

State of New Hampshire Priority Climate Action Plan March 2024



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**State of New Hampshire
Priority Climate Action Plan**

March 2024

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The mission of the Department of Environmental Services is to help sustain a high quality of life for all citizens by protecting and restoring the environment and public health in New Hampshire.

Cover photo provided to NHDES by Charlie Krautmann, October 11, 2018: Basin Brook Reservoir with Ragged Jacket Mountain (right) and Mt. Meaner (left) in the background, Chatham, New Hampshire.

Executive Summary

The New Hampshire Priority Climate Action Plan (PCAP) was developed by the New Hampshire Department of Environmental Services (NHDES) utilizing a planning grant from the U.S. Environmental Protection Agency (EPA). The goal of the PCAP is to create a pathway that will support investment in policies, practices, and technologies that reduce pollutant emissions, create high-quality jobs, spur economic growth, and enhance the quality of life for all Granite Staters. The PCAP includes the following: a summary of New Hampshire's past and present greenhouse gas (GHG) emissions; a detailed, state-level GHG inventory; a list of priority measures that could reduce the state's GHG emissions; and an analysis of how those measures would benefit low-income, disadvantaged communities in the state.

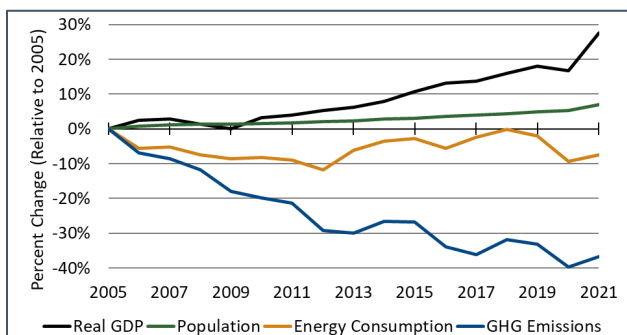
These priority measures are not intended to be exhaustive but are selected based on their potential to meet EPA's three broad objectives for the Climate Pollution Reduction Grants (CPRG) program and many other programs under the Inflation Reduction Act. The objectives are to:

- Reduce climate pollution while supporting the creation of good jobs and lowering energy costs for families.
- Accelerate work to reduce environmental impacts to low-income, overburdened communities.
- Deliver cleaner air by reducing harmful air pollution in places where people live, work, play and go to school.

Process and Planning

In August 2023, the EPA awarded the NHDES a grant under the CPRG program, established under the Inflation Reduction Act of 2022. The CPRG grant requires three key deliverables: development of the PCAP by March 1, 2024; development of a Comprehensive Climate Action Plan (CCAP) by August 2025; and submittal of a Status Report by August 2027.

The New Hampshire PCAP builds on the state's past and present energy policies and programs in the electric generation, building and transportation sectors. The PCAP process relied on extensive



stakeholder engagement, facilitated by NH Listens of the Carsey School of Public Policy at the University of New Hampshire, to identify new opportunities, and develop specific goals and outcomes. NHDES also conducted significant analyses of the available energy and emission data to evaluate the potential to reduce GHG emissions and associated co-pollutants in these sectors. The final set of priority measures in this PCAP are those that

align best with current policies and stakeholder goals, and possess the greatest potential to build on prior state progress reducing GHG emissions while growing the economy. While the state has already achieved significant GHG emissions reductions since they peaked in 2005, significant technological

innovations have resulted in new effective and affordable solutions that will further reduce overall energy use, energy costs, and GHG emissions.

Primary Measures

The selected measures occur primarily in the transportation, buildings, local government, and waste sectors and include a focus on workforce development.

PCAP Chapter	Priority Measure
Chapter 5: Transportation Sector	Electric Charging Infrastructure for Electric Vehicles
	Incentives for Consumer Purchase of Electric Passenger Vehicles
	Expanded Public Transit Options
Chapter 6: Residential Building Sector	Heat Pumps to Improve Energy Efficiency of Space and Water Heating of Buildings
	Weatherization to Improve Energy Efficiency in Residential Buildings
	Pre-Weatherization to Improve Energy Efficiency in Residential Buildings
Chapter 7: Local Government and Sector	Resilient Local Energy Systems
	Energy Efficiency Improvements at Wastewater and Drinking Water Systems
Chapter 8: Waste and Materials Management	Expand Programs for Waste Reduction, Diversion and Recycling
Chapter 9: Workforce Development	Workforce Development of Skilled Trades to Support Priority Measures

Transportation Measures

The transportation sector in New Hampshire is the single largest source of GHG emissions in the state and those emissions have remained relatively constant over the past two decades. Reducing these emissions offer both public health and economic opportunities for New Hampshire. Fortunately, more energy efficient transportation alternatives, such as electric vehicles, expanded public transit systems, and incentivizing sustainable commuting practices through measures such as dedicated bicycle lanes are proving to be more cost effective and accessible than in the recent past. The transportation measures in this plan include incentives for specific socioeconomic groups to purchase electric vehicles (EV), financing to support the development of public EV charging stations, and additional support for and expansion of existing transportation options such as local and regional bus systems.

Residential Building Measures

The building sector in New Hampshire represents the second largest source of GHG emissions in the state, more if you factor in the secondary emissions associated with the consumption of retail electricity. Further, the energy sources consumed for building heating are significantly different than other regions in the US in that northern New England states are highly dependent on expensive delivered fuels such as

heating oil (#2 distillate fuel), propane, and kerosene. GHG emissions and the total energy consumption in the building sector have remained relatively constant over the past decade. The PCAP identifies building electrification, weatherization, and pre-weatherization as complimentary measures that could maximize energy savings and reduce energy consumption and associated GHG emissions.

Local Government

Local government entities, inclusive of municipalities, school districts, and counties, present a unique and critical opportunity to reduce energy consumption, avoid energy costs, and minimize taxpayer costs, all while reducing GHG emissions. Achieving this will require enhancement of existing efficiency programs and new initiatives tailored to empower action by local governments. By implementing energy efficiency, renewable energy, and energy storage projects at local government facilities, New Hampshire communities can lower energy costs, reduce GHG emissions, and improve public and environmental health. Such actions can also improve overall grid resilience and critical infrastructure availability to residents and businesses.

Waste Reduction

In 2022, a total of 1,128,570 short tons of municipal solid waste and 266,333 tons of construction and demolition debris were disposed of in New Hampshire's landfills and incinerators. This measure would create or scale up incentive programs to reduce waste generation and maximize diversion of waste from disposal in New Hampshire's landfills and incinerators. These programs would lower GHG emissions from waste combustion and from landfills that produce methane, a powerful GHG, which results from decomposition of waste materials.

Workforce Development

Implementation of measures identified in the PCAP and future measures developed under the CCAP will require an expanded skilled workforce. The PCAP has included workforce development as a necessary measure to support all other program areas. As the demand for affordable and clean energy solutions increases, there will be need of a proficient workforce equipped with the knowledge, skills, and adaptability to meet the challenges and opportunities. Programs to bridge the gap between traditional education and the specialized competencies required in the energy sector are needed. Such investment can foster a pipeline of talented professionals poised to contribute to the sustainable development and efficient operation of energy systems locally and globally. Through strategic collaboration and targeted program design, a New Hampshire energy workforce initiative will seek to provide individuals the expertise to thrive in diverse roles, provide quality high paying jobs, within the energy workforce, ultimately bolstering economic growth, fostering innovation, and advancing environmental sustainability.

Implementation and Next Steps

The priority measures contained herein should be construed as broadly available to any entity in New Hampshire eligible for receiving funding from competitive implementation grants under EPA's CPRG program. Eligible entities for those grants include New Hampshire state agencies, municipalities, intrastate coalitions of those entities, and coalitions with other eligible states, tribes, territories, or metropolitan statistical areas, such as the Metro Boston Metropolitan Planning Council. In addition, the PCAP provides the foundation for New Hampshire's forthcoming required CCAP and Status Report.

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Over 100 New Hampshire stakeholders and members of the community that submitted comments and attended the community engagement events.

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New Hampshire Department of Business and Economic Affairs – Office of Planning & Development

New Hampshire Department of Energy

New Hampshire Department of Environmental Services

Air Resources Division, Atmospheric Science and Analysis Bureau and Mobile Sources Bureau

Waste Management Division, Solid Waste Management Bureau

Water Division, Wastewater Engineering Bureau and Drinking Water and Groundwater Bureau

New Hampshire Department of Health and Human Services, Division of Public Health Services

New Hampshire Department of Natural & Cultural Resources

New Hampshire Department of Transportation

NH Listens and the UNH Carsey School of Public Policy

City of Lebanon, Planning and Development Department

Canterbury Community Power Committee

Enfield Energy Committee

Hudson Sustainability Committee

Sandwich Energy Committee

Upper Valley Lake Sunapee Regional Planning Commission

EPA Region 1

Massachusetts Competitive Partnership - Boston Metropolitan Statistical Area

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NH Regional Public Health Networks

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Manchester Transit Authority

Nashua Transit Authority

UNH Wildcat Transit

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Nashua Regional Planning Commission

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List of Abbreviations and Acronyms

Acronym or Abbreviation	Definition
AHS	American Housing Survey
ANL	Argonne National Laboratory
BBtus	Billion British Thermal Units
C&D	Construction and Demolition
CAA	Clean Air Act
CCAP	Comprehensive Climate Action Plan
CEJST	Climate and Economic Justice Screening Tool
CFR	Code of Federal Regulations
CH ₄	Methane
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CPRG	Climate Pollution Reduction Grant
CT	Connecticut
DCFC	Direct Current Fast Charging
EJScreen	Environmental Justice Screening and Mapping Tool
EPA	United States Environmental Protection Agency
EVs	Electric Vehicles
EVSE	Electric Vehicle Supply Equipment
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program
GSCCC	Granite State Clean Cities Coalition
GVWR	Gross Vehicle Weight Rating
GWh	Gigawatt Hour
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
HVAC	Heating, Ventilation, and Cooling
IRA	Federal Inflation Reduction Act of 2022
IRS	Internal Revenue Service
ISO-NE	Independent System Operator of New England
kg	Kilogram
kWh	Kilowatt-Hour
LDVs	Light-Duty Vehicles
LIDAC	Low-Income and Disadvantaged Community
MA	Massachusetts
ME	Maine
MMBTU	Million British Thermal Units
MMTCO ₂ e	Million Metric Tons of Carbon Dioxide Equivalents
MSA	Metropolitan Statistical Area
MSW	Municipal Solid Waste
MT	Metric Tons
MTCO ₂ e	Metric Tons of Carbon Dioxide Equivalents

Acronym or Abbreviation	Definition
MW	Megawatt
MWh	Megawatt-Hour
N ₂ O	Nitrous Oxide
NESCAUM	Northeast States for Coordinated Air Use Management
NEVI	National Electric Vehicle Infrastructure
NF ₃	Nitrogen Trifluoride
NH	New Hampshire
NH ₃	Ammonia
NHDES	New Hampshire Departmental Environmental Service
NH DMV	New Hampshire Division of Motor Vehicles
NHDOE	New Hampshire Department of Energy
NHES	New Hampshire Employment Security
NO _x	Nitrogen Oxides
NREL	National Renewable Energy Laboratory
PCAP	Priority Climate Action Plan
PFCs	Perfluorocarbons
PHEVs	Plug-in-Hybrid Electric Vehicles
PM ₁₀	Particulate Matter that are 10 Microns or Less in Diameter
PM _{2.5}	Fine Particulate Matter that are 2.5 Microns or Less in Diameter
PV	Photovoltaic
REC	Renewable Energy Certificate
RGGI	Regional Greenhouse Gas Initiative
RI	Rhode Island
RPS	Renewable Portfolio Standards
RSA	Revised Statutes Annotated
SF ₆	Sulfur Hexafluoride
SIT	State Inventory Tool (provided by the EPA)
SO ₂	Sulfur Hexafluoride
SO _x	Sulfur Oxides
U.S. CEQ	U.S. Council on Environmental Quality
U.S. DOE	U.S. Department of Energy
U.S. DOT	U.S. Department of Transportation
U.S. EIA	U.S. Energy Information Administration
U.S. EPA	U.S. Environmental Protection Agency
UNH	University of New Hampshire
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VT	Vermont
WAP	Weatherization Assistance Program
WWTF	Wastewater Treatment Facility

Chapter 1: Introduction

1.1 Climate Pollution Reduction Grant Program Overview

Through the Inflation Reduction Act of 2022 (IRA), many funding opportunities were provided to support the development and deployment of myriad innovative energy technologies, programs, and policies to pursue greenhouse gas (GHG) pollution reductions.¹ One tool is the Climate Pollution Reduction Grants (CPRG) program, which is being administered by the United States Environmental Protection Agency (EPA). The CPRG program is providing \$5 billion in grants to states, local governments, tribes and territories to develop and implement plans for reducing GHG emissions and other harmful air pollution across the nation's economy in the following key sectors: electricity generation, industry, transportation, buildings, agriculture, natural and working lands, and waste management. In implementing the CPRG, EPA seeks to achieve three broad objectives:

- Reduce climate pollution while supporting the creation of good jobs and lowering energy costs for families.
- Accelerate work to reduce environmental impacts to low-income, overburdened communities.
- Deliver cleaner air by reducing harmful air pollution in places where people live, work, play and go to school.

The CPRG is a two-phase program that provides \$250 million for noncompetitive planning grants and approximately \$4.6 billion for competitive implementation grants.

On August 15, 2023, EPA awarded the New Hampshire Department of Environmental Services (NHDES) a noncompetitive CPRG planning grant (\$3 million) to develop the following three key deliverables to help achieve those objectives on behalf of the State of New Hampshire:

- **Priority Climate Action Plan (PCAP) due March 1, 2024:** A narrative report that includes a focused list of New Hampshire's near-term, high-priority, and implementation-ready measures to reduce GHG pollution and an analysis of GHG emissions reductions from proposed measures (see Chapters 4 to 9). The proposed, priority measures in this PCAP will result in reductions in GHG emissions by 2030 and beyond while also maximizing long-term economic benefits to the citizens of New Hampshire. The PCAP is a pre-requisite for competing in the second phase of the CPRG program, in which EPA will competitively award \$4.6 billion in grants for implementation of measures listed in a PCAP. Each state that received a planning grant must submit a PCAP to EPA by March 1, 2024.
- **Comprehensive Climate Action Plan (CCAP) due August 15, 2025:** A narrative report that provides details of New Hampshire's significant GHG sources, sinks and sectors; establishes near-term and long-term GHG emission reduction goals; and identifies strategies and measures

¹ Greenhouse gases (GHGs) are defined by section 137 (d)(2) of the federal Clean Air Act as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

that would help New Hampshire meet those goals. New Hampshire's CCAP must be submitted to EPA by August 15, 2025, which is two years after EPA awarded NHDES a CPRG planning grant.

- **Status Report due August 15, 2027:** A narrative report that includes the implementation status of the quantified GHG reduction measures included in the CCAP; any necessary updated analyses or projections supporting CCAP implementation; and next steps and future budget or staffing needs to continue CCAP implementation. New Hampshire's Status Report must be submitted to EPA by August 15, 2027, which is four years after EPA awarded NHDES a CPRG planning grant.

NHDES' climate plans will include programs and projects that complement existing New Hampshire energy programs and provide economic, social and environmental benefits to New Hampshire residents.

On September 20, 2023, EPA issued a Notice of Funding Opportunity and Request for Applications for approximately \$4.3 billion of general competition grants to implement GHG reduction measures described in PCAPs developed by eligible states, including New Hampshire, and entities representing metropolitan statistical areas, such as the Metro Boston Metropolitan Planning Council, which is the regional planning agency serving cities and numerous towns of southern New Hampshire, such as Nashua, Salem, and Seabrook. (MAPC, 2020). EPA also announced the availability of \$300 million for competitive CPRG implementation grants exclusively for eligible tribes and territories.

The following is a summary of the major components of the CPRG's competitive implementation grants program.

- **Implementation Grant Applications due April 1, 2024:** EPA will award competitive grants to eligible applicants to implement GHG reduction measures (i.e., programs, policies, and projects) that are identified in PCAPs. EPA expects to award up to 115 grants nationwide that range between \$2 million and \$500 million. EPA will give precedence to applications that reduce GHG emissions by 2030 and benefit low-income, disadvantage communities (LIDAC).² Eligible applicants include state agencies and any municipality, which, for the purposes of the CPRG program, is defined by section 302(f) of the Clean Air Act (i.e., 42 U.S.C. § 7602(f)) as "a city, town, borough, county, parish, district, or other public body created by or pursuant to State law."
- **Application:** Each eligible applicant is limited to two grant applications: one as an individual applicant and one as the lead applicant for a coalition. EPA recommends that eligible applicants coordinate with each other to avoid submitting more than one application to implement the same GHG reduction measure in the same geographic location. For a coalition application, the lead applicant must include a signed letter of intent from each coalition member stating the member's intent to sign a memorandum of agreement (MOA). After the application with the letter is submitted by April 1, 2024, the signed MOA must be submitted to EPA by July 1, 2024.

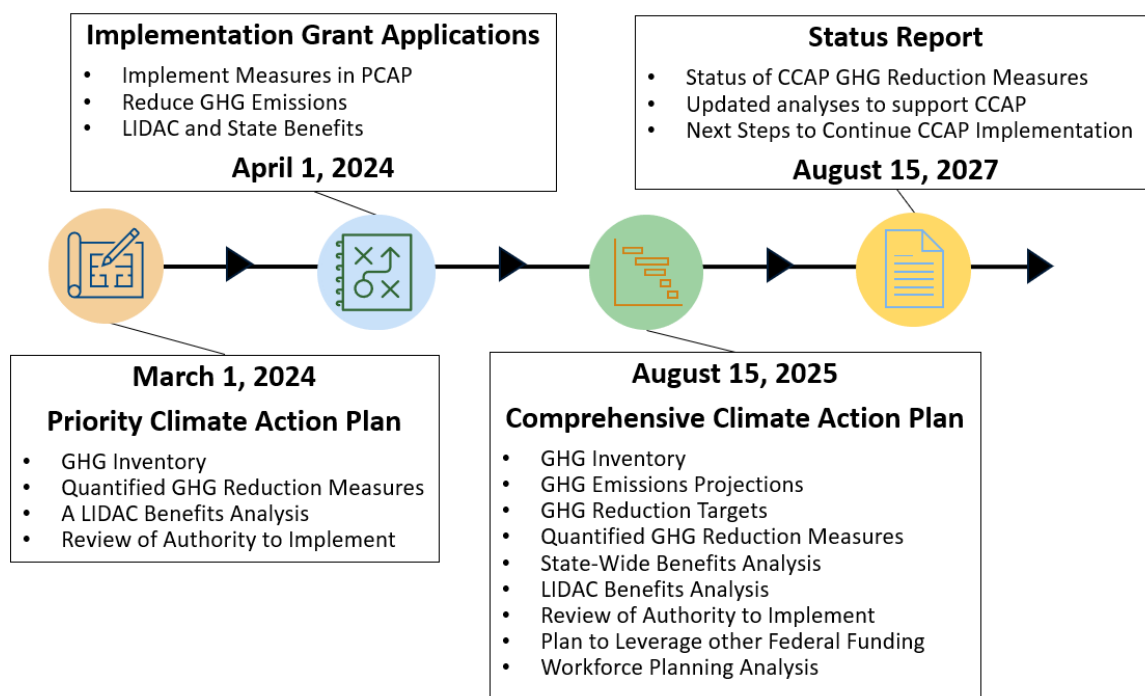
² Low-income and disadvantage community (LIDAC): For purposes of the New Hampshire's PCAP, NHDES used EPA's recommendation for defining LIDACs, which is any census tract that is included as disadvantaged in the Climate and Economic Justice Screening Tool (CEJST); and any census block group that is at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the entire state.

Each application will be rated using a point system based on a total of 250 possible points. EPA will score each application based on the following evaluation criteria:

- Overall project summary and approach (45 points).
 - Impact of GHG reduction measures (60 points).
 - Environmental results – outputs, outcomes, and performance measures (30 points).
 - Benefits to LIDACs (35 points).
 - Programmatic capability and past performance (30 points).
 - Budget and timely expenditure of grant funds (45 points).
 - Job quality of Applicant (5 points).
- **Award limits:** EPA anticipates that within a single state, no more than two state-level applications would be awarded a grant; and within a single municipality, no more than two municipal applications would be awarded a grant. Applicants may pass down funding via contracts, subawards, and participate support costs, including to for-profit and non-profit entities. EPA’s estimated period of performance of grant awards will be up to five years. The estimated project start date for awards is October 1, 2024.

Figure 1-1 summarizes New Hampshire’s schedule and key components of the CPRG program.

Figure 1-1. Schedule and Key Components of New Hampshire’s Implementation of its Climate Pollution Reduction Grant Program.



The CPRG general competition is designed to incentivize eligible applicants to apply for funding as a coalition to implement GHG reduction measures regionally, across multiple municipalities, state

boundaries, or even state and tribal boundaries. In general, EPA anticipates that applications may seek funding for the following types of measures:

- A new, stand-alone GHG reduction measure that will be implemented solely through CPRG funding.
- An expansion of a GHG reduction measure that is already being implemented, where the expansion of the measure will be funded through CPRG funding.
- A new GHG reduction measure for which the applicant has already secured partial funding and needs additional funding from the CPRG program to secure the total funding needed to fully implement the measure.

1.2 Overview of New Hampshire's Priority Climate Action Plan

NHDES used the CPRG planning grant award received from EPA in August 2023 to produce this PCAP. This PCAP was developed with assistance from New Hampshire Listens, a community engagement initiative of the Carsey School of Public Policy at the University of New Hampshire, and the Northeast States for Coordinated Air Use Management (NESCAUM), and in coordination with other New Hampshire state agencies. New Hampshire's PCAP development relied on the engagement of hundreds of individuals, as well as municipalities, nonprofits, and business interests to inform the selection of implementation ready measures. The purpose of the PCAP is to support investment in programs, practices and technologies that reduce pollutant emissions, create high-quality jobs, spur economic growth, and enhance the quality of life for all Granite Staters.

The PCAP builds upon existing state and regional programs, as well as past and present state energy policies and initiatives in various sectors, primarily electricity generation, building and transportation. NHDES identified opportunities for further emission reductions through an analysis of a detailed, state-level GHG inventory. The result is a list of priority measures that, if implemented, would result in near-term and cost-effective reductions in New Hampshire's GHG emissions, while supporting a safe and resilient energy system and benefiting the state's LIDACs. In addition, the PCAP will provide the basis for New Hampshire's forthcoming CCAP and Status Report.

The measures contained herein should be construed as broadly available to any entity in New Hampshire eligible for receiving funding from competitive implementation grants under EPA's CPRG program. Eligible entities for those grants include New Hampshire state agencies, municipalities, intrastate coalitions of those entities, and coalitions with other eligible states, tribes, territories, or metropolitan statistical areas, such as the Metro Boston Metropolitan Planning Council.

This PCAP includes the following additional chapters:

- **Chapter 1: Introduction:** This chapter summarizes EPA's CPRG program, New Hampshire's PCAP, and NHDES' approach to developing the PCAP.
- **Chapter 2: New Hampshire's Greenhouse Gas Emissions: Past to Present.** This chapter provides a high-level summary of New Hampshire's 2009 Climate Action Plan and the critical policies and plans that have supported New Hampshire's environmental, social and economic gains. Changes to the state's GHG emissions and sinks are also summarized.

- **Chapter 3: New Hampshire's GHG Emissions Inventory.** This chapter identifies and quantifies New Hampshire's GHG emission sources and sinks using standard methods for the following sectors: industry; electricity generation; transportation; commercial and residential buildings; agriculture; natural and working lands; waste and materials management; and land use, land use change, and forestry.
- **Chapter 4: Summary of New Hampshire's Priority Measures.** This chapter summarizes New Hampshire's priority measures and lists the criteria that NHDES used to establish the measures. This chapter also generally describes the key implementing agencies, geographic scope, implementation schedule, and milestones of the measures.
- **Chapters 5 through 9: New Hampshire's Priority Measures.** These chapters provide detailed information on the scope and implementation of the priority measure identified in Chapter 4.
- **Chapter 10: Authority to Implement Priority Measures:** This chapter describes NHDES' existing statutory or regulatory authority to implement the priority measures.
- **Chapter 11: Low-Income and Disadvantaged Community Analysis.** This chapter identifies each LIDAC within New Hampshire, how NHDES and its partners meaningfully engaged with LIDACs in the development of this PCAP, and how NHDES and its partners will continue to engage into the future.
- **Chapter 12: Coordination and Outreach.** This chapter describes the framework that NHDES used to support robust and meaningful engagement strategies to ensure comprehensive stakeholder representation and overcome obstacles to engagement, including linguistic, cultural, institutional, geographic and other barriers.

The PCAP development process has engaged a variety of Granite State stakeholders in the emission reduction planning process and has:

- Improved their understanding of the scope and sources of the past and current GHG emissions in New Hampshire.
- With stakeholder input, identified priority strategies to reduce these emissions and the potential scope of those reductions.
- Identified other potential benefits of implementing these strategies.

1.3 Approach to Developing the Priority Climate Action Plan

The Air Resources Division's Technical Services Bureau of NHDES led the development of this PCAP with the support of outside experts who were funded, in part, by a CPRG planning grant. As described in Chapter 12, NHDES engaged numerous stakeholders and received input from hundreds of citizens regarding the content of measures. NHDES' drafting of the PCAP began with a review of New Hampshire's 2009 Climate Action Plan, with an eye toward identifying priorities to carry forward, areas where there are opportunities for change and improvement, and potential gaps. NHDES' PCAP measures were based on input garnered through stakeholder and community engagement as well as available data for emissions of GHGs and associated co-pollutants. NHDES produced a state-level GHG emissions

inventory using EPA's State Inventory Tool to evaluate the progress of and continued opportunities for actions identified in the 2009 Plan. NHDES also evaluated, among other things, benefits of potential measures to LIDACs; consistency with New Hampshire Department of Energy's (NHDOE) New Hampshire 10-Year State Energy Strategy; and alignment with existing and proposed climate strategies and plans in the state. NHDES utilized several models, tools and data from variety of sources for this evaluation.

1.3.1 Outreach and Engagement

With support from the New Hampshire Listens team, NHDES held several stakeholder engagement sessions, including sessions with state, municipal and regional partners as well as with community-based organizations and community members. New Hampshire's PCAP was developed with the phrase "nothing about us without us" in mind. Opportunities for input from stakeholders, including the public, were an important focus of the project team and that engagement will facilitate later implementation. Core components of the plan were shared with stakeholders at various points throughout the development process to allow the opportunity for review and input. On February 5, 2024, NHDES published a Notice of Request for Public Comment for its preliminary draft priority measures of the PCAP. NHDES received and reviewed over 110 comments during the public comment period and considered those comments to select and develop the priority measures of the PCAP. NHDES' outreach and engagement efforts are summarized in Chapter 12.

NHDES consulted with many other New Hampshire agencies, including NHDOE, New Hampshire Department of Transportation, New Hampshire Department of Health and Human Services, and New Hampshire Department of Natural and Cultural Resources. NHDES also sought input from New Hampshire's municipalities individually and in a coordinated way via outreach through the New Hampshire Municipal Association.

In addition to relying on existing networks and community connections, the following tools were used to identify populations that are identified as LIDAC for targeted outreach and communication:

- U.S. Council on Environmental Quality – Climate and Economic Justice Screening Tool (CEJST) (U.S. CEQ, 2023).
- U.S. EPA's – Environmental Justice Screening and Mapping Tool (EJScreen) (U.S. EPA, 2023a).

NHDES and its partners completed a LIDAC benefit analysis for the priority measures that are included in this PCAP. That analysis is summarized in Chapter 11 of this PCAP.

1.3.2 Review of New Hampshire's 10-Year State Energy Strategy

In 2022, NHDOE published the New Hampshire State Energy Strategy (Strategy), which identifies specific energy goals and recommends policy and program actions to support those goals. The Strategy focuses on the most critical energy issues facing the state and establishes a framework and guiding principles intended to steer the development and evolution of energy policies. The broad objective of the Strategy is to support the creation of energy policies and programs that best serve New Hampshire's needs (NHDOE, 2022).

The Strategy centers on cost-effective energy while also balancing broader outcomes that will enable business and consumer cost savings, job creation, economic growth, industry competitiveness,

environmental protection, and a reliable and resilient energy system. NHDES reviewed the Strategy and have aligned New Hampshire's priority measures with the Strategy's policy goals, which are:

- Prioritize cost-effective energy policies.
- Ensure a secure, reliable and resilient energy system.
- Adopt all-resource energy strategies and minimize government barriers to innovation.
- Achieve cost-effective energy savings.
- Achieve environmental protection that is cost-effective and enables economic growth.
- Government intervention in energy markets should be limited, justifiable and technology-neutral.
- Support a robust, market-selection of cost-effective energy resources.
- Generate in-state economic activity without reliance on permanent subsidization of energy.
- Protect New Hampshire's interests in regional energy matters.
- Ensure that appropriate energy infrastructure is able to be sited while incorporating input and guidance from stakeholders.

In the Strategy, NHDOE determined the following, among several other findings:

- In some circumstances, heat pumps make sense as a replacement for high-cost carbon intensive systems because they are very efficient and technological improvements have largely overcome the issues with keeping homes warm on the coldest days of the year.
- Heating costs constitute a significant portion of a family's or business's expenses during the colder months. Reducing heating costs not only means more disposable income for New Hampshire's residents, families and businesses, but a reduction in carbon emissions.
- Rebates and other services available through programs, such as the utility-led NHSaves Program, make energy efficiency measures and home upgrades more accessible to low- and moderate-income Granite Staters.
- Passenger vehicles will likely remain the dominant transportation mode for the foreseeable future. However, the energy usage required for car passenger miles is likely to continue to fall and the increased adoption of electric vehicles offers opportunities to reduce energy intensity in the transportation sector without drastic disturbances in consumer behaviors and expectations.
- There are areas where population density allows for effective mass transit utilization.

1.3.3 Review of Other Climate Action Plans in New Hampshire

Some municipalities in New Hampshire have developed strategies to reduce energy consumption or GHG emissions within their jurisdictions. NHDES reviewed existing and proposed strategies of the states' municipalities to help understand existing priorities and identify synergies in the development of the

priority measures in New Hampshire's PCAP. NHDES reviewed strategies from the following municipalities: Portsmouth; Lebanon; Dover; Durham; Nashua; Keene; and Hanover. (City of Portsmouth, 2024; City of Lebanon, 2012; City of Dover, 2023; Town of Durham, 2022; City of Nashua, 2024; City of Keene, 2021; Town of Hanover, 2023).

1.3.4 Development of Priority Measures

NHDES developed New Hampshire's priority measures by evaluating its state-specific GHG inventory and other emission and economic information, by reviewing resources that are referenced in the bibliography of this PCAP, and by relying on data from the following federal resources:

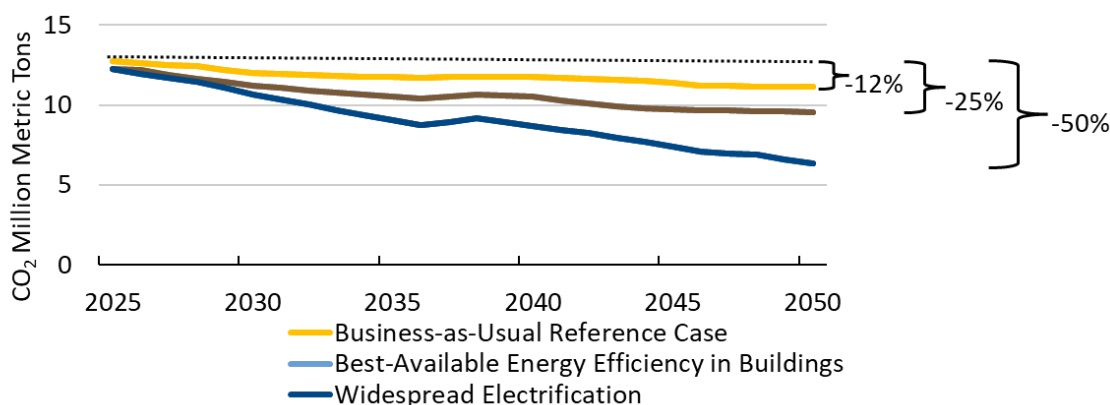
- U.S. EPA's State Inventory Tool (SIT Tool) (U.S. EPA, 2024c).
- U.S. EPA's Annual Inventory of U.S. Greenhouse Gas Emissions and Sinks (U.S. EPA, 2023f).
- U.S. Energy Information Administration State Profile (U.S. EIA, 2024a).
- U.S. EPA's Greenhouse Gas Reporting Program (U.S. EPA, 2024a).
- U.S. National Renewable Energy Laboratory's (NREL) State and Local Planning for Energy (NREL, 2024d).

NHDES and its partners used those tools to help identify, select and develop the priority measures that are included this PCAP. NHDES included priority measures that would significantly reduce GHG emissions and meaningfully benefit LIDACs by 2030 and beyond. NHDES' GHG inventory showed that a majority of New Hampshire's GHG emissions are from the transportation and residential sectors, which account for 43.8% and 20.5% of emissions, respectively. NHDES analyzed New Hampshire's potential to achieve substantial and near term GHG emission reductions by evaluating how the magnitude and source of emissions have changed since 2005, which was the last year of GHG emissions examined in NHDES' 2009 Plan. NHDES determined that vast majority of GHG emissions reductions since 2005 were from New Hampshire's electricity generation sector, which declined by nearly 73% between 2005 and 2021. Emissions from the transportation, residential, and commercial sectors only declined by approximately 10%, 20%, and 29%, respectively, since 2005. Based on stakeholder feedback, NHDES also identified waste reduction, diversion, and recycling as measure that could reduce emissions from the transportation sector as well as the waste and materials management sector. Based on an analysis of all sectors as well as the availability of emission reducing technologies and opportunities, NHDES determined that the highest potential for substantial GHG emission reductions will come from the transportation and residential building sectors, followed by reductions from the commercial building and waste sectors.

To better understand the trajectory of New Hampshire's GHG emissions, NHDES estimated New Hampshire's emissions from 2025 through 2030 and 2050 under various scenarios using NREL's Scenario Planner. NREL's Scenario Planner, which is part of NREL's State and Local Planning for Energy (SLOPE) platform, translates energy consumption data for the transportation, residential, commercial, and industrial sectors into projections of CO₂ emissions and, therefore, does not include all sources of GHG emissions (NREL, 2024d). However, comparing CO₂ emission reductions under various scenarios provided NHDES with an understanding of the potential to reduce New Hampshire's GHG emissions over various time periods. For example, under a no-action, "business-as-usual" reference case (i.e., based on existing

state and federal 2020 policies), New Hampshire's CO₂ emissions from 2025 to 2050 would only decline by approximately 12%. However, if New Hampshire adopted widespread enhanced energy efficiency in buildings, the model showed that the state would reduce CO₂ emissions by 25% from 2025 to 2050.³ If New Hampshire adopted widespread electrification in its building and transportation sectors, the model showed that the state would reduce CO₂ emissions by 50% from 2025 and 2050 (NREL, 2024c).⁴

Figure 1-2. New Hampshire's Projected CO₂ Emissions from 2025 to 2050 from Major Sectors Under Three Modeled Scenarios Using NREL's Scenario Planner.



NHDES analyzed co-pollutant emission reductions associated with GHG reduction measures that impact public health and the environment in New Hampshire. Many pollutants contribute to degradation of air quality, but pollutants of concern include the criteria pollutants that cause regional haze and are detrimental to public health.⁵

In New Hampshire, one of the most pervasive and widespread air pollutants is ground-level ozone. Exposure to ozone can reduce lung function; aggravate chronic lung diseases such as asthma, emphysema, and bronchitis; and cause or exacerbate other respiratory problems. Breathing elevated concentrations of ozone may contribute to premature death in people with heart and lung disease. Ground level ozone is created by a chemical reaction of NO_x, VOCs and ultraviolet light (NHDES, 2020). As shown in Figure 1-3, the majority of New Hampshire's NO_x emissions, over 63%, are from vehicles (on- and off-highway), and a plurality of New Hampshire's VOC emissions, over 32%, are also from vehicles (U.S. EPA, 2023b). Sulfur dioxide (SO₂) is also harmful to the respiratory system and aggravates heart disease. Residential and commercial heating with oil dominates the SO₂ emitting sectors. New

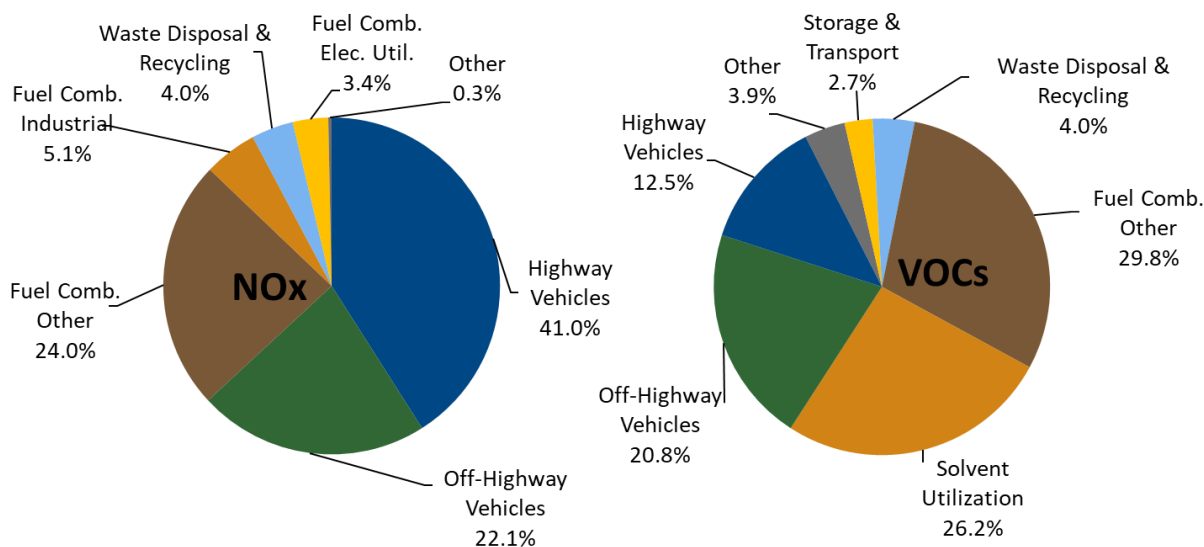
³ In NREL's SLOPE model, "enhanced energy efficiency in buildings" assumes that energy efficiency of residential and commercial buildings increases over time, consistent with consumers pursuing aggressive energy conservation measures, including equipment, envelope, and other efficiency improvements that reduce direct fuel use in buildings.

⁴ In the NREL's SLOPE model, "widespread electrification" assumes transformational electrification in buildings and transportation, such as 84% of light-duty cars and trucks being plug-in electric vehicles and electric technologies serving most buildings.

⁵ The federal Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six commonly found air pollutants known as criteria air pollutants and include carbon monoxide (CO), lead (Pb), ground-level ozone (O₃), particulate matter (PM), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂).

Hampshire's emissions of PM_{2.5} come from a wide variety of emission sources but is dominated by residential wood combustion during colder months for heating purposes.

Figure 1-3. New Hampshire's 2020 NOx and VOC Emissions by Source (Percentage).



By implementing the measures of the PCAP, New Hampshire will achieve substantial emission reductions beginning immediately, using cost-effective and available technology.

NHDES developed the priority measures of this PCAP based on opportunities to implement projects that would address the priorities of New Hampshire's residents, benefit New Hampshire's LIDACs, and have the highest potential to reduce GHG and co-pollutant emissions. In evaluating New Hampshire's largest sources of pollutant emissions, the greatest reduction opportunities would come from improvements in the building and transportation sectors, followed by reductions from the commercial building and waste sectors. The total impact of the measures will be sufficient to help New Hampshire achieve substantial GHG emission reductions by 2030 and to be well placed to achieve extensive reductions by 2050. While additional measures and funding will be needed in the long-term to achieve those 2050 reductions, such measures are likely to be based on the widespread adoption of new and advanced technologies across all sectors as well as the preservation and restoration of New Hampshire's natural ecosystems. New Hampshire's priority measures will benefit the economy, increase state and regional energy security, and improve environmental quality.

Chapter 2: New Hampshire's Greenhouse Gas Emissions: Past to Present

As described in Chapter 1, the New Hampshire PCAP builds on New Hampshire's past and present statewide energy policies and programs in the electric generation, building and transportation sectors. The establishment of New Hampshire's energy policies was driven by the global energy crises of the 1970s and 1980s, which also spurred the first waves of efficiency and innovation in the state. Since then, New Hampshire's environment and public health have all improved considerably. The following sections provide a high-level summary of the critical policies and plans that have contributed to New Hampshire's environmental and public health gains.

2.1 New Hampshire's 2009 Climate Action Plan

In December 2007, Executive Order 2007-3 established a Climate Change Policy Task Force and directed the Task Force to develop a climate action plan for the state (Lynch, 2007). The Task Force, which was chaired by the Commissioner of NHDES, was composed of 29 members including regulators, scientists, business leaders, utility representatives and environmental groups. The Task Force was charged with developing a set of climate change action goals as well as a set of recommendations outlining the regulatory, voluntary, and policy actions that could be taken to achieve those goals. In March 2009, following nearly 18 months of work, the Task Force released the New Hampshire Climate Action Plan (2009 Plan) with the support of 125 stakeholders spread across six working groups (NH CCPTF, 2009). The 2009 Plan set forth a set of aspirational GHG emission reduction targets and included 67 actions, organized within 10 overarching strategies, to achieve the following goals:

- Reduce GHG emissions from buildings, electric generation, and transportation.
- Protect our natural resources to maintain the amount of carbon sequestered.
- Support regional and national initiatives to reduce GHGs.
- Develop an integrated education, outreach, and workforce training program.
- Adapt to existing and potential climate change impacts.

In the 2009 Plan, the Task Force projected that New Hampshire's GHG emissions would rise to 31.36 million metric tons of carbon dioxide equivalents (MMTCO₂e) by 2025 under a no-action, "business-as-usual" scenario.⁶ The Task Force asserted that 2025 emissions could be reduced by 18.69 MMTCO₂e (59.6%) if New Hampshire implemented the recommended actions in the plan. This would bring GHG emissions in 2025 to 12.67 MMTCO₂e, which would be a 20% reduction from New Hampshire's 1990 emissions.

⁶ A measure used to compare the emissions from various GHGs based on their global-warming potential (GWP) by converting amounts of other gases, such as methane and nitrous oxide, to the equivalent amount of carbon dioxide. For example, in its *1990-2021 Inventory of U.S. Greenhouse Gas Emissions and Sinks*, EPA used a GWP of 28 for methane and 265 for nitrous oxide based on a 100-year timeframe (U.S. EPA, 2023g).

To achieve the goals of the 2009 Plan, the Task Force recommended the following 10 overarching strategies:

- Maximize Energy Efficiency in Buildings.
- Increase Renewable and Low-Emitting Sources of Energy in a Long-Term Sustainable Manner.
- Support Regional and National Actions to Reduce GHG Emissions.
- Reduce Vehicle Emissions through State Actions.
- Encourage Appropriate Land Use Patterns That Reduce Vehicle-Miles Traveled.
- Reduce Vehicle-Miles Traveled Through an Integrated Multi-Modal Transportation System.
- Protect Natural Resources to Maintain the Amount of Carbon Fixed or Sequestered.
- Lead by Example in Government Operations.
- Plan for How to Address Existing and Potential Climate Change Impacts.
- Develop an Integrated Education, Outreach, and Workforce Training Program.

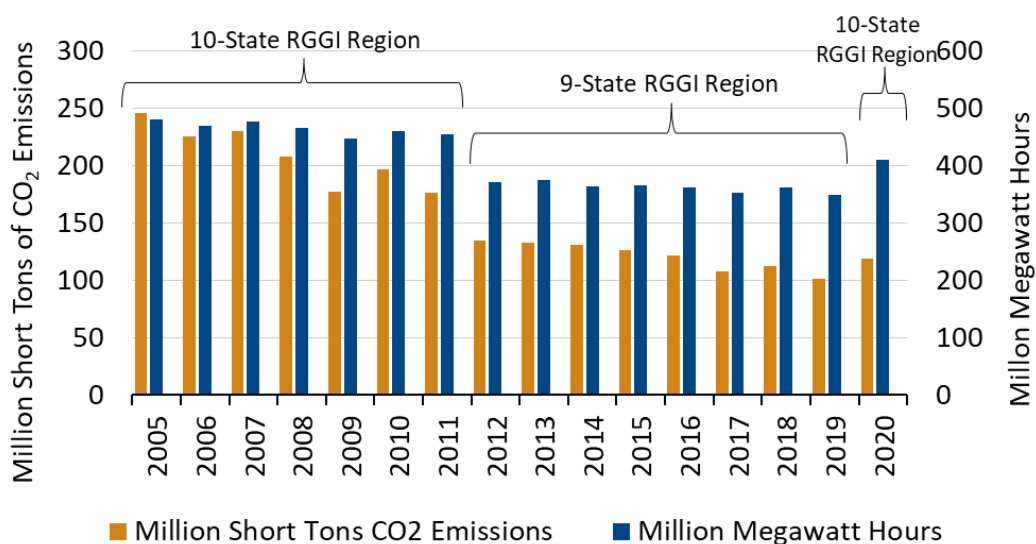
A clear message the Task Force also distilled from the 2009 Plan development process was that the solutions to climate change present a significant set of economic opportunities. In the 2009 Plan, the Task Force determined that a reduction in GHG emissions could avoid the export of dollars that formerly left the state economy to pay for energy inputs when those dollars could be saved through efficiency and conservation initiatives within the state. Those savings could be reinvested in New Hampshire to create growth in non-energy sectors of the economy. In addition, the development of renewable energy sources in the state would keep dollars in the state's economy and create jobs by doing so. The Task Force concluded that investments in climate change mitigation actions over the long-term, when combined on a global scale, would ultimately reduce expenditures by avoiding the most severe impacts of climate change.

In the past 15 years, New Hampshire has made progress towards implementing the actions in the 2009 Plan. New Hampshire has continued and developed programs to support the reduction of GHG emissions, primarily CO₂. The state's programs have balanced cost-effective energy savings while also balancing broader outcomes that enabled business and consumer cost savings, job creation and economic growth. Between 2005 and 2021, New Hampshire's real gross domestic product has increased by approximately 28%, while its population has only increased by 5% (U.S. EIA, 2024b). Three examples of programs that have reduced GHG emissions in New Hampshire's electricity generation and transportation sectors are presented in the following three sections of this PCAP: the Regional Greenhouse Gas Initiative; New Hampshire's Renewable Portfolio Standard for Electricity Generation; and the Granite State Clean Cities Coalition. These programs reduced GHG emissions and the overall demand for energy and energy costs. In the last section of this chapter, NHDES discusses New Hampshire's current GHG emissions (i.e., 2021 emissions) and reasons why those emissions have changed since 2005.

2.2 The Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI) is a flexible, market-based program to reduce CO₂ emissions from power plants within participating states in the Northeast and New England. Since the inception of RGGI in 2009, the number of participating states has shifted as states either joined or left the cooperative effort. In the beginning of 2024, RGGI consists of the following states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont. Together, participating states have established a regional cap on CO₂ emissions, which sets a limit on the emissions from regulated power plants within the participating states. Under the program, a limited number of allowances, with each allowance equal to one ton of CO₂ emissions, are auctioned off. These allowances are offered at quarterly auctions to generators, who are required to purchase allowances for the emission of CO₂. The proceeds of those auctions are divided among the states based on a pre-determined proportion of the total emissions cap. Over time, the regional cap declines, so that CO₂ emissions decrease in a planned and predictable way (RGGI, 2024).

Figure 2-1. Annual CO₂ Emissions from Electricity Generation Serving the RGGI Region and Annual Electricity Demand in the RGGI Region from 2005 to 2020.



As shown in Figure 2-1, annual emissions of CO₂ in the RGGI region from 2005 to 2020 have declined from approximately 246 million short tons to approximately 118 million short tons. Annual electricity demand in the RGGI region during that same period declined from approximately 480 million megawatt hours (MWh) to approximately 411 million MWh. Annual values from 2005 to 2011 and 2020 represent the 10-state RGGI region; annual values from 2012 to 2019 represent the nine-state RGGI region (RGGI, 2023).

Since 2009, annual power-sector CO₂ emissions in RGGI states have been reduced by more than 50%. The transition to natural gas and other market forces, in combination with RGGI, have driven much of these emissions reductions. The initiative has raised approximately over \$7 billion to invest into local communities. Within the RGGI states, regulated power plants must acquire one RGGI CO₂ allowance for every short ton of CO₂ they emit. The RGGI states distribute allowances at quarterly auctions, where they can be purchased by power plants and other entities. Each participating state originates allowances

in proportion to its share of the regional cap. To comply with their state's regulations, fossil fuel-fired power plants sized 25 megawatts (MW) or more must acquire enough RGGI allowances to cover their emissions (in New York, power plants sized 15 MW or greater are regulated under RGGI) (RGGI, 2024).

The RGGI states have adopted frameworks for implementing RGGI in their respective states based on a "Model Rule," which RGGI states developed to act as a template for each state to shape its own CO₂ budget trading program. Once a state has implemented its program, they are able to participate in RGGI allowance auctions. The auctions ensure access to allowances under uniform terms, help establish a market-based value for the price of CO₂ allowances, avoid windfall profits for power plant owners, and support investments in a clean and equitable future (RGGI, 2024). The proceeds from RGGI are used to fund emissions reduction initiatives in New Hampshire that also provide benefits and improvements to residential homes, local businesses, multi-family housing, industrial facilities, community buildings, retail customers and more (NHDES, 2024b).

Some of RGGI's proceeds are directed to New Hampshire's Energy Efficiency Fund, a dedicated fund created by New Hampshire legislation (RSA 125-O:23), which is administered NHDOE and the state's regulated energy utilities to fund weatherization programs, including a low-income energy efficiency program and utility core programs for municipal and local government energy efficiency projects (NHDOE, 2024d). For example, New Hampshire's electric and natural gas utilities (NH Utilities) have been working to provide New Hampshire customers with energy efficiency programs offered under the NHSaves® brand (NH Utilities, 2023). The bulk of RGGI proceeds are rebated to retail ratepayers, effectively lowering rates for all.

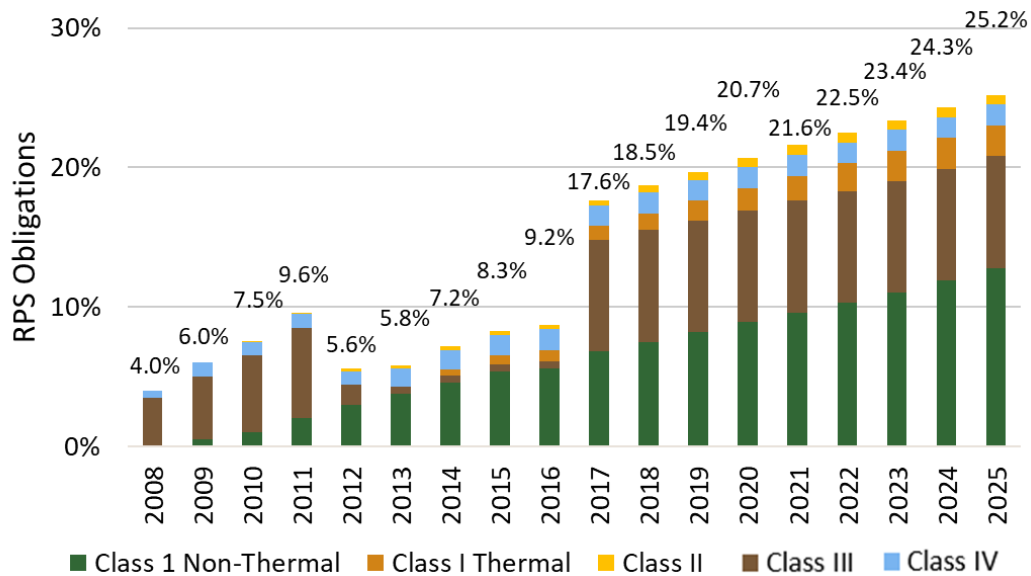
2.3 New Hampshire's Renewable Portfolio Standard for Electricity Generation

New Hampshire's Electric Renewable Portfolio Standard (RPS) is another example of how New Hampshire has attempted to reduce GHG emissions. The RPS was established by law in 2007 (RSA 362-F) and is currently administered by NHDOE. The RPS is a program intended to increase the supply of local renewable energy electric generation, protect, and enhance fuel diversity, and improve air quality and public health by reducing emissions of GHG, nitrogen oxides (NO_x), and particulate matter that are transported into, or generated within, New Hampshire. The RPS requires electric service providers, including distribution utilities and competitive suppliers, to acquire a certain percentage of supply from renewable energy sources. In 2008, the total RPS mandate only called for 4.0% of electricity sold to retail electric customers to be generated by renewable energy sources. This mandate has increased substantially over time. For 2024, the RPS mandate calls for a total of 24.3%, with a goal of 25.2% by 2025 and thereafter (NHDOE, 2024b). Under New Hampshire's RPS law, applicable renewable energy sources are organized into the following four classes (for more details on these classes, see RSA 362-F:4):

- **Class I:** Wind; geothermal; hydrogen derived from biomass fuel, water or methane gas; ocean thermal, wave, or tidal energy; methane gas; eligible biomass fuels (including the biomass share of certain generators co-fired with fossil fuels); useful thermal energy from eligible biomass, geothermal, and solar systems (i.e., solar-electric energy not used to satisfy the Class II obligation). These sources only qualify if the source began operation after January 1, 2006, or after January 1, 2013, depending on the type of source.
- **Class II:** New solar technologies (e.g., photovoltaic), provided the technology began operation after January 1, 2006.

- **Class III:** Existing biomass or methane facilities that meet air emission criteria and provided the source began operation prior January 1, 2006, among other restrictions.
- **Class IV:** Existing small hydroelectric projects (i.e., 5 or 1 MW capacity or less depending on the source, among other restrictions), provided the source began operation prior to January 1, 2006.

Figure 2-2. New Hampshire’s Renewable Portfolio Standard Obligations for Electricity Generation from 2008 to 2025.



Utility service providers have three options for satisfying RPS requirements:

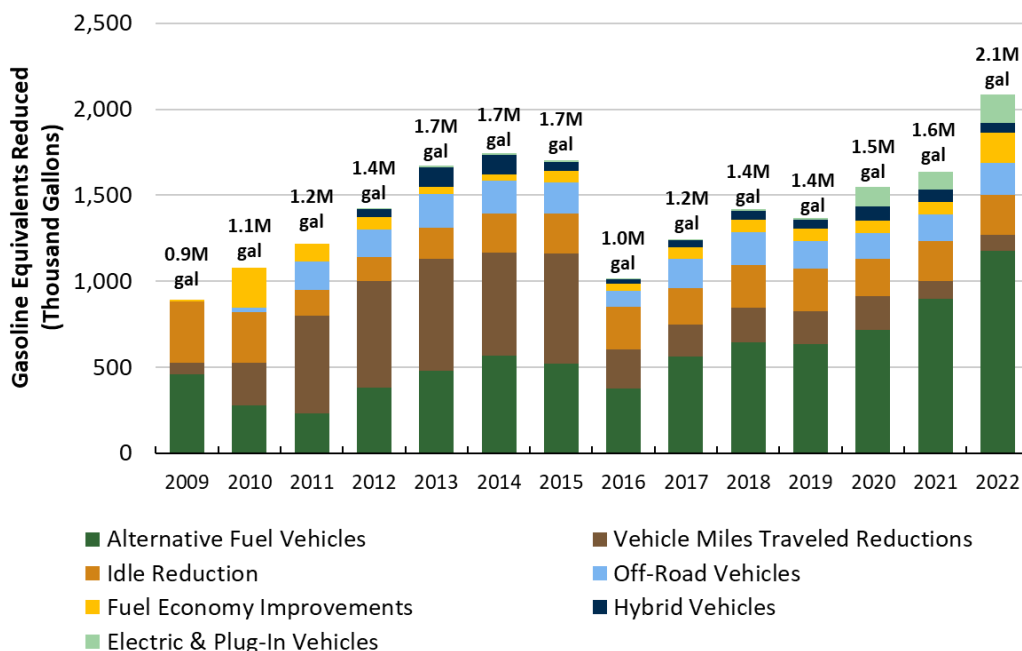
- Purchasing renewable energy certificates (RECs) from eligible projects on the open market. A single REC represents one MWh of electricity produced from eligible renewable energy sources and may be sold separately from the associated electricity.
- In certain situations, investing directly in eligible renewable projects, such as investing in renewable and clean distributed energy resources as specified under RSA 374-G.
- If the electricity providers are not able to meet the RPS requirements by purchasing or acquiring RECs during a compliance year, then the provider must pay an alternative compliance payment to the Renewable Energy Fund established under RSA 362-F:10. The Renewable Energy Fund supports thermal and electrical renewable energy initiatives through renewable energy rebate programs or competitive grant solicitations for the following programs (NHDOE, 2024e):
 - Residential electrical renewable energy rebate program.
 - Residential central wood pellet boiler or furnace heating system rebate program.
 - Low- to moderate-income community solar.
 - Commercial and industrial solar technologies rebate program.
 - Commercial and industrial central wood pellet boiler/furnace rebate program.

- Commercial and industrial competitive grant program.

2.4 Granite State Clean Cities Coalition

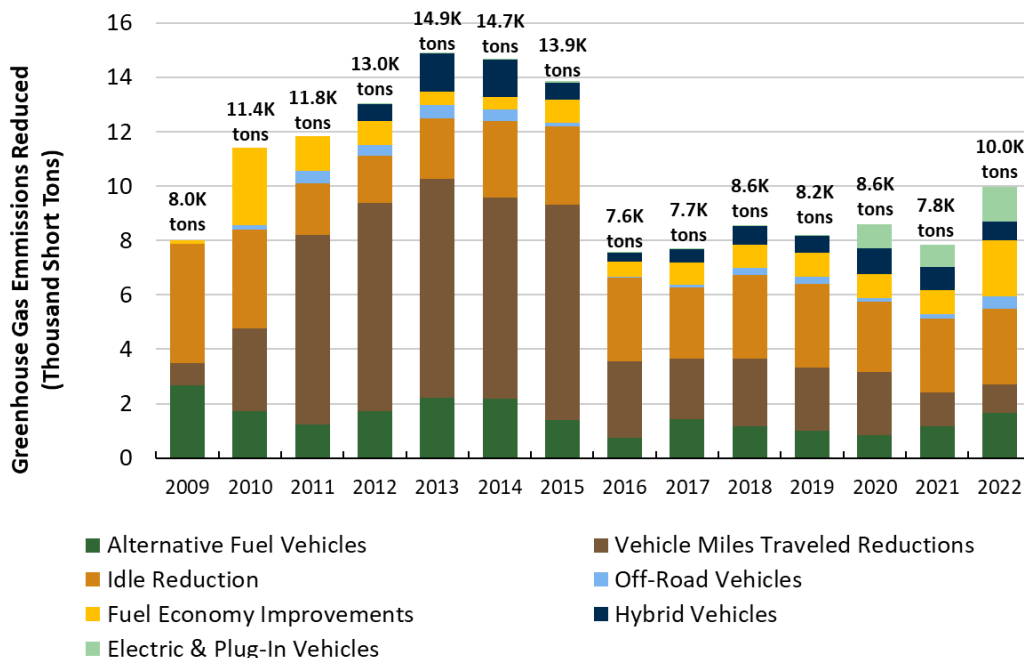
The Granite State Clean Cities Coalition (GSCCC) has been working since 2002 to reduce petroleum use in New Hampshire's transportation sector. GSCCC assists public and private vehicle fleet managers at New Hampshire's businesses and municipalities in adopting affordable, domestic alternative transportation fuels, advanced vehicle technologies, and other fuel-saving strategies. GSCCC is comprised of over 150 stakeholders and is steered by an advisory board made up of state agency officials and private industry leaders. Each year, GSCCC collects data from stakeholders who are implementing clean transportation projects in New Hampshire (GSCCC, 2024). Figure 2-3 shows reductions in gallons of gasoline equivalents resulting from GSCCC stakeholder projects.

Figure 2-3. New Hampshire's Historical Gallons of Gasoline Equivalent Reduced by GSCCC stakeholders from 2009 to 2022.



The transportation sector has been the largest source of GHG emissions in New Hampshire. The adoption of alternative fuels and advanced vehicle technologies are a solution. GSCCC provides connections, tools and resources to support successful stakeholder projects like Nashua Transit System's hybrid-electric transit buses, Eversource Energy's biodiesel bucket trucks with battery-powered aerials, and Manchester Transit Authority's propane powered school buses. These projects not only reduce petroleum use, but also reduce emissions of GHGs and criteria pollutants. Figure 2-4 shows the reductions in GHG emissions that resulted from GSCCC stakeholder projects.

Figure 2-4. New Hampshire's Historical GHG Emissions Reduced by GSCC stakeholders from 2009 to 2022.

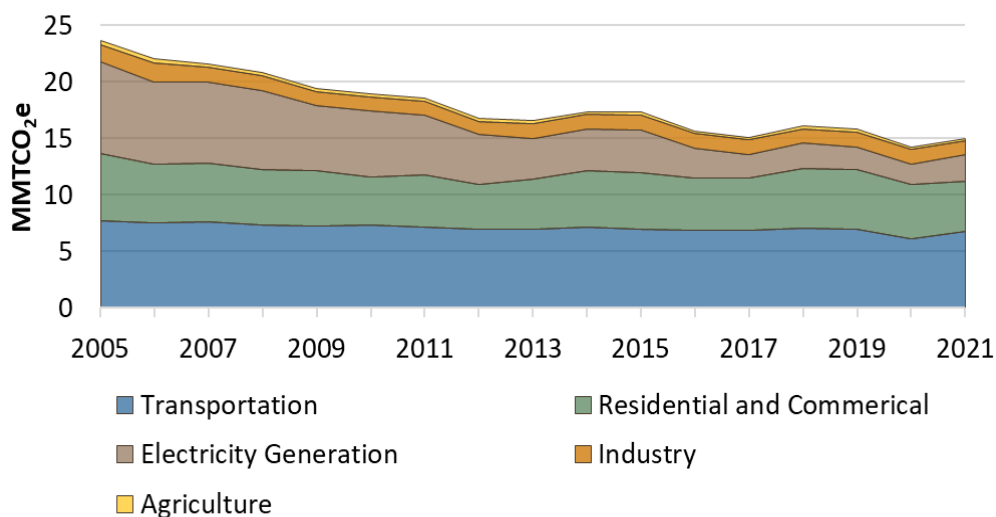


Through a combination of projects focused on increasing vehicle efficiency, shifting to domestic alternative fuel sources, and offering consumers additional transportation choices, GSCC stakeholders saved over 2.1 million gasoline gallon equivalents and reduced GHG emissions by nearly 10,000 short tons in 2022 alone.

2.5 New Hampshire's Current (2021) Greenhouse Gas Emissions

Based on New Hampshire's GHG inventory (see Chapter 3:), New Hampshire emitted approximately 15.21 MMTCO₂e in 2021, which is a reduction of approximately 8.49 MMTCO₂e (36%) since the peak in 2005 at 23.6 MMTCO₂e. New Hampshire's 36% decline between 2005 and 2021 is substantially more than national decline, which was approximately 15% (U.S. EPA, 2023f). The state's emissions are currently lower than the reduction pathway identified in the 2009 New Hampshire Climate Action Plan. Although GHG emissions declined across all major sectors, a deeper analysis shows that the bulk of New Hampshire's 36% drop in emissions came from the electricity generation sector, which fell by approximately 5.71 MMTCO₂e (73%) since 2005. As illustrated in Figure 2-5, this decrease is much greater than the reductions experienced by New Hampshire's other sectors: 1.25 MMTCO₂e (24%) in the residential and commercial sectors; 0.76 MMTCO₂e (10%) in the transportation sector; 0.41 MMTCO₂e (21%) in the industrial sector; and 0.04 MMTCO₂e (21%) in the agriculture sector.

Figure 2-5. New Hampshire's Total GHG Emissions from 2005 to 2021 by Sector (MMTCO₂e).



As shown in Figure 2-6, New Hampshire's largest source of GHG emissions in 2021 was from the transportation sector at 45.9%, which was followed by the other sectors: residential (16.9%); electricity generation (14.1%); industrial (10.2%); commercial (9.4%); waste (1.1%); agriculture (1.0%); wastewater (0.9%); and international bunker fuels⁷ (0.5%).

Figure 2-6. New Hampshire's Total GHG Emissions in 2021 by Sector (Percentage of 15.12 MMTCO₂e).

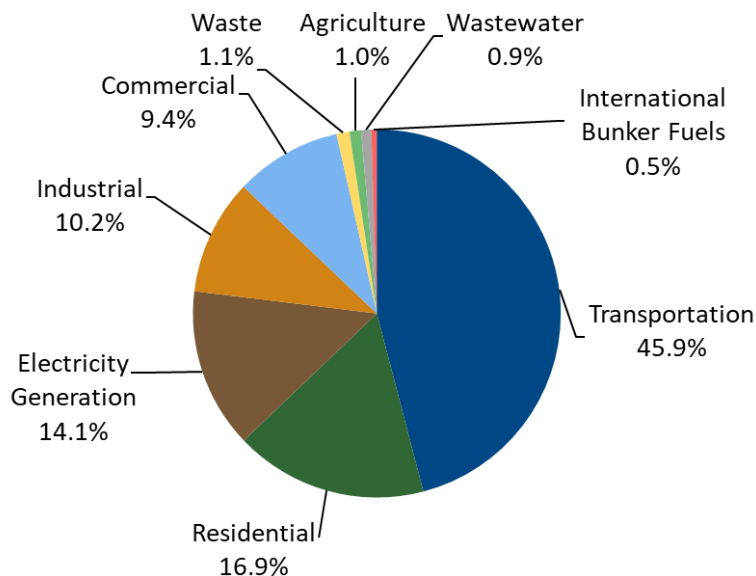
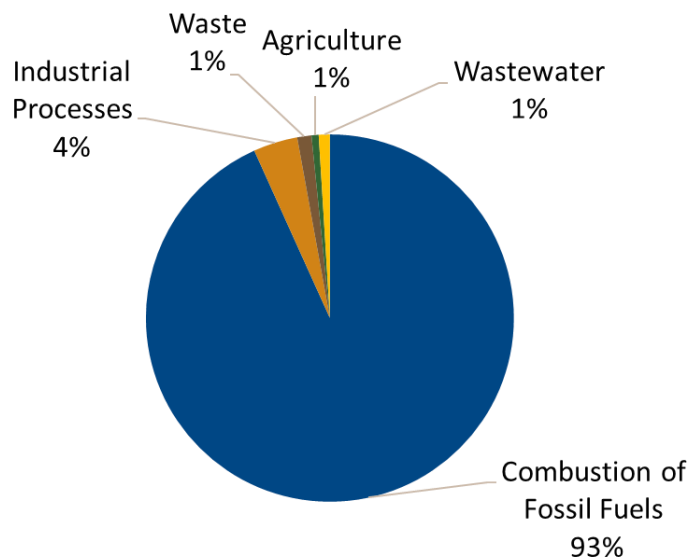


Figure 2-7 shows New Hampshire's total GHG emissions by inventory sector. Approximately 93% of New Hampshire's GHG emissions come from the combustion of fossil fuels; 4% from industrial processes; 1% from biological processes and off-gases from landfills (i.e., waste); 1% from wastewater; and 1% from agriculture (U.S. EPA, 2024c).

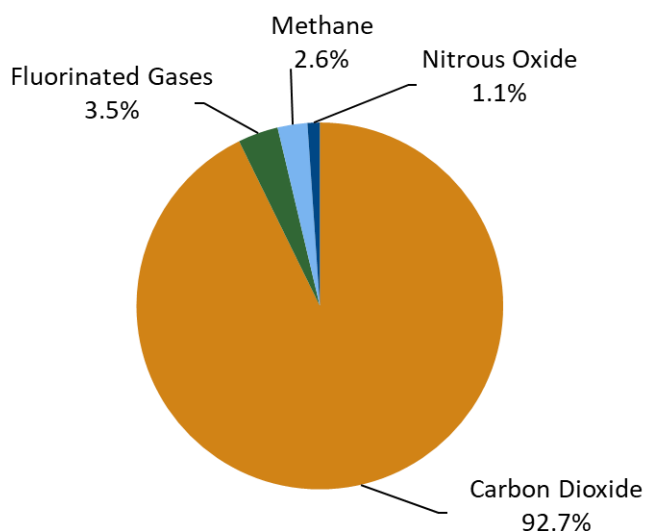
⁷ Fuels used in marine and aviation transport originating in New Hampshire with international destinations.

Figure 2-7. New Hampshire's Total GHG Emissions by Inventory Sector (Percentage of 15.12 MMTCO₂e).



The vast majority of New Hampshire's GHG pollution is emitted as carbon dioxide. In terms global warming potential and carbon dioxide equivalents (CO₂e), carbon dioxide comprises approximately 92.7% of New Hampshire's GHG emissions, followed by fluorinated gases (3.5%), methane (2.6%), and nitrous oxide (1.1%) (U.S. EPA, 2024c).

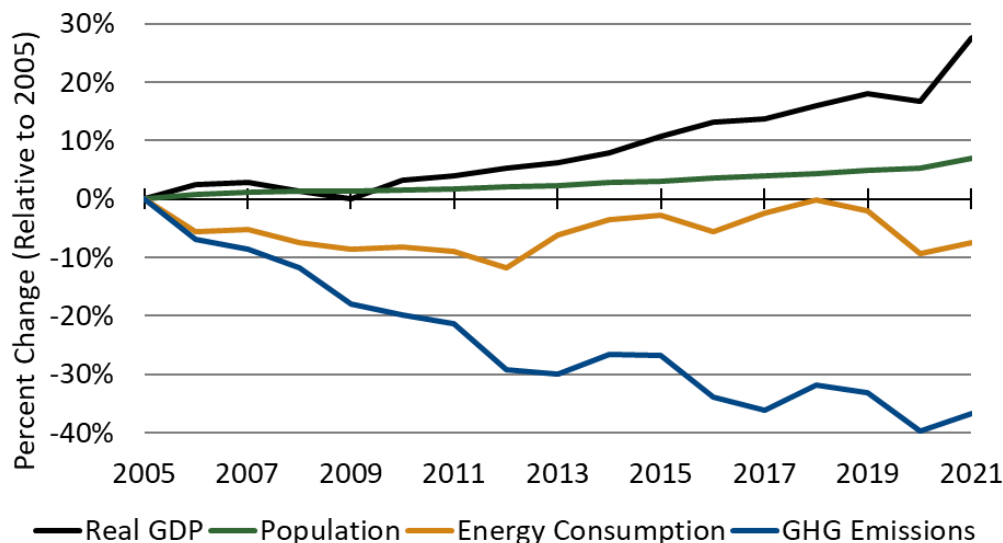
Figure 2-8. New Hampshire's Total GHG Emissions by Gas Type (Percentage of 15.12 MMTCO₂e).



The 36% reduction of GHG emissions experienced by New Hampshire since 2005, which is largely driven by the 73% reduction in the electricity generation sector, has outpaced declines in New Hampshire's energy consumption and retail electric sales. Between 2005 and 2021, New Hampshire's total energy consumption only decreased by 8%, from 326,092 billion British thermal units (BBtus) to 301,559 BBtus, while electricity consumption only decreased by 3%, from 11,245 GWh to 10,867 GWh (U.S. EIA, 2023). New Hampshire's 36% GHG emissions reductions between 2005 and 2021 are perhaps even more

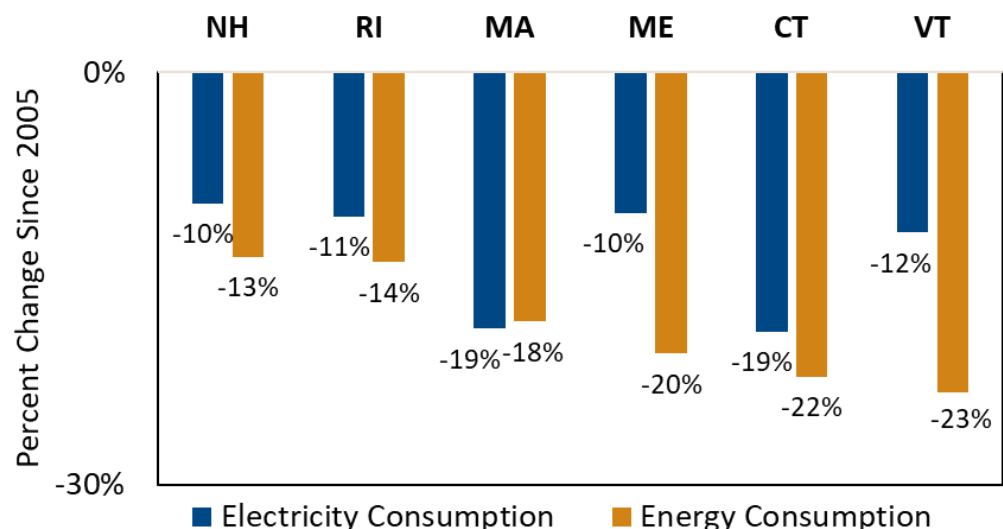
striking when comparing those declines to New Hampshire's growth in population and real gross domestic product, which increased by 7% and 28%, respectively, since 2005 (U.S. EIA, 2024b).

Figure 2-9. New Hampshire's Percent Change in Real Gross Domestic Product, Population, Energy Consumption, and GHG Emissions from 2005 to 2021.



Compared to the other New England states, New Hampshire experienced the most pronounced GHG emission reductions since 2005 on a per capita basis with a nearly 41% reduction. This is despite New Hampshire having the smallest changes of electricity and energy consumption on a per capita basis relative to the other New England states.

Figure 2-10. Percent Change of Per Capita Electricity Consumption and Energy Consumption of New England States between 2005 and 2021.



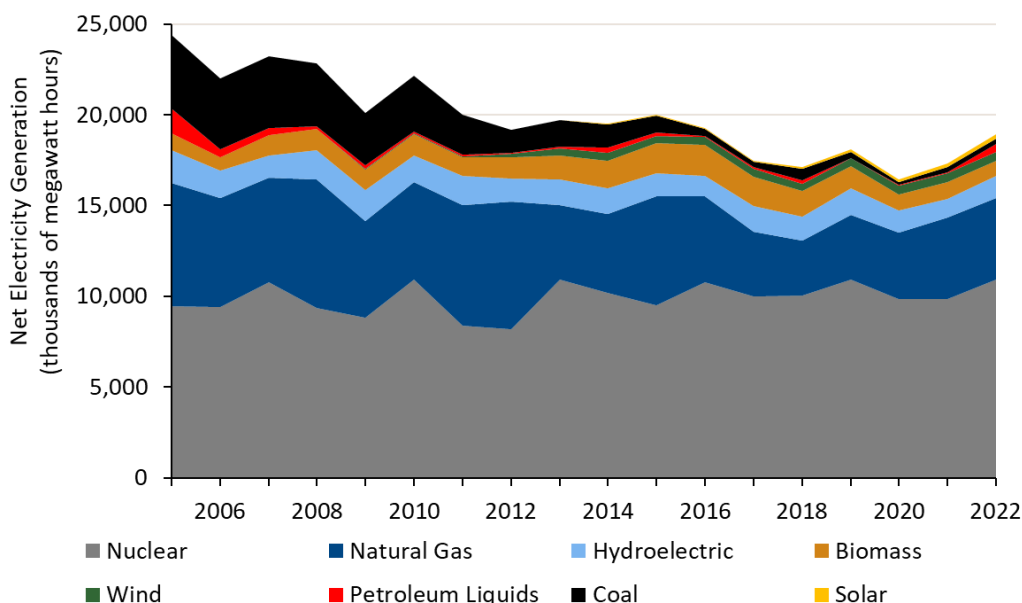
As illustrated in Figure 2-10, from 2005 to 2021, New Hampshire's per capita energy consumption decreased by approximately 10%, and New Hampshire's energy consumption decreased by approximately 13%; both decreases are the lowest among New England states.

New Hampshire's relatively low reductions in per capita energy use relative to other New England states are driven by its transportation and residential sectors. In the residential sector, New Hampshire's total per capita energy consumption has only decreased by 4% since 2005, while other New England states have seen decreases ranging from 7% to 19%. New Hampshire's total per capita energy consumption in the transportation sector has only decreased by 11% since 2005, while other New England states have seen decreases ranging from 15% to 24%. This contrasts with the industrial and commercial sectors, where New Hampshire has experienced increased energy efficiency comparable to other New England states (U.S. EIA, 2021).

Electricity generated in New Hampshire is fed to the regional grid with nearly half of the electricity being exported and utilized with the other New England states, which is managed by the Independent System Operator of New England (ISO-NE). ISO-NE is an independent, not-for-profit corporation responsible for collaborating with various entities to keep electricity flowing across the six New England states and ensure that the region has reliable, competitively priced wholesale electricity market (ISO-NE, 2024).

Figure 2-11 shows New Hampshire's net electricity generation from 2005 to 2022. Since 2005, the Seabrook Nuclear Power Plant located in Seabrook, New Hampshire, has produced the most electricity. In 2022, nuclear power comprised 57.5% of New Hampshire's net electricity generation, which was followed by natural gas at 23.7%, hydroelectric at 6.3%, biomass at 4.5%, wind at 2.5%, petroleum liquids at 2.3%, coal at 1.6%, and solar at 1.3% (U.S. EIA, 2024c).

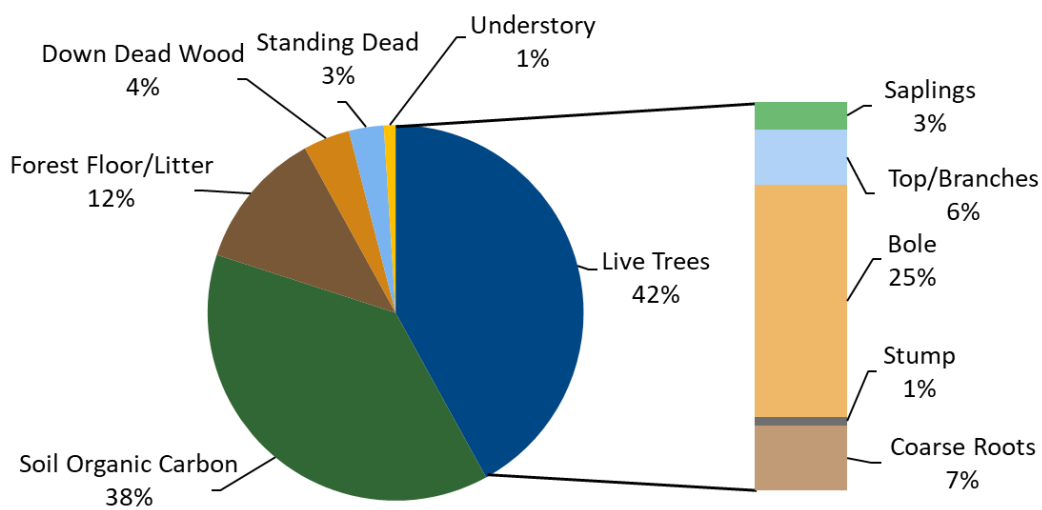
Figure 2-11. New Hampshire Net Electricity Generation (thousands of megawatt hours) from 2005 to 2022.



As New Hampshire's electricity generation sector emissions have already fallen considerably and further regional reductions in electricity consumption are not expected, significant reductions of GHG emissions can come from substantially increasing energy efficiency and strategic electrification across all sectors of New Hampshire's economy, continuing to increase sources of cost-effective renewable energy investments, responsibly designing New Hampshire's communities to reduce our reliance on automobiles for transportation, and maximizing electrification of all sectors.

Preserving New Hampshire's working forests and avoiding conversion of the state's forest lands to other purposes has a role in continued reductions in GHG emissions. With approximately 4.7 million acres of forest in 2021, New Hampshire is over 81% forested; second only to Maine on a percentage basis (USDA Forest Service, 2024). However, New Hampshire's forested acreage has declined since its peak around 1970 at 5.1 million acres and 88% forested (i.e., peak after the abandonment of European immigrant farms in the mid-1800s). Since 1970, New Hampshire has lost approximately 390,000 acres of forest to other uses. Forests are both a source and a sink for CO₂ emissions. Forests remove CO₂ from the atmosphere through photosynthesis, the process by which plants use sunlight, water, and CO₂ to create oxygen and energy in the form of sugar that is used for plant growth. Through this process, forests capture and sequester carbon in the form of wood and other organic matter such as leaves, bark, and roots. As Figure 2-12 illustrates, New Hampshire's forest carbon sinks are estimated to be located in the following components of a forest: live trees at 42%; soil organic carbon at 38%; forest floor and litter at 12%; down dead wood at 4%; standing dead at 3%; and understory at 1% (NH DNCR, 2020).

Figure 2-12. Percentage of Forest Carbon Sinks within each Forest Ecosystem Component for New Hampshire.



Conserving New Hampshire's forests and other natural carbon sinks is critical to maximize carbon storage. The amount of GHG emissions that the state's forests can take up is gradually declining over time with the decline of forest area and the maturing of forested areas that have already regrown. Between 2005 and 2021, the capacity of New Hampshire's forests to sequester GHG emissions declined from approximately 8.17 MMTCO₂e to 7.69 MMTCO₂e, a 5.9% reduction. Minimizing forest land conversion to non-forested uses will be a key component of any successful terrestrial carbon emission reduction strategy. Public policy objectives could include encouraging forest landowners to manage their forests sustainably for the dual purposes of producing forest products and maximizing carbon storage. Available tools include conservation easements, carbon easements and leases, new forest management strategies, and land use regulation. New Hampshire has had considerable success in conserving large blocks of contiguous forest land through perpetual easements, which is an important tool in maintaining the carbon sink that New Hampshire's forests presently provide and one which should be aggressively promoted in the presence of growing, competing land use pressures. In addition, the forest products industry has been and will continue to be a key component of the state's economy. New Hampshire's

tourism and outdoor recreation economies are heavily dependent on the health of our forests. Sustainably managed forests in New Hampshire provide a broad range of benefits, including: the ability to absorb and store large amounts of carbon; renewable supply of wood for heating, lumber, and a variety of forest products; and recreational opportunities.

Understanding New Hampshire's past and present GHG emissions, trends of those emissions, and the opportunities to implement programs with the highest potential to reduce those emissions, were important during the development of the priority measures of this PCAP. As discussed in Chapter 1, the building and transportation sectors present the highest potential to reduce the state's GHG emissions, while the potential in the electricity generation sector is much lower. In essence, a response to climate change and our economic future are inextricably tied to how we produce and consume energy.

Chapter 3: New Hampshire's Greenhouse Gas Inventory

3.1 Scope and Summary

NHDES developed a statewide inventory of the major sources of GHG emissions to better identify and select priority measures of this PCAP. The inventory provides estimates of the primary GHG emissions and sequestered carbon across the entire state for nine sectors: transportation; residential; electricity generation; industrial; commercial; waste; agriculture; wastewater; and international bunker fuels.⁸

From the GHG inventory, NHDES found that transportation remained the largest source of GHG emissions in New Hampshire, while the building sector, including the residential and commercial emissions, contributed the second most emissions. The transportation and building sectors also showed the least change across the entire inventory period, with the electricity generation sector falling the most. Based on that information, and as noted in Chapter 2 of this PCAP, NHDES found that the transportation and building sectors possess the largest source of GHG emissions reduction potential within the state. As the fossil fuels consumed in these sectors can be expensive and experience price swings, the reduction of GHG emissions in these sectors can also provide significant economic benefits.

NHDES selected 2021 as its primary GHG inventory year because 2021 is the most recent year for which EPA has published state-level, GHG emission inventory tools. NHDES also used those tools to develop an inventory for 2005 to assist in identifying opportunities that would have the greatest potential to reduce energy consumption and GHG emissions. NHDES chose 2005 because the 2009 Plan involved development and evaluation of state-level GHG inventory from 1990 to 2005, and New Hampshire's GHG emissions peaked in either 2004 or 2005 (depending on the source of GHG inventory data). NHDES evaluated changes to GHG emissions since 2005 resulting from projects, programs, or policies to help guide selection of priority measures of this PCAP. NHDES does not consider 2005 to be the baseline year of the state's GHG inventory. NHDES plans to establish a baseline year for a more comprehensive GHG inventory in the CCAP.

3.2 Methodology

NHDES prepared the 2005 and 2021 inventories using EPA's State Inventory Tool (SIT), version 2024.1. The SIT is an interactive spreadsheet model that consists of estimation modules (U.S. EPA, 2024c). Users of the SIT can either input state-specific data or use EPA's default data pre-loaded for each state. The default data are from federal agency reports and other sources covering fossil fuels, electricity consumption, agriculture, forestry, waste management, and industry. To produce data for the GHG inventory, NHDES entered EPA's default values for New Hampshire into the following modules of the SIT:

- Emissions from Combustion of Fossil Fuels (Fossil Fuels).

⁸ International bunker fuels are fuels used in marine and aviation transport originating in New Hampshire with international destinations.

- Emissions from Mobile Combustion (Mobile Combustion).⁹
- Emissions from Stationary Combustion (Stationary Combustion).
- Carbon Dioxide, Methane, and Nitrous Oxide Emissions from Agriculture.
- Municipal Solid Waste.
- Wastewater.
- Emissions from Natural Gas and Oil Systems.
- Industrial Processes.
- Emissions and Sinks from Land Use, Land-Use Change, and Forestry.

NHDES extracted results from those modules to populate results by nine sectors for 2005 and 2021. To ensure that NHDES correctly apportioned results into the different sectors, NHDES imported the results from the module into EPA SIT's Synthesis Tool module to confirm that NHDES's total GHG emissions in its inventories matched totals of the Synthesis Tool. In the next section of this chapter, NHDES summarizes the results of New Hampshire's 2005 and 2021 inventories by sectors, sources, and gases in a series of tables and charts. Emissions are reported in metric tons of carbon dioxide equivalent (MTCO₂e) units for 2005 and 2021.

There are two general options to assess GHG emissions from the generation of electricity. The first option is to account for all GHG emissions emitted by fossil fuel electricity generation occurring within the state (i.e., generation-based). The second option is to account for GHG emissions associated with electricity used within the state (i.e., consumption-based). NHDES used the generation-based approach for the 2005 and 2021 inventories in this PCAP.

For additional information about the methods and terms used in the SIT Modules, visit the EPA's [State Inventory and Projection Tool](#) webpage.

⁹ Instead of using results from the Fossil Fuels module for the transportation sector, NHDES used results from the Mobile Combustion module because it provides results in more detail (i.e., by transportation mode), which is not available in the Fossil Fuels module.

3.3 Greenhouse Gas Inventory Results

Table 3-1. New Hampshire's Total GHG Emissions in 2005 and 2021 by Sector.

Sectors	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Transportation	7,703,482	6,945,353
Residential	3,222,228	2,561,504
Electricity Generation	7,836,600	2,126,464
Industrial	1,944,148	1,535,072
Commercial	2,008,919	1,420,527
Waste	511,455	172,173
Agriculture	195,069	153,404
Wastewater	125,798	135,099
International Bunker Fuels	61,912	72,341
Gross Total GHG Emissions	23,609,611	15,121,937

Figure 3-1. New Hampshire's Total GHG Emissions in 2021 by Sector.

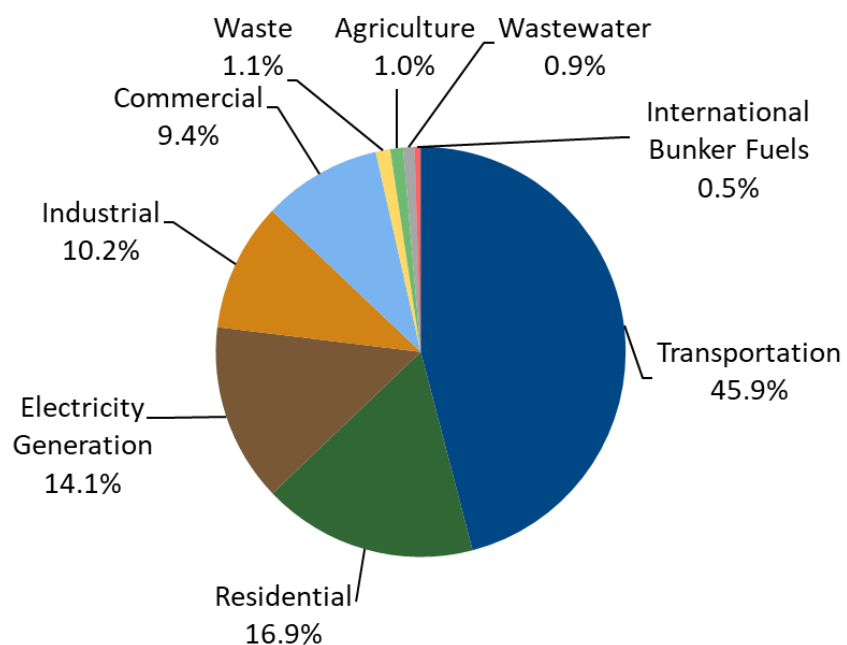


Table 3-2. New Hampshire's Total GHG Emissions in 2005 and 2021 by Gas Type.

GHG Type	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Carbon Dioxide	22,264,058.23	14,025,071.43
Methane	632,202.75	396,878.04
Nitrous Oxide	319,386.17	164,212.82
Fluorinated Gases	393,963.45	535,774.27
Gross Total GHG Emissions	23,609,611	15,121,937

Figure 3-2. New Hampshire's 2021 Total GHG Emissions by Gas Type.

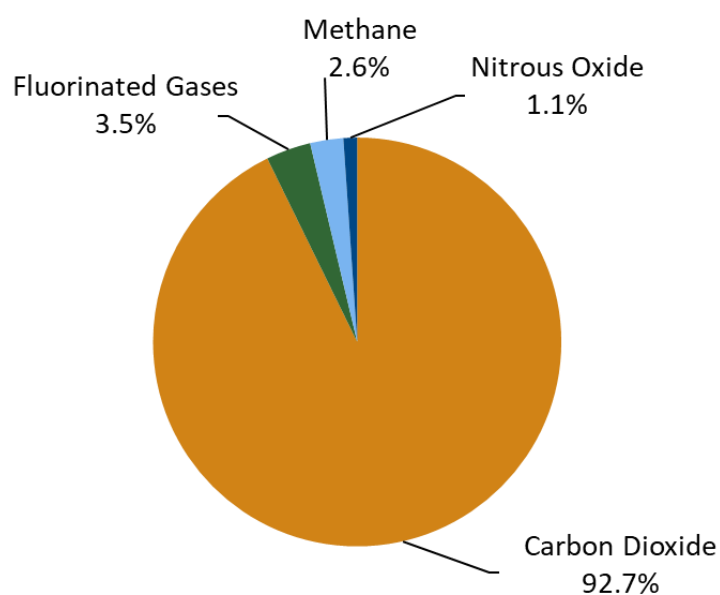


Table 3-3. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Transportation Sector.

Transportation Sector	Sub-Sector / Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Highway	Passenger Cars (Gasoline)	2,878,579	2,740,802
	Passenger Cars (Diesel)	14,279	17,018
	Light-Duty Trucks (Gasoline)	2,181,178	1,131,701
	Ligh-Duty Trucks (Diesel)	63,343	46,441
	Heavy-Duty Vehicles (Gasoline)	171,064	58,138
	Heavy-Duty Vehicles (Diesel)	1,371,403	1,924,224
	Heavy-Duty Buses (Diesel)	47,441	93,728
	Motorcycles (Gasoline)	8,187	12,460
Non-Highway	Aviation	211,564	263,439
	Boats	87,183	322,391
	Locomotives	1,354	0
	Other*	666,706	332,713
Alternative Fuel Vehicles	Light-Duty Vehicles	94	38
	Heavy-Duty Vehicles	596	373
	Buses	511	1,887
Total Transportation Sector		7,703,482	6,945,353

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

Figure 3-3. New Hampshire's 2021 GHG Emissions from the Transportation Sector by Vehicle Type.

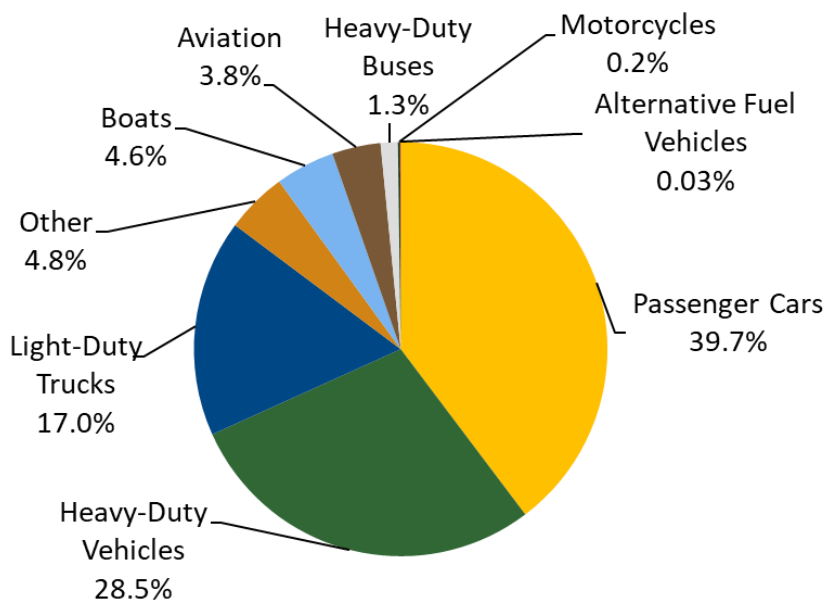


Table 3-4. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Residential Sector.

Residential Sector Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Coal	834	-
Petroleum	2,768,777	2,061,400
Natural Gas	422,782	407,530
Wood (Only includes emissions of CH ₄ and N ₂ O, not CO ₂)	29,834	92,574
Total Residential Sector	3,222,228	2,561,504

Figure 3-4. New Hampshire's 2021 GHG Emissions from the Residential Sector by Fuel Source.

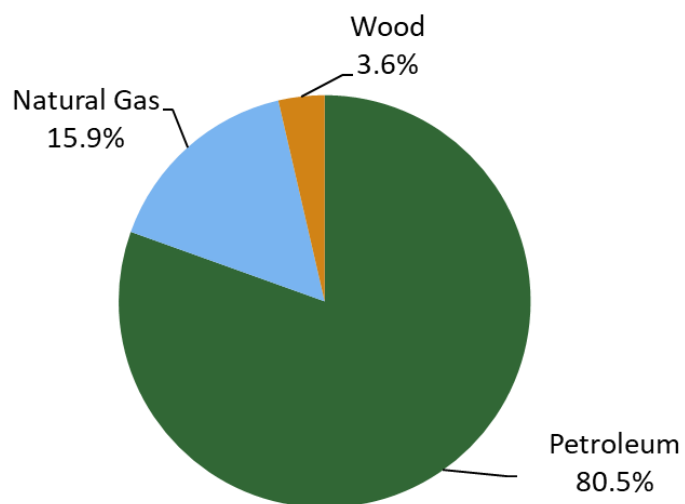


Table 3-5. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Electric Power Sector.

Electric Power Sector Sub-Sector / Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Coal	4,233,066	313,715
Petroleum	1,039,936	38,548
Natural Gas	2,545,790	1,754,179
Wood (Only includes emissions of CH ₄ and N ₂ O, not CO ₂)	17,809	20,022
Total Electric Power Sector	7,836,600	2,126,464

Figure 3-5. New Hampshire's 2021 GHG Emissions from the Electric Power Sector by Fuel Source.

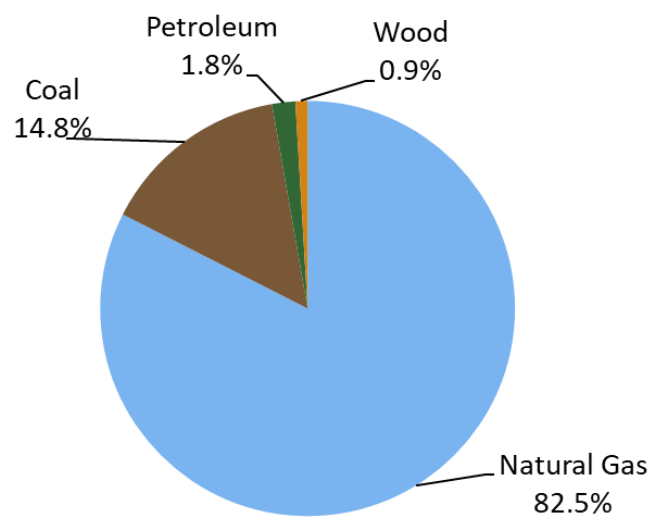
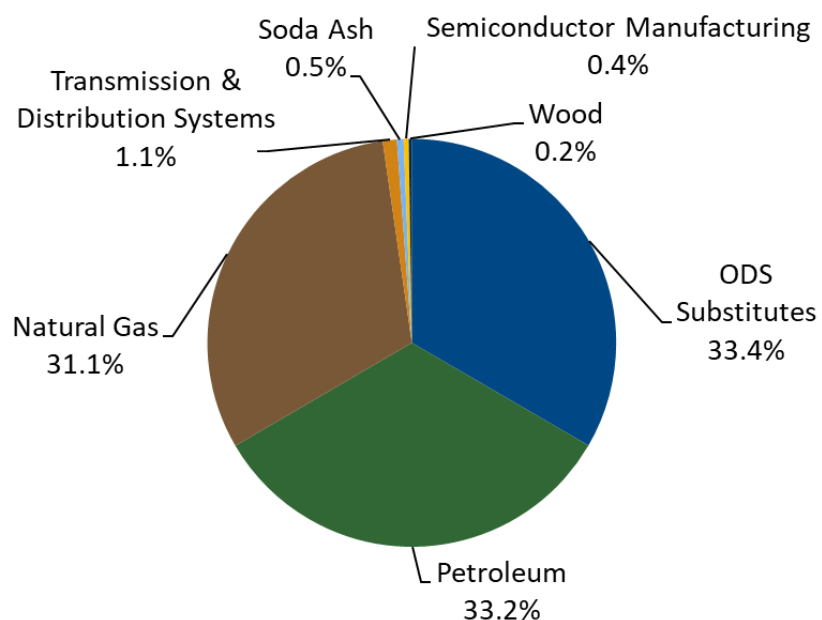


Table 3-6. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Industrial Sector.

Industrial Sector	Sub-Sector / Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
CO ₂ Emissions	Soda Ash	11,295	8,066
	Urea Consumption	75	28
HFC, PFC, SF ₆ and NF ₃ Emissions	Ozone Depleting Substances (ODS) Substitutes	350,376	512,509 ¹⁰
	Semiconductor Manufacturing	7,207	6,180
	Electric Power Transmission and Distribution Systems	36,381	17,086
Combustion of Fuels	Petroleum	1,168,960	509,602
	Natural Gas	357,788	477,871
	Wood (Only includes emissions of CH ₄ and N ₂ O, not CO ₂)	12,066	3,732
Total Industrial Sector		1,944,148	1,535,072

Figure 3-6. New Hampshire's 2021 GHG Emissions from the Industrial Sector by Sub-Sector and Fuel Source.



¹⁰ Values for ozone depleting substances are 2020 values from version 2023.2 of EPA's Industrial Processes SIT Module because version 2024.1 of that module did not produce 2021 values for ODS when NHDES developed the GHG inventory.

Table 3-7. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Commercial Sector.

Commercial Sector Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Coal	8,943	-
Petroleum	1,461,100	892,261
Natural Gas	534,088	511,655
Wood (Only includes emissions of CH ₄ and N ₂ O, not CO ₂)	4,788	16,610
Total Commercial Sector	2,008,919	1,420,527

Figure 3-7. New Hampshire's 2021 GHG Emissions from the Commercial Sector by Fuel Source.

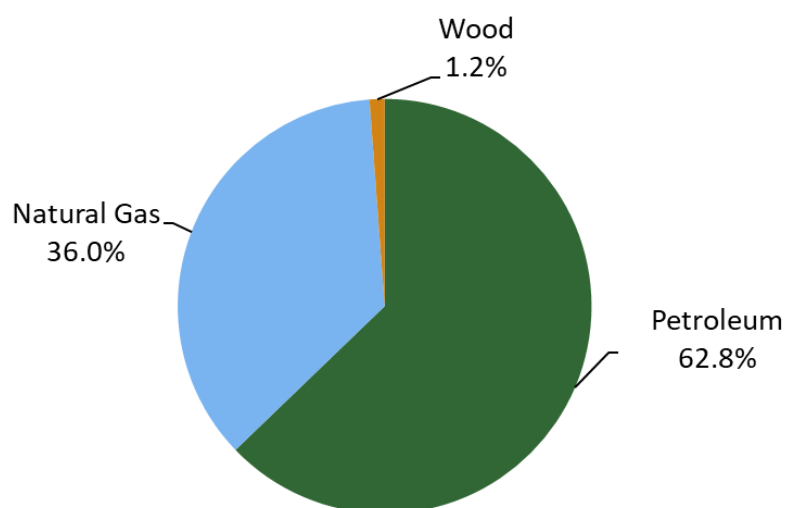


Table 3-8. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Waste Sector.

Waste Sector	Sub-Sector / Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
CH₄ Emissions from Landfills	Municipal Solid Waste Generation	878,423	854,198
	Industrial Generation	61,490	59,794
	CH ₄ Avoided by Flare and Landfill Gas-to-Energy	(571,138)	(854,198)
	Oxidation at MSW Landfills	(30,728)	-
	Oxidation at Industrial Landfills	(6,149)	(5,979)
CO₂ and N₂O Emissions from Waste Combustion	Plastics	121,883	76,319
	Synthetic Rubber in MSW	17,914	11,490
	Synthetic Fibers	36,208	28,595
	N ₂ O	3,409	1,875
	CH ₄	144	79
Total Waste Sector		511,455	172,173

Figure 3-8. New Hampshire's 2021 GHG Emissions from the Waste Sector by Source.

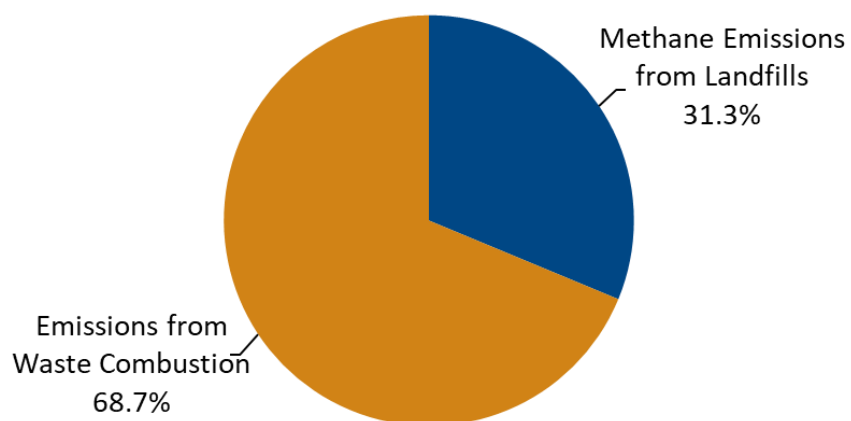


Table 3-9. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Agriculture Sector.

Agriculture Sector Sub-Sector / Source	2005 (MTCO₂e)	2021 (MTCO₂e)
Enteric Fermentation	99,636	79,318
Manure Management	36,787	41,002
Agriculture Soils	58,140	32,897
Urea Fertilization	506	187
Total Agriculture Sector	195,069	153,404

Figure 3-9. New Hampshire's 2021 GHG Emissions from the Agriculture by Sub-Sector.

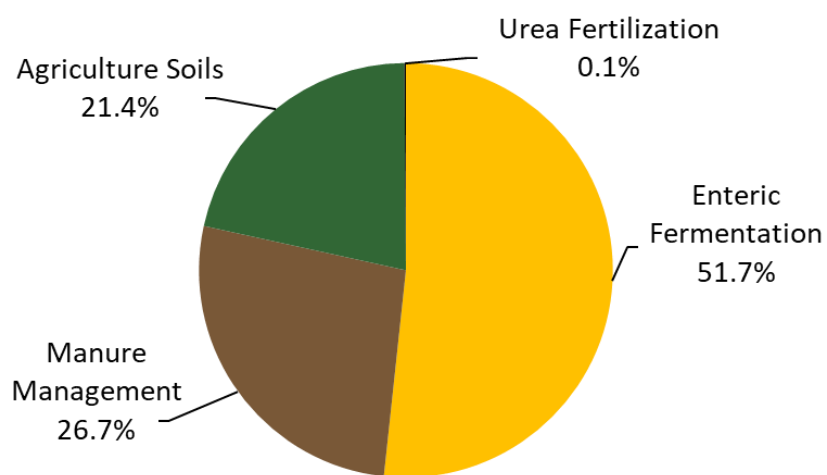


Table 3-10. New Hampshire's Total GHG Emissions in 2005 and 2021 from the Wastewater Sector.

Wastewater Sector Sub-Sector / Source	2005 (MTCO ₂ e)	2021 (MTCO ₂ e)
Municipal CH ₄	90,651	96,969
Municipal N ₂ O	35,146	37,332
Industrial CH ₄	-	797
Total Wastewater Sector	125,798	135,099

Figure 3-10. New Hampshire's 2021 GHG Emissions from the Wastewater Sector by Source.

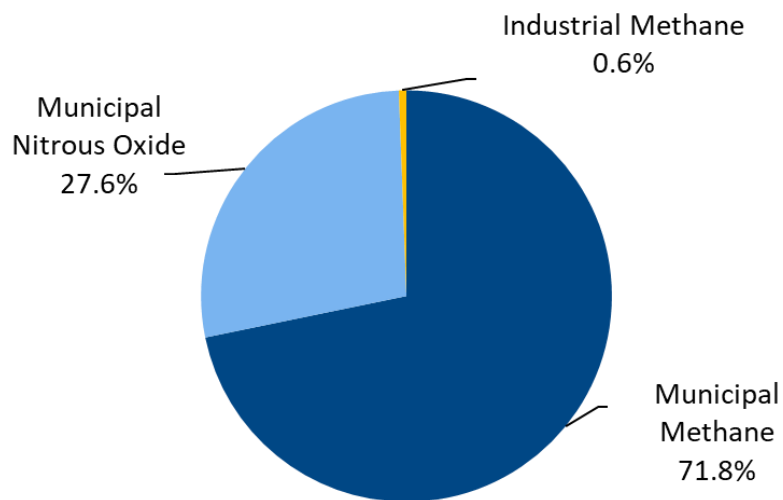


Table 3-11. New Hampshire's Total GHG Emissions and Sinks in 2005 and 2021 from Land Use and Forestry Emissions and Sinks.

Land Use and Forestry Emissions and Sinks	Sub-Sector / Source	2005 (MTCO₂e)	2021 (MTCO₂e)
Forest Land Remaining Forest Land	Aboveground Biomass	(3,780,000)	(3,330,000)
	Belowground Biomass	(750,000)	(660,000)
	Deadwood	(750,000)	(730,000)
	Litter	10,000	70,000
	Soil (Mineral)	(340,000)	(410,000)
	Total wood products and landfills	(2,113,003)	(2,113,003)
Land Converted to Forest Land	Aboveground Biomass	(150,000)	(150,000)
	Belowground Biomass	(30,000)	(30,000)
	Deadwood	(30,000)	(30,000)
	Litter	(80,000)	(80,000)
	Soil (Mineral)	(20,000)	(20,000)
Forest Land Converted to Land	Aboveground Biomass	180,000	180,000
	Belowground Biomass	30,000	30,000
	Deadwood	30,000	40,000
	Litter	170,000	180,000
	Soil (Mineral)	20,000	20,000
Landfilled Yard Trimmings and Food Scraps	Grass	(1,833)	(2,892)
	Leaves	(14,562)	(14,363)
	Branches	(13,277)	(13,179)
	Landfilled Food Scraps	(15,492)	(16,866)
	N₂O from Settlement Soils	2,066	686
	Agricultural Soil Carbon Flux	85,842	94,815
	Urban Trees	(608,758)	(701,406)
	Total Land Use and Forestry Emissions and Sinks	(8,169,017)	(7,686,208)

Chapter 4: Summary of New Hampshire's Priority Measures

The priority measures listed in Table 4-1 are further described in Chapters 5 through 9 of this PCAP.

Table 4-1: New Hampshire Priority Measures

PCAP Chapter	Priority Measure		Cumulative GHG Emissions Reductions (MTCO ₂ e) 2025 - 2030	Cumulative GHG Emissions Reductions (MTCO ₂ e) 2025 - 2050
Chapter 5: Transportation Sector	Deploy Electric Charging Infrastructure for Electric Vehicles		5,129	85,728
	Provide Incentives for Purchase of Electric and Plug-In Hybrid Electric Vehicles		113,741	1,901,092
	Support and Expand Public Transit Options (values based on bus transit service by fuel type)	Electric	14,434	241,256
		Hybrid Diesel	10,411	174,005
		Compressed Natural Gas	9,192	153,638
		Diesel	9,069	151,588
Chapter 6: Residential Building Sector	Heat Pumps to Improve Energy Efficiency of Buildings	Space Heating	3,445,762	47,026,162
		Water Heating	491,588	5,744,959
	Weatherization to Improve Energy Efficiency in Residential Buildings		60,151	1,005,380
	Pre-Weatherization to Improve Energy Efficiency in Residential Buildings ¹¹		60,151	1,005,380
Chapter 7: Local Government Building and Facility Sector	Resilient Local Energy Systems		8,527	142,521
	Improving Energy Efficiency at Wastewater and Drinking Water Systems		10,676	178,450
Chapter 8: Waste and Materials Management	Expand Programs for Waste Reduction, Diversion and Recycling	Food Waste	241,506	1,046,528
		Asphalt Concrete	614	2,659
		Concrete	2,168	9,394
Chapter 9: Workforce Development	Workforce Development of Skilled Trades to Support Priority Measures		Supports other priority measures	Supports other priority measures

¹¹ NHDES would estimate emissions reductions associated the pre-weatherization measure by using the same general methods described in the weatherization measure but categorize those estimates as “potential emissions reductions” until a building is weatherized to avoid double counting of emissions reductions.

NHDES identified the priority measures for the purpose of pursuing funding through CPRG implementation grants and, therefore, the list is not exhaustive of the New Hampshire's priorities. Instead, the priority measures included in this PCAP meet the following criteria:

- Achieve significant cumulative GHG reductions by 2030 and beyond.
- Complement other funding sources to maximize these GHG reductions and community benefits.
- Implementation ready, meaning that the design work for the policy, program, or project is complete enough that a full scope of work and budget can be included in a CPRG implementation grant application.
- The measure can be completed in the near term, meaning that all funds will be expended, and the project completed, within the five-year performance period for the CPRG implementation grants.
- New Hampshire stakeholders consistently identified the measure as key to reducing the state's GHG emissions.

Priority measures are organized by general sectors in Chapters 5 through 9. Within each chapter, the measures are organized by sections that provide information about the measure in the following subsections:

- Measure Concept.
- Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions.
 - For each measure, NHDES estimated annual and cumulative emissions reductions by inputting factors into various models for general case evaluations. Eligible applicants could use NHDES's methods, alternative models, or other factors to refine reduction estimates for more specific measures in a CPRG implementation grant application.
 - Cumulative estimates are for the periods from 2025 through 2030 and 2025 through 2050. For most of the cumulative calculations, NHDES assumed that emissions reductions achieved from a measure in an initial implementation year (e.g., 2025) would be achieved at the same magnitude in each successive year and be additive throughout the periods. Appendix A of this PCAP provides additional information about the methods and assumptions that NHDES used to estimate pollutant emissions reductions for some of the measures.
- Metrics for Tracking Progress.
- Intersection with Other Funding Availability.
 - Since EPA does not require this information in the PCAP, NHDES only included this information for some of the measures. EPA requires this information in the CCAP.

4.1 Key Implementing Agencies and Geographic Scope

The priority measures, portions of each measure, or a pilot program of a measure could be implemented by the following entities and geographic locations, depending on the nature, funding, and scale of the measure:

- A New Hampshire municipality, such as a town or city, could implement the measure within the boundary of the municipality.
- A state public body created by or pursuant to state law, such as the state's Regional Planning Commissions that were established under RSA 36:46, could implement measures within its boundary.
- State agencies, such as NHDES, could implement the measure within the boundary of New Hampshire.
- A group of multiple states, municipalities, state public bodies, or Metropolitan Statistical Areas (MSAs) could work together to develop a coalition and implement an intrastate or interstate regional measure. Responsibilities of coalition partners would be described and agreed upon in a memorandum of agreement that would be signed by all coalition partners.¹² Coalition members could share a third-party administrator to make implementation more efficient and reduce costs of a measure.
- A municipality, state agency, state public body, or coalition could use funding of a measure to bolster existing state and federal programs or create a new program. Those entities could:
 - Subaward funds to subrecipients under financial assistance agreements to carry out a measure, or portion of a measure.
 - Provide participant support costs to measure beneficiaries to enable them to participate in a measure project. Participant support costs could include rebates, subsidies, stipends, or other payments to measures beneficiaries by grant recipient or subrecipient.
 - Enter into contracts with for-profit or non-profit third-party administrators or contractors to obtain goods or services to implement a measure, or portion of a measure.

4.2 Implementation Schedule and Milestones

EPA anticipates issuing CPRG awards by October 2024 and, therefore, NHDES expects that implementation of funded measures would begin in fourth quarter of 2024. Implementation would continue through the five-year period of performance of a grant and funds would be expended by the five-year deadline. In the fourth quarter of 2024, NHDES or other eligible grant recipients could make subawards or sign contracts with eligible entities, in accordance with federal requirements, to implement the measures. NHDES would work with those partners to help ensure efficient and effective implementation and tracking of each funded measure. NHDES would submit, or work with partners to

¹² For more information about CPRG-related coalitions requirements, see section 1.1 of this PCAP.

submit, timely semi-annual progress reports to EPA that would be required as a condition of CPRG funding. Those semi-annual progress reports would include a summary of the following for each funded measure:

- Technical progress and performance based on tracking the metrics of a measure (see Metrics for Tracking Progress sub-section under each priority measure).
- Accomplishments during the semi-annual period, such making subawards, signing contracts, and overcoming barriers to implement the measure.
- Milestones achieved, including a description of outputs and outcomes. This would include estimated GHG and co-pollutant emission reduction estimates, quantified benefits of the measure in LIDAC and cost savings to residents.
- Community engagement activities.
- Expenditures and purchases during the reporting period.
- Oversight of grant subrecipients, contractors, or vendors.
- Planned activities for the next six months.

Within 120 calendars days of the completion of the five-year period of performance of a grant, NHDES, or other eligible grant recipient, would submit a detailed final report to EPA to summarize the success of the measure. The report would include a summary of the following for the measure:

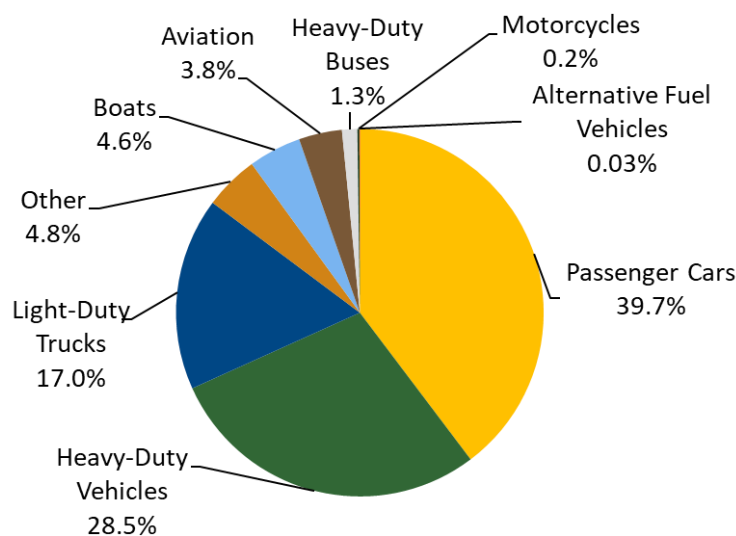
- A summary of the total progress and performance based on tracking the metrics of a measure.
- Total cost of a measure.
- Total estimated GHG and co-pollutant emission reduction estimates.
- Quantified benefits of the measure in LIDAC.
- Community engagement activities and results of those activities.
- Discussion of the problems, successes, and lessons learned from the implementation of the measure that could help overcome structural, organizational, or technical obstacles to implementing a similar project elsewhere.

To produce the semi-annual and final reports, NHDES plans to use data it receives from subrecipients, contractors, and vendors. NHDES would supplement that information with data and results published by organizations and government agencies related to pollutant emissions, consumption of energy and electricity, and economic data (e.g., jobs in New Hampshire's energy efficiency sector). Examples of possible resources include academic publications, pollution projection models, and data produced by various agencies and organizations that are referenced in this PCAP.

Chapter 5: Transportation Sector Measures

In 2021, the transportation sector accounted for 45.9% of all GHG emissions in New Hampshire, which is more than any other individual sector (see Figure 3-1). As shown in Figure 5-1, passenger cars and light-duty trucks, collectively referred to as light-duty vehicles (LDVs), were responsible for 39.7% and 17.0% of those emissions, respectively.¹³ LDVs are the primary mode of passenger travel in New Hampshire and are also the major contributor of other air pollutants that impact overall air quality and directly impact people who live in or near highly trafficked areas. For example, ground-level ozone, which can cause or exacerbate several respiratory illnesses, is created by a chemical reaction of nitrogen oxides (NOx), volatile organic compounds (VOCs), and ultraviolet light. In 2020, more than 63% of New Hampshire's NOx emissions were from vehicles and over 32% of the state's VOC emissions are from vehicles (U.S. EPA, 2023b). Reducing fossil fuel use in the transportation sector, either via improved fuel economy or transitioning to cleaner alternative fuels, is a key strategy to reduce overall GHG emissions.

Figure 5-1. New Hampshire's 2021 GHG Emissions from the Transportation Sector by Vehicle Type.



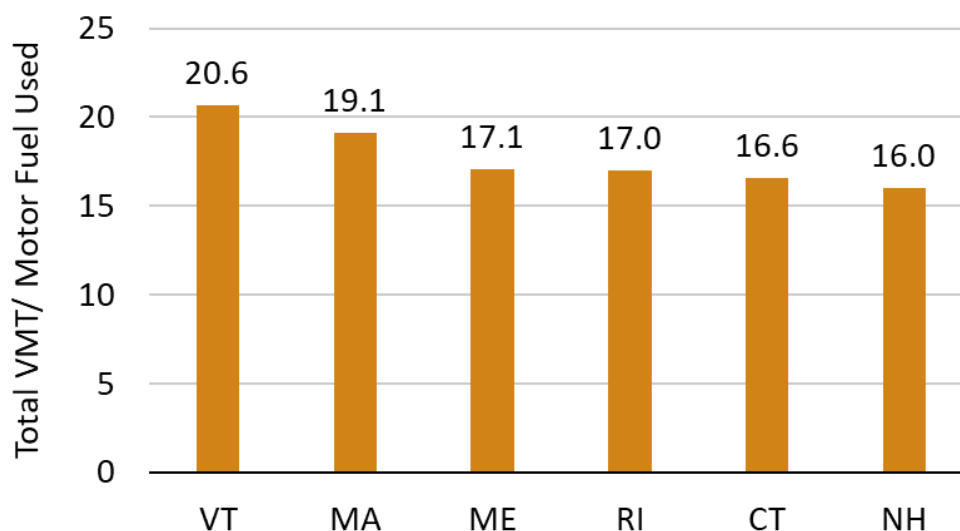
The fuel economy of new LDVs in the U.S. has improved by about 30% over the past 15 years, driven largely by the Corporate Average Fuel Economy standards established by the National Highway Traffic Safety Administration (NHTSA) and recent EPA GHG emissions standards (U.S. DOE et al., 2023; U.S. EPA, 2023e; NHTSA, 2024). Although that improved fuel economy has translated into significant per-vehicle energy and emissions savings, sales of LDVs have trended towards the larger and less-efficient light trucks and sport utility vehicles versus passenger cars. This trend in vehicle sales has led to lower overall emission reductions than would have otherwise been achieved without these market shifts (U.S. EPA, 2023j).

Depending on the type of travel (e.g., urban or rural; interstate or non-interstate), LDVs accounted for 89% to 95% of New Hampshire's total vehicle miles traveled (VMT) in 2022. The U.S. Federal Highway Administration estimated that the state logged nearly 13.3 billion total VMT in 2022 and consumed

¹³ Light-duty trucks include pickup trucks, vans, and sport-utility vehicles with a gross vehicle weight rating of 8,500 pounds or less).

almost 830 million gallons of motor fuel in 2022. Since 2005, the state's VMT has decreased by about 1%, but motor fuel use has increased by about 1% due to the trend to larger vehicles (U.S. DOT, 2023c). These relatively small changes have resulted in New Hampshire having the lowest VMT per gallon of motor fuel used among all New England states, as shown in Figure 5-2. Reducing the VMT by LDVs while increasing the percentage of zero- and low- emission LDVs would reduce the state's emissions of GHGs and other air pollutants.

Figure 5-2. Ratios of Total Vehicle Miles Traveled to Motor Fuel Used for all New England States in 2022.



Increasing adoption of zero- or low-emission LDVs, such as all-electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs), by New Hampshire residents and supporting EV and PHEV travel to and through the state by visitors presents a significant opportunity to reduce emissions from the transportation sector. Other measures, including expanding other clean transportation options such as public transit and micro-mobility options (e.g., bicycles, e-bikes, scooters), could further decrease combustion of liquid fuels in LDVs and reduce total VMT. Collectively these actions would reduce tailpipe emissions on roadways and throughout neighborhoods, reduce noise pollution, and improve public health.

Considering the available opportunities for this PCAP, New Hampshire is prioritizing the following measures to reduce GHG emissions in the transportation sector:

- Deploy Electric Charging Infrastructure for Electric Vehicles.
- Provide Incentives for the Consumer Purchase of Electric and Plug-In Hybrid Electric Vehicles.
- Support and Expand Public Transportation Options.

5.1 Deploy Electric Charging Infrastructure for Electric Vehicles

5.1.1 Measure Concept

The measure could result in deployment of publicly accessible EV charging infrastructure, also known as electric vehicle supply equipment (EVSE), to support the use of EVs and PHEVs in New Hampshire, which could be accomplished through competitive solicitation. The availability of publicly accessible EVSE is critical to supporting and enabling a growing number of electric EVs and PHEVs in the state, which will require a robust network of stations for consumers. While it is estimated that more 75 to 80% of personal EV and PHEV charging will occur at homes, the uniform and broad distribution of public chargers along travel corridors and within communities can assure New Hampshire drivers and out of state travelers that they will have adequate resources to travel throughout the state (McKinsey & Company, 2018).

Funding the PCAP measure could be used to cover costs associated with “behind the meter” equipment purchases and site work, and “front of the meter” utility system upgrades to support publicly accessible EVSE sites at the following locations:

- In areas of the state ineligible for existing state and federal funding streams due to minimum standards associated with those funding streams.
- At municipalities, public libraries, public schools, and public institutions of higher education.
- At New Hampshire’s hospitality and tourism industry via small businesses (e.g., restaurants, ski areas, entertainment venues).
- At New Hampshire State Parks and other recreational destinations in the state.
- At or near multi-unit dwellings.

Funding the PCAP measure could also be used to:

- Assist transit companies in procuring ESVE to charge electric transit buses to support a transition to cleaner fleets.
- Support the co-location of solar photovoltaic systems or electric storage devices to reduce or eliminate possible demand charges associated with electric rates or reduce associated utility side upgrades needed to connect to the grid.
- Support technical assistance by New Hampshire’s Regional Planning Commissions to communities developing and implementing their own EVSE deployment strategy.

NHDES prioritized this measure because public EVSE installations have not kept pace with charging needs. Based on NHDES’ analysis of vehicle registration data from the New Hampshire Department of Motor Vehicles (NH DMV), the share of LDVs that are EVs and PHEVs in the state increased from 4,231 to 14,761 from 2019 to 2023, a robust 249% increase. As of February 23, 2024, New Hampshire had a total of 238

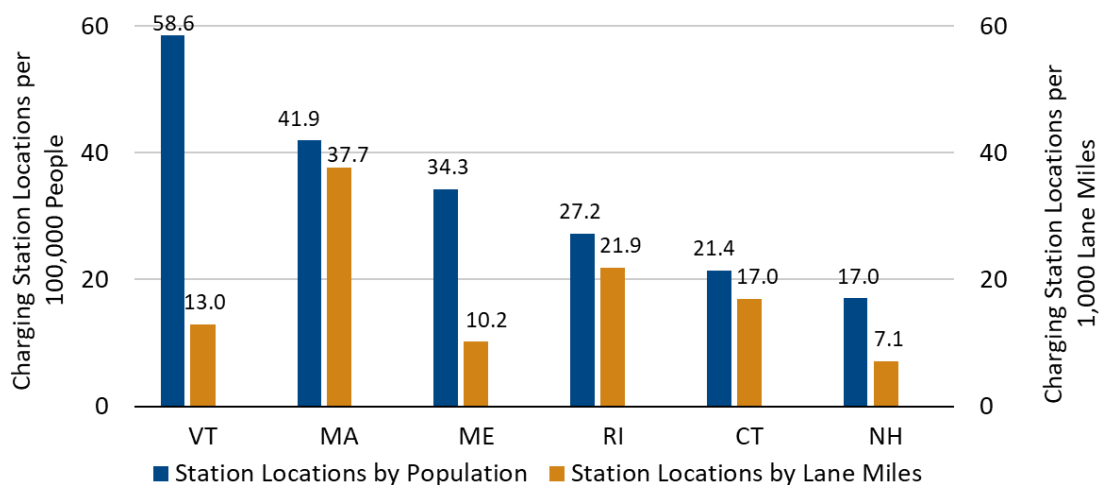
publicly accessible Level 2 charging and Direct Current Fast Charging (DCFC) station locations, as summarized in Table 5-1 (U.S. DOE, 2024a).¹⁴

Table 5-1. Total Number of Publicly Accessible Level 2 Charging and DCFC Station Locations in New England States (as of February 23, 2024).

	MA	CT	ME	VT	RI	NH
Level 2 Station Locations	2,748	658	395	327	263	193
DCFC Station Locations	178	114	81	52	35	45
Total Charging Level 2 and DCFC Station Locations	2,926	772	476	379	298	238

As illustrated in Figure 5-3, New Hampshire has 7.1 charging station locations per 1,000 lane miles and 17 charging station locations per 100,000 people (U.S. DOT, 2023b; U.S. Census Bureau, 2023).

Figure 5-3. Total Number of Level 2 Charging and DCFC Station Locations of Each New England State per 100,000 People and per 1,000 Lane Miles (as of February 23, 2024).



5.1.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

To estimate GHG and co-pollutant emissions reductions from installing publicly accessible EVSE, NHDES used the Charging and Fueling Infrastructure Emissions Calculator (CFI) of the Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) tool that was developed by the Argonne National Laboratory (ANL) for the U.S. Department of Energy's (U.S. DOE) Clean Cities Coalition Network (ANL, 2024b; U.S. DOE, 2023a). Co-pollutant estimates include CO, NO_x, PM₁₀, PM_{2.5}, VOCs, SO_x. The CFI calculator incorporates factors, such as EV charging utilization, vehicle mix, upstream emissions, and the electric generation grid fuel mix specific to certain regions of the country (ANL, 2023).

¹⁴ Level 2 EVSEs provide alternating current charging through 240-volt or 280-volt electrical service and can charge an EV in 4 to 10 hours and PHEV in 1 to 2 hours from empty to 80 percent. DCFC EVSEs offer rapid charging, are typically located along heavy-traffic corridors and can charge an EV from near zero to 80 percent in 20 minutes to an hour (U.S. DOT, 2023a).

Table 5-2 provides a summary of the results of CFI’s estimated annual average emissions reductions of GHGs and co-pollutants if 36 Level 2 chargers and 12 DCFC stations are installed at publicly accessible locations in New Hampshire.

Table 5-2. Average Annual GHG and Co-Pollutant Emission Reductions if 36 Level 2 Chargers and 12 DCFC stations are Installed at Publicly Accessible Locations.

	MTCO ₂ e	CO (kg)	NO _x (kg)	PM ₁₀ (kg)	PM _{2.5} (kg)	VOC (kg)	SO _x (kg)
Average Annual Emission Reductions	244.2	1,024.1	24.5	2.4	2.0	97.1	1.5

If New Hampshire could install 36 Level 2 chargers and 12 DCFC stations per year beginning in 2025, then New Hampshire’s cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 5,129 MTCO₂e and 85,728 MTCO₂e, respectively. New Hampshire would also reduce emissions of CO, NO_x, PM₁₀, PM_{2.5}, VOCs, SO_x, by implementing the measure, as shown in Table 5-3.

Table 5-3. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 if 36 Level 2 Chargers and 12 DCFC Stations are Installed at Publicly Accessible Locations Each Year.

	MTCO ₂ e	CO (kg)	NO _x (kg)	PM ₁₀ (kg)	PM _{2.5} (kg)	VOC (kg)	SO _x (kg)
Cumulative Emission Reductions Between 2025 – 2030	5,129	21,506	514	50	43	2,038	32
Cumulative Emission Reductions Between 2025 – 2050	85,728	359,464	8,586	841	715	34,067	529

5.1.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Number of EVSEs installed in New Hampshire by location, venue, and type of charger.
- Changes to New Hampshire’s GHG and co-pollutant emissions in the transportation sector.
- Changes to motor fuel consumption by LDVs in New Hampshire.
- Number of educational materials produced, and outreach efforts undertaken.

5.1.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- The New Hampshire Department of Transportation’s (NHDOT) Plan for Electric Vehicle Infrastructure Deployment was developed in accordance with the federal National Electric Vehicle Infrastructure (NEVI) formula program requirements and serves as a framework to meet the charging infrastructure needs within New Hampshire’s federally designated Alternative Fuel

Corridors (NHDOT, 2022).¹⁵ Between 2022 and 2026, New Hampshire intends to administer \$17 million of NEVI funds to develop DCFC stations along the state's highways beginning with the interstate routes I-93, I-95, and I-89. Installation of those stations will be followed by stations on NH 9, NH 12, NH 101, NH 9/US 202 from I-89 to Keene, NH 11, US 4/NH 9, NH 16, US 302, and US 2.

- A portion of the State of New Hampshire's Volkswagen Mitigation Trust (VW Trust) is being used to fund DCFC stations in the state. As of July 2023, and subject to completing contract negotiations and approvals for selected projects, NHDES plans to use over \$4 million of funding from the VW Trust to support installation of 12 EVSE projects at locations that are publicly accessible 24 hours per day (NHDES, 2024c).

5.2 Provide Incentives for Consumer Purchase of Electric and Plug-In Hybrid Electric Vehicles

5.2.1 Measure Concept

The measure could provide incentives or programs to increase the adoption of EVs and PHEVs in New Hampshire by addressing the barrier of higher up-front costs, particularly for residents of LIDACs. As the infrastructure for EVs and PHEVs is expanded, the potential for LDVs to transition to electric increases. Greater adoption of EVs would reduce emissions of GHGs and other air pollutants by reducing the amount of motor fuel combustion.

Funding the measure could be used to:

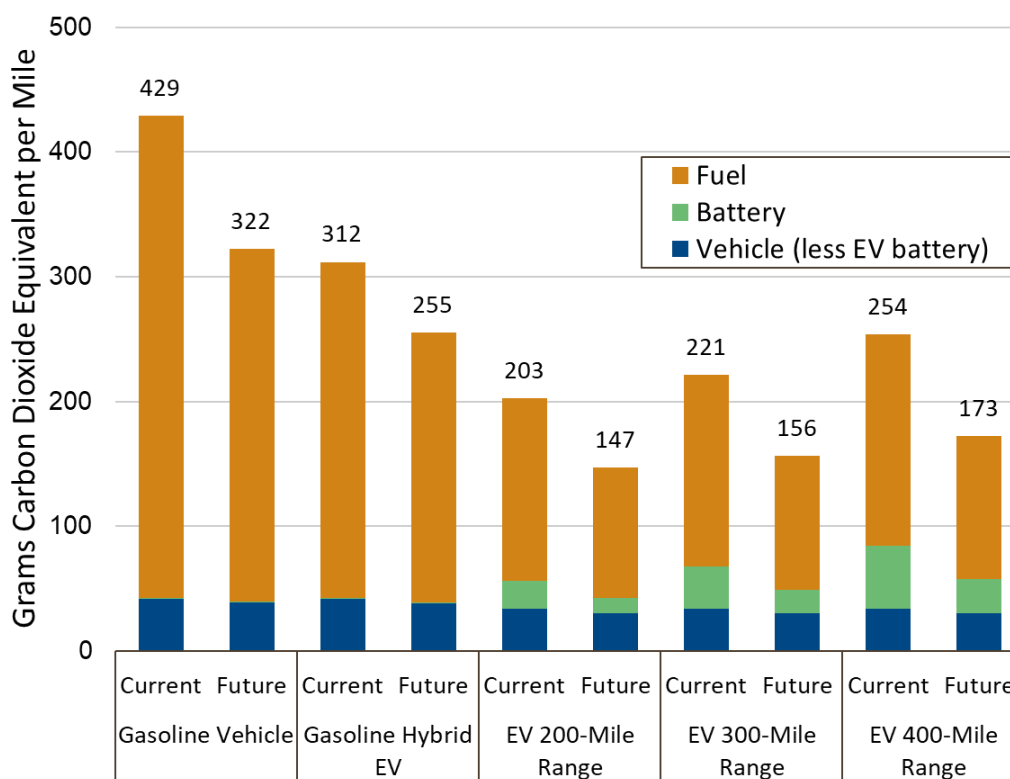
- Provide monetary incentives for the purchase of EVs and PHEVs over conventional gas or diesel vehicles for municipal, county and state fleets to demonstrate cost of ownership savings and provide direct savings to New Hampshire taxpayers.
- Provide income-qualified monetary incentives for resident EV and PHEV purchases to encourage adoption of those vehicles.
- Provide incentives for the purchase of EVs and PHEVs by private fleets to demonstrate the business case for this transition to the broader business community.
- Support automobile dealership consumer education and incentive programs for EVs and PHEVs.

EVs and PHEVs can have significant emissions benefits over conventional vehicles. All-electric vehicles produce zero tailpipe emissions and PHEVs produce no tailpipe emissions when operating in all-electric mode. However, tailpipe emissions and fuel economy are not the only factors in considering a vehicle's life cycle emissions; gasoline and electricity fuel pathways also have upstream emissions to consider, which include extracting, refining, producing, and transporting the fuel. Estimating cradle-to-grave emissions must account for both fuel-cycle emissions (also known as "well to wheels") and vehicle-cycle emissions (i.e., material and vehicle production as well as end of life). The combined emissions from vehicle and fuel production through vehicle decommissioning (i.e., recycling or scrapping) are referred to as life cycle or cradle-to-grave emissions.

¹⁵ Alternative Fuel Corridors are national EV charging fueling corridors (i.e., roads) nominated by state or location officials and designated by the U.S. Federal Highway Administration.

A comprehensive life cycle analysis, or cradle-to-grave analysis, of gasoline vehicles, EVs, and PHEVs demonstrated that use of EVs and PHEVs decrease total GHG emissions as compared with gasoline vehicles during the expected lifetimes of the vehicles (Kelly, 2023; U.S. DOE, 2023c). The assessment included emissions from raw material extraction, fuel production and transport, vehicle manufacturing, vehicle use, the vehicle's end-of-life, and emissions from the electric generation grid fuel mix associated with charging EVs. The study estimated total emissions based on current (2020) and future (2030-2035) electric and gasoline technologies. For a small sport utility vehicle (SUV), the results of the study showed that EVs had between 41% to 53% fewer GHG emissions than gasoline vehicles, as summarized in Figure 5-4.

Figure 5-4. Grams of Carbon Dioxide Equivalent per Mile for the Life Cycle of Current (2020) and Future (2030-2035) Small SUVs by Gasoline Vehicle, Gasoline Hybrid EV, and EVs.



5.2.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

NHDES used AFLEET's Payback On-Road online model to estimate GHG and co-pollutant emissions reductions from incentivizing the purchase of EVs and PHEVs (ANL, 2024a). Co-pollutant estimates include CO, NO_x, PM₁₀, PM_{2.5}, VOCs, and SO_x. The model incorporates several factors, such as vehicle type, vehicle fuel economy, vehicle mileage per year, upstream emissions, and the electric generation grid fuel mix specific to certain regions of the country.

Table 5-4 provides a summary of the results of the model's estimated annual average emissions reductions of GHGs and co-pollutants if 1,000 passenger EVs and 1,000 passenger PHEVs displace 2,000 passenger gasoline vehicles per year in New Hampshire.

Table 5-4. Average Annual GHG and Co-Pollutant Emissions Reductions if 1,000 Passenger EVs and 1,000 Passenger PHEVs Displace 2,000 Gasoline Vehicles in New Hampshire.

	MTCO _{2e}	CO (kg)	NOx (kg)	PM ₁₀ (kg)	PM _{2.5} (kg)	VOCs (kg)	SOx (kg)
Average Annual Emissions Reductions EVs vs. Gasoline Vehicles (1,000)	3,389	17,311	414	41	34	1,641	21
Average Annual Emissions Reductions PHEVs vs. Gasoline Vehicles (1,000)	2,028	4,223	151	10	8	602	2,028

If New Hampshire displaced 2,000 passenger gasoline vehicles with 1,000 passenger EVs and 1,000 passenger PHEVs per year beginning in 2025, then New Hampshire's cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 113,741 MTCO_{2e} and 1,901,092 MTCO_{2e}, respectively. New Hampshire would also reduce emissions of CO, NOx, PM₁₀, PM_{2.5}, VOCs, and SOx, by implementing the measure, as shown in Table 5-5.

Table 5-5. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 if 1,000 Passenger EVs and 1,000 Passenger PHEVs Displace 2,000 Gasoline Vehicles in New Hampshire.

	MTCO _{2e}	CO (kg)	NOx (kg)	PM ₁₀ (kg)	PM _{2.5} (kg)	VOCs (kg)	SOx (kg)
Cumulative Emission Reductions Between 2025 – 2030	113,741	452,230	11,852	1,058	900	47,098	679
Cumulative Emission Reductions Between 2025 – 2050	1,901,092	7,558,704	198,106	17,690	15,037	787,218	11,351

5.2.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Total number of EVs and PHEVs purchased per semi-annual and annual periods compared to prior years.
- Total number of EVs and PHEVs registered with the NH DMV.
- Changes to New Hampshire's GHG and co-pollutant emissions from LDVs.
- Changes to motor fuel consumption by LDVs.
- Estimated number of jobs created because of the measure.
- Changes to transportation costs for residents who purchase EVs and PHEVs.
- Number of educational materials produced, and outreach efforts undertaken.

5.2.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- Used Clean Vehicle Tax Credit - Section 13402 of The Inflation Reduction Act of 2022 established a tax credit for previously owned clean vehicles purchased by a taxpayer after December 31, 2022. The credit is worth the lesser of \$4,000 or 30% of the sale price. The model year of the vehicle must be at least two years earlier than the calendar year in which the taxpayer acquires it, and the vehicle must have a gross vehicle weight of less than 14,000 pounds (IRS, 2023c).
- Plug-In Electric Drive Vehicle Tax Credit - Section 13401 of The Inflation Reduction Act of 2022 modified this tax credit for EVs placed into service after December 31, 2022. Beginning on January 1, 2023, qualifying EVs can receive a total tax credit of \$7,500 if certain component sourcing requirements are met; \$3,750 for critical minerals and \$3,750 for battery components. Additionally, the final assembly of vehicles must take place in North America to be eligible (IRS, 2024a).

5.3 Support and Expand Public Transportation Options

5.3.1 Measure Concept

The measure could increase access to and use of public transportation options and support the shift to low- or no-emission vehicles and facilities. Expanding public transportation options would reduce GHG and co-pollutant emissions and would expand the affordable, efficient, and accessible transportation options for many New Hampshire households. The measure could incentivize the purchase or lease of zero-emission and low-emission high-occupancy vehicles, such as buses, as well as the acquisition, construction, and leasing of necessary supporting facilities. This could put more people into more fuel-efficient, higher-occupancy modes of transportation and limit the increase of LDVs on the road that would occur with population growth.

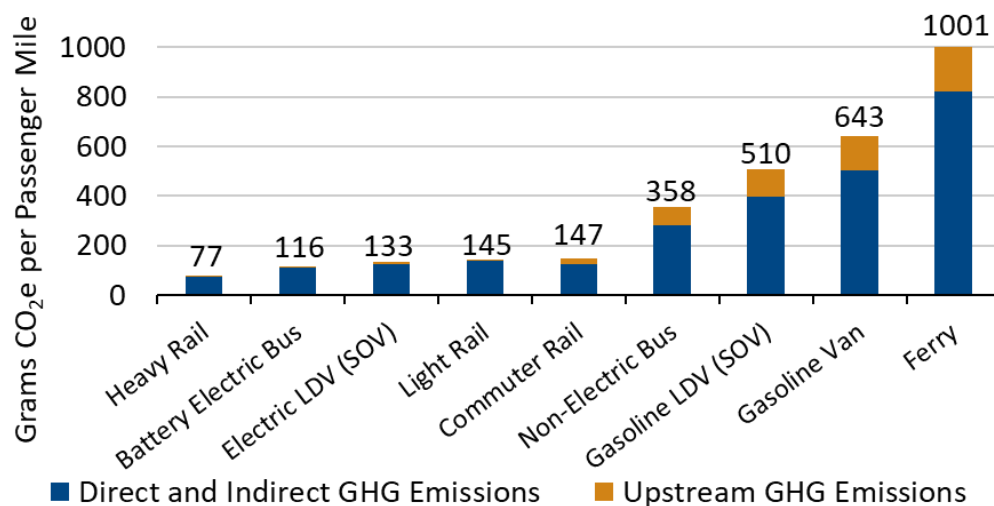
Funding the measure could be used to:

- Support charging infrastructure to assist transit systems in procuring commercially available transit buses with cleaner alternative fuels to spur the transition to cleaner fleets.
- Incentivize increased adoption of battery electric or low-emission transit vehicles through vehicle purchases or pilot projects.
- Help finance transit station upgrades, including electrification and decarbonization of buildings, improvements to resiliency for service continuity, and acquisition of real estate.

- Connect more people with public transit by supporting “first-mile/last-mile” solutions, such as increased access to public or private micro-mobility devices or autonomous EVs.^{16, 17}
- Improving intermodal transportation connections (i.e., travel by two or modes of transportation).
- Support technical assistance by New Hampshire’s Regional Planning Commissions to communities developing and implementing new or expanded transit programs.

For local passenger travel, large personal vehicles with low occupancy have the highest emissions, while buses and passenger rail transit offer the cleanest options other than walking or biking. A 2021 study by National Academies of Sciences, Engineering, and Medicine (NASEM) evaluated national data for transit vehicles, energy use, and passengers that are reported in the National Transit Database. The dataset included several transit systems in New Hampshire (NASEM, 2021). The study analyzed direct, indirect, and upstream GHG emissions associated with vehicle travel and, therefore, accounted for the full life-cycle of emissions associated with using particular fuels.¹⁸ The study found that nation-wide public transportation in 2018 avoided 148 billion miles of personal vehicle travel through transportation efficiency and land use efficiency savings, which saved 63 MMTCO₂e of GHG emissions. The study also estimated the average GHG efficiency on a per passenger mile basis by mode of travel, as summarized in Figure 5-5. The lowest-emitting transit mode was heavy rail followed by battery electric buses and electric single-occupancy vehicles (SOVs).

Figure 5-5. Average GHG Emissions per Passenger Mile by Transportation Mode.



¹⁶ The first/last mile problem in passenger transport refers to the disconnect between public transport and an individual's origin or destination and is directly linked to whether public transport is considered accessible and, therefore whether individuals choose to use it.

¹⁷ Micro-mobility devices are a range of small, lightweight vehicles operating at speeds typically below 15 mph and driven by users personally. Devices include bicycles, e-bikes, and electric scooters.

¹⁸ Direct GHG emissions are the CO₂, CH₄, and NO_x emissions that occurred at the vehicle when fuel was consumed. Indirect GHG emissions occurred at the power plant when electricity was produced or in the process of producing hydrogen. Upstream Emissions, sometimes referred to as “well-to-pump” emissions, are the GHG emissions that occurred during fuel production and distribution.

Investment in public transportation can also reduce household transportation costs and bolster economic growth. Based on an analysis of public transit fares, vehicle costs, and gasoline prices, transit riders can save more than \$13,000 per year using public transit instead of driving (American Public Transportation Association, 2023). At a national level, investment in public transportation infrastructure generates large economic returns with every \$1 invested in public transportation generating an estimated \$5 in long-term annual economic returns, and every \$1 million invested in public transportation supporting about 20 jobs (U.S. DOE et al., 2023). In New Hampshire, a 2021 economic impact study conducted by the Rockingham Planning Commission (RPC) and Strafford Regional Planning Commission (SRPC) found that every \$1 invested in the transit services provided by Cooperative Alliance for Seacoast Transportation (COAST) generated approximately \$4.08 of activity in the local economy (RPC & SRPC, 2021).¹⁹

5.3.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

NHDES used the Federal Transit Administration’s Transit Greenhouse Gas Emissions Estimator (version 3.0) to estimate GHG emissions reductions that result from a case evaluation of public transit options (U.S. DOT, 2022). The calculator uses inputs of annual VMT for a selected transit option and annual VMT of the vehicle displaced by the selected transit option to calculate both upstream and downstream GHG emissions. NHDES incorporated direct emissions reductions from transportation efficiency (i.e., decreased use of passenger LDVs when occupants ride transit) and land-use efficiency, which is the decreased use of passenger LDVs in the community through changes in land use resulting from transit service, such as more compact development (McGraw, Haas, Ewing, & Sabouri, 2021). NHDES used the calculator to determine average annual GHG emission reductions if transit systems in New Hampshire add or maintain approximately 1 million passenger miles to bus service during a year.

Table 5-6 provides a summary of the results of the calculator’s estimated annual average GHG emissions reductions if a measure, or a component of a measure, resulted in adding or maintaining 1 million passenger miles of transit bus travel fueled by electricity, diesel, hybrid diesel, or compressed natural gas.

Table 5-6. Average Annual GHG Reductions by Fuel Type if New Hampshire Transit Systems Add or Maintain 1 Million Passenger Miles of Bus Service.

	Electric Bus	Hybrid Diesel Bus	Compressed Natural Gas Bus	Diesel Bus
MTCO ₂ e Emissions Reductions per Million Passenger Miles	687	496	438	432

If New Hampshire could add or maintain 1 million passenger miles per year with electric bus service beginning in 2025, then New Hampshire’s cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 14,434 MTCO₂e and 241,256 MTCO₂e, respectively, as shown in Table 5-7.

¹⁹ COAST, which was established by RSA 329, is the regional public transportation provider serving the Seacoast communities of Portsmouth, Dover, Rochester, Somersworth, Farmington, and Newington New Hampshire; and Berwick, South Berwick, Eliot and Kittery Maine.

Table 5-7. Cumulative GHG Emissions Reductions from 2025 to 2030 and 2050 by Fuel Type if New Hampshire Transit Systems Add or Maintain 1 Million Passenger Miles of Bus Service.

	Electric Bus	Hybrid Diesel Bus	Compressed Natural Gas Bus	Diesel Bus
Cumulative Emission Reductions Between 2025 – 2030	14,434	10,411	9,192	9,069
Cumulative Emission Reductions Between 2025 – 2050	241,256	174,005	153,638	151,588

5.3.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

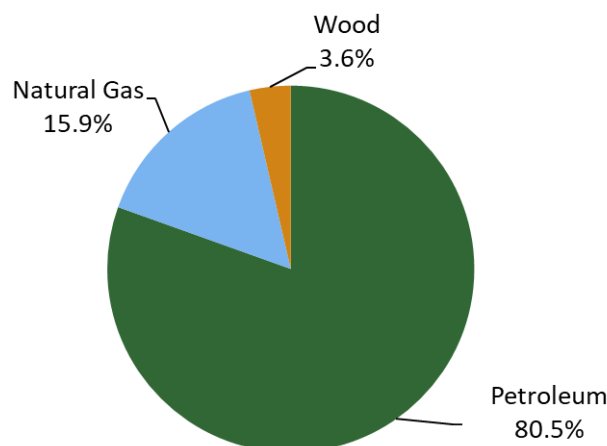
- Number of ESVE installed at transit systems for electric transit vehicles.
- Number of transit station upgrades, including electrification and decarbonization of buildings, improvements to resiliency for service continuity, and acquisition of real estate that resulted from the measure.
- Number of electric or low-emission transit vehicles purchased.
- Surveys to determine the number of people who began using public transit because of “first-mile/last-mile” solutions that resulted from the measure.
- Improvements to intermodal transportation connections.
- Changes to transportation costs for residents who use public transportation.
- Changes to motor fuel consumption by LDVs.

Chapter 6: Residential Building Sector Measures

The residential building sector in New Hampshire represents the second largest source of GHG emissions in the state (see Figure 3-1). The energy sources consumed for building heating are significantly different than other states and regions in the U.S. because New Hampshire and the rest of northern New England are highly dependent on expensive, vehicle-delivered fuels such as heating oil (i.e., No. 2 distillate fuel), propane and kerosene. The overlap of relatively high GHG emissions and expensive energy consumption associated with the residential building sector offers opportunities to reduce GHG emissions while delivering significantly lower energy bills and improved environmental quality for state residents.

In 2021, the consumption of fuels in New Hampshire's residential buildings resulted in over 2.56 MMTCO₂e of emissions, representing approximately 17% of the state's total GHG emissions (see Figure 3-1); more if one factors in indirect emissions associated with the consumption of retail electricity (U.S. EPA, 2024c). Although GHG emissions from the residential sector declined by over 20% from 2005 to 2021, New Hampshire's decline in residential per capita energy and electricity consumption from 2005 to 2021 was the lowest among New England states (see Figure 2-10). As shown in Figure 6-1, combustion of fossil fuels is the primary source of those emissions. Direct burning of fossil fuels results in emissions of CO₂, CH₄, NO_x, SO₂, PM_{2.5}, and hazardous air pollutants that are emitted at smaller concentrations (e.g., benzene, formaldehyde, and toluene) (Michanowicz, et al., 2022). Exposure to those pollutants is associated with a variety of health effects (Perera, 2017).

Figure 6-1. New Hampshire's 2021 GHG Emissions from the Residential Sector by Fuel Source (Percentage of 2.56 MMTCO₂e).



Considering the source of state's building sector emissions and the energy efficiencies already achieved by other New England states, New Hampshire has tremendous potential to realize substantial reductions in its energy and electricity consumption by maximizing the thermal and electrical efficiency of residential buildings. This will lead to significant and direct reductions in energy costs and emissions of GHGs and other air pollutants.

Because of these opportunities, New Hampshire is prioritizing the following measures in this PCAP to reduce GHG emissions in the residential building sector:

- Heat Pumps to Improve Energy Efficiency of Space and Water Heating in Buildings.
- Weatherization to Improve Energy Efficiency in Buildings.
- Pre-Weatherization to Improve Energy Efficiency in Buildings and Enable Implementation of Weatherization Measures.

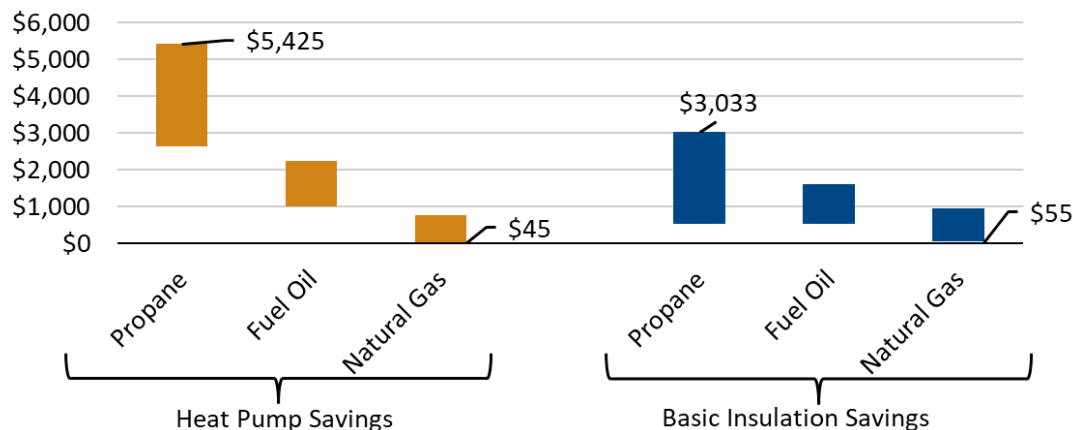
These measures could not only reduce energy consumption and GHG emissions but could also support the creation of high-quality jobs in New Hampshire by using funding to expand outreach and recruitment efforts. U.S. DOE reported that New Hampshire had 30,156 energy workers in 2022, with energy efficiency jobs representing the highest share of that market with 11,299 jobs (U.S. DOE, 2023d). However, studies have shown that a lack of sufficient workforce in the energy efficiency market is a significant barrier to implementing weatherization programs. For example, New Hampshire's electric and natural gas utilities have been working together for over two decades to provide New Hampshire customers with energy efficiency programs offered under the NHSaves® brand (NHSaves Programs). In 2023, New Hampshire utilities jointly produced a 2024-2026 New Hampshire Statewide Energy Efficiency Plan (NH Utilities, 2023). That plan identified workforce constraints as one of the significant barriers to maximizing implementation of the NHSaves Programs and recommended that the New Hampshire utilities identify potential funding streams to expand workforce outreach and recruitment, and consider workforce incentive programs to encourage contractors to participate in weatherization programs.²⁰ The measure could help fund those types of programs and other recommendations of that study team.

Implementation of the measures could reduce heating expenses of New Hampshire households. Using state-energy data from the U.S. EIA and statistical sampling of New Hampshire's housing stock from NREL, NHDES approximated annual average bill savings per household of the building measures using "The Cube" model from Rewiring America (U.S. EIA, 2024a; Rewiring America, 2024; NREL, 2024a).²¹ Depending on the county where an upgrade would occur and the type of fossil fuel currently being used to heat a home, the model provides a range of annual average bill savings at standard single-family homes in New Hampshire based on the upgrade type. As shown in Figure 6-2, a home that upgrades to an air- or ground-source heat pump system could see bill savings that range from \$45 to \$5,425 per year depending on the type of fossil fuel that is currently being used to heat a home. If a home that is not adequately weatherized is upgraded with basic insulation package, bill savings range from \$55 to \$3,033 per year depending on the heating energy source.

²⁰ The New Hampshire utilities submitted the *2024-2026 New Hampshire Statewide Energy Efficiency Plan* to the New Hampshire Public Utilities Commission for approval as required by RSA 374-F (NH Utilities, 2023). In *Attachment L* of the plan, GDS Associates, Inc. summarized key findings and recommendations for workforce development to support NHSaves Programs. In *Attachment N* of that plan, DNV identified workforce constraints as a significant barrier, among other barrier, to the NHSaves Programs in a study titled *Market Barriers to Energy Efficiency*.

²¹ See Appendix A – Building Sector Measures for more information about "The Cube" model.

Figure 6-2. Range of Annual Average Bill Savings at Single-Family Homes in New Hampshire if a Fossil-Fueled Heating Systems Upgrade to a Heat Pump System or Upgrade to Basic Insulation.



6.1 Heat Pumps to Improve Energy Efficiency of Space and Water Heating of Buildings

6.1.1 Measure Concept

The measure could provide incentives, other financial support, and technical assistance to drive increased consumer adoption of heat pumps for space and water heating and for space cooling in buildings. The use of electric heat pumps eliminates direct burning of fossil fuels in homes and results in a net reduction of GHG emissions and associated co-pollutants. The measure could support the supply chain, help build a workforce, and activate consumer demand. Individual consumer rebate programs, midstream incentives to distributors and contractors, or quick-start grants, could motivate homeowners, contractors, or the regional supply chain to make ground- or air-sourced heat pumps installations attractive. The measure could also:

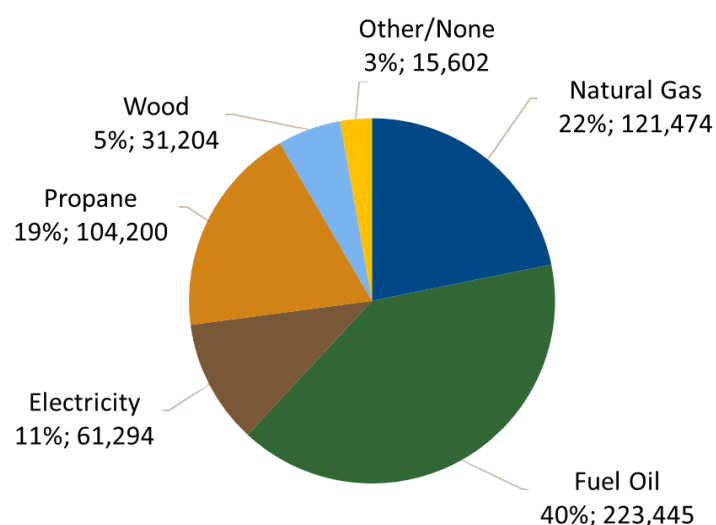
- Intersect with existing consumer-based incentives from existing state, federal, and utility programs.
- Confront state-specific market barriers identified by existing programs, such as consumer awareness, contractor availability, and upfront costs.
- Quantify, track, and report how the measure overcomes market barriers and creates lasting transformation of the residential heating, cooling, and ventilation (HVAC) market in New Hampshire.

Modern heat pumps are electric-powered, energy efficient appliances that can generate both heat and cooling for space, and water heating. For space heating and cooling, the more common residential configuration in New Hampshire is a “mini-split” ductless heat pump connected to indoor heads. Other configurations include “whole-house” heat pump systems that use a central heat pump to distribute heating and cooling through a building using ducts. A 2022 study showed that use of residential air-source heat pumps, as compared to use of a gas furnace to heat a home, reduces CO₂ emissions by up to 53% and 20-year global warming potentials by up to 67% over a 15-year period. Per the study, the northeast region of the United States experiences the second highest emission reductions after Pacific

region (emissions from transportation, storage, and local distribution systems were not in the study) (Pistochini, et al., 2022).

In 2022, of the approximately 557,220 households in New Hampshire, approximately 40%, or 223,445 households, use fuel oil as their primary heating fuel, which is followed by natural gas (22%; 121,474 households), propane (19%; 104,200 households), electricity (11%; 61,294 households), wood (5%; 31,204 households), and other (2.8%; 15,602 households) (U.S. Census Bureau, 2022; U.S. EIA, 2024a). On a percentage basis, New Hampshire's use of petroleum products to heat households is the second only to Maine among all U.S. states and almost seven times greater than the national average (U.S. EIA, 2024a).

Figure 6-3. Energy Source Used for Home Heating in New Hampshire (Percentage and Number of Share of Households).



6.1.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

NHDES used results from The Cube model that Rewiring America developed to estimate the potential residential building emission reductions associated with replacing fossil-fuel heating and water systems with electric heat pumps for space and water heating (Rewiring America, 2024). The model calculates GHG and co-pollutant emissions reductions, among other outputs, resulting from heat pump upgrades at an individual household, city, or county level.

Based on results from the model, Table 6-1 contains a summary of estimated annual average GHG and co-pollutant emissions reductions if existing space and water heating systems that are fueled by fuel oil, propane, and natural gas are replaced with air or ground source heat pump systems at single-family homes in New Hampshire. NHDES assumed that New Hampshire could replace 20,000 residential fossil-fueled heating systems with heat pump systems each year, which is the number the State of Maine accomplished over a 5-year period from 2019 and 2023 (State of Maine, 2023).

Table 6-1. Average Annual GHG and Co-Pollutant Emission Reductions if 20,000 Existing Space and water Heating Systems Fueled by Fossil Fuels are Replaced with Heat Pump Systems.

	MTCO ₂ e	NH ₃ (kg)	SO ₂ (kg)	NOx (kg)	VOC (kg)	PM _{2.5} (kg)
Space Heating Average Annual Emissions Reductions	164,084	8,630	(847)	136,181	5,206	10,387
Water Heating Average Annual Emissions Reductions	23,409	1,476	(107)	18,928	771	1,120

If New Hampshire began replacing existing fossil-fuel fired heating systems at rate of 20,000 per year beginning in 2025, then all of New Hampshire’s single-family homes that currently use fossil fuels as their primary space heating source, which is approximately 300,000 based on NREL housing data, would be replaced within 15 years. All of New Hampshire’s single-family homes that currently use fossil fuels as their primary water heating source, which is approximately 240,00 based on NREL housing data, would be replaced within 12 years. Considering the assumptions of The Cube’s modeling, such as assuming 95% decarbonization of state’s electricity generation sector by 2050, New Hampshire’s cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 3.45 MMTCO₂e and 47.03 MMTCO₂e, respectively, for space heating, and 0.49 MMTCO₂e and 5.74 MMTCO₂e for water heating. As shown in Table 6-2, New Hampshire would also significantly reduce net emissions of NH₃, NOx, VOCs, and PM_{2.5}, but there would be a relatively small net increase of SO₂ emissions because of increased electricity demand and production in the electricity generation sector.

Table 6-2. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 if Existing Space and Water Heating Systems Fueled by Fossil Fuels are Replaced with Heat Pump Systems at a rate of 20,000 per year.

	MMTCO ₂ e	NH ₃ (kg)	SO ₂ (kg)	NOx (kg)	VOC (kg)	PM _{2.5} (kg)
Space Heating Cumulative Emission Reductions Between 2025 – 2030	3.45	181,232	(17,778)	2,859,806	109,321	218,135
Space Heating Cumulative Emission Reductions Between 2025 – 2050	47.03	2,473,377	(242,627)	9,029,315	1,491,960	2,977,001
Water Heating Cumulative Emission Reductions Between 2025 – 2030	0.49	30,996	(2,255)	397,478	16,185	23,525
Water Heating Cumulative Emission Reductions Between 2025 – 2050	5.74	362,237	(26,355)	4,645,137	189,150	274,923

6.1.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Number of heat pumps installed by type and home type (e.g., single-family; multi-family; rental; subsidized; manufactured), including number of heat pumps per home.
- Number of energy audits conducted before and after installations.
- Changes to New Hampshire's GHG and co-pollutant emissions in the residential sector.
- Reductions to the consumption of fossil fuels for home heating from installation of heat pumps.
- Estimated number of jobs created because of the measure.
- Number of educational materials produced, and outreach efforts undertaken.

6.1.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- Under the NHSaves® brand (NHSaves Program), New Hampshire's electric and natural gas utilities incentivize efficient customers to upgrade their heating and cooling systems by offering rebates for installation of high-efficiency heat pumps (NHSaves, 2024).
- Through the federal Weatherization Assistance Program (WAP), U.S. DOE issues grants to NHDOE to improve the energy efficiency of low-income homes in the state. NHDOE subcontracts with New Hampshire's Community Action Agencies, which are responsible for operating and delivering weatherization services at the local level. The overall goal of the WAP is to serve those low-income households that are most vulnerable to high energy costs and who do not have the means of making cost-effective energy conservation improvements to their homes. Eligible upgrades include installation of more energy efficient home heating, ventilation, and cooling systems (HVAC) (NHDOE, 2024f). The federal government appropriated additional funding to this program by signing into law the Infrastructure Investment and Jobs Act (Public Law 117-58), also referred to as the Bipartisan Infrastructure Law.
- In 2024, NHDOE anticipates beginning its Home Electrification and Appliance Rebates Program, which was created as part of the federal Inflation Reduction Act and is being managed by the U.S. DOE. The program will reduce the upfront costs of efficient electric technologies in single-family and multi-family homes. The program will offer rebates to New Hampshire homeowners seeking to replace their existing home appliances with more efficient electric appliances, such as heat pumps for hot water and space heating and cooling, to help offset the costs of those appliances. Rebates amounts would be subject to caps based on technology type, and also be capped at 50% of the project cost for those earning between 80% and 150% of area median income, and 100% of the project cost for those making less than 80% of area median income (NHDOE, 2024c; U.S. DOE, 2024b).

- Homeowners may qualify for the Energy Efficient Home Improvement Credit (i.e., the “25C” energy efficiency tax credit) after making qualified energy-efficient improvements to their home, including upgrading existing HVAC systems with air- or ground-sourced heat pumps. Certain heat pumps qualify for a credit up to \$2,000 per year (IRS, 2024b).

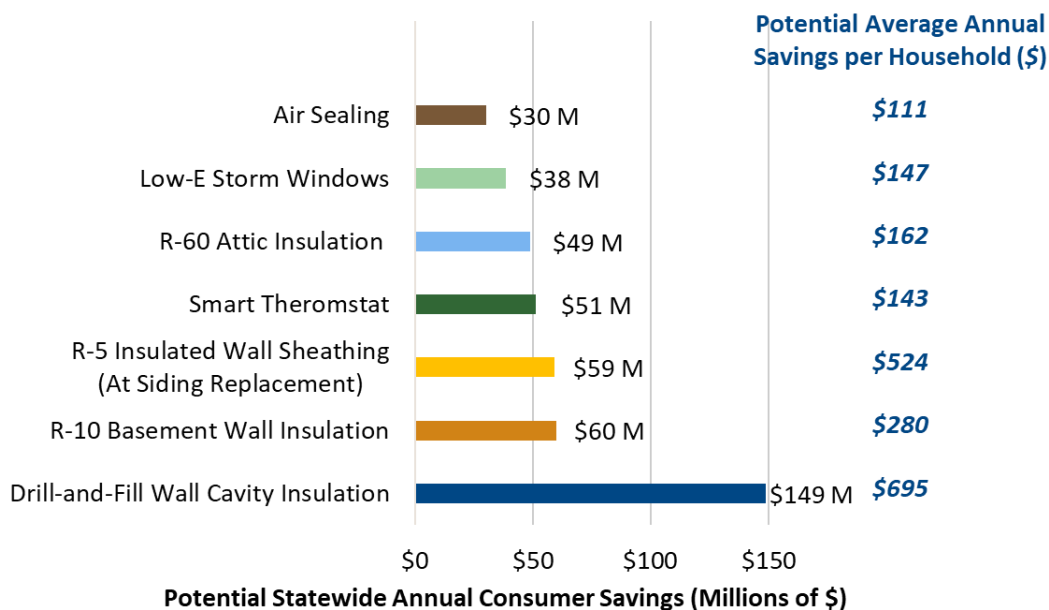
6.2 Weatherization to Improve Energy Efficiency in Residential Buildings

6.2.1 Measure Concept

The measure could create or scale up existing incentive programs to weatherize residential buildings by upgrading the envelope of buildings or their heating, cooling, and electrical systems to improve energy efficiency, health, safety, and comfort, while also providing cost-effective energy savings. Building envelope efficiency and other weatherization upgrades are typically cost-effective tools to reduce GHG emissions and lower utility bills. Retrofits to improve a building envelope with better insulation reduce radiant losses, lower energy use intensity, and can often be implemented relatively quickly once energy audits identify inefficiencies and funding becomes available. Weatherization projects in colder climates, such as New Hampshire, typically realize significant energy savings while helping to reduce peak electricity demands when implemented at scale.

NREL estimated that 25% of energy used by New Hampshire single-family homes can be saved through cost-effective improvements, which would have the following residential energy savings potential per year: \$468.1 million per year in utility bill savings; 20 trillion British thermal units in gas, propane, and fuel oil savings; and nearly 600 million kilowatt-hours of electricity. NREL also calculated potential, annual statewide and average household savings for top weatherization improvements in New Hampshire, which are summarized in Figure 6-3 (NREL, 2017).

Figure 6-4. New Hampshire’s Top Seven Weatherization Improvements by Potential Statewide Annual Consumer Savings (Millions of Dollars) and Average Annual Savings per Household (Dollars).



Existing, dedicated state and federal funding streams for residential retrofit energy conservation are insufficient to address New Hampshire’s needs. Federal tax rebates, by themselves, often do not provide incentives to induce large numbers of homeowners or landlords to invest in energy conservation. This measure could provide additional grants, loans, or rebates, a percentage of which could be directed to income-qualified households, to motivate homeowners and landlords to invest in energy efficiency improvements. Outcomes of the measure could be tracked through procurement and use of a database system that would log energy audits, implementation of contracts, weatherization actions, projected and realized energy savings, estimated emission reductions, and expenditures. Energy savings would result in lower living costs that could potentially contribute to lower housing costs and rental rates.

The goals of the measure are to significantly grow the number households that can benefit from weatherization upgrades, increase awareness of the opportunities to reduce energy use and costs via weatherization programs, and permanently reduce GHG and co-pollutant emissions from New Hampshire’s residential sector.

6.2.2 Estimates of GHG and Co-Pollutant Emissions Reductions

NHDES partnered with Rewiring America to estimate the potential residential building emission reductions when an existing single-family home in New Hampshire with inadequate insulation is upgraded with a basic insulation package (Rewiring America, 2024). Rewiring America developed a model that calculates GHG and co-pollutant emissions reductions, among other outputs, resulting from weatherization upgrades at an individual household, city, or county level.

Based on modeling results, Table 6-3 provides a summary of estimated annual average GHG and co-pollutant emission reductions if 20,000 existing space heating systems that are fueled by fuel oil, propane, and natural gas are replaced with air- or ground- source heat pump systems at New Hampshire households.

Table 6-3. Average Annual GHG and Co-Pollutant Emission Reductions if 1,000 Homes that Need Weatherization are Upgraded with a Basic Insulation Package.

	MTCO ₂ e	NH ₃ (kg)	SO ₂ (kg)	NO _x (kg)	VOC (kg)	PM _{2.5} (kg)
Average Annual Emission Reductions	2,864	139	18	1,977	85	135

If New Hampshire could weatherize an additional 1,000 homes per year beginning in 2025, and considering the assumptions of The Cube’s modeling, such as assuming 95% decarbonization of state’s electricity generation sector by 2050, then New Hampshire’s cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 60,151 MTCO₂e and 1,005,380 MTCO₂e, respectively. New Hampshire would also reduce net emissions of NH₃, SO₂, NO_x, VOCs, and PM_{2.5}, by implementing the measure, as shown in Table 6-4.

Table 6-4. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 if 1,000 Homes that Need Weatherization are Upgraded with a Basic Insulation Package Each Year.

	MTCO ₂ e	NH ₃ (kg)	SO ₂ (kg)	NO _x (kg)	VOC (kg)	PM _{2.5} (kg)
Cumulative Emission Reductions Between 2025 – 2030	60,151	2,910	388	41,509	1,781	2,829
Cumulative Emission Reductions Between 2025 – 2050	1,005,380	48,644	6,489	693,798	29,775	47,277

6.2.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Number of weatherization improvements by type and home type (e.g., single-family; multi-family; rental; subsidized; manufactured), including number of improvements per home.
- Number of energy audits conducted before and after weatherization.
- Changes to New Hampshire’s GHG and co-pollutant emissions in the residential sector.
- Reductions to the consumption of fossil fuels and electricity for home heating from weatherization improvements.
- Level of customer satisfaction with the weatherization improvements.
- Estimated number of jobs created because of the measure.
- Number of educational materials produced, and outreach efforts undertaken.

6.2.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- Under the NHSaves® brand (NHSaves Program), New Hampshire’s electric and natural gas utilities implement a variety of programs exist, serving both residential and commercial and industrial customers. NHSaves Programs are designed to educate and induce customers to choose products and services that are appropriate for their specific circumstances and result in energy and cost savings to both participating customers and users of the electricity and natural gas systems. These programs have delivered significant economic benefits to New Hampshire, reduced the need for additional investments in generating capacity, and achieved other environmental objectives related to energy generation and consumption. They include programs for new construction and retrofitting existing structures. Although the primary goal of the NHSaves Programs is to save energy and costs of New Hampshire’s electricity and natural gas consumers, the success of the programs has also resulted in reduced GHG emissions. Money collected from the energy efficiency portion of the Systems Benefit Charge, a per kilowatt-hour charge on the bills of New Hampshire’s electric customers, help fund those programs (NHSaves,

2024). Also, some of proceeds from RGGI that are directed to New Hampshire's Energy Efficiency Fund for these programs (see section 2.2 of this PCAP for more information about RGGI).

- Through the federal Weatherization Assistance Program (WAP), U.S. DOE issues grants to NHDoe to improve the energy efficiency of low-income homes in the state. NHDoe subcontracts with New Hampshire's Community Action Agencies, which are responsible for operating and delivering weatherization services at the local level. The overall goal of the WAP is to serve those low-income households that are most vulnerable to high energy costs and who do not have the means of making cost-effective energy conservation improvements to their homes. Eligible upgrades include installation of more energy efficient home heating, ventilation, and cooling systems (HVAC) (NHDoe, 2024f). The federal government appropriated additional funding to this program by signing into law the law the Infrastructure Investment and Jobs Act (Public Law 117-58), also referred to as the Bipartisan Infrastructure Law.
- In 2024, NHDoe anticipates beginning its Home Electrification and Appliance Rebates Program, which was created as part of the federal Inflation Reduction Act and is being managed by the U.S. DOE. The program will reduce the upfront costs of efficient electric technologies in single-family and multi-family homes. The program will offer rebates to New Hampshire homeowners seeking to replace their existing home appliances with more efficient electric appliances, such as heat pumps for hot water and space heating and cooling, to help offset the costs of those appliances. Rebates amounts would be subject to caps based on technology type, and also be capped at 50% of the project cost for those earning between 80% and 150% of area median income, and 100% of the project cost for those making less than 80% of area median income (NHDoe, 2024c; U.S. DOE, 2024b).
- Homeowners may qualify for the Energy Efficient Home Improvement Credit (i.e., the "25C" energy efficiency tax credit) after making qualified energy-efficient improvements to their home, including upgrading existing HVAC systems with air- or ground-sourced heat pumps. Certain heat pumps qualify for a credit up to \$2,000 per year (IRS, 2024b).

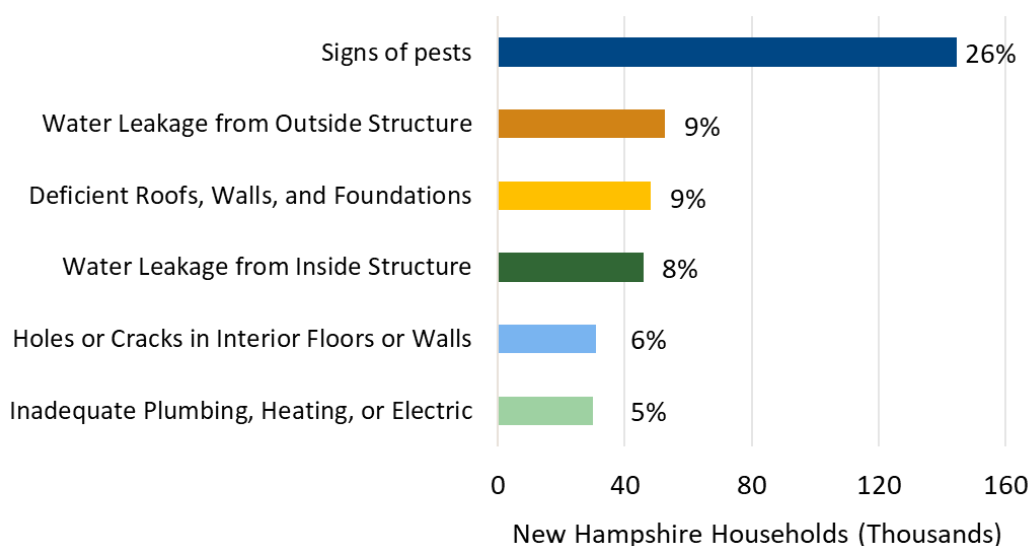
6.3 Pre-Weatherization to Improve Energy Efficiency in Residential Buildings

6.3.1 Measure Concept

The measure would provide pre-weatherization incentives and technical assistance to owners of homes and multi-family residential buildings to conduct structural repairs and home health remediation. These repairs will allow previously deferred income-eligible households to access incentives for weatherization, efficiency, electrification, and renewables. Reasons for deferral from existing programs can include deficiencies in the building structure, sanitary system problems, extent and condition of lead paint or asbestos-containing materials, and inadequate electrical or plumbing (NASCS, 2024). Under the program, eligible entities in New Hampshire would partner with a third-party administrator to hire contractors to remediate moisture, standing water, electrical and wiring issues, environmental contaminants, and structural and roofing deficiencies. This work remediates issues that would cause a home to be deferred from the existing weatherization and renewable energy programs, such as NHDoe's Weatherization Assistance Program (WAP).

Data from the 2021 American Housing Survey (AHS), the nation’s most recent and comprehensive housing survey, estimates of housing deficiencies of surveyed states, such as Massachusetts, can be used to gain a general understanding of housing deficiencies in New Hampshire (Massachusetts was the only New England state included in the 2021 AHS). According to the 2021 AHS, over 150,000, or approximately 5.5%, of Massachusetts households lack adequate plumbing, heating, or electricity (U.S. Census Bureau, 2021). If Massachusetts data is applied to New Hampshire, then over 30,000 households of New Hampshire’s total 557,220 households may have inadequate plumbing, heating, or electric utilities, which present significant barriers to weatherization upgrades. Other categories of deficiencies can potentially be much higher, as shown in Figure 6-5.

Figure 6-5. New Hampshire Housing Deficiencies by Percentage and Number of Households (Thousands) based on 2021 U.S. Census American Housing Survey Data for Massachusetts.



The goals of the measure are to transform the weatherization market by providing substantial funding to previously under-resourced pre-weatherization programs in the state and allow households with deficiencies that that would be deferred from weatherization programs to participated in those programs. The goals of this measure intersect with the goals of the weatherization measure of the prior section:

- Significantly grow the number households that can benefit from weatherization upgrades.
- Increase awareness of the opportunities to reduce energy use and costs via weatherization programs.
- Permanently reduce GHG and co-pollutant emissions from New Hampshire’s residential sector.

6.3.2 Estimates of GHG and Co-Pollutant Emissions Reductions

Significant GHG and co-pollutant emissions reductions of this pre-weatherization measure may only be realized after a residential building is weatherized, as NHDES describes in section 6.2, Weatherization to Improve Energy Efficiency in Buildings, of this PCAP. Therefore, NHDES would estimate emissions reductions associated with implementation of this pre-weatherization measure by using the same general methods described in the weatherization measure but categorize those estimates as “potential

emissions reductions” until a building is weatherized. To avoid double counting of emissions reductions, NHDES and other entities that may receive CPRG implementation funding should not account for emissions reductions from both the pre-weatherization and weatherization methods.

6.3.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

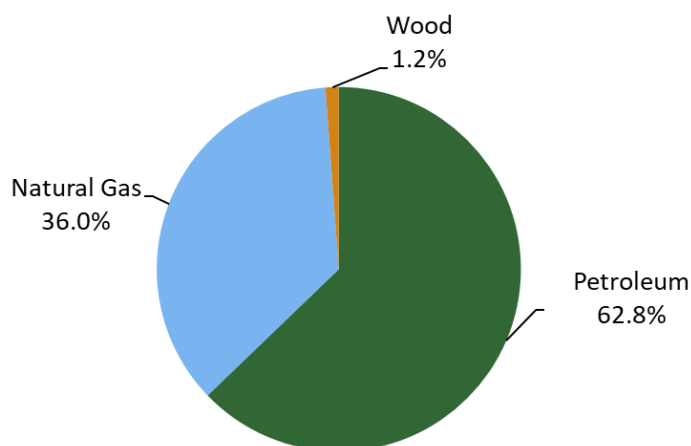
- Number of pre-weatherization improvements by type and home type (e.g., single-family; multi-family; rental; subsidized; manufactured), including number of improvements per home.
- Number of energy audits conducted before and after weatherization.
- Changes to New Hampshire’s GHG and co-pollutant emissions in the residential sector.
- Reductions to the consumption of fossil fuels and electricity for home heating from weatherization improvements.
- Level of customer satisfaction with the improvements.
- Estimated number of jobs created because of the measure.
- Number of educational materials produced, and outreach efforts undertaken.

Chapter 7: Local Government Building and Facility Measures

Local governments, inclusive of municipalities, school districts and counties, present a unique and critical opportunity to reduce energy consumption and minimize energy and taxpayer costs, all while reducing GHG emissions. Coordination of existing programs with new initiatives tailored to empower local governments will maximize these benefits. By implementing coordinated energy efficiency, renewable energy, and energy storage projects at local government facilities, New Hampshire can realize lower energy costs, reduced GHG emissions, and improved public and environmental health. These projects could also improve the consistency of critical electricity service delivery to local residents and businesses by supporting overall grid reliability and resilience.

The commercial building sector in New Hampshire represents the fifth largest source of GHG emissions in the state. In 2021, combustion of fuels in the commercial sector resulted in over 1.42 MMTCO₂e of emissions, representing approximately 9.4% of the state's total GHG emissions (see Figure 3-1); more if one factors in indirect emissions associated with the consumption of retail electricity. Emissions from the commercial sector include service-providing facilities and equipment from private and public organizations, such as local government buildings and facilities, and businesses (U.S. EPA, 2023g). As shown in Figure 7-1, Most emissions from the commercial sector come from the combustion of petroleum fuels. Those petroleum fuels include heating oil (i.e., No. 2 distillate fuel), propane and kerosene, and are often vehicle-delivered fuels that are relatively expensive compared to other fuel sources.

Figure 7-1. New Hampshire's 2021 GHG Emissions from the Commercial Sector by Fuel Source (Percentage of 1.42 MMTCO₂e).



Municipal and school buildings are essential components of healthy towns, cities, and counties because they house important functions of local government and represent the unique character of each community. Local governments provide services that enhance the public health, safety, and welfare of their residents. When those services are interrupted, the quality of life of a community can be significantly affected. Deploying renewable energy and improving energy efficiency at local government buildings and facilities would reduce energy costs and taxpayer expenditures as well as direct or indirect

emissions of GHGs and co-pollutants, while improving their resiliency during power outages.²² Because of these opportunities, New Hampshire is prioritizing the following measures in this PCAP to reduce GHG emissions in the residential building sector:

- Resilient Local Energy Systems.
- Improving Energy Efficiency at Wastewater and Drinking Water Systems.

7.1 Resilient Local Energy Systems

7.1.1 Measure Concept

This measure could support deployment of renewable energy and storage systems, such as onsite solar photovoltaic (PV) and battery technologies, for local government buildings to reduce energy costs and provide resilience in case of an electric grid outage. The measure could ensure power to first responders and critical services and provide refuge from extreme weather during interruptions to the power supply from natural disasters. By developing new distributed electricity capacity, the measure could improve grid reliability and lower overall grid costs particularly during times of peak demand. This measure could be utilized by any local government entity, including towns, cities, counties, and school districts. The measure could fund, through grants or rebates, resilient energy systems and associated administrative costs at the following local government buildings and operations, among others:

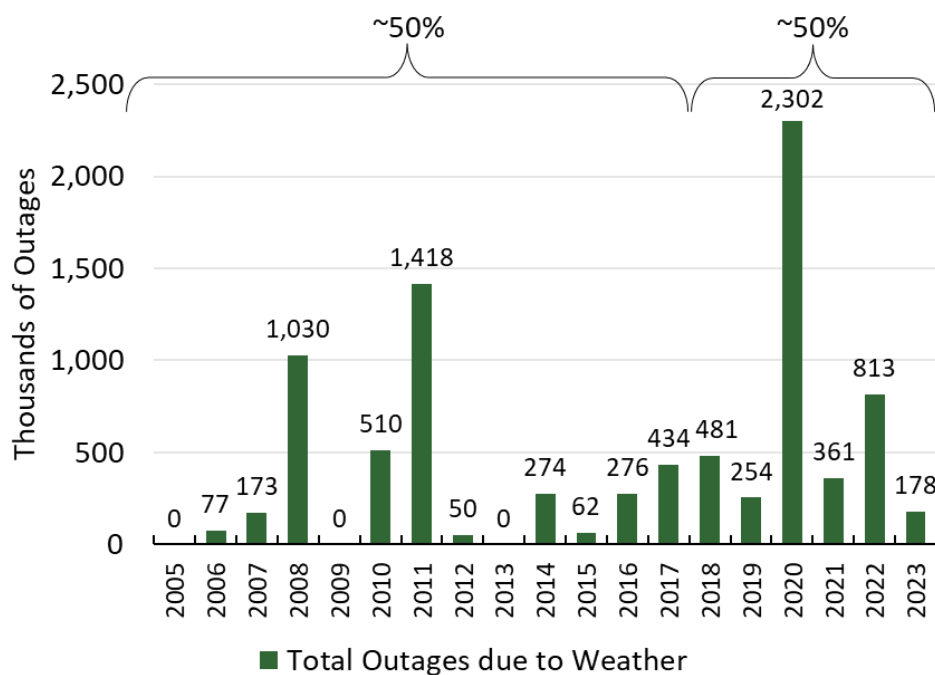
- Town and City Halls.
- Government offices.
- Police Stations.
- Fire Stations.
- Schools.
- Libraries.
- Courthouses.
- Recreational centers.
- Drinking water systems.
- Wastewater treatment facilities.

Despite improvements to electrical utility infrastructure and management, the number of electricity outages caused by weather in New England, when those outages involved New Hampshire, has generally increased between 2005 and 2023. Based on electric emergency incidents reported to the U.S. DOE, approximately 50% of those outages occurred in most recent 6-year period from 2018 to 2023, while the

²² Direct emissions occur from sources that are controlled or owned by the municipality (e.g., emissions associated with fuel combustion in boilers and furnaces). Indirect emissions are associated with the consumption of electricity, steam, heat, or cooling that are produced by sources owned by other entities (e.g., powerplants) (U.S. EPA, 2023i).

remaining 50% of those outages occurred during a 13-year period from 2005 to 2017, as shown in Figure 7-2 (U.S. DOE, 2023b). This national trend tracks with New Hampshire's historic outages. The seven most severe outages statewide have all occurred since 2008, with two storms causing outages for more than 50% of the state's residents (NHDOE, 2020). Recently, two Major Disaster Declarations were approved by the federal government for severe storms and flooding that occurred in New Hampshire from December 22 to 25, 2022, and from July 9 to 17, 2023 (FEMA, 2024). This measure could help minimize electrical outages at participating local government buildings and facilities should similar disasters happen again.

Figure 7-2. Number of Electricity Outages Caused by Weather in New England, when those Outages Involved New Hampshire, from 2005 to 2013 (Thousands of Outages).



7.1.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

NHDES applied equations developed by a consultant that used NREL's PVWatts® Calculator and REopt® Tool to estimate GHG and co-pollutant emissions reductions based on a case evaluation (NREL, 2023; NREL, 2024b). The PVWatts® Calculator estimates the energy production of PV energy systems by calculating the performance of potential PV installations based on certain assumptions and inputs. The REopt® Tool evaluates the economic viability of distributed PV, identifies system sizes and dispatch strategies to minimize energy costs, and estimates how long a system can sustain critical load during a grid outage. In those models, the consultant assumed 387 kW rooftop solar installations with 50 kW battery capacity capable of storing 153 kWh of electric power.

For the evaluated case, NHDES assumed allocating \$2 million of funding per year to the measure, excluding administrative costs. Table 7-1 contains a summary of estimated average annual emissions reductions of GHGs, NO_x, SO₂ and PM_{2.5}.

Table 7-1. Average Annual GHG and Co-Pollutant Emission Reductions if \$2 Million Funds Rooftop Solar Installations with Storage Batteries.

	MTCO ₂ e	NO _x (kg)	SO ₂ (kg)	PM _{2.5} (kg)
Average Annual Emission Reductions	406	416	416	24

If New Hampshire were to allocate \$2 million per year to develop solar PV-based resilient energy systems beginning in 2025, then New Hampshire’s cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 8,527 MTCO₂e and 142,521 MTCO₂e, respectively. By implementing the measure, New Hampshire would also reduce emissions of NO_x, SO₂, and PM_{2.5} as shown in Table 7-2.

Table 7-2. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 if \$2 Million Worth of Rooftop Solar PV Resilient Systems are Installed Each Year.

	MTCO ₂ e	NO _x (kg)	SO ₂ (kg)	PM _{2.5} (kg)
Cumulative Emission Reductions Between 2025 – 2030	8,527	8,738	8,738	514
Cumulative Emission Reductions Between 2025 – 2050	142,521	146,043	146,043	8,591

7.1.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Number of facilities installing renewable energy and storage.
- Number of kilowatts of installed renewable energy.
- Number of kilowatts of battery power installed.
- Number of kilowatt hours battery capacity installed.
- Expected lifespan of projects.
- Number of performance years to quantify lifetime pollution reductions.
- Changes to the amount of fossil fuel used.
- Reduction of electricity used from the grid.

7.1.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- Clean Electricity Production Tax Credit – Certain qualified clean energy facilities in service after 2024 may be classified as 5-year property via the modified accelerated cost recovery system (MACRS) under Provision 13703 of the Inflation Reduction Act of 2022. Clean energy facilities include including wind, biomass, geothermal, solar, small irrigation, landfill and trash, hydropower, marine and hydrokinetic energy (IRS, 2023a; IRS, 2023b).

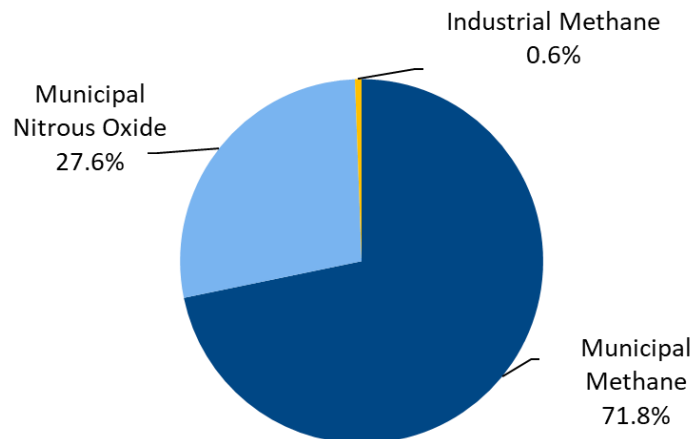
- Clean Electricity Investment Tax Credit – Certain qualified clean electricity property and technology in service after 2024 may be classified as 5-year property via the MACRS under Provision 13703 of the Inflation Reduction Act of 2022. Clean electricity includes fuel cell, solar, geothermal, small wind, energy storage, biogas, microgrid controllers, and combined heat and power properties (IRS, 2023a; IRS, 2023b).

7.2 Improving Energy Efficiency at Wastewater and Drinking Water Systems

7.2.1 Measure Concept

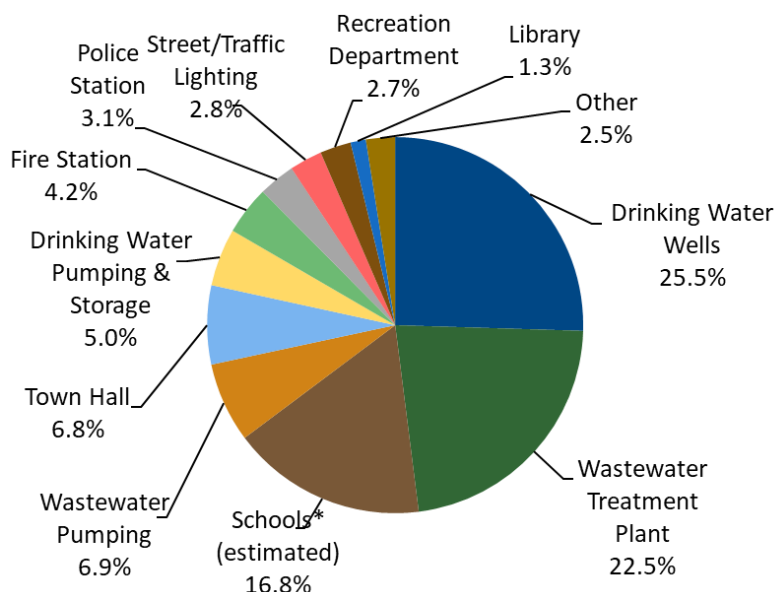
This measure would improve energy efficiency in New Hampshire’s wastewater and drinking water systems with equipment upgrades, operational modifications, and building envelope improvements. Depending on site conditions at a system, the measure could also install renewable energy technologies, such as onsite solar PV technologies, which would reduce direct and indirect emissions of GHGs and co-pollutants. Installation or upgrading other renewable energy technologies, such in-line turbines to generate renewable energy in drinking water distribution systems or anaerobic digesters to capture and utilize biogas. These technologies would also reduce emissions of methane from municipal wastewater systems, which represents 71.8% of GHG emissions from New Hampshire’s wastewater sector as shown in Figure 7-3. The measure could fund energy audits to demonstrate the effectiveness of improvements in reducing energy use by wastewater and drinking water systems.

Figure 7-3. New Hampshire’s 2021 GHG Emissions from the Wastewater Sector by Source (Percentage of 0.14 MMTCO₂e).



Electricity used for aeration is typically the largest source of energy consumption by wastewater treatment plants. For drinking water systems, electricity used to pump water is often the largest source of energy consumption for local communities. Wastewater operations are often the largest energy user for a community with a wastewater treatment facility (WWTF). Electricity alone is a significant proportion of a WWTF’s annual operating budget and can result in up to 30% of a given municipality’s total energy bill (Office of State and Community Energy Programs, 2024). For example, a 2020 electricity audit conducted at a New Hampshire town showed that its wastewater treatment plant and wastewater pumps accounted for 22.5% and 6.9% of the total electricity used by the town. Another 25.5% and 5.0% of total electricity was consumed by the drinking water wells and drinking water pumping and storage facilities, as shown in Figure 7-4.

Figure 7-4. Breakdown of Electricity Use at a New Hampshire Municipality in 2020.



NHDES' Water Infrastructure Energy Efficiency Program (WIEEP) focuses on improving the energy efficiency of New Hampshire's wastewater and drinking water systems. Since 2016, WIEEP has worked with its municipal and utility partners to identify potential savings through comprehensive process-level energy audits that focus on energy efficiency and renewable energy. For New Hampshire's wastewater systems, WIEEP has, to date, identified average potential savings of approximately 28% annual kWh usage, which translates to annual savings of 15,876,306 kWh. For drinking water systems, WIEEP has identified, to date, average potential savings of approximately 24% annual kWh usage, which would be annual savings of 2,710,857 kWh. An additional approximately 6,000,000 kWh has been proposed for savings through solar arrays. WIEEP added the renewable energy projects into the energy audit process in approximately 2022. There may be additional opportunities for renewable energy projects for facilities that were audited prior to 2022. This measure could support implementation of projects that would realize those energy savings and reduce costs for municipalities.

7.2.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

NHDES used EPA's online AVOIDed Emissions and geneRation Tool (AVERT) to estimate GHG and co-pollutant emissions reductions based on a case evaluation (U.S. EPA, 2024b). AVERT uses hourly data from EPA's Air Markets Program Data and National Emissions Inventory to perform statistical analysis on actual behavior of past electricity generation and emissions data given various regional electricity sector demand levels, including New England's electricity grid.

For the evaluated case, NHDES assumed that energy efficiency and renewable projects at New Hampshire's municipal wastewater and drinking water systems could reduce annual electricity consumption by 1 gigawatt-hour. Table 7-3 contains a summary of estimated average annual emissions reductions of GHGs, NOx, SO₂, PM_{2.5} and VOCs.

Table 7-3. Average Annual GHG and Co-Pollutant Emission Reductions if Energy Efficiency and Renewable Projects at New Hampshire’s Wastewater and Drinking Water Systems Reduced Annual Electricity Consumption by 1 GWh.

	MTCO ₂ e	NO _x (kg)	SO ₂ (kg)	PM _{2.5} (kg)	VOCs (kg)
Average Annual Emission Reductions	508	118	100	18	9

If New Hampshire could reduce annual electricity consumption each year by 1 gigawatt-hour at municipal wastewater and drinking water systems with energy efficiency and renewable projects beginning in 2025, then New Hampshire’s cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 10,676 MTCO₂e and 178,450 MTCO₂e, respectively. By implementing the measure, New Hampshire would also reduce emissions of NO_x, SO₂, PM_{2.5}, and VOCs as shown in Table 7-4.

Table 7-4. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 if Energy Efficiency and Renewable Projects at New Hampshire’s Wastewater and Drinking Water Systems Reduced Annual Electricity Consumption by 1 GWh Each Year.

	MTCO ₂ e	NO _x (kg)	SO ₂ (kg)	PM _{2.5} (kg)	VOCs (kg)
Cumulative Emission Reductions Between 2025 – 2030	10,676	2,477	2,096	381	191
Cumulative Emission Reductions Between 2025 – 2050	178,450	41,395	35,026	6,368	3,184

7.2.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Number of facilities receiving a comprehensive process level energy audit.
- Number of energy reduction projects implemented at each WWTF and drinking water system.
- Number of facilities installing renewable energy and storage.
- Number of kilowatts of installed renewable energy.
- Number of kilowatt hours battery capacity installed.
- Expected lifespan of projects.
- Number of performance years to quantify lifetime pollution reductions.
- Changes to the amount of fossil fuel used.
- Reduction of electricity use from the grid.

7.2.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- NHSaves Energy Efficiency Program - NHSaves is a collaboration of New Hampshire's electric and natural gas utilities working together to provide NH customers with information, incentives, and support designed to save energy, reduce costs, and protect our environment statewide. NHSaves' utility partners offer a wide variety of rebates on the products and technologies that help New Hampshire businesses and municipalities save energy and money.

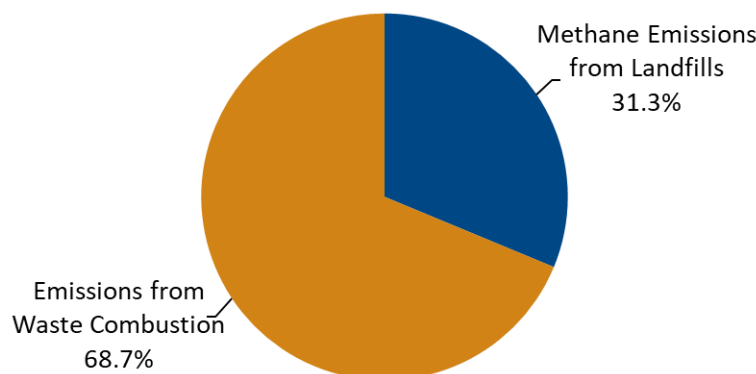
Chapter 8: Waste and Materials Management Measure

8.1 Expand Programs for Waste Reduction, Diversion and Recycling

8.1.1 Measure Concept

This measure would create or scale up incentive programs to reduce waste generation and maximize diversion of waste from disposal in New Hampshire's landfills and incinerators. The measure focuses on education, outreach and infrastructure improvements. These programs would lower emissions from waste combustion and from landfills that produce CH₄, a powerful GHG, which results from decomposition of waste materials. Emissions of CH₄ from landfills and from waste combustion accounted for 31.3% and 68.7%, respectively, of emissions from the state's waste sector as shown in Figure 8-1. Food waste is the largest contributor of CH₄ emissions from landfills and would be prioritized in this measure. The measure could also reduce GHG and co-pollutant emissions indirectly from the transportation sector because recycling can lower the need to extract and transport virgin material to create new goods.

Figure 8-1. New Hampshire's 2021 GHG Emissions from the Waste Sector by Source (Percentage of 1.72 MTCO₂e).



Funding of the measure could be used to:

- Assist municipalities with equipment purchases and infrastructure improvements necessary to divert wastes such as recyclables, construction and demolition debris, and organics.
- Increase public access to reuse options, recycling, and food waste diversion.
- Develop educational materials, including online resources, to educate residents, municipalities, and businesses about the New Hampshire Waste Management Hierarchy (RSA 149-M:3), EPA Wasted Food Scale and sustainable materials management practices.
- Develop local markets for waste diversion.
- Assist schools, universities, businesses and manufacturing facilities with recycling programs, food scrap diversion and waste audits.

- Develop incentives for New Hampshire businesses that produce or use products with post-consumer recycled content or compostable materials to build demand for recycled materials.
- Provide technical assistance to increase composting of organic wastes (food scraps, leaf/yard waste, manures, clean wood) through site visits, educational workshops, facts sheets and guidance documents to ensure stakeholders are equipped with the latest information.
- Increase infrastructure capacity to better manage organics, specifically food waste, statewide.

In 2022, a total of 1,128,570 short tons of municipal solid waste (MSW) and 266,333 tons of construction and demolition debris (C&D) were disposed of in New Hampshire's landfills and incinerators (NHDES, 2023). The landfills and incinerators received the waste from both in-state and out-of-state sources. Under RSA 149-M:2, the state's statutory disposal reduction goals are to reduce the quantity by weight of MSW and C&D disposed by 25% by 2030 and 45% by 2050 based on quantities disposed of in 2018. Achieving these targets will require robust efforts to simultaneously reduce the quantities of waste generated while also maximizing diversion from disposal through reuse, recycling, composting, or other means. This measure would help New Hampshire achieve its statutory goal by implementing some of the strategies in the state's 2022 Solid Waste Management Plan (NHDES, 2022b).

8.1.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

NHDES used EPA's Waste Reduction Model (WARM) to estimate GHG emissions reductions based on a case evaluation of reductions to food waste, concrete, and asphalt concrete disposed at New Hampshire's landfills (U.S. EPA, 2024d). NHDES used those three waste types because the state's statutory disposal reduction goal is tracked by weight of MSW and C&D. According to EPA national disposal data, food waste makes up a significant portion of MSW by weight, as does concrete and asphalt concrete for C&D. WARM provides high-level comparative estimates of the potential GHG emissions, energy savings, and economic impacts of materials managed in baseline and alternative materials management practices, including source reduction, recycling, composting, anaerobic digestion, combustion, and landfilling.

For the evaluated case, NHDES estimated GHG emissions reductions that would result from using certain alternative management scenarios to reduce the amount of food waste, asphalt concrete, and concrete landfilled in New Hampshire. Using the WARM tool, NHDES could model numerous variations of this type of evaluated case, which could be applied to many other types of waste that are landfilled within New Hampshire.

NHDES estimated the current amount of food waste landfilled and incinerated in New Hampshire using the total short tons of reported MSW disposed in 2022 from in-state sources.²³ Based on EPA estimates, NHDES assumed that 24% of the reported in-state MSW was food waste (U.S. EPA, 2023h). To align with the targets specified under RSA 149-M:2, NHDES assumed that New Hampshire residents could reduce food waste by 3.6% per year, compost 10% of food waste per year and use anaerobic digesters to break down an additional 10% of food waste per year.

²³Based on reports submitted to NHDES, a total of 1,128,570 short tons of MSW were disposed in New Hampshire facilities in 2022. Of that total, 546,409 short tons of MSW was generated from New Hampshire sources.

NHDES estimated the current amount of concrete and asphalt concrete disposed at New Hampshire's landfills using the total short tons of reported C&D in 2022 from in-state sources.²⁴ Based on EPA estimates of the general composition of landfilled C&D, NHDES assumed that approximately 50% and 3% of in-state generated C&D is concrete and asphalt concrete, respectively (U.S. EPA, 2020). Then NHDES assumed that New Hampshire could reduce asphalt concrete waste by 5% per year and recycle asphalt concrete and concrete 5% and 10% per year, respectively.

Table 8-1 contains a summary of estimated average annual GHG emissions reductions from using alternative management scenarios, under the previously mentioned scenarios, to reduce landfilled food waste, asphalt concrete, and concrete.

Table 8-1. Total Annual GHG Reductions by Using Alternative Management Scenarios to Reduce the Amount of Food Waste, Asphalt Concrete, and Concrete Landfilled in New Hampshire.

	Food Waste	Asphalt Concrete	Concrete
Total Annual Emission Reductions (MTCO₂e)	40,251	102	361

If New Hampshire could reduce disposal of food, asphalt concrete, and concrete waste each year based on the evaluated case, then New Hampshire's cumulative GHG emissions reductions from 2025 to 2030 and 2050 would be approximately 244,288 MTCO₂e and 1,058,581 MTCO₂e (i.e., total of food waste, asphalt concrete, and concrete scenarios), respectively, as shown in Table 8-2.

Table 8-2. Cumulative GHG and Co-Pollutant Emissions Reductions from 2025 to 2030 and 2050 by Using Alternative Management Scenarios to Reduce the Amount of Food Waste, Asphalt Concrete, and Concrete Landfilled in New Hampshire.

	Food Waste	Asphalt Concrete	Concrete
Cumulative Emission Reductions Between 2025 – 2030 (MTCO₂e)	241,506	614	2,168
Cumulative Emission Reductions Between 2025 – 2050 (MTCO₂e)	1,046,528	2,659	9,394

8.1.3 Metrics for Tracking Progress

Implementing agencies or entities could track the following metrics to evaluate the measure, and report the results on a semi-annual and annual basis:

- Reported tons of waste collected and diverted or reused.
- Identified opportunities and outlets for diversion.
- Metric tons of GHG emissions reduced.
- Number of participating New Hampshire communities, specifically low-income disadvantaged communities.
- Types of equipment purchased and specs about the equipment capacity to manage wastes.

²⁴ Based on reports submitted to NHDES, a total of 266,333 short tons of C&D were landfilled in New Hampshire in 2022. Of that total, 259,205 short tons of C&D was generated from New Hampshire sources.

- Number of infrastructure improvements that are installed.
- Types of technical assistance provided.
- Number of education & outreach materials created and distributed.
- Biennial Solid Waste Reports published by NHDES.

8.1.4 Intersection with Other Funding Availability

The following programs could be used to fund implementation of the measure beyond funding from the CPRG Program.

- New Hampshire Solid Waste Management Fund (SWMF) - The approved state operating budget for state fiscal year 2024-2025 allocated \$1 million to the SWMF. Under RSA 149-R:4, part of the fund must be used to provide matching grant funding to New Hampshire municipalities, private entities, and businesses for projects that will provide a demonstrated, significant improvement in waste diversion methods and contribute to a reduction of wastes. As a requirement of the legislation, half of the allocation must be used to target food waste reduction and diversion. A portion of the allocation must also be used to hire a new, full-time NHDES staff person to create and implement the grant program.
- EPA Solid Waste Infrastructure for Recycling (SWIFR) Grant - All U.S. states opted in for EPA's non-competitive SWIFR grant. NHDES received \$572,065. NHDES's award will be used to conduct the state's first waste characterization study, a food waste generator study, and develop outreach and education materials related to sustainable materials management. Data generated by the two studies will be used by NHDES to inform regulatory decision-making, implementation of the 2022 Solid Waste Management Plan, program impacts, and more focused technical assistance. Having detailed information about the composition of New Hampshire's waste stream will also allow NHDES to better estimate GHG reductions using the WARM tool.

Chapter 9: Workforce Development to Support Priority Measures

NHDES and NHDOE recognize the critical need for a skilled workforce to respond to New Hampshire's evolving energy economy (NHDOE, 2022). Therefore, NHDES included workforce development as an enabling measure to support all other priority measures. As the demand for affordable and clean energy solutions continues to escalate alongside advancements in technology, there exists a pressing need to cultivate a proficient workforce equipped with the knowledge, skills, and adaptability to meet the challenges and opportunities of this dynamic industry. There is a need for a set of projects and programs to bridge the gap between traditional education and the specialized competencies required in the energy sector, thereby fostering a pipeline of talented professionals poised to contribute to the sustainable development and efficient operation of energy systems locally and globally. Through strategic collaboration and targeted program design, a New Hampshire energy workforce initiative would seek to empower individuals with the expertise to thrive in diverse roles within the energy workforce, ultimately bolstering economic growth, fostering innovation, and advancing environmental sustainability.

Throughout NHDES' community engagement efforts for the PCAP and CCAP, numerous stakeholders expressed concern about New Hampshire businesses having a difficult time hiring skilled workers. This concern is backed at the state and federal level with data. According to a 2023 U.S. DOE report, 48% of New Hampshire employers reported overall hiring difficulty (U.S. DOE, 2023d). In particular, the report shows that businesses that are involved with energy technologies in the United States find it very difficult to find qualified workers. It also noted that surveyed companies anticipated a 6.4% expected job growth in energy efficiency in 2022-2023.

Another concern of New Hampshire's workforce is the shortage of workers in the trade industries, such as construction, plumbing and electrical work. This is due to several factors, such as an aging population, a low unemployment rate, low housing availability, and a lack of interest among young people in pursuing these careers. The U.S. Chamber of Commerce reports that New Hampshire has the "Most Severe" rating, 28 available workers for every 100 open jobs. The report also cites that the state's unemployment rate is 1.8% (U.S. Chamber of Commerce, 2024). The New Hampshire State Commission on Aging Annual Report 2022 cites that New Hampshire is ranked eighth highest in the country for proportion of the population aged 65 and over (Maine is ranked first and Vermont, fourth). The report also notes that New Hampshire is ranked second for its high median age, with Maine ranked first and Vermont ranked third. Finally, there is a severe lack of housing in the state with New Hampshire have the lowest rate of rental occupancy in the Northeast (New Hampshire Housing, 2023b).

The New Hampshire Employment Security's (NHES) Economic Analysis Report – 2023 referenced the following from a prior NHDES report: "Despite the fact that the number of residents not in the labor force grew from about 307,500 in 2007 to 354,500 in 2017, close to all of the increase in the number of residents not in the labor force was attributed to residents in the older age cohorts" (those in the age cohorts 55 and over) (NHES, 2023; NHES, 2018).

The analysis compares data from 2022 with pre-pandemic 2019 data and found an increase in the number of persons aged 55 and over. Between 2019 and 2022, there were 52,650 more persons not in the labor force, and of those three quarters were in the age cohort 55 and over. Between 2019 and 2022, the number of persons not in the labor force due to retirement increased by about 43,250.

Younger workers, such as high school and college students, and persons of retirement age are far less likely to participate in the labor force than those of prime working age. When a state has an aging population, as New Hampshire does, and the share of the population that is at or beyond retirement age is growing more rapidly than younger age cohorts, the retired as a share of the entire population increases, resulting in a lower overall participation rate.²⁵

9.1 Funding Opportunities and Incentives to Attract Students to Skilled Trades to Support Priority Measures

9.1.1 Measure Concept

Funding would help prepare individuals for high-quality, career pathways that enable economic mobility, rather than short-term, low-wage jobs. This funding could provide incentives to reduce barriers to stimulate high-quality workforce development activities tied to New Hampshire's other proposed measures that would benefit individuals in low-income and disadvantaged communities.

The Community College System of New Hampshire (CCSNH) has numerous associate degrees and certificate programs as well as the State Apprenticeship Expansion Formula (SAEF) that pertain to our priority measures. ApprenticeshipNH is a CCSNH workforce training program that aims to promote high-quality registered apprenticeship and pre-apprenticeship programs in various leading industries throughout the state.²⁶ The program is funded by U.S. Department of Labor Employment and Training Administration grants and offers technical assistance to employers in creating such programs. Additionally, ApprenticeshipNH provides financial support to apprentices and pre-apprentices, as well as pre-apprenticeship opportunities with employers and high schools. The program already financially supports students with transportation issues and required program supplies. The program has been instrumental in enhancing workforce training opportunities in the state, as evidenced by its successful track record over the past four years²⁷.

Effective registered apprenticeships require strong supplemental instruction. CCSNH, with its seven colleges and extensive experience in collaborating with industry partners to design training programs, is well-positioned to meet the current and future employee training requirements across New Hampshire. Whether it is credit and certificate programs or tailor-made training, CCSNH can assist employers in creating a highly skilled workforce while also providing apprentices with opportunities to advance their careers.

In addition, The Center for Impact Finance at the University of New Hampshire's Carsey School of Public Policy offers free online training for non-profit organizations, cooperatives, and mission-driven organizations interested in building out a business line to develop community solar projects. There are

²⁵ Current Population Survey data indicate that persons aged 55 and over represented 40.3% of New Hampshire's civilian noninstitutionalized population in 2019 and 43.6% in 2022 (NHES, 2023).

²⁶ The total funding of the ApprenticeshipNH initiative is \$12.07M with 99% funded through the following U.S. Department of Labor-Employment and Training Administration grants in the amounts indicated: State Apprenticeship Expansion 2020 (SAE2020) \$3.4M, State Apprenticeship Expansion Formulas (SAEF) \$2.82M, and Apprenticeship Building America (ABA) \$5.8M. Additional Support of less than 1% is provided by third party scholarship grants (ApprenticeshipNH, 2024).

²⁷ Quoted from Anne Banks, Apprenticeship Programs Manager, ApprenticeshipNH, CCSNH

two virtual courses: Introduction to Community Solar (self-paced) and The Community Power Accelerator Learning Lab (instructor led).²⁸

Through the Investing in America agenda (September 20, 2023), the American Climate Corps was launched to train young people in clean energy, conservation, and climate resilience skills, create good paying jobs and tackle the climate crisis. This agenda will be protecting more than 21 million acres of public lands and water, and advancing the Justice40 Initiative, which directs 40 percent of the benefits from key federal investments to disadvantaged communities (U.S. White House, 2024).

The American Climate Corps will:

- Train young people in clean energy, conservation, and climate resilience related skills.
- Coordinate Recruitment Across Federal Programs.
- Expand AmeriCorps Segal Education Awards Access.
- Streamline Pathways into Civil Service.
- Leverage Tribal, State and Local Governments.

The Investing in America agenda will also continue:

- Investing in Pre-Apprenticeships and Registered Apprenticeships through the Department of Labor.
- Investing in Pre-Apprenticeship Programs through U.S. DOE.
- Expanding National Service Opportunities to Advance our Wildfire Crisis Strategy.
- Expanding the Indian Youth Service Corps.

9.1.2 Estimates of Quantifiable GHG and Co-Pollutant Emissions Reductions

Workforce programs focused on energy represent a crucial investment in the infrastructure necessary for sustainable energy practices and measures that would reduce GHG emissions. While these programs may not directly produce immediate energy savings or emissions reductions, their impact lies in equipping individuals with the knowledge, skills, and resources needed to implement energy-efficient measures effectively. By fostering a skilled workforce adept at identifying inefficiencies, implementing best practices, and utilizing cutting-edge technologies, these programs enable businesses, organizations, and communities to realize substantial energy and cost savings over time. Moreover, a well-trained workforce can drive innovation, streamline processes, and optimize energy systems, resulting in long-term benefits, including implementing measures that would reduce GHG emissions. While the direct impact of workforce programs on energy savings and GHG emissions reductions may not be immediately apparent, their pivotal role in facilitating and maximizing energy efficiency efforts cannot be overstated.

²⁸ The Learning Lab is part of the National Community Solar Partnership, a national effort funded by the U.S. Department of Energy to capture the community benefits of community solar.

Chapter 10: Authority to Implement Priority Measures

This PCAP is non-regulatory in nature and the measures contained herein constitute a list of voluntary actions available for implementation if EPA awards CPRG funding to eligible entities in New Hampshire. No new regulatory authority is provided by EPA through this program. NHDES has reviewed New Hampshire's existing statutory and regulatory authority to implement each priority measure contained in this PCAP and has determined that following statutes provide New Hampshire the authority to implement each measure.

- Under New Hampshire Revised Statutes Annotated (RSA) 21-O:3 *Duties of Commissioner*, para. III, NHDES has existing authority to receive, administer, and internally audit all present and future federal and state air pollution control grant programs. This is sufficient authority for NHDES's to use CPRG funding to implement each priority measure.
- Under RSA 124:1 *Authority for Seeking Aid*, the Governor, with the approval of the Governor and Executive Council (G&C), is authorized to apply for financial or any other aid which the United States government has authorized or may authorize to be given to the several states for emergency industrial or unemployment relief, for public works and highway construction, for the creation of employment agencies, or for any other purpose intended to relieve distress. Any officer of the state who may be designated in any act passed by the Congress of the United States, or in any regulation or requirement of any agency of the United States, is authorized in the name of the state to make all applications and sign all documents which may be necessary to obtain such aid, provided that such applications have the approval of the G&C. The state treasurer is directed to receive all money so granted by the United States, or by any agency thereof, to the state and to hold all such funds separate from all other funds of the state. Such funds shall be disbursed by the treasurer upon warrants drawn by the Governor for the purposes for which such relief or aid is granted.
- Under RSA 14:30-a *Fiscal Committee*, para. VI, any non-state funds in excess of \$100,000, whether public or private, including refunds of expenditures, federal aid, local funds, gifts, bequests, grants, and funds from any other non-state source, which under state law require the approval of G&C for acceptance and expenditure, may be accepted and expended by the proper persons or agencies in the state government only with the prior approval of the fiscal committee of the General Court.

If NHDES or other New Hampshire state agency seeks to enter into an MOA with a coalition of other states or eligible entities for implementation of a potential CPRG funding award, the agency would consult with the New Hampshire Department of Justice and obtain approval of the MOA from G&C in accordance with of the New Hampshire Department of Administrative Services' Manual of Procedures (MOP) 161- *Memoranda of Understanding*.

Chapter 11: Low-Income and Disadvantaged Community Analysis

In this chapter, NHDES identifies LIDACs in New Hampshire and describes the impacts of the following priority measures on LIDACs:

- Transportation Sector Measures.
 - Deploy Electric Charging Infrastructure for Electric Vehicles.
 - Provide Incentives for Consumer Purchase of Electric and Plug-In Hybrid Electric Passenger Vehicles.
 - Support and Expand Public Transportation Options.
- Residential Building Sector Measures.
 - Heat Pumps to Improve Energy Efficiency of Space and Water Heating in Buildings.
 - Weatherization to Improve Energy Efficiency of Residential Buildings.
 - Pre-Weatherization to Improve Energy Efficiency of Residential Buildings.
- Municipal Building and Facility Measures.
 - Resilient Local Energy Systems.
 - Improving Energy Efficiency at Wastewater and Drinking Water Systems.
- Waste and Materials Management Measure.
 - Expand Programs for Waste Reduction, Diversion and Recycling.
- Workforce Development Measure.

Based on an analysis by NREL, NHDES determined that the residential building sector measures could provide New Hampshire with the highest potential statewide annual consumer savings (approximately \$436 million total) and an estimated \$2,000 in potential average annual savings per household (see Figure 6-4) (NREL, 2017). Those measures also have the highest potential to reduce emissions of GHGs and associated co-pollutants.

11.1 Identification of LIDACs

NHDES identified LIDACs in New Hampshire using two criteria, as strongly recommended by EPA: EPA's Supplemental Index in EJScreen and the White House Council on Environmental Quality's Climate and Economic Justice Screening Tool (CEJST) (U.S. EPA, 2023c; U.S. EPA, 2023d). For this analysis, any census block group that qualified as LIDAC based on either the EPA's Supplemental Index or CEJST was considered disadvantaged and identified as LIDAC.

EPA's Supplemental Index includes thirteen environmental indexes, each of which combines environmental and demographic criteria to evaluate vulnerability at the census block group level. The thirteen indexes are:

1. Particulate Matter 2.5 (PM_{2.5}).
2. Ozone.
3. Diesel Particulate Matter.
4. Air Toxics Cancer Risk.
5. Air Toxics Respiratory Hazard Index.
6. Toxic Releases to Air.
7. Traffic Proximity.
8. Lead Paint.
9. Risk Management Program Facility Proximity.
10. Hazardous Waste Proximity.
11. Superfund Proximity.
12. Underground Storage Tanks.
13. Wastewater Discharge.

To develop the index for each environmental indicator, EPA first calculates each census block group's national and state percentile for that environmental indicator. EPA then calculates a demographic index by taking the average of five demographic indicators (percent low-income, unemployment rate, percent with limited English proficiency, percent with less than a high school diploma, and life expectancy). EPA multiplies each environmental percentile by the demographic indicator to calculate the supplemental index. As recommended by EPA, any block group with an index of 90% or higher in any of the 13 indexes is considered LIDAC.

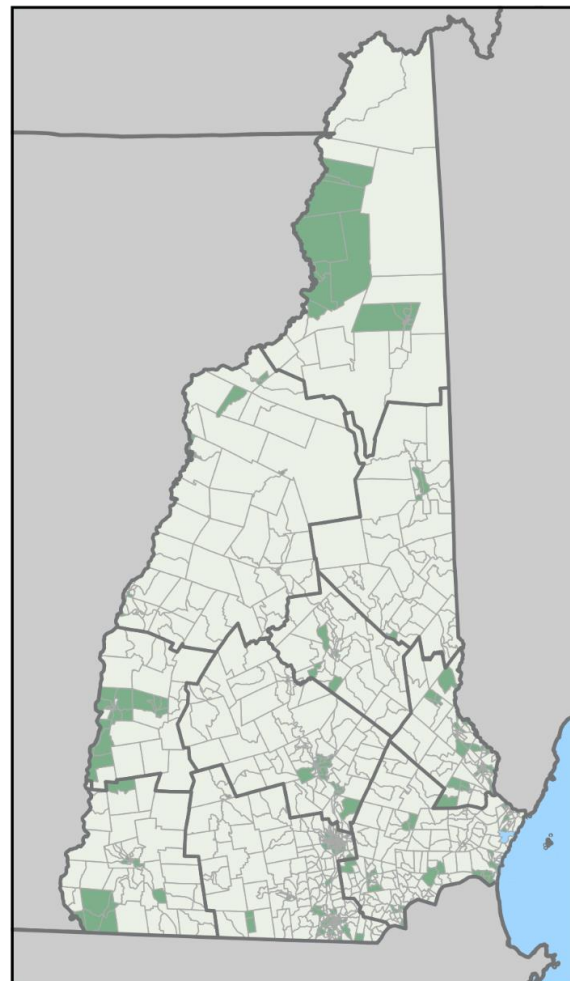
The White House's CEJST is a geospatial mapping tool that identifies census tracts as disadvantaged based on environmental and demographic indicators (U.S. CEQ, 2024). A census tract is considered disadvantaged if it meets one of the tool's burden categories and meets the associated demographic threshold for that burden category. For example, the CEJST's energy burden category will be triggered if a census tract is at or above the 90th percentile for energy cost or if PM_{2.5} in the air and is at or above the 65th percentile for low-income. By triggering one or more burden categories, a census tract is considered disadvantaged. The burden categories in CEJST include climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. All federally recognized tribes are also considered disadvantaged in CEJST. Because CEJST identifies disadvantaged census tracts, not census blocks, New Hampshire assumed all block groups within each disadvantaged census tract were disadvantaged.

Census block groups in New Hampshire that triggered CEJST's disadvantaged indicator or the Supplemental Index's LIDAC indicator were considered LIDAC for this analysis. Table 11-1 lists the number and percent of LIDAC census block groups in each county in New Hampshire. A map of LIDAC census block groups is presented in Figure 11-1 Figure 11-2 presents LIDAC census groups in the Concord, Manchester, Nashua, and Portsmouth area.

Table 11-1. Number of LIDAC Census Block Groups per County.

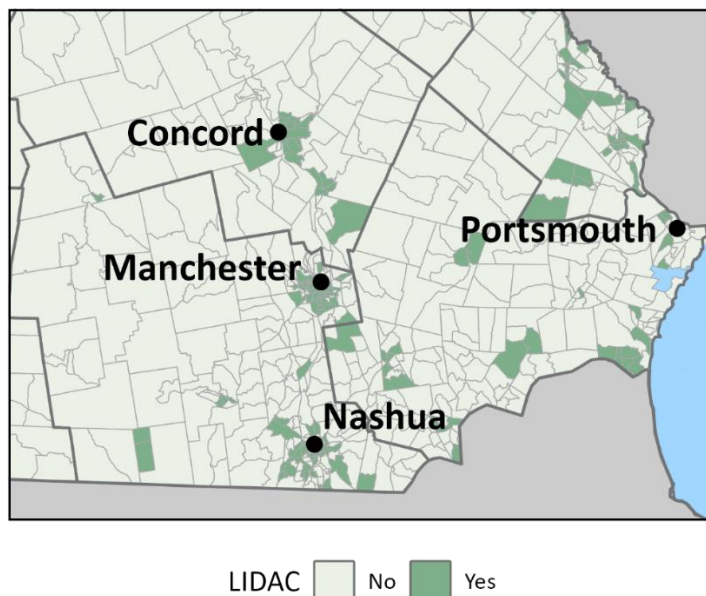
County	Population	Number of LIDAC Census Block Groups	Percent of LIDAC Block Groups
Belknap	63,395	8	15%
Carroll	49,961	4	8%
Cheshire	76,473	14	24%
Coos	31,360	20	56%
Grafton	91,025	7	9%
Hillsborough	420,504	115	40%
Merrimack	152,983	19	18%
Rockingham	312,771	30	15%
Strafford	130,598	32	38%
Sullivan	43,105	19	48%
NH State Total	1,372,175	268	27%

Figure 11-1. Locations of LIDACs in New Hampshire



LIDAC No Yes

Figure 11-2. Locations of LIDACs in the Concord, Manchester, Nashua, and Portsmouth Area.



11.2 Transportation Sector Measures

11.2.1 Deploy Electric Charging Infrastructure for Electric Vehicles

NHDES proposes to expand electric vehicle (EV) charging infrastructure throughout the state to support the continued adoption of EVs. This measure could address gaps in the state's EV infrastructure by directing support to areas that ongoing state and federal infrastructure development programs do not target. In particular, this measure could support the development of infrastructure in public areas near multi-unit residential buildings, public buildings, and shopping centers. EV ownership has been steadily increasing in New Hampshire, underscoring the need to expand EV charging infrastructure to support this growth (U.S. DOE, 2024c).

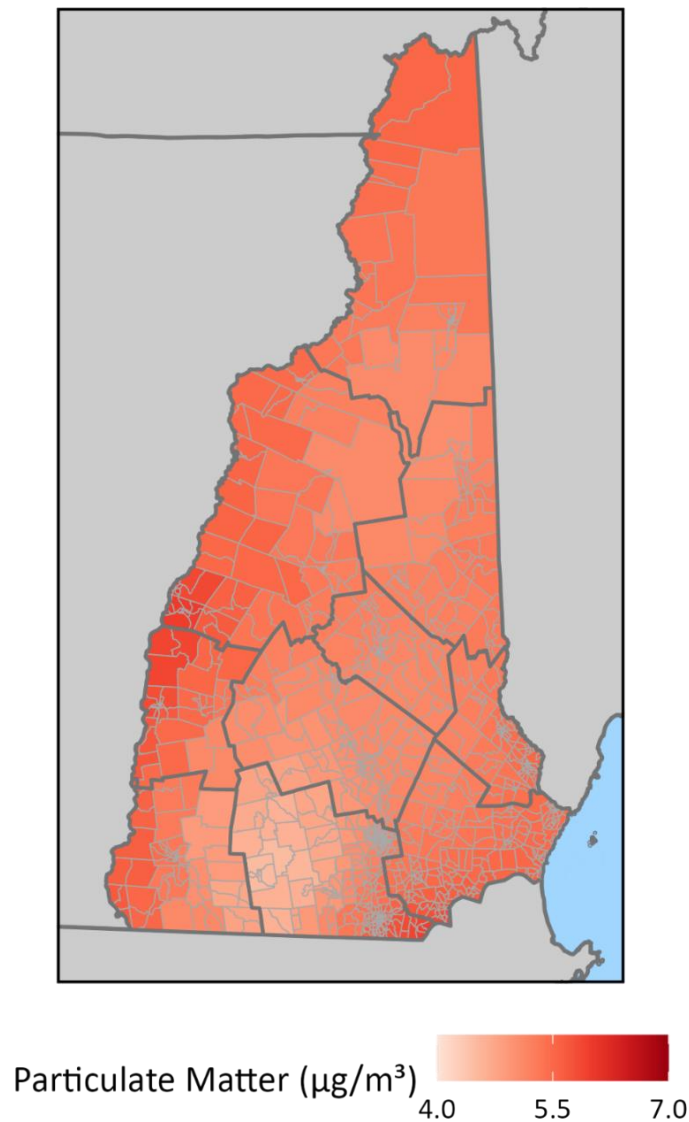
In this PCAP, NHDES includes a measure that would install public stations in parking lots, at retail and leisure locations, and at other publicly accessible locations, such as near multi-unit dwellings. The measure would install Level 2 EV chargers, which cost less to purchase and install than direct current fast charging chargers. This measure could benefit LIDACs by improving charging accessibility, one of the main barriers to EV ownership. Installing at-home charging infrastructure is expensive, and renters typically cannot install charging infrastructure. Without at-home charging infrastructure, EV owners depend on public charging stations, which are often inaccessible due to distance.

By installing accessible and affordable charging stations in LIDACs, this measure aims to increase the feasibility of EV vehicle ownership in LIDACs and thus increase the number of EVs in LIDACs. This allows LIDACs to access the financial, health, and environmental benefits of EV ownership. These benefits are often out of reach for LIDACs due to barriers that limit EV ownership.

EVs have lower fuel and maintenance costs than conventional vehicles. Additionally, as vehicles electrify in a community, tailpipe emissions of criteria pollutants like particulate matter (PM_{2.5}), nitrogen oxides (NO_x), and volatile organic compounds (VOCs) will decrease. For example, there is potential to reduce

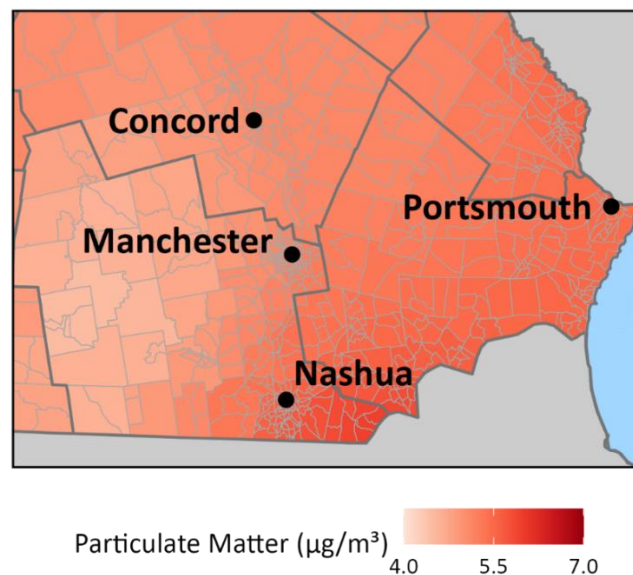
concentrations of PM_{2.5} from recent levels in New Hampshire, as shown Figure 11-3 and Figure 11-4 and presented as an annual average (2019) in micrograms per cubic meter (µg/m³) based on data from CEJST.²⁹ The measure could improve local health by reducing incidences of pollution-related health impacts such as respiratory and cardiovascular illnesses in LIDACs.

Figure 11-3. PM_{2.5} Concentrations in New Hampshire.



²⁹ Light gray denotes missing data in the figures.

Figure 11-4. PM 2.5 Concentration Near Concord, Manchester, Nashua and Portsmouth.



In addition to the financial, health, and environmental benefits from EV adoption in communities with accessible charging infrastructure, there are potential economic benefits associated with installing chargers. EV owners tend to “top up” their vehicle charge rather than let the battery discharge to near “empty”. Having Level 2 chargers available at locations residents regularly visit such as malls, grocery stores, or local parks provide residents unable to install a home charger the opportunity to successfully utilize an EV. This increases foot traffic and consumer spending in the community, thereby supporting economic development and enhancing the vitality of local businesses. The success of this strategy can be measured by examining total energy use from new chargers. Total energy use can be used to determine aggregate cost savings and reductions in criteria pollutants.

11.2.2 Provide Incentives for Consumer Purchase of Electric and Plug-In Hybrid Electric Vehicles

In this PCAP, NHDES includes a measure that would support EV incentive programs, specifically consumer rebates for EVs. Rebates could be tiered with income level, meaning lower-income residents could receive larger rebates. To maximize emission reductions from this measure, the measure could also prioritize high mileage drivers and drivers with older, fuel-inefficient vehicles. This measure could also be directed towards municipal and private fleets to help lessen EV upfront costs and towards car dealership EV education programs.

This strategy aims to increase adoption of EVs in New Hampshire by lessening the financial burden associated with EV purchases. While EV operational costs are less than those of conventional vehicles, the high upfront cost of an EV is one of the major barriers to EV adoption (ICF, 2022). By offering EV rebates, this measure can make the price to purchase an EV more competitive with a conventional vehicle.

EV rebates can make the vehicles more affordable and increase the adoption rate of EVs in LIDACs. This has benefits for air quality and public health in LIDACs. As vehicles electrify, tailpipe emissions will decrease, and LIDACs will likely see lower rates of respiratory and cardiovascular health impacts that are caused by criteria pollutants. Lessening the cost burden of EV purchases also allows low-income

residents, who are typically unable to purchase EVs due to their higher upfront cost, to save on fuel and maintenance costs throughout vehicle ownership. By reducing the barrier to EV ownership, this measure offers health, environmental, and financial benefits in LIDACs. The impact of EV rebates can be measured through EV ownership rates in the state, as well as EV ownership rates by income.

11.2.3 Support and Expand Public Transportation Options

In this PCAP, NHDES proposes a measure to support decarbonization and accessibility of current transit systems. This measure could subsidize the purchase of electric or low-emission transit vehicles and charging infrastructure for transit systems, help fund station upgrades, and help fund potential new transit stops. This measure could also be used to increase accessibility of micro-mobility devices, autonomous EVs, or other forms of transportation to help get residents to and from transit stops. The measure could also improve the connection between various modes of transportation. This measure aims to better meet the needs of transit users by broadening the current accessibility of existing transit systems and supporting the transition to zero- or low-emission transit systems in New Hampshire.

This measure would benefit LIDACs by expanding access to public transportation, reducing transportation costs, and improving air quality and public health. Improving connections to transit stops will enable more residents to utilize public transportation options that were previously inaccessible due to distance. Adding additional stops will also expand the current reach of public transit systems. Public transportation is a cheaper mode of transit than driving a personal vehicle, so improving access to transit will help decrease transportation costs across New Hampshire households. According to a study conducted by the American Public Transportation Association, residents who use public transit instead of driving a personal vehicle can save over \$13,000 a year (American Public Transportation Association, 2023). As the second highest cost for United States households, expanding access to cost-effective transit options helps lower the overall cost of transportation.

The development of transit systems can lead to another benefit known as the land-use efficiency effect. This effect refers to changes in land use from transit investments. Investments in transit spur the growth of shops, workplaces, and other important establishments around transit stops, leading to more compact development and greater land-use efficiency (McGraw, Haas, Ewing, & Sabouri, 2021). Communities that are land-efficient are easier to navigate on foot or bicycle, leading to indirect benefits on GHG and criteria pollutant emissions (American Public Transportation Association, 2018). Based on the land-use efficiency effect, transit developments in LIDACs will benefit residents by promoting compact development, where essential businesses are grouped and are easily accessible to residents. Residents in land-efficient areas also benefit by living in walkable and bikeable communities. As more residents walk or bike, fewer cars will be on the road. This shift reduces pollution from vehicles in communities, leading to cleaner air and improved health for residents.

As more residents opt for public transit instead of driving, this measure could also lower the number of cars on the road, providing additional environmental and health benefits from a reduction in tailpipe emissions. Electrifying public transit can reduce criteria pollutants from diesel- or gasoline-fueled buses. This would benefit LIDACs in dense, highly trafficked areas near public transit routes by reducing emissions from transit buses. The state's traffic proximity and volume are illustrated in Figure 11-5 and Figure 11-6, which are shown in units of number of vehicles at major roads within 500 meters by distance in meters (the data is from 2019 CEJST).²⁹

Figure 11-5. Traffic Proximity and Volume in New Hampshire.

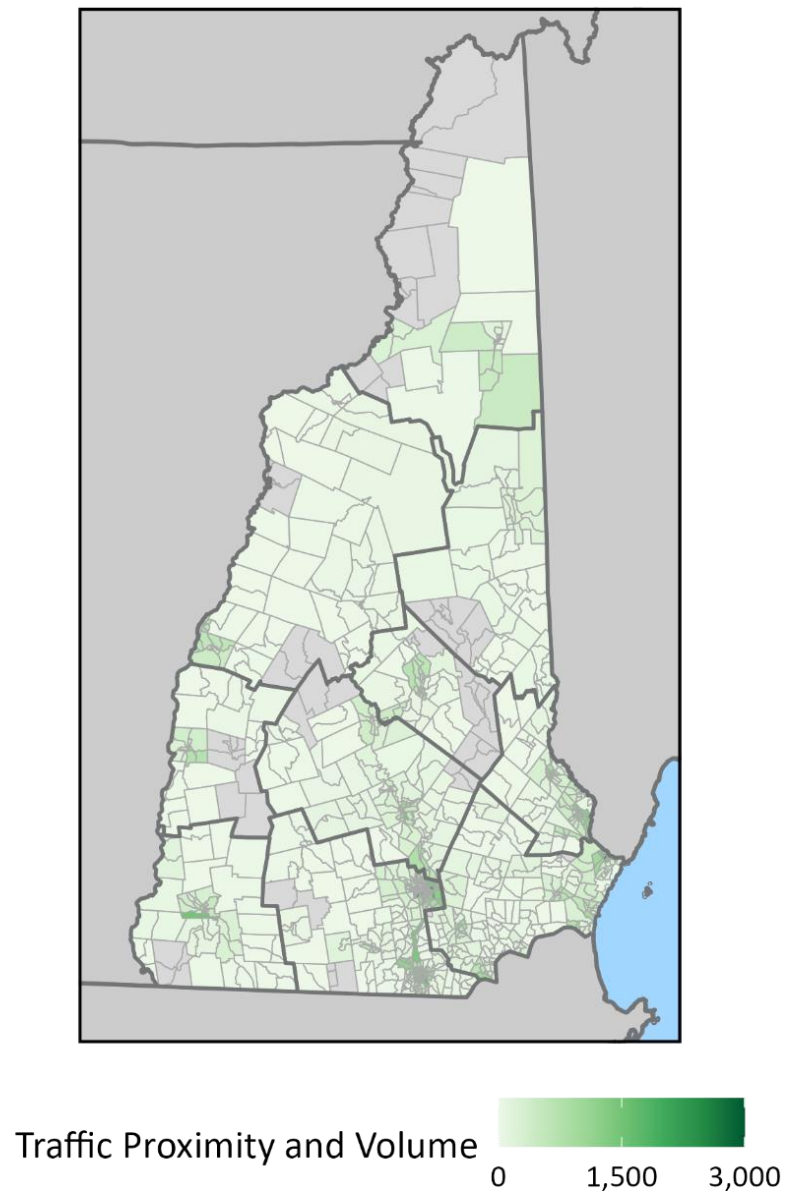
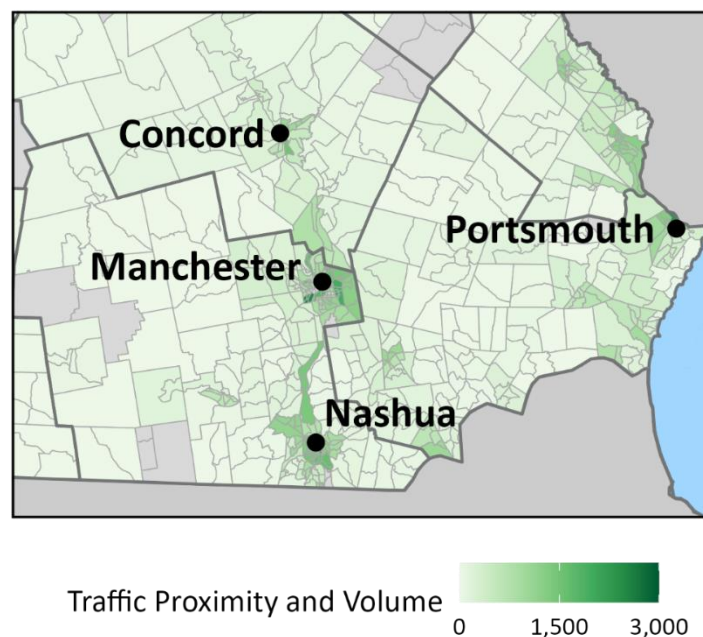


Figure 11-6. Traffic Proximity and Volume Near Concord, Manchester, Nashua and Portsmouth.



11.3 Residential Building Sector Measures

11.3.1 Heat Pumps to Improve Energy Efficiency of Space and Water Heating in Buildings

Heat pumps are efficient electric appliances that generate both heating and cooling for spaces and water heating. Residential building heat pumps can be utilized in all climates, including New Hampshire. Nearly all homes in New Hampshire use central heating systems, with furnaces and boilers being the primary heating technologies and conventional systems for cooling, with approximately 2% of homes utilizing heat pumps (Itron, 2020). The heating systems are fueled by oil in 40% to 42% of New Hampshire resident's homes (U.S. Census Bureau, 2022; NHDOE, 2024a). Heat pumps offer an energy-efficient alternative to furnaces and can reduce net GHG emissions by eliminating the direct burning of fossil fuels in homes. Compared to the use of a gas furnace to heat a home, heat pumps reduce carbon dioxide emissions by up to 53% (Pistochini et al., 2022). Heat pumps also offer an energy-efficient alternative to window air conditioner units.

The cost savings from reductions in energy usage are especially beneficial to LIDACs burdened with energy costs that are a higher percentage of their income (U.S. DOE, 2019). Heat pumps reduce criteria and precursor pollutants and have filtration features that improve indoor air quality. These improvements can translate to health benefits, which are especially important for LIDACs that typically have higher rates of asthma and other respiratory illnesses. The heating and cooling features of heat pumps can provide increased comfort during the cold and warm seasons in New Hampshire and could potentially be lifesaving during extreme weather events.

This measure can create jobs through the process of designing, producing, installing, and maintaining energy-efficient heat pumps, support the supply chain, and encourage consumer demand through incentives, financial support, and technical assistance. The success of this strategy can be measured by the number of units deployed and the duration of a heat pump's useful life.

11.3.2 Weatherization to Improve Energy Efficiency of Residential Buildings

Weatherization reduces GHG emissions and energy costs, including annual heating and electric costs, by increasing energy efficiency in existing buildings. Measures include upgrades to the building envelope and heating, cooling, and electrical systems, which provide cost-effective energy savings, health and safety benefits, and enhanced comfort.

The weatherization process involves the identification of health and safety concerns, such as indoor air quality, combustion safety, and mold infestations. The elimination of these hazards can translate to fewer out-of-pocket health costs, which is particularly beneficial in LIDACs (U.S. DOE, 2019). Weatherization is especially effective in colder climates, such as New Hampshire, because the annual per capita energy consumption, and thus the potential for energy savings, is higher relative to mild climates (Certaineed, 2024). In addition to enhancing comfort for residents, when implemented at scale, these energy efficiencies reduce peak electricity demands.

Weatherization makes other energy efficiency measures, such as heat pumps, more effective due to building improvements, such as insulation. Existing homes with closed ceilings and walls can have energy inefficiencies due to a lack of insulation. Instead of removing entire walls to install insulation, residents can implement drill-and-fill wall cavity insulation to increase heat retention (TruTeam, 2024). Based on an analysis by NREL, this weatherization could provide New Hampshire with the highest potential statewide annual consumer savings (approximately \$436 million total) and an estimated \$2,000 in potential average annual savings per household (NREL, 2017). Improvements in insulation and other weatherization measures can reduce utility costs and improve the efficiency of heating and/or air conditioning. Additionally, the local economy benefits from weatherization inspections, installations, and maintenance. Examples of metrics to track progress of this strategy include the number of homes weatherized in New Hampshire, the estimated GHG and co-pollutant emission reductions, and the quantified benefits in LIDACs.

11.3.3 Pre-Weatherization to Improve Energy Efficiency of Residential Buildings

Pre-weatherization provides incentives and technical assistance to owners of homes and multi-residential buildings to address severe conditions that would otherwise render weatherization measures unsafe or ineffective and cause a home to be deferred from existing programs, such as the NHDOE's Weatherization Assistance Program (WAP) (NASCS, 2019). Incentives to improve weatherization, efficiency, and electrification include support conducting structural repairs and home health remediation. This involves mold remediation, roof repair, pest control, and improvements to concerns involving moisture, standing water, electrical and wiring concerns, environmental contaminants, and structural issues. For example, a building with sewage or other sanitary problems could endanger the residents and weatherization installers, therefore the pre-weatherization measure enables access to weatherization by first addressing health and safety concerns.

The pre-weatherization measure is relevant to the state because over 30,000 of New Hampshire's 557,220 total households may have inadequate plumbing, heating, or electric utilities based on applying estimates from the 2021 AHS for Massachusetts to New Hampshire (U.S. Census Bureau, 2021). LIDACs are more heavily burdened by those deficiencies and energy costs, including heating and electric costs. Therefore, a more energy-efficient building can help to alleviate some of this cost burden.

Improvements to buildings with faulty mechanical systems, including electric and plumbing, sewage and sanitation problems, severe moisture concerns, and combustion appliances with dangerous levels of carbon monoxide provide health and safety benefits to residents. These associated reductions for out-of-pocket health costs are also particularly beneficial to LIDAC members. According to the National Association for State Community Services Program, the participants in a “Pre-WAP” program in Indiana reported health outcomes including a 25% reported improvement in asthma and allergy symptoms and 20% reported improvement in anxiety and depression symptoms (NASCS, 2019). Examples of metrics to track progress include the number of homes pre-weatherized in New Hampshire and the life of the pre-weatherized houses/units.

11.4 Local Government Building and Facility Measures

11.4.1 Resilient Local Energy Systems

NHDES includes a measure in the PCAP that could install solar PV panels, grid battery storage systems, and other zero-emission systems at New Hampshire’s municipal buildings. This measure would improve the energy-efficiency of local government buildings and improve resilience in case of a power outage.

This measure could benefit LIDACs by helping local governments reduce electricity costs and providing a location to shelter residents during emergency situations. For example, in the event of severe weather, government buildings equipped with solar, or another resilient power source can also provide shelter to residents in need of assistance. Cost savings could be reallocated towards other local government programs, such as education, public service, parks and recreation, or other community initiatives.

11.4.2 Improving Energy Efficiency at Wastewater and Drinking Water Systems

NHDES included a measure in the PCAP that would improve energy efficiency in New Hampshire’s wastewater and drinking water systems. Renewable energy measures, such as the installation of onsite solar PV technologies, are also included. NHDES’ WIEEP works to improve the energy efficiency of wastewater and drinking water systems. New Hampshire municipalities have various water infrastructure including WWTF, wastewater pumping stations, and drinking water systems. These sites undergo comprehensive, process-level energy audits geared toward identifying energy efficiency measures within each system. In addition to the energy efficiency measures, renewable energy measures such as solar arrays, in-line turbines and biogas improvements may also be recommended if site conditions warrant. Facility improvements identified during the energy audit process may include:

- Equipment upgrades.
- Operational modifications.
- Energy-efficiency modifications to facility buildings, such as HVAC equipment, and improvements to lighting and insulation.

Aeration is commonly the largest energy user in the treatment process of WWTFs. Pumps are typically the largest energy user of wastewater and drinking water systems. Wastewater operations are often the largest energy user for a community, thus energy-efficiency improvements of those operations would reduce municipal costs and emissions of GHGs and co-pollutants. Electricity alone constitutes a significant proportion of a WWTF’s annual operating budget and can result in up to 30% of a given

municipality's total energy bill (Office of State and Community Energy Programs, 2024). Since its inception in 2016, WIEEP has identified an average potential savings of approximately 28% and 24% annual kWh usage for wastewater (59 energy audits) and drinking water systems (40 energy audits), respectively.

When municipalities implement recommendations from energy audits, municipalities have seen significant reductions in their energy use. For example, the improvements implemented in 2020 and 2021 at the WWTF in Claremont, New Hampshire, have resulted in a 40% reduction in total energy use (Process Energy Services, LLC, 2022). Measures implemented in Plymouth and Peterborough have resulted in total energy use reductions of 45% and 43%, respectively. (NHDES and Process Energy Services, 2020).

The reduction in energy usage provides cost savings for municipalities. Those savings could be used to fund additional high priority projects that address aging infrastructure. A significant portion of the water infrastructure in LIDACs needs to be upgraded or replaced, so reducing the energy bills for these communities can provide an opportunity to address additional priorities without increasing the burden on the rate payers. Approximately half of the residents (54%) of New Hampshire get their drinking water from public water systems (NHDES, 2024a), and low-income consumers are estimated to spend more than 4% of their income on water bills, with 3% of households spending more than 10% of their income (New Hampshire Public Utilities Commission, 2021). Additionally, wastewater bills can also impact LIDACs as they range between 5% to 28% higher than water bills in New Hampshire (Environmental Finance Center, 2021).

Beyond the cost savings, these significant reductions in energy usage by water and wastewater facilities have environmental benefits through the reduction of fossil fuel combustion, which play a role in mitigating the impacts of GHG emissions. Extreme events pose significant risks to critical infrastructure, such as pump stations and WWTFs, which may flood from both surface water and excessive infiltration and inflow. When flooding occurs, the capacity to manage floodwaters can diminish and water quality may deteriorate, potentially resulting in health and safety concerns (NHDES, 2022a). In LIDAC areas, there may be fewer resiliency measures and resources ensuring community members are not exposed to these health and safety concerns.

11.5 Waste and Materials Management Measure

11.5.1 Expand Programs for Waste Reduction, Diversion and Recycling

In this PCACP, NHDES includes a measure to help reduce, divert, and recycle waste using incentive programs targeting education, outreach, and infrastructure improvements to reduce landfill waste and the associated emissions from landfills in New Hampshire. Landfills produce methane, a powerful GHG that is 84 times more effective at absorbing the sun's heat than carbon dioxide, meaning this is a significant contributor to climate change (University of Colorado Boulder, 2021). In addition to GHG emissions, landfills produce hazards such as odor, smoke, noise, bugs, waste vehicle traffic and potential water supply contamination (University of Colorado Boulder, 2021). Nationally, landfills and waste facilities are disproportionately located in LIDACs and expose these communities to adverse health and environmental impacts (Cape Cod Commission, 2023). In New Hampshire, the current landfill locations with the percentage of LIDAC block groups located within their respective counties include Success in

Coos County (56%), Rochester in Strafford County (38%), Bethlehem and Lebanon in Grafton County (9%), and Conway in Carroll County (8%). The diversion of waste from landfills could improve environmental quality and health outcomes for landfill-adjacent communities by reducing exposure to pollution and GHG emissions, risk of contamination, and associated health risks from emissions and water pollution. The reduction in health-related out-of-pocket expenses is especially important for LIDAC members, who bear a greater burden of the cost relative to income.

Certain mechanisms are in place to reduce waste disposal, such as residential pay-as-you-throw (PAYT) programs, a unit-based fee system that is metered, like electricity and water utilities that incentivizes residents to reduce their waste. These PAYT programs have been used in New Hampshire by communities including Shelburne, Littleton, and Concord (Northeast Resource Recovery Association, 2021). However, in the near term, PAYT programs may disproportionately impact LIDACS, because they could cost residents more than an annual sticker program (Cape Cod Commission, 2023). For this reason, incentives including vouchers for waste services and waste management facilities with accessible hours of operation are important steps towards increasing the benefits of waste diversion in all communities. Oftentimes, LIDACs have less access to recycling programs, underscoring the importance of outreach and education to help residents reduce waste being sent to landfills and increase recycling efforts at home. This may also include adapting educational materials to fit the language and cultural needs of a community. Furthermore, waste diversion through recycling, reuse, and composting has the potential to generate new local employment opportunities within the community.

11.6 Workforce Development of Skilled Trades Measures

New Hampshire is facing a workforce shortage in the trade industries, such as construction, plumbing, and electrical work. This is due to several factors, such as an aging population, a low unemployment rate, and a lack of interest among young people in pursuing these careers. As of May 2022, the share of residents aged 65 and over is 18% and is projected to increase. An additional 16% is aged 55-64 (State of New Hampshire Commission on Aging, 2022). This means that many workers in trade industries are retiring or nearing retirement, and there are not enough younger workers to replace them. The state's unemployment rate was 2.5% in December 2023, indicating a tight labor market with few available workers (Bureau of Labor Statistics, 2024). Furthermore, many young people are opting for college degrees over trade certificates, or leaving the state for other opportunities, resulting in a decline in the supply of workers entering the trades. New Hampshire has an apprenticeship program, which employs several thousand people each year, which combines classroom instruction related to job activities with practical learning experience on the job. From 2019 to 2022, the number of active apprenticeships decreased from 2,814 to 2,707. However, they increased in 2023 to 2,981 (NHES, 2023). The shortage of skilled workers has negative impacts on the state's economy, infrastructure, and housing market. To address this challenge, New Hampshire needs to invest in workforce development programs that can attract, train, and retain workers in the trades.

The residential building and transportation strategies outlined above would create an additional need for trade workers in New Hampshire. This alone will create incentives for young people to join the trades. However, these incentives alone may not create the additional jobs required to accomplish this work. This measure could increase the trade industry workforce by providing scholarships and awards to trade schools in the state. These are often two-year programs that provide all the training necessary to

become certified in a specific trade field. Additionally, the measure could cover the cost of trade program certificates to reduce the financial burden of the programs.

These programs will benefit LIDACs as they provide jobs that offer competitive pay and require a two-year associate degree. These jobs are necessary, especially as additional homes are needed in New Hampshire. According to New Hampshire Housing, over 20,000 additional houses are currently needed to stabilize the housing market, and 90,000 houses are needed by 2040 (New Hampshire Housing, 2023a). This program can be measured by the amount of funds allocated to trades school and certificate exams, the number of students that are awarded scholarships, or the number of workers that enter the New Hampshire workforce after being awarded a grant through this program.

Chapter 12: Coordination and Outreach

New Hampshire's current climate action plan is over a decade old. Scientists, contractors, utilities, climate action working groups, businesses, concerned community members, advocacy groups, and people committed to investments that benefit LIDACs and building New Hampshire's workforce are plentiful and active. NHDES undertook an initiative to gather information from these various resources.

The culture of New Hampshire is about keeping things local while addressing statewide challenges. Therefore, to bolster awareness and further networking, the Climate Pollution Reduction Grant and Planning Process, NHDES sub-contracted with the University of New Hampshire's (UNH) Carsey School of Public Policy Civic Engagement initiative [New Hampshire Listens](#) (NH Listens) and the UNH Survey Center to garner an overarching and local inventory of near-term, implement-ready priorities that could become funded projects in the future.

Between October 2023 and mid-February 2024, New Hampshire Listens and facilitated with the NHDES CPRG team:

- 26 cross-sectional interviews with organizations and individuals committed to climate action, planning, workforce development, and Justice40 related priorities.
- 3 online cross-sector stakeholder gatherings.
- 3 online statewide community conversations.
- 7 in-person community conversations; the locations were based on the CEJST screening tool analysis of areas most in need of support.

Furthermore, in December 2023 and January 2024, the NHDES CPRG team engaged with communication w/ representatives from: Dept of Administrative Services, Dept of Business and Economic Affairs, Dept of Energy, Dept of Health and Human Services, Department of Natural & Cultural Resources, Dept of Transportation. The team also met internally with fellow NHDES staff from the Air, Waste Management, and Water Divisions.

Throughout the engagement process that informed the PCAP, NHDES and NH Listens invited people to learn and talk together about local priorities and possibilities to reduce GHG emissions, noting that "Air pollution affects us ALL in our homes, at work, where we and our families learn, and where we play." The overarching goals were for people to come together in small group conversations to provide their thoughts about local issues and potential solutions from people in New Hampshire interested in, and already working on, air pollution reductions to inform New Hampshire's PCAP, implementation proposals, and future comprehensive plan. Many people described New Hampshire's potential to reduce GHG emissions and encouraged the CPRG team's work.

12.1 Identification of Stakeholders

In October 2023, New Hampshire Listens reached out to a wide range of initial stakeholders (Table 12-1) in New Hampshire with an invitation to be interviewed. The invites included people who were seen as key contributors and thought partners who could identify the characteristics of each region, help create

effective engagement strategies, and build on existing efforts in communities. The focus questions for each interview, which included 1 to 4 people were:

- What are the most important issues in your community?
- What efforts are already being made?
- What relationships need to be built?
- What barriers are you seeing to community-engaged work? What needs to change?
- If you could name 2-3 priorities, what would they be?

These questions sparked a number of responses that helped guide further outreach and engagement efforts. Many of the participants in interviews attended additional engagement sessions (November 2023 to February 2024) and helped with outreach efforts by forwarding the opportunity to engage with their networks. This round of interviewing not only helped to create community-engaged foundations for the PCAP, but it will also further outreach and engagement design and strategy moving into the CCAP and implementation process.

The goals for these initial interviews were shared with participants as follows:

- Engage you as a thought partner who can join with others actively involved in GHG reduction initiatives that focus on community-engaged solutions, especially with communities most affected by air pollution created by GHGs.
- Learn from you to then host a series of regional, community, or county-based learning exchanges and conversations to help us inform a community engagement plan that details goals, challenges, potential solutions, methods to measure progress, and manners for continued engagement.

Given that some of the participants were familiar with GHG and air pollution efforts and others were not, New Hampshire Listens in collaboration with the NHDES CPRG team also provided some background information and links to the CPRG process. New Hampshire Listens specifically pointed people to the GHG sectors that they could relate to regarding their area of work (i.e., Transportation, Electricity generation and/or use, Natural and working lands, Industry, Agriculture, Commercial and residential buildings, Waste and materials management, Wastewater; along with connections to health more broadly, workforce development, and community engagement).

The findings from the interviews helped develop outreach lists along with priority areas that were then used to guide the design and facilitation of the community conversations and stakeholder gatherings. Section 12.2 includes a description of how stakeholders were identified within New Hampshire state agencies.

Table 12-1. List of Initial Stakeholders Identified at the Start of the Engagement Process.

Stakeholder	Coordination
Ammonoosuc Community Health Services	Interview
Apprenticeship New Hampshire	Interview
Clean Energy New Hampshire	Interview, engagement events
Community Loan Fund	Interview
Conservation Law Foundation	Interview, engagement events
Endowment for Health	Participated in engagement events
Indigenous New Hampshire Collaborative Collective	Interview, engagement events
New England Grassroots Environment Fund	Email response, engagement events
New England Municipal Sustainability Network	Interview
New Hampshire Businesses for Social Responsibility	Interview, engagement events
New Hampshire Center for Equity and Justice	Interview
New Hampshire Charitable Foundation (Tillotson Fund)	Interview
New Hampshire Municipal Association	Interview
New Hampshire Public Health Association	Interview, engagement events
New Hampshire Sierra Club	Interview, engagement events
New Hampshire Community Development Finance Authority	Interview
North Country Council	Email response, engagement events
Piscataqua Region Estuaries Partnership (PREP)	Interview, engagement events
Society for the Protection of New Hampshire Forests	Interview, engagement events
The Community Builders Hub - North Country Stewards	Interview
The Nature Conservancy	Interview, engagement events
The Resilient American Communities (RAC) Network	Interview
UNH - Cooperative Extension	Participated in engagement events
UNH - Dept of Natural Resources & Earth Systems Science	Interview
UNH - Health Management and Policy Program	Interview
UNH - Inst. Of Health Policy and Practice	Interview
UNH - New Hampshire State Climate Office	Interview, engagement events
UNH - Sustainability Institute	Interview, engagement events
Union of Concerned Scientists	Interview
Welcoming New Hampshire and the MIRA Coalition	Participated in engagement events
Business and Industry Association	N/A
Environmental Business Council of New England	N/A
Nashua Public Health Department	N/A
United Way of Greater Nashua	N/A

12.2 Interagency and Intergovernmental Coordination

State employees were encouraged to participate both as private citizens at the engagement events with NH Listens, and as agency employees to share current and future projects related to their work, that reduce GHG emissions and co-pollutants. The CPRG team created a guidance document and templates for proposed measures to be submitted via email for potential inclusion in the PCAP. The CPRG team met with state agency representatives to discuss potential implementation measures, existing funding sources for similar projects, and potential partnerships during implementation. Starting in December 2023, the NHDES CPRG team engaged with state employees across state agencies including the following:

- New Hampshire Department of Environmental Services (NHDES).
- New Hampshire Department of Administrative Services (NHDAS).
- New Hampshire Department of Business and Economic Affairs (NHDBEA).
- New Hampshire Department of Energy (NHDOE).
- New Hampshire Department of Health and Human Services (NHDHHS).
- New Hampshire Department of Natural & Cultural Resources (NHDNCR).
- New Hampshire Department of Transportation (NHDOT).

Table 12-2. Timeline of Interagency Engagement

Date(s)	Attendees	Notes
December 2023	Initial, high-level conversations between administrators of New Hampshire state agencies	<ul style="list-style-type: none"> • Engagement should be coordinated by a representative within an agency rather than NHDES engaging with state employees directly (avoid mass emails). • Focus on soliciting measures for the PCAP rather than policy/rule/law suggestions. • Staff should focus on measures relative to an employee's role at the state (they are free to engage as private citizens on their own time).
December 14, 2023	Representatives from New Hampshire agencies: NHDAS, NHDBEA, NHDOE, NHDHHS, NHDNCR and NHDOT	<ul style="list-style-type: none"> • Discussed the CPRG program, timeline, and engagement plan with state workers. • Agency representatives will identify which internal programs may reduce GHG emissions and assign staff to share existing/proposed implementation measures with NHDES to inform the PCAP and Implementation Grant Application. • NHDES CPRG team will prepare an overview document of the CPRG process/timeline along with templates for reporting existing measures and proposed projects.
Late December 2023 - Early January 2024	NHDES CPRG team	Development of a 4-page guidance document giving an overview of the CRPG process and timeline, links to EPA resources for additional information, and description of state worker engagement process.

Date(s)	Attendees	Notes
January 2024	Continued meetings as requested with representative from other state agencies	Discussed potential implementation measures, funding sources for similar projects, and potential partnerships during implementation.
January 2024	NHDES: agency wide	<ul style="list-style-type: none"> Initial meetings with Assistant Directors of Air, Water, and Waste Management Divisions. As requested, meetings with teams assigned by the Assistant Directors.
Early February 2024	NHDES: agency wide	Feedback from NHDES divisions regarding current projects related to GHG reduction, including proposed measures for PCAP.

12.3 Outreach Plan

The NHDES CPRG team and New Hampshire Listens worked together and separately to complete the PCAP engagement activities, which included: (1) a mix of stakeholder interviews with organizations and individuals committed to climate action, planning, workforce development, and Justice40 related priorities (as described above); (2) interagency and inter-governmental coordinating meetings and listening sessions, (3) online and in-person community conversations (4) online stakeholder gatherings; and (5) utilized the UNH Survey Center’s Granite State Poll to ask two broad questions about people’s perspectives on air pollution reduction and climate change in the state. Section 12.5 details these outreach and coordination efforts.

The NHDES CPRG team and New Hampshire Listens used both an emergent and strategic approach for engagement to build awareness, connection, and relationships. In addition to the steps described above, the in-person community conversations were identified using the Climate & Economic Justice Screening tool. In each in-person meeting the team talked about categorical burdens relevant to the community.

During the online conversations and stakeholder gatherings, NHDES and New Hampshire Listens focused on gathering partner ideas and strategies for reaching LIDACs moving forward. Overall, the engagement sessions created opportunity for stakeholders and community members to share near-term/implement ready priorities and projects and become increasingly aware of the opportunities emerging from the CPRG processes. NHDES staff were able to connect with multiple entities and individuals in part from the engagement sessions across the state. More detail on outreach is spread throughout this chapter.

12.4 Strategies to Overcome Linguistic, Cultural, Institutional, Geographic, and Other Barriers to Participation

To account for barriers to participation, the NH Listens and NHDES teams offered multiple means of engagement that included online and in-person sessions, outreach via social media, partnerships with regional planning commissions, email lists, webpages, and meeting summaries. For each engagement opportunity, there were online registration links asking about accommodations and interpretation needs. Locations were chosen using CEJST. The documentation for each public engagement session is located here: [Updating the New Hampshire Climate Action Plan | New Hampshire Listens \(unh.edu\)](https://www.unh.edu/climate-action-plan). The summaries, slides, and group activity note transcriptions were checked for accessibility for the visually impaired. Interpretation services were ready through NHDES and offered via a local environmental

justice advocate who co-directs a local interpretation business. Furthermore, NHDES has accessibility and communication rules that outreach documents via their website, email, this report, etc. must follow.

12.5 Outreach and Coordination Documentation

This section provides an overview of outreach and engagement during the development of New Hampshire's PCAP.

12.5.1 Interviews (October – December 2023)

Outreach and engagement efforts started in October/November 2023 with New Hampshire Listens stakeholder interviews (see Section 12.1 Identification of Stakeholders).

12.5.2 Webpages and Email (November 2023 – Ongoing)

Webpages were developed and a designated NHDES CPRG email was made public. [NH Listens](#) and [NHDES CPRG](#) specific webpages continue to be updated with engagement event schedules and reports.

NHDES email address (cprg@des.nh.gov) was created specifically for all public questions and comments related to the CPRG process. This email address is monitored and will be managed by the NHDES CPRG team for the remainder of the 4-year planning grant timeline. NOTE: from November 1, 2023 (launch) through February 20, 2024, 162 emails were received from 105 individuals including representatives from 75 stakeholder groups and 19 private New Hampshire citizens. The comments received fell into 4 main categories:

- Questions about the CPRG process and how to participate (42%).
- Comments on the PCAP and measures (46%).
- Solicitations (10%).
- Inquiries from the press (3%).

12.5.3 Conversations and Meetings (November 2023 – February 2024)

November 2023 and mid-February 2024, New Hampshire Listens and NHDES facilitated a series of online and in-person community conversations online stakeholder gatherings. Over the course of the 13 engagement events, 369 individuals helped inform the development of the PCAP. They self-identified as being residents of 96 New Hampshire towns and cities, while representing over 150 organizations or stakeholders. The numbers varied as did the discussion depending on the region and people attending. Across all engagement sessions, the themes and key points began to converge which lent to honing measures and priorities.

- Figure 12-1 includes an attendance report.
- Table 12-3 includes a timeline of stakeholder and public engagement efforts.
- Figures 12-2 through 12-5 include screen shots from the online public engagement.

As engagement unfolded, further requests emerged from interested groups in New Hampshire for follow-up meetings. These follow-up meetings were responsive in nature, and they offered insight into measures, projects, barriers to implementation, and how engagement can deepen during the CCAP process.

- Table 12-4 includes follow-up meetings and conferences that emerged throughout.

December 2023 and January 2024 - the NHDES CPRG team engaged with communication w/ representatives from state agencies (see Section 12.2 Interagency and Intergovernmental Coordination).

Figure 12-1. Participant Counts by Engagement Session Open to the Public.

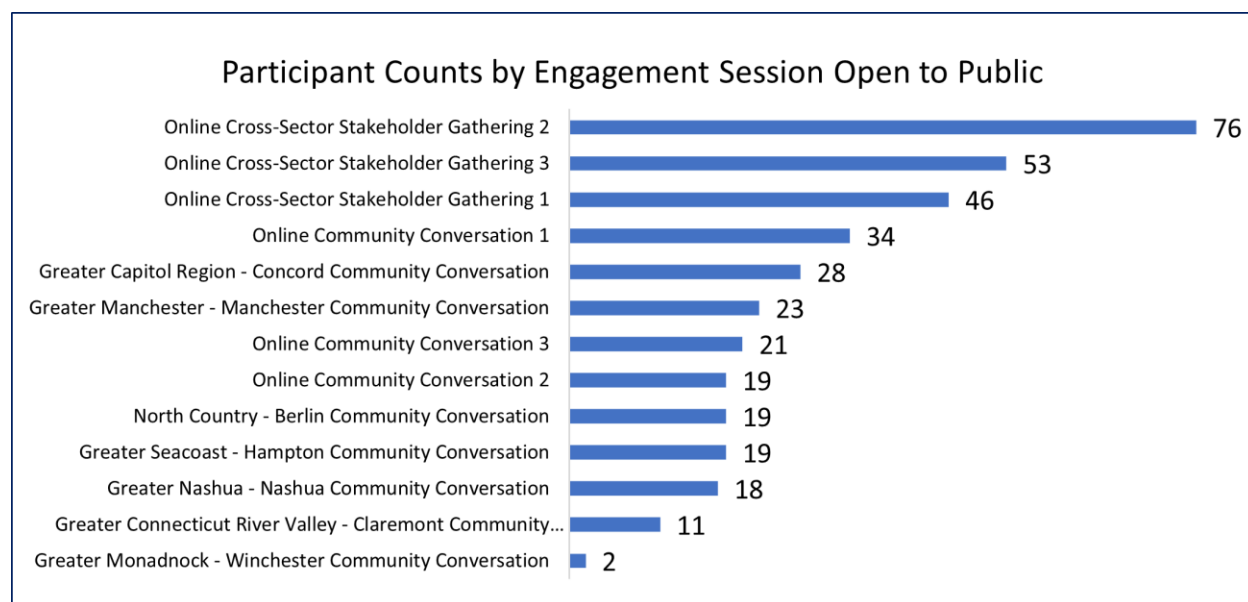


Table 12-3. Stakeholder and Public Engagement Efforts Associated with PCAP Development.

Date(s)	Engagement Type	Participants/Stakeholders	Notes
October - December 2023	Initial Outreach Interviews (<i>Facilitation: NH Listens</i>)	See list in Table 12-1	26 interviews informed further outreach, areas of focus, partnerships, and public engagement session designs (community and stakeholder conversations). The participants' suggestions helped build the broader stakeholder list of over 900 people across the state. Participants also joined the other engagement efforts offered.

Date(s)	Engagement Type	Participants/Stakeholders	Notes
November 1, 2023 - ongoing	NHDES designated CPRG email address (Facilitation: NHDES)	<ul style="list-style-type: none"> General public Municipalities Stakeholder groups The press/media Private companies State employees 	162 emails received or forwarded from CPRG team members as of Feb 20, 2024 (last day to comment on PCAP Public Notice).
November 30, 2023, January 11, 2024, February 8, 2024	Online Cross-Sector Stakeholder Conversations (Facilitation: NH Listens and NHDES)	Targeted at stakeholders	<ul style="list-style-type: none"> NH Listens/Carsey School webpage Direct link to summary report Gathering 1 – Slides & Notes. Gathering 2 - Slides & Notes. Gathering 3 - Slides & Notes.
December 6, 2023, January 9, 2024, January 24, 2024	Online Community Conversations (Facilitation: NH Listens and NHDES)	Targeted at the general public	<ul style="list-style-type: none"> NH Listens/Carsey School webpage Direct link to summary report Conversation 1 - Slides & Notes. Conversation 2 -- Slides & Notes. Conversation 3 -- Slides & Notes.
January - February 2024	In-Person Community Conversations (Facilitation: NH Listens and NHDES – NOTE: Hampton was in partnership with the Rockingham Planning Commission, Nashua Regional Planning Commission, and Manchester with the Southern NH Planning Commission with the who are all supporting the Greater Boston CPRG team with MAPC.)	Community Members and Stakeholders: <ul style="list-style-type: none"> January 17 – Hampton January 18 – Nashua January 25 – Claremont January 25 - Winchester January 31 – Berlin February 1 – Manchester February 12 - Concord 	<ul style="list-style-type: none"> Greater Seacoast/ Hampton Flyer, Summary, Slides, & Notes Greater Nashua/ Nashua Flyer, Summary, Slides, & Notes Greater Connecticut River Valley/ Claremont Flyer, Summary, Slides, & Notes Greater Monadnock/ Winchester Flyer, Summary, Slides, & Notes North Country/ Berlin Flyer, Summary, Slides, & Notes Greater Manchester/ Manchester Flyer, Summary, Slides, & Notes Greater Capitol Region/ Concord Flyer, Summary, Slides, & Notes
February 5-20, 2024	Comment Period on Public Notice on draft PCAP measures (Facilitation: NHDES)	Respondents to the draft measures	See Section 12.5.5 Public Notice.

For more information see Appendix B: Summary Reports of Engagement Events and Appendix C: Current Stakeholder List.

The figures on the following pages include screen shots from the online public engagement sessions (captioned in Figures 12-2 through 12-5). Participants engaged in interactive activities that asked them to brainstorm near-term, high-priority, implement ready projects, programs, and policies that would reduce

GHGs in New Hampshire, help identify current and past barriers to implementation, and identify partners for future engagement and implementation of PCAP measures.

Figure 12-2. Screenshot of a Google Slide with Group Directions, from the First Online Cross-Sector Stakeholder Gathering, November 30, 2024.

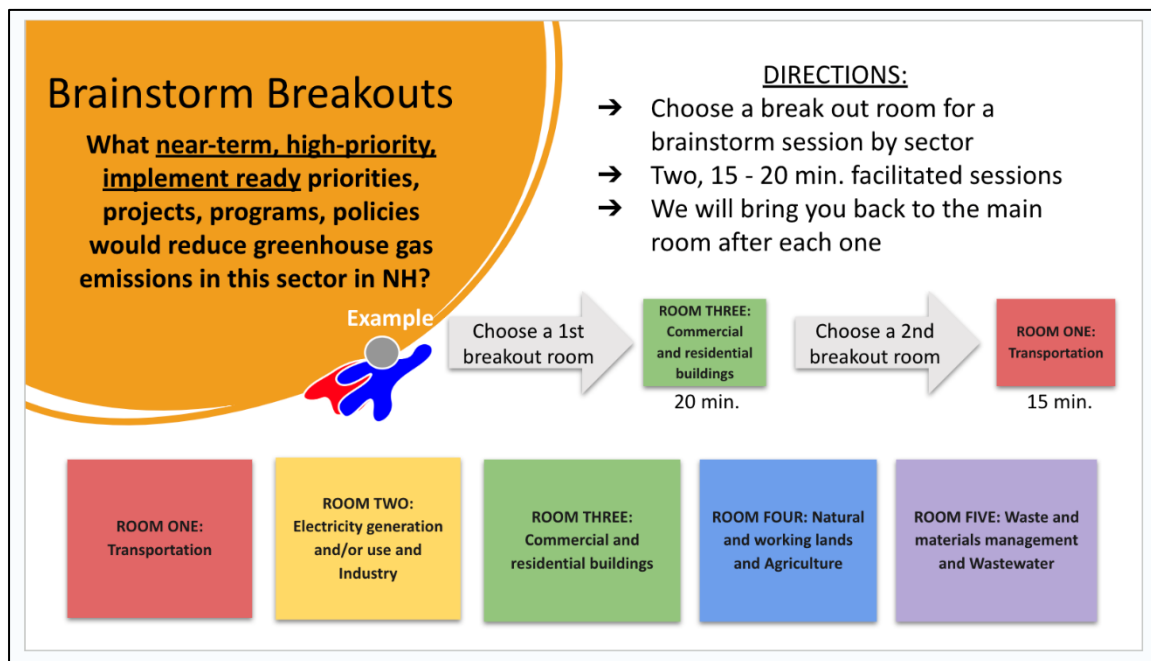


Figure 12-3. Screenshot of an Interactive Google Slide during Small Group Activity, from the First Online Cross-Sector Stakeholder Gathering, November 30, 2024.

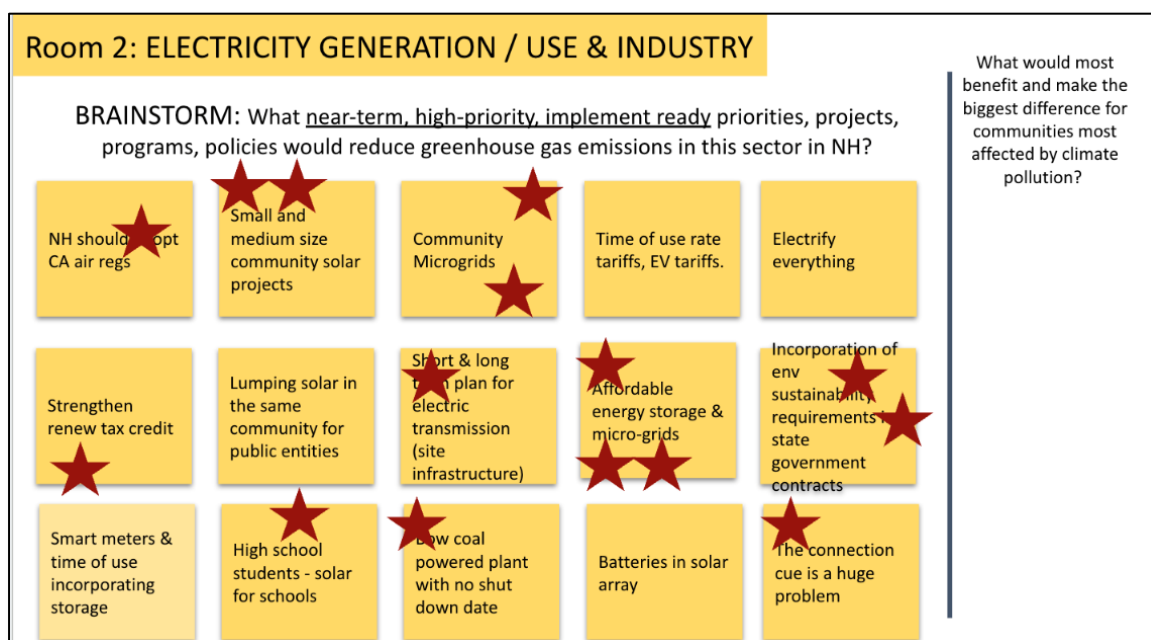


Figure 12-4. Screenshot of a Google Slide with Small Group Directions, from the First Online Community Conversation, December 6, 2023.

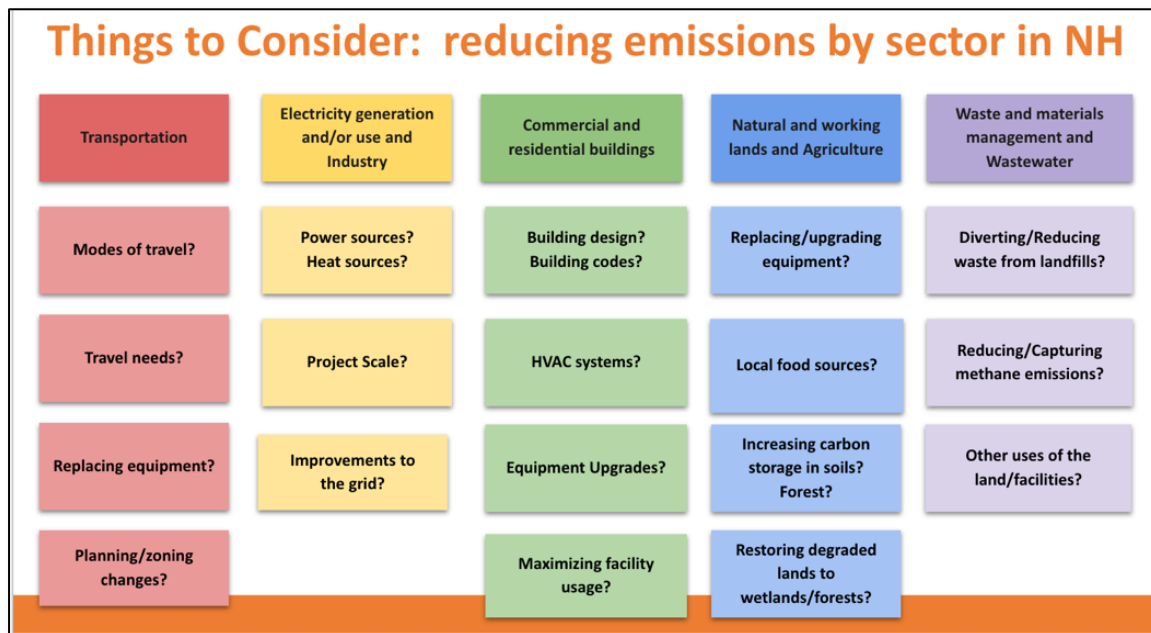


Figure 12-5. Screenshot of an Interactive Google Slide during Small Group Activity, from the First Online Community Conversation, December 6, 2023.

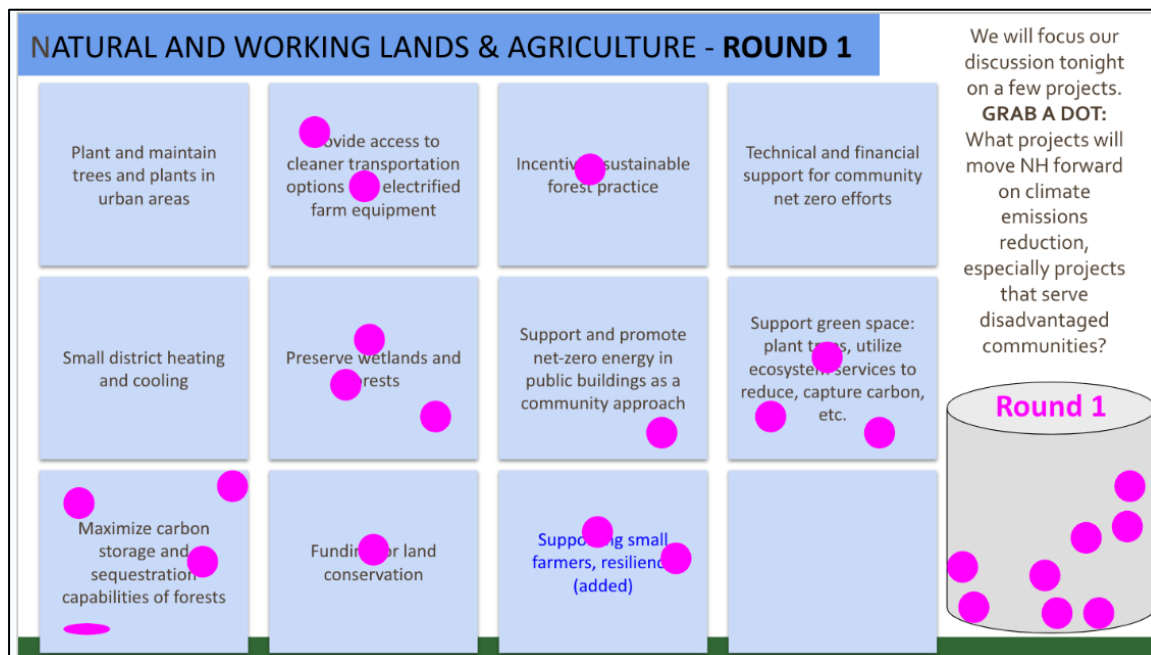


Table 12-4. Follow-up Requests for Presentations and Listening Sessions based on Outreach and Engagement.

Date(s)	Engagement Type	Participants/Stakeholders	Notes
December – January, 2024	Requests from specific stakeholders to discuss PCAP measures (Facilitation: NHDES)	City of Lebanon	NHDES CPRG team met virtually with representatives to discuss PCAP measures including heat pumps for low-income households.
December, 2023 – ongoing	State-wide round table (NH Listens and NHDES)	New Hampshire Environmental Justice Roundtable	NH Listens and NHDES staff attend these monthly virtual events; gave an update on the CPRG process on January 17.
January 8, 2024	State-wide conference (Facilitation: NHDES)	2024 Youth Forum on Climate Action and Clean Energy (Concord)	NHDES CPRG team staffed a table in the gallery throughout the event.
January 26 – February 9 2024	Specific stakeholder requests to discuss PCAP measures (Facilitation: NHDES)	Utility Companies in the state: <ul style="list-style-type: none"> • Eversource • Liberty • New Hampshire Electric Co-op • Unitil 	NHDES CPRG team met virtually with representatives to discuss PCAP measures including: EV charging, weatherization, and pre-weatherization.
January – February 2024	Specific stakeholder requests to discuss PCAP measures (Facilitation: NHDES)	Bus Transit Systems: <ul style="list-style-type: none"> • New Hampshire Transit Association • Manchester Transit Authority • Nashua Transit System • Cooperative Alliance for Seacoast Transportation • University of New Hampshire Wildcat Transit 	NHDES CPRG team met virtually with representatives to discuss PCAP transportation measures.
January 29, 2024	Listening Sessions requested by specific stakeholders (Facilitation: NH Listens and NHDES)	New Hampshire Healthcare Workers for Climate Action	NH Listens and NHDES staff met virtually with group to give an update on PCAP progress and facilitate a listening session.
January 29, 2024	Specific stakeholder requests to discuss PCAP measures (Facilitation: NHDES)	Cheshire County Conservation District	NHDES CPRG team met virtually with staff to discuss possible PCAP measures, existing programs, and implementation barriers in the Agriculture Sector.

Date(s)	Engagement Type	Participants/Stakeholders	Notes
January 31, 2024	Specific stakeholder requests to discuss PCAP measures (Facilitation: NHDES)	New Hampshire Bike-Walk Alliance	NHDES CPRG team met virtually with representatives to discuss PCAP transportation measures: e-bikes and expanding bike routes and accessibility.
February 12, 2024	Listening Sessions requested by specific stakeholders (Facilitation: NH Listens and NHDES)	NH Food Alliance	NH Listens and NHDES staff met virtually with network to give an update on PCAP progress and facilitate a listening session.
February 13, 2024	Specific stakeholder requests to discuss PCAP measures (Facilitation: NHDES)	350 New Hampshire	NHDES CPRG team met virtually with representatives to discuss PCAP progress, possible measures, and the CCAP components.

12.5.4 Polling (January 2024)

The University of New Hampshire Survey Center included two questions on its Granite State Poll for NHDES to better understand New Hampshire residents' feelings about climate change and air pollution. One thousand, eight hundred, and sixty-four (1,864) Granite State Panel members completed the survey online between January 4 and January 8, 2024. The margin of sampling error for the survey is +/- 2.3 percent. Key findings from the poll included:

- Six in ten New Hampshire residents feel that climate change is happening now and is caused mainly by human activities. Just over a quarter of state residents, particularly libertarians and conservatives, feel climate change is happening now but is caused mainly by natural forces, while less than one in ten feel that climate change is not happening now.
- Just over half of Granite Staters think it should be a very high or high priority for New Hampshire to reduce air pollution to address climate change, including most who believe climate change is happening and caused mainly by humans. Just over a quarter think reducing air pollution should be a low or very low priority for the state, including a majority of those who believe climate change is happening but caused mostly by natural forces and nearly all of those who believe climate change is not happening now. Young people and those with high levels of education are particularly likely to think reducing air pollution should be a very high or high priority.
- A copy of the full report from the UNH Survey Center may be found at : [Updating the New Hampshire Climate Action Plan | New Hampshire Listens \(unh.edu\)](#).

12.5.5 Public Notice (February 2024)

A public notice “Draft Measures for New Hampshire’s Priority Climate Action Plan” was released by NHDES on February 5, 2024, with a public comment period through February 20, 2024. A mass email (over 900 recipients) was sent informing them of the issuance of the public notice. A contact list was compiled from people who had signed up for notifications on the NHDES CPRG website, past emails to

the CPRG team, registration lists from the community conversations and stakeholder gatherings, and stakeholders who had met with NH Listens and NHDES.

- Appendix C includes a copy of the public notice.

Comments were received via the CPRG email address. 114 emails were received during the public comment period, with 62% of the comments focused on PCAP measures. These comments helped inform existing PCAP measures and proposed additional measures; some of which were added to the PCAP, while others will be considered for the CCAP and future funding opportunities. 13 emails included messages of support and encouragement to the CPRG team.

12.6 Moving Forward – Learning from the Community

Much was shared by participants during the engagement efforts put forth during the PCAP working period. Participants spent time brainstorming climate pollution reduction projects that were near-term, high-priority, and implement-ready to provide input to the PCAP and CCAP efforts. Specific projects were discussed in more detail to learn about the barriers and potential partners to move these projects forward. Participants also spent time brainstorming climate pollution reduction projects that would make a difference where they live, work, learn, and play in New Hampshire. Specific projects were discussed in more detail to learn about the barriers and potential partners. Participants shared what was happening in their New Hampshire communities focused on ways to invest in LIDACs.

Table 12-5 shows a sampling of what participants shared during the online and in-person engagement sessions focused on the general community and stakeholders. The notes specifically focus on suggestions for how to move forward in the state.

Table 12-5. Opportunities for Moving Forward, as Shared by Participants of Engagement Sessions.

Engagement	Notes in brief
Online Stakeholder Gatherings: November 30, 2023, January 11, 2024, February 8, 2024 <i>(Facilitation: NH Listens, NHDES)</i>	Themes for moving forward included: <ul style="list-style-type: none"> • Informed, community-based approaches and funding structures. • Move towards the future and transition away from emissions-reliant systems. • Continue community engagement and key outreach. • The transportation sector is a major focus. • Ensure that New Hampshire receives fair funding to make a difference
Online Community Conversations: December 6, 2023, January 9, 2024, January 24, 2024 <i>(Facilitation: NH Listens, NHDES)</i>	Priorities highlighted broadly for follow up included: <ul style="list-style-type: none"> • Equity in New Hampshire communities. • Awareness, education, and engagement. • Connection and partnership are needed. • Technical assistance. • Funding sources are siloed and complicated. • Developing the workforce and pipeline for good jobs. • Local issues, regional impact.

Engagement	Notes in brief
In-Person Community Conversation - Greater Seacoast – Hampton: January 17, 2024 <i>(Facilitation: NH Listens, NHDES)</i>	Themes for moving forward included: <ul style="list-style-type: none"> • Recognizing ongoing efforts of towns in the Seacoast region creating their own Climate Actions Plans and how they can fit into NHDES’ Climate Action Plan. • Understanding how New Hampshire’s Climate Plan will approach on-the-ground implementation and how communities can be involved. • Distinguishing between private property and community-wide opportunities to focus on an equitable balance of resources. • Providing education around the various projects, programs, and policies discussed to generate community buy-in. • Addressing local traffic while addressing demand for housing and proximity to the beach.
In-Person Community Conversation - Greater Nashua – Nashua: January 18, 2024 <i>(Facilitation: NH Listens, NHDES, Nashua Regional Planning Commission)</i>	Themes for moving forward included: <ul style="list-style-type: none"> • Providing accessible, comprehensive public education that provides information, resources, and potential services providers related to projects that can be funded with the Climate Pollution Reduction Grants. • Addressing Nashua’s multi-family dwellings by providing opportunities to reduce energy output for new and existing buildings. • Preserving existing greenspace, forests, and local agriculture and mitigating loss of ecosystems and economies that are dependent of these places.
In-Person Community Conversation - Greater Connecticut River Valley – Claremont: January 25, 2024 <i>(Facilitation: NH Listens, NHDES)</i>	Themes for moving forward included: <ul style="list-style-type: none"> • Building strong partnerships with city departments and managers to achieve much of the climate reduction measures discussed. • Promoting education to the general public regarding the importance of implementing climate reduction measures. • Upgrading the energy efficiency of residential property, with an emphasis on cluster renovations.
In-Person Community Conversation - Greater Monadnock Region – Winchester: January 25, 2024 <i>(Facilitation: NH Listens, NHDES)</i>	Themes for moving forward included: <ul style="list-style-type: none"> • Working with local collaborators who are working around pollution reduction and coordinating efforts through partnerships and knowledge-sharing exchanges. • Identifying towns that are pursuing existing grants and opportunities that align with the Climate Pollution Reduction Grants to amplify parallel efforts. • Partnering with schools, at both the secondary and high education levels, to provide solar infrastructure and education for students to learn about careers in the energy sector.

Engagement	Notes in brief
In-Person Community Conversation - North Country – Berlin: January 31, 2024 (<i>Facilitation: NH Listens, NHDES</i>)	Themes for moving forward included: <ul style="list-style-type: none"> • Curating “15-minute” towns that are suitable for walking, biking, and other forms of non-car transportation, including bike infrastructure and protected lanes, wider sidewalks, and rail trails. • Connecting with utility companies to understand how distribution automation will be implemented. • Filling in the capacity gap of providers that can provide energy efficient services.
In-Person Community Conversation - Greater Manchester – Manchester: February 1, 2024 (<i>Facilitation: NH Listens, NHDES, Southern NH Regional Planning Commission</i>)	Themes for moving forward included: <ul style="list-style-type: none"> • Solving current barriers to trade and technical schools, including staff shortages and cost of living, to better support apprenticeships and other forms of postsecondary education. • Addressing current stigmas around public transportation, greenspaces, and apprenticeship programs, that could hold otherwise impede on potential progress. • Recognizing that incoming building improvements programs and projects can lead to unintended increase in cost-of-living that could displace current residents. • Identifying zoning and regulation barriers and navigating with relevant partners to achieve desired outcomes. • Having an accessible communications channel to understand the City’s public transit system. • Providing forthcoming workshops, information, and resources in multiple languages.
In-Person Community Conversation - Greater Capitol Region – Concord: February 12, 2024 (<i>Facilitation: NH Listens, NHDES</i>)	Themes for moving forward included: <ul style="list-style-type: none"> • Acknowledging that there may be a lack of incentive for landlords to take advantage of energy-efficient measures. Any measures taken by landlords may inadvertently shift costs of heating from landlord to tenant. • Coordinating with high schools, community colleges, trade schools and other post-secondary institutions to expose careers to high school students and other potential students. • Feelings of NIMBY-ism (or “not in my backyard”) from community members that resist change that can impede climate-related progress. • Understanding sustainable management of forests, the benefits it provides, and sharing that information with the public. • Addressing lack of grid support as local power plants are closing and are not being replaced with sources of power.

As stated at the beginning of the chapter, there are many stakeholders and local community members in New Hampshire that are ready to address the urgency to update the state’s climate plan. The findings from the PCAP engagement process also lend to building clear pathways during implementation. The potential partners, priorities and barriers identified during the PCAP engagement process will assist in the drafting of the CCAP, be shared with other programs and funding sources and inform community engagement moving forward.

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Appendix A: Methods for Emissions Reductions Estimates

This appendix provides additional methodology and assumptions that NHDES used to develop the estimated GHG and co-pollutant emissions reductions of measures included in New Hampshire's PCAP. For each measure, NHDES estimated annual and cumulative emissions reductions by inputting factors into various models for general case evaluations. Eligible applicants could use NHDES's methods, alternative models, or other factors to refine reduction estimates for more specific measures in a CPRG implementation grant application. NHDES anticipates revising emission estimates as models are improved and more accurate factors are established.

A.1 Transportation Sector Measures

A.1.1 Deploy Electric Charging Infrastructure for Electric Vehicles

To estimate GHG and co-pollutant reductions from installing publicly accessible charging stations for EVs and PHEVs, NHDES used the [Charging and Fueling Infrastructure Emissions Calculator \(CFI\) of the Alternative Fuel Life-Cycle Environmental and Economic Transportation \(AFLEET\) tool](#) that was developed by ANL for U.S. DOE's Clean Cities Coalition Network. Co-pollutant estimates include CO, NO_x, PM₁₀, PM_{2.5}, VOCs, and SO_x. The CFI calculator incorporates factors, such as EV charging utilization, vehicle mix, upstream emissions, and the electric generation grid fuel mix specific to certain regions of the country.

To broadly quantify annual GHG and co-pollutant emission reductions from installing EVSE in New Hampshire, NHDES used the following in the CFI:

- Assumed installation of EVSE for 36 Level 2 chargers and 12 DCFC per year at the following publicly accessible venues: 50% at parking lots; 25% at retail and leisure locations; and 25% at educational institutions.
- CFI's defaults for high predicted weekly utilization of chargers (instead of low or medium utilization). For Level 2 charging, the defaults of the venues were: 6.5 weekly sessions per week per charger (s/w/c) for parking lots; 7.0 s/w/c for retail and leisure; and 9.0 s/w/c for education. For DCFC, the defaults of the venues were: 26 s/w/c for parking lots, retail and leisure, and education.
- CFI's defaults for charge times. For Level 2 chargers, the defaults for parking lots and education were 150 minutes, and the default for retail and leisure was 90 minutes. For DCFC, the default for all venues was 90 minutes.
- CFI's defaults for average power session. For Level 2 chargers, 4 kW; for DCFC, 24 kW.
- The electric grid mix that the CFI used for New Hampshire was the area covered by the Northeast Power Coordinating Council, Inc. (NPCC).

NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude in each successive year from 2025 through 2030 and from 2025 to 2050. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years.

A.1.2 Incentives for Consumer Purchase of Electric Passenger Vehicles

NHDES used [AFLEET's Payback On-Road online model](#) to estimate GHG and co-pollutant emissions reductions from incentivizing the purchase of EVs and PHEVs. Co-pollutant estimates include CO, NOx, PM10, PM2.5, VOCs, and SOx. The model incorporates several factors, such as vehicle type, vehicle fuel economy, vehicle mileage per year, upstream emissions, and the electric generation grid fuel mix specific to certain regions of the country.

NHDES assumed the following in the online model to estimate annual GHG and co-pollutant emission reductions if 1,000 EVs and 1,000 PHEVs displace 2,000 gasoline vehicles per year in New Hampshire.

- Vehicle type for EVs, PHEVs and gasoline vehicles were passenger cars.
- Mileage per year of all vehicles was 12,400 miles per year.
- The fuel economy of gasoline vehicles was 30.7 miles per gallon.
- Gasoline vehicles and PHEVs used low NOx engines.
- The fuel economy of EVs and PHEVs was 118.2 and 53.4 miles per gasoline gallon equivalents, respectively.
- The electric grid mix that the model used for New Hampshire was the area covered by NPCC.

NHDES subtracted estimated annual emissions results for EVs and PHEVs from results for gasoline vehicles to establish annual values. NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude each successive year from 2025 through 2030 and from 2025 to 2050. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years.

A.1.3 Support and Expand Public Transit Options

NHDES used [the Federal Transit Administration's \(FTA\) Transit Greenhouse Gas Emissions Estimator \(version 3.0\)](#) to estimate GHG emissions reductions that result from a case evaluation of public transit options. The calculator uses inputs of annual VMT for a selected transit option and annual VMT of the vehicle displaced by the selected transit option to calculate both upstream and downstream GHG emissions.

NHDES incorporated direct emissions reductions from transportation efficiency (i.e., decreased use of passenger LDVs when occupants ride transit) and land-use efficiency, which is the decreased use of passenger LDVs in the community through changes in land use resulting from transit service, such as more compact development. NHDES used the calculator to determine average annual GHG emission reductions if transit systems in New Hampshire add or maintain approximately 1 million passenger miles to bus service during a year.

In the estimator, NHDES selected "Sedan/Auto" to compare emissions from LDVs to emissions from transit bus travel fueled by electricity, diesel, hybrid diesel, and compressed natural gas. To determine VMT values of LDVs and buses associated with increasing bus service by 1 million passenger miles, NHDES assumed a mode shift factor of 0.329 and a transit multiplier (i.e., transportation land-use

efficiency) of 6.03, which were median values calculated for transit systems by the [National Academies of Sciences, Engineering, and Medicine \(NASEM\) in a 2021 study](#). Taken together, that mode shift factor and transit multiplier mean that 1 million transit passenger miles would see a total reduction of 1,983,870 VMT in LDVs, as shown in the following equation.

- 1,000,000 passenger miles x 0.329 mode shift factor = 329,000 avoided VMT.
- (329,000 VMT x 6.03 transit multiplier) – 329,000 VMT = 1,654,870 land use efficiency VMT savings.
- 329,000 VMT + 1,654,870 VMT = 1,983,870 VMT.

Data from NASEM study included total 2018 VMT and passenger miles reported to the National Transit Database by four of New Hampshire’s bus transit systems: 11,442,469 passenger miles and 2,155,707 VMT, which is approximately 5.3 passenger miles per VMT. Based on that ratio, NHDES determined 1 million bus transit passenger miles results in approximately 188,395 of bus transit VMT.

NHDES assumed the following in FTA’s Estimator to approximate annual GHG and co-pollutant emission reductions if New Hampshire transit systems were to add or maintain 1 million passenger miles of bus service.

- Sedan/auto vehicles are fueled by gasoline.
- Bus transit systems are fueled by electricity, diesel, hybrid diesel, or compressed natural gas.
- 188,395 bus transit VMTs displace 1,983,870 VMT of sedan/auto vehicles per year.
- When NHDES selected “New Hampshire” in the estimator, the estimator applied the electric grid mix area covered by NPCC New England (i.e., NEWE eGrid).

NHDES subtracted estimated annual emissions results for each bus transit system fuel type from emissions results for sedan/auto to establish annual emission reduction estimates for each bus system fuel type. NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude each successive year from 2025 through 2030 and from 2025 to 2050. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years.

A.2 Residential Building Sector Measures

NHDES used results from “The Cube” model that [Rewiring America](#) developed to estimate the potential residential building emission reductions associated with replacing fossil-fuel heating and water systems with electric heat pumps for space and water heating. The model calculates GHG and co-pollutant emissions reductions, among other outputs, resulting from heat pump upgrades at an individual household, city, or county level (NHDES used county level data).

The Cube is based, in part, on [NREL’s “ResStock” analysis tool](#), a model that uses a large amount of data from public and private sources, as well as statistical sampling and sub-hourly building simulations. The tool was designed to help users identify which building stock improvements could save the most energy and money. To obtain net reductions in emission estimates from electrifying residential buildings with

heat pumps, The Cube not only considers the reduction of direct combustion emissions from heating equipment at a residence (e.g., furnaces, boilers, etc.), but also considers the off-site reductions and increases of emissions associated with production of electricity at the regional grid level. The Cube uses emission factors at a state level and, therefore, estimated emission changes in electricity generation sector that would result from the priority measures by accounting for the electricity generation profile of New Hampshire.

A.2.1 Heat Pumps to Improve Energy Efficiency of Space and Water Heating in Buildings

NHDES used county level results from The Cube model to estimate the potential residential building emission reductions associated with replacing fossil-fuel heating and water systems with electric heat pumps for space and water heating. The Cube model assumes the following:

- All values are per-household averages for a standard, single-family home in New Hampshire.
- Installation of ductless, air-source heat-pumps with a Seasonal Energy Efficiency Ratio (SEER) of 18 and Heating Seasonal Performance Factor (HSPF) of 10.5, which meet the performance standards required to get the federal tax credits or electrification rebates. However, The Cube cannot yet include cold-climate heat pumps in its model, but that capability is expected in the first half of 2024.
- The modeled heat pumps for space address both cooling and heating loads, while modeled heat pumps for water only address water heating.
- Estimates of emission reductions use emission factors from NREL's Cambium Tool based on a 95% decarbonized electricity generation sector by 2050, and then are levelized over 15 years with a 3% discount rate.
- Although the model does not specifically evaluate ground-source heat pump systems, NHDES and Rewiring America determined that model provides emission reductions results that are also reasonable representative of ground-source heat pumps. In general, ground-source heat pumps are more efficient than air-source heat pumps and, therefore, the results are likely conservative for ground-source heat pumps.

Table A-1 shows results of The Cube's annual average emissions reduction estimates per single-family home at the county level by fuel type for replacing existing, fossil-fuel fired space heating and cooling systems with electric heat pumps. Estimates are provided for MTCO_{2e}, NH₃ kg; SO₂ kg, NO_x kg, VOCs kg, and PM_{2.5} kg. Table A-1 also shows the estimated number of single-family homes of each county by baseline fuel for space heating based on NREL's ResStock analysis tool.

Table A-2 shows results of The Cube's annual average emissions reduction estimates per single-family home at the county level by fuel type for replacing existing, fossil-fuel fired water heating systems with electric heat pumps. Estimates are provided for MTCO_{2e}, NH₃ kg; SO₂ kg, NO_x kg, VOCs kg, and PM_{2.5} kg. Table A-2 also shows the estimated number of single-family homes of each county by baseline fuel for water heating based on NREL's ResStock analysis tool.

Table A-1. Per-Household Average Annual Emission Reduction Estimates after Replacing Fossil-Fueled Space Heating Systems with Electric Heat Pump Systems at Standard Single-Family Homes in New Hampshire.

County	Baseline Fuel	MTCO ₂ e	NH ₃ (kg)	SO ₂ (kg)	NO _x (kg)	VOCs (kg)	PM _{2.5} (kg)	Single-Family Homes
Belknap	Fuel Oil	6.3	0.28	-0.02	5.08	0.18	0.60	11,622
	Natural Gas	6.1	1.05	-0.07	4.71	0.26	-0.01	969
	Propane	12.7	0.02	-0.10	12.48	0.45	-0.01	2,663
Carroll	Fuel Oil	8.1	0.36	-0.02	6.42	0.23	0.76	11,380
	Natural Gas	2.0	0.37	-0.03	1.64	0.09	-0.01	484
	Propane	8.1	0.02	-0.06	7.87	0.28	0.00	3,632
Cheshire	Fuel Oil	10.6	0.47	-0.03	8.43	0.30	1.00	10,896
	Propane	6.6	0.01	-0.05	6.47	0.23	0.00	2,906
Coos	Fuel Oil	14.1	0.63	-0.05	11.25	0.40	1.33	6,538
	Propane	13.1	0.02	-0.12	13.01	0.47	-0.01	2,179
Grafton	Fuel Oil	11.6	0.52	-0.04	9.26	0.33	1.10	12,349
	Natural Gas	3.8	0.66	-0.05	2.97	0.16	-0.01	484
	Propane	8.4	0.01	-0.09	8.50	0.30	-0.01	4,600
Hillsborough	Fuel Oil	9.0	0.40	-0.03	7.16	0.26	0.85	42,373
	Natural Gas	5.6	0.97	-0.07	4.34	0.24	-0.01	31,477
	Propane	7.8	0.02	-0.06	7.66	0.28	-0.01	15,981
Merrimack	Fuel Oil	9.8	0.44	-0.03	7.81	0.28	0.93	16,949
	Natural Gas	6.8	1.19	-0.09	5.32	0.29	-0.01	7,748
	Propane	5.9	0.01	-0.05	5.87	0.21	-0.01	6,053
Rockingham	Fuel Oil	7.6	0.34	-0.02	6.01	0.22	0.71	48,426
	Natural Gas	7.4	1.25	-0.08	5.63	0.31	-0.01	10,170
	Propane	6.7	0.01	-0.05	6.47	0.23	0.00	17,918
Strafford	Fuel Oil	8.0	0.36	-0.02	6.38	0.23	0.76	17,191
	Natural Gas	1.5	0.28	-0.02	1.22	0.07	0.00	4,600
	Propane	13.3	0.03	-0.09	12.86	0.47	-0.01	3,632
Sullivan	Fuel Oil	12.5	0.56	-0.04	10.02	0.36	1.19	8,475
	Propane	10.7	0.02	-0.09	10.57	0.38	-0.01	1,211

Table A-2. Per-Household Average Annual Emission Reduction Estimates after Replacing Fossil-Fueled Water Heating Systems with Electric Heat Pump Systems at Standard Single-Family Homes in New Hampshire.

County	Baseline Fuel	MTCO ₂ e	NH ₃ (kg)	SO ₂ (kg)	NO _x (kg)	VOCs (kg)	PM _{2.5} (kg)	Single-Family Homes
Belknap	Fuel Oil	1.1	0.046	-0.001	0.816	0.030	0.097	7,990
	Natural Gas	0.9	0.149	-0.009	0.672	0.037	-0.001	2,421
	Propane	1.5	0.003	-0.012	1.486	0.054	-0.001	2,421
Carroll	Fuel Oil	1.3	0.054	-0.001	0.970	0.036	0.115	8,717
	Natural Gas	1.4	0.225	-0.013	1.015	0.056	-0.001	1,453
	Propane	0.9	0.002	-0.009	0.902	0.032	-0.001	2,663
Cheshire	Fuel Oil	1.5	0.067	-0.002	1.191	0.043	0.141	5,811
	Natural Gas	0.6	0.124	-0.014	0.544	0.029	-0.003	1,453
	Propane	1.3	0.002	-0.012	1.302	0.047	-0.001	2,906
Coos	Fuel Oil	1.3	0.056	-0.002	0.997	0.036	0.118	4,358
	Natural Gas	1.2	0.185	-0.009	0.838	0.047	0.000	484
	Propane	1.3	0.002	-0.010	1.225	0.044	-0.001	2,179
Grafton	Fuel Oil	1.2	0.052	-0.002	0.924	0.034	0.110	9,201
	Natural Gas	0.5	0.103	-0.014	0.449	0.023	-0.003	726
	Propane	1.1	0.002	-0.009	1.068	0.039	-0.001	3,632
Hillsborough	Fuel Oil	1.3	0.056	-0.001	0.999	0.037	0.118	23,487
	Natural Gas	1	0.160	-0.009	0.722	0.040	-0.001	34,140
	Propane	1.2	0.002	-0.009	1.193	0.043	-0.001	12,833
Merrimack	Fuel Oil	1.4	0.060	-0.002	1.070	0.039	0.127	9,927
	Natural Gas	0.9	0.149	-0.009	0.673	0.037	-0.001	9,927
	Propane	1.3	0.003	-0.009	1.265	0.046	0.000	5,085
Rockingham	Fuel Oil	1.3	0.056	-0.001	1.008	0.037	0.119	28,329
	Natural Gas	0.9	0.150	-0.008	0.681	0.038	0.000	14,286
	Propane	1.2	0.002	-0.008	1.157	0.042	0.000	15,496
Strafford	Fuel Oil	1.2	0.052	-0.001	0.923	0.034	0.109	12,833
	Natural Gas	0.9	0.159	-0.011	0.715	0.039	-0.001	4,358
	Propane	1.2	0.002	-0.008	1.128	0.041	0.000	3,148
Sullivan	Fuel Oil	1.2	0.050	-0.001	0.893	0.033	0.106	5,327
	Natural Gas	1.1	0.182	-0.012	0.816	0.045	-0.001	1,937
	Propane	1.4	0.002	-0.017	1.461	0.052	-0.002	1,695

To broadly quantify GHG and co-pollutant emission reductions if existing space and water heating systems that are fueled by fuel oil, propane, and natural gas are replaced with air or ground source heat pump systems at single-family homes in New Hampshire, NHDES used the following methodology and assumptions in its calculations:

- Because NREL's ResStock tool currently models installation of ducted heat pumps to address space cooling demands that are not representative of New Hampshire's demands, the analysis for space heating and cooling is based on ductless systems. NREL Rewiring America are working

on modifying the sizing assumptions and modeling cold-climate heat pumps, which will solve this issue.

- Assumed that New Hampshire could replace 20,000 residential fossil-fueled heating systems with heat pump systems each year, which is the number the [State of Maine accomplished over a 5-year period from 2019 and 2023](#).
- Assumed that 20,000 heat pump replacements per year would be installed on an equivalent percentage basis across all New Hampshire counties and fossil-fuel types. Based on the total number of homes that currently use fossil fuels as their primary space heating source, which is 302,906 based on NREL housing data, this would be 6.6% of single-family homes per year for space heating (302,906 homes / 20,000 replacements per year \approx 6.6%); and 8.4% of single-family homes per year for water heating (239,223 homes / 20,000 replacements per year \approx 8.4%)
- If New Hampshire began replacing existing fossil-fuel fired heating systems at rate of 20,000 per year beginning in 2025, then all of New Hampshire's single-family homes that currently use fossil fuels as their primary space heating source would be replaced within approximately 15.15 years and by 2040. All of New Hampshire's single-family homes that currently use fossil fuels as their primary water heating source would be replaced within approximately 11.96 years and by 2036.
- Assumed that heat-pumps would be replaced nearly immediately after the end of their useful life.
- NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude each successive year from 2025 through 2030 and from 2025 to 2050 until all fossil-fueled fired systems are replaced with electric heat pumps. For space heating and cooling systems, all replacements would be complete by 2040; for water heating systems, by 2036. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years, but annual emissions reductions did not increase after 2040 for space heating and 2036 for water heating.

A.2.2 Weatherization to Improve Energy Efficiency in Buildings

Rewiring America used The Cube to estimate GHG and co-pollutant emission reductions when an existing single-family home in New Hampshire with inadequate insulation is upgraded with a basic insulation package. The Cube's estimates are based on several assumptions, including the following:

- All values are per-household averages for a standard, single-family home in New Hampshire.
- Attic floor insulation up to International Energy Conservation Code (IECC)-Residential 2021 levels depending on climate zone, which is R-60 for New Hampshire's 5A and 6A climate zones (IECC, 2024).
- General air sealing to achieve a 30% reduction in Air Changes per Hour @ 50 Pascals (ACH₅₀).
- Duct sealing to 10% leakage.

- R-13 drill-and-fill insulation (if the home currently has wood stud walls with no insulation).
- Estimates of emission reductions use emission factors from NREL's Cambium Tool based on a 95% decarbonized electricity generation sector by 2050, and then are levelized over 15 years with a 3% discount rate (NREL, 2024).

Table A-3 shows results of The Cube's per-household annual average emission reduction estimates at the county level for MTCO_{2e}, NH₃ kg; SO₂ kg, NO_x kg, VOC kg, and PM_{2.5} kg. Although the emission reduction estimates of Table A-3 rely on broad approximations and assumptions, they are sufficient for evaluating emission reductions associated with upgrading homes that would benefit from a basic insulation package at scale.

Table A-3. Per-Household Average Annual Emission Reduction Estimates after Upgrading a Standard Single-Family Home in New Hampshire that has Inadequate Insulation with a Basic Insulation Package.

County	Baseline Fuel	MTCO _{2e}	NH ₃ (kg)	SO ₂ (kg)	NO _x (kg)	VOC (kg)	PM _{2.5} (kg)
Belknap	Fuel Oil	1.7	0.06	0.01	1.12	0.04	0.13
	Natural Gas	3.0	0.39	0.01	1.82	0.11	0.01
	Propane	6.0	0.02	0.02	4.96	0.19	0.02
Carroll	Fuel Oil	3.1	0.11	0.03	2.05	0.08	0.24
	Natural Gas	0.2	0.02	0.00	0.11	0.01	0.00
	Propane	3.0	0.01	0.01	2.48	0.10	0.01
Cheshire	Fuel Oil	4.2	0.16	0.04	2.81	0.11	0.33
	Propane	1.8	0.01	0.01	1.50	0.06	0.00
Coos	Fuel Oil	5.0	0.19	0.04	3.34	0.13	0.40
	Propane	1.2	0.00	0.00	0.95	0.04	0.00
Grafton	Fuel Oil	3.6	0.13	0.03	2.38	0.09	0.28
	Natural Gas	1.1	0.14	0.00	0.68	0.04	0.00
	Propane	2.8	0.01	0.01	2.32	0.09	0.01
Hillsborough	Fuel Oil	3.5	0.13	0.03	2.32	0.09	0.27
	Natural Gas	1.9	0.25	0.01	1.20	0.07	0.01
	Propane	3.2	0.01	0.01	2.60	0.10	0.01
Merrimack	Fuel Oil	3.5	0.13	0.03	2.32	0.09	0.27
	Natural Gas	2.8	0.37	0.01	1.76	0.10	0.01
	Propane	1.9	0.01	0.01	1.57	0.06	0.00
Rockingham	Fuel Oil	2.7	0.10	0.02	1.77	0.07	0.21
	Natural Gas	3.1	0.41	0.01	1.93	0.11	0.01
	Propane	1.0	0.00	0.00	0.86	0.03	0.00
Strafford	Fuel Oil	3.3	0.12	0.03	2.17	0.09	0.26
	Natural Gas	0.5	0.06	0.00	0.28	0.02	0.00
	Propane	5.6	0.02	0.02	4.58	0.18	0.01
Sullivan	Fuel Oil	5.1	0.19	0.04	3.40	0.13	0.40
	Propane	2.0	0.01	0.01	1.68	0.07	0.01

To broadly quantify GHG and co-pollutant emission reductions from a weatherization measure in New Hampshire, NHDES used the data in Table A-3 to estimate reductions based on the number of households that would utilize a basic insulation package each year starting in 2025. NHDES used the following methodology in its calculations:

- Applied the percentage of population for each county within in the state to the percentages of the number of households in the state (i.e., approximately 557,220 households distributed by county population).
- Assumed that New Hampshire could weatherize 1,000 homes per year, which is between the range of annual participants that the New Hampshire utilities projected in their [2024-2026 New Hampshire Statewide Energy Efficiency Plan](#) for their Home Performance Program and Income-Eligible Home Energy Assistance Program.
- Assumed that number of weatherization upgrades at homes would be implemented on an equivalent percentage basis per year across all New Hampshire counties and fuel types.

NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude in each successive year from 2025 through 2030 and from 2025 to 2050. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years.

A.3 Local Government Building and Facility Measures

A.3.1 Resilient Local Energy Systems

NHDES applied equations developed by a consultant that used NREL's [PVWatts® Calculator](#) and [REopt® Tool](#) to estimate GHG and co-pollutant emissions reductions based on a case evaluation. The PVWatts® Calculator estimates the energy production of PV energy systems by calculating the performance of potential PV installations based on certain assumptions and inputs. The REopt® Tool evaluates the economic viability of distributed PV, identifies system sizes and dispatch strategies to minimize energy costs, and estimates how long a system can sustain critical load during a grid outage. In those models, the consultant assumed 387 kW rooftop solar installations with 50 kW battery capacity capable of storing 153 kWh of electric power. For the evaluated case, NHDES assumed allocating \$2 million of funding per year to the measure, excluding administrative costs.

NHDES used the following equations to estimate annual GHG emission reductions from the measure:

- $0.7 \times (\$2 \text{ million} / 817,154) \times 237 \approx 406 \text{ MTCO}_2\text{e}$
- $0.17 \times (\$2 \text{ million} / 817,154) \times 1,000 \text{ kg/MT} = 416 \text{ kg NO}_x$
- $0.17 \times (\$2 \text{ million} / 817,154) \times 1,000 \text{ kg/MT} = 416 \text{ kg SO}_2$
- $0.01 \times (\$2 \text{ million} / 817,154) \times 1,000 \text{ kg/MT} = 24 \text{ kg PM}_{2.5}$

NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude each successive year from 2025 through 2030 and from 2025 to 2050. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years.

A.3.2 Improving Energy Efficiency at Wastewater and Drinking Water Systems

NHDES used [EPA's online AVOIDed Emissions and geneRation Tool \(AVERT\)](#) to estimate GHG and co-pollutant emissions reductions based on a case evaluation. AVERT uses hourly data from EPA's Air

Markets Program Data and National Emissions Inventory to perform statistical analysis on actual behavior of past electricity generation and emissions data given various regional electricity sector demand levels, including New England's electricity grid.

For the evaluated case, NHDES assumed that energy efficiency and renewable projects at New Hampshire's municipal wastewater and drinking water systems would reduce New England's annual electricity production by 1 GWh. NHDES assumed the following in AVERT to obtain annual estimated GHG and co-pollutant emission reductions if New Hampshire's municipal wastewater and drinking water systems could reduce annual electricity consumption by 1 GWh.

- The 1 GWh reduction of total annual generation would be spread evenly throughout the year.
- When NHDES selected "New Hampshire" in the tool, the tool applied the electric grid mix area covered by NPCC New England (i.e., NEWE eGrid).

NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude each successive year from 2025 through 2030 and from 2025 to 2050. Therefore, the emission reductions of each year after 2025 included the sum of annual reductions achieved during the year and the reductions achieved in the prior years.

A.4 Waste and Material Management Measure

A.4.1 Expand Programs for Waste Reduction, Diversion and Recycling

NHDES used [EPA's Waste Reduction Model \(WARM\)](#) to estimate GHG emissions reductions based on a case evaluation of reductions to food waste, concrete, and asphalt concrete disposed at New Hampshire's landfills. This evaluation used those three waste types because the state's statutory disposal reduction goal is tracked by weight of MSW and C&D. According to EPA national disposal data, food waste makes up a significant portion of MSW by weight, as does concrete and asphalt concrete for C&D. WARM provides high-level comparative estimates of the potential GHG emissions, energy savings, and economic impacts of materials managed in baseline and alternative materials management practices, including source reduction, recycling, composting, anaerobic digestion, combustion, and landfilling.

For the first part of the evaluated case, NHDES estimated total food waste disposed at landfills based on the following values and assumptions:

- 702,153 short tons of MSW from in-state sources are landfilled in New Hampshire annually, which is based on values reported to NHDES in 2022.
- NHDES assumed the following values, which NHDES inputted into the WARM:
 - 168,517 short tons (24%) of the reported in-state MSW is food waste based on [EPA estimates](#).
 - 6,067 short tons (3.6%) of that food waste could be reduced.
 - 16,582 short tons (10%) of that food waste could be composted.
 - 16,582 short tons (10%) of that food waste could be broken down by anaerobic digestors.

- The remaining food waste, 128,747 short tons, would continue to be landfilled.

For the second part of the evaluated case, NHDES estimated total asphalt concrete and concrete disposed at landfills based on the following values and assumptions:

- 266,333 short tons of C&D are landfilled in New Hampshire annually, which is based on values reported to NHDES in 2022.
- Approximately 258,343 shorts (97%) of that C&D are from in-state sources.
- NHDES assumed the following values, which NHDES inputted into the WARM:
 - 127,914 short tons (49.5%) of the reported in-state C&D was concrete based on [EPA estimates](#).
 - 12,791 short tons (10%) of that concrete could be recycled and the remaining 115,123 shorts tons would continue to be landfilled.
 - 8,303 short tons (3.4%) of the reported in-state C&D was asphalt concrete based on [EPA estimates](#).
 - 440 short tons (5%) of that asphalt concrete could be reduced.
 - 404 short tons (5%) of that asphalt concrete could be recycled.
- NHDES assumed annual emissions reductions from the measure would begin in 2025 and would be achieved at the same magnitude each successive year from 2025 through 2030 and from 2025 to 2050. NHDES did not assume that emission reductions from prior year would continue into successive years.

Appendix B: Summary Reports of Engagement Events

This appendix provides key themes and points shared by attendees of the Community Conversations and Stakeholder Gatherings facilitated by NH Listens and NHDES; organized by sector, modality and location. Copies of detailed summary reports, event flyers and presentation slides for each event may be found at the [NH Listen's webpage](#) under "WHAT WE LEARNED, COMMUNITY OUTREACH 2023-24".

B.1 Online Community Conversation Summary Report Notes by Sector

Three events were held:

- First Online Community Conversation – December 6, 2023, 4:30 to 6:00 pm, 34 participants.
- Second Online Community Conversation – January 9, 2024, 5:00 to 6:30 pm, 19 participants.
- Third Online Community Conversation – January 24, 2024, 6:30 to 8:00 pm, 21 participants.

B.1.1 Transportation

Participants shared wide-ranging ideas about reducing greenhouse gas emissions in transportation and other wide-ranging projects related to living in New Hampshire. The need for more public transportation, bus routes and higher ridership, walkable cities and towns, awareness and education and close to home opportunities for recreation. Participants noted that the sector is a large source of emissions in New Hampshire, there is opportunity to focus on transportation alternatives to reduce emissions.

- Projects highlighted for additional discussion:
 - Increased funding for public transportation and bus routes.
 - Infrastructure for low-emission transportation, such bike lanes and rail trails.
 - Public and community electric vehicle charging stations, especially for renters.
- Barriers to highlighted projects:
 - Low priority in state funding for public transportation.
 - New Hampshire's low population density and land use patterns, including sprawl.
 - Car-dependent infrastructure and behaviors.
 - Low ridership, awareness and perception.
 - Access and infrequency; workforce availability.
 - Renters and landlords have different incentives towards electric vehicle charging.
 - Focusing solely on electric vehicle charging is not equitable or reduce car-dependency.
- Potential partners for highlighted projects:
 - New Hampshire Department of Transportation.
 - New Hampshire Legislature.
 - Local governments.
 - Service Link Community Action Programs.
 - Workforce development programs.

B.1.2 Electricity Generation and/or Use and Industry

Priorities in this sector include updating the grid and adding more residential and community solar arrays. Expedited closure of Bow Power and increasing community-based solar programs were emphasized. Examples such as Green Mountain Power and increasing and diversifying energy storage were noted. Participants expressed passion to ‘think big’ and remove fossil fuel from the grid. Other wide-ranging projects were discussed including indoor air quality, induction stoves and weatherization.

- Projects highlighted for additional discussion:
 - Small and medium size community solar projects and storage systems.
 - Community microgrids.
 - Incentives for landlords to install electric vehicle charging stations, solar and weatherization efforts.
- Barriers to highlighted projects:
 - Community support and cost to municipalities.
 - Technical support to municipalities.
 - Costs to landlords when housing and rents are a considerable issue in New Hampshire.
- Potential partners for highlighted projects:
 - New Hampshire-based utility companies.
 - Solar energy installers and providers.
 - Regional Planning Commissions and energy circuit riders, Weatherization programs.

B.1.3 Commercial and Residential Buildings

Participants emphasized weatherization programs and limitations with New Hampshire SAVES program. Adding alternative energy infrastructure to commercial and municipal buildings was also a focus. Expanding energy audits, heat pumps, adaptive building reuse and connecting existing funding programs (ex. Lead abatement) with other weatherization funding were noted as opportunities.

- Projects highlighted for additional discussion:
 - Incentives for building efficiency measures, like audits, heat pumps and weatherization.
 - Workforce development and training, including paid apprenticeships in weatherization.
 - Build out contractor capacity.
 - Create opportunities for renters to secure effective approaches to heating, home energy and electric vehicle charging.
- Barriers to highlighted projects:
 - Lack of centralized place for all weatherization information and funding; siloed funding streams that result in stalled projects.
 - Few qualified contractors and lack of training opportunity and time.
 - Renters cannot access incentive programs and landlords unable or unwilling.
 - Housing affordability.
- Potential partners for highlighted projects:
 - Town energy committees.
 - Community Action Program weatherization programs.
 - Contractors.

- Workforce development and community colleges.
- Multi-family housing developers.

B.1.4 Natural & Working Lands and Agriculture

Priorities in this sector include maintaining and expanding green spaces and tree canopy and addressing heat islands, specifically in disadvantaged areas. Protecting wetlands, open space, forests and agricultural lands were emphasized, as well as connections with New Hampshire's forest economy. Education, legislation and raising community awareness about wide-ranging greenhouse gas reduction efforts were discussed.

- Projects highlighted for additional discussion:
 - Preserve wetlands and forests to maximize carbon storage and sequestration capabilities.
 - Support small farmers.
 - Provide access to electrified farm equipment and cleaner transportation options.
- Barriers to highlighted projects:
 - Challenging economics of New Hampshire's forest economy.
 - Complex state regulations to wetlands.
 - Technical assistance for municipalities and small farmers; tractor options (no mid-sized electric vehicles) and costs are limited to small farmers.
- Potential partners for highlighted projects:
 - National Forest Service.
 - NHDES Wetlands.
 - United States Dept of Agriculture and Natural Resources Conservation Service.
 - New Hampshire farming community.

B.1.5 Waste & Materials Management and Wastewater

Participants discussed recycling waste back into the grid and reducing waste at the local level. Air pollution from Penacook Incinerator was an example of impacts disproportionately affecting low-income communities. Participants discussed wide-ranging projects and community education about waste and materials management, including local waste stations could not install the desired solar systems due to complex regulations.

- Projects highlighted for additional discussion:
 - Waste reduction and reuse (i.e., preventing waste being generated in the first place).
 - Recycling and waste diversion (i.e., avoiding disposal of items in a landfill or incinerator).
 - Incentives for anaerobic digesters to recycle waste for energy back to grid.
- Barriers to highlighted projects:
 - Educating the public.
 - Legislation and political will.
 - Technical assistance.
 - Funding at municipal level.

- Potential partners for highlighted projects:
 - Natural Resources Conservation Services.
 - Municipalities.
 - Legislators.
 - Product manufacturers.

B.2 Online Cross-Sector Stakeholder Gathering Summary Report Notes by Sector

Three events were held:

- First Online Stakeholder Gathering – November 30, 2023, 2:30 to 4:00 pm, 46 participants.
- Second Online Stakeholder Gathering –January 11, 2024, 3:30 to 5:00 pm, 53 participants.
- Third Online Stakeholder Gathering – February 8, 2024, 3:00 to 4:30 pm, 76 participants.

B.2.1 Transportation

Participants brainstormed many specific, desired projects to reduce climate pollution in New Hampshire’s transportation sector. Projects included increasing electric vehicle fleets for municipalities, schools and university systems to addressing the charging stations, building codes and infrastructure systems needed. The need for more public transportation, regional bus routes and safe, accessible infrastructure for transportation alternatives were included. Technical support for municipalities, connections to current programs and funding streams and adopting low-emissions standards and policies were noted. Stakeholders continue to focus on opportunities to reduce emissions from the transportation sector given its outsized contribution to New Hampshire’s total emissions.

- Projects highlighted for additional discussion:
 - Electric vehicle charging infrastructure in residential areas with emphasis on access and affordability in underserved communities / multi-unit rental properties.
 - Municipal-owned electrification of vehicle fleets, buses, equipment.
 - Improving public transportation accessibility, connections and ridership.
 - Funding for infrastructure improvements for low to no-emissions transportation, such as e-bikes, bike lanes and pedestrian safety.
- Barriers to highlighted projects:
 - Limited use of gas tax not invested in public transit; incentivizing electric vehicle purchases for municipalities.
 - Renters and landlords have different incentives towards electric vehicle charging.
 - Focusing solely on Electric Vehicle charging is not equitable or reduce car-dependency.
- Potential partners for highlighted projects:
 - NHDOT.
 - Regional Planning Commissions.
 - local governments.
 - Service Link Community Action Programs.
 - Workforce development.

B.2.2 Electricity Generation and/or Use and Industry

Priorities in this sector include adding renewable energy to the grid, notably community solar projects, offshore wind, municipal sources such as landfills and virtual power plant concept of distributed sources. Modernizing the system, accounting for energy storage and addressing the Bow Power plant were discussed. Providing technical assistance to municipalities trying to move community solar and other projects forward was emphasized.

- Projects highlighted for additional discussion:
 - Small and medium size community solar projects and storage systems.
 - Community microgrids.
 - District heating and cooling systems.
- Barriers to highlighted projects:
 - Community support and cost to municipalities; technical support to municipalities.
 - Utility cooperation and communication.
 - Local zoning for solar.
 - State regulatory issues.
- Potential partners for highlighted projects:
 - Community Power Coalition of New Hampshire.
 - Clean Energy New Hampshire.
 - Revision Energy.
 - Biomass industry.

B.2.3 Commercial and Residential Buildings

Participants discussed expanding and connecting financing and incentive programs that homeowners, landlords and commercial buildings have access to. While residential and multi-unit buildings were a focus, it was noted that renters face barriers in benefiting from available programs. Opportunities for commercial and municipal owned buildings were discussed. Specific projects ideas around weatherization, energy audits, heat pumps and adaptive building reuse were shared. Workforce and skills training are needed to meet demand.

- Projects highlighted for additional discussion:
 - Support and promote net-zero energy in public buildings as a community approach.
 - Provide incentives for commercial/ office building owners to (e.g., install affordable electric vehicle charging for their tenants.
 - Incentives and/or cost support for solar energy for town offices, schools.
 - Heat-pumps incentives – increased adoption for space and water heating by supporting the supply chain, building a workforce and activating consumer demand.
 - Weatherization incentive programs and electrical system improvements.
- Barriers to highlighted projects:
 - Lack of centralized place for all weatherization information and funding.
 - Siloed funding streams that result in stalled projects.

- Community buy-in and project champions; technical assistance needed for municipalities.
- Few qualified contractors and lack of training opportunity and time.
- Renters cannot access incentive programs and landlords unable or unwilling.
- Housing affordability.
- Potential partners for highlighted projects:
 - Town energy committees.
 - Resident Owned Communities (ROC).
 - New Hampshire Saves, Community Action Program weatherization programs.
 - Contractors.
 - Workforce development and community colleges.
 - Multi-family housing developers.

B.2.4 Natural & Working Lands and Agriculture

Priorities in this sector include preserving and expanding green space, forests, wetlands and farms. Supporting local, small farms, electrical farm equipment, healthy soils and local food systems was emphasized and reducing food waste and composting. Education and raising community awareness to how our food systems and open lands are connected to climate pollution was encouraged.

- Projects highlighted for additional discussion:
 - Preserve wetlands and forests and other green infrastructure.
 - Funding land conservation; agricultural lands for preservation and conservation.
 - Sustainable agriculture practice, supporting small farmers.
 - Maintain trees and plants in urban areas.
 - Incentivize sustainable agriculture practices.
- Barriers to highlighted projects:
 - Policy and political barriers; conservation funding.
 - Community buy-in; available open space and pressure to develop land for housing and uses.
- Potential partners for highlighted projects:
 - Local Conservation Commissions.
 - Land Trusts.
 - Regenerative Roots.
 - Freshstart Farms.
 - Farming businesses.
 - County Conservation Districts.
 - New Hampshire Food Alliance.
 - New Hampshire Department of Agriculture.
 - Arbor Day Foundation.

- University of New Hampshire Cooperative Extension.
- Society for the Protection of New Hampshire Forests.
- University of New Hampshire Sustainability Institute.

B.2.5 Waste & Materials Management and Wastewater

Participants discussed recycling waste back into the grid, including anaerobic digesters and reducing waste at the local level. Reducing food waste, composting, required recycling, eliminating plastics were shared. The sector also included the need for upgrading infrastructure and technical assistance to municipalities.

- Projects highlighted for additional discussion:
 - Incentives for anaerobic digesters to recycle waste for energy back to grid.
 - Incentives for subsidizing composting to get food scraps out of the waste stream (aerobic digestion).
 - Authority for NHDES to proactively addressing waste and transportation of waste.
- Barriers to highlighted projects:
 - Educating the public.
 - Patterns of consumption.
 - Legislation and political will.
 - Expense for new composting facilities.
 - Infrastructure.
 - Technical assistance.
 - Funding.
- Potential partners for highlighted projects:
 - NHDES.
 - Residents.
 - Natural Resources Conservation Services.
 - Municipalities.
 - Legislators.
 - Product manufacturers.

B.2.6 Workforce Development

Participants also discussed priorities for workforce development in recognition that the topic cuts across all the sectors. Select projects discussed include:

- Industry training for contractors, heating ventilation and air conditioning professionals, other building trades.
- Build out contractor capacity and Career Tech program needs for New Hampshire's students, including High Roads Training Partnership Programs.
- Address barriers to licensure of skilled trades people.

B.2.7 Linkages to Public Health

Connection to public health cuts across all sectors and is important in addressing Justice40 principles in New Hampshire. The following select projects, concerns and barriers were discussed:

- Air quality in urban areas.
- Improving public transportation, electrifying buses, more options for walking and alternative transportation modes.
- Locating power plants, incinerators and other greenhouse gas emissions infrastructure disproportionately affecting disadvantaged communities.
- Greenspace, tree canopy, plants in urban areas.
- Access to local foods and farms.

B.3 In-person Community Conversation Summary Reports by Location and Sector

Seven in-person events were held.

B.3.1 Greater Seacoast region event in Hampton on January 17, 2024, 5:30 to 7 pm, 19 participants.

- Transportation:
 - Residents talked about needed investment in developing reliable, sustainable modes of public transportation, particularly public buses and shuttles.
 - Car-free designs, including rail trails, were also a priority for both recreational and non-recreational means.
 - Partnering with existing transit providers and local businesses, outdoors groups and educators were noted.
- Electricity Generation and/or Use and Industry:
 - Priorities under this sector include updating the grid and introducing sustainable sources of power including solar and tidal power.
 - Increasing storage and diversifying means of energy storage is important, as well as utilizing underused spaces for energy generation, including solar farms.
 - Participants identified potential partnerships with New Hampshire-based utility companies and private energy installers and providers (i.e., solar providers).
- Commercial and Residential Buildings:
 - Participants identified success in these areas as effectively repurposing existing buildings to address needs in a particular community (such as using a former commercial space as a residential one, or vice versa).
 - Weatherization programs were also discussed, with potential projects to incentivize weatherizing new and existing buildings being spotlighted.
 - Residents identified partners like owners of commercial and residential buildings, builders & contractors and environmental groups.
- Natural & Working Lands and Agriculture:
 - Residents in Greater Seacoast want to prioritize green spaces (i.e., parks and community gardens) and utilizing underused spaces, like parking lots.

- To mitigate negative externalities caused by flooding in the region, participants noted projects that could support flood-related adversities.
- Partnerships with conservation organizations, local government and developers are key.
- **Waste & Materials Management and Wastewater:**
 - Residents discussed recycling waste back to the grid and mitigating waste on the locally.
 - Programs around composting were discussed, as well as community education to inform community members about the importance and process of composting in the Seacoast.
 - Partnering with the town, local businesses and organizations that prioritize recycling and reuse (like garden clubs and composting services) was acknowledged.

B.3.2 Greater Nashua region event in Nashua on January 18, 2024, 5 to 6:30 pm, 18 participants.

- **Transportation:**
 - Community members discussed expanding public transportation and other mass transit options to reduce the frequency of personal vehicles on the road.
 - Other transportation infrastructure considerations were micro-transit options to accommodate bikes, scooters and walking.
 - Municipal departments with fleets were also brought up about opportunities to electrify their fleet of vehicles.
 - Potential partners include local public and private transit providers and select municipal departments.
- **Electricity Generation and/or Use and Industry:**
 - The conversation around electrifying vehicle fleets was also discussed in this sector, as well as supporting electricity vehicle infrastructure expansion.
 - Participants talked about the importance of developing business models and maintenance management for electric vehicle infrastructure and use.
 - Partnerships named include research universities, technical schools and energy companies and providers.
- **Commercial and Residential Buildings:**
 - High-level priorities for this sector include creating incentives for builders to consider energy efficiency, electricity charging capacity and greenspace conservation regarding new buildings.
 - There was conversation around having a central location for the public to access information, resources and services around energy efficiency in buildings.
 - Potential partnerships named include utility companies, builders and developers and residential property owners.
- **Natural & Working Lands and Agriculture:**
 - Community members in this sector highlighted open space and the need for open space protection and education to the public about the benefits of urban forestry.
 - Partners identified in this sector include local schools and universities, local businesses and conservation organizations.
- **Waste & Materials Management and Wastewater:**

- Community members discussed the infrastructure investment needed for wastewater treatment facilities, expanding capacity and moving towards anaerobic digesters.
- Participants discuss varying opportunities for recycling including public education, collecting compost and capturing and using methane.
- Potential partners include sustainability committees, waste management companies and high-residency business owners.

B.3.3 Greater Connecticut River Valley event in Claremont on January 25, 2024, 5:30 to 7 pm, 11 participants.

- Transportation:
 - Community members discussed investing in sustainable, reliable public transportation.
 - Urban infrastructure could also tend to pedestrian and bike-friendly design.
 - Public education was also emphasized to inform the community on what it means to transition to cleaner modes of transportation.
 - Potential partners mentioned include schools, bicycle groups and energy-focused organizations.
- Electricity Generation and/or Use and Industry:
 - Priorities under this sector include investing in solar infrastructure.
 - Ideas for solar projects include general investment for solar arrays and incentives for homeowners to purchase solar.
 - Recycle and reuse was also discussed, including filtering ash, metals and nitrogen and sulfur oxides.
- Commercial and Residential Buildings:
 - Energy efficiency programs were considered under this sector, one major project discussed being the bulk buying and installation of residential heat pumps.
 - The groups talked about to potential to provide weatherization efforts to neighborhood homes in clusters.
 - Potential partners include housing authorities and energy efficiency contractors.
- Natural & Working Lands and Agriculture:
 - Participants wanted to prioritize conservation.
 - One group discussed efforts to empower conservation commissions to protect wet canals.
 - In the second round, the group discussed forestry education for landowners and foresters alike.
 - Partners that could be involved in the mentioned processes include farmers, waste management companies and school boards.

B.3.4 Greater Monadnock region event in Winchester on January 25, 2024, 6 to 7:30 pm, 2 participants.

- Transportation & Electricity Generation and/or Use and Industry:
 - Updating the grid was considered a priority for the Greater Monadnock region.
 - Expanding existing infrastructure is necessary to usher in clean energy measures such as solar power and electric vehicle charging.
 - Participants noted the various opportunities to expand electric vehicle infrastructure (like EV fleets and charging stations) in the region at the municipal, school and private sector levels.

B.3.5 North Country region event in Berlin on January 31, 2024, 5 to 6:30 pm, 19 participants.

- Transportation:
 - Expanding the capacity of the electrical grid to support electric vehicle infrastructure, including electric vehicle charging for vehicles.
 - Building out off-road bike paths and rail trails separate from car traffic.
 - Partnering with local organizations that can advocate for and encourage employees to seek alternate modes of commuting.
- Electricity Generation and/or Use and Industry:
 - Utilizing buildings to support energy efficiency measures (i.e., solar on roofs) and installing electric vehicle charging for vehicles, e-bikes, etc.
 - Partnering with utility companies and property owners and developing implementation groups.
- Commercial and Residential Buildings:
 - Installing electric vehicle charging stations at high-traffic areas including schools, businesses and banks.
 - Installing solar farms, with attention to where it is installed, including superfund sites and landfills.
 - Partnering with local community colleges to establish new and/or support existing programs to provide postsecondary education, develop workforce and implement energy efficient services.
- Natural & Working Lands and Agriculture:
 - Investing in green spaces: including planting trees in central locations and maintaining forests.
 - Supporting local farmers and the services they can provide to the community.
 - Partnering with state and local partners that can oversee agricultural and conservation efforts like state parks, local farmers and community-based organizations.

B.3.6 Greater Manchester region event in Manchester on February 1, 2024, 5 to 6:30 pm, 23 participants.

- **Transportation:**
 - Expanding public transportation access, as well as bike and pedestrian infrastructure.
 - Establishing a diverse ecosystem of electric vehicles and charging stations.
 - Partnering with tech-focused companies and organizations.
- **Electricity Generation and/or Use and Industry:**
 - Supporting investments in community solar including solar for multi-unit dwellings, public buildings and commercial spaces.
 - Partnering with property and landowners to encourage solar panels and other energy efficiency measures.
- **Commercial and Residential Buildings:**
 - Providing heating ventilation and air-conditioning professionals with information about alternative cost-saving and energy-efficient heating ventilation and air-conditioning measures that can be relayed to homeowners.
 - Offering incentives to homeowners and landlords to install weatherization measures.
 - Partnering with installation and weatherization services.
- **Natural & Working Lands and Agriculture:**
 - Creating an urban incentive for greenspaces that benefits the public including projects that address run-off reduction, carbon sequestration and biodiversity.
 - Educating the public on good forestry practices and delineating extractive versus destructive practices to promote ongoing care of local trees and forests.
 - Partnering with land trusts, research institutions and other relevant stakeholders on land management.
- **Waste & Materials Management and Wastewater:**
 - Supporting stormwater treatment through natural filtration; avoiding mixing stormwater and sewage.
 - Partnering with community planners that support improving wastewater treatment.
- **Workforce Development:**
 - Promoting training and licensure for workforce development, with attention to youth programming.
 - Working with local schools to promote existing and cultivate new accessible pathways to community colleges, trade schools and apprenticeship programs.
- **Linkages to Public Health:**
 - Providing incentives for building and maintaining greenspace, expanding the capacity of local farms and providing education around urban corridors for wildlife.
 - Acknowledging public concerns that specific measures to improve neighborhood are believed to lead to gentrification.
 - Partnering with the local community to create coalitions of citizens that want to improve public health.

B.3.7 Greater Capitol region event in Concord on February 12, 2024, 5 to 6:30 pm, 28 participants.

- Transportation:
 - Supporting public infrastructure that is accessible (i.e. universal adapters) to expand electric vehicle use.
 - Expanding public transportation, with a focus on smaller transit vehicles that can serve smaller populations with flexible routes.
 - Partnering with employers, landlords and local Chamber of Commerce.
- Electricity Generation and/or Use and Industry:
 - Providing education and training for incoming workforce to install and maintain energy-saving measures, like solar and heat pumps.
 - Upgrading local scale transmission to support new sources of energy.
 - Partnering with community power providers, utility companies and solar businesses.
- Commercial and Residential Buildings:
 - Providing incentives to prompt increased use of sustainable materials to build commercial and residential units.
 - Expand weatherization investments for non-profit social services agencies, mental health centers, community health centers, childcare centers, etc.
 - Working with local and regional groups like Resilient Buildings Group and Clean Energy New Hampshire, as well as local property owners.
- Natural & Working Lands and Agriculture:
 - Providing support for municipal and local trusts to purchase conservation easements on forested lands from willing private landowners.
 - Promoting urban forestry and engaging in sustainable practices like planting trees and planning across forest parcels.
 - Partnering with farmers, natural resources services and land trusts.
- Waste & Materials Management and Wastewater:
 - Supporting regional composting facilities and anaerobic digesters processes.
 - Addressing wastewater plant repairs and updates.
 - Partnering with local composting companies, solid waste management companies and researchers.
- Workforce Development:
 - Coordinating a needs assessment to understand what employment and educational gaps are present in the Greater Capitol Region.
 - Supporting post-secondary institutions that are working to recruit and retain talent in the Greater Capitol Region.
 - Partnering with practitioners and institutions like trade associations, credentialed mentors and apprenticeship programs.
- Linkages to Public Health:
 - Expanding opportunities to farm and harvest fresh produce, focus on growing and eating local foods.
 - Partnering with local organizations like Girl Scouts and Boy Scouts, University of New Hampshire Extension and New Hampshire Audubon.

Appendix C: Current Stakeholder List

This appendix includes a list of affiliations as named by participants who joined the NH Listens and NHDES engagement events and who contacted NHDES by email during the development of the PCAP. Detailed lists of affiliations and hometowns provided by attendees of each engagement event may be found at the [NH Listen's webpage](#) in the “Read the summary” links under “WHAT WE LEARNED, COMMUNITY OUTREACH 2023-24”.

- 350 New Hampshire
- 350 New Hampshire Youth Team
- ACTS Now
- American Institute of Architects
- American Short Line and Regional Railroad Association
- Amherst Commissioner
- Ammonoosuc Community Health Services
- Ammonoosuc Conservation Trust
- Ammonoosuc Community Health Services, Inc.
- AMP
- Appalachian Mountain Club
- Apprenticeship NH
- Bike-Walk Alliance of New Hampshire
- BW Research Partnership
- Canterbury Community Power Committee
- Casella Waste systems
- Center for EcoTechnology
- Ceres, Inc.
- Cheshire County Conservation District
- Citizens' Climate Lobby
- City of Berlin, Community Development Department
- City of Berlin, Planning Board
- City of Concord
- City of Dover
- City of Dover (Energy Commission)
- City of Keene
- City of Lebanon
- City of Nashua
- Clean Energy New Hampshire
- Climate Action New Hampshire
- Cochecho River Advisory Committee
- Cogan Climate Strategies
- Collaborative Solid Waste Strategies
- Community Behavioral Health Association of NH
- Community College System of NH
- Community Development Finance Authority
- Community Loan Fund
- Community Power Coalition of New Hampshire
- Concord Environment and Energy Advisory Committee

- Conservation Commission
- Conservation Law Foundation
- Cowasuck Band of the Pennacook Abenaki
- Cross New Hampshire Adventure Trail
- DDH Energy Consulting
- Dover Energy Commission
- Dunbarton Garden Club
- Durham resident
- Ecological Land Management
- Ecological Solutions Consulting
- Ecological Solutions, LLC
- Ecostrat, Biomass Advisory Group
- EF Design & Planning, LLC
- Endowment for Health
- Energy Audits Unlimited, LLC
- Eversource
- Fairman Marketing
- Federal Emergency Management Agency (FEMA)
- Fine Furniture Master
- Food Solutions New England
- Franklin Pierce University
- Friends of the Concord-Lake Sunapee Rail Trail
- Friends of the Northern Rail Trail (FNRT)
- Fuss & O'Neill
- Granite State Organizing Project (GSOP)
- Hannah Grimes Center
- Healthcare Workers for Climate Action
- Healthy Home Habitats
- Hopkinton Conservation Commission
- Hopkinton Waste Reduction Committee
- Hudson Sustainability Committee
- IBEW Local Union 490
- InDepthNH.org
- Indigenous New Hampshire Collaborative Collective
- Indigenous NH Collaborative Collective
- Ingeniator Group, LLC
- INRIX Signal Analytics
- Kent Street Coalition
- League of Conservation Voters
- Lebanon Energy Advisory Committee
- Manchester NAACP
- Mason energy commission
- Meredith Energy Committee
- Merrimack energy committee
- Metropolitan Area Planning Council
- MIRA Coalition
- MLK & Company
- Monadnock Climbers Association
- Monadnock Sustainability Hub
- Mount Washington Valley Climate Change Working Group
- Mount Washington Valley Trails Association
- Mt. Kearsarge Indian Museum

- Nashua Regional Planning Commission
- Nelson Clean Energy
- NEMO Equipment
- New Castle Energy Committee
- New England Grassroots Environment Fund
- New England Municipal Sustainability Network
- New England Power Generators Association (NEPGA)
- New Hampshire Association of Conservation Commissions
- New Hampshire Audubon
- New Hampshire Businesses for Social Responsibility
- New Hampshire Center for Equity and Justice
- New Hampshire Chapter Committee on the Environment
- New Hampshire Charitable Foundation
- New Hampshire Charitable Foundation (Tillotson Fund)
- New Hampshire Housing
- New Hampshire Manufacturing Extension Partnership (NH MEP)
- New Hampshire Municipal Association
- New Hampshire Network
- New Hampshire Public Health Association
- New Hampshire Public Radio (NHPR)
- New Hampshire Rail Trails Coalition
- New Hampshire Sea Grant
- New Hampshire Sierra Club
- New Hampshire Solar Renewable Energy Certificates
- New Hampshire State Climatologist
- NH Alliance for Immigrants and Refugees
- NH Association of Conservation Commissions
- NH Bureau of Trails
- NH Businesses for Social Responsibility
- NH Coastal Adaptation Workgroup (NHCAW)
- NH Coastal Adaptation Workgroup (UNH)
- NH Community Development Finance Authority
- NH Dept. of Business and Economic Affairs (NHBEA)
- NH Dept. of Environmental Services (NHDES)
- NH Dept. of Fish and Game
- NH Dept. of Health and Human Services (NHDHHS)
- NH Dept. of Health and Human Services, Division of Public Health Services
- NH Dept. of Health and Human Services, Office of Health Equity
- NH Dept. of Transportation (NHDOT)
- NH Food Alliance
- NH Healthcare Workers for Climate Action
- NH House of Representatives
- NH Network, Energy working group

- NH Network: Environment, Energy, Climate
- NH Network, Plastics Working Group
- NH Office of Planning & Development (BEA)
- NH Public Health Association
- NH Public Radio
- NH Rail Trails Coalition
- NHDES Coastal Program
- North American Sustainable Refrigeration Council
- North Country Council
- North Country Invasives Services
- Northeast Resource Recovery Association
- Northern Forest Center
- Office of Congressman Chris Pappas (NH-01)
- Office of Senator Shaheen
- Pelham Community Power Committee
- Pembroke Energy Committee
- Perpetual
- Perpetualuse
- Peterborough Renewable Energy Project
- Piscataqua Region Estuaries Partnership (PREP)
- Portsmouth Climate Action
- Portsmouth Sustainability Committee
- ReGenerative Roots
- Regulatory & Legislative Affairs Committee
- Resilience Planning and Design
- Resilient Buildings Group
- Resource Management Incorporated
- ReVision Energy
- Rindge Conservation Commission
- River Ridge Condo Association
- Rockingham Regional Planning Commission
- Rye Energy Committee
- Saint Anselm College
- Sandwich Conservation Commission
- Sandwich Energy Committee
- SAU 67 Bow-Dunbarton School District
- Seacoast Science Center
- SEE Science Center
- Sensiba, LLP
- Sierra Club
- Ski New Hampshire
- Society for the Protection of New Hampshire Forests
- Solaflect Energy
- Somersworth Conservation Commission
- South Church Social Justice Associates
- Southern NH Planning Commission
- Southern NH Services
- Southwest Region Planning Commission
- St. David's Episcopal
- Star Island Corporation
- Strafford Green Committee
- Sullivan County Conservation District
- Tallwood House

- Tamworth Energy Committee
- The Community Builders Hub - North Country Stewards
- The Dupont Group
- The Farmlink Project
- The Nature Conservancy New Hampshire
- The Penny Hoarder
- The Resilient American Communities (RAC) Network
- Third Act New Hampshire
- Town of Bedford
- Town of Bedford, Energy Commission
- Town of Durham
- Town of Enfield, Energy Committee
- Town of Exeter
- Town of Hampton
- Town of Hampton, Conservation Commission
- Town of Hampton, Planning Board
- Town of Sandwich, Energy Committee
- Town of Stratford
- Town of Winchester
- Town Peterborough
- TRC
- Trout Unlimited
- UNH - Cooperative Extension
- UNH - Dept of Natural Resources & Earth Systems Science
- UNH - Health Management and Policy Program
- UNH - Inst. Of Health Policy and Practice
- UNH - New Hampshire State Climate Office
- UNH - Sustainability Institute
- Union of Concerned Scientists
- Unitarian Universalist Action New Hampshire
- Unitarian Universalist Society of Laconia
- Unitol Service Corp
- University of New Hampshire (UNH)
- University of New Hampshire Carsey School of Public Policy
- University of New Hampshire Extension
- Upper Valley Lake Sunapee Regional Planning Commission
- Vapor Motive Company
- Wagner Forest Management
- Welcoming New Hampshire
- windowdressers.org
- World Wildlife Fund

Appendix D: Public Notice of Draft PCAP Measures

This appendix includes a copy of the request for public comment issued by NHDES on February 5, 2024. The public comment period remained open through February 20, 2024.

Notice of Request for Public Comment

Draft Priority Measures for New Hampshire's Priority Climate Action Plan

The New Hampshire Department of Environmental Services (NHDES) issues this Notice of Request for Public Comment for NHDES's draft Priority Measures for New Hampshire's Priority Climate Action Plan (PCAP).

Through the Inflation Reduction Act of 2022, the federal government provided many tools to pursue greenhouse gas (GHG) pollution reductions, including the Climate Pollution Reduction Grants (CPRG) program, which is being administered by United States Environmental Protection Agency (EPA). The CPRG program is providing \$4.3 billion in grants to states and local governments to develop and implement ambitious plans for reducing greenhouse gas emissions and other harmful air pollution. In implementing the CPRG, EPA seeks to achieve the following broad objectives:

- Tackle damaging GHG pollution while creating good jobs and lowering energy costs for families.
- Accelerate and empower community-driven solutions in low-income, disadvantaged communities.
- Reduce harmful air pollution in places where people live, work, play, and go to school.

On August 15, 2023, EPA awarded NHDES a noncompetitive CPRG planning grant to develop, among other things, a PCAP that must be submitted to EPA by **March 1, 2024**. The PCAP will be a narrative report that will include a focused list of New Hampshire's near-term, high-priority, and implementation-ready measures to reduce GHG emissions in the state. The PCAP is a pre-requisite for competing in the second phase of the CPRG program, during which EPA will competitively award \$4.3 billion in grants for implementation of measures listed in a PCAP. NHDES has developed a draft list of priority measures, which is available on the following NHDES website (*see next page for a copy*).

INSTRUCTIONS FOR SUBMITTING COMMENTS: NHDES will accept comments on its draft priority measures until **4 pm, February 20, 2024**. Only written comments will be accepted. Comments may be sent by postal mail, or email (**email is preferred**). Please include, your name, organization, mailing address, email address, and telephone number with your submittal.

By email: cprg@des.nh.gov. Please include the following text in the subject line: "Public Notice - Draft Priority Measures for New Hampshire's Priority Climate Action Plan".

By Mail: NHDES Climate Pollution Reduction Grants
Attention: Kurt Yuengling, Air Resources Division
NHDES Permitting and Environmental Health Bureau
P.O. Box 95
Concord, NH 03301-0095

For more information about the CPRG program, please visit the [Climate Pollution Reduction Grants](#) page of the NHDES website. For information about NHDES' community engagement for CPRG program, please visit NHDES' partner's, [New Hampshire Listens](#), website. If you have questions about the draft priority measures or have difficulties accessing a copy, please contact NHDES at cprg@des.nh.gov.



Notice of Request for Public Comment
Draft Priority Measures for New Hampshire's Priority Climate Action Plan
February 5, 2024

The New Hampshire Department of Environmental Services (NHDES) issues this Notice of Request for Public Comment on NHDES's draft Priority Measures for New Hampshire's Priority Climate Action Plan (PCAP). NHDES will accept comments on the draft priority measures until **4 pm, February 20, 2024**. Written comments should be submitted to cprg@des.nh.gov (please include "Public Notice - Draft Priority Measures for New Hampshire's Priority Climate Action Plan" in the email subject line) or mailed to the following address: NHDES CPRG; Attention: Kurt Yuengling, Air Resources Division; P.O. Box 95; Concord, NH 03301-0095.

Through the Inflation Reduction Act of 2022, the federal government provided many tools to pursue greenhouse gas (GHG) pollution reductions, including the Climate Pollution Reduction Grants (CPRG) program, which is being administered by United States Environmental Protection Agency (EPA). In implementing the CPRG, EPA seeks to achieve the following broad objectives:

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- Reduce harmful air pollution in places where people live, work, play, and go to school.

On August 15, 2023, EPA awarded NHDES a CPRG planning grant to develop a PCAP, among other deliverables, which NHDES must submit to EPA by **March 1, 2024**. The PCAP will be a narrative report that will include a focused list of New Hampshire's near-term, high-priority, and implementation-ready measures to reduce GHG emissions in the Granite State. Timely submittal of a PCAP is a prerequisite for competing in the second phase of the CPRG program, in which EPA will competitively award \$4.3 billion in grants to eligible entities for implementation of measures listed in their PCAP. NHDES has developed a draft list of priority measures available for review and comment below.

As part of the second phase of the CPRG program, EPA issued a [Notice of Funding Opportunity \(NOFO\) and Request for Applications](#) on September 20, 2023 to announce the availability of \$4.3 billion of general competition grants to implement GHG reducing measures that are described in PCAPs. Eligible applicants include state agencies and municipalities, which EPA defines as "a city, town, borough, county, parish, district, or other public body created by or pursuant to State law." Coalitions of eligible applicants are also allowed to apply but must be represented by a lead applicant under a single application. EPA expects to award up to 115 grants nationwide that range between \$2 million and \$500 million. NHDES understands that EPA will give precedence to applications that reduce GHG emissions by 2030 and benefit low-income, disadvantage communities (LIDAC).

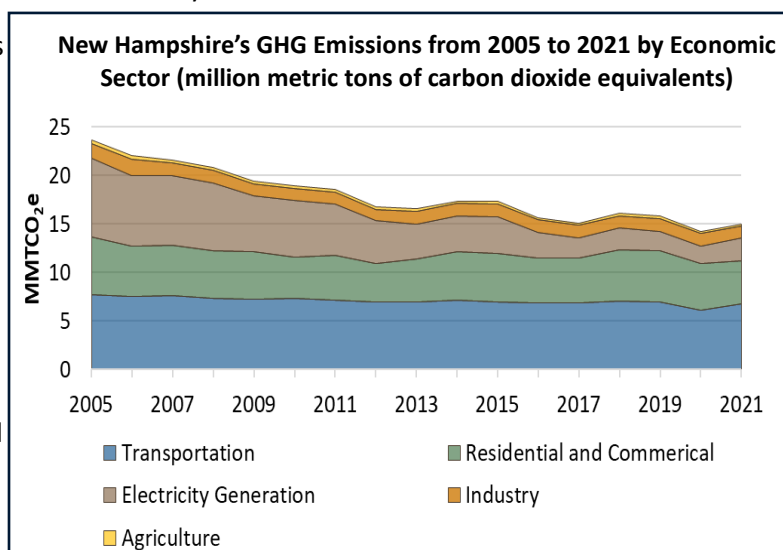
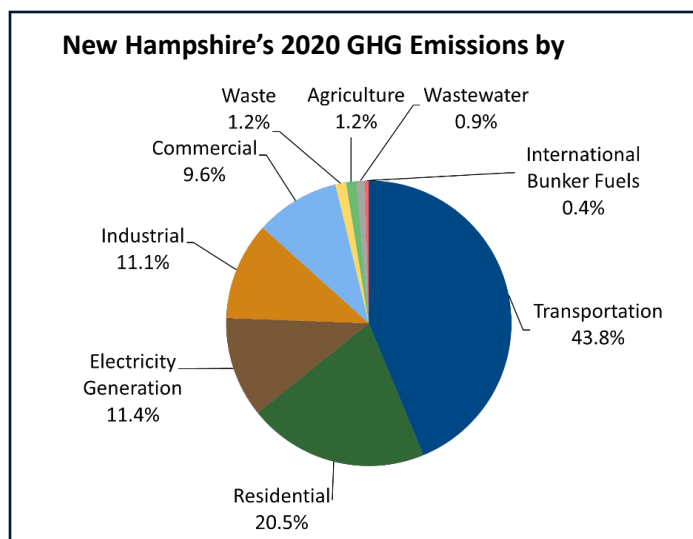
Implementation grant applications must be submitted to EPA by **April 1, 2024**. EPA's estimated period of performance of grant awards will be up to five years. The estimated project start date for awards is October 1, 2024. For a coalition application, the lead applicant must include a signed letter of intent from each coalition member stating the member's intent to sign a memorandum of agreement (MOA), which must be submitted to EPA by **July 1, 2024**. EPA's NOFO provides additional details about EPA's implementation grant application requirements, including EPA's application scoring criteria for the competitive grants.

To develop its draft priority measures, NHDES began with extensive community outreach and engagement. By working with its partner, [New Hampshire Listens](#) of the University of New Hampshire Carsey School of Public Policy, NHDES coordinated, planned, and facilitated stakeholder engagement sessions, including sessions with state, municipal, and regional partners as well as with community-based organizations and residents.

NHDES analyzed the progress of the 67 actions that were recommended in the [2009 New Hampshire Climate Action Plan](#). As part of that analysis, NHDES produced a state-level GHG emissions inventory based on data from [EPA's State Inventory Tool](#) to help evaluate the status and efficacy of actions advocated in the 2009 plan. NHDES's GHG inventory showed that a majority of New Hampshire's GHG emissions are from the transportation and residential sectors, which account for 43.8% and 20.5% of emissions, respectively. To aid NHDES's data-driven development of the draft priority measures, NHDES used several models, reports, and other tools to examine the state's potential to achieve substantial and efficient GHG emission reductions, which included an assessment of the changes to magnitude and source of emissions since 2005. NHDES determined that vast majority of GHG emissions reductions between 2005 and 2021 were from New Hampshire's electricity generation sector, which declined by more than 70%. Emissions from the residential and transportation sectors only declined by approximately 13%, some of the lowest reductions by economic sector since 2005.

NHDES evaluated co-pollutant emission reductions that impact public health and the environment in New Hampshire. For example, sulfur dioxide (SO₂) emissions are harmful to the respiratory system and aggravates heart disease. Residential and commercial heating with oil dominates the SO₂ emitting sectors. One of the most pervasive and widespread air pollutants is ground-level ozone, which can cause or exacerbate several respiratory illnesses. Ground level ozone is created by chemical reaction of nitrogen oxides (NO_x), volatile organic compounds (VOCs), and ultraviolet light. More than 63% of New Hampshire's NO_x emissions are from vehicles and over 33% of the state's VOC emissions are from vehicles.

NHDES also considered the following when it developed New Hampshire's draft priority measures for the PCAP: benefits to LIDAC; consistency with the New Hampshire Department of Energy's [New Hampshire 10-Year State Energy Strategy](#); and alignment with existing climate strategies and plans produced by other state organizations.



NHDES is currently focused on the following list of implementation-ready, draft priority measures for New Hampshire’s PCAP. However, as NHDES receives additional comments from organizations and residents of the Granite State, NHDES may modify these measures or incorporate other measures into the PCAP. For each priority measure, EPA requires applicants to include the following: an estimate of the quantifiable GHG emissions reductions, key implementing agency or agencies, implementation schedule and milestones, expected geographic location, milestones for obtaining legislative or regulatory authority as appropriate, identification of funding sources if relevant, and metrics for tracking progress.

Sector	Priority Measure	Description
Transportation	Deploy Public Electric Vehicle (EV) Charging Infrastructure	Install EV charging stations with an emphasis on access and affordability for underserved communities (e.g., low income, multifamily housing) and to fill EV charging gaps in New Hampshire.
	Expand Public Transportation Options	Increase access to clean, public transportation options, including expanding existing transit fleets to better serve disadvantaged populations and, where feasible, transition to zero emission transit options.
	Incentives for Consumer Purchase of Electric Vehicles	Reduce upfront costs of EV purchases, including used EVs, by providing rebates to consumers with a focus on providing incentives to low-income, disadvantaged communities.
Residential Building	Pre-Weatherization of Residential Buildings	Create or scale up existing programs to pre-weatherize residential buildings, such as structural repairs and home health remediation. Pre-weatherization will allow previously deferred low-income households to access incentives for weatherization, efficiency, electrification, and renewable energy.
	Weatherization of Residential Buildings	Create or scale up existing incentive programs to weatherize residential buildings by upgrading the envelope of buildings or their heating, cooling, and electrical systems to improve energy efficiency, health, safety, and comfort, while also providing cost-effective energy savings.
	Heat-Pumps Incentives	Provide incentives to drive increased adoption of energy efficient, residential heat pumps for space and water heating. This may include actions such as customer purchase incentives, mid-stream supplier incentives, workforce development activities, and activating consumer demand.
Transportation and Residential Building	Workforce Development of Skilled Trades	Provide incentives to reduce barriers to stimulate high-quality workforce development activities tied to New Hampshire’s other proposed measures that would benefit individuals in low-income and disadvantaged communities. Funding would help prepare individuals for high-quality, middle-skill career pathways that enable economic mobility, rather than short-term, low-wage jobs.