating oil/propane/NG; each to have a separate percentage reduction). Encourage a B20 blend where possible.
E17	Electricity Generation	Ease solar permitting
E18	Electricity Generation	Expand demand response programs
E19	Electricity Generation	Solar policy advocacy to increase non-residential solar production
E20	Electricity Generation	Hydrogen - port operations, energy storage
E21	Electricity Generation	Upgrade grid
E22	Electricity Generation	Increase community solar in communities across the region
B1	Commercial/Residential Buildings	Reduce municipal, residential, and commercial reliance on heating oil by five percent
B2	Commercial/Residential Buildings	Increase the adoption of biofuel in home heating to offset traditional fossil fuels
B2	Commercial/Residential Buildings	Provide incentives for green building adoption
B3	Commercial/Residential Buildings	Green building standards education for property owners, developers, and the public
B4	Commercial/Residential Buildings	Workshops on green building standards for architects and builders

#	SECTOR	MEASURE NAME
B5	Commercial/Residential Buildings	Financial literacy workshops for renters to transition to homeowners
B6	Commercial/Residential Buildings	Develop job training programs in green construction
B7	Commercial/Residential Buildings	Consider code changes or requirements to developers to include pedestrian and bicycle facilities in projects, etc.
B8	Commercial/Residential Buildings	Auction of non-compliant properties
B9	Commercial/Residential Buildings	Limit out-of-state landlords
B10	Commercial/Residential Buildings	Equitable transition: from green building standards to homeownership
B11	Commercial/Residential Buildings	Community collaboration and empowerment
B12	Commercial/Residential Buildings	Promote the use of heat pumps and geothermal for municipal buildings
B13	Commercial/Residential Buildings	Land-use reforms: allow for mixed-use zones
B14	Commercial/Residential Buildings	Require new buildings and major renovations to meet Energy Use Index (EUI) targets of 20 or less with annual reporting to CT DEEP required for these high performance buildings
B15	Commercial/Residential Buildings	For municipal building energy upgrades, set a target EUI goal of 25 or less
B16	Commercial/Residential Buildings	Develop green building standards and updated building codes
B17	Commercial/Residential Buildings	Encourage green or cool roofs
B18	Commercial/Residential Buildings	Water conservation programs for GHG emission reductions
B19	Commercial/Residential Buildings	Energy retrofits - residential audits, health and safety focus
I1	Industrial	Workforce development
I2	Industrial	Lower GHG emissions through sustainable procurement: environmental product declaration (EPD) disclosures for materials
I3	Industrial	Encourage remanufacturing
I4	Industrial	Use of brownfields to encourage clean industrial growth
T1	Transportation	Install public electric vehicle charging stations
T2	Transportation	Pursue 1-2 percent mode shift away from single-occupancy vehicles
T3	Transportation	Switch lawn and garden equipment to electric
T4	Transportation	Convert light-duty municipal fleets to EVs/ hybrids. Encourage switching of municipality owned and privately owned school buses to electric fleets or renewable diesel (R-99), propane, and/or CNG as interim measures
T5	Transportation	Develop green corridors in city/town streets

#	SECTOR	MEASURE NAME
T6	Transportation	Encourage mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users
T7	Transportation	Install public EV charging infrastructure and fund maintenance of EV charging infrastructure
T8	Transportation	Multi-service leasing opportunities
T9	Transportation	Promote transit-oriented development (TOD) by providing funding opportunities
T10	Transportation	Promote transit-oriented development (TOD) by updating zoning
T11	Transportation	Evaluation of road widening projects
T12	Transportation	Community-centric revenue redistribution
T13	Transportation	Train and bus improvements
T14	Transportation	Install electric charging and solar bus stations
T15	Transportation	Rest stops with charging for electric bus charging and solar bus stations (rest stops for a sustainable future)
T16	Transportation	Promote EV or hydrogen transit buses
T17	Transportation	Idle reduction truck-mounted attenuators (TMAs)
T18	Transportation	Convert light-duty municipal fleets to electric vehicles (EVs)/hybrids, install municipal charging infrastructure, switch municipal gas-powered equipment to electric
T19	Transportation	Encourage municipality-owned and privately-owned school buses switch to 20 percent biodiesel (B20) as an interim measure with a long-term focus on converting light-duty municipal fleets to EVs/hybrids
T20	Transportation	Expand bus rapid transit
T21	Transportation	Develop and implement roundabout projects across the region
T22	Transportation	Switch municipal equipment to electric
T23	Transportation	Further expand bus rapid transit (BRT) in the state by shifting high-occupancy vehicle (HOV) lanes to dedicated BRT lanes
T24	Transportation	Remove HOV lanes and replace with natural areas
T25	Transportation	Increase micromobility options
T26	Transportation	Connect the City of Hartford to the airport with better public transportation
T27	Transportation	Pursue recommended improvements for at least one of the six transit corridors highlighted in Metro Hartford Rapid Routes Transit Priority Corridors Study

#	SECTOR	MEASURE NAME
W1	Waste and Materials Management	Establish and expand residential and academic food waste/food rescue diversion programs and examine ways to increase utilization of anaerobic digestion
W2	Waste and Materials Management	Expand commercial composting
W3	Waste and Materials Management	Litter mitigation
W4	Waste and Materials Management	Advocate for extended producer responsibility programs
W5	Waste and Materials Management	Establish and promote unit-based pricing
W6	Waste and Materials Management	Renewable power from trash incineration
W7	Waste and Materials Management	Passing energy savings to ALICE/EJ consumers
W8	Waste and Materials Management	Get rid of astroturf and artificial turf
W9	Waste and Materials Management	Promote EV hauling trucks/rail
W10	Waste and Materials Management	Promote EV garbage trucks
W11	Waste and Materials Management	Promote and expand green public procurement
W12	Waste and Materials Management	Promote landfill methane capture
W13	Waste and Materials Management	Emissions-lowering school lunches

APPENDIX B: COLLECTIVE CLIMATE ACTION FORUM FINAL REPORT

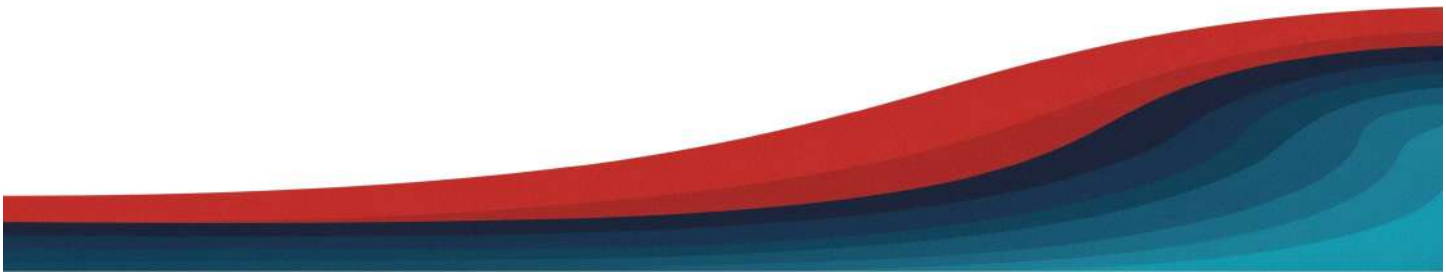
ColleCTive Climate Action Forum

October 23, 2024

Connecticut State Community College Middlesex

Middletown, Connecticut

Summary of Findings Report



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Megan Jouflas
Naugatuck Valley Council of Governments
Christine O'Neill
Northwest Hills Council of Governments
Jean Speck
South Central Regional Council of Governments
Stephanie Camp, AICP
Ian McElwee, AICP
Andrew Thomas, AICP
Western Connecticut Council of Governments
Tucker Beckett
Jaclyn Reelick
Michael Towle
Dewberry
Keyana Aghamirzadeh, WEDG, LEED Green Associate, ENV SP
Renata Silberblatt, AICP, ENV SP
Keramida, Inc.
Nick McCreary
SLR Consulting
Pamela Green
Chanel Lobdell
University of Massachusetts, Amherst
Amelia Lavallee
Andrew MacDougall
Michael McNally
Audrey Potash
Karl Tacheron
Weston & Sampson
Cassidy Yates, EIT

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Bryan Garcia, Connecticut Green Bank

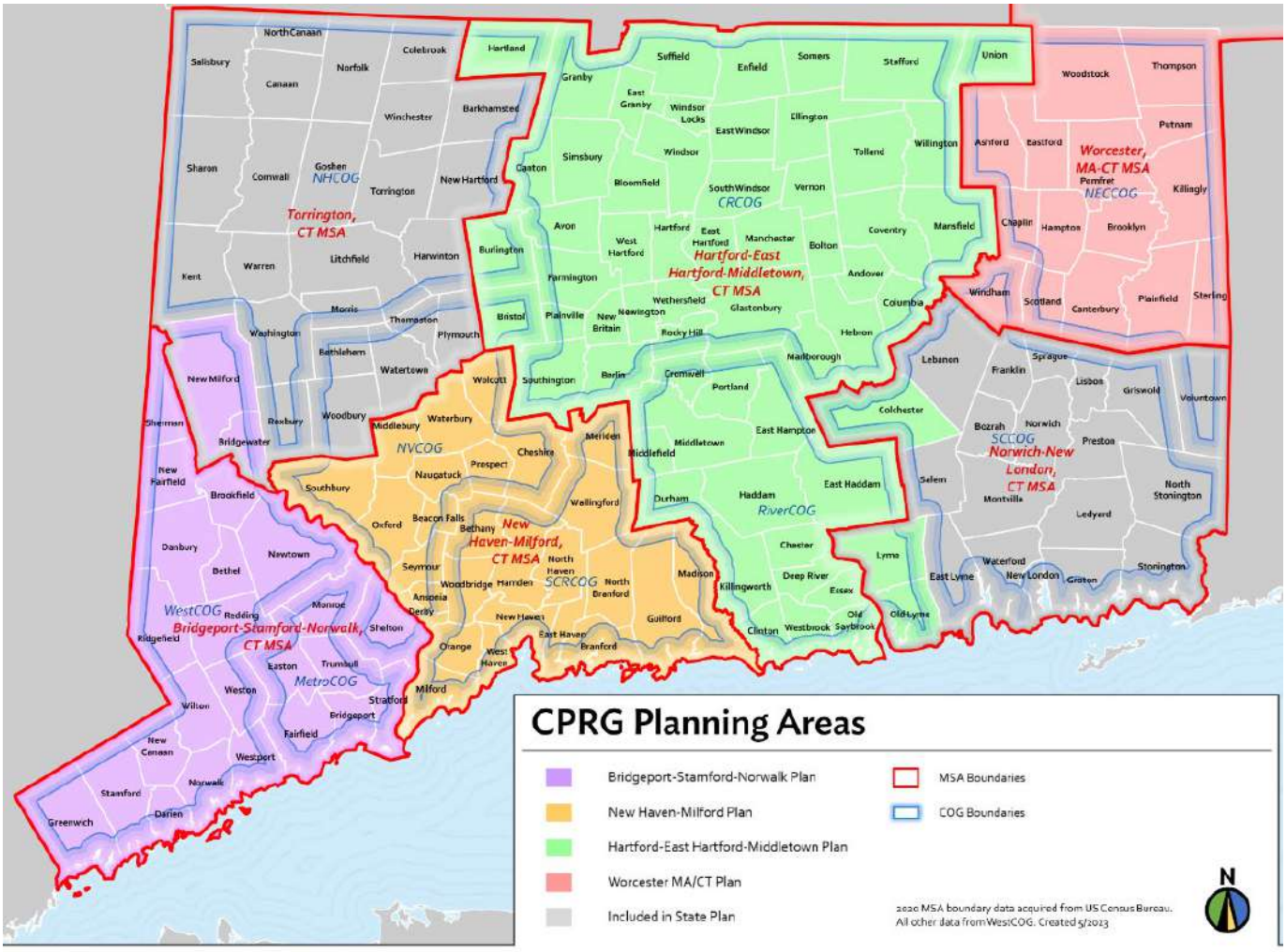
The Staff at CT State Community College Middlesex

Table of Contents

Introduction

Over the past year, Councils of Government (COGs) across Connecticut have been developing regional climate action plans through the U.S. Environmental Protection Agency's Climate Pollution Reduction Grant (CPRG) program. The CPRG program is intended to help states, local governments, tribes, and territories develop and implement ambitious plans for reducing greenhouse gas emissions and other harmful air pollution. While climate change is a global concern, the CPRG program recognizes that direct local, regional and state action is necessary to adequately address the challenge.

Given the existing government structures in Connecticut, the primary authority to implement significant projects lies with the State or local municipalities. State efforts will be run primarily through the Department of Energy and Environmental Protection, in concert with other State agencies. As such, the COGs have devoted much of our efforts to identify ways our member municipalities can help reduce their emissions, whether individually or through collaborative regional efforts.



CPRG planning areas overlap various COG and municipal boundaries, making a siloed planning approach impractical.

Collective Climate Action Forum

While there are three major regional plans being developed (Bridgeport, Hartford and New Haven) most of the issues and challenges facing our member municipalities are overwhelmingly similar. Given this reality, planning in regional silos makes little sense. The COGs recognize that local governments from across the state can better identify realistic pathways towards reducing emissions when sharing information, best practices, and drawing upon the collective experience of on-the-ground stakeholders.

Commissioner Katie Dykes, CT DEEP

The Collective Climate Action Forum was intended to bring together sector experts from across the state to help refine the eventual strategies in the regional climate action plans. The event was organized by some of the major emission sectors, along with strategies to reduce emissions:

Clean Transportation – As the single largest sector contributing to GHG emissions, creating cleaner transportation systems is typically a major emphasis in most climate action plans.

- Electric Vehicles (EVs) - Transitioning from the internal combustion engine to EVs, for both public fleets and personal automobiles.
- Complete Streets – Creating street infrastructure that safely accommodates all users beyond single-occupant vehicles – include infrastructure for pedestrians, cyclists and public transit. It can potentially include land use decisions like transit-oriented development.
- Enhance Public Transportation – Making public transportation more accessible and efficient to encourage greater mode shift.

Decarbonizing Buildings – The residential building sector is another major contributor of GHG emissions. Decreasing the use of fossil fuels to heat and cool homes is a critical measure for reducing emissions.

- Deployment of HVAC efficient technology – Heat pumps and renewable energy technologies will allow heating and cooling of buildings while significantly reducing greenhouse gas emissions.
- Retrofit older buildings – As a state with some of the oldest housing stock in the nation, Connecticut GHG emissions would be significantly reducing by widespread retrofitting of older properties to increase energy efficiency measures.

- Climate-friendly land use and building codes - Leveraging local and state governments land use and building code authority to develop, adopt, and implement regulations and processes that yield low-emissions outcomes.

Towards a Zero Carbon Electrical Grid – Moving away from the use of fossil fuels to generate electricity is a key emissions reduction strategy. This includes large-scale policies and actions taken by both regulated utilities and smaller-scale actions taken by individual property owners.

- Utility-scale renewables – Deploying utility-scale wind, solar, geothermal, or other clean and renewable resources to generate electricity for the grid.
- Distributed generation – Developing microgrids, community solar, networked geothermal, or on-site renewables that produce the energy at the point of consumption, removing strain from the grid.
- Municipal energy – Leveraging municipal policy and resources to procure renewable power, phase out fossil fuels, and evaluate sites for clean energy installations.

Waste Management – While not the largest contributor to global GHG emissions, waste management is consistently cited as a concern during public engagement. Many agree that Connecticut is facing a waste management crisis, as a large portion of our waste is shipped hundreds of miles out of the state, resulting in high tipping fees and uncaptured GHG emissions.

- Reduction – Minimizing the amount of waste created through unit-based pricing, extended producer responsibility (EPR), and other programming that incentivizes behavior change.
- Diversion – Redirecting waste from landfills or waste-to-energy incinerators to reuse, recycling, and composting facilities when feasible to decrease GHG emissions.
- Infrastructure – Developing efficient waste management and wastewater treatment systems that reduce GHG emissions and operating costs.

Event Summary

Over eighty people attended the Collective Climate Action Forum on October 23rd, 2024. Attendees included representatives from State agencies, municipal staff, utilities, non-profit organizations and other interested stakeholders. Discussion was robust and informative, with a focus on identifying practical pathways for implementation. The notes included in this packet attempt to summarize the day's discussion and hopefully provide a follow-up resource for local governments to help with their climate and sustainability initiatives. As always, municipalities are encouraged to reach out to their respective Council of Governments with any comments or questions.

Clean Transportation

Introduction

Transportation accounts for over 40 percent of statewide emissions and had a larger carbon footprint than the next two sectors (residential and commercial, from use of fossil fuels) combined. This theme included discussions on policies intended to reduce the need for single-occupancy vehicle trips through land use, infrastructure and public transit improvements as well as transitioning to cleaner electric vehicles.

Session 1

Electric Vehicles & Charging Infrastructure

The discussion on electric vehicles covered a variety of areas, from the conversion of municipal vehicle fleets (including school buses) to EVs, to the necessity of EV charging infrastructure, to residential households opting for EVs in place of traditional internal combustion vehicles.

Grid capacity and charging infrastructure for widespread EV usage was a prominently mentioned challenge. Converting publicly owned vehicle fleets (state and municipal) was seen as an important initial step and a meaningful signal, particularly to utilities, who were mentioned as an essential partner.

Dagmar Noll and Renata Silberblatt

Municipal public works staff said light-duty vehicles are more promising opportunities for EV conversion, while heavy duty vehicles are currently more difficult, due to cost and current performance limitations. The lack of grid capacity for charging heavy duty electric vehicles was cited as a concern. The higher upfront costs of EVs were also mentioned, but this could be overcome by emphasizing the total lifecycle costs and savings on maintenance.

Built Environment & Infrastructure

This category includes specific initiatives such as Complete Streets improvement to more long-range policies such as reforming land use and zoning regulations. Measures in this category are broadly intended to reduce the demand for single-occupancy vehicle trips, by making walking and biking to destinations safer and more convenient. These strategies were recognized as a critical component for reducing transportation-related emissions, but challenges such as cost, required workforce and the relatively long timeframe for implementation were cited.

Consistent, sufficient funding for transformative infrastructure improvements is necessary to significantly reduce transportation demand for single occupancy vehicles at the scale required. Many localities are incrementally completing projects, but land use changes and large-scale infrastructure improvements take time to fully realize their benefits.

Enhanced Public/Active Transportation

This category included discussions of perception/marketing of public transit, operational policies such as free or low-fare rides, and identifying areas poorly served by existing transit. There was discussion on the need to improve both the perception and actual experience of taking public transportation in the state. Free or low-fare trips on priority routes was seen as a beneficial policy to incentivize ridership but presents operational challenges when there is no dedicated funding to make up the revenue gap.

Session 2

Priority Measures

1. Electrify municipal and state vehicle fleets
2. Encourage mode shift through complete street improvements
3. Reduce transportation demand through land use
4. Improve public transit access and affordability
5. Enhance micromobility through e-bikes, scooters, and other services
6. Transportation demand management to reduce peak hour volumes

Authority to Implement

CT DOT and local governments have the necessary authority to implement most projects pertaining to the built environment/land use and infrastructure. Sufficient funding from the state and federal government is typically the limiting factor, as many local governments struggle to contribute a 20 percent match for some infrastructure projects. COGs and the newly created Municipal Redevelopment Authority were seen as entities that could help local governments advance projects.

Workforce Needs

The workforce was cited as a considerable challenge for improving public transportation, as the sector generally has low pay and high turnover. The workforce was also cited as a concern for both the State and local governments, as there are often not enough qualified staff to shepherd projects to completion.

Barriers to Implementation

For many infrastructure or land use-related development projects, negative public sentiment can be a barrier; multi-family development proposals or roundabout projects are examples where public feedback is not always supportive. Upfront design costs were also cited as a barrier, as many municipalities do not always have staff capacity to complete preliminary design. As mentioned above, a typically required 20 percent match from local municipalities is often a barrier for less resourced communities.

Equity Considerations

For many infrastructure or land use-related development projects, negative public sentiment can be a barrier; multi-family development proposals or roundabout projects are examples where public feedback is not always supportive. Upfront design costs were also cited as a barrier, as many municipalities do not always have staff capacity to complete preliminary design. As mentioned above, a typically required 20 percent match from local municipalities is often a barrier for less resourced communities.

Final Notes

Changing land use patterns and creating less car-dependent communities was recognized as critical policies for reducing transportation emissions. However, these policies occur incrementally over a relatively long period of time. Specific infrastructure improvement like Complete Streets investments can be done in a somewhat timelier but limited fashion. By contrast, supporting the transition to electric vehicles and enhancing public transportation are policies that can be implemented in a comparably shorter time frame.

Final Summary

Local governments must reform land use and development practices to encourage less car-dependent communities. CT DOT and local governments have the necessary authority to implement projects, but not always sufficient funding or staff capacity. Dedicated, consistent funding streams with adequate staffing to shepherd projects to completion are necessary. While individual households will take longer to transition to electric vehicles, converting publicly owned State and municipal vehicle fleets (including school buses) should be prioritized. Finally, improving public transit, both the perception and actual experience of taking transit is critical for encouraging mode shift. Public transit must focus on efficiency and convenience.

Decarbonizing Buildings

Introduction

Residential and commercial buildings are a major source of GHG emissions, both through energy expenditure on heating/cooling systems and through construction. As the pace of residential development increases to meet demand in Connecticut, it is important to consider how policies regarding land use and building codes can impact these emissions. This sector discussion considered deployment of efficient HVAC technologies, retrofitting of existing buildings, and development of climate-friendly land use and building codes.

Session 1

Deployment of HVAC Efficient Technology

Discussion of HVAC technologies is focused primarily on increasing adoption of heat pump systems in both new construction and existing buildings. Despite the significant advantages these systems offer, uptake has been slow due in part to a lack of expertise among installers, public misconceptions regarding efficacy, and the current ubiquity of fossil-fuel based heating systems. To address some of these barriers, CT DEEP is currently working with a coalition of other New England states to accelerate adoption of heat pump systems using CPRG funding. While other alternative heating/cooling technologies such as geothermal are valuable tools for replacing fossil-fuel based systems, these face similar (but more significant) barriers to widespread implementation. The increased load on the power grid from a broad shift to non-fossil systems also bears consideration.

Retrofit Older Buildings

Retrofitting existing buildings is crucial to reducing energy use in the sector. Much of the building stock in Connecticut is aging and fails to meet modern standards of weatherization, leading to energy loss in heating and cooling. These retrofits can be costly, especially as newer, more efficient technologies require additional equipment and specialized knowledge from contractors, increasing the availability of these technologies hinges on increasing the availability of this expertise. Retrofit costs can also be offset through tax incentives and low/no-interest financing programs.

Climate Friendly Land use and Building Codes

Addressing efficiency through building codes generally involves requirements for significant upfront investments such as foam insulation and passive design elements. While effective, these requirements can significantly increase building costs, which are passed on to renters and home buyers. Passive design requires skilled attention from architects and newer technologies such as spray foam insulation require specific equipment and expertise from contractors; this suggests opportunities for reducing some of these costs through funding programs for training, certification, and equipment.

Session 2

Priority Measures

1. Adopt the use of networked geothermal systems
2. Support energy efficiency upgrades for municipal buildings
3. Support the use and expansion of energy efficient building technologies
4. Incentivize residential & commercial energy efficient building retrofits
5. Support HVAC & weatherization upgrades for low-income households
6. Advise municipalities to adopt energy efficient building codes
7. Require energy reduction benchmarks for buildings
8. Support the use of sustainable building materials in construction & renovations
9. Incentivize & support adaptive reuse of aged & vacant buildings
10. Support cluster development in nodes that support transit systems and are sited near jobs & amenities

Authority to Implement

A large component of the priority measures listed hinge on workforce training and homeowner/builder education. This could be effectively carried out by state agencies or regional organizations such as COGs provided adequate state/federal funding is available. Incentivization of efficient technologies can be accomplished through a combination of tax credits, rebates, and low/no-interest loans for both homeowners and contractors. Municipal land use authorities can also play a significant role in incentivizing efficient construction through siting/design guidelines and streamlining of approval processes.

Workforce Needs

There is a general need for training and expertise in the installation of energy efficient building technologies to overcome the momentum of traditional techniques. Public sector support is required to make training and certification more widely available to builders, contractors, and HVAC technicians as greater availability would do much to lower costs.

Barriers to Implementation

Higher costs remain a significant barrier to the implementation of energy efficient building technologies. Homeowners and builders are also more likely to choose systems that they are familiar with when replacing/upgrading an existing HVAC system. Current outreach efforts are largely targeted towards homeowners; programs focusing on educating HVAC installers and builders on the advantages and limitations of these technologies could improve adoption. The capacity of the power grid to accommodate a large-scale shift to electrical heating/cooling is also a barrier that requires state attention.

Equity Considerations

Special care needs to be taken to ensure that the cost of any required efficiency upgrades does not create an additional burden for low-income renters or homeowners. Accessibility should also be a consideration in the siting and availability of training and funding opportunities.

Final Notes

Reducing energy consumption and emissions in the building sector will involve significant investment in workforce training and education to increase the availability of energy saving technologies. Existing authorities at the local, regional, and state level are well-positioned to facilitate these investments; some progress is already being made by CT DEEP in this regard.

Final Summary

Significant opportunities exist for decarbonization of the building sector, but they will require coordinated and consistent investment at all levels to overcome the ubiquity of fossil fuel dependent heating/cooling systems and low-cost but inefficient building techniques. Expanding current outreach efforts from homeowners to contractors and technicians is seen as an effective path forward towards broadening adoption of climate-friendly technologies. State agencies, municipal departments, and regional planning authorities all have roles to play in these efforts, which must necessarily be coordinated with efforts to address connected issues of energy and transportation.

Towards a Zero Carbon Electrical Grid

Introduction

Connecticut's electrical grid is powered primarily by natural gas (62%) and nuclear (35%), with a small portfolio of renewables (U.S. Energy information Administration). In alignment with Connecticut's legislative goal of eliminating greenhouse gas emissions from electricity by 2040 (PA 22-5), all three COG Priority Climate Action Plans established measures to move towards a zero-carbon electrical grid. The discussions at the Climate Action Forum centered around how to balance the attainment of this goal with the realities of the grid and politics, including: infrastructure upgrades, energy reliability, political/legislative will, utility collaboration, workforce readiness, and the long on-ramp for enacting reforms. Stakeholders represented a wide variety of organizations, including CT DEEP, the utilities, municipalities, nonprofits, small businesses, and local commissions.

Session 1

Utility-Scale Renewables

Off-shore wind dominated the conversation of utility-scale renewable energy, emerging as a more viable and impactful option than solar farms. Utilities, voters, and legislators all seem to like the concept, plus the State Pier in New London has CT well-positioned to deploy turbines. However, roadblocks such as the monumental upfront investment and the unpredictability of the post-COVID market have already delayed projects and will likely continue to do so. Workforce development for offshore wind will be key, including partnerships with unions, apprenticeships, and CT schools. To accommodate offshore wind (and most of the other topics discussed throughout the day), the grid is in serious need of infrastructure and technological upgrades.

Distributed Generation

A recurring concern related to ground-mounted solar was using prime agricultural land or cutting down forests as a counterproductive way to access clean energy. Solar is better suited as canopies over parking lots, on roofs, or over brownfields rather than "solar farms" sited in undeveloped land, the groups agreed. Microgrids were lauded as promising and should be incorporated into redevelopment plans, but given that there are only a handful in CT, there needs to be more attention and investment from government. Interconnection challenges (i.e., I want to put solar here but there's no capacity, now what?) could be mitigated if conversations with utilities are started earlier. Again – the need for grid upgrades. Homeowners are often overwhelmed when it comes to installing residential solar, due to aggressive or dishonest marketing tactics, supply chain challenges, and the high upfront costs (even with rebates). It is also crucial to ensure renters access solar benefits, with some sort of security that the landlord will pass along solar savings to the tenants.

Municipal Energy

While municipalities do have access to decarbonization incentives – reimbursement from the IRA, technical assistance from UConn, utility-based programs – they often lack the capacity to seek funding and then implement the grants. Disadvantaged communities especially tend to have older buildings that are not ideal for major energy upgrades. Municipal staff are not necessarily experts in energy and may not consider it a priority, given competing tasks. Yet, municipalities have several powerful tools they can use to enact energy reform, like requiring EV charging at new developments or bonding for energy upgrades as part of CIP or POCD planning. They could also tap into COG capacity for grant-writing.

Session 2

Priority Measures

Seven out of fourteen potential measures were chosen. The group modified the wording of several measures. ~~Strikethrough means a word was eliminated~~; *italics means a word was added*. Explanations for these changes are written below.

1. Invest in Offshore Wind Energy
2. Fund Electrical Grid Improvements & Upgrades
3. ~~Expand~~ *Maintain* Natural Gas Pipelines
    a. The group acknowledged that although we don't want to increase fossil fuels, it is important that the disadvantaged populations who might get left behind in the clean energy transition have safe, reliable, affordable access to energy.
4. ~~Expand~~ *Optimize* Energy Assistance for Low-Income Families
    a. These programs don't necessarily need to expand, but they need to be much easier to access and navigate.
5. ~~Increase Rebates~~ *Provide Technical Assistance* for Solar Panels on Residential Homes
    a. Significant financial incentives already exist for solar adoption – what people need is help to ensure they understand what they're signing up for, to give them confidence that they won't get caught in a scam or have to pay a huge cancelation fee.
6. Invest in Energy Storage Tech
7. Work with Developers & Utilities to Site Solar

Authority to Implement

There are many parties that need to work together to accomplish this, but they don't always play nicely together. This includes: the Connecticut legislature, the Public Utilities Regulatory Authority (PURA), the Federal Energy Regulatory Commission (FERC), the CT Siting Council, and of course the utilities. Better communication and a clear vision of how to move forward would be helpful. The utilities pointed out that Massachusetts has a much "friendlier" regulatory environment and that is why they have been able to make more progress on grid upgrades.

Workforce Needs

Electrical engineers, software engineers, manufacturers, arborists, and union laborers all have a role to play in the clean energy transition. It is crucial that we work with schools at all levels (K-12 computer science, technical high schools, community college apprenticeship programs) to build a CT-based workforce that can tackle these jobs.

Barriers to Implementation

It will cost billions of dollars to upgrade the grid, making funding one of the foremost barriers. Moreover, the logistics of upgrading equipment in millions of individual homes and businesses means that this would need to take place over many, many years. By the time the last "smart meter" is installed, that tech may already be outdated. Additionally, the nature of the electrical grid is such that upgrades will only really work at scale – for instance, putting in new infrastructure in only 10 of the 169 towns isn't going to have an impact. Finally, the utilities pointed out that no matter where the funding comes from, it will ultimately fall on the backs of the public (either as "ratepayers" or "taxpayers").

The group brainstormed ways to address these barriers, including better education across all age groups, earmarking funds in the legislature strictly for infrastructure upgrades, and trying to attract private investment.

Equity Considerations

Grid improvements should start in environmental justice communities. Interestingly, the group discussed that upgrading existing infrastructure – which is primarily located in EJ communities like Bridgeport – will still put the burden on urban areas to provide energy for rural areas. Is the upgrading-in-place model fair to low-income communities? There was some discussion of "virtual power plants," where each home or business produces a little more energy that they use and put that back into the grid, thereby decentralizing production to remove the burden of certain residents having to live next to power plants.

Final Notes

Upgrading and maintaining our grid is the key that allows us to unlock all the benefits of renewable energy. It also takes a *very* long time, so we need to start as soon as possible.

Final Summary

Stakeholders acknowledged and engaged with the many barriers to transitioning Connecticut's electrical grid away from fossil fuels. We need better communication between utilities, regulators, and legislators. The relationship between the three is complicated and too often results in a chicken-and-egg situation where no one wants to make the first move, the first investment, without a signal from the other side. Similarly, inaction from the legislature and the inability to move common sense energy reforms through the Capitol was another barrier that came up multiple times. Legislators need more education on energy issues. Our grid is in desperate need of infrastructure and technological upgrades, if we have any chance of accommodating the renewable energy necessary to reach zero emissions. Certain technologies, like wind, geothermal, storage, and smart grid tech, are still "emerging" and might be vastly improved-upon in ten years. Is it prudent to make a large investment now when it could become outdated in short order? Finally, the workforce is a very important piece of this puzzle, especially because Connecticut prides itself on being a hub of precision manufacturing.

Forum attendees

Waste Management

Introduction

Following the closure of the MIRA Waste to Energy facility, 42% of municipal solid waste is now being exported out of state, resulting in rising tipping fees. This has made managing the waste stream and its associated emissions a particularly acute issue in Connecticut. This theme included discussions on policies intended to reduce the amount of waste generated, diversion of waste from destinations such as out of state landfills, and ensuring that the appropriate infrastructure is in place to accommodate significant change.

Session 1

Waste Management Infrastructure

An acute stressor that has the potential to worsen with increased rainfall and rising sea levels, the discussion on wastewater management centered primarily on the prohibitive cost of infrastructure. There was a recognition that major investments are still needed to fully phase out combined sewer outflows (CSO's) and properly maintain current infrastructure to ensure capacity.

A major barrier to the implementation of wastewater infrastructure improvements was identified as the complex web of the authority to implement which has been exacerbated by a lack of communication between the Department of Public Health, the Department of Energy and Environmental Protection, local health officials, and key town staff. The creation of regional stormwater authorities was proposed as a potential path forward to address this issue.

Increasing Connecticut's capacity to manage waste within the state was seen as a priority, with a waste-to-energy facility or updating existing facilities as potential solutions. Further, the group recognized a need to rapidly scale supporting infrastructure to allow for greater food waste and organics collection. Complicated zoning and permitting have made a siting process that is already sensitive to environmental justice community concerns especially difficult. For organics diversion to significantly increase, there is a need for the development of more anaerobic digesters and composting sites statewide.

A general lack of state leadership and coordination have made new waste management infrastructure difficult to develop. Overall, there was an understanding that both new infrastructure development and legacy maintenance are expensive and cost prohibitive, thus requiring greater emphasis on waste reduction.

Waste Reduction Strategies

While waste diversion is inherently intertwined with achieving large-scale reductions in municipal solid waste, this category includes initiatives that serve to reduce waste with minimal requirements to invest in expensive new infrastructure.

Unit-Based-Pricing (UBP) was the predominant waste reduction method discussed, generally combined with some form of organics collection. While the strategy was viewed as holding immense potential to reduce municipal solid waste levels if legislated by the state and enforced properly by municipalities, there were several roadblocks to implementation. The current paradigm in Connecticut focuses on a decentralized approach to waste, while several participants expressed a desire for more top-down leadership from state agencies and the legislature. The logistics of UBP were also seen as a barrier, with multi-family dwellings, increased costs for residents and haulers, and the need for significant public education to ensure smooth implementation being cited as the greatest concerns.

Other initiatives discussed included ensuring single stream and curbside recycling in the communities where not currently in practice. Extending producer responsibility and recycling friendly packaging were proposed as measures to reduce waste directly from the source of production. Overall, the group recognized the need for greater public education to reduce contamination in the recycling stream and promote higher levels of reuse.

Waste Diversion

As the heaviest subset of municipal solid waste, diversion and disposal of food waste and organics through new collection programs and increased composting holds considerable promise to reduce both hauling and management emissions. For municipal and regional programs, successful pilots have thus far been limited by continued funding and available capacity to offload organic waste. Participants saw potential for more decentralized forms of organics diversion through improved in-house composting technology, neighborhood programs, and greater involvement of farms in composting. It was noted that conversations surrounding further scaling of organics diversion should involve groups that were not represented in the current discussion, including schools, farmers, and private haulers.

Session 2

Priority Measures

1. Establish a county/statewide unit-based pricing program with food scrap collection and public education
2. Expand existing waste diversion infrastructure
3. Promote reuse, recycling, and composting within waste diversion programming
4. Advance municipal food waste reduction programs
5. Construct a new waste-to-energy facility

Authority to Implement

The state has the authority to make legislative advances in waste reduction and diversion, supporting and mandating municipalities and private entities in making improvements to their current methods of waste disposal. Participants expressed a desire for the formation of regional waste authorities to reduce costs and implement innovations, while those already served by regional resource recovery authorities conveyed their importance. There was an understanding that significant coordination with the private sector haulers and developers will be vital to increase Connecticut's capacity to handle municipal solid waste and diverted organics.

Workforce Needs

There is a need to improve labor practices in the industry as there has been an overall high turnover since the pandemic while private haulers specifically have struggled with a low retention rate even while having a large applicant pool. Increased training opportunities at community colleges were cited as necessary to train younger employees to fill in workforce gaps left by older, experienced staff members who are retiring without sufficient replacements.

Sonya Carrizales facilitating

Barriers to Implementation

The need for significant public education and associated funding to improve the quality of current recycling and waste diversion efforts, while new methods of waste disposal will require accompanying campaigns to ensure smooth implementation. Funding and equitable siting are current obstacles to the development of new waste management infrastructure. The monetary and municipal staff time cost of voluntarily improving waste collection methods is significant without the state or regional support.

Equity Considerations

The greatest concern for low-income and environmental justice communities was the siting of waste management facilities. Historically, such infrastructure was built in communities with little resources to oppose their construction, bringing with them numerous negative externalities that actively diminish the quality of life for nearby residents.

Final Notes

The reduction of municipal solid waste through unit-based-pricing and organics diversion programs were seen as the most promising opportunities to significantly reduce emissions in the waste sector. However, large scale adoption of such improvements will require a paradigm shift of greater state leadership and funding support to effectively implement. Regional authorities to manage both municipal solid waste and

wastewater were viewed as cost effective means of taking up the burden of waste from the municipalities. Increased funding for public education programs was seen as essential in improving current waste management operations and as any part of a future change in collection methods.

The Future of Climate Planning in Connecticut

Currently, COGs are hard at work creating the next deliverable for the Climate Pollution Reduction Grant: the Comprehensive Climate Action Plan (CCAP). These plans are due by December 2025 and will contain long term strategies, policies, and actions that municipalities can take to reduce air pollution. COGs will share all notes and documentation from the event with consultants writing the CCAPs for the three MSAs, and they will work to identify appropriate areas to incorporate forum input and feedback into their respective plans. COGs and their consultants will continue to create region-specific engagement exercises (tabling, online surveys, public meetings, etc.) and meet with the public to hear their concerns and feedback around the topic so the public can further shape the final plan. COGs will continue to update and maintain project webpages where members of the public can interact with CPRG content. Additionally, the State is working on developing a statewide CCAP so that all residents and all municipalities are represented and can benefit from these critical plans and planning efforts. In the Fall of 2025, COGs will post the draft CCAPs for public comment, and they look forward to hearing from and working with as many members of the public as possible. For more information on the CPRG planning process, please visit the following websites:

Hartford MSA (CRCOG, RiverCOG, and NVCOG)

Southwest CT (MetroCOG, WestCOG, and NVCOG)

New Haven County (SCRCOG and NVCOG)

State of Connecticut Resources

Forum attendees

Appendix A: List of Participants

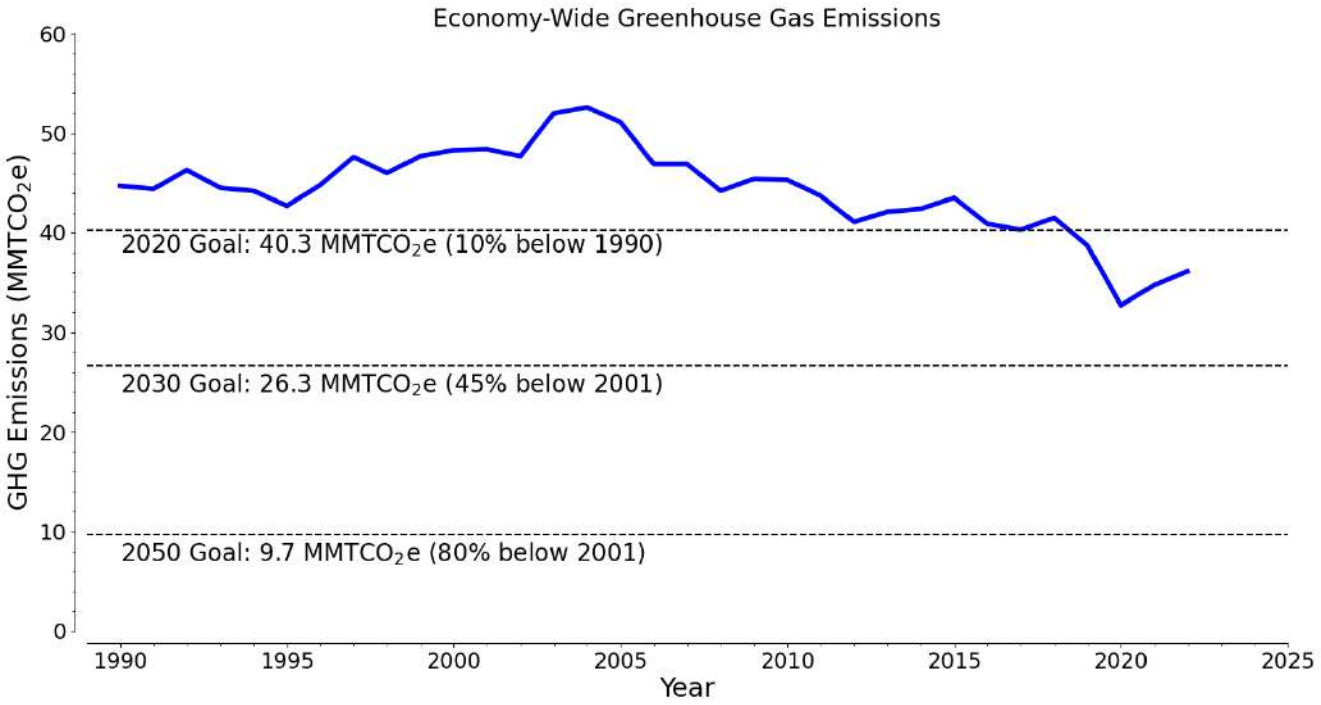
Rebecca Andreucci, CT DOT
Paul Ashworth, CT DOT
Cora Barber, CT DOT
Sydney Barnwell, CT Roundtable on Climate & Jobs
Kevin Barrow, Stewards AI
Renata Bertotti, UConn CLEAR
Emily Bigl, SECOG
Desira Blanchard, NVCOG
Tyler Bowne, Town of Branford
Mary Buchanan, CIRCA
Daniel Carter, Town of Bloomfield
Alicia Dolce, BuildGreenCT
Cecelia Drayton, City of Hartford
Sachin Dubey, UConn
Killian Duborg, Save the Sound
Lily Engbith, CT OPM
Elizabeth Esposito, Avangrid
Jonathan Ferrigno, Eversource
Camille Fontanella, CT DEEP
Bill Freeman
Brenna Giannetti, CT DEEP
Zachary Giron, CT DOT
Alexa Gorlick, Town of Berlin
Nicole Govert, CIRCA
Claudia Gwardyak, Town of Bloomfield Library Board of Trustees
Jack Healy, Town of New Milford
Arthur Henderson, Table2Ground
Darren Hobbs, CT DAS
Mary Hogue, Sustainable Fairfield
Paula Jones, Town of Bloomfield Conservation Energy and Environment Committee
Andrew Lavigne, CT DECD
Jessica LeClair, Sustainable CT
Michael Looney, CT DEEP
Sonia Marino, Town of Guilford
Mark Massaro, Eversource
Julianna McVeigh, Save the Sound
Marc Morgan, Casella
Mark Moriarty, City of New Britain
Austin Murray, Town of Manchester
Kimberly Norman-Rosedam, Town of Guilford
Leslie O'Brien, Eversource
Bernard Pelletier, PACE
Danielle Petretta, City of Stamford
John Phillips, Town of West Hartford
Allison Pilcher, CT Roundtable on Climate & Jobs
Daniel Rabin, Town of Branford Clean Energy Committee
Lilian Ruiz, CT Council on Soil & Water Conservation
Jason Scott, Town of Rocky Hill
Lindsay Seti, CCM
Katie Shelton, CT Green Bank
Ashley Stephens, Town of Vernon
Janet Stone McGuigan, Town of Greenwich
Rob Trottier, Town of Bloomfield
Emily Tully. CT DEEP
Ken Vallera, Bristol Resource Recovery Facility Operating Committee
Victoria Vetre, Resilient Land & Water
Charles Vidich, WestCOG
Bryan Walsh, CTrides
Hank Webster, CT DEEP
Ben Winter, Town of Rocky Hill
Joanna Wozniak-Brown, CT OPM
Barbara Yaeger, B. Yaeger, LLC

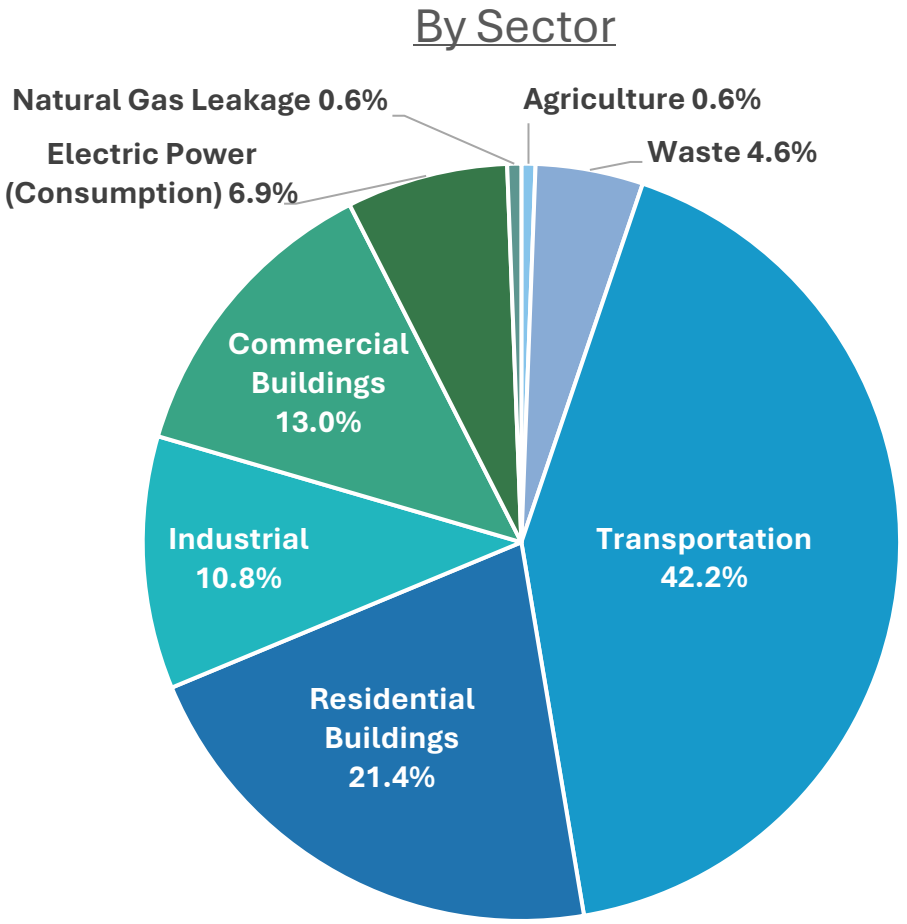
Appendix B: Presentations

CT DEEP: CLIMATE PLANNING UPDATE AND CPRG IMPLEMENTATION GRANTS

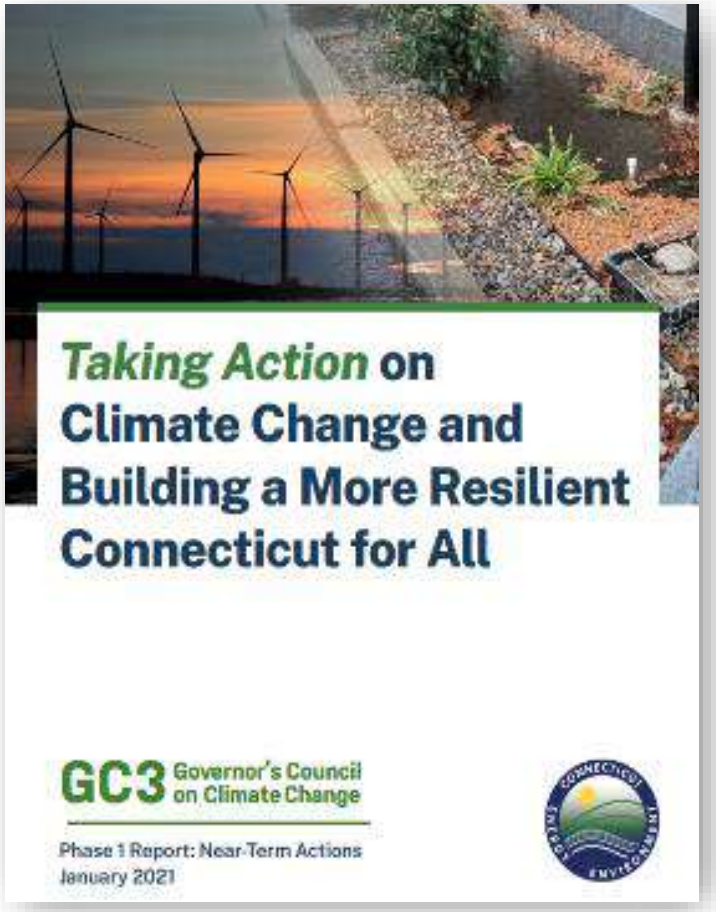
CRCOG Climate Action Summit
October 23, 2024

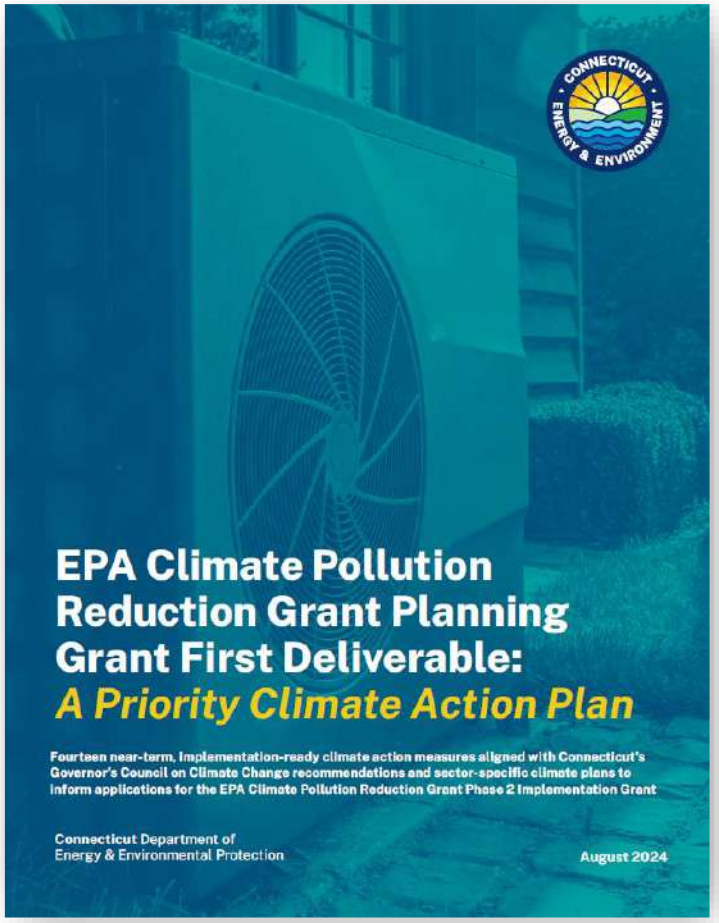
CONNECTICUT GREENHOUSE GAS INVENTORY – 2022





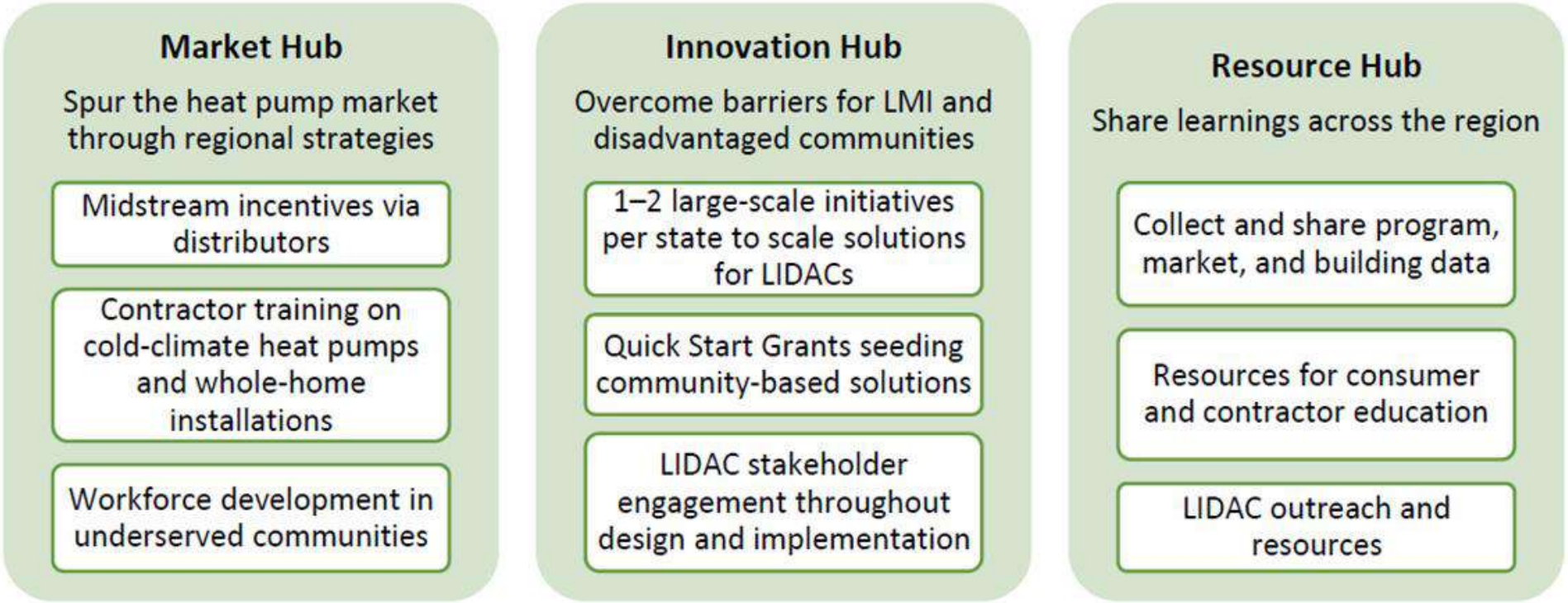
State Priority Climate Action Plan – 14 actions to implement governor's council on climate change recommendations





New England Heat Pump accelerator

- 5-State Coalition: Connecticut (Lead), Maine, Massachusetts, New Hampshire, Rhode Island
- EPA Awarded $450 Million to Boost Heat Pump Adoption, Workforce Development, Knowledge Base
- Hubs Launch in mid-2025
- GHG Reduction of over 9 million tons between 2025-2050 across coalition states.

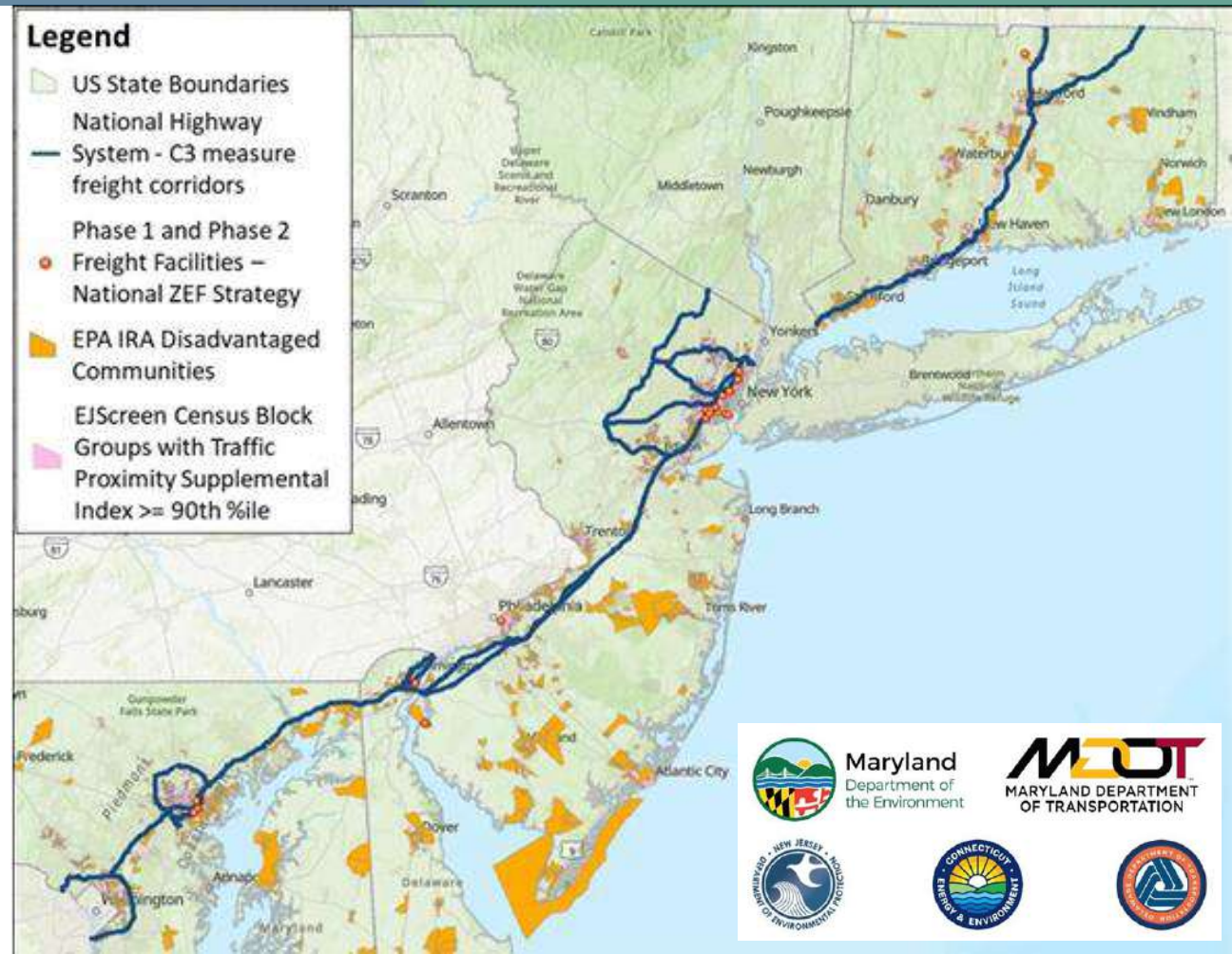


CLEAN CORRIDOR COALITION (C3)

The Clean Corridor Coalition led by New Jersey was awarded a $249 million grant from the U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Grant (CPRG) program in July 2024.

The Clean Corridor Coalition will:

- fund charging infrastructure for zero-emission medium- and heavy-duty vehicles
- provide technical assistance to charging sites
- deliver training and provide support services to establish a skilled workforce
- conduct meaningful community engagement
- enable planning by states and stakeholders along the corridor.



Next steps: Comprehensive climate action plan (CCAP)

The CCAP will serve as a roadmap to reach the state's statutory GHG emission reduction targets of:

- 45% below 2001 levels by 2030,
- a zero-carbon energy supply by 2040, and
- 80% below 2001 levels by 2050

Additionally, the state will plan for pathways to achieve **net zero by 2050**, including opportunities to use nature-based solutions for carbon sequestration in the natural and working lands sector.

Green Bank 101

Connecticut Climate Action Summit

Middlesex Community College

October 23, 2024

CONNECTICUT GREEN BANK®

Mission & Vision

CONNECTICUT GREEN BANK®

Connecticut Green Bank is the nation's first state level green bank. Established in 2011 as a quasi-public agency, the Green Bank uses limited public dollars to attract private capital investment and offers green solutions that help people, businesses and all of Connecticut thrive.

Our mission is to confront climate change by increasing and accelerating investment into Connecticut's green economy to create more resilient, healthier, and equitable communities.

PLANET PROTECTED
BY THE LOVE OF HUMANITY

Our vision

Investment to E^4 Impact

Energy and Economy

CONNECTICUT GREEN BANK

ENERGY

ENERGY BURDEN

The Green Bank has reduced the energy costs on families, businesses, and our communities.

63,300+
families

8,125+
businesses

DEPLOYMENT

The Green Bank has accelerated the growth of renewable energy to more than **707.2 MW** and lifetime savings of over **89.3 million MMBTUs** through energy efficiency projects.

ECONOMIC DEVELOPMENT

JOBS The Green Bank has supported the creation of more than **29,248** direct, indirect, and induced job-years.

TAX REVENUES

The Green Bank's activities have helped generate an estimated **$148.0** million in state tax revenues.

$56.4 million individual income tax

$58.0 million corporate taxes

$32.0 million sales taxes

$1.5 million property taxes

Invested $410 million of Public Revenues to mobilize $2.5 billion of private investment into Connecticut's green economy

Investment to E^4 Impact

Environment and Equity

CONNECTICUT GREEN BANK®

ENVIRONMENTAL PROTECTION

POLLUTION The Green Bank has helped reduce air emissions that cause climate change and worsen public health, including **7.0** million pounds of SOx and **8.7** million pounds of NOx lifetime.

11.4 MILLION tons of CO_2 : EQUALS

172 MILLION tree seedlings grown for 10 years

OR

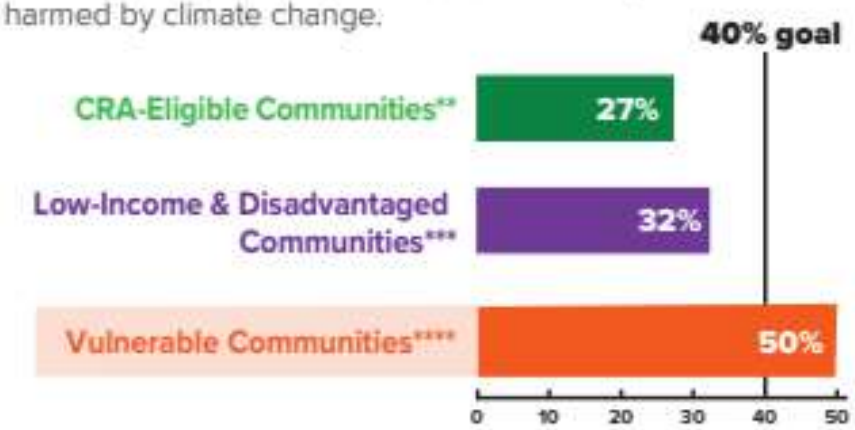
2.3 MILLION passenger vehicles driven for one year

PUBLIC HEALTH The Green Bank has improved the lives of families, helping them avoid sick days, hospital visits, and even death.

$218.9 – $494.9 million of lifetime public health value created

EQUITY

INVESTING in vulnerable communities, The Green Bank has set **goals** to reach **40% investment** in communities that may be disproportionately harmed by climate change.



** Community Reinvestment Act (CRA) Eligible Communities – households at or below 80% of Area Median Income (AMI)

*** Low-Income and Disadvantaged Communities – those within federal Climate and Economic Justice Screening Tool and Environmental Justice Screening Tool

**** Vulnerable Communities – consistent with the definition of Public Act 20-05, including low- to moderate-income communities (i.e., less than 100% AMI), CRA-eligible communities, and environmental justice communities (e.g., including DECD distressed communities)

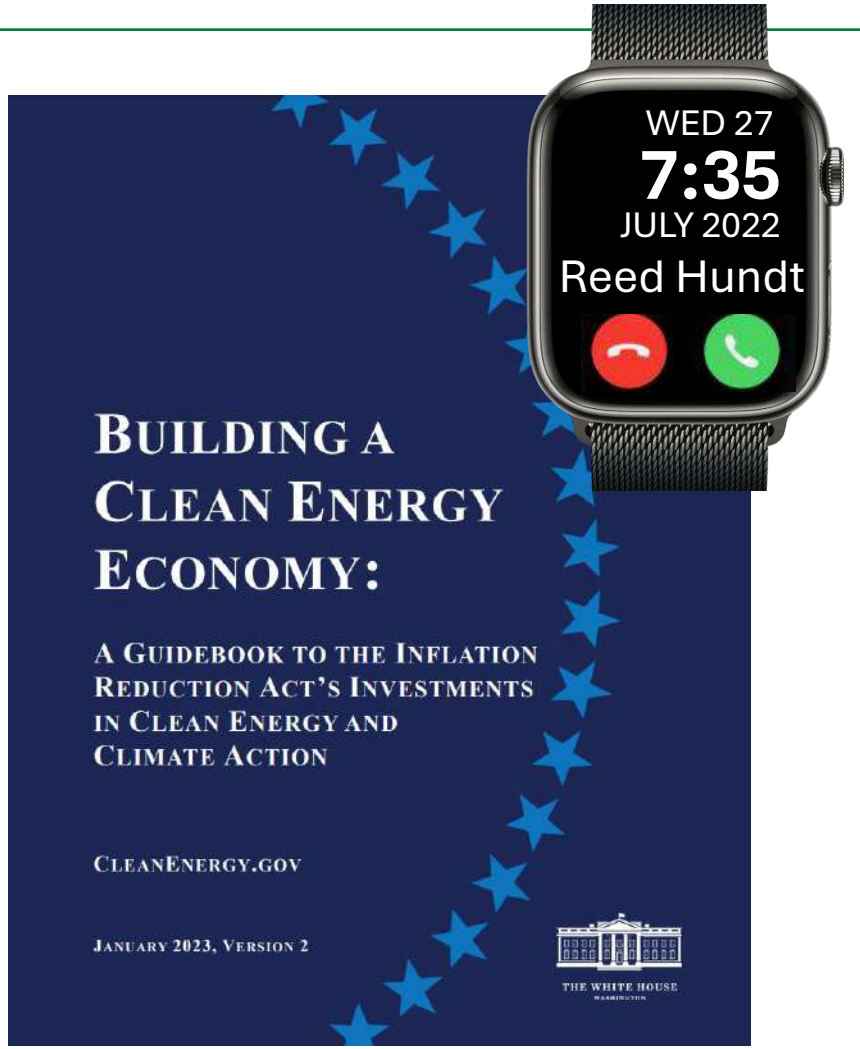
2nd Anniversary Celebration

Inflation Reduction Act

- **August 16** – Inflation Reduction Act ("IRA") signed into law on August 16, 2022 – Green Bank celebrated 2-year anniversary

- **Investment Tax Credits** ("ITC") – provided a thorough overview of 48 within the ITC, including adders (i.e., energy communities, low-income communities, domestic content)

- **Greenhouse Gas Reduction Fund** ("GGRF") – revisited the history of the GGRF (e.g., CEDA within ACES in 2009, PA 11-80), delving into Solar for All (e.g., RSIP, PosiGen), and National Clean Investment Fund (i.e., Coalition for Green Capital)



Greenhouse Gas Reduction Fund

	National Clean Investment Fund (NCIF)	Solar for All (SFA)
Funding Amount	**$14 Billion**, with 40% expended in low-income and disadvantaged communities ("LIDACs")	**$7 Billion**, with **100% expended in LIDACs**
Types of Projects	EPA identifies **distributed energy generation and storage, zero-emissions buildings, and zero-emissions transportation** as priority categories Partner with private capital providers to catalyze tens of thousands of **clean technology projects** aimed at reducing or avoiding greenhouse gas emissions	**Residential rooftop** and **community solar photovoltaic (PV) projects, including affordable multifamily housing properties** Can include associated storage and enabling upgrades
Awardees	**Coalition for Green Capital ($5 billion)** Climate United Fund ($7 billion) Power Forward Communities ($2 billion)	60 Grants to States, Municipalities, Tribal Governments and Eligible Recipient (Non-Profits); **Connecticut Department of Energy and Environmental Protection (DEEP) ($62.5 million)**
CT Green Bank Subaward	Subrecipient under CGC's award Deploy up to **$49 million** in financial assistance in CT	Subrecipient under the **Project SunBridge** award led by DEEP Deploy **$43 million** in financial assistance in CT

In addition, Clean Communities Investment Accelerator awarded $6 billion among 5 awardees

Priority Funding Areas
Connecticut Green Bank

	Program	Technology				LIDACs (min%)
		Solar	Storage	Energy Efficiency	Other	
SfA	Green Homes (Multifamily) + Additional ESS incentives	X	X	X		100%
SfA	Green Homes (Single-family)	X	X	X		100%
NCIF	Green School Buildings	X	X	X		60%
NCIF	Green Municipal & Commercial Buildings	X	X	X		40%
NCIF	Green Resilience Hubs	X	X	X	X	40%
NCIF	Environmental Infrastructure				X	40%
NCIF	Green School Buses				X	60%

**Includes additional Solar for All funding for Capital Solutions and building assessments and audits*

Green Homes Multifamily
Public Act 21-48 (Section 2)

- **Scope** – Multifamily (5+ units); may include energy audit, weatherization measures, installation of heat pumps, solar PV, battery storage, EV chargers, and/or other improvements (e.g., roof, health and safety measures).
- **Strategy** – for multifamily, we have expanded our Solar MAP program to include affordable multifamily. By integrating GGRF dollars into our financing for these projects (leases or loans), we can make the economic benefits to the property owner and tenants
- **How are we supporting communities?** – for multifamily, through our Solar MAP program, we provide full project development assistance, from initial feasibility assessments to incentive and contractor procurement to financing with GGRF dollars. This makes projects easier for property owners to get done, meaning they're saving money and the tenants are seeing larger reductions to their electric bill, while also making the property more resilient for the tenants.

Environmental Infrastructure
Public Act 21-115

- **<u>Scope</u>** – may deploy commercial technologies related to environmental infrastructure, such as land, parks and recreation, agriculture, waste and recycling (e.g., anaerobic digestion and organic waste), water, and/or utilize environmental markets that meet EPA eligible project definition.
- **<u>Strategy</u>** – Capital Solutions Open Rolling RFP
- **<u>How are we supporting communities?</u>** – we're not sure yet! Potential for project or proposal development support.

Environmental Infrastructure (cont'd)

Financing Environmental Infrastructure & Nature Based Solutions through GGRF

- Not listed as priority project categories, but any project can qualify if it meets all six eligibility requirements
- Must deliver additional benefits to American communities within one or more of the following seven categories:

(1) climate change	Urban tree canopy and carbon project
	Rural improved forest management carbon project
	Living shoreline project
(2) clean energy and energy efficiency	Food waste/Farm waste to energy, water quality benefit
(3) clean transportation	Tree planting in transit corridors
	Culvert and stream crossing improvements
(4) affordable and sustainable housing	Climate resilience measures
(5) training and workforce development	Urban/rural wood waste beneficial use with workforce development
(6) brownfield remediation	Park creation on former brownfield
(7) development of critical clean water infrastructure	Green infrastructure
	Stormwater Authority project

Financing Nature-Based Solutions via GGRF by Duke Nicholas Institute & Quantified Ventures

Green School Buses
Public Act 22-25

- **Scope** – (1) Investment in zero-emission school buses (2) Associated charging and fueling equipment (3) "Make-ready" infrastructure for charging depots & (4) Innovations to support vehicle-to-grid charging (demand response and community resilience)
- **Strategy**
  - Near-term: Increase understanding of business models & plug capital gaps for grant-supported projects
  - Medium-term: accelerate electric school bus deployment
  - Long-term: help build a robust electric school bus market!!
- **How are we supporting communities?**
  - Currently working with PURA to design and administer a "Fleet Advisory Services" Program for ESBs
  - Services will support schools and school bus operators from initial interest to fleet deployment
  - Public Health Focus: on-bus air quality improvements for kids and community-level reductions in ground-level ozone
  - 100% of school bus NCIF resources to federal EJ communities / LIDAC / Vulnerable Communities

Thank you!

CONNECTICUT
GREEN BANK®

CRCOG

Lower Connecticut River Valley Council of Governments

METROCOG
Connecticut Metropolitan Council of Governments
ctmetro.org

NHCOG
— Northwest Hills —
Council of Governments

NVCOG

SCR COG | South Central Regional Council of Governments

WESTCOG

APPENDIX C: OUTREACH AND COORDINATION LOG

TITLE	DATE	TOPIC	PARTIES INVOLVED	OUTREACH METHOD	LOCATION	OUTCOME(S) AND NEXT STEPS
IGWG	Spring 2024	Discussion of CCAP progress	All COGs involved with CPRG planning in Connecticut	Virtual	Virtual	Bi-weekly progress meetings to push progress forward
ColleCTive Climate Action Forum	10/23/24	Comprehensive Climate Action Plan Feedback from the COGs, IGWG members	CRCOG, RiverCOG, Middlesex Community College, Dewberry Engineers CT DEP, CT Creen Bank	In-Person	Middletown, CT	Use feedback gathered to inform the CCAP.
Sustainable CT Coffee Hour	11/21/24	CCAP Progress	CRCOG, NVCOG	Virtual	Virtual	Discussion of climate action planning efforts
Table Talk One	12/5/24	Extreme weather, transportation, energy, and food systems	Eight University of Connecticut EcoHusky members	In-person	University of Connecticut	Use feedback gathered to inform the CCAP measures.
Table Talk Two	12/27/24	Food access and transportation	Twenty-nine total participants comprising of community members and local organizations including Nonprofit Accountability Group (NAG), Aknew, Gay Black Men Together, BLM860, T.H.E. Movement, Fiddleheads Food Co-Op, and PowerUp	In-person	Kamora's Cultural Corner (Hartford, CT)	Use feedback gathered to inform the CCAP measures.
CTAC Meeting	1/23/25	GHG Reduction Measures	RiverCOG, CRCOG municipal staff in Hartford, East Hartford, New Britain, Manchester, Middletown, and West Hartford and Sustainable CT	Virtual	Virtual	CTAC has continued to meet on an as-needed basis to inform this process.
Table Talk Three	2/11/25	Feasibility of climate mitigation and air pollution reduction measures	Representatives from the Vernon Community Network and five Vernon residents	In-person	The NOOK (Vernon, CT)	Use feedback gathered to inform the CCAP measures.

TITLE	DATE	TOPIC	PARTIES INVOLVED	OUTREACH METHOD	LOCATION	OUTCOME(S) AND NEXT STEPS
American Planning Association National Planning Conference Virtual Presentation	4/24/25	An overview of how local governments can amplify ongoing climate action measures across the state	CRCOG	Virtual	Virtual	Explanation of CPRG program and CCAP
Tabling Events	7/13/25; 7/17/25	Discussion of CCAP progress	Community members	In-Person	Coventry Farmer's Market; Off Main Manchester	Share CCAP progress and upcoming Public Meeting
Public Meeting	7/30/25	Share draft CCAP	Share the final CCAP with residents of the MSA.	Virtual	Virtual	Gather feedback on CCAP.

APPENDIX D: DETAILED TABLE TALK SUMMARIES

Table Talk #1

Students at the University of Connecticut led a Table Talk during a sustainability club meeting. Eight club members discussed a wide range of topics, including extreme weather, transportation, energy, and food systems. Student members recalled more extensive drought conditions and less snow than in prior years. When asked about community resources and ways to respond to environmental hazards, students acknowledged that they were unaware of how to protect themselves in a weather-related emergency or the hazard mitigation resources available.

The group expressed strong support for more built public transit infrastructure, preferring trains and public transit to electric vehicles. Club members noted that in-state public transit travel is lackluster compared to interstate travel. Hartford and West Hartford were seen as having accessible public transit, while students felt they could not get around Storrs easily without a car. Barriers to traveling off campus include confusing Storrs bus software and safety concerns with using bus systems more broadly. Student members also conveyed their support for maintaining bicycle and pedestrian infrastructure, with UConn's campus highlighted as very walkable and bike friendly. Students appreciate the numerous bike lock areas, crosswalk improvements, and blocked roads for pedestrians on campus. Members felt that walking infrastructure should be extended to areas beyond campus.

When discussing the energy sector, student members indicated that energy utility costs are a problem. Students perceived some energy-efficiency barriers, including how several campus housing options are owned by a few landlords and natural gas being the only energy option on campus. They articulated how the air conditioning and heating are kept off as long as possible, due to energy-efficiency barriers in on-campus housing. Everyone in attendance knew about energy incentives such as solar panels and electric car credits and had experience utilizing cooling centers and/or participating in energy incentive programs.

Finally, the student club members spoke about food systems on and off campus. Students recognized a large discrepancy in food accessibility on and off campus, with nutritious food being easy to access without having to drive on campus and almost impossible to get without a car for students off campus. That said, students with dietary restrictions (gluten-free, dairy-free, vegetarian, etc.) have a more difficult time finding healthy, nutritious food on campus. Students were aware of some food options where fresh produce is available for community members outside of the UConn community, including the food pantry and farmer's market on campus. Club members were pleased with the convenience of visiting the farmer's market on campus while it's in season. The student group wrapped up their Table Talk discussing programs, policies, and incentives to produce less food waste. While Blue Earth composting is available in some public schools, the members reported not having many incentive programs on campus. They noted that on campus, dining halls do use food waste for biopower.

Table Talk #2

A Hartford-based community leader and Sustainable CT Equity Coach led a Table Talk session centered on cultural humility during an annual Kwanzaa celebration. Multiple

Greenhouse Gas Emissions Technical Appendix

This technical appendix provides a summary of approaches and methodologies used to calculate and quantify the greenhouse gas (GHG) reductions from each measure.

Increase Urban Tree Canopy in Municipalities Across the Region

The GHG emissions reductions and other benefits of urban tree canopy are well-studied; however, quantifying a specific case requires detailed analysis. Hartford's Tree Canopy Action Plan 2020[1] set and analyzed a goal of achieving 35% urban tree canopy by 2070 from an existing 25%. This plan references the Urban Tree Canopy Assessment & Planting Plan[2] conducted by American Forests in 2014 that quantified the benefits of the urban tree canopy, also listed at 25% at that time. This plan calculated that urban tree canopy in Hartford sequestered 0.01 million metric tons of carbon dioxide equivalents ($MMTCO_2e$) (or 10,219 metric tons of carbon dioxide equivalents ($MTCO_2e$)) annually, as well as quantifying other co-benefits. These reductions are only from carbon sequestration. There may be additional emissions reductions due to the cooling effect of the urban tree canopy that reduces the energy consumed for cooling buildings. Assuming a linear annual increase from an existing 25% to 35% by 2070, this set the projected urban tree canopy at 26.1% in 2030 and 30.6% in 2050. The GHG reductions and co-benefits were scaled to quantify the short-term and long-term impacts.

To estimate the GHG reductions and co-benefits for the CRCOG and RiverCOG region, the net impacts of increasing the urban tree canopy for Hartford (17.4 square miles) were scaled to all urbanized areas within Capital Region Council of Governments (CRCOG) and Lower Connecticut River Council of Governments (RiverCOG) as defined by the 2020 US Census (582 square miles).

Table 1. Projected Annual GHG Emissions Reduction – Increase Urban Tree Canopy

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.02	0.08

[1] City of Hartford. (2020). *Hartford Connecticut's Tree Canopy Action Plan 2020.* https://www.hartfordct.gov/files/assets/public/v/1/mayors-office/sustainability/sustainability-documents/hartford-tree-canopy-action-plan.pdf

[2] American Forests. (2014). *Urban Tree Canopy Assessment & Planting Plan. https://www.americanforests.org/wp-content/uploads/2015/04/AF-Community-ReLeaf-%e2%80%94-Hartford-UTC-Assessment.pdf*

Table 2. Projected Annual Co-Pollutant Emissions Reduction – Increase Tree Canopy

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
CO (lbs)	7,947	40,459
NO_2 (lbs)	22,459	114,334
O_3 (lbs)	160,447	816,823
SO_2 (lbs)	4,297	21,878
PM (lbs)	22,341	113,735
Reduction in stormwater runoff (gal)	869,821,853	4,428,183,977

Support the Increase of Solar Projects in the Region, Creating 900 Megawatts Across the Region

Executive Order 3 (EO3)[3], issued in September 2019, directed the Connecticut Department of Energy & Environmental Protection (CT DEEP) to analyze pathways to achieve a zero-carbon electric grid in the state by 2040. This goal was passed into law in 2022 (Public Act 22-5).[4] CT DEEP's 2020 Integrated Resources Plan,[5] published in October 2021, estimated that 2200 to 3500 megawatts (MW) of additional solar capacity needed to be installed to meet this goal. The 2850 MW mid-point of this state-wide range was prorated to the population of CRCOG and RiverCOG (approximately 30%). This set the measure goal at 900 MW by 2040. To establish short- and long-term impacts, it was assumed that installed capacity would increase linearly: 300 MW installed by 2030, and all 900 MW installed by 2040.

To calculate GHG and co-pollutant emissions reductions, the US Environmental Protection Agency's (EPA's) AVoided Emissions and geneRation Tool (AVERT)[6] v4.3 was used. AVERT is designed to model the impact of policies and programs on emissions from

[3] Lamont, N. (2019, September 3). *Executive Order No.3: Concerning Climate Change Planning and Resiliency.* Office of the Governor, State of Connecticut. https://portal.ct.gov/-/media/Office-of-the-Governor/Executive-Orders/Lamont-Executive-Orders/Executive-Order-No-3.pdf

[4] Connecticut General Assembly. (2022, May 10). *Public Act No. 22-5: An Act Concerning Climate Change Mitigation (*S.B. 10). Approved May 10, 2022, effective July 1, 2022. https://www.cga.ct.gov/2022/act/pa/pdf/2022PA-00005-R00SB-00010-PA.pdf

[5] CT DEEP. (October 2021). *2020 Connecticut Integrated Resources Plan.* CT DEEP. https://portal.ct.gov/-/media/deep/energy/irp/2020-irp/2020-connecticut-integrated-resources-plan-10-7-2021.pdf

[6] US EPA. (2024, April 11). *AVERT (AVoided Emissions and geneRation Tool) Version 4.3 [Software].* US EPA. https://www.epa.gov/avert/download-avert

electrical grid. The analysis was run for Connecticut by selecting the New England region and the total MW targets were split evenly between utility-scale solar and distributed-solar to cover a range of potential policies. It was assumed that the 900 MW projection will be met in 2040, and therefore 900 MW was modeled for 2050.

Table 3. Projected Annual GHG Emissions Reduction - Support an Increase in Solar Power

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.24	0.72

Table 4. Projected Annual Co-Pollutant Emissions Reduction - Support an Increase in Solar Power

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
SO_2 (lbs)	38,240	100,510
NO_X (lbs)	94,490	261,460
$PM_{2.5}$ (lbs)	18,300	53,260
VOCs (lbs)	6,580	18,950
NH_3 (lbs)	9,090	26,660

Reduce Municipal, Residential, and Commercial Reliance on Heating Oil by 5%

To determine the GHG emissions reductions for this measure, the RMI (formerly Rocky Mountain Institute) Energy Policy Simulator (EPS)[7] was used. The EPS is a powerful, open-source modeling tool designed to project the long-term environmental, economic, and public health impacts of various climate and energy policies. The tool operates on a set of core assumptions, establishing a "business-as-usual" baseline scenario that projects future emissions based on existing federal and state policies (as of 2024), using publicly available data from reputable sources like the US Energy Information Administration (EIA) and the EPA.

The EPS allows for modeling of specific scenarios and policy changes. For this measure, a policy change that requires 5% of all new heating system sales in both residential and commercial buildings to be electric (e.g., heat pumps) instead of fossil-fuel-based systems like heating oil furnaces by 2030 was simulated. Complete conversion was

[7] Energy Innovation Policy & Technology LLC & Rocky Mountain Institute. (2023, February 2). *Energy Policy Simulator (EPS): State-Level Climate & Energy Policy Modeling Tool [Software].* https://energypolicy.solutions/

assumed for 2050. The emissions reductions were calculated from the baseline default "business as usual" emissions as used in the 2030 and 2050 projections.

Table 5. Projected Annual GHG Emissions Reduction - Reduce Heating Oil

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.01	0.48

To calculate co-pollutant emissions reductions, the total amount of heating oil consumed annually in the residential and commercial sectors in Connecticut was prorated to the population of CRCOG and RiverCOG (approximately 132 million gallons).[8] This amount was then converted to emissions using factors from the EPA[9] while using the Connecticut heating oil sulfur content regulation of 15 parts per million for SO2.[10]

Table 6. Projected Annual Co-Pollutant Emissions Reduction - Reduce Heating Oil

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
NO_X (lbs)	132,640	2,652,800
CO (lbs)	33,160	663,200
PM (lbs)	13,264	265,280
VOCs (lbs)	2,255	45,098
SO_2 (lbs)	1,413	28,252

Install Public Electric Vehicle (EV) Charging Stations

To calculate the impact of installing public EV chargers, it was necessary to translate that action into the adoption and use of EVs to quantify the emissions. In order to reach an approximate passenger fleet vehicle mix of 25% EVs by 2030,[11] approximately 138,000 EVs

[8] US EIA. (2020). *Residential Energy Consumption Survey (RECS) 2020.* https://www.eia.gov/consumption/residential/

[9] US EPA. (2010, May). *Compilation of Air Pollutant Emission Factors, AP-42, 5th Edition: Chapter 1, Section 1.3 – Fuel Oil Combustion (Supplement E, September 1999; corrected May 2010), Table 1.3.* https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors-stationary-sources

[10] Connecticut Regulations of State Agencies. (May 2014). *Title 22a, Section 22a-174-19b (Fuel Sulfur Content Limitations for Stationary Sources).* https://portal.ct.gov/-/media/deep/air/regulations/fuelsulfurcontentlimitationsfactsheetpdf.pdf?la=en

[11] CT DEEP. (2021, April 21). *Electric Vehicle Roadmap for Connecticut: A Policy Framework to Accelerate Electric Vehicle Adoption.* https://portal.ct.gov/-/media/deep/air/mobile/evconnecticut/2020-04-22---ev-roadmap-for-connecticut---final.pdf

would need to be sold each year in Connecticut leading up to 2030 based on historic car sales.

To determine what percentage of new vehicles sold the projected 138,000 annual EV adoption would represent, the total number of new vehicles sold annually in Connecticut was determined. According to publicly available estimates, in 2023, there were 161,374 new cars sold in Connecticut.[12] Using 2023 new car sales figure as the denominator for total new vehicle sales:

> Percentage of new vehicles sold = (Average Annual New EV Registrations / Total Annual New Car Sales) * 100 Percentage of new vehicles sold = (137,931 / 161,374) * 100 Percentage of new vehicles sold ≈ 85%

Therefore, an average annual adoption of approximately 138,000 new EVs would represent roughly 85.5% of the total new vehicles sold in Connecticut, based on 2023 sales figures. The RMI EPS[13] was used to estimate the emissions reductions based on this adoption and sales rate.

Table 7. Projected Annual GHG Emissions Reduction - Install Public EV Chargers

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.09	0.44

For co-pollutants, the total number of cars registered in Connecticut were prorated by population to the CRCOG and RiverCOG region (approximately 1.1 million). Using average fleet statistics for annual miles driven and average fuel economy, a total gallons of gasoline consumed was calculated. Screening-level emissions factors from the EPA were then used to calculate the emissions in co-pollutants.[14]

[12] F&I Tools. (2024). *2023 New Vehicle Sales by State*. https://www.factorywarrantylist.com/uploads/3/3/9/4/3394652/new-vehicle-sales-by-state-2023.pdf
[13] Energy Innovation Policy & Technology LLC & Rocky Mountain Institute. (2023, February 2). *Energy Policy Simulator (EPS): State-Level Climate & Energy Policy Modeling Tool [Software]*. https://energypolicy.solutions/
[14] US EPA. (2023, August). *MOVES4 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity*. https://downloads.regulations.gov/EPA-R09-OAR-2024-0311-0010/content.pdf

Table 8. Projected Annual Co-Pollutant Emissions Reduction - Install Public EV Chargers

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
NO_X (lbs)	808,070	3,232,279
CO (lbs)	3,565,014	14,260,056
VOCs (lbs)	808,070	3,232,279
$PM_{2.5}$ (lbs)	76,054	304,215
PM_{10} (lbs)	95,067	380,268
SO_2 (lbs)	47,534	190,134

Pursue 1-2% Mode Shift Away from Single Occupancy Vehicles (SOV)

This measure was quantified using the RMI EPS[15] by modeling a mode shift policy from SOVs to alternative modes like public transit, walking, or cycling. According to the RMI EPS, 26% is a scientifically-accepted target for vehicle mode shifting by 2050. To achieve a 2% mode shift in 2030, our 2050 policy will be about 7.8% "implemented".

Table 9. Projected Annual GHG Emissions Reduction - Support Mode Shift

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.08	0.43

For co-pollutants, the total number of cars registered in Connecticut were prorated by population to the CRCOG and RiverCOG region (approximately 1.1 million). Using average fleet statistics for annual miles driven and average fuel economy, a total gallons of gasoline consumed was calculated. Screening-level emissions factors from the EPA were then used to calculate the emissions in co-pollutants.[16]

[15] Energy Innovation Policy & Technology LLC & Rocky Mountain Institute. (2023, February 2). *Energy Policy Simulator (EPS): State-Level Climate & Energy Policy Modeling Tool [Software]*. https://energypolicy.solutions/

[16] US EPA. (2023, August). *MOVES4 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity*. https://downloads.regulations.gov/EPA-R09-OAR-2024-0311-0010/content.pdf

Table 10. Projected Annual Co-Pollutant Emissions Reduction - Support Mode Shift

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
NO_X (lbs)	64,646	840,393
CO (lbs)	285,201	3,707,615
VOCs (lbs)	64,646	840,393
$PM_{2.5}$ (lbs)	6,084	79,096
PM_{10} (lbs)	7,605	98,870
SO_2 (lbs)	3,803	49,435

Switch Lawn and Garden Equipment to Electric

GHG and co-pollutant emissions data for gas-powered lawn and garden equipment (GLGE) was pulled from the EPA's 2020 National Emissions Inventory (NEI)[17] which was the most recent year available. Within the NEI, the GLGE analyzed is classified as follows:

[17] US EPA. (March 2023). *2020 National Emissions Inventory (NEI)*. https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data

Table 11. NEI GLGE Classifications

Emissions Inventory System (EIS) Sector	Mobile - Non-Road Equipment – Gasoline Mobile – Non-Road Equipment - Diesel
Source Description	Nonroad
Source Classification Code (SSC) Level 1	Mobile Sources
SSC Level 2	Off-highway Vehicle Gasoline Off-highway Vehicle Diesel
SSC Level 3	Lawn and Garden Equipment
SSC Level 4	2-Stroke Chain Saws < 6 HP (Residential) 2-Stroke Chain Saws < 6 HP (Commercial) 2-Stroke Mowers, Tractors, Turf Eqt (Commercial) 2-Stroke Lawn & Garden Eqt (Residential) 2-Stroke Snowblowers (Residential) 2-Stroke Snowblowers (Commercial) 2-Stroke Lawn & Garden Eqt (Commercial) 4-Stroke Mowers, Tractors, Turf Eqt (Commercial) 4-Stroke Lawn & Garden Eqt (Residential) 4-Stroke Snowblowers (Residential) 4-Stroke Snowblowers (Commercial) 4-Stroke Lawn & Garden Eqt (Commercial) LPG Lawn & Garden Eqt (Commercial) Diesel Mowers, Tractors, Turf Eqt (Commercial) Diesel Lawn & Garden Eqt (Commercial)

Data in the NEI is classified by county. As a reasonable proxy for the CRCOG and RiverCOG area, data was collected for Hartford, Middlesex, and Tolland Counties. Emissions of methane were converted to MTCO2e by using the 100-Year Global Warming Potential (GWP) factor of 28 as listed in the EPA's 2025 GHG Emissions Factors Hub.[18] It is estimated that replacing a gasoline-powered lawnmower with an electric model can reduce net GHG emissions by 33% to 50%.[19] To be conservative, a 33% net reduction was applied to the emissions from all types of equipment in the GLGE sector for the 2030 short-term target. The 33% net reduction was also applied to co-pollutants, when in fact some of the co-pollutants may be eliminated entirely due to the inefficient engines of GLGE as

[18] US EPA. (2025, January 15). *2025 GHG Emissions Factors Hub*. https://www.epa.gov/climateleadership/ghg-emission-factors-hub

[19] Saidani, M. & Kim, H. (2021). *Quantification of the environmental and economic benefits of the electrification of lawn mowers on the US residential market.* International Journal of Life Cycle Assessment, 26(6), 1267-1284. https://esol.ise.illinois.edu/static2/pdf/IJLCA2021.pdf

compared to utility-scale electricity production and emissions control technologies. For the long-term 2050 target, it is assumed that all emissions would be eliminated due to state net-zero goals.

Table 12. Projected Annual GHG Emissions Reduction - Switch Lawn and Garden Equipment

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.03	0.09

Table 13. Projected Annual Co-Pollutant Emissions Reduction - Switch Lawn and Garden Equipment

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
NH_3 (lbs)	844	2,559
CO (lbs)	13,247,487	40,143,899
NO_x (lbs)	168,067	509,295
$PM_{2.5}$ (lbs)	58,885	178,440
PM_{10} (lbs)	54,346	164,686
SO_2 (lbs)	380	1,151
VOCs (lbs)	809,849	2,454,088

Convert Light Duty Municipal Fleets to Electric Vehicles (EV)/Hybrids; Encourage Municipality-Owned and Privately-Owned School Buses to Switch to Electric Fleets

To determine GHG reductions from converting municipal fleets in the CRCOG and RiverCOG region, fleet vehicle usage data was provided by the Town of Manchester, located within CRCOG. The data contained information on vehicles types, fuel consumption, and mileage.

CO_2 emissions can be calculated directly from quantities of fuel. Fuel consumption in gallons of gasoline and diesel for all listed departments for FY23/24 was converted to CO_2 using the EPA's 2025 Emissions Factors Hub (Table 2).[20] Emissions from methane (CH_4) and nitrous oxide (N_2O) depend on distance, fuel type and vehicle type, and vehicle age. Some of the reported distances based on odometer readings were abnormally high and likely erroneous so the analysis was limited to vehicles with less than 20,000 annual miles

[20] US EPA. (2025, January 15). *2025 GHG Emissions Factors Hub*. https://www.epa.gov/climateleadership/ghg-emission-factors-hub

reported. Furthermore, it was assumed that all odometer readings were recording mileage and not hours operated. While the makes and models were given for each vehicle, the engine specifications were not available. It was assumed that most vehicles were gasoline and that every "large" vehicle (e.g., F-250 and larger) consumed diesel. Finally, the age for each vehicle was assumed to be the average age of the fleet. Taking the mileage, fuel and vehicle type, and age, emissions from CH_4 and N_2O were calculated using the EPA's 2025 Emissions Factors Hub (Tables 2, 3, and 4).[21] All emissions were converted to $MTCO_2e$ using unit conversions and the GWP for each compound.

To project the emissions from the Town of Manchester fleet data for the CRCOG and RiverCOG region, the results were extrapolated from the population of Manchester to the total population of the region. It was assumed that 25% of vehicles would be electrified by 2030, and 100% by 2050.

Table 14. Projected Annual GHG Emissions Reduction - Convert Municipal Fleets

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.01	0.04

To calculate co-pollutant emissions reductions, screening-level emissions factors were pulled from the EPA's Motor Vehicle Emission Simulator Version 4 (MOVES4) emissions analysis program and are given in pounds of co-pollutant per gallon of fuel consumed.[22] Calculations were thus completed with the fuel data utilized in the previous analysis.

Table 15. Projected Annual Co-Pollutant Emissions Reduction - Convert Municipal Fleets

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
NO_x (lbs)	11,994	47,976
CO (lbs)	52,914	211,657
VOCs (lbs)	11,994	47,976
$PM_{2.5}$ (lbs)	11,288	45,153
PM_{10} (lbs)	1,411	5,644
SO_2 (lbs)	706	2,822

[21] US EPA. (2025, January 15). *2025 GHG Emissions Factors Hub*. https://www.epa.gov/climateleadership/ghg-emission-factors-hub

[22] US EPA. (2023, August). *MOVES4 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity*. https://downloads.regulations.gov/EPA-R09-OAR-2024-0311-0010/content.pdf

Reduce the Region's Waste by Establishing and Expanding Residential and Academic Food Waste/ Food Rescue Diversion Programs and Increase Utilization of Anaerobic Digestion

GHG emissions were calculated using the "2015 Connecticut Statewide Waste Characterization Study" for baseline data and the EPA's Waste Reduction Model (WARM) for emissions modeling.[23] [24]

In 2015, CT DEEP commissioned a comprehensive "Statewide Waste Characterization Study." This study provides a detailed snapshot of the materials being disposed of by residents and businesses across the state.

The EPA's WARM tool is a publicly available tool designed to help solid waste planners and organizations track and report GHG emissions from different waste management practices. WARM calculates emissions in $MTCO_2e$ and considers the entire life cycle of a material:

- **Upstream (source reduction):** The emissions associated with raw material extraction, manufacturing, and transportation of a product.
- **Downstream (waste management):** The emissions associated with landfilling, incineration, recycling, composting, and anaerobic digestion.

By comparing the GHG impacts of different waste management scenarios, WARM can estimate the net emissions reductions from a proposed strategy. For example, it can compare the emissions from landfilling a ton of food waste to the emissions from composting that same ton of food waste.

Using the data from the 2015 Connecticut Waste Characterization Study, a baseline scenario in the WARM tool was created. This involved inputting the total tonnage of MSW generated in Connecticut and the percentage of each material type.

Alternative scenarios where a certain percentage of the food waste is diverted to a different management practice were modeled for the measure. For 2030, 23% of organic waste was reduced, and for 2050, 35% of waste was reduced. The emissions numbers were then prorated to the population of CRCOG and RiverCOG.

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[23] CT DEEP. (2015). *2015 Statewide Waste Characterization Study. https://portal.ct.gov/-/media/deep/waste_management_and_disposal/solid_waste_management_plan/cmmsfinal2015mswcharacterizationstudypdf.pdf*

[24] US EPA. (2023, December). *Waste Reduction Model (WARM) Version 16*. [Software]. https://www.epa.gov/waste-reduction-model/versions-waste-reduction-model#v16

Table 16. Projected Annual GHG Emissions Reduction - Reduce Food Waste

Projected Annual GHG Emissions Reduction ($MMTCO_2e$)	
2030	2050
0.14	0.21

The WARM tool does not calculate co-pollutant emissions. To do so would require a very detailed and technical analysis to account for all the variables of disposal methods. However, using default emission factors for landfills from the EPA, approximate values for co-pollutants for tons of waste reduced gives the following reductions:[25] [26]

Table 17. Projected Annual Co-Pollutant Emissions Reduction - Reduce Food Waste

Projected Annual Co-Pollutant Emissions Reduction		
	2030	2050
CO (lbs)	1,164	1,567
VOCs (lbs)	9,896	13,322

[25] US EPA. (2010, May). *Compilation of Air Pollutant Emission Factors, AP-42, Section 2.4 – Municipal Solid Waste Landfills*. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors-stationary-sources

[26] Alexander, A., Burklin, C., & Singleton, A. US EPA. (2005). *Landfill Gas Emissions Model (LandGEM) Version 3.02*. https://www.epa.gov/land-research/landfill-gas-emissions-model-landgem

community-based organizations and leaders were present, with 29 participants involved in three Table Talk conversations throughout the day. Food access was key to the morning conversation, with the facilitator asking, "Where can I find free food in my community? Is this important?" Everyone confirmed they have faced food insecurity at certain points and accessed "free food" from food banks within the past few months.

As the conversation about local food deserts progressed, one participant shared their perspective on how the food access landscape is more akin to food apartheid. One mother conveyed how the Women, Infants and Children (WIC) program is limited in accommodating dietary restrictions, as it does not provide vegetables or dairy-free food options for her family. A larger conversation emerged about whether dignity was or was not offered at the various food banks and outlets. Participants later discussed their support of and positive experiences at the Knox Farmer's Market, which includes music and spaces for socializing. Some participants learned that they could use food stamps at farmer's markets during the conversation, while the group noted how there is not a comprehensive list of farmer's markets or the vendors and products in Hartford.

The conversation shifted to where participants bought their food, and many overlapping conversations occurred over how coupons did not cover healthy food choices that participants wanted to purchase. It became clear that there is not one food outlet that serves everyone's needs, and that transportation and food issues cannot be separated. Two separate discussions about food access and transportation were held during dinner, but these talks morphed into one large discussion, further exemplifying how food and transportation are interconnected. Before merging into the other discussion, the transportation table spoke about the lack of accessible public transportation and its consequences, with participants without cars elaborating on the high costs of having to pay for Lyft or Uber services to get to their medical appointments. Participants who have used free or reduced-cost transportation services for people with disabilities shared how these services could be improved by amending the rules about scheduling the rides around companions. Others highlighted their fight to maintain free bus services that were offered post-COVID.

Table Talk #3

The third Table Talk, held by a Sustainable CT Equity Coach, was focused on several topics, including community engagement, waste management, industrial processes, and transportation. The group discussed which actions to address climate change and curb air pollution are feasible based on the CCAP measures and community feedback. The Table Talk host shared the summary of strategies below that emerged from the discussion. Participants indicated how these initiatives support a transition towards a more sustainable future that benefits both the environment and the community.

Waste and Materials Management: Several strategies to reduce waste and improve materials management in the region were identified:

1. **Recycling Programs:** Expand curbside recycling to include more materials (e.g., electronics, textiles, plastics) and improve access to recycling facilities.
2. **Zero-Waste Initiatives:** Promote waste reduction through education. Encourage composting in households and businesses.
3. **Extended Producer Responsibility (EPR):** Advocate for policies that hold manufacturers accountable for the lifecycle and disposal of their products.
4. **Waste-to-Energy Projects:** Invest in technologies that convert waste into energy, reducing landfill use and generating renewable energy.

5. **Pollution Prevention:** Implement programs that reduce waste generation at the source, particularly in sectors like construction and manufacturing.
6. **Education Campaigns:** Run public awareness campaigns to promote waste reduction, composting, and sustainable consumption, focusing on reducing single-use plastics.

Industrial Processes: Actions to reduce pollution and make industrial processes more sustainable were discussed:

1. **Cleaner Technologies:** Encourage industries to adopt energy-efficient equipment and renewable energy solutions to reduce emissions.
2. **Emissions Reduction Incentives:** Provide incentives for businesses that invest in technologies or practices that lower emissions, such as electrifying industrial processes or using carbon capture.
3. **Green Certifications:** Promote eco-friendly certifications like ISO 14001 and LEED to encourage sustainable practices in manufacturing.
4. **Sustainable Supply Chain Practices:** Support local industries in sourcing raw materials sustainably, reducing carbon footprints in production.
5. **Circular Economy Initiatives:** Promote circular economy approaches, where materials are reused and recycled, reducing the need for virgin materials.
6. **Industry Collaboration:** Foster partnerships between industries, local governments, and other stakeholders to reduce pollution and promote sustainability.

Transportation: The group focused on improving transportation options to reduce emissions:

1. **Electric Vehicle (EV) Infrastructure:** Increase EV charging station supply and collaborate with businesses to provide EV-friendly parking and charging.
2. **Public Transit Expansion:** Enhance public transportation options to reduce the reliance on private vehicles and make transit accessible more frequently.
3. **Biking and Walking Infrastructure:** Develop safer biking and walking paths to promote alternative transportation modes, and consider implementing car-free zones or bike-sharing programs.
4. **Cleaner Fuels and Technologies:** Encourage the use of cleaner fuels (biofuels, hydrogen) in public transport and freight operations.
5. **Carpooling and Ride-sharing Programs:** Promote carpooling and ride-sharing to reduce the number of vehicles on the road and minimize emissions.
6. **Telecommuting and Flexible Work Options:** Support telecommuting to reduce commuter traffic and associated pollution.
7. **Incentives for Electric and Hybrid Vehicles:** Offer financial incentives like tax credits and rebates for purchasing electric or hybrid vehicles.

Community and Engagement Strategies: The group emphasized the importance of community involvement and public education:

1. **Community Involvement:** Engage local residents and businesses in the climate action plan through surveys, focus groups, and public meetings to ensure that their concerns are addressed.
2. **Public Awareness Campaigns:** Conduct awareness campaigns focused on climate change, air pollution, and the benefits of sustainable practices, especially targeting schools and local organizations.
3. **Collaborative Partnerships:** Form partnerships with environmental groups, businesses, and government agencies to share ideas and resources for effective climate action.

APPENDIX E:
GHG TECHNICAL MEMORANDUM

APPENDIX F:
GHG INVENTORY REPORT

Greater Hartford MSA Greenhouse Gas Inventory and Methodology

Greater Hartford MSA Comprehensive Climate Action Plan

OCTOBER 10, 2024

Dewberry

DRAFT

SUBMITTED BY
Dewberry Engineers Inc.
600 Parsippany Rd, Suite 301
Parsippany, NJ 07054

SUBMITTED TO
Capital Region Council of Governments
350 Church Street, 3rd Floor
Hartford, CT 06103

Greater Hartford MSA Greenhouse Gas Inventory and Methodology

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1. Summary

This report aims to outline and describe the methodology employed in creating the greenhouse gas (GHG) inventory for the Capitol Region Council of Governments (CRCOG) and the Lower Connecticut River Valley Council of Governments (RiverCOG). This inventory forms part of their Comprehensive Climate Action Plan (CCAP) and serves as a supporting document to the associated Microsoft Excel calculations. Throughout the report, the area under discussion is referred to as the Greater Hartford Metropolitan Statistical Area (Greater Hartford MSA), also known as the Hartford-East Hartford-Middletown MSA. This project was undertaken under the Environmental Protection Agency's (EPA's) Carbon Pollution Reduction Grant (CPRG) program. This report summarizes carbon emissions as CO_2e: carbon dioxide equivalent. Because GHGs, like CH_4 and N_2O, have different climate impacts, to compare them, their impacts are converted using Global Warming Potential (GWP) values, which normalize emission impacts over a 100-year time horizon.

As part of the Priority Climate Action Plan (PCAP), a GHG inventory was performed by UMass Amherst. The EPA requires an update of this GHG inventory for the CCAP. The purpose of this document is to detail the process of developing a GHG inventory for the Greater Hartford MSA's CCAP using EPA-recommended tools and methods and update the most recent GHG inventory provided to the Greater Hartford MSA by UMASS Amherst. The UMass Amherst report and this report utilize the same underlying datasets; however, this report includes data through 2022, while the UMass Amherst report includes data only up to 2021.

The tool shows that the total estimated emissions for the Greater Hartford MSA is approximately 10.90 million metric tons of CO_2 equivalent (about the same as that for 2,700,000 gasoline-powered cars driven for a year), an increase year-over-year from UMass Amherst's 2021 GHG inventory, as shown in Table 1. This increase can be attributed to changing behavior as COVID-related business closures ended.

Table 1: Total Estimated Emissions for 2021 Versus 2022

REPORT	ESTIMATED TOTAL EMISSIONS IN MILLION METRIC TONS OF CO_2E
PCAP 2021 GHG Inventory (UMass Amherst)	8.67
CCAP 2022 GHG Inventory, this document (Dewberry)	10.90

2. Methodology

This GHG inventory for the Greater Hartford MSA utilizes the EPA's State Inventory Tool (SIT), a Microsoft Excel-based model designed to streamline the development of state-level inventories. The SIT uses data provided to agencies like the US Department of Agriculture (USDA) or the Energy Information Administration (EIA) to capture a broader snapshot of emissions statewide. In this way, the SIT provides a standardized framework for estimating emissions across various sectors including energy, transportation, industry, agriculture, and waste. Significantly, Connecticut's Department of Energy & Environmental Protection (DEEP) also uses this SIT module set and methodology.

This report utilizes a combination of state-specific data and default values pre-loaded within the SIT. In cases of gaps in recent data , such as non-dairy heifer replacement stocks or industrial energy use from wood burning, data were interpolated by averaging values from the previous five years to maintain consistency and generate a more complete inventory. As more data become available, further refinement of values within the provided Excel sheets (Appendix A), including replacing interpolated data, can be performed to generate a more accurate estimate of emissions.

Since emissions intensities as well as carbon sink sizes may vary from region to region within the state and within the Greater Hartford MSA, for the most accurate measure, emissions would ideally be directly measured at the regional level. However, data availability constraints necessitated an alternative approach. This approach employed for this analysis rests on two assumptions:

- Uniformity in emissions sources and intensities across the state and,

- Each person across the state emits the same amount of emissions.

2.1 Differences between 2021 and 2022 Inventories

There are two important differences between the methodology used for this inventory and the methodology of the previously completed inventory. UMass Amherst did their own manual calculations using emission factors from various federal sources; they did not use SIT.

Secondly, UMass Amherst normalized the emission data by either land area or population, depending on the sector. This report employs a per capita normalization approach to estimate emissions for the Greater Hartford MSA.

2.2 SIT Modules

The SIT is a modular set of spreadsheet-based calculators that guide users through the process of developing a state GHG inventory. This report calculates statewide GHG emissions before calculating a per capita emissions factor to estimate emissions at the Greater Hartford MSA level. The SIT is composed of modules, each addressing a different emission source. Users input state-specific data, and the tool calculates emissions using standardized methodologies. The SIT includes the modules listed in Table 2.

Table 2: EPA SIT Module List and Description

MODULE NAME	DESCRIPTION
Agriculture Module	Focuses on agricultural and livestock emissions
CO_2 from Fossil Fuels	Calculates and projects CO2 emissions specifically from fossil fuel combustion at stationary facilities like power plants
Coal	Dedicated to coal-related emissions and consumption projections
Electricity Consumption	Projects electricity usage and generation as well as associated emissions for residential, commercial, industrial, and transportation sectors
Industrial Processes	Covers emissions from various industrial processes
Land-Use Change and Forestry	Addresses emissions related to changes in land use and forestry practices
Mobile Combustion	Focuses on emissions from transportation and mobile sources
Natural Gas and Oil	Covers emissions from natural gas and oil consumption
Solid Waste	Addresses emissions from solid waste management
Stationary Combustion	Focuses on emissions from stationary combustion sources
Wastewater	Covers emissions related to wastewater treatment and management

Projection Tool	Creates emission forecasts from 2022-2050 based on historical data and results from the below modules (Note: this module was not used in this report as this report deals with calculating emissions from 2022)
Synthesis Tool	Combines data from other modules for comprehensive analysis and provides results

Each module provides default data and emission factors but allows for the use of state-specific data. The default data are historical data from the 1960s to 2021.

The Projection Tool will be used to provide the Greater Hartford MSA with future emissions estimates in the CCAP.

2.3 Data Sources

Table 3 below lists the data sources for the modules. Note that "SIT Default" indicates data provided by the EPA tool as well as data derived from interpolating five years of historical data where data gaps existed for 2022. The EPA provides default data for sectors, like wastewater, where emissions calculations may include data sources that are not publicly available. Note that the "Coal" module was used but returned no data as there are no emissions related to coal mining orburning activities within Connecticut.

Table 3: Module Data Sources

SECTOR	DATA UTILIZED
Agriculture	USDA, United States Geological Survey (USGS), SIT Default
Electricity Generation	EIA, SIT Default
Coal	N/A
Electricity Consumption	EIA, SIT Default
Industrial Processes	EIA, SIT Default
Land Use	USDA, SIT Default
Mobile Combustion	FHWA, SIT Default
Natural Gas and Oil	EIA, SIT Default
Solid Waste	EPA, SIT Default
Stationary Combustion	EIA, SIT Default
Wastewater	SIT Default

3. Results

According to the 'Synthesis' module, which pulls the results of each of the other modules, the total net carbon emissions for year 2022 is 34.16 million metric tons of CO_2e for all of Connecticut.

Using this total, emissions are broken down on a per capita basis. A per capita number allows for the normalization of emissions per person across Connecticut and can be used to estimate emissions for the Greater Hartford MSA by multiplying the total population of the Greater Hartford MSA by this per capita number. The total population for the State of Connecticut is 3,611,317.[1] To calculate per capita emissions, total emissions are divided by the total population of the state:

$$\frac{34{,}160{,}000}{3{,}611{,}317} = 9.45912\ metric\ tons\ CO_2e\ per\ person$$

As shown in Table 4, the total estimated emissions for the Greater Hartford MSA **is 10.9001 million metric tons of CO_2e**.

Table 4: Participating MSA GHG Emissions

GREATER HARTFORD MSA COGS	TOTAL POPULATION	TOTAL ESTIMATED EMISSIONS (MILLION METRIC TONS OF CO_2E)
CRCOG	977,165	9.243
RiverCOG	175,244	1.658
Total	**1,152,409**	**10.9001**

Since GHG reduction measures in the CCAP are focused on individual sectors, the inventory next considers emissions per sector across the region. Table 5 shows the total estimated emissions from the SIT Synthesis Tool and the percent share from each sector. The Other Energy Generation source includes energy generation that does not come from utilities and instead is generated on-site through diesel or other fossil fuel generators.

Table 5: Per Sector Emissions for Participating Regions

SOURCE	ESTIMATED EMISSIONS (MILLION METRIC TONS OF CO_2E)	ESTIMATED EMISSIONS (PERCENT SHARE)
Residential	**1.962018**	18%
Commercial	**1.199011**	11%
Industrial	**0.763007**	7%
Transportation	**4.360040**	40%
Other Energy Generation	**2.616024**	24%
Total	**10.9001**	---

[1] U.S. Census Bureau. (2022). Age and Sex. American Community Survey, ACS 5-Year Estimates Subject Tables, Table S0101. Retrieved October 1, 2024, from https://data.census.gov/table/ACSST5Y2022.S0101?q=connecticut 2022

4. Conclusion

The EPA's State Greenhouse Gas Inventory and Projection Tools offer a comprehensive and standardized approach for developing the Greater Hartford MSA's GHG inventory. The tools' alignment with federal guidelines, ability to cover multiple sectors, customization options, and extensive support make them a strong choice for completing the GHG inventory for this MSA. Through these tools, the Greater Hartford MSA can develop a transparent and reliable GHG inventory, facilitating effective climate action and integration with state efforts.

The results of this calculation estimate the emissions in the Greater Hartford MSA to be approximately **10.9001 million metric tons of CO_2e**. Once emission reduction targets are set, the Greater Hartford MSA can implement various GHG emission reduction measures across the different sectors. Some reduction measures may include promoting energy efficiency and conservation, switching to renewable energy sources, implementing demand response programs, and encouraging distributed generation.

5. References

Dewberry. (2024). Hartford-East Hartford-Middletown Priority Climate Action Plan.

EPA. (2023). State Greenhouse Gas Inventory and Projection Tools. Retrieved from https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool

APPENDIX A: SIT Modules

9. Connecticut Emissions Summary

This Worksheet Provides a Summary of Agriculture Emissions for CT Once All Prior Worksheets Have Been Completed.

Note: The Agriculture module now estimates carbon dioxide emissions from Liming of Soils and Urea Fertilization. These categories were previously estimated in the Land Use, Land-Use Change, and Forestry module. Totals below do not account for emissions from the following animals, fertilizers, crops, or harvested areas:

Enteric Fermentation:

Manure Management
and Ag Soils-Animal:

Ag Soils-Plant-Residues, Legumes, Histosols: Red Clover, White Clover, Birdsfoot Trefoil, Arrowleaf Clover, Crimson Clover,

Ag Soils-Plant-Fertilizers: Organic: Dried Blood, Compost, Other Sewage Sludge, Tankage

Rice Cultivation:

Ag Residue Burning:

Liming and Urea:

The "National Adjustment Factor" is applied to reconcile differences between the methodologies for estimating nitrous oxide emissions from agricultural soils of the National Inventory of Greenhouse Gas Emissions and the State Inventory Tool. The method used in the SIT underestimates indirect emissions from fertilizers and overestimates indirect emissions from livestock and all direct sources of agricultural soils emissions relative to the National Inventory. Other sources will not be affected.

Emissions (MMTCE)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Enteric Fermentation	0.050	0.048	0.048	0.048	0.048	0.048	0.045	0.044	0.045	0.045	0.045	0.043	0.041	0.038	0.036	0.036	0.034	0.035	0.034	0.034	0.033	0.034	0.035	0.035	0.033	0.034	0.035	0.035	0.036	0.034	0.035	0.035	-	-	-	-
Manure Management	0.017	0.017	0.022	0.023	0.023	0.023	0.017	0.016	0.018	0.019	0.019	0.019	0.019	0.019	0.018	0.032	0.019	0.033	0.033	0.021	0.022	0.023	0.023	0.023	0.023	0.024	0.026	0.026	0.029	0.027	0.028	0.025	0.024	-	-	-
Ag Soils	0.033	0.028	0.033	0.037	0.036	0.036	0.030	0.028	0.032	0.036	0.032	0.037	0.042	0.040	0.035	0.039	0.036	0.045	0.044	0.031	0.028	0.032	0.030	0.029	0.020	0.023	0.027	0.027	0.029	0.029	0.026	0.019	0.010	-	-	-
Rice Cultivation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liming	-	-	-	-	0.002	-	-	0.004	0.004	-	-	-	0.004	-	-	-	0.001	0.028	0.001	0.001	0.001	-	-	-	-	-	0.001	0.003	-	0.007	0.003	-	-	-	-	-
Urea Fertilization	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-
Agricultural Residue Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**0.100**	**0.094**	**0.104**	**0.110**	**0.110**	**0.107**	**0.092**	**0.093**	**0.100**	**0.100**	**0.096**	**0.099**	**0.107**	**0.098**	**0.090**	**0.108**	**0.090**	**0.142**	**0.112**	**0.087**	**0.084**	**0.089**	**0.089**	**0.088**	**0.075**	**0.081**	**0.090**	**0.091**	**0.094**	**0.097**	**0.092**	**0.079**	**0.034**	**-**	**-**	**-**

Emissions (MMTCO2 Eq.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Enteric Fermentation	0.183	0.177	0.176	0.178	0.176	0.176	0.166	0.160	0.165	0.164	0.165	0.156	0.150	0.140	0.131	0.132	0.125	0.129	0.126	0.126	0.121	0.123	0.129	0.129	0.120	0.123	0.129	0.128	0.134	0.125	0.128	0.127	-	-	-	-
Manure Management	0.062	0.061	0.082	0.085	0.085	0.083	0.061	0.059	0.066	0.071	0.068	0.070	0.069	0.069	0.065	0.119	0.069	0.120	0.122	0.075	0.079	0.083	0.085	0.085	0.083	0.090	0.095	0.096	0.105	0.098	0.102	0.091	0.088	-	-	-
Ag Soils	0.122	0.104	0.121	0.137	0.134	0.131	0.110	0.103	0.119	0.132	0.117	0.134	0.154	0.145	0.130	0.144	0.133	0.167	0.161	0.114	0.102	0.117	0.110	0.107	0.073	0.084	0.099	0.100	0.106	0.106	0.094	0.071	0.037	-	-	-
Rice Cultivation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liming	-	-	-	-	0.007	-	-	0.016	0.014	-	-	-	0.013	-	-	-	0.003	0.104	0.002	0.003	0.003	-	-	-	-	-	0.004	0.010	-	0.025	0.013	-	-	-	-	-
Urea Fertilization	0.001	0.001	0.001	0.002	0.003	0.002	0.001	0.001	0.002	0.002	0.003	0.004	0.005	0.004	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Agricultural Residue Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**0.368**	**0.344**	**0.380**	**0.402**	**0.404**	**0.392**	**0.339**	**0.341**	**0.367**	**0.368**	**0.353**	**0.364**	**0.392**	**0.358**	**0.328**	**0.395**	**0.331**	**0.522**	**0.412**	**0.320**	**0.306**	**0.325**	**0.325**	**0.322**	**0.276**	**0.299**	**0.328**	**0.335**	**0.345**	**0.356**	**0.337**	**0.290**	**0.125**	**-**	**-**	**-**

Emissions by Gas (MMT CO2, MMTCH4, or MMTN2O)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Carbon Dioxide	**0.001**	**0.001**	**0.001**	**0.002**	**0.010**	**0.002**	**0.001**	**0.018**	**0.016**	**0.002**	**0.003**	**0.004**	**0.018**	**0.004**	**0.002**	**0.001**	**0.004**	**0.106**	**0.004**	**0.004**	**0.005**	**0.002**	**0.002**	**0.001**	**0.001**	**0.001**	**0.005**	**0.011**	**0.001**	**0.026**	**0.014**	**0.001**	**-**	**-**	**-**	**-**
Liming	-	-	-	-	0.007	-	-	0.016	0.014	-	-	-	0.013	-	-	-	0.003	0.104	0.002	0.003	0.003	-	-	-	-	-	0.004	0.010	-	0.025	0.013	-	-	-	-	-
Urea Fertilization	0.001	0.001	0.001	0.002	0.003	0.002	0.001	0.001	0.002	0.002	0.003	0.004	0.005	0.004	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Methane	**0.008**	**0.008**	**0.008**	**0.008**	**0.008**	**0.008**	**0.007**	**0.007**	**0.008**	**0.008**	**0.008**	**0.007**	**0.007**	**0.007**	**0.006**	**0.007**	**0.006**	**0.007**	**0.007**	**0.007**	**0.006**	**0.007**	**0.007**	**0.007**	**0.007**	**0.007**	**0.007**	**0.007**	**0.008**	**0.007**	**0.008**	**0.007**	**0.003**	**-**	**-**	**-**
Enteric Fermentation	0.007	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.004	0.005	0.004	0.005	0.004	0.004	0.005	0.005	0.004	0.004	0.005	0.005	0.005	0.004	0.005	0.005	-	-	-	-
Manure Management	0.001	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	-	-	-
Rice Cultivation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agricultural Residue Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrous Oxide	**0.001**	**0.000**	**0.001**	**0.001**	**0.001**	**0.001**	**0.000**	**0.000**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**-**	**-**	**-**
Manure Management	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-
Ag Soils	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-
Agricultural Residue Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Nitrous Oxide Emissions from Ag Soils (metric tons N2O)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Direct	**383**	**330**	**379**	**426**	**423**	**406**	**346**	**322**	**360**	**402**	**362**	**406**	**475**	**449**	**392**	**441**	**403**	**511**	**487**	**347**	**311**	**360**	**349**	**332**	**230**	**258**	**300**	**300**	**318**	**319**	**285**	**218**	**113**	**-**	**-**	**-**
Fertilizers	166	125	143	192	188	198	166	150	193	248	203	252	320	301	246	229	259	287	266	191	160	211	198	164	84	112	156	161	167	176	155	101	-	-	-	-
Crop Residues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Fixing Crops	41	39	42	39	50	24	28	19	12	13	17	12	16	17	12	12	10	12	15	9	8	7	9	9	10	8	6	11	11	8	6	7	-	-	-	-
Histosols	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Livestock	176	166	193	196	185	185	153	153	155	141	142	142	140	132	134	199	135	212	206	147	143	141	142	158	136	139	138	129	140	135	124	110	113	-	-	-
Indirect	**77**	**62**	**80**	**92**	**81**	**89**	**71**	**69**	**89**	**95**	**78**	**100**	**106**	**98**	**99**	**102**	**97**	**118**	**119**	**85**	**73**	**81**	**67**	**72**	**45**	**60**	**74**	**76**	**81**	**80**	**70**	**48**	**25**	**-**	**-**	**-**
Fertilizers	15	11	14	17	15	17	14	13	20	23	18	25	27	25	25	21	25	26	27	20	17	19	15	16	9	13	18	19	20	19	17	11	-	-	-	-
Livestock	15	14	18	19	17	17	13	13	14	12	11	12	11	10	11	17	10	18	18	11	11	10	10	11	9	10	9	9	10	10	9	7	16	-	-	-
Leaching/Runoff	47	38	48	56	49	54	43	42	56	60	49	63	68	63	63	63	62	73	75	53	46	51	42	45	27	37	47	48	51	50	44	30	8	-	-	-
Fertilizer Runoff/Leac	30	21	28	35	30	35	29	27	40	46	37	50	55	51	50	43	50	53	54	41	34	39	30	32	17	26	36	38	40	39	34	22	-	-	-	-
Manure Runoff/Leach	17	16	20	21	19	19	15	15	16	14	12	13	13	12	12	20	12	21	20	13	12	12	11	13	10	11	11	10	12	11	10	8	8	-	-	-
TOTAL	**460**	**392**	**458**	**518**	**505**	**495**	**417**	**390**	**449**	**497**	**441**	**506**	**581**	**547**	**491**	**542**	**501**	**629**	**607**	**431**	**384**	**440**	**416**	**403**	**275**	**318**	**373**	**376**	**399**	**399**	**354**	**266**	**138**	**-**	**-**	**-**

CO2 Emissions (MMTCO2 Eq.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Liming	-	-	-	-	0.007	-	-	0.016	0.014	-	-	-	0.013	-	-	-	0.003	0.104	0.002	0.003	0.003	-	-	-	-	-	0.004	0.010	-	0.025	0.013	-	-	-	-	-
Urea Fertilization	0.001	0.001	0.001	0.002	0.003	0.002	0.001	0.001	0.002	0.002	0.003	0.004	0.005	0.004	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-	-
TOTAL	**0.001**	**0.001**	**0.001**	**0.002**	**0.010**	**0.002**	**0.001**	**0.018**	**0.016**	**0.002**	**0.003**	**0.004**	**0.018**	**0.004**	**0.002**	**0.001**	**0.004**	**0.106**	**0.004**	**0.004**	**0.005**	**0.002**	**0.002**	**0.001**	**0.001**	**0.001**	**0.005**	**0.011**	**0.001**	**0.026**	**0.014**	**0.001**	**-**	**-**	**-**	**-**

CH4 Emissions (MMTCO2 Eq.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Enteric Fermentation	0.183	0.177	0.176	0.178	0.176	0.176	0.166	0.160	0.165	0.164	0.165	0.156	0.150	0.140	0.131	0.132	0.125	0.129	0.126	0.126	0.121	0.123	0.129	0.129	0.120	0.123	0.129	0.128	0.134	0.125	0.128	0.127	-	-	-	-
Manure Management	0.041	0.041	0.043	0.047	0.046	0.045	0.042	0.040	0.047	0.052	0.050	0.052	0.052	0.051	0.049	0.059	0.052	0.063	0.065	0.056	0.060	0.063	0.065	0.065	0.065	0.071	0.076	0.077	0.084	0.082	0.084	0.077	0.075	-	-	-
Rice Cultivation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agricultural Residue Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**0.224**	**0.219**	**0.219**	**0.225**	**0.222**	**0.221**	**0.208**	**0.201**	**0.212**	**0.215**	**0.214**	**0.208**	**0.202**	**0.192**	**0.180**	**0.191**	**0.177**	**0.193**	**0.190**	**0.182**	**0.181**	**0.187**	**0.193**	**0.194**	**0.184**	**0.195**	**0.205**	**0.205**	**0.218**	**0.207**	**0.213**	**0.204**	**0.075**	**-**	**-**	**-**

N2O Emissions (MMTCO2 Eq.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Manure Management	0.021	0.020	0.039	0.038	0.038	0.037	0.020	0.019	0.020	0.019	0.019	0.018	0.018	0.018	0.016	0.059	0.017	0.057	0.057	0.020	0.019	0.020	0.020	0.019	0.018	0.018	0.019	0.019	0.021	0.017	0.017	0.014	0.014	-	-	-
Ag Soils	0.122	0.104	0.121	0.137	0.134	0.131	0.110	0.103	0.119	0.132	0.117	0.134	0.154	0.145	0.130	0.144	0.133	0.167	0.161	0.114	0.102	0.117	0.110	0.107	0.073	0.084	0.099	0.100	0.106	0.106	0.094	0.071	0.037	-	-	-
Agricultural Residue Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**0.143**	**0.124**	**0.160**	**0.176**	**0.172**	**0.169**	**0.130**	**0.122**	**0.139**	**0.151**	**0.136**	**0.152**	**0.172**	**0.163**	**0.146**	**0.203**	**0.150**	**0.223**	**0.218**	**0.134**	**0.121**	**0.137**	**0.130**	**0.126**	**0.091**	**0.103**	**0.118**	**0.119**	**0.126**	**0.122**	**0.111**	**0.085**	**0.050**	**-**	**-**	**-**

10. Connecticut Emissions Summary (MMTCO2E)

MMTCO2E	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	8.15	7.89	9.36	8.94	8.54	7.85	8.32	8.07	7.02	7.93	8.75	8.46	8.20	9.77	10.27	9.35	8.06	8.29	8.12	8.13	7.59	7.23	6.67	7.26	7.54	7.73	6.31	6.54	7.51	7.33	6.59	7.17	7.12	-	-	-
Coal	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	6.09	5.85	7.04	6.63	6.26	5.61	5.93	5.86	5.10	5.85	6.48	6.24	6.01	7.28	7.87	6.93	5.93	5.94	5.80	5.74	5.27	4.79	4.42	4.73	4.75	4.96	3.80	3.91	4.62	4.48	3.94	4.45	4.36	-	-	-
Natural Gas	2.05	2.03	2.31	2.30	2.27	2.23	2.39	2.21	1.92	2.08	2.27	2.23	2.19	2.48	2.40	2.42	2.13	2.35	2.32	2.39	2.33	2.44	2.25	2.53	2.79	2.77	2.50	2.64	2.90	2.85	2.65	2.71	2.76	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	3.80	3.64	4.28	3.82	4.15	3.82	4.11	4.28	4.01	4.27	4.54	4.31	4.12	4.95	3.94	3.75	3.32	3.35	3.37	3.28	3.36	3.59	3.24	3.57	3.81	4.32	3.89	3.90	4.31	4.17	3.80	4.27	4.21	-	-	-
Coal	0.02	0.03	0.04	0.02	0.02	0.05	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	2.17	2.14	2.62	2.08	1.98	1.70	1.92	1.94	1.70	1.67	1.88	1.89	1.91	2.84	2.00	1.79	1.53	1.39	1.33	1.12	1.14	1.15	0.93	1.06	1.02	1.47	1.15	1.04	1.14	1.03	0.95	1.26	1.20	-	-	-
Natural Gas	1.61	1.47	1.63	1.71	2.14	2.07	2.17	2.32	2.30	2.58	2.65	2.41	2.20	2.11	1.93	1.94	1.78	1.95	2.04	2.16	2.21	2.45	2.32	2.51	2.79	2.85	2.73	2.86	3.17	3.14	2.86	3.01	3.01	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial	3.63	3.91	4.03	4.05	3.71	3.63	3.52	3.25	2.75	2.84	2.98	2.85	2.72	3.70	3.49	3.82	3.55	2.86	1.87	2.89	2.87	2.86	2.60	2.99	2.84	2.42	2.55	2.60	2.58	2.53	2.50	2.13	2.47	-	-	-
Coal	-	-	0.02	0.06	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	2.31	2.23	2.14	2.09	2.07	1.97	1.84	1.46	1.08	1.20	1.31	1.52	1.21	2.46	2.42	2.75	2.42	1.67	0.69	1.60	1.61	1.48	1.18	1.42	1.34	1.07	1.27	1.32	1.30	1.25	1.30	0.95	1.22	-	-	-
Natural Gas	1.32	1.69	1.87	1.90	1.58	1.66	1.68	1.79	1.67	1.64	1.67	1.33	1.51	1.23	1.07	1.07	1.13	1.19	1.18	1.29	1.27	1.38	1.42	1.56	1.49	1.35	1.28	1.28	1.29	1.28	1.20	1.18	1.25	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transportation	14.52	14.39	14.46	14.49	14.41	14.14	14.94	15.00	15.25	16.47	16.05	16.72	16.65	17.40	19.06	18.07	17.32	17.23	16.23	15.90	15.71	15.43	15.02	14.80	14.78	14.89	15.03	15.15	15.48	15.25	12.93	14.13	14.59	-	-	-
Coal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	14.50	14.36	14.42	14.47	14.37	14.07	14.86	14.86	15.20	16.30	15.87	16.56	16.51	17.21	18.86	17.88	17.14	16.99	15.99	15.58	15.35	15.09	14.76	14.56	14.52	14.61	14.79	14.85	15.15	14.88	12.56	13.75	14.24	-	-	-
Natural Gas	0.03	0.03	0.03	0.03	0.04	0.07	0.08	0.14	0.05	0.17	0.17	0.17	0.14	0.19	0.20	0.19	0.18	0.24	0.23	0.32	0.37	0.35	0.26	0.24	0.26	0.28	0.24	0.31	0.33	0.37	0.37	0.38	0.35	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric Power	11.03	10.62	8.57	7.41	7.28	8.10	9.14	12.22	11.09	9.85	10.65	9.47	8.59	7.87	8.66	9.89	9.48	8.82	7.95	6.57	7.70	6.58	7.23	6.78	6.69	7.42	6.97	6.27	8.03	7.92	8.66	9.23	8.02	-	-	-
Coal	3.63	3.64	3.66	3.44	3.56	3.82	3.90	4.26	3.08	1.44	3.44	3.80	3.26	3.99	4.20	4.00	4.36	3.80	4.31	2.51	2.74	0.58	0.89	0.73	0.87	0.62	0.22	0.24	0.38	0.08	0.01	0.28	0.20	-	-	-
Petroleum	6.70	6.16	4.18	3.33	2.71	2.71	4.28	6.64	6.89	6.72	5.36	3.94	1.81	1.60	1.29	2.46	1.05	1.07	0.45	0.25	0.36	0.13	0.10	0.22	0.36	0.28	0.07	0.12	0.24	0.02	0.04	0.05	0.10	-	-	-
Natural Gas	0.69	0.83	0.74	0.63	1.00	1.57	0.97	1.32	1.11	1.70	1.85	1.73	3.53	2.27	3.17	3.43	4.07	3.95	3.19	3.81	4.60	5.87	6.24	5.83	5.45	6.52	6.68	5.91	7.40	7.81	8.61	8.90	7.73	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
International Bunker Fuels	0.19	0.21	0.24	0.22	0.23	0.24	0.25	0.24	0.22	0.25	0.27	0.23	0.22	0.23	0.27	0.28	0.27	0.25	0.22	0.17	0.25	0.28	0.29	0.21	0.25	0.22	0.23	0.30	0.36	0.28	0.13	0.18	0.25	-	-	-
Petroleum	0.19	0.21	0.24	0.22	0.23	0.24	0.25	0.24	0.22	0.25	0.27	0.23	0.22	0.23	0.27	0.28	0.27	0.25	0.22	0.17	0.25	0.28	0.29	0.21	0.25	0.22	0.23	0.30	0.36	0.28	0.13	0.18	0.25	-	-	-
TOTAL	41.13	40.45	40.70	38.70	38.08	37.53	40.04	42.82	40.12	41.36	42.96	41.82	40.28	43.69	45.41	44.88	41.72	40.55	37.54	36.76	37.24	35.70	34.76	35.39	35.65	36.78	34.74	34.47	37.91	37.20	34.49	36.93	36.41	-	-	-
Coal	3.66	3.67	3.73	3.53	3.66	3.88	3.91	4.27	3.10	1.45	3.45	3.81	3.27	4.00	4.21	4.02	4.36	3.81	4.31	2.51	2.74	0.58	0.89	0.73	0.87	0.62	0.22	0.24	0.38	0.08	0.01	0.28	0.20	-	-	-
Petroleum	31.77	30.74	30.40	28.61	27.39	26.06	28.84	30.76	29.97	31.74	30.91	30.15	27.44	31.39	32.44	31.82	28.07	27.06	24.26	24.30	23.73	22.64	21.38	21.98	22.00	22.39	21.08	21.24	22.44	21.66	18.78	20.46	21.12	-	-	-
Natural Gas	5.70	6.04	6.58	6.57	7.03	7.59	7.29	7.79	7.05	8.16	8.60	7.86	9.57	8.29	8.76	9.04	9.28	9.69	8.96	9.96	10.77	12.48	12.48	12.68	12.78	13.76	13.43	13.00	15.08	15.46	15.70	16.19	15.10	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ac

Note: The Land Use, Land-Use Change, and Forestry module no longer estimates carbon dioxide emissions from Liming of Soils and Urea Fertilization. These categories are now estimated in the Agriculture module.

Emissions were not calculated for the following sector: Forest Fires. If you skipped any of these by mistake, please return to the control worksheet and complete each skipped source.

Emissions* (MMTCO2E)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net Forest Carbon Flux	(4.25)	(4.28)	(4.32)	(3.74)	(3.75)	(3.74)	(3.74)	(3.76)	(3.75)	(3.78)	(3.80)	(3.81)	(3.82)	(3.87)	(3.90)	(3.93)	(3.96)	(3.97)	(4.03)	(4.05)	(4.04)	(4.04)	(4.05)	(4.05)	(4.04)	(4.04)	(4.07)	(4.10)	(4.12)	(4.16)	(4.19)	(4.05)	(2.98)	-	-	-
Forest Land Remaining Forest Land	(3.30)	(3.32)	(3.35)	(2.76)	(2.77)	(2.76)	(2.76)	(2.75)	(2.74)	(2.76)	(2.78)	(2.79)	(2.80)	(2.84)	(2.85)	(2.87)	(2.90)	(2.92)	(2.96)	(2.97)	(2.96)	(2.96)	(2.97)	(2.96)	(2.95)	(2.95)	(2.98)	(3.01)	(3.03)	(3.07)	(3.10)	(3.12)	(2.98)	-	-	-
Aboveground Biomass	(2.05)	(2.07)	(2.10)	(2.09)	(2.09)	(2.09)	(2.08)	(2.08)	(2.07)	(2.09)	(2.10)	(2.12)	(2.13)	(2.15)	(2.16)	(2.19)	(2.21)	(2.23)	(2.26)	(2.28)	(2.29)	(2.30)	(2.31)	(2.32)	(2.33)	(2.34)	(2.36)	(2.39)	(2.41)	(2.44)	(2.46)	(2.48)	(2.22)	-	-	-
Belowground Biomass	(0.39)	(0.39)	(0.40)	(0.39)	(0.39)	(0.39)	(0.39)	(0.39)	(0.39)	(0.39)	(0.40)	(0.40)	(0.40)	(0.41)	(0.41)	(0.41)	(0.42)	(0.42)	(0.43)	(0.43)	(0.43)	(0.43)	(0.44)	(0.44)	(0.44)	(0.44)	(0.45)	(0.45)	(0.46)	(0.46)	(0.47)	(0.47)	(0.42)	-	-	-
Deadwood	(0.28)	(0.28)	(0.28)	(0.29)	(0.30)	(0.30)	(0.31)	(0.31)	(0.32)	(0.32)	(0.32)	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.32)	(0.32)	(0.33)	(0.33)	(0.32)	(0.32)	(0.31)	(0.30)	(0.29)	(0.29)	(0.30)	(0.31)	(0.31)	(0.32)	(0.33)	(0.34)	(0.31)	-	-	-
Litter	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	-	-	-
Soil (Mineral)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.01)	-	-	0.01	0.02	0.03	0.04	0.05	0.06	0.06	0.07	0.08	(0.01)	-	-	-
Soil (Organic)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drained Organic Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total wood products and landfills	(0.47)	(0.47)	(0.47)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	-	-	-	-
Land Converted to Forest Land	(1.32)	(1.33)	(1.34)	(1.35)	(1.35)	(1.35)	(1.35)	(1.38)	(1.38)	(1.38)	(1.38)	(1.38)	(1.38)	(1.39)	(1.41)	(1.42)	(1.42)	(1.41)	(1.43)	(1.44)	(1.44)	(1.44)	(1.44)	(1.45)	(1.45)	(1.45)	(1.45)	(1.45)	(1.45)	(1.45)	(1.45)	(1.29)	-	-	-	-
Aboveground Biomass	(0.90)	(0.91)	(0.91)	(0.91)	(0.91)	(0.91)	(0.91)	(0.93)	(0.93)	(0.93)	(0.93)	(0.93)	(0.93)	(0.94)	(0.96)	(0.96)	(0.96)	(0.96)	(0.97)	(0.98)	(0.98)	(0.98)	(0.98)	(0.98)	(0.99)	(0.99)	(0.99)	(0.99)	(0.99)	(0.99)	(0.99)	(0.91)	-	-	-	-
Belowground Biomass	(0.15)	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.16)	-	-	-	-
Deadwood	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.07)	-	-	-	-
Litter	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.14)	-	-	-	-
Soil (Mineral)	-	-	-	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	-	-	-	-
Forest Land Converted to Land	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	-	-	-	-
Aboveground Biomass	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	-	-	-	-
Belowground Biomass	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-	-	-
Deadwood	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-	-
Litter	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	-	-	-	-
Soil (Mineral)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-
Urban Trees	(1.73)	(1.75)	(1.78)	(1.81)	(1.84)	(1.87)	(1.89)	(1.92)	(1.95)	(1.98)	(2.01)	(2.01)	(2.02)	(2.02)	(2.03)	(2.04)	(2.04)	(2.05)	(2.06)	(2.06)	(2.07)	(2.07)	(2.08)	(2.09)	(2.09)	(2.10)	(2.10)	(2.11)	(2.12)	(2.12)	(1.89)	(2.05)	(2.06)	-	-	-
Landfilled Yard Trimmings and Food Scraps	(0.31)	(0.29)	(0.28)	(0.24)	(0.21)	(0.17)	(0.13)	(0.14)	(0.14)	(0.13)	(0.13)	(0.13)	(0.14)	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)	(0.10)	(0.12)	(0.13)	(0.12)	(0.12)	(0.11)	(0.11)	(0.11)	(0.10)	(0.09)	(0.12)	(0.12)	(0.12)	(0.12)	(0.07)	-	-	-
Grass	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	-	-	-
Leaves	(0.13)	(0.12)	(0.12)	(0.10)	(0.09)	(0.07)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	-	-	-
Branches	(0.13)	(0.12)	(0.12)	(0.10)	(0.09)	(0.07)	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	-	-	-
Landfilled Food Scraps	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	-	-	-	-
Forest Fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N2O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N2O from Settlement Soils	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Agricultural Soil Carbon Flux	(0.09)	(0.11)	(0.08)	(0.17)	(0.09)	(0.10)	(0.13)	(0.14)	(0.12)	(0.14)	(0.10)	(0.13)	(0.14)	(0.12)	(0.08)	(0.10)	(0.04)	(0.08)	(0.11)	(0.08)	(0.10)	(0.08)	(0.08)	(0.09)	(0.11)	(0.12)	(0.10)	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	-	-	-
Additional Emission Sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**(6.37)**	**(6.43)**	**(6.46)**	**(5.96)**	**(5.88)**	**(5.88)**	**(5.89)**	**(5.96)**	**(5.96)**	**(6.02)**	**(6.03)**	**(6.08)**	**(6.11)**	**(6.13)**	**(6.12)**	**(6.18)**	**(6.15)**	**(6.21)**	**(6.30)**	**(6.31)**	**(6.33)**	**(6.31)**	**(6.33)**	**(6.34)**	**(6.35)**	**(6.37)**	**(6.38)**	**(6.41)**	**(6.46)**	**(6.50)**	**(6.31)**	**(6.32)**	**(5.22)**	**-**	**-**	**-**

*** Note that parentheses indicate net sequestration.**

7. Connecticut Emissions Summary (MMTCO2E)

MMTCO2E	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	4.05	4.07	4.09	4.11	4.25	4.01	4.27	4.24	4.27	4.51	4.54	4.67	4.67	5.14	5.25	5.02	4.73	4.51	3.93	3.52	3.80	3.44	3.37	3.42	3.26	3.19	3.32	2.96	3.05	2.89	3.29	3.32	3.25	-	-	-
Space Heating	0.37	0.37	0.37	0.37	0.38	0.38	0.39	0.38	0.39	0.41	0.41	0.42	0.38	0.44	0.38	0.22	0.22	0.24	0.23	0.23	0.29	0.32	0.31	0.34	0.35	0.37	0.35	0.33	0.37	0.37	0.37	-	-	-	-	-
Air conditioning	0.37	0.37	0.37	0.37	0.38	0.38	0.39	0.38	0.39	0.41	0.41	0.42	0.49	0.56	0.42	0.70	0.56	0.49	0.32	0.24	0.29	0.29	0.29	0.32	0.33	0.35	0.37	0.42	0.41	0.55	0.45	0.55	0.55	-	-	-
Water Heating	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.32	0.32	0.33	0.34	0.35	0.34	0.35	0.32	0.32	0.29	0.27	0.33	0.33	0.33	0.34	0.36	0.39	0.36	0.34	0.35	0.32	0.34	0.33	0.33	-	-	-
Lighting	1.70	1.72	1.73	1.76	1.79	1.79	1.83	1.85	1.90	1.96	1.98	2.06	2.09	2.08	2.03	2.04	1.48	1.06	1.18	0.94	0.92	0.75	0.41	0.42	0.42	0.42	0.42	0.38	0.37	0.36	0.36	0.36	0.36	-	-	-
Cooking	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.33	0.34	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	-	-	-
Refrigeration	0.44	0.45	0.44	0.45	0.46	0.46	0.47	0.48	0.50	0.50	0.50	0.55	0.53	0.54	0.53	0.56	0.44	0.41	0.44	0.47	0.53	0.59	0.57	0.56	0.49	0.45	0.46	0.41	0.41	0.41	0.41	0.41	0.41	-	-	-
Office Equipment	0.22	0.22	0.22	0.23	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.27	0.27	0.27	0.27	0.31	0.35	0.35	0.35	0.35	0.34	0.39	0.38	0.38	0.35	0.33	0.32	0.27	0.25	0.24	0.22	0.22	0.23	-	-	-
Computers	0.22	0.22	0.22	0.23	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.27	0.27	0.27	0.27	0.31	0.35	0.35	0.35	0.35	0.34	0.39	0.38	0.38	0.35	0.33	0.32	0.27	0.25	0.24	0.22	0.22	0.23	-	-	-
Other	0.53	0.54	0.54	0.55	0.56	0.56	0.56	0.56	0.61	0.63	0.63	0.65	0.66	0.65	0.71	0.77	0.74	0.80	0.69	0.63	0.71	0.68	0.66	0.66	0.70	0.72	0.75	0.72	0.76	0.70	0.72	0.72	0.73	-	-	-
Industrial	2.38	2.37	2.29	2.18	2.31	2.31	2.31	2.31	2.26	2.28	2.27	2.17	2.09	2.09	2.09	2.01	1.79	1.83	1.35	1.03	1.11	1.03	0.99	0.91	0.90	0.85	0.82	0.78	0.78	0.70	0.73	0.65	0.68	-	-	-
Delivered-case Boiler Fuel	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-
Conventional Boiler Use	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-
CHP and/or Cogeneration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Direct-Use Total Process	2.37	2.35	2.27	2.16	2.29	2.29	2.29	2.29	2.24	2.26	2.25	2.15	2.07	2.07	2.07	1.99	1.77	1.81	1.33	1.01	1.09	1.01	0.97	0.89	0.88	0.83	0.80	0.76	0.76	0.68	0.71	0.63	0.66	-	-	-
Process Heating	0.29	0.28	0.28	0.27	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.26	0.27	0.26	0.27	0.24	0.29	0.27	0.27	0.25	0.25	0.24	0.24	0.22	0.21	0.22	0.20	0.20	0.19	0.20	0.18	0.18	-	-	-
Process Cool-ing and Refrig.	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-	-	-
Machine Drive	1.09	1.08	1.03	1.00	1.05	1.05	1.06	1.06	1.04	1.03	0.98	0.96	0.96	0.96	0.92	0.82	0.64	0.61	0.47	0.30	0.40	0.37	0.36	0.30	0.31	0.30	0.29	0.28	0.28	0.23	0.26	0.23	0.24	-	-	-
Electro-Chemical Processes	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Other Process Use	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-
Direct-Use Total Nonprocess	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-
Facility HVAC	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Facility Lighting	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Other Fuel Use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Electric Transportation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Other Nonprocess Use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Other	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Transportation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.07	0.07	0.06	0.06	0.06	0.05	-	0.05	0.04	0.05	0.04	0.04	0.04	-	0.04	0.04	-	-
Motorized Gasoline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gasoline (ethanol-ex)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.06	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	-	-
Jets Use	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gasoline Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclined Plane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trolleybus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	10.41	10.42	10.38	10.43	10.93	10.91	11.09	11.05	11.30	11.63	11.68	11.85	12.05	12.42	12.57	12.91	11.92	11.92	9.86	8.32	9.07	8.45	7.73	7.76	7.53	7.28	6.98	6.72	6.93	6.39	6.82	6.93	6.82	-	-	-
Residential	4.05	4.07	4.09	4.11	4.25	4.01	4.27	4.24	4.27	4.51	4.54	4.67	4.67	5.14	5.25	5.02	4.73	4.51	3.93	3.52	3.80	3.44	3.37	3.42	3.26	3.19	3.32	2.96	3.05	2.89	3.29	3.32	3.25	-	-	-
Commercial	4.16	4.16	4.23	4.31	4.37	4.41	4.50	4.55	4.79	4.82	4.87	5.07	5.13	5.11	5.28	5.44	4.98	5.10	4.22	3.71	4.01	3.68	3.42	3.38	3.30	3.19	3.31	2.93	2.94	2.75	2.80	2.85	2.83	-	-	-
Industrial	2.38	2.37	2.29	2.18	2.31	2.31	2.31	2.31	2.26	2.28	2.27	2.17	2.09	2.09	2.09	2.01	1.79	1.83	1.35	1.03	1.11	1.03	0.99	0.91	0.90	0.85	0.82	0.78	0.78	0.70	0.73	0.65	0.68	-	-	-
Transportation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.06	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	-	-

16. Connecticut Emissions Summary (MTCO2E)

Emissions were not calculated for the following sources: Cement Manufacture, Lime Manufacture, Aluminum Production, Carbon Dioxide, Ammonia Production, Nitric Acid Production, Adipic Acid Production, Magnesium Production, HCFC-22 Production, and Aluminum Production, PFCs.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Carbon Dioxide Emissions	35,869	34,172	33,588	33,551	43,148	59,951	53,795	888,373	840,709	716,033	800,178	748,564	777,877	646,290	816,869	662,595	611,838	558,166	549,124	308,124	279,790	278,746	278,635	279,889	281,403	275,999	285,614	272,997	267,946	273,370	279,243	292,987	277,309	-	-	-
Cement Manufacture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lime Manufacture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Limestone and Dolomite Use	-	-	-	-	10,039	26,009	20,754	29,983	21,602	17,853	17,383	13,571	16,603	14,309	27,342	27,274	24,262	8,237	8,647	9,822	13,668	13,318	13,707	14,955	16,429	12,054	21,240	9,863	5,136	11,337	18,458	31,275	15,214	-	-	-
Soda Ash	35,727	34,021	33,417	33,244	32,736	33,649	32,874	33,062	33,187	32,375	32,079	31,885	32,077	31,247	31,004	30,505	29,867	28,870	27,566	24,174	25,344	24,582	24,076	24,345	24,203	23,132	23,535	22,408	22,040	21,261	20,012	20,937	21,332	-	-	-
Aluminum Production, CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron & Steel Production	-	-	-	-	-	-	-	825,114	785,632	665,529	750,248	702,496	728,472	600,164	758,245	604,722	557,535	520,827	512,705	274,020	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	240,618	-	-	-
Ammonia Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Urea Consumption	142	151	171	306	373	294	167	215	288	276	468	612	725	570	278	94	193	232	205	108	160	227	234	170	154	195	221	109	152	154	155	157	145	-	-	-
Additional CO2 Emissions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrous Oxide Emissions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitric Acid Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional N2O Emissions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HFC, PFC, NF3, and SF6 Emissions	256,703	245,604	255,817	284,185	355,963	504,954	612,034	712,297	772,468	862,303	924,111	990,815	1,036,803	1,085,303	1,122,494	1,168,211	1,225,090	1,299,661	1,382,438	1,420,222	1,312,718	1,386,973	1,495,495	1,722,251	1,921,757	1,834,973	1,839,459	1,575,556	1,753,833	1,681,192	1,824,342	1,909,815	1,748,947	-	-	-
ODS Substitutes	3,283	6,838	18,267	58,923	141,864	309,979	433,756	549,247	631,879	717,317	789,699	859,413	912,999	963,525	1,004,135	1,053,209	1,121,333	1,198,507	1,285,063	1,332,094	1,225,714	1,288,599	1,397,249	1,637,505	1,843,018	1,769,762	1,781,136	1,526,414	1,706,627	1,629,184	1,774,219	1,858,044	1,698,898	-	-	-
Semiconductor Manufacturing	6,311	6,311	6,311	7,889	8,678	10,905	12,110	12,798	15,167	14,807	11,941	8,040	7,779	7,961	7,972	7,926	9,063	8,586	13,141	13,807	24,169	41,540	49,579	57,664	31,172	23,466	15,553	7,754	8,030	7,439	7,410	8,162	7,759	-	-	-
Magnesium Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric Power Transmission and Distribution Systems	247,110	232,455	231,239	217,373	205,421	184,070	166,168	150,252	125,422	130,179	122,471	123,362	116,025	113,817	110,388	107,076	94,695	92,568	84,234	74,321	62,836	56,833	48,667	47,082	47,567	41,745	42,770	41,387	39,175	44,568	42,713	43,609	42,290	-	-	-
HCFC-22 Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum Production, PFCs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional HFC, PFC, NF3, and SF6 Emissions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Emissions	292,573	279,776	289,405	317,736	399,110	564,905	665,829	1,600,670	1,613,177	1,578,336	1,724,289	1,739,379	1,814,680	1,731,593	1,939,363	1,830,805	1,836,928	1,857,828	1,931,562	1,728,346	1,592,508	1,665,718	1,774,130	2,002,140	2,203,161	2,110,973	2,125,074	1,848,553	2,021,779	1,954,561	2,103,585	2,202,803	2,026,256	-	-	-

12a. Mobile Source Emissions Summary, CH_4 and N_2O

Emissions were not calculated for the following source: Alternative Fuel Vehicles.

Total CH_4 and N_2O Emissions from Mobile Sources (MTCO2E)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	485,923	507,873	516,070	536,373	540,864	559,006	557,047	555,993	558,865	522,482	508,391	468,715	441,309	416,558	377,517	343,919	332,538	286,218	261,905	226,817	211,910	199,242	173,520	150,180	130,629	113,379	101,084	86,088	71,088	76,812	63,944	50,870	61,682	-	-	-
Passenger Cars	311,177	304,006	298,212	301,454	301,927	309,276	305,086	299,740	298,893	273,117	263,440	243,185	226,919	210,066	194,574	178,382	160,417	147,402	133,822	156,943	146,220	139,540	122,351	106,236	91,143	80,594	69,351	59,170	50,314	51,456	41,062	35,024	44,001	-	-	-
Light-Duty Tru	164,081	192,030	206,503	223,405	227,351	237,731	239,766	243,720	246,641	235,759	231,261	212,556	200,805	192,616	169,740	153,537	168,490	135,430	124,898	65,492	62,000	56,507	48,279	41,461	37,334	31,004	26,981	22,784	17,252	21,841	21,957	13,775	15,644	-	-	-
Heavy-Duty Ve	10,151	11,317	10,838	10,987	11,056	11,456	11,697	12,062	12,865	13,104	13,205	12,544	13,169	13,469	12,787	11,584	3,231	3,107	2,949	4,067	3,437	2,960	2,655	2,289	1,986	1,640	4,627	4,024	3,430	3,387	816	1,865	1,963	-	-	-
Motorcycles	514	520	517	528	530	543	499	472	466	501	485	430	417	408	417	416	400	277	236	315	254	235	236	195	166	141	125	110	93	127	109	206	74	-	-	-
Diesel Highway	2,130	2,147	2,144	2,238	2,376	2,498	2,519	2,642	2,742	2,866	2,932	3,199	3,238	3,234	3,318	3,256	3,567	7,041	9,053	12,520	13,908	14,947	17,393	20,081	22,738	25,055	24,486	25,816	28,526	29,463	35,751	32,676	35,336	-	-	-
Passenger Cars	53	47	44	43	41	39	36	36	34	35	34	30	30	29	29	29	26	30	34	101	187	275	363	422	471	521	510	534	549	538	652	698	576	-	-	-
Light-Duty Tru	86	94	99	107	107	112	113	117	119	122	127	125	127	130	130	132	151	495	779	488	553	626	747	854	1,021	1,109	1,151	1,239	1,291	1,174	1,465	1,484	1,385	-	-	-
Heavy-Duty Ve	1,830	1,844	1,844	1,922	2,058	2,177	2,198	2,313	2,408	2,512	2,575	2,864	2,909	2,904	2,992	2,924	3,226	5,955	7,478	11,066	12,249	12,965	15,007	17,393	19,622	21,658	20,966	21,997	24,404	25,144	31,426	28,070	30,619	-	-	-
Heavy-Duty Bu	162	162	156	166	169	171	171	176	180	197	196	180	172	170	167	170	164	561	763	864	919	1,082	1,276	1,411	1,625	1,767	1,858	2,046	2,282	2,607	2,209	2,424	2,756	-	-	-
Non-Highway	10,087	9,282	9,553	8,924	9,765	10,101	10,896	9,711	9,268	9,987	10,807	9,894	9,007	8,459	9,573	11,132	9,754	9,132	8,168	6,692	8,105	8,273	8,955	6,784	7,295	6,471	6,747	8,496	9,776	7,982	4,546	6,388	7,437	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	640	821	920	201	551	631	627	839	694	721	1,037	558	480	339	321	376	341	434	276	236	198	206	479	517	531	528	512	464	452	522	527	527	499	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	9,447	8,460	8,632	8,722	9,214	9,470	10,270	8,872	8,574	9,266	9,770	9,336	8,526	8,120	9,251	10,756	9,412	8,698	7,892	6,456	7,907	8,067	8,476	6,266	6,764	5,943	6,235	8,032	9,324	7,459	4,018	5,860	6,939	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	498,140	519,302	527,767	547,535	553,004	571,605	570,463	568,346	570,875	535,334	522,129	481,808	453,554	428,251	390,408	358,306	345,859	302,390	279,127	246,030	233,923	222,462	199,868	177,044	160,662	144,904	132,316	120,401	109,390	114,256	104,241	89,934	104,455	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

Total CH_4 and N_2O Emissions from Mobile Sources (MTCE)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	132,524	138,511	140,746	146,284	147,508	152,456	151,922	151,635	152,418	142,495	138,652	127,831	120,357	113,607	102,959	93,796	90,692	78,059	71,429	61,859	57,794	54,339	47,324	40,958	35,626	30,922	27,568	23,479	19,388	20,949	17,439	13,874	16,822	-	-	-
Passenger Cars	84,866	82,911	81,330	82,215	82,344	84,348	83,205	81,747	81,516	74,487	71,847	66,323	61,887	57,291	53,066	48,650	43,750	40,201	36,497	42,803	39,878	38,056	33,368	28,973	24,857	21,980	18,914	16,137	13,722	14,033	11,199	9,552	12,000	-	-	-
Light-Duty Tru	44,749	52,372	56,319	60,929	62,005	64,836	65,391	66,469	67,266	64,298	63,071	57,970	54,765	52,532	46,293	41,874	45,952	36,936	34,063	17,862	16,909	15,411	13,167	11,308	10,182	8,456	7,358	6,214	4,705	5,957	5,988	3,757	4,267	-	-	-
Heavy-Duty Ve	2,769	3,087	2,956	2,996	3,015	3,124	3,190	3,290	3,509	3,574	3,601	3,421	3,591	3,673	3,487	3,159	881	847	804	1,109	937	807	724	624	542	447	1,262	1,097	935	924	222	509	535	-	-	-
Motorcycles	140	142	141	144	144	148	136	129	127	137	132	117	114	111	114	113	109	76	64	86	69	64	64	53	45	38	34	30	25	35	30	56	20	-	-	-
Diesel Highway	581	586	585	610	648	681	687	721	748	782	800	872	883	882	905	888	973	1,920	2,469	3,415	3,793	4,077	4,743	5,477	6,201	6,833	6,678	7,041	7,780	8,035	9,750	8,912	9,637	-	-	-
Passenger Cars	14	13	12	12	11	11	10	10	9	10	9	8	8	8	8	8	7	8	9	28	51	75	99	115	128	142	139	146	150	147	178	190	157	-	-	-
Light-Duty Tru	23	26	27	29	29	30	31	32	33	33	35	34	35	36	35	36	41	135	212	133	151	171	204	233	278	302	314	338	352	320	400	405	378	-	-	-
Heavy-Duty Ve	499	503	503	524	561	594	600	631	657	685	702	781	793	792	816	798	880	1,624	2,039	3,018	3,341	3,536	4,093	4,744	5,351	5,907	5,718	5,999	6,656	6,858	8,571	7,655	8,351	-	-	-
Heavy-Duty Bu	44	44	43	45	46	47	47	48	49	54	53	49	47	46	46	46	45	153	208	236	251	295	348	385	443	482	507	558	622	711	602	661	752	-	-	-
Non-Highway	2,751	2,531	2,605	2,434	2,663	2,755	2,972	2,648	2,528	2,724	2,947	2,698	2,456	2,307	2,611	3,036	2,660	2,490	2,228	1,825	2,210	2,256	2,442	1,850	1,989	1,765	1,840	2,317	2,666	2,177	1,240	1,742	2,028	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	175	224	251	55	150	172	171	229	189	197	283	152	131	92	88	102	93	118	75	64	54	56	131	141	145	144	140	127	123	142	144	144	136	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	2,576	2,307	2,354	2,379	2,513	2,583	2,801	2,420	2,338	2,527	2,665	2,546	2,325	2,215	2,523	2,934	2,567	2,372	2,152	1,761	2,156	2,200	2,312	1,709	1,845	1,621	1,700	2,191	2,543	2,034	1,096	1,598	1,892	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	135,856	141,628	143,936	149,328	150,819	155,892	155,581	155,004	155,693	146,000	142,399	131,402	123,697	116,796	106,475	97,720	94,325	82,470	76,125	67,099	63,797	60,672	54,509	48,285	43,817	39,519	36,086	32,837	29,834	31,161	28,429	24,527	28,488	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

CH_4 Emissions from Mobile Sources (MTCO2E)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	72,615	71,011	67,621	66,429	63,631	62,628	59,403	56,300	53,960	46,130	42,832	38,445	34,900	31,979	29,031	26,501	25,331	21,936	20,150	18,156	17,037	16,201	14,364	12,729	11,431	10,362	9,865	8,960	8,163	8,676	7,348	6,732	7,453	-	-	-
Passenger Cars	44,558	40,943	38,019	36,690	35,316	34,895	33,277	31,606	30,429	27,685	25,523	22,792	20,320	18,129	16,532	14,978	13,316	12,200	11,083	13,013	12,169	11,692	10,331	9,111	8,002	7,316	6,566	5,930	5,380	5,614	4,726	4,385	5,057	-	-	-
Light-Duty Tru	23,906	25,790	25,747	26,036	24,764	24,199	22,837	21,738	20,797	15,908	15,144	13,770	12,820	12,211	10,971	10,139	11,553	9,288	8,656	4,582	4,400	4,098	3,637	3,264	3,109	2,761	2,588	2,375	2,172	2,420	2,426	1,907	1,998	-	-	-
Heavy-Duty Ve	3,884	4,008	3,585	3,428	3,275	3,251	3,031	2,713	2,495	2,280	1,916	1,662	1,547	1,429	1,316	1,172	258	306	290	400	339	292	276	254	235	212	648	599	563	577	140	335	360	-	-	-
Motorcycles	268	271	269	275	276	283	258	243	239	258	250	221	214	209	213	212	205	142	121	161	130	120	120	100	85	72	64	56	48	65	55	106	38	-	-	-
Diesel Highway	206	207	207	216	230	242	245	257	267	279	285	313	317	316	325	319	350	438	498	601	632	642	697	752	813	855	816	845	899	883	1,072	1,034	1,025	-	-	-
Passenger Cars	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	12	24	37	50	59	66	74	72	76	78	76	93	100	82	-	-	-
Light-Duty Tru	5	6	6	7	7	7	7	7	8	8	8	8	8	8	8	8	10	51	88	56	64	74	90	104	125	136	142	153	160	145	182	185	172	-	-	-
Heavy-Duty Ve	185	186	186	194	208	220	222	233	243	253	260	289	294	293	302	295	325	354	375	500	511	496	519	550	580	601	558	568	610	609	753	704	717	-	-	-
Heavy-Duty Bu	13	13	13	14	14	14	14	14	15	16	16	15	14	14	14	14	13	31	33	33	32	34	37	39	42	44	44	47	50	53	44	46	53	-	-	-
Non-Highway	1,660	1,126	1,165	1,009	1,123	1,262	1,298	1,128	1,284	1,199	1,305	1,510	1,227	1,105	1,301	2,402	1,830	1,786	1,469	1,646	1,375	1,353	1,410	1,144	896	796	802	934	1,047	930	612	789	863	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	159	204	228	50	137	157	156	208	172	179	257	138	119	84	80	93	85	108	68	59	49	51	119	128	132	131	127	115	112	130	131	131	124	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	1,501	922	937	959	986	1,105	1,142	920	1,112	1,020	1,048	1,371	1,108	1,021	1,222	2,309	1,746	1,678	1,400	1,587	1,326	1,302	1,292	1,015	765	665	675	819	935	801	481	659	739	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	74,481	72,345	68,994	67,655	64,984	64,132	60,945	57,685	55,511	47,608	44,423	40,268	36,444	33,401	30,658	29,222	27,512	24,160	22,117	20,403	19,045	18,196	16,471	14,624	13,141	12,013	11,484	10,739	10,109	10,489	9,031	8,556	9,340	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

N_2O Emissions from Mobile Sources (MTCO2E)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	413,308	436,862	448,449	469,944	477,233	496,379	497,645	499,693	504,905	476,352	465,558	430,270	406,409	384,580	348,486	317,417	307,207	264,281	241,755	208,662	194,873	183,041	159,155	137,452	119,198	103,017	91,219	77,128	62,926	68,136	56,596	44,138	54,229	-	-	-
Passenger Cars	266,619	263,064	260,192	264,764	266,611	274,382	271,809	268,133	268,464	245,433	237,917	220,394	206,599	191,937	178,043	163,404	147,101	135,202	122,739	143,929	134,051	127,848	112,020	97,124	83,140	73,278	62,785	53,240	44,934	45,842	36,336	30,639	38,945	-	-	-
Light-Duty Tru	140,175	166,239	180,756	197,368	202,588	213,532	216,929	221,982	225,844	219,852	216,117	198,786	187,984	180,405	158,768	143,398	156,937	126,142	116,242	60,911	57,600	52,410	44,642	38,197	34,225	28,243	24,393	20,409	15,079	19,421	19,532	11,869	13,646	-	-	-
Heavy-Duty Ve	6,267	7,310	7,253	7,559	7,781	8,205	8,666	9,349	10,371	10,825	11,289	10,881	11,622	12,039	11,471	10,412	2,973	2,801	2,659	3,667	3,098	2,668	2,379	2,035	1,751	1,428	3,979	3,425	2,867	2,810	675	1,530	1,603	-	-	-
Motorcycles	246	249	248	253	254	260	241	229	227	243	236	209	203	199	204	203	196	136	115	154	124	115	115	95	81	69	61	54	46	62	53	100	36	-	-	-
Diesel Highway	1,925	1,940	1,937	2,021	2,145	2,256	2,274	2,385	2,475	2,587	2,646	2,886	2,921	2,917	2,993	2,937	3,217	6,603	8,555	11,919	13,276	14,306	16,696	19,329	21,925	24,200	23,669	24,972	27,628	28,580	34,680	31,642	34,311	-	-	-
Passenger Cars	50	45	42	41	39	37	35	34	32	33	32	28	28	28	28	28	25	28	31	89	162	237	313	363	404	447	438	458	471	462	559	598	494	-	-	-
Light-Duty Tru	80	88	93	100	101	104	106	110	112	114	119	117	119	122	122	123	141	444	691	432	488	552	657	751	896	972	1,009	1,085	1,131	1,029	1,284	1,299	1,212	-	-	-
Heavy-Duty Ve	1,646	1,658	1,658	1,728	1,850	1,957	1,976	2,080	2,165	2,259	2,316	2,575	2,616	2,611	2,690	2,629	2,901	5,601	7,103	10,566	11,738	12,469	14,488	16,843	19,042	21,057	20,408	21,429	23,794	24,535	30,672	27,366	29,902	-	-	-
Heavy-Duty Bu	148	149	144	152	156	157	157	161	166	181	180	165	158	156	153	156	151	530	729	831	887	1,048	1,238	1,372	1,582	1,723	1,814	1,999	2,232	2,554	2,165	2,378	2,702	-	-	-
Non-Highway	8,427	8,155	8,387	7,914	8,642	8,839	9,599	8,583	7,984	8,787	9,502	8,384	7,779	7,353	8,271	8,730	7,923	7,346	6,700	5,047	6,729	6,920	7,545	5,640	6,398	5,674	5,944	7,562	8,728	7,051	3,934	5,598	6,575	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	481	617	692	151	414	474	471	631	522	542	780	419	361	255	242	282	257	326	207	178	149	155	360	389	399	397	385	349	340	393	396	396	375	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	7,946	7,538	7,696	7,763	8,228	8,365	9,128	7,953	7,462	8,246	8,722	7,964	7,418	7,099	8,030	8,447	7,667	7,020	6,492	4,869	6,581	6,765	7,185	5,251	5,999	5,277	5,560	7,213	8,389	6,659	3,538	5,202	6,200	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	423,659	446,957	458,774	479,880	488,021	507,473	509,517	510,662	515,364	487,726	477,706	441,540	417,110	394,850	359,750	329,084	318,348	278,230	257,010	225,627	214,878	204,267	183,396	162,420	147,521	132,891	120,832	109,662	99,282	103,767	95,210	81,378	95,115	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

CH_4 Emissions from Mobile Sources (MTCE)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	19,804	19,367	18,442	18,117	17,354	17,080	16,201	15,355	14,716	12,581	11,682	10,485	9,518	8,721	7,918	7,228	6,909	5,983	5,495	4,952	4,647	4,418	3,918	3,471	3,118	2,826	2,690	2,444	2,226	2,366	2,004	1,836	2,033	-	-	-
Passenger Cars	12,152	11,166	10,369	10,006	9,632	9,517	9,076	8,620	8,299	7,550	6,961	6,216	5,542	4,944	4,509	4,085	3,632	3,327	3,023	3,549	3,319	3,189	2,818	2,485	2,182	1,995	1,791	1,617	1,467	1,531	1,289	1,196	1,379	-	-	-
Light-Duty Tru	6,520	7,034	7,022	7,101	6,754	6,600	6,228	5,928	5,672	4,338	4,130	3,755	3,496	3,330	2,992	2,765	3,151	2,533	2,361	1,250	1,200	1,118	992	890	848	753	706	648	592	660	662	520	545	-	-	-
Heavy-Duty Ve	1,059	1,093	978	935	893	887	827	740	680	622	523	453	422	390	359	320	70	83	79	109	92	80	75	69	64	58	177	163	153	157	38	91	98	-	-	-
Motorcycles	73	74	73	75	75	77	70	66	65	70	68	60	58	57	58	58	56	39	33	44	35	33	33	27	23	20	17	15	13	18	15	29	10	-	-	-
Diesel Highway	56	57	57	59	63	66	67	70	73	76	78	85	86	86	89	87	95	119	136	164	172	175	190	205	222	233	223	230	245	241	292	282	279	-	-	-
Passenger Cars	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	7	10	14	16	18	20	20	21	21	21	25	27	22	-	-	-
Light-Duty Tru	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	14	24	15	18	20	24	28	34	37	39	42	44	40	50	50	47	-	-	-
Heavy-Duty Ve	50	51	51	53	57	60	60	64	66	69	71	79	80	80	82	80	89	97	102	136	139	135	142	150	158	164	152	155	166	166	205	192	196	-	-	-
Heavy-Duty Bu	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	8	9	9	9	9	10	11	12	12	12	13	14	14	12	13	15	-	-	-
Non-Highway	453	307	318	275	306	344	354	308	350	327	356	412	335	301	355	655	499	487	401	449	375	369	385	312	244	217	219	255	286	254	167	215	235	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	43	56	62	14	37	43	42	57	47	49	70	38	33	23	22	25	23	29	19	16	13	14	32	35	36	36	35	31	31	35	36	36	34	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	409	252	256	262	269	301	312	251	303	278	286	374	302	279	333	630	476	458	382	433	362	355	352	277	209	181	184	223	255	218	131	180	201	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	20,313	19,730	18,816	18,451	17,723	17,490	16,621	15,732	15,139	12,984	12,115	10,982	9,939	9,109	8,361	7,970	7,503	6,589	6,032	5,564	5,194	4,963	4,492	3,988	3,584	3,276	3,132	2,929	2,757	2,861	2,463	2,333	2,547	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

N_2O Emissions from Mobile Sources (MTCE)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	112,720	119,144	122,304	128,167	130,154	135,376	135,721	136,280	137,701	129,914	126,970	117,346	110,839	104,885	95,042	86,568	83,784	72,077	65,933	56,908	53,147	49,920	43,406	37,487	32,508	28,096	24,878	21,035	17,162	18,583	15,435	12,038	14,790	-	-	-
Passenger Cars	72,714	71,745	70,962	72,208	72,712	74,831	74,130	73,127	73,217	66,936	64,886	60,107	56,345	52,346	48,557	44,565	40,119	36,873	33,474	39,253	36,559	34,868	30,551	26,488	22,675	19,985	17,123	14,520	12,255	12,502	9,910	8,356	10,621	-	-	-
Light-Duty Tru	38,230	45,338	49,297	53,828	55,251	58,236	59,162	60,541	61,594	59,960	58,941	54,214	51,268	49,201	43,300	39,108	42,801	34,402	31,702	16,612	15,709	14,294	12,175	10,417	9,334	7,703	6,653	5,566	4,112	5,297	5,327	3,237	3,722	-	-	-
Heavy-Duty Ve	1,709	1,994	1,978	2,061	2,122	2,238	2,363	2,550	2,828	2,952	3,079	2,968	3,170	3,283	3,129	2,840	811	764	725	1,000	845	728	649	555	478	390	1,085	934	782	766	184	417	437	-	-	-
Motorcycles	67	68	68	69	69	71	66	62	62	66	64	57	55	54	56	55	53	37	31	42	34	31	31	26	22	19	17	15	12	17	14	27	10	-	-	-
Diesel Highway	525	529	528	551	585	615	620	651	675	706	722	787	797	796	816	801	877	1,801	2,333	3,251	3,621	3,902	4,554	5,271	5,979	6,600	6,455	6,811	7,535	7,795	9,458	8,630	9,358	-	-	-
Passenger Cars	14	12	12	11	11	10	9	9	9	9	9	8	8	8	8	8	7	8	9	24	44	65	85	99	110	122	119	125	128	126	152	163	135	-	-	-
Light-Duty Tru	22	24	25	27	27	28	29	30	30	31	32	32	32	33	33	34	39	121	188	118	133	150	179	205	244	265	275	296	308	281	350	354	331	-	-	-
Heavy-Duty Ve	449	452	452	471	505	534	539	567	591	616	632	702	713	712	734	717	791	1,528	1,937	2,882	3,201	3,401	3,951	4,594	5,193	5,743	5,566	5,844	6,489	6,691	8,365	7,463	8,155	-	-	-
Heavy-Duty Bu	40	41	39	42	42	43	43	44	45	49	49	45	43	43	42	43	41	145	199	227	242	286	338	374	432	470	495	545	609	697	590	649	737	-	-	-
Non-Highway	2,298	2,224	2,287	2,158	2,357	2,411	2,618	2,341	2,177	2,397	2,591	2,286	2,122	2,005	2,256	2,381	2,161	2,003	1,827	1,376	1,835	1,887	2,058	1,538	1,745	1,548	1,621	2,062	2,380	1,923	1,073	1,527	1,793	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	131	168	189	41	113	129	128	172	142	148	213	114	98	69	66	77	70	89	57	48	41	42	98	106	109	108	105	95	93	107	108	108	102	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	2,167	2,056	2,099	2,117	2,244	2,281	2,489	2,169	2,035	2,249	2,379	2,172	2,023	1,936	2,190	2,304	2,091	1,914	1,771	1,328	1,795	1,845	1,959	1,432	1,636	1,439	1,516	1,967	2,288	1,816	965	1,419	1,691	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	115,543	121,897	125,120	130,876	133,097	138,402	138,959	139,271	140,554	133,016	130,284	120,420	113,757	107,686	98,114	89,750	86,822	75,881	70,094	61,535	58,603	55,709	50,017	44,296	40,233	36,243	32,954	29,908	27,077	28,300	25,966	22,194	25,940	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

CH_4 Emissions from Mobile Sources (Gigagrams)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0	1.9	1.6	1.5	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.3	-	-	-
Passenger Cars	1.6	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-	-	-
Light-Duty Tru	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-
Heavy-Duty Ve	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Motorcycles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Diesel Highway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Passenger Cars	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Light-Duty Tru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Heavy-Duty Ve	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Heavy-Duty Bu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Non-Highway	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.1	2.0	1.7	1.6	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

N_2O Emissions from Mobile Sources (Gigagrams)

Fuel Type/Vehicle Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Highway	1.6	1.6	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.6	1.5	1.5	1.3	1.2	1.2	1.0	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	-	-	-
Passenger Cars	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	-	-	-
Light-Duty Tru	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.7	0.7	0.6	0.5	0.6	0.5	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	-	-	-
Heavy-Duty Ve	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Motorcycles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Diesel Highway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-
Passenger Cars	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Light-Duty Tru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Heavy-Duty Ve	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-
Heavy-Duty Bu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Non-Highway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Boats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Locomotives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Farm Equipmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aircraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Other*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Fuel Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light Duty Veh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Duty Ve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.6	1.7	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.6	1.5	1.4	1.2	1.2	1.0	1.0	0.9	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.4	-	-	-

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

N2O Emissions Summary for Connecticut

MMTCO2E	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	0.024	0.024	0.027	0.026	0.025	0.024	0.025	0.022	0.019	0.021	0.023	0.021	0.020	0.023	0.025	0.018	0.016	0.016	0.016	0.019	0.019	0.018	0.016	0.018	0.018	0.020	0.015	0.015	0.018	0.018	0.015	0.017	0.015	-	-	-
Coal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	0.013	0.013	0.015	0.014	0.014	0.012	0.013	0.013	0.011	0.013	0.014	0.013	0.013	0.016	0.017	0.015	0.013	0.013	0.013	0.012	0.011	0.010	0.010	0.010	0.010	0.011	0.008	0.009	0.010	0.010	0.009	0.010	0.010	-	-	-
Natural Gas	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-
Wood	0.010	0.010	0.011	0.011	0.011	0.011	0.011	0.008	0.007	0.007	0.008	0.006	0.006	0.007	0.007	0.002	0.002	0.002	0.003	0.006	0.006	0.006	0.005	0.007	0.007	0.008	0.005	0.006	0.006	0.007	0.005	0.006	0.005	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	0.007	0.007	0.008	0.007	0.007	0.006	0.007	0.007	0.006	0.006	0.007	0.006	0.006	0.008	0.006	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.006	0.005	0.005	0.005	0.005	0.004	0.005	0.005	-	-	-
Coal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	0.005	0.005	0.006	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.006	0.004	0.004	0.003	0.003	0.003	0.002	0.003	0.003	0.002	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.002	0.003	0.003	-	-	-
Natural Gas	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-
Wood	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial	0.008	0.008	0.008	0.008	0.008	0.008	0.010	0.010	0.008	0.009	0.009	0.009	0.007	0.009	0.009	0.010	0.009	0.007	0.005	0.007	0.008	0.008	0.008	0.008	0.008	0.007	0.008	0.007	0.007	0.007	0.007	0.006	0.007	-	-	-
Coal	-	-	0.000	0.000	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	0.005	0.005	0.005	0.005	0.005	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.005	0.005	0.006	0.005	0.004	0.002	0.003	0.004	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.002	0.003	-	-	-
Natural Gas	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-
Wood	0.002	0.002	0.002	0.002	0.002	0.003	0.005	0.006	0.005	0.005	0.005	0.005	0.003	0.003	0.004	0.004	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric Power	0.030	0.029	0.024	0.022	0.021	0.022	0.026	0.032	0.028	0.021	0.027	0.025	0.019	0.021	0.022	0.024	0.022	0.020	0.020	0.013	0.014	0.005	0.007	0.006	0.008	0.009	0.009	0.006	0.009	0.007	0.007	0.009	0.008	-	-	-
Coal	0.015	0.015	0.015	0.014	0.015	0.016	0.016	0.018	0.013	0.006	0.014	0.016	0.014	0.017	0.017	0.017	0.018	0.016	0.018	0.010	0.011	0.002	0.004	0.003	0.004	0.003	0.001	0.001	0.002	0.000	0.000	0.001	0.001	-	-	-
Petroleum	0.014	0.013	0.009	0.007	0.006	0.006	0.009	0.014	0.015	0.014	0.011	0.008	0.004	0.003	0.003	0.005	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	-	-	-
Natural Gas	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.001	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.002	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.003	-	-	-
Wood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.005	0.003	0.003	0.003	0.004	0.003	0.003	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	0.068	0.067	0.067	0.063	0.061	0.060	0.068	0.071	0.061	0.056	0.064	0.061	0.052	0.062	0.062	0.057	0.052	0.048	0.046	0.043	0.046	0.036	0.034	0.037	0.039	0.042	0.036	0.034	0.038	0.037	0.034	0.037	0.035	-	-	-
Coal	0.015	0.015	0.016	0.015	0.015	0.016	0.016	0.018	0.013	0.006	0.014	0.016	0.014	0.017	0.017	0.017	0.018	0.016	0.018	0.010	0.011	0.002	0.004	0.003	0.004	0.003	0.001	0.001	0.002	0.000	0.000	0.001	0.001	-	-	-
Petroleum	0.037	0.035	0.034	0.031	0.028	0.026	0.030	0.034	0.032	0.033	0.032	0.029	0.024	0.031	0.029	0.030	0.024	0.022	0.018	0.019	0.018	0.017	0.014	0.016	0.016	0.017	0.014	0.014	0.016	0.015	0.014	0.015	0.015	-	-	-
Natural Gas	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.007	0.007	0.007	-	-	-
Wood	0.013	0.013	0.014	0.015	0.014	0.015	0.018	0.015	0.013	0.013	0.014	0.012	0.011	0.011	0.012	0.007	0.006	0.006	0.006	0.009	0.012	0.011	0.010	0.012	0.014	0.016	0.015	0.013	0.014	0.014	0.013	0.014	0.012	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

11. Connecticut Emissions Summary

Emissions were not calculated for the following sources: Industrial fruits & vegetables, Industrial red meat, Industrial poultry, and Industrial pulp & paper.

Emissions (MMTCO2E)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Municipal CH4	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-	-	-
Municipal N2O	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.09	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	-	-	-
Industrial CH4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fruits & Vegetables	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red Meat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poultry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pulp & Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Emissions	**0.32**	**0.32**	**0.32**	**0.32**	**0.32**	**0.32**	**0.32**	**0.32**	**0.33**	**0.33**	**0.33**	**0.33**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.34**	**0.35**	**0.35**	**0.35**	**0.35**	**0.35**	**0.34**	**0.35**	**0.35**	**0.35**	**-**	**-**	**-**

Emissions (MMTCE)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Municipal CH4	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-	-	-
Municipal N2O	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Industrial CH4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fruits & Vegetables	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red Meat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poultry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pulp & Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Emissions	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.09	-	-	-

14. Connecticut Emissions Summary

This Worksheet Provides a Summary of Emissions from Landfills and Waste Combustion Once All Control Steps Have Been Completed.

Total Emissions from Landfills and Waste Combustion (MMTCO2E)*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CH4	1.10	1.13	1.12	1.02	1.01	1.00	0.90	0.74	0.47	0.45	0.44	0.07	0.35	0.79	0.80	0.78	0.77	0.60	0.56	0.52	0.50	0.47	0.43	0.41	0.36	0.36	0.34	0.33	0.34	0.42	0.40	0.39	0.32	-	-	-
CO2	0.636	0.780	0.671	0.572	0.794	0.800	0.835	0.854	0.959	1.057	1.127	1.023	0.884	1.076	1.305	1.368	1.351	1.380	1.506	0.932	1.019	1.042	1.055	1.087	1.119	1.150	1.190	1.201	1.268	1.268	1.268	1.268	-	-	-	-
N2O	0.021	0.023	0.020	0.016	0.022	0.022	0.021	0.021	0.023	0.025	0.025	0.022	0.019	0.023	0.027	0.026	0.026	0.027	0.027	0.017	0.018	0.018	0.018	0.018	0.018	0.018	0.019	0.019	0.020	0.020	0.020	0.020	0.020	-	-	-
Total	**1.754**	**1.932**	**1.812**	**1.613**	**1.829**	**1.817**	**1.752**	**1.617**	**1.448**	**1.528**	**1.593**	**1.112**	**1.252**	**1.892**	**2.134**	**2.179**	**2.143**	**2.011**	**2.096**	**1.468**	**1.532**	**1.534**	**1.501**	**1.513**	**1.497**	**1.530**	**1.553**	**1.547**	**1.630**	**1.706**	**1.693**	**1.681**	**0.340**	**-**	**-**	**-**

*** When default flaring and LFGTE activity data are utilized for AZ, DE, ME, VT, and WY landfill methane avoided is greater than landfill methane produced. This is a result of using various sources of default data.**

CH4 Emissions from Landfills (MTCO2E)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Potential CH4	1,218,469	1,253,488	1,244,727	1,244,387	1,230,844	1,210,903	1,199,422	1,187,326	1,175,693	1,155,054	1,134,031	1,116,589	1,129,102	1,172,427	1,183,070	1,162,713	1,142,893	1,124,010	1,106,362	1,089,900	1,064,047	1,039,676	1,016,324	993,910	972,567	952,291	933,067	915,011	897,701	882,707	868,302	854,461	820,957	-	-	-
MSW Generation	1,138,756	1,171,485	1,163,296	1,162,978	1,150,322	1,131,685	1,120,955	1,109,651	1,098,778	1,079,490	1,059,842	1,043,541	1,055,236	1,095,726	1,105,673	1,086,647	1,068,124	1,050,477	1,033,983	1,018,598	994,436	971,660	949,835	928,888	908,941	889,992	872,025	855,150	838,973	824,960	811,497	798,562	767,250	-	-	-
Industrial Generation	79,713	82,004	81,431	81,408	80,523	79,218	78,467	77,676	76,914	75,564	74,189	73,048	73,866	76,701	77,397	76,065	74,769	73,533	72,379	71,302	69,611	68,016	66,488	65,022	63,626	62,299	61,042	59,861	58,728	57,747	56,805	55,899	53,707	-	-	-
CH4 Avoided	-	-	-	(106,263)	(106,263)	(106,300)	(104,500)	(363,810)	(659,720)	(659,720)	(645,548)	(1,043,541)	(741,998)	(292,316)	(292,316)	(292,316)	(292,316)	(454,316)	(482,482)	(514,145)	(514,145)	(514,145)	(540,966)	(540,966)	(572,929)	(551,729)	(551,729)	(551,729)	(520,060)	(419,646)	(419,646)	(419,254)	(466,067)	-	-	-
Flare	-	-	-	-	-	-	-	(359,310)	(338,620)	(338,620)	(395,548)	(948,781)	(469,098)	(49,416)	(49,416)	(49,416)	(49,416)	(49,416)	(96,282)	(148,445)	(148,445)	(148,445)	(212,566)	(212,566)	(244,529)	(244,529)	(244,529)	(244,529)	(212,860)	(208,946)	(208,946)	(208,554)	(216,527)	-	-	-
Landfill Gas-to-Energy	-	-	-	(106,263)	(106,263)	(106,300)	(104,500)	(4,500)	(341,100)	(341,100)	(250,000)	(242,900)	(242,900)	(242,900)	(242,900)	(242,900)	(242,900)	(404,900)	(386,200)	(345,700)	(345,700)	(345,700)	(328,400)	(328,400)	(328,400)	(307,200)	(307,200)	(307,200)	(307,200)	(211,000)	(211,000)	(211,000)	(249,540)	-	-	-
Oxidation at MSW Landfills	113,876	117,148	116,330	105,671	104,406	102,539	91,646	74,584	43,906	41,977	41,429	-	31,324	80,341	81,336	79,433	77,581	59,616	55,150	50,445	48,029	45,751	40,887	38,792	33,601	33,826	32,030	30,342	31,891	40,531	39,185	37,931	30,118	-	-	-
Oxidation at Industrial Landfills	7,971	8,200	8,143	8,141	8,052	7,922	7,847	7,748	7,691	7,556	7,419	7,305	7,387	7,670	7,740	7,607	7,477	7,353	7,238	7,130	6,961	6,802	6,649	6,502	6,343	6,230	6,104	5,986	5,873	5,775	5,680	5,590	5,371	-	-	-
Total CH4 Emissions	1,096,622	1,128,140	1,120,254	1,024,311	1,012,123	994,143	895,430	741,164	464,375	445,801	439,634	65,743	348,393	792,100	801,679	783,357	765,520	602,725	561,492	518,180	494,912	472,978	427,822	407,650	359,674	360,506	343,304	326,953	339,877	416,755	403,790	391,687	319,401	-	-	-

Landfill emissions (from MSW and Industrial Generation) are provided to 2021 and assume 2016 as the proxy for the Waste in Place that will generate emissions in future years.

CO2, N2O, and CH4 Emissions from Waste Combustion (MTCO2E)

Gas/Waste Product	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CO2	636,049	780,081	671,140	572,240	793,924	799,575	834,500	854,063	959,057	1,056,811	1,127,270	1,023,016	884,065	1,076,263	1,304,842	1,367,693	1,350,606	1,380,313	1,506,036	932,182	1,018,710	1,042,289	1,055,105	1,086,730	1,118,737	1,150,124	1,189,891	1,200,910	1,268,392	1,268,392	1,268,392	1,268,392	1,268,392	-	-	-
Plastics	429,419	524,355	448,575	383,525	525,957	533,173	556,549	576,168	647,382	723,568	787,378	692,996	598,592	723,439	894,981	947,122	924,266	925,017	1,013,624	604,388	687,150	706,725	701,761	715,991	732,277	761,259	778,306	788,625	831,612	831,612	831,612	831,612	-	-	-	-
Synthetic Rubber in MSW	91,552	112,898	97,140	76,924	104,801	95,064	97,869	96,387	106,556	111,445	113,746	112,396	95,837	117,374	137,860	139,207	137,284	150,495	159,334	104,689	106,157	108,931	107,539	110,644	110,696	112,574	116,281	118,321	125,195	125,195	125,195	125,195	-	-	-	-
Synthetic Fibers	114,878	144,828	130,824	112,213	163,165	171,338	180,082	181,507	205,120	221,798	226,145	217,623	189,635	235,449	272,002	281,364	269,056	304,801	333,078	223,105	225,443	226,433	245,826	260,075	275,764	276,291	295,304	293,963	311,586	311,586	311,586	311,586	-	-	-	-
N2O	20,567	22,658	19,860	15,765	21,999	21,932	21,283	21,276	23,440	24,752	25,268	22,177	18,796	22,803	26,755	26,487	26,219	26,719	27,218	17,070	17,544	17,608	17,631	17,825	18,058	18,317	18,736	18,775	20,431	20,431	20,431	20,431	20,100	-	-	-
CH4	869	958	840	666	930	927	900	899	991	1,046	1,068	937	794	964	1,131	1,119	1,108	1,129	1,150	721	741	744	745	753	763	774	792	792	863	863	863	863	863	849	-	-	-
Total CO2, N2O, CH4 Emissions	657,484	803,696	692,049	588,673	816,852	822,434	856,683	876,238	983,488	1,082,609	1,153,605	1,046,130	903,656	1,100,029	1,332,728	1,395,300	1,377,933	1,408,161	1,534,405	949,974	1,036,995	1,060,641	1,073,481	1,105,308	1,137,558	1,169,215	1,209,419	1,220,478	1,289,687	1,289,687	1,289,687	1,289,687	20,949	-	-	-

Total Emissions from Landfills and Waste Combustion (MMTCE)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CH4	0.299	0.308	0.306	0.280	0.276	0.271	0.244	0.202	0.127	0.122	0.120	0.018	0.095	0.216	0.219	0.214	0.209	0.165	0.153	0.142	0.135	0.129	0.117	0.111	0.098	0.099	0.094	0.089	0.093	0.114	0.110	0.107	0.087	-	-	-
CO2	0.173	0.213	0.183	0.156	0.217	0.218	0.228	0.233	0.262	0.288	0.307	0.279	0.241	0.294	0.356	0.373	0.368	0.376	0.411	0.254	0.278	0.284	0.288	0.296	0.305	0.314	0.325	0.328	0.346	0.346	0.346	0.346	-	-	-	-
N2O	0.006	0.006	0.005	0.004	0.006	0.006	0.006	0.006	0.006	0.007	0.007	0.006	0.005	0.006	0.007	0.007	0.007	0.007	0.007	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.005	-	-	-
Total	0.478	0.527	0.494	0.440	0.499	0.495	0.478	0.441	0.395	0.417	0.435	0.303	0.341	0.516	0.582	0.594	0.585	0.548	0.572	0.400	0.418	0.418	0.409	0.413	0.408	0.417	0.423	0.422	0.444	0.465	0.462	0.459	0.093	-	-	-

Total Emissions table above does not include emissions inputted by user (optional) from the Additional Data Input tab.

*Graph includes emissions inputted by user from the Additional Data Input tab

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"Kwanzaa's Collateral Collision: Nia's U-Turn" painted by David Jackson

CRCOG

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