New York City – Newark – Jersey City Metropolitan Statistical Area (NY-NJ MSA)

Priority Climate Action Plan

March 2024

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NYC Mayor's Office of Climate & Environmental Justice

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Definitions and Acronyms

Term	Definition
Active transportation	Human-powered forms of transportation (e.g., walking, biking, rolling)
Anthropogenic emissions	Greenhouse gas emissions (primarily carbon) that are generated through human activities
Auxiliary power unit (APU)	Small turbine engine on aircrafts that powers non-propulsion functions (pressuring air, powering environmental control systems, etc.)
Biogenic emissions	Emissions from natural sources
Carbon Abatement	Curbing GHG emissions, particularly CO_2, to reduce the amount of GHGs contaminating the atmosphere
CO_2e	Carbon dioxide equivalent is used to represent GHGs' impacts, standardized to an equivalent amount of CO_2 that would have the same impact, based on global warming potential
Complete streets	Streets that are designed to support all types of transportation modes- driving, walking, biking, public transit riding, etc. Inclusive of street components like sidewalks, bike and bus lanes, streetscapes, and more.
ComStock	The Commercial Building Sector Stock model. Developed by the National Renewable Energy Laboratory (NREL) to estimate the annual sub hourly energy consumption of the commercial building stock across the United States
Criteria air pollutant	Air pollutants with defined acceptable levels of exposure that have set ambient air quality standards, including ozone, carbon monoxide, nitrogen dioxide, sulphur dioxide, and PM10 and PM2.5.
Decarbonization	The process of reducing the amount of GHGs, primarily CO_2, released into the atmosphere by a system, asset, or organization
Direct GHG emissions	As defined by the Greenhouse Gas Protocol, direct GHG emissions are greenhouse gas emissions from sources that are owned or controlled by the reporting entities. In an organizational carbon footprinting context, Scope 1 emissions are direct GHG emissions
Electrification	Switching from using fuels, such as gas or petroleum, to using electricity
eGRID	Emissions & Generation Resource Integrated Database. Provided by the EPA as a source of data on the environmental characteristics of almost all electric power generated in the United States. Information is provided on emissions, emission rates, generation, heat input, resource mix, and more.
Embodied emissions (or embodied carbon)	The sum of all the GHG emissions produced in the manufacture of a product. This includes emissions from the extraction and transportation of raw materials, repair, replacement and refurbishment of assets, and the manufacturing processes used to create the final product
Emissions abatement	Emissions abatement means curbing GHG emissions to reduce the amount of GHGs contaminating the atmosphere
Emissions intensity	Emissions of a pollutant relative to the intensity of specific activities. E.g., carbon dioxide released per megajoule of energy produced, or GHG emissions released per unit of GDP.
Energy from waste	Refers to taking waste and turning it into a useable form of energy, typically electricity
Environmental justice (EJ)	Environmental justice describes the fair treatment and meaningful involvement of all persons, regardless of race, color, national origin, or income, in matters of environmental laws, regulations, activities, and the distribution of benefits.
EJScreen	Environmental Justice Screening and Mapping Tool. Developed by the EPA to provide a nationally consistent dataset for environmental and demographic socioeconomic indicators.
Environmental Protection Agency (EPA)	The United States Environmental Protection Agency is an independent federal agency that oversees the protection of human health and environment
Facility Level Information on GHG Tool (FLIGHT)	Facility Level Information on Greenhouse Gases Tool (FLIGHT). Provides greenhouse gas data reported to EPA by large emitters, facilities that inject CO2 underground, and suppliers of products that result in GHG emissions when used in the United States.
Fossil fuels	A hydrocarbon-containing material (coal, oil, natural gas, etc.) formed from the remains of prehistoric plants and animals that is extracted from ground sources and burned as a fuel.

Greenhouse gas emissions	Addition to the atmosphere of gases that are a cause of global warming, including CO_2, methane, and others as set out in the Kyoto Protocol
GDP	Gross domestic product. A measure of the value of final goods and services. Typically reported at the national level, but can be calculated for states, regions, municipalities, etc. in the U.S. as well
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. An international standard adopted by many communities internationally to serve as the comprehensive global standard for measuring and managing GHG emissions.
GWP	Global warming potential. A measure of how much energy the emissions of 1 ton of a gas will absorb over a given period, relative to the emissions of 1 ton of carbon dioxide (CO2)
Heat rejection	Waste heat generated by machines that do work and in other processes that use energy (e.g., the heat released by refrigerators while in operation)
HVAC	Heating, ventilation, and air conditioning. Systems that regulate and move heated and/or cooled air in buildings.
Indirect GHG emissions	As defined by the Greenhouse Gas Protocol, indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity. In an organizational carbon footprinting context, indirect emissions are scope 2 and 3 emissions. Scope 2 emissions are indirect GHG emissions from consumption of purchased electricity, cooling, heat, or steam. Scope 3 emissions are indirect GHG emissions that cover those produced by customers using an organization's products or services or those used by suppliers that are inputs to the organization's products and services
Justice40	A goal to deliver forty percent of overall benefits from federal investments to disadvantaged communities
LIDAC	Low income and disadvantaged community.
MMBtu	Million British thermal units. A thermal unit of measurement for natural gas
MSA	Metropolitan Statistical Areas. Delineated by the United States Office of Management and Budget (OMB), the general concept of a metropolitan or micropolitan statistical area is that of a core area with a large population concentration, combined with adjacent communities that have a high degree of economic and social integration with that core
Micro-mobility	Small, low-speed, human- or electric-powered transportation device (e.g., bicycles, scooters bicycles, electric-assist bicycles, electric scooters (e-scooters), etc.)
MSW	Municipal solid waste. Trash/garbage- includes items like product packaging, food scraps, batteries, paper products, from residential and commercial sources.
MT	Metric ton. A unit of measure, typically used in environmental analysis contexts to describe carbon emissions. 1 metric ton = 1000 kilograms (kg).
NZEV	Near zero emissions vehicle. Vehicles with both conventional gasoline, diesel or natural gas-powered engine and a battery that can be recharged from the electrical grid.
Net zero	Refers to the balance between the amount of GHG that is produced and the amount that is removed from the atmosphere within a given boundary
NGO	Non-governmental organization. Not a strictly defined category, but typically describes non-public entities that further some ideology, cause, religion, social issue, or other interest.
Renewable energy	The energy that is collected from resources that are naturally replaced in human timescales such as sunlight, wind, rain, tides, and waves
ResStock	The Residential Building Sector Stock model. The residential building analysis tool equivalent of ComStock. Combines information from multiple sources to create granular data on home characteristics like square footage, insulation, window-type, HVAC type, and HVAC efficiency.
Short ton	A unit of measure, typically used in this context in relation to emissions amounts. 1 short ton = 2,000 pounds (907 kg).
Smart growth	An approach to development and conservation that look to protect human health and natural environment in advancing community economic prosperity and environmental resilience
SAF	Sustainable Aviation Fuel. Non-petroleum-based jet fuels that reduces emissions from air transportation. Made by using physical, biological, and chemical reactions to break down biomass and waste and recombine them to form hydrocarbons that can be used as fuel.
TEU	Twenty-foot equivalent units. Designation for the dimensions of containers
TDM	Travel demand model. A model that is used to forecast traffic flows in transportation systems.
TOD	Transit oriented development. A development practice that prioritizes the creation of non-vehicle dependent, mixed-use communities near transit where people have easy access to jobs and services.

T&D	Transmission and distribution. Refers to the different stages of carrying electricity over poles and wires from generators to commercial/residential sites.
TSMO	Transportation Systems Management and Operations. A set of strategies that focus on operational improvements to a transportation system to maintain and increase performance without adding additional capacity.
UHI	Urban heat island. A phenomenon experienced in urban areas where temperatures are significantly warmer than surrounding rural areas.
VMT	Vehicle miles travelled. A unit of measure for distance travelled by vehicles in a geographic region over a given period.
ZEV	Zero Emissions Vehicle. Vehicles that produce zero tailpipe exhaust emissions of any criteria pollutant or greenhouse gas under all possible operational modes or conditions.

Acknowledgments

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New York City and regional partners are grateful to the many stakeholders involved in the development of this Priority Climate Action Plan for the NY-NJ MSA. We acknowledge the valuable feedback and insights received and recognize and hope to continue collaboration across the region throughout the duration of the CPRG Program and beyond. We also appreciate and acknowledge the support of the project consultant, Guidehouse, for their assistance with the plan.

Executive Summary

Climate change has emerged as the defining challenge of the 21st century. In the global economic and cultural center that is the New York-Newark-Jersey City Metropolitan Statistical Area (NY-NJ MSA), state and local policymakers, planners, and program managers have been dedicated to reducing greenhouse gas (GHG) emissions for decades. The region has been a leader in climate action planning and environmental justice through the creation of ambitious plans, targets, and actions to collectively work towards a carbon-neutral future. But with the climate crisis growing more urgent, there is still considerable work to be done. To effectively reduce GHGs in the NY-NJ MSA, a densely populated region intricately connected through a network of highly trafficked transportation, energy, information, and economic corridors, the region needs substantial intrastate and interstate coordination and investment.

The NY-NJ MSA is the nation's largest metropolitan area by population, home to more than 19 million people across 22-counties.[1] If the MSA were a state it would be the 5th most populous state in America. One of the most economically productive regions in the United States (U.S.), the MSA generated $2 trillion in GDP in 2022.[2] This scale of population and economic activity led to the MSA emitting more than 150 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2022. Although a relatively low rate of emissions per capita, this aggregate level of emissions is greater than that of 40 U.S. states.[3] In addition to GHGs, the combustion of fossil fuels in this densely population region exposes its millions of residents to other pollutants, such as particulate matter and smog. About 35% of the population of the MSA – nearly seven million people – reside in low-income or disadvantaged communities (LIDACs) and are both overexposed to this pollution and more vulnerable to the long-term impacts of climate change.

The consequences of not mitigating the impacts of climate change are becoming difficult to ignore. Thousand-year floods and once-in-a-generation storm events have already cost the region billions of dollars in damages over the last decade, disproportionately affecting its most vulnerable communities.[4] The personal impact on individuals, as well as the broader economic costs associated with climate change, will intensify if the region continues "business as usual," with activities that contribute significant amounts of GHG emissions in the atmosphere, like burning fossil fuels as a primary source of energy or improperly disposing of waste in landfills.

Project Overview and Regional Objectives

Funding allocated by the Inflation Reduction Act (IRA) and the U.S. Environmental Protection Agency (EPA) emphasizes the continued threat GHG emissions present to communities. To address this challenge, the EPA is making $4.3 billion in competitive grants available through the Climate Pollution Reduction Grants (CPRG) program to help state, local, and tribal governments accelerate their planning and implementation efforts. This program is specifically

[1] Climate and Economic Justice Screening Tool. 2023. Communities List Data. https://screeningtool.geoplatform.gov/en/downloads
[2] U.S. Bureau of Economic Analysis. December 18, 2023. CAGDP2 Gross domestic product (GDP) by county and metropolitan area. https://www.bea.gov/itable/national-gdp-and-personal-income
[3] Energy-Related CO2 Emission Data Tables, U.S. Energy Information Administration. https://www.eia.gov/environment/emissions/state/
[4] "Ten Years After Sandy: Barriers to Resilience," New York City Comptroller. 2022. https://comptroller.nyc.gov/reports/ten-years-after-sandy/

designed to encourage cross-regional collaboration by providing funding for planning activities, such as the creation of regional partnerships and projects designed to reduce GHG emissions while offering direct net-zero co-benefits to LIDACs. The CPRG program presents a unique opportunity for the NY-NJ MSA. Governmental bodies, and other key stakeholders (e.g., private companies, planning organizations, transportation authorities) possess a significant history of expertise and leadership in climate action planning, providing the necessary infrastructure to ensure that these grants are utilized effectively.

The first phase of this effort is the creation of this Priority Climate Action Plan (PCAP), an EPA-required document for the MSA to access and apply for implementation grant funding. This PCAP builds on existing work from countless entities and policies operating in the space and details the scope of the challenge the MSA faces, while surfacing an initial set of priority initiatives for consideration for implementation. The objective of this effort is to create an actionable, region-wide strategy to reduce GHGs by 2050 through the introduction of specific interventions that reflect the urgent needs of communities across the region.

Table 1. Counties in the NY-NJ MSA

New Jersey		New York City	New York State
• Bergen County	• Morris County	• Bronx County	• Nassau County
• Essex County	• Ocean County	• Kings County	• Putnam County
• Hudson County	• Passaic County	• New York County	• Rockland County
• Hunterdon County	• Somerset County	• Queens County	• Suffolk County
• Middlesex County	• Sussex County	• Richmond County	• Westchester County
• Monmouth County	• Union County		

Through the development of this PCAP, the NY-NJ MSA is focused on the following objectives:

1) **Reducing Climate Pollution:** By strengthening cross-jurisdictional collaboration regional partners will create comprehensive pathways for reducing pollution and maximizing benefits to communities in the region, especially in low-income and disadvantaged communities.
2) **Strategic Positioning**: Positioning the region to apply for and receive funding that supports innovative programs and policies that can be scaled up across jurisdictions.
3) **Focusing on the Near-Term**: Identifying optimized measures to achieve significant emissions reductions by 2030.

NY-NJ MSA Region-wide Greenhouse Gas Emissions

NYC and regional partners have completed a regional GHG inventory for the NY-NJ MSA PCAP; a first for the 22-county region. Simplified to include just the region's largest emitting sectors, the inventory indicates that emissions from the NY-NJ MSA's three largest sectors – Stationary Energy, Transportation, and Waste – equal 158 million metric tons of CO2-equivalent ($MMTCO_2e$), based on 2022 data. At this magnitude, if the MSA was a state, it would be ranked 11th in the nation in terms of GHG emissions (at 19 million residents, the region would be the 5th largest state in the US). Given the infrastructural characteristics of the region, the transportation and stationary energy sectors are the largest sources of GHGs in the NY-NJ MSA

– representing 36% and 57% of emissions in the simplified GHG inventory constructed for this PCAP, respectively. For a national comparison, recent U.S. EPA data shows that transportation and commercial/residential buildings contributed 28% and 13% of U.S. GHG emissions in 2021, respectively.[5]

Table 2. Emissions of Largest GHG Sectors by MSA Sub-Region, 2022 ($MMTCO_2e$) [6]

Sector	Type	Emissions from New Jersey counties in the MSA	Emissions from New York Counties, excluding NYC, in the MSA	Emissions from New York City	Total MSA Emissions
Stationary Energy (On-site Combustion, Steam & Electricity Emissions)	Residential Buildings	16	17	18	51
	Commercial Buildings	13	10	16	39
Transportation	On-Road	24	16	14	55
	Off-Road	-	-	-	2
Waste	Scope 1 (Emissions from the treatment and disposal of waste within MSA boundaries)	0.4	1	0.1	2
	Scope 3 (Emissions from waste generated by the MSA but treated outside the MSA)	4	3	3	8

Priority GHG Reduction Measures

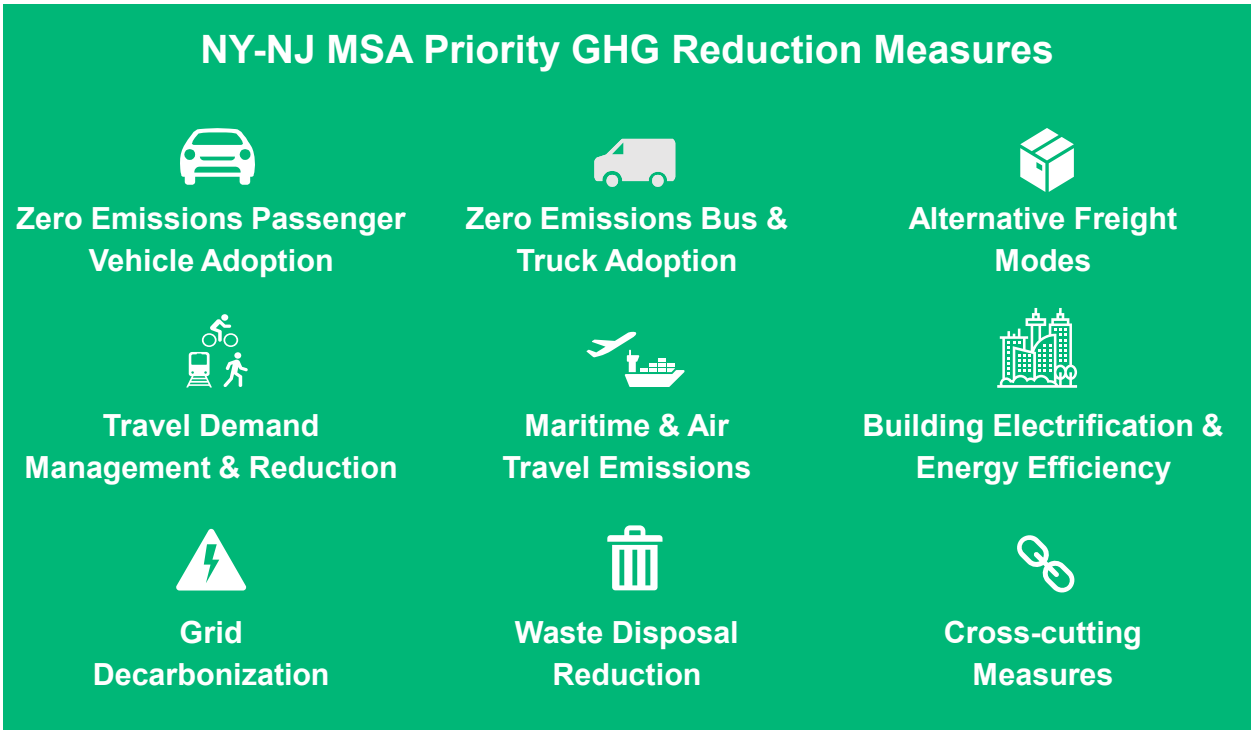
Nine priority GHG reduction measures have been identified for the NY-NJ MSA. Presented below, these measures are designed to address the region's largest sources of GHG emissions across the sectors of transportation, stationary energy, and waste. They are further proposed in recognition of existing GHG reduction efforts/initiatives within the region, which have been a part of decades-long climate action planning processes undertaken by various local, regional, and cross-jurisdiction entities operating in the region. These jurisdictions are thus equipped with the organizational experience and capacity to ensure that funding opportunities to support these measures are utilized effectively. By implementing actions that support these measures, the region could see a reduction of nearly 150 $MMTCO_2e$, a 92% decrease in gross emissions by 2050, compared to 2022 baselines. These reduction levels are consistent with established state and local net zero goals and plans.

Spanning the homes, businesses, travel, and commuting habits of millions of people and trillions of dollars of economic output, these GHG reduction measures will require contributions from a broad body of regional stakeholders. The MSA includes the jurisdictional purviews of many entities: from state and local agencies to municipal and county governments to cross-jurisdiction entities such as transit authorities and utilities. These authorities must also work in concert with

[5] Sources of Greenhouse Gas Emissions | U.S. Environmental Protection Agency
[6] Emissions total may not sum exactly as specified due to rounding.

state, regional, and federal actors, especially those governing interstate highways, regulating the gas system and electric providers of New York and New Jersey, and managing the coastal waters anticipated to be a key location for abundant, clean offshore wind power in the coming decades. Thus, bringing in the right stakeholders, at the right time, to tackle the challenges ahead associated with these measures stands as a critical enabler of success for the MSA's CPRG program.

Figure 1. Priority GHG Reduction Measures for the NY-NJ MSA CPRG Program



About the NY-NJ Regional Partnership

Regional coordination is one of the key guiding principles driving the creation of this PCAP for the NY-NJ MSA. The PCAP is intended to serve as a mechanism to capture the cross-jurisdictional perspectives of planners, policymakers, and program managers. Drafting the PCAP has required significant coordination from a coalition of stakeholders representing 22 counties in New York and New Jersey. Leading this effort is the City of New York (NYC, the City) through the New York City Economic Development Corporation (NYCEDC) and the Mayor's Office of Climate & Environmental Justice (MOCEJ). The City is joined by two Metropolitan Planning Organizations (MPOs) for the region in heading this work: the New York Metropolitan Transportation Council (NYMTC) and the North Jersey Transportation Planning Authority (NJTPA). Starting in late spring/early summer 2023 this group of regional partners have collaborated to support the development of the PCAP. The content was created through a series of coordination meetings and stakeholder discussions, to frame the regional perspective of this initiative. Additionally, the project team reviewed initial feedback from the public as well as previous municipal and state climate action plans to ensure existing plans and efforts were incorporated into this planning process.

Stakeholders across the MSA are currently designing implementation grant applications for these measures while also preparing for the development of the Comprehensive Climate Action Plan (CCAP). Where the PCAP rapidly sets the foundation for the region, the CCAP will crystalize the path to 2050. Upon the submission of this PCAP, the regional partners' efforts will shift to the CCAP, bringing more research, analysis, stakeholder engagement and community outreach to drive towards a discrete set of measures across all sectors that get the region to net-zero emissions.

1 Introduction

1.1 CPRG Overview

The largest metropolitan area in the United States—the New York-Newark-Jersey City, NY-NJ-PA Metropolitan Statistical Area (NY-NJ MSA)—has received Climate Pollution Reduction Grant (CPRG) funding from the U.S. Environmental Protection Agency (EPA) to develop this Priority Climate Action Plan (PCAP). This work emerges from recent, once-in-a-generation investments by the federal government in state and local climate action planning. Through the Inflation Reduction Act (IRA), the federal government has allocated billions of dollars in funding to help communities plan, develop, and deliver meaningful climate projects and initiatives across the nation. As part of this legislation, the U.S. Environmental Protection Agency (EPA) introduced the Climate Pollution Reduction Grants (CPRG) program to encourage cross-jurisdictional collaboration for climate action planning. These grants endow regional leaders with tools and resources to identify and collaborate on critical greenhouse gas (GHG) emission reduction measures that will best meet their region's reduction targets between 2030 and 2050. The CPRG provides an essential infusion of funding to help localities develop robust coordination structures to inspire intentional regional engagement and provides a framework for prioritizing innovative initiatives and projects that will have the highest potential for reducing GHG emissions across the MSA.

To facilitate the delivery of prioritized GHG reduction measures, the CPRG program provides two near-term initiatives. First, the EPA released a $250M formula grant pool for state and regional climate action planning. As part of that, one-million-dollar grants were awarded to MSAs to develop Priority Climate Action Plans (PCAPs), due March 1, 2024, and Comprehensive Climate Action Plans (CCAPs), due two years after the award date of the CPRG planning grant. Separately, the IRA authorized a $4.3 billion competitive CPRG implementation grant program with the stipulation that implementation measures must be included in the PCAP to be considered for an award. New Jersey and New York have also been awarded $3 million planning grants, separate from the qualifying regional MSAs within their borders. As part of the PCAP development process, the NY-NJ MSA team has engaged agencies in each state that are developing their state-wide PCAPs. Coordination with these partners has been intentional to ensure that the framing and activities included in the PCAP are strategically consistent and refer to existing statewide planning efforts and regulations.

While the NY-NJ MSA is making progress towards a net-zero future through the ongoing planning and implementation activities of various regional and local entities within its borders, greater coordination across the region will allow more to be accomplished. CPRG funding opportunities will help the region identify and deploy feasible yet impactful interventions that drive forward near-term GHG emission reductions and tangible air quality and environmental justice benefits.

In the MSA, access to clean energy, technology constraints, outdated infrastructure, and funding gaps all continue to complicate the delivery of targeted climate actions and the associated benefits for communities throughout the region. Authority and jurisdiction are distributed across multiple municipal, regional, state, and federal actors throughout the region's cities and towns, highways and waterways, energy producers and energy consumers. For example, New York State effectively has two separate electrical grids: upstate, where most of the state's clean energy power supply is generated and areas in and around New York City,

which is said to have the dirtiest grid in the state.[7] Adding further complication, New York City effectively consumes the most energy in the state, with high total annual demand, congested transmission lines, and overtaxed distribution systems. Transmission-related capacity constraints limit the amount of energy, including energy from clean energy sources, that can be delivered from external power generation sources in upstate New York or New Jersey. To this point, New York City relies more on fossil fuel-burning plants for conventional energy consumption, when compared to other areas that can use cleaner energy sources.[8] Although the magnitude of investment required represents a considerable barrier, financing must be complemented with enhanced cross-jurisdictional cooperation to enable state and federal actors to target those investments wisely and to give local actors surety, guidance, and resources to meet those investments halfway.

This paradigm is not unique to the greening of the grid – infrastructure for public and private transit, freight delivery and waste disposal, zoning and housing patterns, and alternative fuel corridors and hubs all require a cross-jurisdictional perspective. Given the density of the region, heavy traffic continues to present a considerable challenge to environmental quality as people continue to use single-occupancy vehicles (with combustion engines) as one of the primary modes of personal travel.[9] This will not change without a fundamental behavior shift, changing how people think about and subsequently travel throughout the region. Regional partners are taking notice and have established unique methods to track progress on cross-sector GHG reductions. For example, NYC's climate dashboard provides a status update on how the city is working to address several priorities, including:

- **Transitioning to renewable energy sources**: Installation of 1,000 MW of Solar Power by 2030. To date, New York City is 40% of the way to its goal.[10]
- **Investing in a sustainable future**: Making $50B in climate investments through 2035. To date, NYC is 20% of the way to its goal.[11]

These types of climate challenges are not unique to NYC. The NY-NJ MSA described throughout this document is inclusive of parts of Central and Northern New Jersey, the lower Hudson Valley, and suburban Long Island subregions of New York State. While historically part of the MSA, Pike County, Pennsylvania was removed in September 2023.[12] For more information on the region, see Section 2, NY-NJ MSA Climate Action Context.

All regional partners supporting the development of this PCAP have historically been engaged in ambitious climate planning and implementation for years, if not decades. NYC developed its first citywide GHG emissions inventory and long-term climate action plan, *PlaNYC*, in 2007. That plan and subsequent updates are bracketed by landmark state actions, such as New York State's Climate Leadership and Community Protection Act (CLCPA), the Scoping Plan, and the State Energy Plan, as well as New Jersey's Global Warming Response Act (GWRA), the NJ Energy Master Plan and the GWRA 80x50 Report. In coordination with those roadmaps,

[7] PowerUp NYC. MOCEJ. 2023. https://climate.cityofnewyork.us/wp-content/uploads/2023/09/PowerUpNYC.pdf
[8] PowerUp NYC. MOCEJ. 2023. https://climate.cityofnewyork.us/wp-content/uploads/2023/09/PowerUpNYC.pdf
[9] Encompassed by how nationally, around 70% of commutes by workers over 16 are by single occupancy trip in a car, bus, or van, according to Census ACS 5-year data from 2022
[10] NYC Climate Dashboard. NYC Comptroller. https://comptroller.nyc.gov/services/for-the-public/nyc-climate-dashboard/energy/
[11] NYC Climate Dashboard. NYC Comptroller. https://comptroller.nyc.gov/services/for-the-public/nyc-climate-dashboard/energy/
[12] EPA informed the NY-NJ MSA Team that Pike County, PA was removed from the updated NYC MSA Boundaries on 9/17.

communities across the MSA have consistently set bold commitments and taken critical steps to protect both the climate and residents.[13]

With upcoming milestones for emissions reductions across the region, CPRG funding comes at a crucial time. This opportunity will equip jurisdictions with the necessary tools and resources to implement the policies, projects, and initiatives that will help the region realize its climate goals.

Table 3. Counties in the NY-NJ MSA

New Jersey		New York City	New York State
• Bergen County	• Morris County	• Bronx County	• Nassau County
• Essex County	• Ocean County	• Kings County	• Putnam County
• Hudson County	• Passaic County	• New York County	• Rockland County
• Hunterdon County	• Somerset County	• Queens County	• Suffolk County
• Middlesex County	• Sussex County	• Richmond County	• Westchester County
• Monmouth County	• Union County		

Participation in the CPRG program represents a key opportunity to harmonize, optimize, and prioritize these plans into a holistic vision – while providing the funding necessary to bring that vision to life.

1.2 PCAP Details and Definitions

A first step in the NY-NJ MSA's pursuit of CPRG-related funding opportunities involves the development of the CPRG PCAP. According to guidance released by the EPA, the PCAP should surface a select list of near-term, implementation-ready measures that can meaningfully impact GHG pollution across the region. This effort also includes an analysis of emission reduction measures that would be accomplished through implementation. Completing and submitting a PCAP is a requirement for access to the implementation funding of the CPRG program, which will competitively award $4.3 billion in grants to fund projects and initiatives.[14]

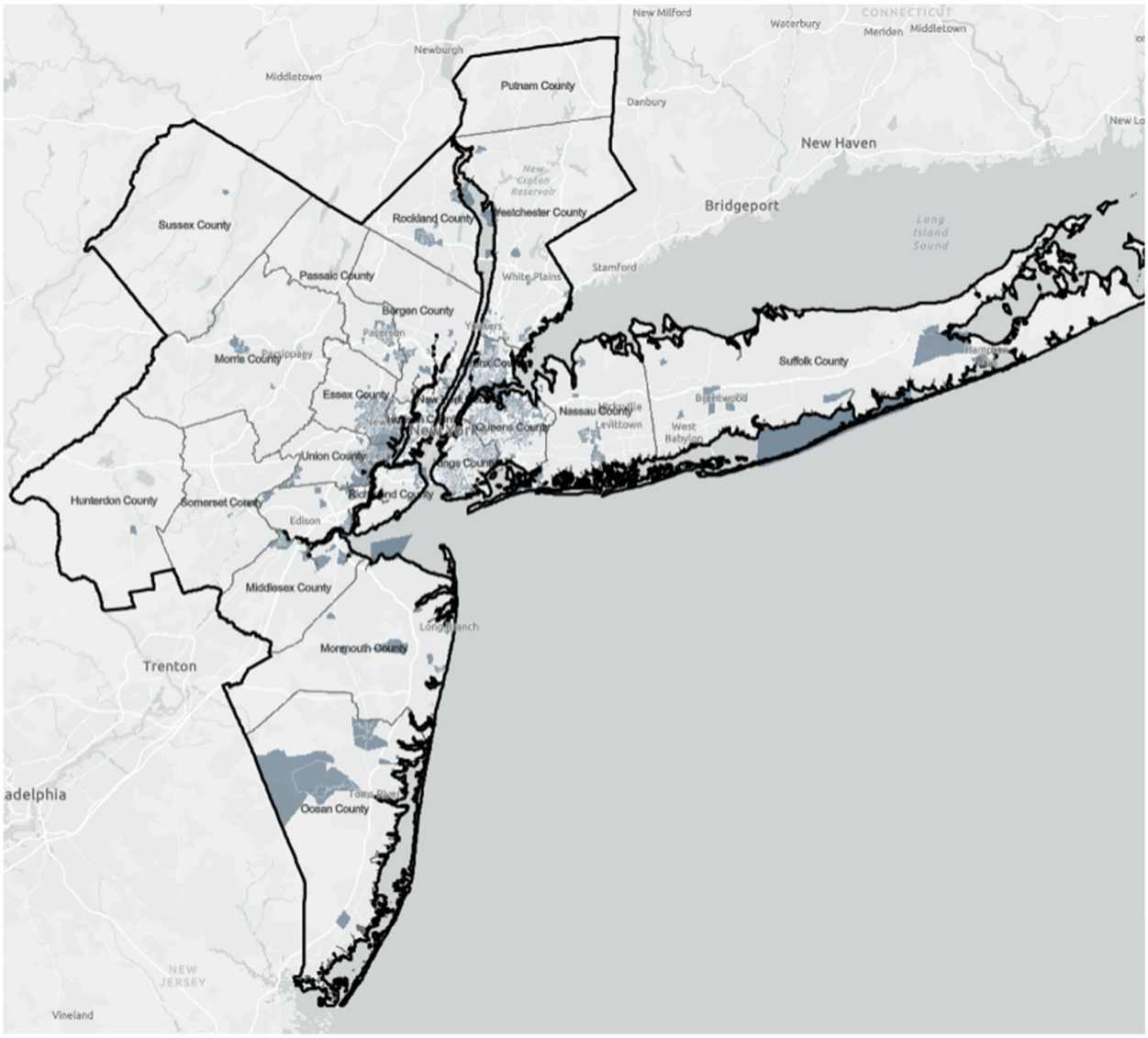
PCAPs can focus on one or several policy sectors and need not comprehensively address all GHG emissions and sinks (i.e., carbon sources that capture GHGs) in the jurisdiction.[15] Any future application for an implementation award under the CPRG program will need to reference a PCAP that describes the programs, policies, measures, and projects the entity will carry out with the implementation grant funding.

The City of New York (the City, New York City, NYC), through the New York City Economic Development Corporation (NYCEDC) and the Mayor's Office of Climate & Environmental Justice (MOCEJ), is the planning grant recipient for this effort. Joining the city in this work are two regional partners: the New York Metropolitan Transportation Council (NYMTC) and the North Jersey Transportation Planning Authority (NJTPA) – two metropolitan planning organizations with jurisdictions covering all portions of the MSA in New York and New Jersey. Further details regarding the lead and partner organizations and their roles in pursuing CPRG-related opportunities can be found in Section 4. Together, these entities prepared a PCAP that

[13] Examples include NYC's Local Law 97, various pledges by large New Jersey cities in the MSA to reduce emissions by 2050 (e.g., Jersey City, Hoboken), and suburban localities' strategies and pathways to engage in climate action planning to support their communities (e.g., Somerset County).
[14] "About CPRG Planning Grant Information." EPA. About CPRG Planning Grant Information | U.S. EPA
[15] Carbon Sources and Sinks | National Geographic Encyclopedic Entry

is representative and impactful for the 22-county region, which includes the jurisdictions shown in Figure 2.

Figure 2. Map of the NY-NJ MSA



In addition to the overarching goals of the CPRG program, the NY-NJ MSA is focused on three key objectives while developing the PCAP.[16]

1. Enabling regional collaboration to create comprehensive pathways for reducing pollution and maximizing benefits to communities in the region, especially in low-income and disadvantaged communities;
2. Positioning the region to apply for and receive funding that supports innovative programs and policies that can be scaled up across jurisdictions;
3. Identifying optimized measures to achieve significant emissions reductions by 2030.

[16] As described in the NY-NJ MSA CPRG workplan.

For the PCAP, the analysis of MSA emissions and potential reduction impacts focuses on three priority sectors: stationary energy (energy consumption in residential and commercial buildings, especially on-site fossil fuel consumption, but also including steam and electricity produced off-site), transportation, and waste. These sectors are prioritized for the PCAP as they represent the largest sources of GHG emissions in the MSA and have data readily available for the preliminary analysis informing the PCAP. The regional team identified these measures through discussions with regional stakeholders for the purpose of pursuing funding through CPRG implementation grant opportunities. Further, these measures and associated implementation actions are the product of ongoing work by regional representatives.

The MSA's analysis and findings are presented in the following required sections:

- **GHG Inventory:** Summarizes the MSA's GHG inventory, which is inclusive of the geographic boundary of the MSA comprised of 22 counties across New York and New Jersey. The GHG inventory covers three priority sectors: stationary energy, transportation, and waste. The GHG inventory leverages the methodologies established in the Global Protocol for Community-Scale Greenhouse Gas Inventories, which is further explained in Section 3.1, GHG Inventory.
- **GHG Reduction Measures:** Describes priority GHG emission reduction measures that will achieve significant emissions reductions (especially by 2030), deliver co-benefits with a focus on Low Income and Disadvantaged Communities (LIDACs), and more broadly meet the goals of the CPRG program.
- **Low-Income and Disadvantaged Communities Benefits Analysis:** Qualitatively and quantitatively describes how the GHG reduction measures included in the PCAP will benefit LIDACs in the MSA. This section also includes an overview of the MSA's engagement with our community to gather and integrate their input on the GHG reduction measures in the PCAP.
- **Review of Authority to Implement:** Identifies the existing statutory or regulatory authority to implement the GHG reduction measures included in the PCAP. Where authority to implement must be obtained, the MSA outlines feasible milestones to secure authority.

The NY-NJ MSA's PCAP also includes the following optional sections to provide a more thorough depiction of the region's climate goals and approach to reducing GHG emissions. Moreover, this initial optional analysis sets the foundation for the CCAP, in which these elements are required.

- **GHG Emissions Projections:** Summarizes GHG emissions projections in a business-as-usual scenario as well as a projection of GHG emissions under a scenario where the PCAP is fully implemented.
- **GHG Reduction Targets:** Summarizes near-term and long-term GHG emission reduction targets for the NY-NJ MSA.
- **Benefits Analysis:** Qualitatively and quantitatively describes the benefits associated with the GHG reduction measures identified in the PCAP, including estimated co-pollutant reductions of criteria air pollutants.

- **Intersection with Other Funding Availability:** Identifies federal funding opportunities other than the CPRG implementation grants that can support the implementation of the PCAP GHG reduction measures.
- **Next Steps:** Identifies priority next steps to develop the CCAP, including the MSA's plan for continued community engagement. This section also discusses how the MSA will build on the analyses presented in the PCAP for the CCAP.

2 NY – NJ MSA Climate Action Context

2.1 Region Overview

The NY-NJ MSA is the nation's largest MSA by population, home to more than 19 million people.[17] Around 6% of the nation's total population resides in the MSA, and its economic output comprises nearly 8% of the nation's GDP.[18]

The MSA is economically and geographically centered on New York City, which is comprised of five boroughs stretched across all or parts of three islands as well as a portion of the mainland. The city shares a well-used natural harbor at the southern end of the Hudson River with northern New Jersey to the west. In addition to the city, the MSA can be divided into the following sub-regions:[19,20]

- **Long Island, New York.** East of the city lies Nassau and Suffolk counties on Long Island, known for their beach-lined coasts and barrier islands. Large municipalities here include Hempstead, Brookhaven, and Babylon.
- **Lower Hudson Valley, New York.** North of New York City is the Hudson Valley, a hilly region of three counties (Westchester, Rockland, Putnam) with mostly suburban communities. The area is home to large natural habitats, such as Harriman and Bear Mountain State Parks. Large municipalities include Yonkers, Mount Vernon, Newburgh, New Rochelle, Poughkeepsie, and White Plains.
- **Northern, Central, New Jersey.** Twelve counties in northeastern New Jersey comprise the state's portion of the NY-NJ MSA. This region contains several large cities, including Newark, Jersey City, and Paterson as well as many suburban communities; the largest of these include Woodbridge and Lakewood Townships in Middlesex and Ocean County, respectively. This sub-region also features rural areas and natural environments (e.g., New Jersey Highlands Region in the northwest and part of New Jersey Pinelands in Ocean County), further out from the urban core around NYC.

Figure 3. Sub-region types in the NY-NJ MSA

[17] Climate and Economic Justice Screening Tool. 2023. Communities List Data. https://screeningtool.geoplatform.gov/en/downloads

[18] NY-NJ MSA GDP of around $2 trillion, as a share of national GDP of $27 trillion, per BEA data on GDP by county and metro area and BEA data on national GDP; data from 2022.

[19] The regions included in the NY-NJ MSA are a subset of the wider New York metropolitan area (e.g., the metro area as defined by the U.S, Census). This subset reflects the EPA definition of the NY-NJ MSA for the CPRG program.

[20] Photos licensed under creative commons at the following in clockwise order from top left: 1, 2, 3, 4

The NY-NJ MSA is the most productive economic region in the United States. In 2022, the 22-county region recorded a gross domestic product of nearly $2 trillion, nearly twice that of Los Angeles, the next largest metropolitan area.[21] The economic core of the MSA is New York City. Accounting for the lion's share of the region's GDP, the economic significance of the city can be understood at a global scale; alone, the city's economy is larger than that of countries like South Korea and Australia.[22] The industry composition supporting the city's economic productivity is diverse, including the finance, real estate and media sectors.[23] A prosperous economy supports the City's rich social and cultural fabric. Iconic skyscrapers and surrounding infrastructure contain world-renowned entertainment venues, museums, art galleries, and notable landmarks, making the region a global destination to live, work, and play.

While New York City is a major driver of regional economic performance, Long Island, Hudson Valley, and North-Central New Jersey are important contributors to the regional economy as well. The suburban areas throughout the region have their own economic ecosystems and house major regional, national, and international corporations. For example, Bergen County in New Jersey is home to two National Football League franchises – the New York Jets and the New York Giants – and major companies in electronics, healthcare, and professional services[24]. Given the business opportunities and tourism in the region, these areas also draw commuters from New York City and beyond.[25] Similarly, the Route 110 Corridor in Suffolk County on Long Island is also a suburban business center, meaning this area is home to many low-rise commercial buildings. Further, the agriculture and tourism opportunities these regions provide are valuable for potential workers and visitors alike. Finally, the region contains anchor infrastructure assets. Northern New Jersey hosts the busiest port on the United States' East Coast, with the Newark-Elizabeth Marine Terminal handling well over nine million twenty-foot equivalent units (TEUs) of freight in 2022.[26]

The NY-NJ MSA draws its economic strength from its people. The 19 million people in the MSA come from diverse backgrounds. The region is majority minority, with 57% residents identifying as non-white in the 2022 5-year Census American Community Survey (ACS).[27] The population is moreover nearly 30% foreign born.[28] In some places in the MSA this value is as high as 43%. for instance, Paterson, NJ, in Northern New Jersey is home to some 65,000 (43%) foreign born residents based on Census ACS data from 2022. Of those employed throughout the MSA, the largest shares of jobs are in education, health, social services, professional, scientific, and waste services, retail trade and finance and real estate.[29]

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[21] U.S. Bureau of Economic Analysis. December 18, 2023. CAGDP2 Gross domestic product (GDP) by county and metropolitan area. https://www.bea.gov/itable/national-gdp-and-personal-income
[22] "The NYC Difference." NYCEDC. https://edc.nyc/why-nyc
[23] "A Diversified Economy." NYCEDC. https://edc.nyc/why-nyc
[24] "About the Business Community." Bergen County. https://www.co.bergen.nj.us/business-community
[25] Prevost, Lisa. August 12, 2007. Now Arriving: Reverse Commuters. *The New York Times*. http://www.nytimes.com/2007/08/12/realestate/12wczo.html
[26] Port Authority of New York and New Jersey (PANYNJ). 2023. 2022 Port at a Glance. https://www.panynj.gov/content/dam/port/our-port/PONYNJ_AtAGlance2022.pdf
[27] https://censusreporter.org/profiles/31000US35620-new-york-newark-jersey-city-ny-nj-pa-metro-area/
[28] Census Reporter | Place of Birth by Nativity and Citizenship Status
[29] U.S. Census Bureau. 2023. American Community Survey 5-Year Estimates | Industry by Occupation for Civilian Employed Population 16 Years and Over

These jobs support livelihoods in one of the highest cost-of-living metropolitan areas in the nation. However, disparities do exist. In fact, the MSA has one of the highest number of residents living in low income and disadvantaged communities (LIDACs)- nearly 7 million. This population is spread across the region, concentrated most primarily on census tracts in and around New York City. This work thus represents a critical opportunity for both region and nation to make significant progress on Justice40 and other initiatives that seek to ensure that marginalized populations are not left behind in the transition to a carbon-free society. For more information regarding how the NY-NJ MSA is thinking about LIDACs in the development of the region's PCAP, see Section 3.5.2 LIDAC Benefits Analysis.

2.2 Climate Action Policy Landscape

The NY-NJ MSA is a nationwide leader in establishing and implementing climate action policies and initiatives. It is full of towns, cities, and counties that have created their own climate action plans often aligned with their respective states' goals that also incorporate a discrete set of community needs to achieve meaningful climate progress. While these plans often reference similar ideas or seek to reach the same targets, the operations and timeframes supporting these activities are different. The CPRG program presents an opportunity for broader regional collaboration to better target emission reduction measures that require cross-jurisdictional implementation to be effective. This can include initiatives like introducing and expanding electric vehicle (EV) charging infrastructure in key transportation corridors or the expansion of multi-modal transportation options for commercial goods (e.g., blue highway initiatives for heavy and medium duty freight traffic). This PCAP is the result of regional coordination, focused on building on existing climate action planning efforts to accomplish regional goals.

The following portions of this section synthesize key climate policies, plans, and regulations across New Jersey, New York State, and New York City within the context of the CPRG program. These initiatives have defined the region's emissions reduction actions thus far. For example, between the introduction of strong environmental justice laws passed by both New Jersey and New York, as well as the ambitious local policy from the nation's largest municipality, with its first-in-class ordinances around building retrofits and energy efficiency, it is evident some of the country's most impactful climate action policies come from this region.

The efforts detailed below enable steady progress toward climate change mitigation and pollution reduction across communities in the MSA.

New Jersey. The State of New Jersey has been an early mover in the climate policy space. Its 80% emissions reduction by 2050 (80 x 50) goal has been a statutory mandate since 2007.[30] At the local level, municipalities have also done their fair share of work to advance GHG emissions reduction initiatives.

- **New Jersey**. The state's position on climate change and sustainability is outlined in documents such as the New Jersey Board of Public Utility's (NJBPU) Energy Master

[30] Global Warming Response Act, 2007. https://pub.njleg.gov/bills/2006/PL07/112_.HTM#:~:text=The%20Legislature%20therefore%20finds%20and,to%20the%201990%20level%20or

Plan (2019) and the New Jersey Department of Environmental Protection's (NJDEP) NJ GWRA 80 x 50 Report (2020). These documents identify key climate action priorities for the state, such as building decarbonization, zero-emissions vehicle adoption and clean energy[31]. More recently, the NJDEP released its draft Strategic Climate Action Plan, which provides updates on the state's progress towards net-zero emissions and its New Jersey Protecting Against Climate Threats initiative, which encompasses regulatory reforms that help reduce greenhouse gases and other climate pollutant emissions while increasing natural and built environment resiliency.[32] In parallel, the executive office of the state has issued new targets for achieving clean energy. Through three executive orders, the state is committed to bringing 100% clean energy to residents by 2035.[33] New Jersey is further committed to transitioning in an equitable and environmentally just way, stipulating provisions for how the state can work to ensure this through its Environmental Justice Law.

- **The NJTPA.** The NJTPA has been involved in climate planning for over a decade, preparing a comprehensive "region-wide" GHG inventory in 2011 which included all major sectors including fuel consumption and electricity use in buildings, transportation, industrial, agriculture, waste management and land use. The organization also completed a regional GHG mitigation plan in 2013, focused on a reduction of on-road transportation emissions. In addition to creating these inventories, NJTPA participated in U.S. Department of Housing and Urban Development's (HUD) Sustainable Communities Grant program to coordinate on promoting regional economic activity in a climate-centered way. Locally, NJTPA led Together North Jersey, a consortium of partners who created plans, studies, and programs to reduce GHG emissions in their communities. And as an MPO, NJTPA prepares a "Long Range Transportation Plan" every four years. The most recent plan, "Plan 2050: Transportation. People. Opportunity.", was released in 2021.
- **North Jersey communities.** Climate action at the local level in North Jersey communities takes several forms. In municipalities such as Jersey City, Newark, Woodbridge, Madison, and Hoboken, various sustainability, climate action and energy objectives have been outlined in plans dating back to as early as 2010.[34] Suburban regions, such as Somerset County, have also been recognized for their climate action efforts.[35] Further, municipalities are active participants in specific state climate action initiatives, such as the NJBPU's Community Energy Plan Grant Program. Over 25 municipalities in the MSA participate in this program and are focused on developing local

[31] NJ DEP Strategic Climate Action Plan, 2023. https://dep.nj.gov/wp-content/uploads/strategic-climate-action-plan/strategic-climate-action-plan-draft.pdf#page=4
[32] 'What is NJ Pact.' https://dep.nj.gov/njpact/
[33] Including Executive Order Numbers 315, 316, and 317 for targeting of 100% clean energy by 2035, installing of zero emissions heating and cooling systems in 400,000 residential and 20,000 commercial properties/ having 10% of all low-to-moderate income (LMI) properties be electrifiable by 2030, and convening stakeholders to determine the future for natural gas utilities in the state, respectively.
[34] Including: Newark's 2013 Sustainability Action Plan; Hoboken's 2019 Climate Action Plan and Greenhouse Gas Inventories ; Jersey City's 2021 Climate and Energy Action Plan (CEAP); Woodbridge 2010 Sustainable Community Plan and Climate Action Plan (Updated in 2015)
[35] Recent policy actions for the county include a resolution that endorse net zero emissions and transition from fossil fuels and continued work through public entities such as the Somerset County Energy Council that is engaged or planning for work related to energy efficiency, transportation electrification, and green jobs.

climate action plans that introduce specific strategies and tactics to reduce GHG emissions through alternative energy arrangements. Municipalities in the region also actively pursue Sustainable Jersey certifications, which are awarded to municipal governments that demonstrate a commitment to sustainability through a variety of climate-related implementation steps and actions. There are a total of 136 certified communities across the 12-county subregion. Municipalities in the region also participate in Together North Jersey, a consortium of local governments, academic organizations, non-profits, and private enterprises worked together to make the region more competitive, efficient, livable, and resilient. These goals are accomplished through activities like regional collaboration and strategic planning efforts, developing reports, and providing specialized programmatic support for community partners.[36]

New York State. New York State's ambitious climate goals put the state at the forefront of climate action policy. While the state issued legislation related to GHG emissions reductions as early as 2009[37], recent efforts to implement the CLCPA in 2019, the state's new anchor legislation on emissions reductions, are pushing the needle ever further forward. In addition to state-led efforts, localities in the Hudson Valley and Long Island have taken steps to address climate change and to mitigate GHG emissions impacts in their communities as well.

- **New York State.** As mentioned above, the CLCPA is a key climate change statute in New York State. The Act contains world-leading targets pertaining to emissions reduction and renewable energy adoption while holding space for a just transition to its envisioned net zero future. Further details about how targets set in the CLCPA will be achieved are enumerated in the state's Scoping Plan. Approved and adopted in 2022, the Scoping Plan outlines regulatory, legal, and market mechanisms/technologies that can be leveraged to help the state achieve its CLCPA targets.
- **New York Metropolitan Planning Council (NYMTC).** Climate planning is a core part of NYMTC's work. A focus on sustainable development helps planners manage the growing demand for expanded transportation options and the associated benefits like access to housing, jobs, shopping, and recreational activities. Much like NJTPA, NYMTC participated in HUD's Sustainable Communities initiative as part of a New York-Connecticut consortium. Additionally, NYMTC develops a Regional Transportation Plan, which is updated every four years, to capture a current, regional vision for sustainability – including a goal of mitigating environmental impacts and reducing GHG emissions. NYMTC also has a long-standing funding commitment to developing programs focused furthering travel demand management and has supported the U.S. Department of Energy's Clean Cities Program through coordination and funding. This commitment extends to supporting and funding regional studies of freight decarbonization and initiatives like NYC's Clean Trucks Program**.**
- **Lower Hudson Valley communities.** Local climate action plans, such as Westchester County's Climate Action Plan, highlight communities' commitment to enabling climate

[36] Together North Jersey | Implementing a Sustainable Future
[37] New York State Executive Order 24: Establishing a Goal to Reduce GHG Emissions 80% by 2050 and Preparing a Climate Action Plan

impact mitigation strategies and GHG emissions reduction efforts locally. While plan development is ongoing with input from all nine local municipalities in the county, the jurisdiction is looking to create a roadmap for sustainable, environmentally conscious solutions that will mitigate climate threats the community may face in the future. Regional stakeholders, such as the Hudson Valley Regional Council, provide communities in the area with support for participating in statewide climate action efforts like the Climate Smart Communities Program, which offers certifications for communities that are able to reduce GHG emissions by implementing sustainability-focused actions.

- **Long Island communities.** Nassau and Suffolk Counties in Long Island have released several plans, policies, and studies that assert their focus on certain climate action topic areas, particularly EV adoption and clean energy transitions.[38] Like Lower Hudson Valley, Long Island local governments also participate in the state's Climate Smart Communities program.

New York City. The City of New York's climate action efforts are encapsulated by key legislation, policies, and strategies dating back as early as 2007. Since 2015, New York City has maintained its commitment to the Paris Agreement and subsequently produced a report titled, 1.5 ℃: Aligning New York City with the Paris Climate Agreement, to articulate the city's plan to continue this work, through specific climate actions. The City also drafted Roadmap to 80x50 to illustrate how policy makers and planners would work to reduce GHG emissions 80% by 2050.

- **PlaNYC.** First published in 2007, PlaNYC is New York City's climate action plan. In the latest 2023 update, *PlaNYC: Getting Sustainability Done*, the city reaffirms its commitment to sustainability and climate action. It builds on work outlined in previous plans around building decarbonization, clean energy in buildings, efficiencies in waste disposal and more. Critically, this fifth climate action plan has lifted environmental justice as a key priority across all the sustainability efforts touched upon in the document—namely, climate action, ambient air quality, water quality and open space.[39]
- **PowerUp NYC.** *PowerUp NYC* is the city's first-ever Long-Term Energy Plan (LTEP). The report contains 29 initiatives addressing energy grid, transportation, and building-related energy issues that look to transition the city away from fossil fuel-based power and towards a renewables-based, low emissions, clean energy future.[40]
- **Recent emissions reduction-focused local legislation (e.g., Local Laws 92/94, 95, and 97 passed under the Climate Mobilization Act, as well as Local Law 120 on school bus electrification).** The city has codified more than 10 local laws since 2007 to support its climate action objectives. These laws govern a mix of regulations and actions that together work to reduce GHG emissions from city activities and mitigate climate impacts. In particular, Local Law 97 established a concrete, enforceable plan to reduce emissions across 60 different building types. The law tackles the city's largest source of emissions within a series of increasingly stringent emissions limits on large buildings through 2050. In fact, Local Law 97 also requires city government to reduce emissions

[38] Such as Nassau County's EV Fleet Conversion Implementation Plan; Suffolk County's Climate Action Plan
[39] PlaNYC: Getting Sustainability Done, 2023. https://climate.cityofnewyork.us/wp-content/uploads/2023/06/PlaNYC-2023-Full-Report.pdf
[40] PowerUp NYC, 2023. climate.cityofnewyork.us/wp-content/uploads/2023/09/PowerUpNYC.pdf

by 50% by 2030. By holding buildings accountable for their environmental impact, NYC further establishes itself as a nationwide leader in sustainability, encouraging other cities and municipalities to adopt similar measures to decarbonize the building sector.

Cross-jurisdictional organizations. Climate action policy in the NY-NJ MSA is influenced by another type of entity, cross-jurisdictional organizations. This category includes public transportation agencies and port authorities as they cover some of the region's key emissions sectors, warranting a consideration of their internal policies, goals, and targets related to climate action. For this PCAP, organizational strategies, plans, and targets for the region's largest entities of this kind include the Metropolitan Transportation Authority (MTA), New Jersey Transit (NJ TRANSIT), and the Port Authority of New York and New Jersey (Port Authority, PANYNJ).

- **Metropolitan Transportation Authority.** Overseeing public transportation for New York City, Long Island, and the Lower Hudson Valley, the MTA maintains several policies, plans, and strategies to help reduce GHG emissions associated with its operation and services. The authority set an emissions target in 2023 to reduce emissions from its operations by at least 85% by 2040.[41] The MTA's strategy involves updating facilities, transitioning fleets and improving energy efficiency to reach its emissions targets. Implementation of these strategies is in flight; for instance, 60 battery-electric buses will enter service in 2023-24, along with the necessary depot installations to support them.[42]
- **New Jersey Transit (NJ TRANSIT).** This transit agency is in the process of developing its Sustainability Plan to further solidify its climate action objectives and strategies. NJ TRANSIT will align the Sustainability Plan with its 10-Year Strategic Plan, of which already contains provisions related to its sustainability efforts, calling the agency to "promote a more sustainable future for our planet", the 5-Year Capital Plan as well as the goals in New Jersey's Energy Master Plan. Focus areas include maximizing ridership, promoting equitable transportation and encouraging the adoption of zero-emission technologies.[43]
- **Port Authority of New York and New Jersey.** PANYNJ is formally committed to achieving net-zero carbon emissions by 2050. It established an interim target to reduce emissions under direct operational control by 50% by 2030. In 2023, the Port Authority released a *Net Zero Roadmap* detailing more than 40 actions that will take the organization to net zero.[44]

The table below summarizes the climate policies, plans and programs across regional governments and entities highlighted above.

[41] MTA Green/Sustainability Information, 2023. https://new.mta.info/investor-info/sustainability
[42] MTA | Transitioning to a zero-emissions bus fleet, 2023. https://new.mta.info/project/zero-emission-bus-fleet
[43] NJ TRANSIT | Sustainability. https://www.njtransit.com/sustainability
[44] Port Authority of New York and New Jersey | Environmental Initiatives. https://www.panynj.gov/port-authority/en/about/Environmental-Initiatives.html

Table 4. Highlighted Climate Action Policies Impacting the NY-NJ MSA

	Legislation	Strategies/Plans	Programs/Initiatives
New Jersey	• Global Warming Response Act (2007) • Executive orders for clean energy under the Murphy Administration (2023)	• The NJTPA Regional Greenhouse Gas Mitigation Plan (2013) • Energy Master Plan (2019) • 80 x 50 Report (2020) • Draft Strategic Climate Action Plan (2023)	• NJBPU's Community Energy Plan Grant Program • Sustainable Jersey Certification Program • NJDEP's New Jersey Protecting Against Climate Threats initiative
New York State	• Climate Leadership and Community Protection Act (2019) • New York State Executive Order 24 (2009)	• Westchester County's Climate Action Plan • Nassau County EV Fleet Conversion Implementation Plan, • Suffolk County Climate Action Plan	• Scoping Plan (2022) • Climate Smart Communities Program
New York City	• Climate Mobilization Act and associated local laws • Local Law 120 (School bus fleet electrification)	• PlaNYC: Getting Sustainability Done (2023) • PowerUp NYC (2023) • NYCHA Sustainability Agenda (2021)	
Inter-region Entities		• PANYNJ Net Zero Roadmap (2023) • NJT 10-Year Strategic Plan • MTA 20-Year Needs Assessment	

Enabling climate change mitigation and GHG reductions through public policy is an established pursuit for states and localities with jurisdictional oversight in the region. At the state level in New York and New Jersey, GHG reduction targets have been codified for over a decade.[45] Since then, both states have moved the needle forward, creating a foundation for ambitious local policies to reduce GHGs.

The NY-NJ MSA's past climate action planning efforts underscore its dedication to the objectives and outcomes of the CPRG program and, more broadly, to a sustainable future. These plans mark a significant stride toward mitigating environmental challenges and fostering resilience in the face of climate change. The NY-NJ MSA builds upon its past planning efforts as distinct entities and presents the MSA-wide PCAP in the following pages.

[45] 2009 and 2007, respectively. By executive order in New York State and by legislative action in New Jersey

3 PCAP Elements

3.1 Greenhouse Gas (GHG) Inventory

This simplified greenhouse gas (GHG) inventory captures priority sources of GHG emissions in the NY-NJ MSA, focusing on the largest sources as well as the sources most addressable by the authorities within the MSA. The CCAP will include a comprehensive inventory with emissions estimates for all sectors. Estimated emissions reported in this section draw from existing work conducted by project partners and other regional stakeholders. Data and documentation consulted throughout the GHG inventory development include recent municipal climate action plans, existing GHG inventories, primary data on energy consumption and existing GHG reduction initiatives. The result is an inventory that is both forward-looking and reflective of previous efforts.

The regional inventory is focused on quantifying GHG emissions using CO_2e emissions factors across the three priority sectors, inclusive of methane and nitrous oxide. That said, a deeper conversation on the generation of anthropogenic emissions has also been considered. These are a diverse set of emissions from gas sources such as CO2 (carbon dioxide), CH4 (methane), and N2O (nitrous oxide), which can be attributed to specific polluting activities organized by sector (e.g., transportation, waste, land management). An exploration of these emissions will be included in the region's CCAP.

The construction of this GHG inventory can be broken down into three main stages: (1) reviewing existing work and data from regional partners and stakeholders, (2) developing a methodology to integrate the modeling processes from multiple existing inventories into a consistent approach for the NY-NJ MSA, and (3) aggregating values across the whole geography in a single workbook. Throughout the process, accounting and reporting standards established by the Greenhouse Gas Protocol's Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC) are used to categorize emissions and guide the methodology. Key high-level assumptions for the inventory are noted in the table below. The following sections (3.1.1 – 3.1.4) expand, expand on this introduction to the GHG inventory for the NY-NJ MSA PCAP, providing a more in-depth review of methodology and data sources used to calculate GHG emissions for the MSA and the results of these efforts.

Table 5. Key GHG Inventory Assumptions and Specifications

	Description
Base Year	2022
Geographic Scope	Bergen, NJ; Essex, NJ; Hudson, NJ; Hunterdon, NJ; Middlesex, NJ; Monmouth, NJ; Morris, NJ; Ocean, NJ; Passaic, NJ; Somerset, NJ; Sussex, NJ; Union, NJ; Nassau, NY; Putnam, NY; Rockland, NY; Suffolk, NY; Westchester, NY; Bronx, NY; Kings, NY; New York, NY; Queens, NY; and Richmond, NY.
Sector Definitions	In line with the GPC and for the purposes of the simplified GHG Inventory required under the PCAP, priority emissions from intra-MSA activities are classified into three main sectors: **Stationary Energy.** Stationary energy covers GHG emissions from the consumption of electricity, natural gas, fuel oil, propane, and steam by residential and commercial buildings. Typically, this type of energy usage is used to power personal, commercial, or industrial equipment for heating, hot water, air conditioning, and other plug loads within various building

Description	
	types. Often, including throughout this document, emissions resulting from on-site combustion of fossil fuels are explicitly separated from induced emissions to generate electricity or steam. **Transportation.** To catalog transportation emissions, the inventory references cross-sectional emissions from twelve vehicle types: Motorcycle; Passenger Car; Passenger Truck; Light Commercial Truck; Intercity Bus; Transit Bus; School Bus; Refuse Truck; Single Unit Short Haul; Single Unit Long Haul; Motor Home; Combination Short Haul; and Combination Long Haul, across five road types. This data is based on a more detailed analysis of EPA's MOVES model. **Waste.** Emissions from the waste sector encompass both Scope 1 emissions from 13 large emitting landfills within the MSA boundaries as well as Scope 3 emissions from the generation of waste by residential, commercial, and industrial sectors within the MSA.
CO_2e Conversion	Methane (CH4) and nitrous oxide (N20) emissions are converted to carbon dioxide equivalent (CO_2e) by multiplying each by its 100-year global warming potential (GWP) published by the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report (AR5).

3.1.1 Stationary Energy Methodology

The stationary energy emissions modeling approach deployed in this inventory enables granular outputs for the residential and commercial buildings sector that allow stakeholders to pinpoint geographic pockets of high emissions intensity to better approximate and assess GHG reductions from interventions (e.g., electrifying all schools across the MSA or in a particular jurisdiction). The NY-NJ MSA uses modeling that relies on census tract and county-level data on household characteristics from the American Community Survey (ACS), the National Renewable Energy Laboratory's (NREL) ResStock and ComStock building energy consumption tools and the Department of Energy's (DOE) City and County Commercial Building Inventories. While the methodologies for residential and commercial buildings differ slightly, given available data, these data sources were determined to be the best references for producing a granular assessment of energy consumption and emissions. In addition, this approach accounts for the nuances and neighborhood-specific characteristics that could influence energy consumption to isolate emissions down to a specific building type within a census tract or county.

Residential energy consumption calculation begins by developing a complete portfolio of the NY-NJ MSA's entire housing stock. This process involves creating over 650,00 unique house archetypes across 1,586 census tracts in New Jersey counties within the MSA and nearly 1.6 million unique archetypes across 3,348 census tracts in New York counties within the MSA to capture the plethora of unique house types and characteristics throughout the region. The total number of occupied households by house type is obtained using 2022 ACS data.[46] From there, housing values are split further according to the county's make-up of household wall types, foundation types and HVAC systems. To match a household type to a corresponding wall type, foundation type, and HVAC system, the median age of the building stock for each of the five different house types in every census tract is calculated and designated into one of the following categories: before 1940, between 1940 and 1980, and after 1980. With vintage bins established, the ratio of wall type, foundation type and HVAC systems to total households within a house type and vintage bin is obtained from NREL's Residential Building Stock Analysis.[47]

[46] U.S. Census | American Community Survey DP04 - Census Bureau Tables
[47] U.S. Building Typology Segmentation Residential | Tableau Public

Lastly, each house archetype is assigned a climate zone based on the county where the census tract is located. There are only two climate zones in New York and New Jersey: mixed humid (4A) and cold (5a). The household attributes listed below are incorporated into the construction of the housing stock portfolio.

Table 6. Housing Types and Attributes

Household Attributes				
House Type (Census Tract)	**Heating Fuel (Census Tract)**	**Wall Type (County)**	**Foundation Type (County)**	**HVAC System (County)**
Single-family detached	Natural gas	Brick	Unheated basement	Fuel boiler
Single-family attached	Electricity	Concrete	Heated basement	Fuel furnace
Multi-family with 2- to 4-units	Propane	Steel frame	Slab vented crawlspace	Fuel wall/floor furnace
Multi-family with 5+ units (1-3 stories)	Fuel oil	Wood frame	Ambient	Shared heating
Multi-family with 5+ units (4+ stories)	Other fuel		Unvented Crawl Space	Air source heat pump
	None			Baseboard
				Electric furnace

A real example can better explain the process behind matching household attributes to the house archetype. Of the single-family homes in Nassau County, NY, built before 1940, 3% have a brick frame, and 97% have a wood frame; of the multi-family with 5+ Units (4+ stories) built after 1980, 14% have a brick frame, 4% have a steel frame, and 82% have a wood frame. In other words, the ratio of all wall types is unique to each household type and vintage bin and sum to one. If, for example, there are zero multi-family with 2-to 4-unit households in Nassau County with a slab vented crawlspace foundation, all multi-family with 2- to 4-unit archetypes in Nassau County with a slab vented crawl space foundation are nulled. Multiplying the ratios of each of the household attributes by the number of occupied household types returns a detailed picture of the NY-NJ MSA's entire residential building sector at a census tract level to capture the unique distinctions within the region's building stock.

With an accurate representation of the housing stock established, ResStock, an analysis tool created by the National Renewable Energy Laboratory with support from the U.S. Department of Energy (DOE), is leveraged to match each household archetype with energy consumption estimates. By combining large public and private data sources, statistical sampling, detailed sub-hourly building simulations, and high-performance computing to segment the U.S. housing stock into 165 subgroups, ResStock creates energy consumption estimates unique to not only each of the 165 subgroups but also each state.

Each household archetype from the housing stock portfolio is matched with corresponding building IDs from ResStock. Matches are successful only when the household archetype and building ID share the same attributes (i.e., both are single-family detached homes that use natural gas for heating, have brick walls, an unheated basement foundation, fuel furnace, and are in climate zone 5A). All house archetypes from the portfolio will have at least one building ID

match, but some may have as many as 20 matches. The weighted average energy consumption across four fuel types and 31 uses of all matched building IDs is calculated, weighing on the total number of occupied households within the house archetype bucket. Energy uses run the gamut of natural gas consumption for heating, electricity consumption for garage lighting and propane consumption for a clothes dryer.

The foundation of commercial building energy consumption modeling is a detailed county-level building stock portfolio that differentiates buildings based on the climate zone, building type, size, and HVAC system. The square footage of commercial buildings within the NY-NJ MSA is pulled from the Department of Energy's City and County Commercial Building Inventories.[48] Each building is identified as one of 12 different building types listed in the table below. No Match is an all-encompassing building type to consolidate all remaining buildings that do not fall neatly into one of the other 11 categories. 12% of the total commercial building square footage within the MSA falls into the No Match category.

Table 7. Building Types from DOE City and County Commercial Building Inventory

Building Types	Square Feet (millions)	Share of Commercial Stock
Full-Service Restaurant	17	1%
Hospital	60	2%
Hotel	140	5%
Office	1,082	36%
Outpatient	87	3%
Quick Service Restaurant	3	0%
Retail	329	11%
School	87	3%
Strip Mall	81	3%
Supermarket	10	0%
Warehouse	791	26%
No Match	360	12%
Total	3,047	100%

Next, each building type is assigned one of three square footage buckets based on the sum of the total area of each commercial building in the inventory: less than 25,000 square feet, between 25,000-200,000 square feet, and over 200,000 square feet. With building type and size assigned, square footage can be split according to the ratio of HVAC systems to total commercial buildings within that corresponding building type and square footage bucket

[48] City and County Building Inventories. July 16, 2021. https://catalog.data.gov/dataset/city-and-county-commercial-building-inventories-010d2

grouping and county. This breakup is possible by leveraging NREL's Commercial Building Stock Analysis.[49]

A hypothetical example can better explain this process: if 11% of schools less than 25,000 square feet use a Packaged Single Zone Air Conditioner (PSZ-AC) with gas coil and 89% use a PSZ-AC with electric coil within Nassau County, a single, 10,000 square foot school in Nassau County will be split into two separate line items: 1,100 square feet that use a PSZ-AC with gas coil and 8,900 square feet that use a PSZ-AC with electric coil. From there, each unique square footage archetype split is matched to a series of ComStock building IDs with the same building type, square footage bucket, climate zone, and HVAC system type. The average energy use intensity across three fuel types and 16 uses for the matched building IDs is calculated and multiplied across the corresponding total square footage of the matched commercial building archetype to return total energy consumption by fuel type and use type.

The final step to solidify residential and commercial building energy consumption values is to benchmark the model's outputs to existing data sources. For natural gas and electricity consumption, the model relies on the EIA's State Energy Data System (SEDS) historical energy consumption time series for non-New York City, New York counties, and New Jersey counties within the MSA. Natural gas and electricity consumption values from New York City's 2022 GHG inventory are used to benchmark model outputs, given the city's access to better gas and electricity consumption figures from utility data. Additionally, the NY-NJ MSA incorporates steam consumption figures from the NYC's 2022 GHG inventory into this PCAP GHG inventory.

Once natural gas, electricity, fuel oil, propane and steam consumption figures are returned, values are multiplied by their corresponding emissions factor published by the EPA to convert consumption units into GHG emissions and other air pollutants.[50] For electricity, EPA eGRID emission factor for the NYC-Westchester (NYC-W) subregion is applied to the electricity consumption of all New York counties, not on Long Island. For those remaining New York counties, the New York-Long Island (NY-LI) subregion eGRID emission factor is multiplied by electricity consumption. For the MSA counties in New Jersey, the inventory relies on an eGRID-driven emissions factor calculated by the New Jersey Department of Environmental Protection to account for in-state resources as a proportion of in-state retail electricity sales, with remaining power demand supplied by power imported from the PJM grid.

Table 8. Electricity Emissions Factors

E-Grid Subregion	kg CO2e per kWh
RFCE	0.26
NYC-W	0.40
NY-LI	0.55

[49] U.S. Building Typology Segments Commercial.
[50] Emissions Factors for Greenhouse Gas Inventories, 2023. EPA. https://www.epa.gov/system/files/documents/2023-03/ghg_emission_factors_hub.pdf

3.1.2 Transportation Methodology

In a region that is always on the move, a strong understanding of the patterns behind on-road transportation provides critical insights to identify the appropriate levers to abate transportation sector emissions. Requirements laid out by the GPC state localities “shall report all GHG emissions from combustion of fuels in transportation occurring within the city boundary in Scope 1” for the BASIC level framework followed in this simplified GHG inventory. Scope 3 emissions from transportation cover the out-of-boundary portion of all GHG-emitting activities from trips that either originate or conclude within the city boundaries. These emissions are expected to be included in the comprehensive GHG inventory required for the CCAP.

This inventory follows the GPC’s geographic/territorial method to quantify transportation emissions activity occurring solely within MSA boundaries, regardless of a trip’s origin or destination. Estimating transportation emissions using this approach requires the deployment of travel demand models to isolate intra-MSA mileage, which aligns with the Scope 1 (territorial) emissions framework that excludes out-of-boundary mileage even for trips that originated or were completed within the MSA.

In line with the prescribed methodology in the GPC, the NY-NJ MSA GHG inventory uses transport/travel demand models (TDMs) developed by regional partners NJTPA and NYMTC to estimate VMT from on-road mobile sources across the region. Additional post-processing, particularly through the EPA’s Motor Vehicle Emission Simulator (MOVES) model, then calculate emissions based on critical factors, such as average speed of traffic and mode of vehicle. Outputs from NJTPA’s model were used to develop annual average emissions factors with county-level geographic resolutions for multiple vehicle types (e.g., car, SUV, bus, heavy-duty truck). Those estimates were also applied to more general GHG emissions developed with NYMTC’s TDM, creating more detailed and standardized on-road transportation emissions data. The outputs of this modeling exercise are two different breakdowns of vehicle miles traveled (VMT) and emissions by vehicle type and road type. Both outputs are important in quantifying the entire MSA’s GHG emissions from the transportation sector. The table below outlines the potential categories within each breakdown.

Table 9. Vehicle and Road Types in EPA’s MOVES Model Outputs

Vehicle Type	Road Type
Motorcycle	Off-Network
Passenger Car	Rural Restricted
Passenger Truck	Rural Unrestricted
Light Commercial Truck	Urban Restricted
Intercity Bus	Urban Unrestricted
Transit Bus	
School Bus	
Refuse Truck	
Single Unit Short Haul Truck	
Single Unit Long Haul Truck	

Vehicle Type	Road Type
Motor Home	
Combination Short Haul Truck	
Combination Long Haul Truck	

The overall output of NJTPA's work serves dual purposes in the GHG inventory for the NY-NJ MSA. First, VMT outputs by road type and county serve as the basis for calculating GHG emissions from the transportation sector for all New Jersey counties within the MSA. The returned VMT by vehicle type is used to split up VMT by road type for all MSA counties in New Jersey. Second, the MOVES model returns detailed emission factors by road type for New Jersey counties in the MSA, which are then leveraged to convert VMT by road type to GHG emissions for MSA counties in both New Jersey and New York. Before going into more detail on the steps taken to apply MOVES emission factor outputs to New York counties, it is important to discuss the thorough nature of NJTPA's efforts. The MOVES model relies on multiple inputs to create a robust estimate of VMT and GHG emissions from the transportation sector. The full list of inputs is shown below:

- **Age Distribution**, based on 2019 motor vehicle registration data.
- **Average Speed Distribution**
- **Fuel**, based on Movesdb20161117 default data for New Jersey.
- **Meteorology**
- **Road Type Distribution**
- **Source Type Population**, based on 2019 motor vehicle registration data received from NJDEP.
- **HPMS Vehicle Type by Year**, an annual VMT for each county, updated using 2019 Highway Performance Monitoring System (HPMS) VMT data from NJDOT.
- **Monthly VMT Fractions**
- **Hourly VMT Fractions**
- **Inspection and Maintenance Programs**
- **On-road Retrofit**

In the NY-NJ MSA GHG inventory, the ratio of VMT for each vehicle type to total VMT by county is used to split VMT by road type for New Jersey counties within the MSA. By creating a cross-section of VMT by road type and vehicle type, the GHG inventory provides a more granular assessment of the specific sources of transportation sector emissions. Additionally, the MOVES outputs play a key role in calculating the emissions factors for the four primary GHG pollutants associated with the on-road transportation sector (CO_2, CH_4, N_2O, and Elemental Carbon) for each road type and county. CH_4 and N_2O are converted to CO_2e using GWPs previously noted. As a result, in New Jersey, there are 45 unique emission factors for each primary GHG pollutant, which are multiplied by road type/ vehicle type cross-sectional VMT values, matching on road types.

A similar approach to splitting VMT by road type and vehicle type is followed for New York counties within the NY-NJ MSA. Travel demand model outputs of VMT by road type are split by using VMT by vehicle type outputs, enabling the creation of a cross-sectional data matrix of GHG emissions by road type and vehicle type. To parallel the methodology and level of

granularity of New Jersey transportation emissions, New York VMT by road type values is manipulated in one of two ways. For counties in New York State outside of New York City, the emission factors by road type for all New Jersey counties within the MSA are averaged and multiplied by road type VMT totals. The second approach applies to New York City; instead of relying on averages across all New Jersey counties within the MSA, only the emission factors from Essex and Hudson counties are deployed.

This approach is taken due to the urban nature of Essex and Hudson counties that parallel the transportation dynamics of New York City. Additionally, New York City's on-road transportation emission factors are benchmarked against the city's 2022 GHG inventory to better align with existing methodologies and data sources specific to New York City. The table below displays the final emission factors used across road types and counties.

Table 10. Transportation Sector Emissions Factors

	CO_2e (grams per mile)			
	Road Type			
County Name	**2**	**3**	**4**	**5**
Bergen	422	475	419	523
Essex	374	432	443	556
Hudson	432	599	388	626
Hunterdon	557	407	545	404
Middlesex	421	448	429	481
Monmouth	337	398	430	465
Morris	430	405	502	463
Ocean	363	404	-	444
Passaic	365	413	392	507
Somerset	551	402	450	420
Sussex	370	392	-	-
Union	395	461	411	535
Nassau	418	436	441	493
Putnam	418	436	441	493
Rockland	418	436	441	493
Suffolk	418	436	441	493
Westchester	418	436	441	493
Bronx	-	-	572	813
Kings	-	-	572	813
New York	-	-	572	813
Queens	-	-	572	813
Richmond	-	-	572	813

Additionally, several off-road transportation categories are included in this simplified GHG inventory. The methodology to quantify emissions from aviation and marine activities is simple, straightforward, and robust.

The Port Authority of New York and New Jersey (Port Authority, PANYNJ) owns, manages and maintains bridges, tunnels, bus terminals, airports, the Port Authority Trans-Hudson (PATH) commuter rail system, and marine terminals that are critical to the metropolitan New York and New Jersey region's trade and transportation capabilities. As part of the organization's 2021 GHG inventory exercises, it quantified GHG emissions from the aviation sector within its jurisdictional boundary. The Port Authority manages and operates John F. Kennedy International Airport, Newark Liberty International Airport, LaGuardia Airport, Stewart International Airport, and Teterboro Airport, all of which fall within the boundaries of the NY-NJ MSA. Aviation emissions are broken into three categories: aircraft movement, auxiliary power units (APU), and ground support equipment. Aircraft movement covers emissions from an aircraft's approach—defined as the portion of the flight from the time the aircraft reaches the mixing height (approximately 3,000 feet altitude) to touch down on the runway— taxi in, startup, taxi out, takeoff, and climb up to the mixing height. APUs are most often onboard generators that provide electrical power to the aircraft while its engines are shut down. Ground support equipment services an aircraft upon arrival and before departure from the runway. The Port Authority's 2021 GHG inventory[51] details specific methodological steps to gather activity data and convert it to CO2 emissions. The NY-NJ GHG inventory directly pulls in the Port Authority's GHG emission values, converting to CO_2e using the key GHG inventory assumptions and specifications shown previously. To adjust 2021 values to match the 2022 base year of the MSA's inventory, a scaling factor is created from the Federal Aviation Administration's Air Traffic Activity Data System, which reports the total number of arrivals and departures at each of the Port Authority's five airports within the MSA. The scaling factor values are unique to each airport and range from 1.16 to 1.90.

For marine activities, emissions are quantified for both ferries that operate as a public transportation service and cruise ships berthed in the Manhattan Cruise Terminal. The NY-NJ MSA identified five agencies that operate ferries around the region— Metro North, New York City Department of Transportation (NYCDOT), NY Waterway, SeaStreak and NYCEDC. The Federal Transit Administration's 2022 Annual Database Energy Consumption documents fuel consumption used by public transportation agencies to operate revenue vehicles.[52] Gallons of diesel consumed by each of the five operators identified above are obtained by filtering on the appropriate agencies and type of service. These gallon values are then multiplied by an emissions factor for diesel fuel published by the EPA to convert consumption into MT of CO_2e emissions.[53]

[51] Reporting and Performance. PANYNJ. https://www.panynj.gov/port-authority/en/about/Environmental-Initiatives/reporting-and-performance---environmental-initiatives-.html
[52] 2022 Annual Database Energy Consumption. December 19, 2023. USDOT. https://www.transit.dot.gov/ntd/data-product/2022-annual-database-energy-consumption
[53] Emission Factors for Greenhouse Gas Inventories (epa.gov)

To quantify cruise ship emissions, the shore power emissions calculator developed by the EPA is leveraged to estimate Annual Vessel Power Emissions. The tool's user guide states it "can calculate emissions of criteria and greenhouse gas (GHG) pollutants based on vessel and fuel inputs and the regional electricity grid mix." Shore power emissions are estimated using emission factors from the EPA's Emissions & Generation Resource Integrated Database (eGRID) 2018 data, and vessel emissions are estimated using emission factors from EPA's 2022 Port Emissions Inventory Guidance (EPA, 2022)." The tool outputs an estimate of 2022 annual emissions, which is then added directly into the GHG inventory workbook with no further manipulation.

3.1.3 Waste Methodology

Scope 1 solid waste emissions for the MSA are calculated using the EPA's Facility Level Information on GHG Tool (FLIGHT) data for the calendar year 2022. This dataset contains emissions from large facilities (defined as those emitting greater than 25,000 MT CO_2e per year) in nine industry groups, including landfills. Filtering on the Waste sector (inclusive of municipal and industrial landfills, wastewater treatment, and solid waste combustion) and state (New York and New Jersey) returns a list of all waste facilities with significant emissions. The carbon dioxide produced from waste is considered biogenic and reported separately from other anthropogenic emissions; as a result, biogenic CO2 emissions are excluded from net emission totals, while CO2 emissions associated with the combustion of waste and landfill gas are included as part of gross emission totals. Final emissions values included in the GHG inventory are equal to the methane emissions generated by each individual waste facility, which are converted to CO_2e using the GWP methodology previously described.

Calculating Scope 3 emissions from waste generated within the MSA requires a different methodology unique to each of the three regions within the MSA. For New York City, the New York City Department of Sanitation (DSNY) publishes fiscal year reports of the city's municipal refuse and recycling statistics.[54] The city's fiscal year runs from July 1 to June 30. For the sake of the GHG inventory, it is assumed fiscal years correspond to the calendar year. These reports break down tons of waste disposed and diverted into several categories, all of which are included in the GHG inventory. The categories include DSNY Curbside and Containerized Collections, Other DSNY Collections, Other Materials, and Other Materials – Not Counted in DSNY-Managed Waste Diversion Statistics.

According to the latest DSNY statistics, Curbside Collections consist of only refuse, paper/cardboard, metal/glass/plastic and organics from roughly 90% residential and 10% institutional. Roughly 90% of containerized collections are from institutions, with 10% from large residential buildings.[55] Containerized collections take place at varying frequencies, from containers ranging from a two to a 30 cubic yard dumpster, to a compactor, to a roll-off container. Refuse also includes street basket refuse collected by dedicated trucks and on the curbside routes. Organics consist of food scraps, food-soiled paper, and yard waste from

[54] "Annual Report." 2023. DSNY. https://dsny.cityofnewyork.us/wp-content/uploads/reports/dsny-collections-annual-fy2023.pdf
[55] "New York City Municipal Refuse and Recycling Statistics: Fiscal Year 2023." DSNY. DSNY - Annual Reports for DSNY & Non-DSNY Collections

selected schools, institutions, multi-unit apartment buildings, and pilot neighborhoods. In addition, DSNY collects Christmas trees citywide every January for composting.

Because DSNY data is almost exclusively residential waste, it does not capture the complete picture of waste generated by NYC. To capture sources of waste from the commercial sector, additional steps were taken to quantify both the tonnage of commercial sector waste and its corresponding emissions. In 2012, DSNY published a study and analysis on commercial solid waste in New York City.[56] Using an employee-based disposed waste model, the agency estimated the tonnage of disposed waste and diversion rates by material category in 2009. These values are pulled into the GHG inventory workbook, maintaining several of the material categories referenced in the study while rolling up a few into an all-encompassing "Other" category. 2009 tonnage from the commercial wastes study is scaled to 2022 estimates based on the growth in commercial building square footage for the Northeast census region, using the Energy Information Administration's Commercial Building Energy Survey 2012 and 2018 results.

Across all the categories of waste collected by DSNY and the identified disposal method, each is matched to a corresponding emissions factor to convert short tons of waste into metric tons of CO_2e. The applied emissions factors are displayed below and are obtained from the EPA's 2023 GHG Emission Factors Hub[57] for Waste. Some other specialized emission factors are brought in from additional sources, such as Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM), to quantify emissions associated with the disposal and diversion of sewage sludge and mixed electronics.

Table 11. DSNY New York City Emission Factors

DSNY Waste Type	Emission Factor	Disposal Method	MT CO_2e / Short Ton Material
Refuse	Mixed MSW	Landfilled	0.52
Paper/Cardboard	Mixed Paper (general)	Recycled	0.07
Organics	Mixed Recyclables	Recycled	0.17
Metal/glass/plastic	Mixed Organics	Composted	0.09
Street Dirt	Yard Trimmings	Landfilled	0.33
Other City Agency Disposal (Non-DSNY)	Mixed MSW	Landfilled	0.52
Miscellaneous	Mixed MSW	Landfilled	0.52
Other Bulk Metal	Mixed Metals	Recycled	0.23
Rikers Food Waste	Mixed Organics	Composted	0.09
Redeemed bottles and cans	Mixed Recyclables	Recycled	0.17
Private Landscaper Leaf and Yard Waste	Yard Trimmings	Composted	0.19

[56] New York City Commercial Solid Waste Study and Analysis. 2012. DSNY. https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/about_2012-commercial-waste-study_0815.pdf
[57] Emission Factors for Greenhouse Gas Inventories (epa.gov)

DSNY Waste Type	Emission Factor	Disposal Method	MT CO_2e / Short Ton Material
Other Organics Collections	Mixed Organics	Composted	0.09
e-cycleNYC Electronics Collections	Mixed Electronics	Recycled	0.02
Electronics Recycling	Mixed Electronics	Recycled	0.02
Tires	Tires	Recycled	0.1
Sewage Sludge	Sewage Sludge	Landfilled	0.18
Sewage Sludge	Sewage Sludge	Recycled	0.06

Table 12. New York City Commercial Building Waste Emission Factors by Waste Type

DSNY Waste Type	Diversion Rate	Emission Factor	MT CO2e / Short Ton Material Landfilled	MT CO2e / Short Ton Material Diverted (Recycled or Composted)
Paper	16%	Mixed Paper (general)	0.8	0.07
Glass	16%	Glass	0.02	0.05
Metal	16%	Mixed Metals	0.02	0.23
Plastic	16%	Mixed Plastics	0.02	0.22
Electronics	0%	Mixed Electronics	0.02	0.02
Other	16%	Mixed MSW	0.52	0.09
Food	0%	Food Waste	0.58	N/A
Yard	94%	Yard Trimmings	0.33	0.19
Textiles	16%	Mixed MSW	0.52	0.09
Carpet	94%	Carpet	0.02	0.02
Other Organics	94%	Mixed Organics	0.28	0.17

For New Jersey counties within the MSA, the state's Department of Environmental Protection (NJDEP) publishes county generation, disposal, and recycling statistics from 1999 to 2020. The most recent figures from 2020 are broken up into three categories: disposed municipal solid waste (MSW), disposed non-MSW and recycled MSW with add-ons. MSW figures include waste originating from private residences, commercial waste that originates in wholesale, retail, or service establishments and institutional waste material originating in schools, hospitals, research institutions and public buildings. Non-MSW waste, on the other hand, includes construction and demolition waste, vegetative waste, and dry sewage sludge from wastewater processing facilities. To model waste emissions in New Jersey for 2022, 2020 tonnage values are divided by annual county population estimates obtained from the Census Bureau's American Community Surveys to return tons of disposed MSW, disposed non-MSW, and recycled MSW with add-ons per capita. The average waste volumes per capita of each category from 2016-2020 are multiplied by 2022 county population figures. Each waste category is then

matched to a corresponding emissions factor in the table below to convert short tons of waste into metric tons of CO_2e. These emission factors are obtained from the EPA's 2023 GHG Emission Factors Hub.[58] The emission factor for disposed non-MSW is calculated by taking the average CO_2e emission factors for all materials, excluding MSW.

Table 13. NJ DEP Emissions Factors by Waste Type

NJDEP Waste Type	Emission Factor	Disposal Method	MT CO2e / Short Ton Material
Disposed MSW	Mixed MSW	Landfilled	0.52
Disposed non-MSW	Non-MSW	Landfilled	0.27
Recycled MSW with add-ons	Mixed Recyclables	Recycled	0.09

For NY-NJ MSA counties in New York, excluding those in New York City, data on waste generated is not available. As a result, a weighted average per capita emissions rate from the 12 New Jersey counties within the NY - NJ MSA is calculated, weighing on total emissions. This weighted average is inclusive of the three waste categories reported by NJDEP— Disposed MSW, disposed non-MSW, and Recycled MSW with add-ons. In 2022, the total waste emissions per capita applied to non-New York City New York counties was 0.58 MT CO_2e; multiplying these values by 2022 county population estimates returns total waste emissions for Nassau, Putnam, Rockland, Suffolk, and Westchester counties.

All told, the emission factors from the EPA deployed in this GHG Inventory for the Waste Sector include emissions from waste transportation to landfills by assuming an average distance traveled to a processing facility.

3.1.4 Inventory Outputs and Analysis

The results of this inaugural 2022 GHG inventory for the NY-NJ MSA provide an in-depth analysis of the region's prioritized sectors and serve as a solid foundation for regional collaboration on reduction measures to ensure robust emissions reduction monitoring begins from a common denominator. This meticulous examination quantifies emissions across residential and commercial buildings, on-road and off-road transportation and waste to provide a detailed understanding of the sources contributing to the MSA's environmental impact. These findings serve as a crucial foundation for informed decision-making, enabling policymakers and environmental advocates to develop targeted strategies for mitigating emissions and advancing the MSA's commitment to a more sustainable future. At an aggregate level, across sectors and counties, the simplified 2022 GHG inventory exercise reveals total emissions from the NY- NJ MSA are equal to 158 million metric tons of CO_2e. This total is greater than emissions generated by Washington, D.C., Vermont, Rhode Island, Delaware, New Hampshire, Maine, South Dakota, Hawaii, Idaho, and Montana in 2021 combined, according to the U.S. Energy Information Administration's (EIA) *State energy-related carbon dioxide emissions by year* report.[59] If the MSA were a state, it would have the 11th highest GHG emissions in the nation. It is likely that upon completion of the Comprehensive GHG Inventory for the CCAP, these figures

[58] Emission Factors for Greenhouse Gas Inventories (epa.gov)
[59] State Carbon Dioxide Emissions Data - U.S. Energy Information Administration (EIA)

will be even larger. Implementing GHG emission reduction measures in the NY-NJ MSA offers the Biden Administration one of the largest and most consolidated opportunities to reduce emissions with its CPRG program. The results of this GHG inventory exercise can provide stakeholders with the necessary information to make fully informed decisions on how and where to implement priority measures to ensure the cost-effectiveness of GHG reductions is maximized.

The inventory results laid out in the following section include three priority sectors: stationary energy, transportation, and waste. The results align with a common trend heard throughout stakeholder and community engagement: emissions from residential and commercial buildings represent a significant portion of the MSA's total emissions: 57% of emissions can be attributed to stationary energy sources, inclusive of both Scope 1 emissions from the burning of fossil fuel and Scope 2 emissions from electricity consumption in residential and commercial buildings. Emissions from vehicles traversing the MSA's rural and urban restricted and unrestricted roadways constitute on-road transportation and contribute to the total emissions significantly as well, constituting 36% of emissions. Waste emissions make up the remaining 7%.

Figure 4. NY-NJ MSA emissions share by priority GHG sector

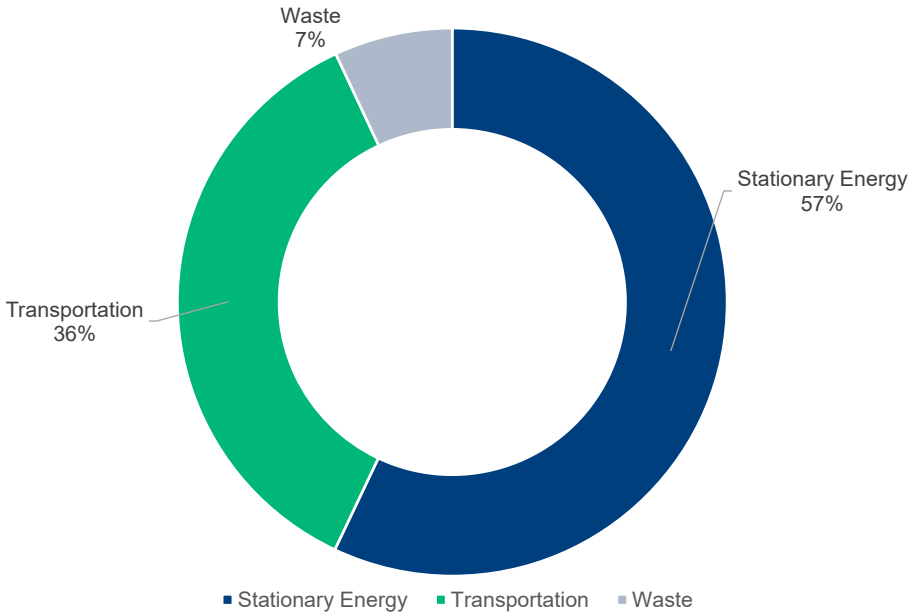


Table 14. Emissions by type and sector (million MT CO_2e)

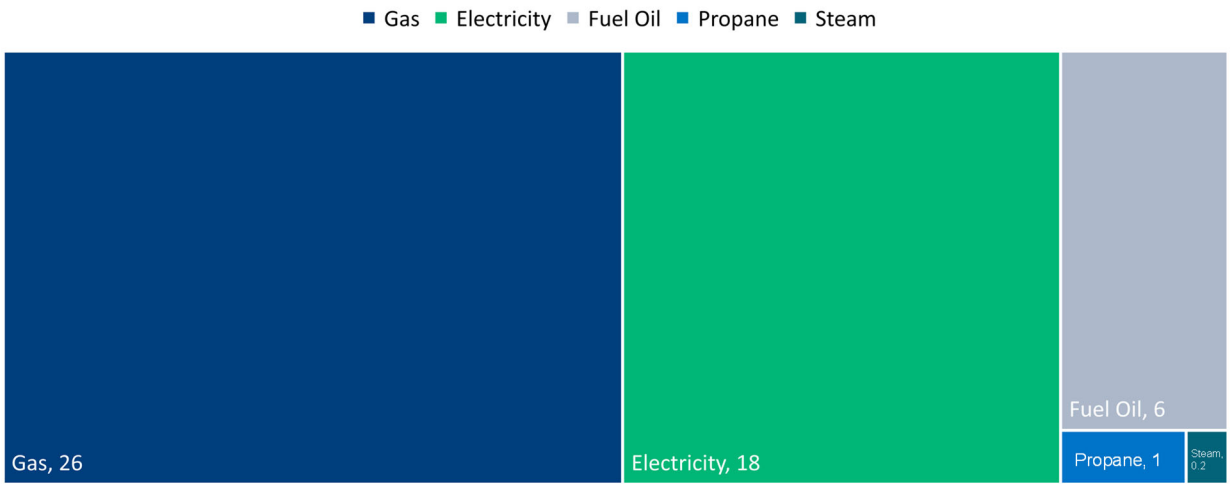
Sector	Type	Emissions from New Jersey counties in the MSA	Emissions from New York Counties, excluding NYC, in the MSA	Emissions from New York City	Total MSA Emissions
Stationary Energy (On-site Combustion, Steam & Electricity Emissions)	Residential Buildings	16	17	18	51
	Commercial Buildings	13	10	16	39
Transportation	On-Road	24	16	14	55
	Off-Road	-	-	-	2

Sector	Type	Emissions from New Jersey counties in the MSA	Emissions from New York Counties, excluding NYC, in the MSA	Emissions from New York City	Total MSA Emissions
Waste	Scope 1 (Emissions from the treatment and disposal of waste within MSA boundaries)	0.4	1	0.1	2
	Scope 3 (Emissions from waste generated by the MSA but treated outside the MSA)	4	3	3	8

Residential Buildings

From single-family homes to walk-up apartment buildings to high-rise condominiums, many unique households make up the housing stock of the NY-NJ MSA. As detailed in the methodology section, the model deployed to estimate residential building sector emissions is designed to capture the nuances of households across neighborhood, county, and state lines. The results show the environmental footprint stemming from the buildings we call home. The residential buildings sub-sector emits 51 million MT CO_2e each year. Contributions to this emissions amount are not evenly distributed across counties in the MSA. Average annual emissions intensity per occupied household from residential buildings ranges from 3 MT CO_2e in Bronx County to 13 MT CO_2e in Suffolk County, representing a 4x difference. The overall region average emissions intensity in this category is roughly 8 MT CO_2e per year. Within the residential sector, natural gas use accounts for a majority of the sub-sector's total emissions. Natural gas use is modeled for a wide variety of activities, including clothes drying, fireplaces, grills, hot water systems, lighting, and ovens. Yet heating is by far the more prominent use of natural gas in the NY-NJ MSA residential sector: 84% of emissions from natural gas use correspond to heating. Natural gas emissions from heating account for 43% of emissions for the entire residential sector, and natural gas emissions from hot water are the only other significant source of natural gas emissions in the residential sector, representing 6% of total residential sector emissions. The remainder of natural gas uses are negligible. This comprehensive inventory of emissions sources for residential buildings underscores the importance and challenge of electrifying residential buildings and transitioning from natural gas and other fossil fuels. These results shed light on the current standing of emissions in the residential building sector, enabling stakeholders across the MSA to align and proactively implement targeted solutions.

Figure 5. Residential Emissions by Fuel Type (Million MT CO_2e)[60]



Just over one-third of residential emissions come from electricity use related to heating and powering household appliances such as ceiling fans, air conditioning, and interior lighting. Plug loads (i.e., electricity from electrical outlets) are the largest driver of electricity use for residential buildings: over 5 million MT CO_2e. This includes the powering and/or charging of devices like phones, televisions, computers, and hair dryers. In fact, electricity emissions from the plug loads for appliances described surpass emissions for both heating and cooling.

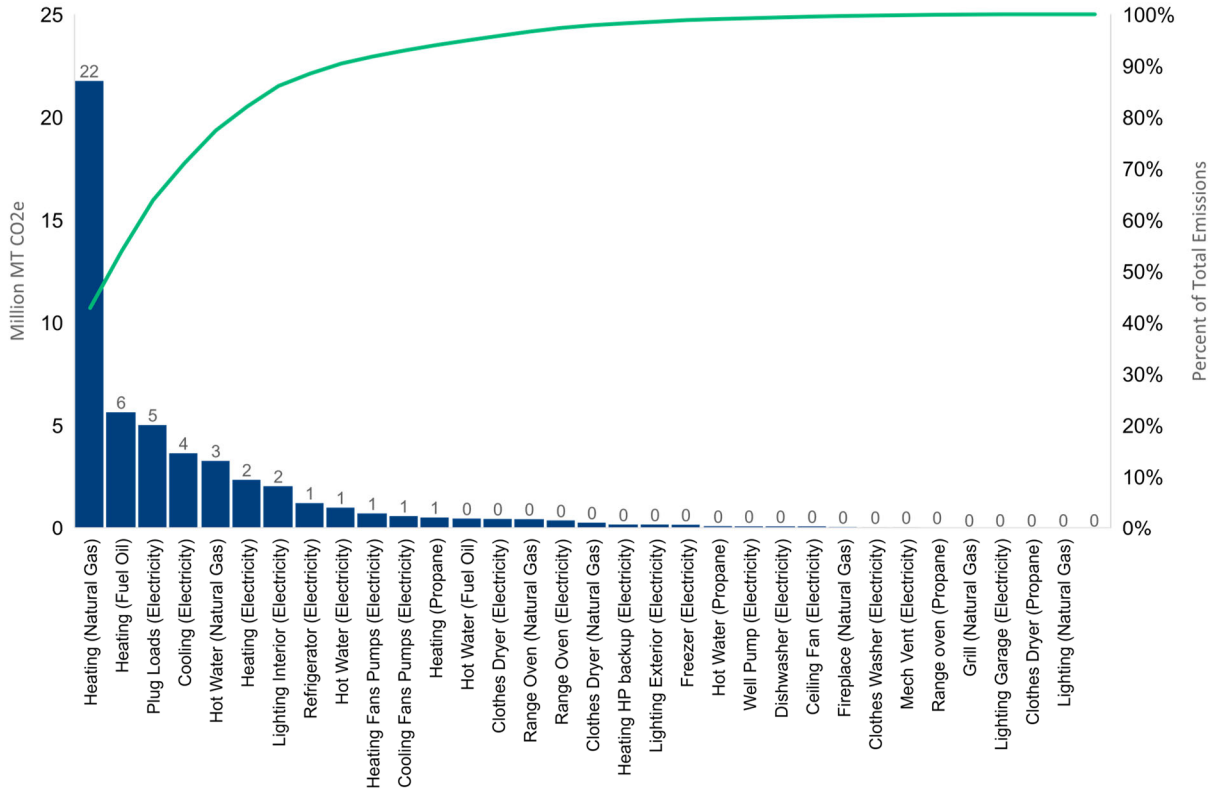
Heating energy can be delivered by various sources, including natural gas, fuel oil and electricity. To this point, natural gas emissions from heating are the largest source of residential emissions. The above figure, which shows the amount and relative share of residential emissions attributable to a given fuel type and use in the MSA, demonstrates this case. It indicates that around 22 million MT CO_2e, or more than 40% of total residential emissions in the MSA, can be attributed to natural gas-based heating. This difference is partly explained by how typical households in the MSA are heated today - 67% of households are heated by natural gas sources, whereas only 13% are heated through electricity.

The use of fuel oil for residential heating is also a significant contributor to the sector's GHG emissions. The figure below further shows how emissions from fuel oil used for heating generate more emissions than electric plug loads but significantly less still than natural gas. Natural gas use intensity per household is inversely related to propane and fuel oil use intensity, meaning that counties with a lower natural gas use intensity per household have a higher use intensity for fuel intensity. For example, Sussex County, NJ, has a natural gas use intensity of 21 MMBtu / occupied household, the second lowest value across the MSA; its fuel oil use intensity equals 49 MMBtu / occupied household, significantly above the MSA average fuel oil use intensity of 15 MMBtu / occupied household. This same inverse relationship does not exist between natural gas and electricity consumption, which is evidence of the current challenges to

[60] Steam: 0.2 $MMTCO_2e$

electrifying and abating emissions from residential buildings, given the entrenched nature of natural gas systems and consumer behaviors.

Figure 6. Residential Emissions by Use and Fuel Type



Commercial Buildings

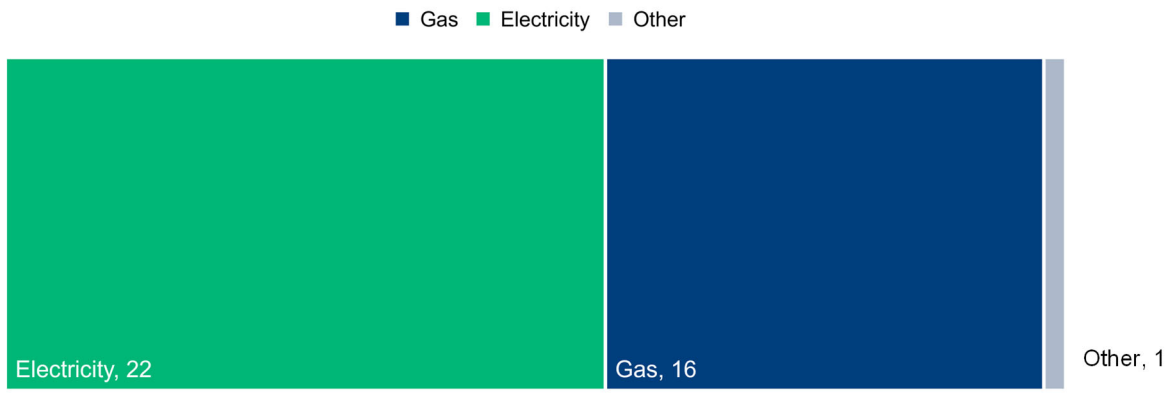
Commercial buildings are a vital hub of economic activity in the NY-NJ MSA, and energy uses and emissions estimates vary significantly depending on the type of activities conducted within a commercial building. Quick-service restaurants, which consist almost entirely of fast-food restaurants that prepare and sell food, as defined by the Department of Energy, do not consume and emit the same as offices, for example, and the approach for modeling commercial building energy consumption ensures differing behaviors and characteristics are accounted for.[61] The model outputs present a granular breakdown of GHG-emitting activities. By understanding the nuances of commercial building emissions, the NY-NJ MSA can pave the way for strategic interventions and foster a balance between economic prosperity and environmental responsibility in the built environment.

It is important to highlight the key differences between energy consumption and emissions in the commercial building sub-sector and the residential building sub-sector. Total commercial building emissions within the MSA are estimated to stand at 40 million MT CO_2e, around 24% lower than emissions from the residential building sector. Commercial buildings consume around 61 million MWh of electricity, compared to 49 million MWh in the residential sector, but

[61] ComStock Reference Documentation: Version 1 (nrel.gov).

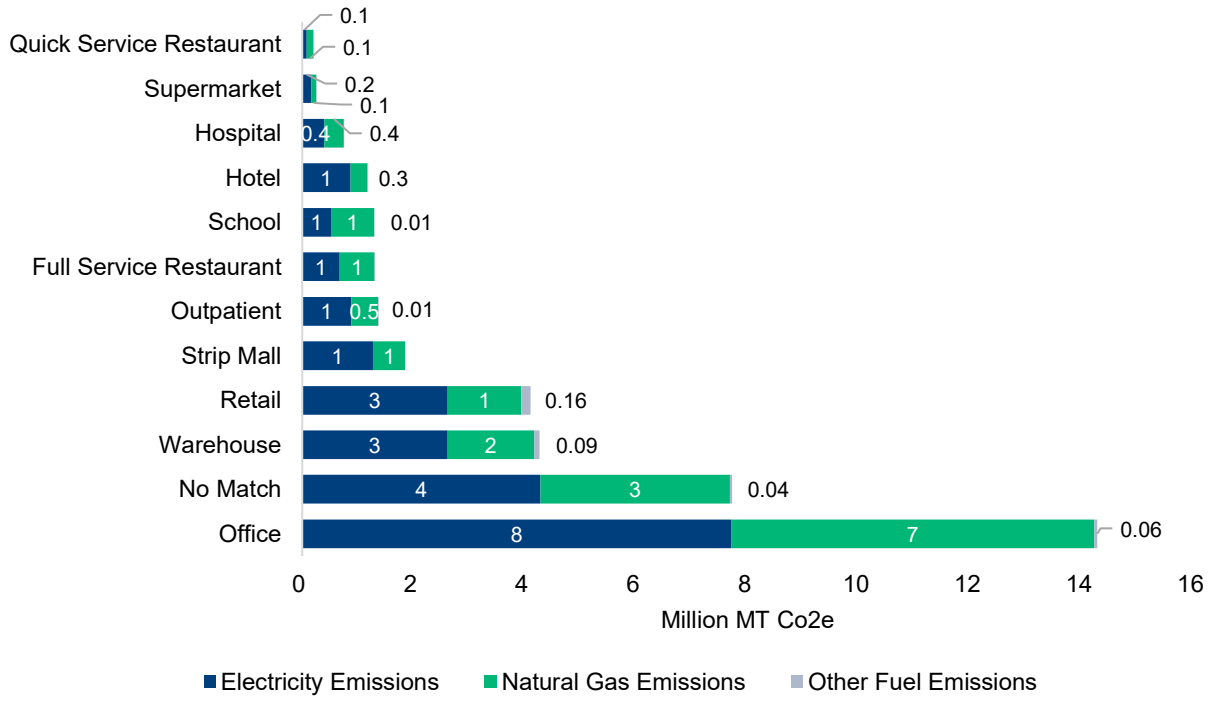
natural gas consumption is significantly lower—303 trillion BTU versus 486 trillion BTU. These consumption differences explain why the commercial building sector generates fewer emissions than the residential building sector. As the grid stands, electricity is more carbon-intensive than natural gas. For reference, the emission factors for electricity used in this GHG inventory exercise equal between 76 kg CO_2e / MMBtu – 161 kg CO_2e / MMBtu, depending on the county. Meanwhile, the emission factor for natural gas equals 53 kg CO_2e per MMBtu. This is largely due to the continued reliance on coal, a dirtier fossil fuel than natural gas, to generate electricity in both New York and New Jersey. Where natural gas emissions are the main driver of residential building emissions, in the commercial building sub-sector, emissions are driven by electricity consumption, the origin of 57% of total emissions, followed by natural gas use at 41% of emissions, and other fuel and steam at 2%. The commercial building sector's reliance on electricity indicates work to reduce commercial building emissions must involve spurring renewable energy development within the MSA to reduce the carbon intensity of the grid.

Figure 7. Commercial Emissions by Fuel Type (Million MT CO_2e)



At both an absolute and relative level, natural gas emissions are prominent in office buildings within the MSA. The NY-NJ MSA is the financial capital of the world, so it is not surprising that across all building type energy consumption modeled as part of the GHG inventory, emissions from office buildings are highest. Diving deeper into these results reveals natural gas emissions as a percent of total office building emissions are above the average across all building types. Across the MSA, schools rank highest in the proportion of emissions from natural gas; 59% of emissions from school buildings come from natural gas. Schools in New York City have an above-average proportion of 60% of total school emissions from natural gas, compared to 52% of total emissions from schools in Nassau, Putnam, Rockland, Suffolk, and Westchester counties coming from natural gas. The second highest absolute emissions figure is for the *No Match* building category, which covers a wide range of building types that do not fall neatly into one of the other 11 building types, such as laboratories, data centers, car washes, and funeral homes. For example, government buildings are generally included in the *No Match* category, excluding schools and public housing.

Figure 8. Commercial Building Emissions by Building Type



When we normalize total emissions by building type on a square footage basis, we get a slightly different picture. Offices are relatively efficient compared to other building types, with an emissions intensity 48% below the average intensity across building types. Warehouses and hotels, however, have the lowest emissions intensity per square foot.

On the other hand, while quick-service restaurants and full-service restaurants have some of the lowest total emissions, on a square footage basis, they represent the two highest intensities across all 12 building types at 73 and 77 kg CO_2e / sq ft, respectively—more than double the average across all building types of around 25 kg CO_2e / sq. ft. In terms of the total share of emissions, office buildings comprise the largest total of the MSA's building stock and, correspondingly, the share of emissions at 36%. This is nearly double the emissions share of the next largest building type group, No Match, at 20%.

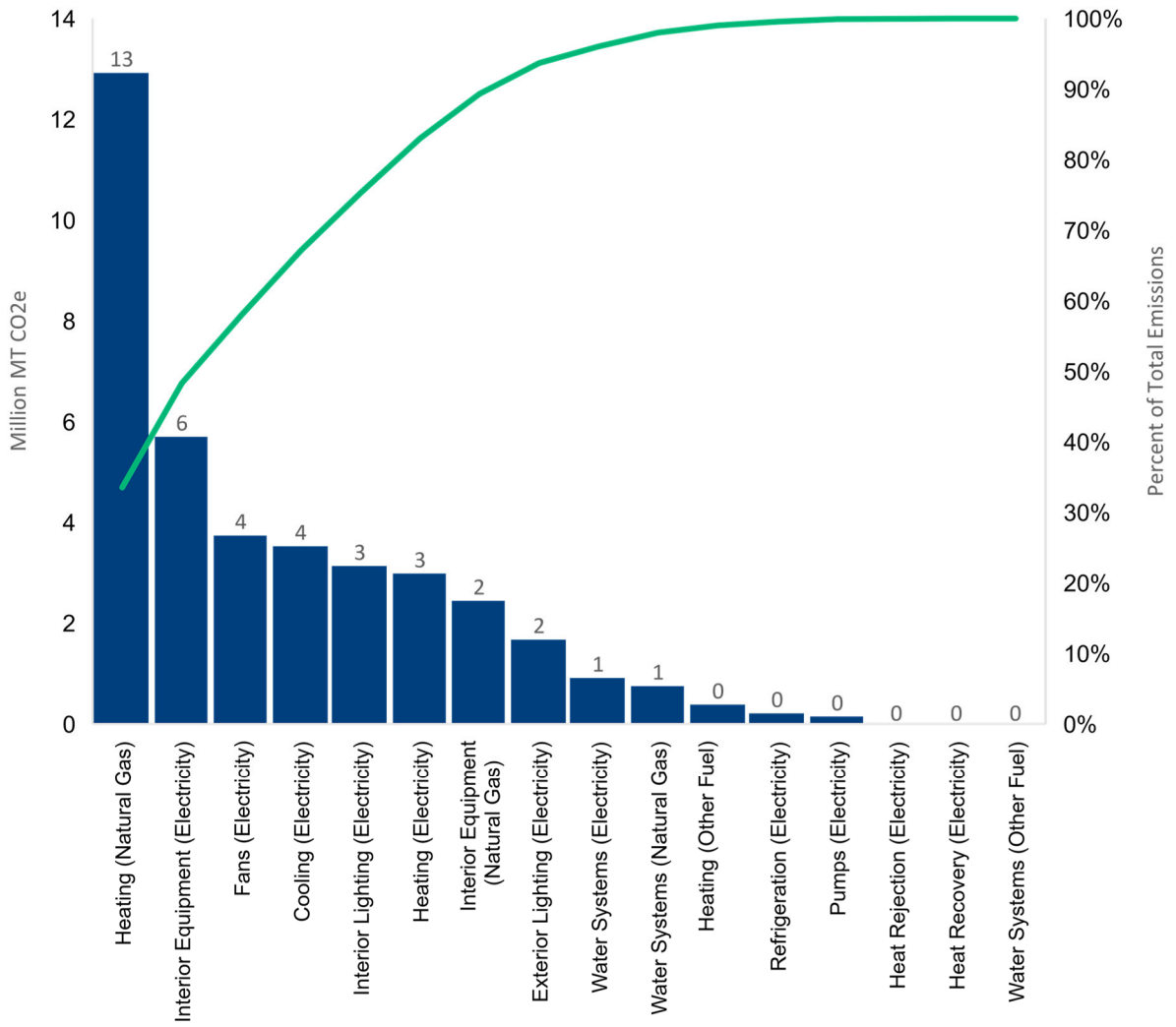
Table 15. Emissions Intensity of Building Types in the NY-NJ MSA

Building Type	Million Square Feet	Stock Share	Emissions Intensity (kg CO_2e / sq ft.)	Total Emissions (MMTCO_2e)	Share of Emissions
Full-Service Restaurant	17	1%	77	1.3	3%
Hospital	60	2%	12	0.8	2%
Hotel	140	5%	8	1.2	3%
Office	1,082	35%	13	14.3	37%
Outpatient	87	3%	16	1.4	4%

Building Type	Million Square Feet	Stock Share	Emissions Intensity (kg CO_2e / sq ft.)	Total Emissions ($MMTCO_2e$)	Share of Emissions
Quick-Service Restaurant	3	0%	73	0.2	1%
Retail	329	11%	12	4.3	11%
School	87	3%	15	1.3	3%
Strip Mall	81	3%	23	1.9	5%
Supermarket	10	0%	26	0.3	1%
Warehouse	791	26%	5	4.3	11%
No Match	360	12%	21	7.7	20%
Total	3047	100%	-	38.6	100%

Like the usage trends in the residential buildings sector, heating from natural gas use represents the largest bucket across fuel types and usages and a significant portion of the commercial building sector's total emissions. Electricity emissions from interior equipment, a category unique to commercial buildings, is the second largest-emitting use type, followed by electricity use for fans.

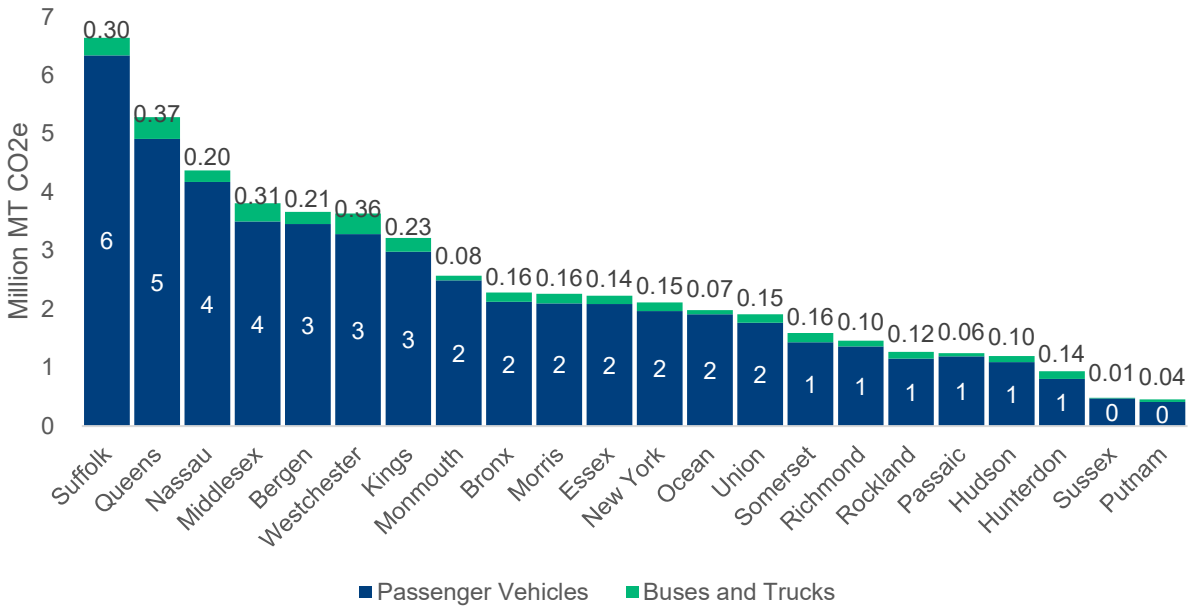
Figure 9. Commercial Emissions by Use and Fuel Type



Transportation

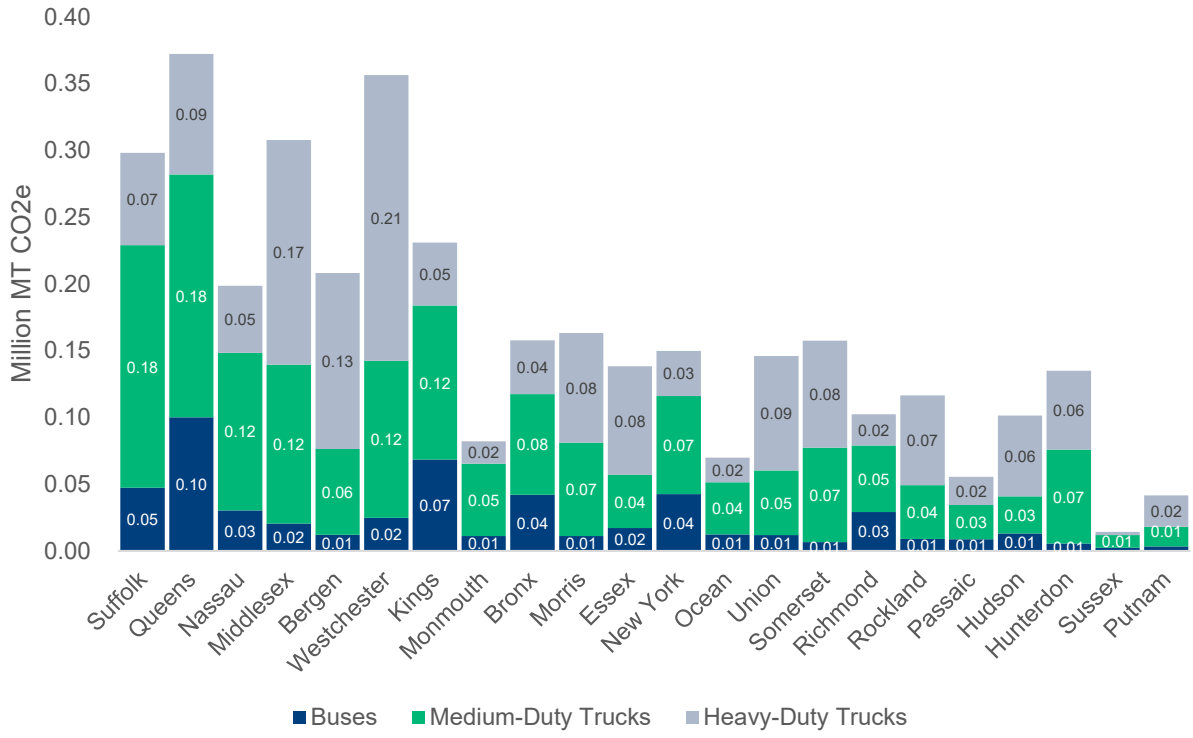
Across all 22 counties in the MSA, passenger vehicles represent the largest source of transportation sector emissions in the NY-NJ MSA, constituting approximately 93% of on-road transportation emissions, leaving medium- and heavy-duty trucks and buses with the remaining 7%. In a region well-known for its public transportation systems, passenger vehicles still play a dominant role in the overall carbon footprint of the MSA. That said, the region's passenger vehicle emissions would be significantly higher *without* those transit systems, the walkability, and the common use of bikes across these communities.

Figure 10. On-Road Transportation Emissions by Vehicle Type and County



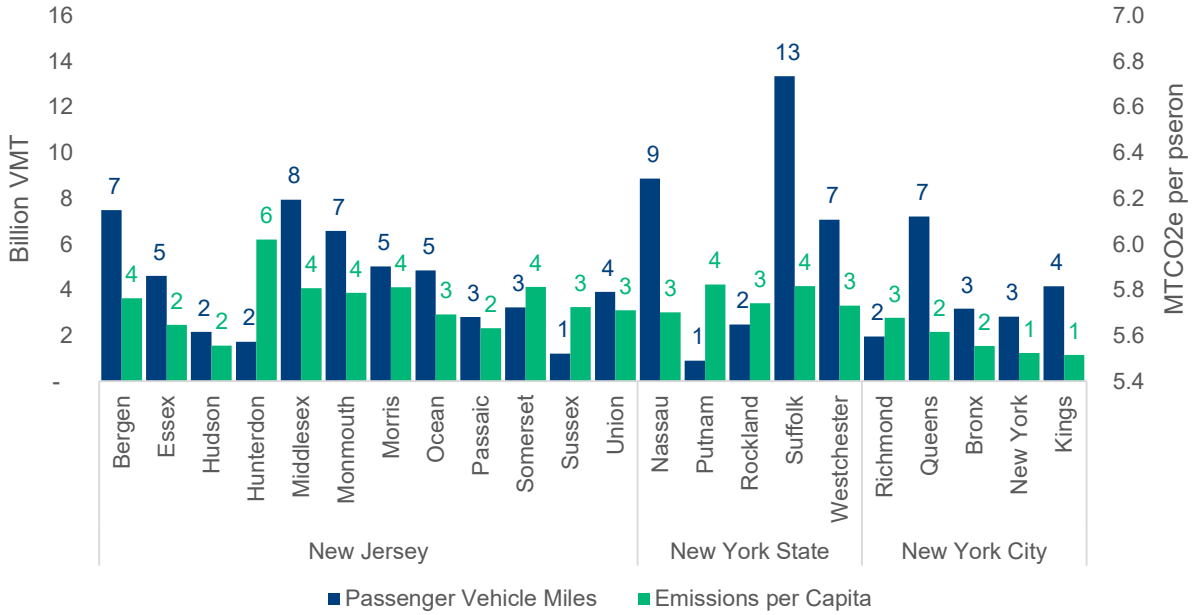
The NY-NJ MSA is typically characterized by its large, interconnected highway system that is shared by many different vehicle types- from small personal vehicles to large commercial semi-trucks. While difficult to discern in the figure above, given the significant load from passenger vehicles, the figure below excludes these vehicles to better understand the trends of transportation emissions from other sources. Light-duty commercial trucks are the third highest-emitting vehicle type in the MSA—generating 3 million metric tons of CO_2e or 6% of total transportation sector emissions.

Figure 11. County Emissions by Vehicle Type, Excluding Passenger Vehicles



Across the counties in the MSA, Suffolk County, NY, ranks first in transportation sector emissions, totaling 6.6 million metric tons of CO_2e. This high result is driven by Suffolk County's 14 billion VMTs, which is about 45% higher than the total VMT in Queens County, the next largest transportation emitter in the MSA. Notably, at 2.3 million residents in 2022, Queens is the second largest county in the MSA, behind only Kings County – that is, Brooklyn – at 2.7 million inhabitants. Adjusting for population highlights, the deeply urbanized core of the region has a far lower passenger vehicle average emissions rate per person – even if those areas show greater emissions per mile (likely due to relatively slower speed of travel). As shown in Figure 11, emissions per capita in the five boroughs of New York City (denoted by their county names) are dramatically lower than the regional average (Hudson, Essex, and Passaic counties on the opposite shore of the Hudson River have similarly low averages). The impact of public transit options offered by the MTA, the Port Authority, and the NJ Transit throughout New York City, Jersey City, and Newark is a critical lever that has maintained relatively low passenger vehicle miles – and resulting GHG emissions – for decades.

Figure 12. Gross Passenger Vehicle Miles Travelled and Emissions per Capita by County



The EPA publishes the Walkability Index dataset and characterizes every 2019 Census block group in the U.S. based on its relative walkability. Walkability depends upon characteristics of the built environment that influence the likelihood of walking being used as a mode of travel. The higher the walkability score, the easier it is for residents and visitors to walk to school, work, a grocery store, bars and restaurants instead of relying on a car. Calculating an area-weighted average walkability score by county and plotting against each county's passenger vehicle emissions shows us that the more walkable a county is, the less emissions are generated by passenger vehicles. The value at the top left of the figure below is Hunterdon County, a New Jersey suburban region that is overall more conducive to personal vehicle use as a primary mode of transportation over walking. The clear inverse relationship between walkability scores and passenger vehicle emissions shown in the below figure reveals an important lever for reducing passenger vehicle emissions: making cities more walkable and reducing reliance on cars. These results also underscore the importance of regional collaboration because walkers are not limited to a single county. Walkers are not bound by county lines—but in some cases, traversing counties is not feasible with walking.

Figure 13. Scatterplot of area-weighted county-level walkability scores against passenger vehicle emissions

This revelation adds complexity to our understanding, emphasizing the need for targeted interventions in both major and less prominent vehicular categories. By dissecting on-road transportation results, we pave the way for strategic initiatives that address specific contributors, fostering a more sustainable urban transportation landscape with lower emissions.

The GHG inventory also includes emissions estimates from aviation and marine sector activities. The results outlined in the table below equate to ~2 million metric tons of CO_2e, a vast majority coming from the airports operated by the Port Authority. While these off-road emissions equal roughly 3% of on-road transportation emissions, they are still important; the MSA believes they are significant enough to quantify to align and fully inform regional stakeholders about today's baseline. Around aviation emissions, this work enables the region to work together to implement policies and programs to alleviate the physical and mental tolls of noise pollution and poor air quality experienced by the LIDACs surrounding the region's airports.

Table 16. Off-road Transportation Emissions (MT CO_2e)

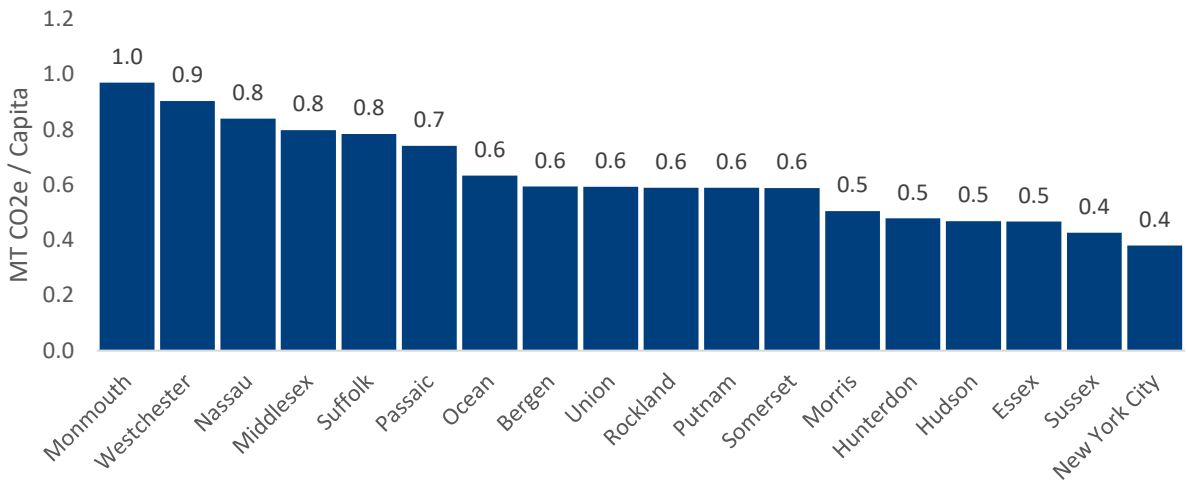
	Aviation	APU	Ground Support	Cruises Shore Power	Ferries
Total Emissions (MT CO_2e)	1,750,000	38,000	200,000	11,000	130,000

Waste

While waste does not emit as many GHG emissions as the stationary energy and transportation sectors in the MSA, it remains a critical component of the simplified inventory assembled for this PCAP. One notable insight is that despite the diverse county typologies in the MSA, throughout New Jersey, residents and businesses behave similarly when it comes to waste practices. Among New Jersey counties in the MSA. Middlesex County's recycling rate of 70% is the highest. Waste generation and emissions in New York City, however, stand out. The city is the third largest generator of waste in the MSA, with emissions far outranking any other county as a greater portion of waste ends up in landfills as opposed to being recycled. Only 16% of New York City's total waste is recycled. Since 2013, New York City has embarked on composting efforts to divert food and yard waste from landfills. Still, in 2022, organics represent only 0.91% of the total tonnage collected by DSNY. The story changes somewhat, though, when waste emissions are viewed on a per capita basis. In this conception, New York City's waste emissions per capital ranks the lowest in the MSA, even when the values from all five city counties are aggregated and compared to single counties across the rest of the region.

Overall, understanding these emissions breakdowns is essential for tailoring targeted strategies and policies to promote better waste management practices, altering consumer behaviors, and fostering a region-wide commitment to reducing emissions in the waste sector.

Figure 14. Waste Emissions per Capita by County



3.2 GHG Reduction Measures

The NY-NJ MSA has identified a set of priority GHG reduction measures that are expected to enable significant decarbonization of the region's largest emission sectors. The measures

selected for prioritization in this PCAP are designed to not only address the primary sources of GHG emissions but also encompass local concerns by incorporating local legislative and regulatory priorities. The MSA has applied a two-step -selection process to identify priority GHG emissions reduction measures:

1. **Long-List Development.** The first step in this selection process involves compiling a long list of reduction measures that draw from existing municipal and state climate action plans and initiatives from NYMTC and NJTPA member entities and through various engagements with local municipalities in the MSA, along with a thorough analysis of the key sectors driving the largest portion of GHG emissions. Each measure is further accompanied by one or more potential implementation actions to explore the types of projects and initiatives that would have the most significant, near-term impact on GHG emissions. These initiatives are organized by sector and are intended to be responsive to the diverse needs of in-scope communities. For example, given the number of buildings and density of the region, large building decarbonization might be advanced by expanding energy-efficient retrofits for public housing or electrifying municipally owned buildings (e.g., schools or administrative structures). The latest long list of measures and implementation actions is available for review in Appendix 6.2 Additional GHG Reduction Measure Details.

2. **Priority-Measure Identification**. With a long list of potential GHG reduction measures and associated implementation actions identified, the next step in the measure -selection process entails subjecting measures to a prioritization exercise to recognize priority measures and their associated implementation actions. The prioritization exercise relies on stakeholder preferences, expressed on a five-point scale, to indicate the importance of including a given measure in the PCAP as a priority reduction measure. A summary of the prioritization outcomes can be found in Appendix 6.2 Additional GHG Inventory Details. Priority measures and their related implementation actions are also noted in the table below:

Table 17. Priority GHG reduction measures and associated actions

Sector	GHG Reduction Measure	Implementation Actions
Transportation	Zero Emissions Passenger Vehicle Adoption	Increase the purchase of new zero-emissions vehicles
		Increase passenger vehicle charging infrastructure
		Support the provision of incentives for taxis and other for-hire fleet electrification
	Zero Emissions Bus and Truck Adoption	Electrify school bus fleets, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)
		Electrify transit fleets, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)
		Electrify freight trucks, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)
	Alternative Freight Modes	Provide additional resources to sustain and expand the Blue Highways Initiative
		Expand the use of commercial cargo bikes for last-mile delivery

Sector	GHG Reduction Measure	Implementation Actions
		Establish additional micro-distribution centers for last-mile delivery (i.e., Microhub Pilot Expansion)
	Travel Demand Management and Reduction	Expand active transportation infrastructure and access to micro-mobility modes (e.g., complete streets, greenways, bikeshare, etc.)
		Enable greater public transit adoption (e.g., improved service, innovation, expansion, low/no-cost fare programs, etc.)
		Support sustainable land use practices (e.g., smart growth planning, zoning reform, transit-oriented development) through opt-in grant programs and developer incentives
		Support strategies that reduce and/or optimize travel demand (e.g., Transportation Systems Management and Operations Strategies (TSMO), congestion pricing, and mobility-as-a-service)
	Maritime & Aviation Emissions	Electrify ground support and shore equipment, including provisions for charging infrastructure
		Explore pilots and commercialization potential of advanced low-carbon alternative fuels while providing industry support to enable a smooth transition
Stationary Energy (On-site Combustion, Steam)	Building Electrification & Energy Efficiency	Address financing gap to decarbonize schools (public k-12, higher education institutions)
		Address the financing gap to decarbonize buildings owned by local governments and other public entities
		Address financing gap to decarbonize public housing
		Address financing gap to decarbonize privately owned buildings, especially for low-to-moderate income families
		Provide technical and financial assistance for municipalities to bolster capacity for owners and tenants of small buildings
Stationary Energy (Electricity)	Enable Grid Decarbonization	Make critical investments in the grid to accommodate anticipated increases in demand (e.g., T&D upgrades, renewable energy sources integration, energy storage innovations, etc.)
		Enable offshore wind transmission capabilities at key power sites (e.g., South Brooklyn & Arthur Kill Terminals)
		Support public solar projects
		Support non-public (i.e., private, non-profit) solar projects
		Decrease regulatory barriers for solar project implementation
Waste	Reduce disposal of waste (especially organics)	Provide grants to municipalities to expand composting, recycling, and reuse programs
		Support programs that enhance public knowledge of sustainable consumption and waste disposal practices
		Pilot and expand organics waste management programs for municipalities
		Pilot opportunities to enhance composting efforts (e.g., compost to fuel initiatives)

Sector	GHG Reduction Measure	Implementation Actions
Cross-cutting	Incorporates reductions and actions from multiple sectors	Fund municipal programs that would provide technical assistance, financing, and other support for municipalities to adopt a suite or package of GHG reduction measures
		Decarbonize large events (e.g., sports tournaments, concerts, parades, celebrations, etc.)

Sections 3.2.1-3.2.9 provide further details on the priority measures, including related potential implementation actions as well as key measure attributes as set forth by EPA CPRG guidance.[62] [63] Across all estimates of potential GHG reduction, the modeling approach taken does not assume any growth. As such, all quantified reductions calculated are using the values returned from the 2022 baseline simplified GHG Inventory completed as part of the PCAP.

3.2.1 Zero Emissions Passenger Vehicle Adoption

Passenger vehicle emissions comprise 32% of the MSA's overall GHG emissions. Transitioning a fleet of nearly ten million passenger vehicles across the region from internal combustion engines to zero-emission electric motors, specifically battery-EVs, can reduce those emissions by 17% by 2030 and to nearly zero by 2050. State and federal incentives and regulations are enabling consumers to purchase EVs in increasing numbers. To complement these policies, local and regional governments have outlined ambitious plans to support vehicle electrification through building a comprehensive network of EV charging infrastructure. Projects like this are particularly critical in the urban areas of the MSA, where many residents lack access to off-street parking necessary for private residential charging. While an effort is being made across the MSA to support the transition to electric passenger vehicles, there is more that can be done to accelerate EV adoption and mitigate barriers to adoption.

Working to overcome this barrier, New York City's 2023 update to its long-standing climate action plan, *PlaNYC*, lays out the goal of building out a network ensuring every New Yorker lives within 2.5 miles of an EV fast-charging hub by 2035.[64] In addition, the City is pursuing new incentives and programs to enable taxis and ride-share fleets to be fully electrified by 2030.[65] Regionally, communities across the MSA have developed plans for introducing publicly accessible charging infrastructure on main streets, in town centers, and in municipal parking lots.[66] In addition, the NJ and NYS Departments of Transportation are working to deploy EV

[62] "Program Guidance for States, Municipalities, and Air Pollution Control Agencies," pg. 53. EPA. 2023.
[63] All details specified in EPA guidance are discussed for measures except for cost, which will be considered in the MSA's CCAP response.
[64] "NYC DOT and New York Power Authority to Create up to 13 Public Electric Vehicle Fast-Charging Hubs at Municipal Parking Facilities Across New York City." May 2023. https://www.nyc.gov/html/dot/html/pr2023/fast-charging-hubs.shtml
[65] "Mayor Adams, TLC Announce new Rules to Require City's Rideshare Vehicles to be Zero-Emission, Wheelchair Accessible by 2030." August 2023. https://www.nyc.gov/office-of-the-mayor/news/597-23/mayor-adams-tlc-new-rules-require-city-s-rideshare-vehicles-be-zero-emission-
[66] Examples include Woodbridge Township, NJ's municipal charging lots, EV charging stations in Hempstead, and the Union County Electric Vehicles Infrastructure Study.

charging infrastructure at highway rest stops throughout the region.[67] Many of these actions could be partially funded by the National Electric Vehicle Infrastructure (NEVI) program.

Zero Emissions Passenger Vehicle Adoption	
Emissions Reductions	In 2030: • 9 million MT CO_2e • 17% reduction in passenger vehicle emissions from 2022 baseline In 2050: • 49 million MT CO_2e • 95% reduction in passenger vehicle emissions from 2022 baseline
Geography	Entire NY-NJ MSA
Schedule and Milestones	• 100% zero-emissions vehicles for new light-duty vehicle sales by 2035 (per Advanced Clean Cars II regulation) • 100% electrification of all taxis and ride-hail vehicles in NYC by 2030[68]
Progress Metrics	• Number of EVs and other zero emissions vehicles (hydrogen, etc.) • Number of new charging stations • Average distance to publicly accessible EV chargers
Funding Sources	• Clean Vehicle Tax Credits • Charging and Fueling Infrastructure (CFI) Discretionary Grant Program • National Electric Vehicle Infrastructure (NEVI) Program • EV Make-Ready Programs[69]

Enabling Actions		
Action	**Implementing Agencies[70]**	**Review of Authority to Implement**
Increase the purchase of new zero-emissions vehicles	**State**: NYSDEC, NJDEP, NJBPU **Local:** County and municipal government **Cross-jurisdiction**: NJT, MTA, PANYNJ	Local governments may seek to directly purchase zero-emissions vehicles, as well as incentivize residents and businesses to purchase them. Cross-jurisdictional entities noted have been working to transition non-revenue vehicle fleets to zero emissions stock. In some instances, these entities may also provision sales of EVs to local governments as well. Both NY and NJ have moved to adopt California's Advanced Clean Cars regulations, enabled by Section 177 of Chapter Five of the Clean Air Act.
Increase passenger vehicle charging infrastructure	**State:** NJDOT NYSDOT, NJTA, NYSTA, NJBPU, NJDEP **Local**: County and municipal agencies (e.g., NYC DOT, etc.) **Cross-jurisdiction**: NYMTC, NJTPA, PANYNJ	Statutory/regulatory authority for state and local governments/agencies to install public charging infrastructure already established. Cross-jurisdictional organizations like PANYNJ have been providing charging infrastructure for passenger

[67] New Jersey Turnpike Authority Minutes. NJTA. April 2023. https://www.njta.com/media/7476/minutes-bm-04-25-2023.pdf
[68] "Mayor Adams, TLC Commissioner Do Deliver On "Green Rides" Program to Make All NYC Shared Rides Zero-Emission Or Wheelchair Accessible By 2030." NYC. October 2023. https://www.nyc.gov/office-of-the-mayor/news/790-23/mayor-adams-tlc-commissioner-do-deliver-green-rides-program-make-all-nyc-shared-rides#/0
[69] In NYS, NJ
[70] See Appendix 6.6.2 for list of full names of implementing agencies mentioned in this section.

		vehicles, taxis, for-hire vehicles (FHVs) at their facilities (e.g., parking garages) and would not need additional authority to continue/expand such efforts within the same scope.
Support the provision of incentives for taxis and other for-hire fleet electrification	**Local:** NYCDOT, NYC TLC **Cross-jurisdiction:** PANYNJ	Under the NYC Green Rides Initiative, a set of proposed guidelines for transitioning the city fleet of taxi/ride share vehicles to zero emissions by 2030 already exists. The NYC Taxi Limousine Commission (TLC) has been identified to guide the initiative rollout. Thus, in its current configuration, no additional considerations around authority to implement this action are required. Cross-jurisdictional organizations like PANYNJ have been providing charging infrastructure for taxi/for-hire vehicles at their facilities and would not need additional authority to continue/expand such efforts within the same scope.

Both New York and New Jersey are signatories to the Clean Air Act's Chapter 5, Section 177 provision, which enables states to substitute California's vehicle emissions regulations for federal regulations under certain circumstances.[71] This standard serves as the foundational assumption guiding our GHG emission reduction modeling. GHG reductions from transitioning to zero emissions vehicles in the MSA are estimated assuming strict compliance with the most recent of these regulations, Advanced Clean Cars II, which calls for sales of zero-emissions vehicles to ramp up to 100% of annual sales by 2035.[72] Assuming a 15-year passenger vehicle lifetime return and a ceiling of 95% of all cars on intra-MSA roads, returns an annual estimate of the NY-NJ MSA's EV population and electrified passenger VMT.

This level of adoption would avert the consumption of nearly a billion gallons of gasoline per year by 2030, resulting in a net emissions reduction of nine million metric tons of CO_2e or seven million metric tons of CO_2e emissions when accounting for emissions from grid electricity consumption. As vehicle stocks continue to turn over, these gross emissions reductions are estimated to grow to 49 million metric tons of CO_2e by 2050, at which point associated electricity emissions are modeled as negligible. Additionally, the passenger vehicle zero emissions adoption measures would reduce methane emissions by 300 metric tons in 2030 and 1,600 metric tons in 2050; N_2O emissions would be reduced by 40 metric tons per year by 2030 and 200 metric tons by 2050. This reduction in criteria pollutant emissions would improve local air quality. Vehicle electrification is also anticipated to reduce noise pollution, improving the overall livability and quality of life for communities throughout the region. As some of the densest and most congested neighborhoods in the U.S., let alone the MSA, low-income and disadvantaged communities are expected to benefit greatly from these improvements in air quality and livability.

[71] "States that have Adopted California's Vehicle Standards under Section 177 of the Federal Clean Air Act." California Air Resources Board. May 2022. https://ww2.arb.ca.gov/sites/default/files/2022-05/%C2%A7177_states_05132022_NADA_sales_r2_ac.pdf

[72] Advanced Clean Cars II. California Air Resources Board. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-car s-ii

Table 18. Passenger Vehicle Electrification Quantified Benefits

Timeframe	GHG Reductions	Criteria Pollutant Reductions
2030	9 $MMTCO_2e$ per year	• 300 MT CH_4 • 40 MT of N_2O per year • 3,000 short tons NOx • 100 short tons PM 2.5 • 600 short tons PM 10 • 12,900 short tons VOC
2050	49 $MMTCO_2e$ per year	• 1,600 MT CH_4, • 200 MT of N_2O per year • 16,500 short tons NOx • 700 short tons PM 2.5 • 3,200 short tons PM 10 • 71,400 short tons VOC

3.2.2 Zero Emissions Bus and Truck Adoption

Electrifying buses and medium and heavy-duty vehicle classes is critical for reducing GHG emissions in the NY-NJ MSA. Outside of passenger vehicles, buses and trucks are key contributors to localized pollution (e.g., noise and particulate matter) due to the predominant use of diesel engines throughout these vehicle classes. In 2022, VMT from bus and truck vehicle types represented seven percent of total VMT traveled in the region, emitting 3.6 million tons of CO_2e of the on-road sector's total emissions. While emissions from bus and truck vehicle classes do not approach the volume of emissions from passenger vehicles, the location of highways and other transportation infrastructure throughout the region (e.g., ports, warehouses, terminals) results in a concentration of the impact of bus and truck emissions in and around LIDACs.

Across the region, buses are viable early candidates for electrification as they can support broader sustainability goals, such as reducing or eliminating carbon emissions and other air pollutants. Buses have relatively consistent duty cycles and typically return to the same depot at the end of that cycle, making charging patterns predictable; that said, the investment in obtaining and installing the required infrastructure remains high. Electrifying school bus fleets can help prevent new air-quality-related asthma cases in one of the region's most vulnerable populations – children. Separately, general improvements in the transportation system, through the introduction of modern electric buses, may also improve the overall commuter experience. Lastly, the broader adoption of electric buses can help accelerate the commercialization process of electrified powertrains (i.e., the power delivery system of a vehicle-engine, transmission, etc. that does not require fossil fuels to run) across the heavy-duty vehicle class, paving the way for greater electrification, energy storage, and resilience throughout the sector.

Zero Emissions Bus and Truck Adoption		
Emissions Reductions	In 2030: • 380,000 MT CO2e • 6% reduction in bus emissions from 2022 baseline • 11% reduction in medium-duty truck emissions from 2022 baseline • 11% reduction in heavy-duty truck emissions from 2022 baseline In 2050: • 3 million MT CO_2e • 95% reduction in bus emissions from 2022 baseline • 90% reduction in medium-duty truck emissions from 2022 baseline • 90% reduction in heavy-duty truck emissions from 2022 baseline	
Geography	Entire NY-NJ MSA	
Schedule and Milestones	Bus Electrification • All new school bus purchases to be zero emission by 2027 (NYS)[73] • All school buses in operation electric by 2035 (NYS)[74] • All zero-emissions transit buses by 2040 (MTA)[75] • All zero-emissions buses by 2040 (NJT) [76] Truck Electrification • Install a network of up to 100 truck chargers by 2026 (NYC)[77] • 30 percent of sales of new MHD vehicles ZEVs by 2030, and 100 percent of • sales ZEVs by no later than 2050 (NJ/NYS)[78]	
Progress Metrics	• Number of zero-emissions school buses, transit vehicles, and freight trucks in use • Number of emissions-generating school buses, transit vehicles, and freight trucks in use	
Funding Sources	• Clean School Bus Program • Diesel Emissions Reduction Act (DERA) Program • Clean Heavy-Duty Vehicle Program • Reduction of Truck Emissions at Port Facilities • National Clean Investment Fund (NCIF) • Clean Communities Investment Accelerator (CCIA) • Utility Incentive Programs for Medium-and-Heavy-Duty EV Charging Infrastructure (e.g., Medium-and-Heavy-Duty Make-Ready Pilot)	
Enabling Actions		
Action	**Implementing Agencies**	**Review of Authority to Implement**
Electrify school bus fleets, including provisions for supporting	**State:** NJDEP, NYSDEC **Local**: Municipal school districts and education departments (e.g., NYC DOE)	Transitioning school bus fleets in the MSA already possesses both local and state precedence. At the local level, for instance, New York City's Local Law 120 calls for

[73] Electric School Buses. NYSERDA. https://www.nyserda.ny.gov/All-Programs/Electric-School-Buses
[74] Electric School Buses. NYSERDA. https://www.nyserda.ny.gov/All-Programs/Electric-School-Buses
[75] MTA | Transitioning to a zero-emissions bus fleet. MTA. October 13, 2023.
[76] NJT2030. June 2020. NJT_2030-A_10-YearStrategicPlan.pdf (njtransit.com)
[77] Delivering Green: A vision for a sustainable freight network serving New York City. NYCEDC and NYCDOT. https://www.nyc.gov/html/dot/downloads/pdf/freight-vision-plan-delivering-green.pdf
[78] Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan. NESCAUM. July 2022. https://www.nescaum.org/documents/multi-state-medium-and-heavy-duty-zev-action-plan.pdf

infrastructure (e.g., chargers, T&D upgrades)		school buses serving New York City public schools to be all-electric by 2035, in line with state statutes on the same issue. Similarly legislative precedence has also been set in New Jersey as the Murphy Administration passed legislation in 2022 to establish the state's Electric School Bus Grant Program, which enables local school districts to conduct the work of decarbonizing school bus fleets across the state.[79]
Electrify transit fleets, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)	**State:** NJDEP, NJEDA, NJBPU **Local**: County and municipal agencies (e.g., Nassau Inter-County Express Electrification, Somerset County Electric Shuttle) **Cross-jurisdiction**: MTA, NJT, PANYNJ, NJTPA, NYMTC	State agencies across the MSA can support the electrification of fleets through incentives and/or policy changes. This can extend down to county and municipal agencies, as well as the cross-jurisdictional public transit providers. For example, public transit providers in the MSA have oversight over their entities' capital planning and projections and thus already possess the authority to transition assets to zero-emissions models.
Electrify freight trucks, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)	**State**: NYSDOT, NJDOT, NJTA, NYSTA, NJBPU, NYSERDA, NJDEP, NJEDA **Local**: County and municipal agencies (Municipal transportation and/or public works departments) **Cross-jurisdiction:** PANYNJ	Implementing agencies identified for the MSA have already been executing similar work related to this action and thus should not require additional authorities for continuing efforts.[80]

For quantifying emissions reduction related to zero emissions buses and truck adoption, a similar approach to zero emissions passenger vehicle adoption is used, in which California vehicle emissions regulations inform bus and medium and heavy-duty vehicle sales and population. The methodology and results from the transportation sector of the GHG Inventory are leveraged to model GHG reductions. Importantly, quantified GHG emissions follow the GPC's geographic/territorial method to estimate transportation emissions activity occurring solely within MSA boundaries, regardless of a trip's origin or destination. As a result, it is assumed that 95% of buses and 90% of trucks that traverse roads in the MSA will be electric by 2050. Results indicate a regional reduction in bus and medium/heavy-duty vehicle related GHG emissions of 3 million metric tons of CO_2e emissions by 2050. This amount further corresponds with a reduction of 100 metric tons of methane emissions and 15 metric tons of N_2O emissions by 2050.

For bus electrification GHG reductions, GHG emissions reductions are estimated from regional climate action plans' existing targets and goals. Although many plans reference school bus electrification, NYC Local Law 120 (2021) specifically mandates that school buses serving New York City public schools must be all-electric by September 1, 2035. The modeling conducted in

[79] "Murphy Administration Announces Launch of Groundbreaking School Bus Electrification Program to Protect Health of Children and Communities." NJ DEP. January 2024. https://www.nj.gov/dep/newsrel/2024/24_0002.htm#:~:text=New%20Jersey's%20Electric%20School%20Bus,charging%20infrastructure%20across%20the%20state.

[80] Modernizing Freight, NYC; Medium- and Heavy-Duty Electric Vehicle Charging Program, NJBPU; Truck Voucher Incentive Program, NYSERDA, Port Authority Accelerates Agency's Electric Vehicle Fleet Conversion, PANYNJ

these efforts reflect extrapolation of this statute across the MSA – that is, reductions in diesel consumption – and associated pollution – reflect the complete electrification of all VMT by school buses not just for the five boroughs but for the whole region. For transit buses, electrification plans from each of the major regional carriers – MTA, NJ TRANSIT, etc. – were established and modeled explicitly. Across the different bus typologies identified (e.g., school buses, transit buses, etc.), electrification under the measure generates a total emissions reduction amount of 500,000 MT CO_2e saved by 2050. Along with this significant reduction in GHG emissions, bus electrification at the anticipated rate looks to reduce NOx emissions by 1 ton per year by 2030 and 20 tons per year by 2050.

Table 17. Bus and Truck Electrification Quantified Benefits

Timeframe	GHG Reductions	Criteria Pollutant Reductions
2030	0.4 $MMTCO_2e$ per year	• 10 MT CH_4 per year • 2 MT N_2O per year • 15 short tons NOx per year • 0.4 short tons PM 2.5 per year • 2 short tons PM 10 per year • 20 short tons VOC per year
2050	3 $MMTCO_2e$ per year	• 100 MT CH_4 • 15 MT N_2O per year • 250 short tons NOx per year • 10 short tons PM 2.5 per year • 30 short tons PM 10 per year • 260 short tons VOC per year

3.2.3 Alternative Freight Modes

The Alternative Freight Modes measure captures strategies for freight decarbonization in the NY-NJ MSA that do not rely on zero emissions vehicle adoption. Under this measure, MSA partners seek to introduce and make common sustainable forms of middle and last-mile freight delivery to reduce emissions from the transportation of goods throughout the region. This can include a transition from heavy-duty or medium-duty trucks to less carbon-intensive modes of transportation options such as rail, commercial cargo bikes, barges, ferries, or ships. Emissions related to freight transportation represent over 6% of the MSA's overall GHG emissions in the simplified PCAP GHG inventory—this figure covers emissions from single-unit short and long-haul trucks and combination short and long-haul trucks. Shifting to freight modes with lower emissions impact, such as those identified above, can reduce medium- and heavy-duty truck emissions by 2% by 2030 and 5% by 2050.

Alternative Freight Modes	
Emissions Reductions	In 2030: • 53,000 MT CO_2e • 0.1% reduction in transportation emissions from 2022 baseline • 2% reduction in medium- and heavy-duty truck emissions from 2022 baseline In 2050: • 163,000 MT CO_2e

	• 0.3% reduction in transportation emissions from 2022 baseline • 5% reduction in medium- and heavy-duty truck emissions from 2022 baseline
Geography	Entire NY-NJ MSA
Schedule and Milestones	Planning and execution of actions are predefined in sub-region policies and plans such as New York City's "Delivering Green: A vision for a sustainable freight network serving New York City" and PlaNYC. Some relevant milestones include: • Shift 25% of last-mile freight deliveries from trucks to small, sustainable delivery methods by 2040. • Grow participation in the NYC DOT Commercial Cargo Bike program from 350 bikes in 2020 to 2,500 bikes by 2026. • By 2025, NYCEDC is to activate six waterfront sites in Brooklyn, Manhattan and the Bronx to support a marine freight distribution network.
Progress Metrics	• Number of on-road freight transportation trips • Freight-type vehicle miles traveled • The number of alternative freight modes in operation (e.g., cargo delivery bikes, ships, etc.)
Funding Sources	• Clean Ports Program • Port Infrastructure Development Program • Reduction of Truck Emissions at Port Facilities

Enabling Actions		
Action	**Implementing Agencies**	**Review of Authority to Implement**
Provide additional resources to sustain and expand the Blue Highways Initiative	**Local**: NYC DOT, NYCEDC **Cross-jurisdiction**: PANYNJ	For actions identified, no additional authority is currently anticipated to be required for implementation. Actions included represent a continuation of existing efforts led by local governments and regional authorities. One consideration though is the coordination that will likely be required between identified entities. For example, regional authorities like MTA and PANYNJ have oversight of critical infrastructure such as the ports and transit system. Aligning efforts between local governments and these entities will be a key element in successful implementation of these actions.
Expand the use of commercial cargo bikes for last-mile delivery	**Local**: County and municipal agencies (e.g., NYC DOT) **Cross-jurisdiction**: PANYNJ, NJTPA	
Establish additional micro-distribution centers for last-mile delivery (i.e., Microhub Pilot Expansion)	**Local**: County and municipal agencies (e.g., NYC DOT, NYCEDC) **Cross-jurisdiction**: PANYNJ, NJTPA	

This PCAP cites quantified benefits for the Alternative Freight Modes measure based on existing estimates of benefits for sub-regions within the MSA, applied to the entire geographic scope. For instance, taking NYC's estimate of those actions is a cargo bike program to transition last-mile delivery from trucks to bikes. By assuming a ratio of 1.5 truck miles to 1 bike mile, a figure founded in New York City's 2021 Commercial Cargo Bicycle Pilot Evaluation

Report,[81] and applying the urban unrestricted emission factor from the GHG Inventory to avoided truck mile equivalents, each additional commercial cargo bike is estimated to reduce 3 MT CO_2e annually. Yet, the alternative freight modes measure, identified as a priority measure by the MSA partners, encompasses other policies and initiatives to reduce medium- and heavy-duty truck VMT and emissions.

New York City's Blue Highway Program is also included in this modeling exercise to capture additional opportunities for emissions reductions. The Blue Highways initiative aims to leverage the region's waterways to transport goods. Several sites near waterways have been previously identified as strong contenders for further development to support greater cargo transportation. The gross emissions reduction is estimated by subtracting the reduction in on-road emissions from Port Newark to each site from additional off-road emissions from barge transportation. Figures are calculated by applying well-founded low, base, and high case assumptions on facility capacity, trips per day, max tonnage per vessel, and tonnage per truck to ton-mileage emission factors. The resulting output is an estimate of 3,600 – 20,000 MT CO_2e in gross emission reductions per year. This modeling exercise also incorporates the development of microhubs, which are small-scale delivery hubs to reduce truck trips and traffic, while creating safer streets for pedestrians. Round trips of up to 2 miles are expected to be replaced by alternative forms of delivery, avoiding 1,500 truck trips per year per microhub, according to assumptions taken from New York City's Microhubs Pilot Recommendations report.[82]

Altogether, modeling the impacts of these three actions creates a representative and holistic bucket of the potential actions and emissions reductions that could occur by implementing the Alternative Freight Modes measure. Preliminary results indicate a potential to reduce GHG emissions in the NY-NJ MSA by 54,000 MT CO_2e by 2030, and 163,000 MT CO_2e by 2050. Further, annual medium and heavy-duty truck VMT are estimated to decrease, freeing up MSA roads, highways, tunnels, and bridges from traffic-caused freight delivery vehicles.

Table 18. Alternative Freight Modes Quantified Reductions

Timeframe	GHG Reductions	Criteria Pollutant Reductions[83]
2030	0.05 MMTCO_2e per year	• 2,000 MT CH_4 per year • 0.3 MT of N_2O per year • 140 short tons NOx per year • 20 short tons PM 2.5 per year • 30 short tons PM 10 per year • 315 short tons VOC per year
2050	.2 MMTCO_2e per year	• 7,100 MT CH_4 per year • 1 MT of N_2O per year • 480 short tons NOx per year • 70 short tons PM 2.5 per year

[81] Commercial Cargo Bicycle Pilot
[82] Microhubs Pilot: Recommendations for Distributing Goods via Sustainable Modes of Transportation. April 2023. New York City Department of Transportation. https://www.nyc.gov/html/dot/downloads/pdf/microhubs-pilot-report.pdf.
[83] Does not include criteria pollutant reductions from the Blue Highways Initiative. Further information is needed about vessel types to accurately quantify.

Timeframe	GHG Reductions	Criteria Pollutant Reductions[83]
		• 100 short tons PM 10 per year • 1,100 short tons VOC per year

3.2.4 Travel Demand Management and Reduction

Travel demand is the product of a range of different drivers and pressures, the sum of hundreds of millions of individual choices of where to live and work, all made within the framework of the available housing stock, employment options and transportation infrastructure. In the MSA, more than ten million passenger vehicles travel nearly one hundred million miles per year, resulting in approximately fifty-one million MT CO_2e per year.[84] A range of investments in alternative transportation modes- from public transit to bike lanes, greenways, and complete streets- paired with smart growth planning and zoning, can help convert many of these trips to low-carbon or non-emitting modes. In addition, programs and policies can be implemented to manage travel demand more holistically. Travel Demand Management (TDM) runs the gamut of incentive programs, from companies instituting/encouraging alternative commuting options to the congestion pricing ordinance currently being rolled out in New York City. Many of the strategies are complementary – the more pursued, the more impactful each could be when pursued in coordination with other strategies. For example, consider an investment in bike infrastructure that connects a community to a nearby train station in combination with an increase in service to that station – both strategies could reduce vehicle trips on their own, but their impact is amplified together. Full implementation of a range of strategies behind these GHG reduction measures could therefore abate as much as 5 million metric tons of CO_2e by 2050. The change in reductions achieved year-to-year decreases over time as the passenger vehicle fleet electrifies, but these actions will likely reduce total costs to charge those vehicles, including generation, transmission, distribution, and energy storage.

VMT and Travel Demand Management measures introduce initiatives that the stakeholders across the MSA can use to both analyze and control the modes and amount of travel through a given transportation system. Under this measure, regional partners are looking to design projects that will help transportation planners deliver innovative strategies to reduce the total number of VMT for single occupancy and GHG-emitting vehicles.

Travel Demand Management and Reduction	
Emissions Reductions	In 2030: • 4 million MT CO_2e • 7% reduction in transportation emissions from 2022 baseline In 2050: • 5 million MT CO_2e • 9% reduction in transportation emissions from 2022 baseline
Geography	Entire NY-NJ MSA

[84] Preliminary estimates from PCAP GHG Inventory. Subject to change.

Schedule and Milestones	A variety of scheduled activities and milestones related to VMT reduction and travel demand management have been published by regional stakeholders across the MSA: • Encourage an increase in cycling mode share for safety and emissions reduction, with a target that ten percent of trips will be by bicycle in NYC by 2050 (NYC DOT)[85] • MTA expects growth of four million people in its service area by 2030 and has been recommended to capture two-thirds of new VMT added in its service area and that two-thirds of all new development be clustered within a quarter to half-mile of MTA transit access (MTA)[86] • Increase the percentage of the New Jersey population that has access to high-frequency service from 27 percent to 40 percent by 2030 (NJT)[87] • Increase the percentage of the sub-poverty line New Jersey population with access to high-frequency service from 34 percent to 50 percent by 2030 (NJT)[88] • By 2025, add 72 new rail cars to expand PATH fleet by 20%; implement a 9-car service between Newark Penn and World Trade Center (PANYNJ)[89]
Progress Metrics	• % decrease in VMT for single occupancy vehicles • % increase in public transit passengers
Funding Sources	• Carbon Reduction Program (CRP) • Energy Efficiency and Conservation Block Grant Program • Surface Transportation Block Grant Program • Safe Streets and Roads for All • Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants • Safe Routes to Schools • NJDOT Transportation Alternatives Set-Aside Program • Congestion Mitigation and Air Quality (CMAQ) Improvement Program

Enabling Actions

Action	Implementing Agencies	Review of Authority to Implement
Expand active transportation infrastructure and access to micro-mobility modes (e.g., complete streets, greenways, bikeshare, etc.)	**State:** NJDOT, NJDEP, NYDEC, NYDOT **Local:** County and municipal agencies (e.g., Municipal engineering, planning, and/or other infrastructure-related departments)	In-flight projects of implementing agencies (across the different levels of government) that align with this action should not need additional authority to implement to sustain. Given this, new projects or projects looking to expand in scope using CPRG funding will benefit from the existing infrastructure. That

[85] Green Wave. City of New York. July 2019. https://www.nyc.gov/html/dot/downloads/pdf/bike-safety-plan.pdf
[86] Greening Mass Transit & Metro Regions: The Final Report of the Blue-Ribbon Commission on Sustainability and the MTA. MTA. https://new.mta.info/document/2331
[87] NJT2030. NJ TRANSIT. June 2020. https://content.njtransit.com/sites/default/files/njtplans/NJT_2030-A_10-YearStrategicPlan.pdf
[88] NJT2030. NJ TRANSIT. June 2020. https://content.njtransit.com/sites/default/files/njtplans/NJT_2030-A_10-YearStrategicPlan.pdf
[89] Net Zero Roadmap. PANYNJ. September 2023. https://www.panynj.gov/port-authority/en/about/Environmental-Initiatives.html

	Cross-jurisdiction: NYMTC, NJTPA, PANYNJ	said, implementation may still require local government review and approval processes prior to implementation. For example, at the state level, NJDEP and NYDEC fund public greenways. NJDEP specifically has an e-mobility program, that can include micro-mobility.
Enable greater public transit adoption (e.g., improved service, innovation, expansion, low/no-cost fare programs, etc.)	**Local**: County and municipal agencies (example services include Suffolk County Transit, Nassau Inter-County Express, Westchester County Bee-Line, Somerset County Shuttles, etc.) **Cross-jurisdiction**: MTA, NJT, PANYNJ	Transit agencies, authorities, and local governments (that own and/or operate a local bus system) have ability to adjust or augment operations and service in ways that promote greater ridership.
Support sustainable land use practices (e.g., smart growth planning, zoning reform, transit-oriented development) through opt-in grant programs and developer incentives	**State:** NJOPA, NJDCA, NJDOT, NJDEP, NYDOT, NYDEC, NYOPD **Local:** County and municipal agencies (Municipal planning departments such as NYC DCP, local governing bodies with oversight over zoning ordinances) **Cross-jurisdiction**: NJT, MTA, PANJYNJ, NYMTC, NJTPA	Implementing agencies can continue existing efforts that align with sustainable land use practices. Given this, new projects or projects looking to expand in scope using CPRG funding will benefit from the existing infrastructure. That said, implementation may still require local government review and approval processes prior implementation.
Support strategies that reduce and/or optimize travel demand (e.g., Transportation Systems Management and Operations Strategies (TSMO), congestion pricing, and mobility-as-a-service)	**State:** NJDOT, NYDOT **Local:** County and municipal agencies (municipal transportation and planning departments) **Cross-jurisdiction**: NJT, MTA, PANJYNJ, NYMTC, NJTPA	Transit agencies and authorities have the existing ability to adjust operations and service in ways that encourage fewer on-road passenger vehicle trips across the MSA.

Two parallel approaches are taken to estimate the potential emissions reductions from these policies and investments. The first step involves investments in infrastructure to increase the walkability of communities across the MSA. According to conservative estimates from NJTPA's 2013 Regional Greenhouse Gas Mitigation Plan, expanding incentives to adjust zoning regulations that permit smart growth, investing in transit-oriented development, and interconnecting bikeways, walkways, and transit stops can result in a 9% reduction in passenger vehicle VMT.[90] This figure represents a feasible outcome that can be achieved by each county in the MSA. Leveraging the results from the GHG Inventory exercise uncovers a unique correlation between walkability score, passenger vehicle VMT, and passenger vehicle emissions. The estimation approach for GHG emissions reductions as a result of decreasing passenger vehicle VMT in the region leverages the assumption that improvements to the walkability score of sub-regions are associated with a level of reduction in passenger vehicle emissions. Using this relationship to model the reduction in passenger vehicle emissions when

[90] NJTPA Regional Greenhouse Gas Mitigation Plan. July 2013. North Jersey Transportation Planning Authority. https://www.njtpa.org/Planning/Regional-Programs/Studies/Completed/2013/NJTPA-Regional-Greenhouse-Gas-Mitigation-Plan.aspx.

implementation actions under this measure increase walkability allows for the calculation of associated emissions savings.

The National Walkability Index is a product of the U.S. EPA Smart Growth program. The index generates "walk scores" for each census block group (typically about a thousand residents), based on a formula that ranks selected indicators from the EPA's national Smart Location Database that have been demonstrated to affect the propensity of walk trips. The holistic rubric includes proxies for a range of investments and programs, such as mixed-use zoning, dense development, and alternative mode infrastructure

The results indicate a 1-point increase in area-weighted walkability scores decreased passenger vehicle emissions per capita by 0.3 MT CO_2e. All told investments in increasing the walkability of communities throughout the MSA are estimated to result in an annual reduction of 3 million MT CO_2e and increase the walkability scores of counties by an average of 0.3 points.

The second step of modeling the GHG reduction potential of this measure involves implementing travel demand management (TDM) programs. Like the approach taken to model the impacts of infrastructure investments, modeling GHG reductions from TDM is not intended to pinpoint specific policies to enact, but rather estimate the impact of enacting a set of potential, reasonable policies. Several studies have estimated the impact of TDM on passenger VMT including, but not limited to, NJTPA's 2013 Regional Greenhouse Gas Mitigation Plan and in-house modeling completed by NYSDOT. In addition to these studies, the approach used leverages the Trip Reduction Impacts of Mobility Management Strategies (TRIMMS) model to inform assumptions on the impact of implementing TDM. Impact levels are set at 10% VMT reduction for urban counties, 2% VMT reduction for suburban counties, and 0.5% VMT reduction for rural counties by 2050, projecting out linearly from 2023.VMT reductions and TDM measures can be deployed by the MSA to both analyze and control the modes and amount of travel through a given transportation system. Under this measure, regional partners are looking to design projects that will help deliver innovative strategies to reduce the total number of VMT for single occupancy, GHG-emitting vehicles. This work will have the added benefit of encouraging the widespread use of public transportation (e.g., rail, subway, buses) and active transportation (e.g., walking, biking) as viable, reliable options for traveling across the region.

Full implementation of TDM policies in combination with investments in alternative transportation infrastructures could reduce GHG emissions by four million MT CO_2e in 2030 and five million MT CO_2e in 2050. For the purposes of this modeling, we do not incorporate the estimated reduction in emissions from the electrification of passenger vehicles; these reductions will likely decline in magnitude as the passenger vehicle fleet electrifies, but these actions will likely reduce total costs to charge those vehicles, including generation, transmission, distribution, and storage of electrical energy. Further, this level of GHG reduction is associated with 300 metric tons of methane and 40 metric tons N_2O reductions per year by 2030 and 1,600 metric tons of methane and 200 metric tons of N_2O by 2050.

Table 19. Travel Demand Management and Reductions Quantified Benefits

Timeframe	GHG Reductions	Criteria Pollutant Reductions
2030	4 $MMTCO_2e$ per year	• 300 MT CH_4 per year • 40 MT of N_2O per year • 3,000 short tons NOx per year • 120 short tons PM 2.5 per year • 600 short tons PM 10 per year • 12,800 short tons VOC per year
2050	5 $MMTCO_2e$ per year	• 1,600 MT CH_4 per year • 200 MT of N_2O per year • 16,500 short tons NOx per year • 650 short tons PM 2.5 per year • 3,200 short tons PM 10 per year • 71,400 short tons VOC per year

3.2.5 Maritime and Aviation Emissions

The NY-NJ MSA is home to three of the nation's largest airports – John F. Kennedy International, LaGuardia, and Newark International – as well as one of the largest seaports in the country, all managed by the Port Authority of New York and New Jersey. A hub for international travel – both of people and of goods – off-road transportation emissions from marine and aviation sectors included in the simplified GHG Inventory account for 4% of the MSA's total transportation emissions. Given the size and significant importance of these transportation hubs to the region, it is critical for the MSA to reduce not only GHG emissions from these off-road activities but also harmful air pollutants and local noise pollution. The Port Authority of New York and New Jersey has laid out its ambitious decarbonization goals in its 2023 Net Zero Roadmap report.[91] The Port Authority is leading the industry in setting targets, planning its path forward, and implementing actions to accelerate the transition to cleaner and more energy-efficient operations within the Port Authority's jurisdictional boundaries and dock workers, as well as surrounding communities. As the development of sustainable aviation fuel (SAF) matures, the MSA will focus on investing in the appropriate infrastructure among its stakeholders. There is still more work to be done and investments to be made to enable the Port Authority to deliver on its commitment to net zero.

Maritime and Aviation Emissions	
Emissions Reductions	In 2030: • 263,000 MT CO_2e • 12% reduction in off-road transportation emissions from 2022 baseline In 2050: • 354,000 MT CO_2e • 17% reduction in off-road transportation emissions from 2022 baseline
Geography	Entire NY-NJ MSA

[91] Environmental Initiatives Information | Port Authority of New York and New Jersey (panynj.gov)

Schedule and Milestones	• 10% use of sustainable aviation fuels (SAFs) by 2030[92] • Reduce overall greenhouse gas emissions from international shipping to be net zero by 2050[93] • Electrify 50% of shore/ground support equipment by 2030, with the ambition to bring all equipment to zero-emission technologies by 2050[94]
Progress Metrics	• Share of ground support equipment converted to zero-emissions technology • Number of charging stations added to airports • Number of charging stations added to seaports • Number of alternative fueling stations added to airports • Number of alternative fueling stations added to seaports
Funding Sources	• Port Infrastructure Development Program (PIDP) • Clean Ports Program • Diesel Emissions Reduction Act (DERA) Program • Clean Heavy-Duty Vehicle Program • Reduction of Truck Emissions at Port Facilities • Electric or Low-Emitting Ferry Program

Enabling Actions

Action	Implementing Agencies	Review of Authority to Implement
Electrify ground support and shore equipment, including provisions for charging infrastructure	**Cross-jurisdiction:** PANYNJ	PANYNJ oversees the largest airports within the MSA as well as the largest container-port on the East Coast, seeing significant air and maritime vessel traffic every day of the year, as well as drayage and freight trucks which transfer goods to and from the port to warehouses and final destinations. Operations at the ports and terminates are supported by numerous types of ground equipment including pushbacks, belt loaders, and containers, each contributing to regional GHG emissions if not powered by renewable energy sources.
Explore pilots and commercialization potential of advanced low-carbon alternative fuels while providing industry support to enable a smooth transition	**Local:** NYCDOT, NYCEDC **Cross-jurisdiction:** PANYNJ	Each of these entities own and operate a fleet of vehicles and vessels such as helicopters, ferries, and airplanes that contribute to the region's GHG emissions levels. These entities also work with private/industry partners who provide critical transportation services to customers and should be engaged on strategies and plans to reduce their GHG emissions.

Due to data limitations in modelling the wider impacts of reducing aviation and maritime emissions in the MSA, only targeted modeling for the impacts of the identified enabling actions under this measure thus far has been completed. These include the reductions associated with electrifying ground support equipment (GSE) and transitioning to sustainable aviation fuels (SAF).

[92] "ICAO Policy Guidance on SAF." International Civil Aviation Organization. https://www.icao.int/environmental-protection/Documents/SAF/Presentation%20on%20ICAO%20SAF%20Policy%20Guidance.pdf
[93] "2023 IMO Strategy on Reduction of GHG Emissions from Ships." International Maritime Organization. 2023 IMO Strategy on Reduction of GHG Emissions from Ships
[94] Discussion with PANYNJ, Feb 2nd, 2024

Electrifying ground vehicles and equipment—such as baggage tugs, fuel trucks, and maintenance vehicles— can drive down criteria and noise pollution and improve air quality and safety for airport and dock workers, as well as surrounding communities. The Port Authority is implementing a Zero-Emission Airside Vehicle Rule at LaGuardia, John F. Kennedy International, and Newark Liberty International Airports, which aims to electrify "the bulk of" the GSE at these three airports by 2030. For GHG reduction modeling, it is assumed that 50% of emissions from GSE will be electrified by 2030, 75% by 2040, and 95% by 2050. By backtracking emissions from the Port Authority to gallons of diesel— using EPA emission factors of 10.21 kg CO2 per gallon— and estimating new electricity consumption— using a diesel-to-kWh conversion factor of 40.65 and medium-duty electric truck efficiency factor of 4— an estimate of 95,000 MT CO_2e of avoided net GHG emissions from electrification is returned.

As the development of SAF matures, the MSA will focus on investing in the appropriate infrastructure to enable airports and seaports to continue decarbonizing into the future. The Clean Skies for Tomorrow Coalition – an industry coalition pushing for the deployment of sustainable aviation fuels– publicly committed to 10% SAF adoption by 2030.[95] The Port Authority has also expressed its interest in being a leader in SAF adoption. Thus, for GHG reduction modeling, it is assumed that 20% of 2022 jet fuel consumption will be replaced by SAF by 2030, where it will remain through 2050. Backtracking CO_2e emissions from aircraft to MMBtu of jet fuel— using an emissions factor of 72.5 kg CO_2e / MMBtu and assuming a 50% reduction in lifecycle greenhouse gas emission, in line with Sustainable Aviation Fuel Grand Challenge goals - returns an estimate of 175,000 MT CO_2e in avoided GHG emissions from the adoption of SAF in 2030.[96]

Modeling aviation sector GHG reductions is based on the presumed realization of implementing agency quantifiable goals in the MSA. Across the off-road sector, these two actions are estimated to reduce aviation emissions by 17% in 2050 from the 2022 baseline.

Table 20. Maritime and Aviation Emissions Quantified Benefits

Timeframe	GHG Reductions	**Criteria Pollutant Reductions**
2030	0.3 MMTCO_2e per year	• 20 MT CH_4 • 5 MT of N_2O per year • 300 short tons NOx per year • .5 short tons SOx per year • 30 short tons PM 2.5 per year • 40 short tons PM 10 per year
2050	0.4 MMTCO_2e per year	• 30 MT CH_4, • 10 MT of N_2O per year • 600 short tons NOx • 1 short ton SOx per year • 60 short tons PM 2.5 • 70 short tons PM 10

[95] "Clean Skies for Tomorrow Leaders: 10% Sustainable Aviation Fuel by 2030" September 2021. World Economic Forum https://www.weforum.org/press/2021/09/clean-skies-for-tomorrow-leaders-commit-to-10-sustainable-aviation-fuel-by-2030/

[96] Alternative Fuels Data Center: Sustainable Aviation Fuel (energy.gov)

3.2.6 Building Electrification and Energy Efficiency

Totaling 57% of the MSA's emissions, stationary energy comprises the largest share of the MSA's GHG inventory. Home to the nation's most densely populated major city with hundreds of skyscrapers to house its residents and workforce, it is unsurprising these buildings dominate the MSA's emissions.[97] Despite the outsized stature of the New York City skyline, the skyscrapers that comprise it are only one component of an expansive and diverse set of residential and commercial typologies that comprise the region's building stock. Energy efficiency measures in buildings can lead to significant reductions in overall energy consumption, crucial for lowering carbon emissions and mitigating city-centric phenomena like the urban heat island effect, which can increase the instance of harmful impacts such as high cooling costs and heat-caused ailments.[98] Buildings are also major contributors to air pollution in urban areas, especially through the combustion of fossil fuels for heating and hot water; as previously noted, natural gas emissions associated with heat are among the largest sources of emissions for residential heating. Electrifying buildings and adopting energy-efficient technologies help reduce emissions of harmful pollutants, improving air quality and public health for residents.

The NY-NJ MSA has launched several landmark initiatives to reduce building emissions, most notably New York City's Local Law 97.[99] Under this law, most buildings over 25,000 square feet must meet progressively stringent GHG intensity emissions limits, which are summarized in the table below. The goal of this law is to reduce the emissions produced by the City's largest buildings by 40% by 2030 and 80% by 2050 from the City's 2005 baseline.[100] While this legislation is most applicable in a NYC context – it provides a foundation for the introduction of similar regulations in other jurisdictions.

Table 21. Summary of Local Law 97's Increasing GHG Emission Reduction Targets

Model Building Type	2024-2029 Targets (kg CO_2e/sq ft)	2030-2034 Targets (kg CO_2e/sq ft)	2035-2039 Targets (kg CO_2e/sq ft)	2040-2049 Targets (kg CO_2e/sq ft)
Full-Service Restaurant	17.8	6.3	4.7	3.1
Hospital	19.8	7.5	5.4	3.6
Hotel	8.3	2.7	1.8	0.9
Office	8.0	3.2	2.2	1.2
Outpatient	11.4	4.9	3.6	2.1
Quick Service Restaurant	11.8	6.5	4.9	3.2

[97] Highest Density. U.S. Census. 2023. https://www.census.gov/popclock/embed.php?component=density
[98] Reduce Heat Island Effect. EPA U.S.EPA. https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect#:~:text=Trees%2C%20green%20roofs%2C%20and%20vegetation,releasing%20moisture%20into%20the%20atmosphere
[99] Similar efforts that apply to jurisdictions in the region include New Jersey's Clean Energy Act benchmarking program, which requires commercial building owners/operators to benchmark energy and water use for the prior calendar year.
[100] Local Law 97. The City of New York. 2019. https://www.nyc.gov/assets/buildings/local_laws/ll97of2019.pdf

Retail	6.8	3.3	2.4	1.5
School	7.2	2.8	2.0	1.2
Strip Mall	11.1	2.4	1.5	0.7
Supermarket	17.6	5.5	3.7	2.1
Warehouse	6.0	1.3	0.9	0.5
Other	10.3	5.1	3.8	2.5
Multi-Family Housing	6.8	3.3	2.7	2.1

To date, a major gap in electrifying buildings in the MSA has been the availability of financing. Upgrading to energy-efficient appliances requires a significant upfront investment, especially burdensome for residents in low-income and disadvantaged communities who already experience higher energy expenses relative to their income.[101] To implement this measure, representative organizations within the MSA will look for ways to reduce costs for renters and homeowners to decarbonize their homes. This effort will also require coordination with state energy offices, public utility commissions, energy providers, energy services companies, regional financial institutions (especially green banks) and local municipal governments. In addition, authorities within the MSA are working to replace boilers in schools and other public buildings for equipment such as heat pumps so the places where people live, work, learn, and play are decarbonized.

Building Electrification and Energy Efficiency	
Emissions Reductions	In 2030: • 31 million MT CO_2e • 34% reduction in stationary energy emissions from 2022 baseline In 2050: • 44 million MT CO_2e • 49% reduction in stationary energy emissions from 2022 baseline
Geography	Entire NY-NJ MSA
Schedule and Milestones	• 40% reduction in GHG emissions for buildings over 25,000 square feet by 2030 from 2005 baseline • Net zero GHG emissions for buildings over 25,000 square feet by 2050
Progress Metrics	• Reduction in household energy burden • Number of heat pumps installed • Number of buildings in compliance with Local Law 97

[101] "Understanding and Alleviating Energy Cost Burden in New York City," Office of the Mayor. 2019. https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/EnergyCost.pdf

Funding Sources	• Environmental Justice and Community Change Grants • Weatherization Assistance Program (WAP) • Low-income Home Energy Assistance Program (LIHEAP) • Energy Efficiency Revolving Loan Fund Capitalization Grant Program • Home Energy Performance-Based, Whole-House Rebates (HOMES) • High-Efficiency Electric Home Rebate Program (HEEHRA) • Energy Efficiency Conservation Block Grant Program • National Clean Investment Fund (NCIF) • Clean Communities Investment Accelerator (CCIA) • Assistance for Latest and Zero Building Energy Code Adoption

Enabling Actions

Action	Implementing Agencies	Review of Authority to Implement
Address the financing gap to decarbonize schools (public k-12 and higher education institutions)	**State:** NJBPU, NYSERDA **Local:** County and municipal agencies such as NYC DOE, school districts	County and municipal governments, school districts and public universities are responsible for setting school budgets and implementing energy efficiency upgrades at schools. In some cases, local agencies like NYC DOE can help finance these upgrades.
Address the financing gap to decarbonize buildings owned by local governments and other public entities	**State:** NJBPU, NYSERDA **Local:** County and municipal agencies (NYC DCAS) **Cross-Jurisdiction:** NJT, MTA, PANYNJ	NYC DCAS manages the city's municipal buildings. In other jurisdictions within the MSA, county and municipal governments that manage their respective buildings will have the authority to decarbonize their buildings. At the state level, organizations like NJBPU and NYSERDA also support financial support and incentives for building decarbonization. NYSERDA finances initiatives related energy efficiency improvements and large-scale clean energy initiatives.[102] NJBPU has introduced initiatives like its clean energy program (NJCEP) to offer energy efficiency funding for a variety of entities.[103,104] Cross-jurisdictional entities like NJT, MTA, and PANYNJ manage their buildings and have the requisite authority to decarbonize.
Address the financing gap to decarbonize public housing	**State**: NJBPU, NYSERDA **Local:** County and municipal agencies (housing authorities such as NYCHA, NHA; housing related agencies such as NYC HPD, NYC DOB, etc.)	NJBPU and its clean energy program (NJCEP) offer energy efficiency funding for a variety of entities.[105]

[102] NYSERDA Building Efficiency & Building Decarbonization | How We're Transforming Buildings to Stand Up to Climate Change
[103] NJBPU's Clean Energy Program's Find A Program (cepfindaprogram.com)
[104] NJBPU also offers funding through its Comfort Partners Program which is co-administered with utilities. https://njcleanenergy.com/
[105] NJBPU's Clean Energy Program's Find A Program (cepfindaprogram.com)

		NYSERDA offers a range of residential programs to improve energy efficiency in affordable housing.[106] NYC HPD is responsible for developing and maintaining the city's affordable housing stock. Representative entities in the MSA can support the financing of public housing operations, including the transition to renewable energy sources for localized consumption. This effort can be supported by the abovementioned initiatives, among other funding sources.
Address financing gap to decarbonize privately owned buildings, especially for low-to-moderate income (LMI) families	**State:** NYS DHCR, NJ DCA, NYSERDA, NJBPU **Local:** Municipal and county governments/agencies (e.g., NYC HPD, NYC DOB)	A combination of housing and energy related agencies at the state level have authority to establish mechanisms for private landlords to access financial support to sustain LMI housing availability. Local involvement from municipal housing and building departments have similar jurisdiction over providing support for LMI housing providers and may be involved in some sub-regions to implement these actions.
Provide technical and financial assistance for municipalities to bolster capacity for owners and tenants of small buildings	**State:** NJBPU, NJDEP, NYSERDA **Local:** County and municipal agencies (MOCEJ, NYC HPD)	Existing work on this action by identified agencies suggests that no additional authorities are required to implement the concept. For instance, MOCEJ and NYC HPD regularly operate pilot initiatives, educational programs, and technical assistance programs. Further, regional stakeholders have noted that state agencies in NJ like NJBPU and NJDEP contract with partners to create technical guidance regarding heat pump installations, educational programs, and more.

The method used to quantify GHG reductions associated with this measure is based on the parameters set forth for large buildings in NYC under Local Law 97. Specifically, we model the emissions reductions associated with an expansion of compliance with Local Law 97 into the counties surrounding New York City that make up the MSA. Specifically, GHG intensity targets outlined in Local Law 97 and summarized above are extrapolated to commercial buildings across the MSA on a per-square-foot basis and multiplied by 2022 estimates of the total square footage of each building type. Similarly, only a small share of the residential buildings in NYC, let alone throughout the MSA, are subject to Local Law 97.

However, technical assistance or other policy measures from local authorities could result in similar levels of decarbonization. For example, the emission intensity ceiling for multifamily

[106] Home Energy Efficiency Programs. NYSERDA. https://www.nyserda.ny.gov/All-Programs/Home-Energy-Efficiency-Upgrades

housing dwellings established by Local Law 97 is assumed to impact all residential house types. The GHG emissions reduction modeling thus reflects a congruent reduction in emissions for all residential stock regardless of the location within the MSA and regardless of square footage. This level of adoption for both commercial and residential buildings would reduce 31 million metric tons of CO_2e emissions by 2030 and 44 million metric tons of CO_2e emissions by 2050. In addition, this would reduce NOx emissions by 14,500 metric tons per year by 2030 and 20,700 by 2050, among several other co-pollutant reductions listed in the table below.

Table 22. Building Electrification and Energy Efficiency Quantified Benefits

Timeframe	GHG Reductions	Criteria Pollutant Reductions
2030	31 $MMTCO_2e$ per year	• 14,500 short tons NOx per year • 2,700 short tons PM 2.5 per year • 5,300 short tons PM 10 per year • 300 short tons SO_2 per year • 2,800 short tons VOCs per year
2050	44 $MMTCO_2e$ per year	• 20,700 short tons NOx per year • 3,900 short tons PM 2.5 per year • 7,600 short tons PM 10 per year • 500 short tons SO_2 per year • 4,000 short tons VOCs per year

3.2.7 Grid Decarbonization

Grid decarbonization plays a pivotal role in addressing climate change and mitigating its impacts. In New York, from Westchester to Long Island, the grid relies on gas combustion for more than 85% of its generation. In Northern New Jersey, natural gas generation accounts for 48% of the fuel mix and coal accounts for 10%.[107] By transitioning away from fossil fuels and embracing renewable energy sources, such as solar, wind, and hydroelectric power, grid decarbonization significantly reduces greenhouse gas emissions associated with electricity generation – a critical lever given that electrification of vehicles and buildings will result in greater demand for electricity over time. Through the Climate Leadership and Community Protection Act (CLCPA), New York State commits to delivering 70% renewable energy by 2030 and a zero-emissions grid by 2040.[108] Similarly, New Jersey has laid out a roadmap to achieving 100% clean energy by 2050 in its Energy Master Plan.[109] Although the two states have set forth these bold targets and have backed them up with procurements for clean power and other key investments, there is still more that can be done to progress toward each state's target. Actors throughout the NY-NJ MSA, from state energy offices to local planning boards to the electric utilities serving the millions of customers in the region, must collaborate to identify, site, fund,

[107] 2022 Emissions & Generation Resource Integrated Database (eGRID). January 30, 2024. Environmental Protection Agency. https://www.epa.gov/egrid/data-explorer.
[108] Senate Bill S6599. The New York State Senate. 2019-2020. https://www.nysenate.gov/legislation/bills/2019/S6599
[109] State of New Jersey Energy Master Plan. 2019. https://www.nj.gov/emp/energy/

and execute critical infrastructure upgrades needed to make widespread electrification and new renewable capacity a reality.

The electricity grid surrounding New York City is home to some of the most congested transmission and distribution systems in the nation. Because of this congestion, power cannot always be imported from less-carbon-intense grids elsewhere in the New York Independent System Operator (NYISO) and Pennsylvania-New Jersey-Maryland Interconnection (PJM), requiring the dispatch of local generators that generate more greenhouse gases than the grid average. Moreover, as large-scale renewables are sited in upstate New York, throughout the PJM region and off the coasts of New York and New Jersey significant grid upgrades will be needed to bring this power to the homes and businesses in the dense core of the MSA. Chief among these investments are potential projects on Staten Island and in South Brooklyn, which could be upgraded into key hubs for interconnecting large offshore wind projects directly into these congested grids. In addition, the *PowerUp NYC* study identified a range of key investments that could help reduce the urban core's reliance on local fossil generators and enable clean energy investments throughout the region to reach customers in the MSA.

The Greenhouse Gas Reduction Fund (GGRF) program is poised to make billions in awards for clean energy technology investment and financing, community infrastructure, and solar programming.[110] With these investments, the nation could see an unprecedented increase in the demand for clean electricity and the supply of distributed energy resources such as rooftop solar PV. This expansion of distributed energy resources (DER) capacity may also require upgrades to the local distribution grid, including new smart meters and microgrid pilots, to handle significant increases in bidirectional and dynamic flows of electricity into and out of the grid. Although awards and programs are still being determined, it is clear co-investment in the grid of the future could help maximize the impacts and benefits of Solar for All and other GGRF programs.

Grid Decarbonization	
Emissions Reductions	In 2030: • 15 million MT CO_2e • 36% reduction in grid emissions from 2022 baseline In 2050: • 40 million MT CO_2e • 100% reduction in grid emissions from 2022 baseline
Geography	Entire NY-NJ MSA
Schedule and Milestones	• 70% clean energy by 2030 • 100% clean energy by 2050
Progress Metrics	• Rooftop solar energy capacity • Offshore wind capacity • Reduction in transmission and distribution ratio • Minimize curtailment of renewables • Energy imports/exports • Fossil fuel plant retirements
Funding Sources	• Grid Resilience State and Tribal Formula Grant Program

[110] The Greenhouse Gas Reduction Fund. EPA. https://www.epa.gov/greenhouse-gas-reduction-fund

	• Smart Grid Grants • Grid Innovation Program • Solar for All

Enabling Actions		
Action	**Implementing Agencies[111]**	**Review of Authority to Implement**
Make critical investments in the grid to accommodate anticipated increases in demand (e.g., T&D upgrades, renewable energy sources integration, microgrids, energy storage innovations, etc.)	**State:** NYISO, NYSPSC, NJBPU **Local:** County and municipal agencies like NYC OMB or municipal electric utilities **Cross-jurisdiction:** Electric utilities	Utilities across the MSA are managed by a cross-sector of public and private entities. Utility providers (e.g., Consolidated Edison, National Grid, and PSE&G) operate in the region and are tasked with investing in and maintaining T&D infrastructure on behalf of their customers. Providers work with public utility commissions in each state approve capital upgrades in energy infrastructure. Separately, organizations such as NYISO, are responsible for managing competitive wholesale electricity market and work in coordination with utility providers and other governmental entities. NYC OMB is the city's chief financial agency and is responsible for capital budgeting, including infrastructure outlays.
Enable offshore wind transmission capabilities at key power sites (e.g., South Brooklyn & Arthur Kill Terminals)	**Local:** NYCDSBS, NYCEDC	NYCEDC, through NYCDSBS, manages city-owned facilities for economic development purposes and contracts with private parties to invest in communities through major infrastructure upgrades, capital projects, and real estate development.
Support public solar projects	**State:** NYSERDA, NJBPU **Local:** County and municipal administrative agencies (e.g., NYC DCAS)	State and local governments have existing authority to increase the use of solar within their own operations.
Support non-public (i.e., private, non-profit) solar projects	**State:** NYSERDA, NJBPU **Local:** County and municipal agencies with oversight of building and real estate related affairs (e.g., NYC DOB)	Identified agencies have existing authority to distribute financial and other forms of support for private solar projects. Further, NYSERDA and NJBPU are the respective Solar for All applicants for each state and will be focal points for investment in solar projects.
Decrease regulatory barriers for solar project implementation	**State:** NYSERDA, NJBPU **Local:** County and municipal regulatory, permitting agencies (e.g., NYC DOB)	Regulatory barriers to solar project implementation exist at most levels of government. Identified implementation agencies/entities should each have prior jurisdiction to help mitigate such challenges, whether with permitting at

[111] Implementing agencies identified and associated authority to implement considerations may be adjusted over the course of the CPRG planning process as roles and responsibilities are validated and iterated upon in the development of the CCAP.

		the local level with municipal governments, or higher-level concerns with streamlining overarching processes for solar project approval at the state level through energy-related agencies like those identified.

Using the New Jersey and New York clean energy goals, new emission factors for New Jersey, NYC-Westchester (NYC-W), and New York-Long Island (NYLI) grids were developed, assuming an interpolated trajectory towards these targets through 2050, shown in the figure below. This level of adoption would reduce 40 million metric tons of CO_2e emissions by 2050 from the 2022 baseline established in the GHG Inventory. In addition, this would reduce NOx emissions by 5,800 tons per year by 2030 and 15,800 tons by 2050. As power generation shifts toward renewable sources, communities will experience cleaner air and reduced health risks associated with pollution from traditional fossil fuel sources. Grid decarbonization not only reduces GHGs and improves air quality but also alleviates cost-related energy burdens for energy consumers. Grid decarbonization is critical to reducing the regional reliance on fossil fuels and higher energy costs. Additionally, this transition will help mitigate energy burden and other inequalities, particularly among low-income and disadvantaged communities. As a result, residents can allocate more resources toward essential needs, such as healthcare, education, and housing, enhancing overall community well-being and socioeconomic equity.

Figure 15. Forecasted CO_2e Intensity of the MSA's Electricity Grids

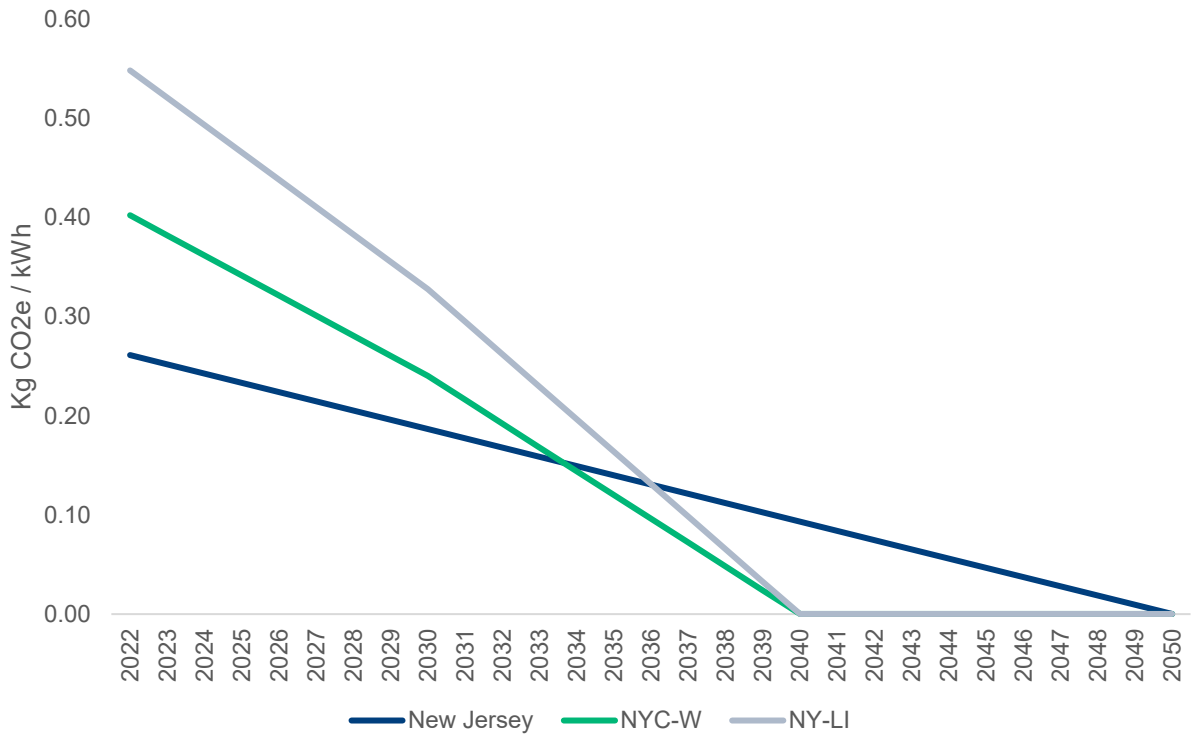


Table 23. Grid Decarbonization Quantified Benefits

Timeframe	GHG Reductions	Criteria Pollutant Reductions
2030	15 $MMTCO_2e$ per year	• 800 MT CH_4 per year • 100 MT N_2O per year • 5,800 short tons NOx per year • 2,200 short tons SO_2 per year • 1,000 short tons PM 2.5 per year
2050	40 $MMTCO_2e$ per year	• 2,200 MT CH_4 per year • 300 MT N_2O per year • 15,800 short tons NOx per year • 5,900 short tons SO_2 per year • 2,800 short tons PM 2.5 per year

3.2.8 Waste Disposal Reduction

PCAP GHG Inventory results indicate that around 7% of emissions are attributable to the waste sector in the MSA. Though a relatively small share of the region's emissions, there is still a significant opportunity to implement efficient and sustainable waste management strategies. Across the MSA, organic waste is primarily disposed of in landfills, producing harmful methane (CH4) emissions. For instance, as of 2022, only 3% of NYC's waste was composted, yet 34% of NYC's waste is organic and suitable for composting.[112] A similar case is true in NJ, where the average rate of recycling in 2022 across NJ counties in the MSA does sit higher at around 58%, but still leaves room for improvement. Several nascent programs in the MSA are beginning to address this issue. For example, the NYC Department of Sanitation has launched a curbside composting program that is available in Brooklyn, Queens, and select areas in the Bronx and Manhattan.[113] This service will be extended to all Bronx, Manhattan, and Staten Island residents in October 2024. In New Jersey, municipalities like Jersey City and Hoboken, as well as counties like Middlesex and Bergen, all offer varying levels of support for MSW diversion.[114] What this measure aims for however, is to bring these programs to scale. The table below summarizes how the MSA will implement this reduction measure through 2050.

[112] PlaNYC: Getting Sustainability Done, pg. 65. The City of New York. 2023. PlaNYC-2023-Full-Report.pdf (cityofnewyork.us)
[113] Curbside Composting. DSNY. https://www.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page/composting-residents-organics
[114] Jersey City, Hoboken, Middlesex County, Bergen County

Waste Disposal Reduction	
Emissions Reductions	In 2030: • 1 million MT CO_2e • 12% reduction in waste emissions from 2022 baseline • 14% reduction in Scope 3 waste emissions from 2022 baseline In 2050: • 4 million MT CO_2e • 34% reduction in waste emissions from 2022 baseline • 39% reduction in Scope 3 waste emissions from 2022 baseline
Geography	Entire NY-NJ MSA
Schedule and Milestones	• Maximize diversion of organic and recyclable waste from landfills • Expand curbside composting and recycling programs across the MSA
Progress Metrics	• Tons of organic waste composted • Tons of waste recycled • Number of households enrolled in curbside composting • Number of households enrolled in curbside recycling
Funding Sources	• Consumer Recycling Education & Outreach Program • Compost Food and Waste Reduction (CFWR) Cooperative Agreements

Enabling Actions

Action	Implementing Agencies	Review of Authority to Implement
Provide grants to municipalities to expand composting, recycling, and reuse programs	**State:** NYSDEC, NJDEP **Local:** County and municipal waste management agencies (e.g., DSNY)	NYC DEC and NJDEP regularly provide grants to local municipalities to execute state, regional, and local initiatives.
Support programs that enhance public knowledge of sustainable consumption and waste disposal practices		State agencies and local governments support composting and/or sustainable waste management programs within their respective jurisdiction.[115, 116, 117]
Pilot and expand organics waste management programs for municipalities		
Pilot opportunities to enhance composting efforts (e.g., compost to fuel initiatives)		

[115] Composting Methods. NYSDEC. https://dec.ny.gov/environmental-protection/recycling-composting/organic-materials-management/technologies/composting
[116] Division of Sustainable Waste Management. NJDEP. https://www.nj.gov/dep/dshw/
[117] Curbside Composting. DSNY. https://www.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page/composting-residents-organics

Indicative modelling has been completed to estimate quantified reductions in GHG emissions from reducing waste disposal. Modelling leverages previous research related to the topic. According to a 2017 report from the NYC Department of Sanitation, 78% of the City's waste could be diverted from landfills.[118] In addition, the NYC Department of Sanitation estimated that 34% of waste can be recycled and 34% can be composted.[119] To model the impact of this measure across the NY-NJ MSA, it is assumed that while 34% of waste can be composted. Many suburban counties have recycling rates much higher than 34%, averaging 58%. In these cases, it was assumed that the county has maximized its recycling potential and would not be able to reduce further emissions by recycling. For these counties, their current recycling rate was subtracted from 78% - the assumed total percent of waste that can be diverted from landfills. For example, Ocean County, NJ currently recycles 50% of its waste, so it was assumed that the County could compost an additional 28% of its waste. This approach applies to each county other than New York City, which recycles 17% and composts 3% of its waste. In this case, it is assumed that New York City will divert 78% of its waste by 2050, with 34% recycled and 34% composted.

Considering the current percent of waste recycled or composted by county from the GHG Inventory, linear projections were modeled through 2050, assuming that in 2050, each county would recycle 34% of their waste and compost an additional 34% of waste. Since many counties already recycled more than 34% of their waste, much of the impact of this measure is accounted for in the uptake of composting. Avoided emissions from diverted waste are calculated by multiplying the increase in short tons that would be recycled and/or composted by the landfilled Mixed MSW emission factor and subtracting by the recycled Mixed Recycled or Composted Mixed Organics emission factors, shown in the table below.

Table 24. Emission Factors Used in GHG Reductions from Waste Measures

	Landfilled Mixed MSW	Recycled Mixed Recyclables	Composted Mixed Organics
Emission Factor (MT CO_2e / Short Ton)	0.52	0.09	0.17

This level of adoption could avert more than three million short tons of landfilled waste per year by 2030, resulting in a reduction of one million metric tons of CO_2e by 2030. This emissions reduction figure equates to a 12% reduction from the 2022 baseline emissions calculated in the GHG Inventory. By diverting materials from landfills, recycling, and composting efforts help preserve the environment and minimize pollution. Moreover, the expansion of these types of initiatives can have a downstream impact on the local economy and foster broader community engagement through participation in waste reduction programs.

[118] "NYC Residential, School, and NYCHA Waste Characterization Study." DSNY, 2017. https://dsny.cityofnewyork.us/wp-content/uploads/2018/04/2017-Waste-Characterization-Study.pdf
[119] "NYC Residential, School, and NYCHA Waste Characterization Study." DSNY, 2017. https://dsny.cityofnewyork.us/wp-content/uploads/2018/04/2017-Waste-Characterization-Study.pdf

Table 25. Waste Disposal Reduction Quantified Benefits

Timeframe	GHG Reductions	Criteria Pollutant Reductions[120]
2030	1 $MMTCO_2e$ per year	-
2050	4 $MMTCO_2e$ per year	-

3.2.9 Cross-cutting Measures

In addition to the sector-specific GHG reduction measures and the suite of implementation actions that support and enable those reductions, the region identified several key cross-cutting approaches that incorporate reductions and actions from multiple sectors.[121] As a primary example, this could include a regionally funded municipal program that would provide technical assistance, financing, and other support for municipalities to adopt a suite or package of GHG reduction measures, such as transit-oriented zoning policies, along with EV charging and active transportation infrastructure at key transit nodes. Although not explicitly modeled in this analysis, the impacts of a package of measures are often not just additive, but amplifying in terms of the community benefits and climate pollution impacts of the measures being implemented.

In addition, the New York City area often hosts highly visible public events and spectacles. From large parades to holiday celebrations, concerts, and sporting events, a myriad of highly publicized events brings thousands of workers, visitors, participants, and tourists to the region. This drives up demand for transportation of all modes, heating and cooling, merchandise production and shipping, and many other activities that, with today's most prevalent technology, emit GHGs. While their individual emissions may be relatively small in comparison to those associated with typical levels of economic activity in the region, these events hold outsized stature in the hearts and minds of the public. Their reach extends beyond the confines of their grandstands and police cordons, being televised, live-streamed, and shared on social media to hundreds of millions of viewers. Piloting new technologies or financing the use of clean energy alternatives in these events – from electrified taxi fleets to zero waste apparel – will not only reduce local air and climate pollution but also highlight and emphasize the possibilities of a Net Zero future for the entire U.S.– and across the globe.

3.3 GHG Reduction Targets

In setting ambitious goals for GHG reduction within our region, this section articulates the MSA's vision for addressing the urgent need for impactful emissions reductions. By establishing clear and measurable targets, the NY-NJ MSA is embarking on a transformative journey to mitigate the impacts of climate change throughout the region. This initiative underscores a collective commitment to fostering a resilient and low-carbon future by aligning regional goals with the national efforts to combat challenges posed by rising emissions.

[120] Criteria pollutant reductions associated with waste disposal reduction to be iterated on in CCAP phase of work.
[121] A separate detail table of attributes is not provided for this measure as it is a function of the parameters/components of the eight previously defined measures presented above in sections 3.2.1-3.2.8

Many existing GHG reduction targets have already been set by jurisdictions with oversight over the NY-NJ MSA. At the regional level, New Jersey, New York State, and New York City have all established GHG reduction targets which are summarized in the table below. These regional targets generally align with one another, aiming for at least 80% emissions reductions by 2050, albeit with different baselines. Localities in the MSA have also expressed support for similar targets in their own action plans and pledges.[122] The scope and ambitions of local targets vary greatly, but taking the common denominator across them indicates the MSA has a clear goal in mind: net zero greenhouse gas emissions reductions by 2050.[123] In recognition of the ongoing work by jurisdictions across the MSA on GHG target setting, the NY-NJ MSA intends to use this target as a basis, with potential future explorations of sector-based targets taking shape in its CCAP response.

Table 26. Regional GHG Emissions Reduction Targets Applicable to the NY-NJ MSA

Location	Target	Source
New Jersey	80% reduction from a 2006 baseline by 2050	Global Warming Response Act
New York	85% reduction from a 1990 baseline by 2050	Climate Act
New York City	80% reduction from a 2005 baseline by 2050	New York City's Roadmap to 80x50

3.4 GHG Emissions Projections

As noted previously, climate action planning across the NY-NJ MSA has been an ongoing effort for nearly two decades. States, localities, and quasi-governmental organizations each use emissions projection exercises to drive decision-making for GHG reduction initiatives such as electrifying municipal fleets, decarbonizing publicly and privately owned buildings, and even designing critical policies to change how energy is delivered to homes. For this document, the regional team has collected and reviewed emissions projections from both local jurisdictions and authorities alongside the quantified GHG reductions as part of the PCAP to develop a regional weighted target of estimated emissions projections through 2050.

Given the time constraints of the PCAP, regional partners have used this planning opportunity to begin the conversation by building an aggregation of MSA-wide emissions projections. This collaboration effort is critical to ensuring the right stakeholders are involved in establishing targets that are both ambitious and feasible within the current environment. Given the PCAP's focus on transportation, stationary energy, and waste as large sources of GHG emissions, deeper conversations are required to establish alignment on regional priorities. While policymakers have introduced various strategies to deliver infrastructure enhancements or change behavior, more can and needs to be done regionally to meet the milestones summarized throughout this document. In addition to avoiding emissions through targeted

[122] Such as: Jersey City's Climate and Energy Action Plan aligns with NJ's 80x50 goal; Newark's Sustainability Action Plan calls for 80% GHG emissions reduction below 2006 levels by 2050; New Brunswick, NJ; Southampton, NY; and East Hampton, NY pledging for 100% renewable energy use in their jurisdictions as early as 2030

[123] While MSA entities are aligned in their overarching GHG reduction goals, it is worth noting that the Intergovernmental Panel on Climate Change (IPCC) has indicated that net zero by 2050 is necessary to limit global warming to 1.5 degrees Celsius. Nationally, the Biden Administration has set the more aggressive target, in line with IPCC findings, of net zero by 2050.

interventions, policymakers should also consider the impact of carbon sinks through capturing emissions through natural sources.

Disparate approaches to calculating emissions projections across the region must be reconciled to derive a trend reflective of the entire MSA. Each sub-region has its own approach to establishing its own emissions projections by using a different baseline year within the context of millions of metric tons of CO_2e. For example, New Jersey's Global Warming Response Act (GWRA) projects a state-wide reduction of emissions to 24.2 MMT CO_2e (80% below 2006 levels) by 2050.[124]

Understanding the evolving landscape of emissions is pivotal to crafting effective mitigation and abatement measures while also ensuring a sustainable and just path forward. Below, the MSA provides a summary of emissions projections, leveraging past modeling efforts by New York, New Jersey, and New York City. This includes the introduction of a "business as usual" (BAU) scenario to provide a forward look at the MSA's emissions over time in the absence of intervention. BAU emissions are obtained by taking the historical average of year-over-year population growth from 1999-2022 and multiplying by 2022 total emissions values obtained from the simplified GHG Inventory Exercise. The sector-level breakdown of BAU vs PCAP scenario emissions is shown as well. These analyses represent a preliminary exploration of the topic. The CCAP for the NY-NJ MSA will showcase more details that will be reflective of the full GHG inventory to be completed over the second phase of the CPRG planning grant program.

[124] Greenhouse Gas Emissions Goals. NJDEP. https://dep.nj.gov/ghg/ghg-emissions-goals/#:~:text=Meeting%20the%20ambitious%20goals%20of,adverse%20effects%20of%20climate%20change

Figure 16. MSA priority sector emissions projections by geography, BAU vs with PCAP measures implemented

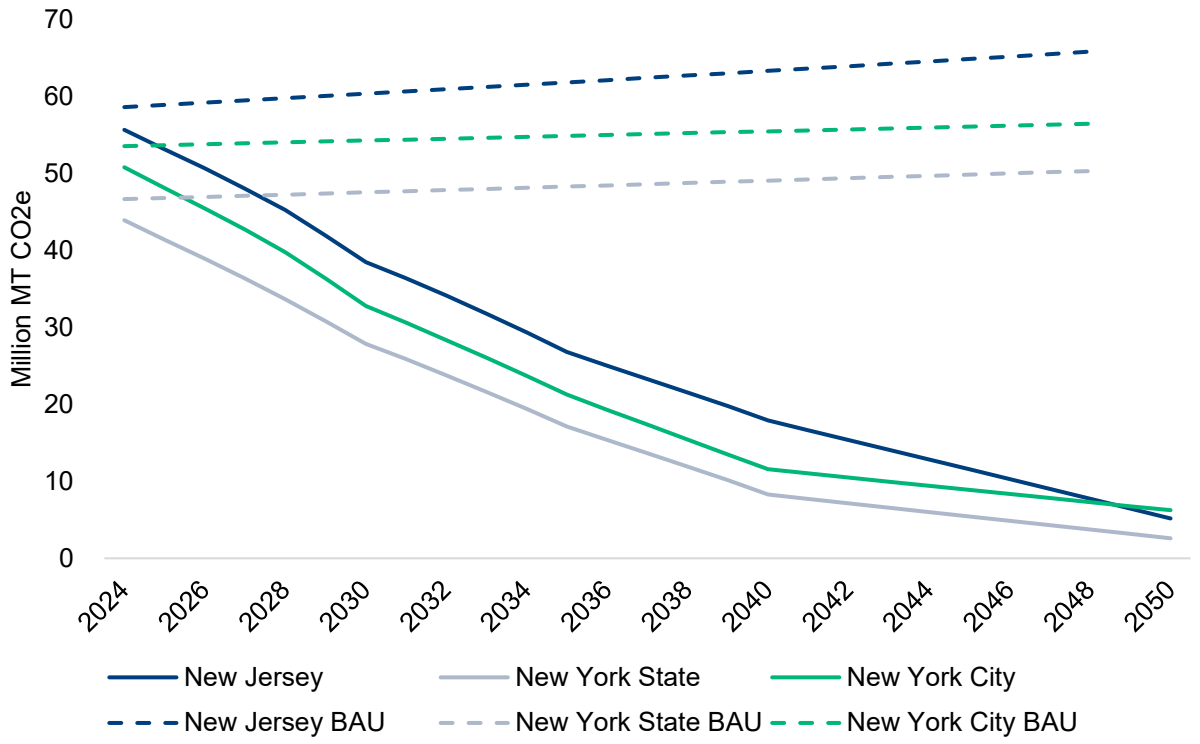


Table 27. Business as Usual (BAU) and Projected Emissions by Sector (Mt CO_2e)

Sector	Base Year	BAU		PCAP	
		2030	2050	2030	2050
Stationary Energy	2022	92	98	44	5
Transportation	2022	56	61	43	0
Waste	2022	11	12	9	7

3.5 Benefits Analysis

3.5.1 Co-Pollutant Benefits Analysis

Many sources of greenhouse gas emissions also emit air pollutants that are harmful for human health, including but not limited to criteria air pollutants (e.g., nitrogen oxides, sulfur dioxide, fine particulate matter, carbon monoxide, volatile organic compounds) as well as hazardous air pollutants or air toxics. Unlike greenhouse gas emissions, which are long-lived and have a global impact, co-pollutants are typically shorter-lived, and their reductions lead to immediate, tangible, and local benefits.

Therefore, the benefits of local and regional climate action generally include the reduction of greenhouse gas emissions as well as the accompanying reductions in hazardous air pollutant (HAP) and criteria air pollutant (CAP) emissions, referred collectively as co-pollutants. In some

cases, however, GHG reduction measures can cause a shift and/or increase in certain co-pollutants. For example, diverting organic waste from landfill to composting facilities reduces greenhouse gas emissions, but composting operations produce co-pollutants and an increase in activity may affect nearby communities.

For the PCAP, the project team has developed preliminary estimates of co-pollutant reductions for the measures included in the plan. These estimates will be refined in the CCAP and will be further accompanied by an analysis of potential disbenefits resulting from the implementation of GHG measures. The CCAP will also detail the region's approach to track, minimize and mitigate disbenefits to the extent possible.

This section provides an overview of the approach to creating a base year inventory for HAP and CAP emissions, the methods used to estimate co-pollutant reductions from PCAP measures. Further below, the results from a high-level LIDAC benefits analysis are presented.

Base Year Air Pollution Emissions Inventory

Analogous to a GHG emissions inventory, an air pollution emissions inventory describes emission sources and the quantity of air pollutants emitted from each source over a defined period within a geographic area. The project team has prepared an air pollution emissions inventory for the NJ – NY MSA for the year 2020, the most recent data year available from the National Emissions Inventory which is maintained by the EPA and updated once every three years (2020 NEI was released in 2023).[125] The NEI includes data on the following air pollutants:

- CAP – Ammonia, Carbon Monoxide, Nitrogen Oxides, PM 10, PM 2.5, Sulfur Dioxide, Volatile Organic Compounds, and Lead Compounds[126]
- HAP – More than 70 air toxics with emissions data for impacted sources and sectors

Emissions sources are organized by activity sectors, and additionally reported in four data categories: on-road, nonroad, point, and nonpoint. On-road mobile sources include emissions from motorized vehicles that normally operate on public roadways, whereas nonroad mobile sources represent those that do not operate on public roadways (excluding commercial marine vessels, locomotives, and aircrafts). Point sources include large facilities, such as energy generation, landfills, and airports. Nonpoint sources include smaller stationary sources and are aggregated at the county level; they include some waste disposal sources and most fuel combustion in the commercial, institutional, residential, and industrial sectors.

In line with CPRG technical guidance, on-road and nonroad mobile sources are excluded from the base year air pollution emissions inventory; air pollutant emission reduction estimates are instead based on the outputs of regional transportation models (i.e. MOVES) and other data provided by agencies in the region (e.g. aviation emissions provided by the Port Authority of New York and New Jersey).

[125] Note that while the NEI draws upon the Greenhouse Gas Reporting Program for point source GHGs, it does not have GHG emissions for most nonpoint sources and is separate from EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State (GHGI).
[126] Lead is both a CAP and HAP

Emissions sources were identified by the project team based on their relevance to the priority climate actions identified in the PCAP. These include:

Point Sources

- Electric Power Generation
- Steam/Heating Facilities
- Institutional (higher education, hospital, and correctional campuses)
- Municipal Waste Combustors
- Solid Waste Landfills
- Airport Operations

Nonpoint Sources

- Commercial/Institutional Fuel Combustion
- Residential Fuel Combustion

The following tables summarize the aggregated baseline emissions by impacted source/sector and baseline emissions by county. Please note these are not comprehensive figures of air pollution throughout the NJ-NY MSA, but rather they are aggregations of the emissions sources selected for PCAP analysis.

Table 28. 2020 Base Year Emissions by Impacted Source/Sector (Short Tons)

Category	Sector	Ammonia	Carbon Monoxide	Nitrogen Oxides	PM10 Primary (Filt + Cond)	PM2.5 Primary (Filt + Cond)	Sulfur Dioxide	Volatile Organic Compounds	Lead Compounds
Point Emissions	Electric Generation	474	5,212	8,020	1,315	1,182	351	822	0.048
	Steam/ Heating Facility	2	65	75	6	6	1	10	0.000
	Institutional	7	525	551	58	52	11	61	0.013
	Municipal Waste Combustors	48	583	4,175	49	43	298	47	0.065
	Unspecified*	12	399	788	55	46	16	105	0.002
	Solid Waste Landfills	85	148	89	199	50	158	57	0.000
	Airport Operations	0	7,986	3,421	153	137	354	1,769	2.650
Nonpoint Emissions	Landfill and Composting	214	0	0	0	0	0	1,722	0.000
	Fuel Combustion Commercial/ Institutional	125	11,305	15,243	1,404	1,230	585	812	0.142
	Fuel Combustion Residential	3,416	50,561	27,195	6,810	6,721	338	7,513	0.305

**The unspecified category includes facilities like those in the other selected sectors.*

Table 29. 2020 Base Year Emissions by County (Short Tons)

State	County	Ammonia	Carbon Monoxide	Nitrogen Oxides	PM10 Primary (Filt + Cond)	PM2.5 Primary (Filt + Cond)	Sulfur Dioxide	Volatile Organic Compounds	Lead Compounds
New Jersey	Bergen	37	2,402	2,209	274	264	31	424	0.008
	Essex	49	3,743	3,904	237	221	222	943	0.184
	Hudson	60	861	1,390	47	44	11	386	0.006
	Hunterdon	13	1,231	274	158	156	7	158	0.145
	Middlesex	133	2,169	2,368	445	294	93	527	0.042
	Monmouth	81	2,929	1,392	355	347	24	415	0.129
	Morris	42	3,510	1,228	441	436	19	518	0.234
	Ocean	89	3,593	1,598	402	399	69	812	0.126
	Passaic	18	1,207	913	128	126	9	220	0.038
	Somerset	17	1,992	798	225	221	11	256	0.228
	Sussex	19	1,652	271	226	225	8	233	0.113
	Union	52	1,319	2,501	209	195	61	205	0.152
	Warren	296	1,291	2,705	190	169	48	181	0.051
New York	Bronx	790	2,773	5,754	261	229	106	345	0.035
	Kings	396	6,579	5,150	930	883	177	843	0.061
	Nassau	479	5,062	8,218	812	731	285	544	0.139
	New York	27	2,772	179	430	428	15	420	0.006
	Putnam	695	5,228	7,685	654	551	290	1,346	0.081
	Queens	170	1,259	1,291	133	127	21	145	0.007
	Richmond	119	2,714	1,076	400	396	45	389	0.010
	Rockland	533	15,177	5,035	2,080	2,036	369	2,536	1.091
	Suffolk	269	7,120	3,607	1,002	982	190	1,052	0.218
	Westchester	37	2,402	2,209	274	264	31	424	0.008

Co-Pollutant Reduction Estimates

The priority climate action measures are expected to reduce co-pollutant emissions across the region. For the PCAP process, the project team has chosen to utilize a simplified approach to estimating reductions, by proportionally applying the reduction in GHGs to co-pollutants. For example, a 50% reduction in GHGs is expected by 2030, then the co-pollutant emissions from that source are estimated to reduce 50% by 2030 as well.

Vehicle Electrification

For on-road emission sources, NJTPA's Regional Transportation Model provided base year estimates of CO_2, CH_4, and N_2O; the proportion of these gases was used to estimate the avoided co-pollutants based on the estimated GHG reduction resulting from battery EVs replacing internal combustion engine vehicles.

Table 30. Co-Pollutant Reduction Estimates, Vehicle Electrification

Sector	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
Electric Passenger Vehicles	CH_4	294	1,643
	N_2O	39	219
Electric Buses	CH_4	1	19
	N_2O	<1	2
Electric Medium Duty Trucks	CH_4	6	51
	N_2O	1	7
Electric Heavy-Duty Trucks	CH_4	5	43
	N_2O	1	6
Total	CH_4	307	1,756
Total	N_2O	41	234

Building Electrification

As fuel combustion is phased out of commercial, institutional, and residential buildings, the co-pollutants produced from boilers, furnaces, hot water heaters, and other appliances will gradually decline. The base year air pollution emissions inventory was used to estimate current co-pollutant emissions, which are scaled down proportionately with GHG reductions.

Table 31. Co-Pollutant Reduction Estimates, Building Electrification

Sector	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
Commercial/Institutional, Residential	NO_X	14,517	20,745
	$PM_{2.5}$	2,720	3,887
	SO_2	316	451
	VOCs	2,848	4,069

Waste Disposal Reduction

Due to complexity, limited time for the PCAP, and the relatively small contribution of the waste sector to GHG emissions, co-pollutant reduction accompanying waste disposal measures will be estimated as part of the CCAP process.

Aviation

Aviation sector GHG and co-pollutant emissions were provided directly by the Port Authority of New York and New Jersey and supersede the NEI data within the air pollution emissions inventory. The adoption of electric ground support equipment (GSE) is the major emissions reduction opportunity, and the same reduction percentages are applied against both GHG reduction and co-pollutants from the base year.

Table 32. Co-Pollutant Reduction Estimates, Aviation (GSE)

Airport	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
John F. Kennedy International Airport (JFK)	CH_4	6	12
	N_2O	42	3
	SO_X	<1	<1
	NO_X	140	266
	$PM_{2.5}$	16	31
	PM_{10}	17	32
LaGuardia Airport (LGA)	CH_4	2	3
	N_2O	1	1
	SO_X	<1	<1
	NO_X	54	103
	$PM_{2.5}$	6	12
	PM_{10}	6	12
Newark Liberty International Airport (EWR)	CH_4	8	15
	N_2O	1	3
	SO_X	<1	<1
	NO_X	100	189
	$PM_{2.5}$	11	21
	PM_{10}	11	21
Total	CH_4	16	30
	N_2O	4	7
	SO_X	1	1
	NO_X	294	558
	$PM_{2.5}$	33	63
	PM_{10}	34	65

VMT Reductions

For on-road emission sources, NJTPA's Regional Transportation Model provided base year estimates of CO2, CH4, and N2O; the proportion of these gases was used to estimate the

avoided co-pollutants based on the estimated GHG reduction. Reductions are based on predicted changes in travel patterns due to walkability improvements.

Table 33. Co-Pollutant Reduction Estimates, VMT Reductions

Sector	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
Passenger Vehicles	CH_4	105	140
	N_2O	43	78

Alternative Freight Modes

For on-road emission sources, NJTPA's regional transportation model provided base year estimates of CO_2, CH_4, and N_2O; the proportion of these gases was used to estimate the avoided co-pollutants based on the estimated GHG reduction. Reductions are based on avoided truck trips due to implementation of cargo bikes and microhubs.

Table 34. Co-Pollutant Reduction Estimates, Alternative Freight Modes

Sector	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
Medium & Heavy-Duty Vehicles	CH_4	2	7
	N_2O	<1	1

Grid Decarbonization

For grid decarbonization, eGRID 2022 Total Output Emission Rates were used to estimate the reduction in regional co-pollutant emissions relative to the GHG reduction estimate. The State Output Emission Rates were used for New Jersey counties, the NYLI Subregion Output Emission Rates were referenced for Nassau and Suffolk Counties, and the remaining New York counties use the NYCW Subregion Output Emission Rates. This simplified approach assumes a straight-line decrease in generation from fossil fuel power plants within the MSA and may be refined for the CCAP to consider the specific point sources within the Base Year Air Emissions Inventory.

Table 35. Co-Pollutant Reduction Estimates, Grid Decarbonization

Geography	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
New Jersey	CH_4	227	795
	N_2O	29	103
	NO_X	1,465	5,129
	SO_2	491	1,718
NYCW	CH_4	139	346
	N_2O	18	45
	NO_X	1,209	3,006

Geography	Pollutant	2030 Annual Avoided Emissions (MT)	2050 Annual Avoided Emissions (MT)
	SO_2	169	421
NYLI	CH_4	644	1,628
	N_2O	87	217
	NO_X	4,368	10,854
	SO_2	2,300	5,716
Total	CH_4	1,021	2,769
	N_2O	135	365
	NO_X	7,042	18,988
	SO_2	2,960	7,855

3.5.2 LIDAC Benefits Analysis

In recent years, the EPA and other government agencies have increasingly embraced environmental justice policies, including but not limited to the Biden Administration's Justice40 initiative; the State of New Jersey's Executive Order (EO) 23 and Environmental Justice Law; and the State of New York's Climate Leadership and Community Protection Act. A prominent example at the local level, New York City's Local Laws 60 and 64 of 2017 require the City to comprehensively study environmental inequities, develop a public web portal, and create an environmental justice (EJ) action plan.

In January 2021, President Biden's Executive Order 14008 – Tackling the Climate Crisis at Home and Abroad, established the Justice40 Initiative, a whole-of-government initiative to ensure that at least 40 percent of the overall benefits from certain defined federal investments go to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. This applies to the Climate Pollution Reduction Grants (CPRG) program, which has three broad objectives:

- Tackle damaging climate pollution while supporting the creation of good jobs and lowering energy costs for families;
- Accelerate work to address environmental injustice and empower community-driven solutions in overburdened neighborhoods; and,
- Deliver cleaner air by reducing harmful air pollution in places where people live, work, play, and go to school.

This section describes the methodology for (1) identifying low-income and disadvantaged communities (LIDACs) and (2) estimating the benefits that may accrue in LIDACs from the implementation of GHG reduction measures described in Section 3.2.

Identifying Low-Income and Disadvantaged Communities

In alignment with the EPA's LIDAC Technical Guidance, the project team used the Climate and Economic Justice Screening Tool (CEJST) with EPA's Environmental Justice Screening and Mapping Tool (EJScreen) as a supplement. LIDACs were defined by two criteria:

- Any Census Tract included as disadvantaged in CEJST; and/or
- Any Census block group at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state.

The project team additionally compared these LIDACs with the Overburdened Communities (OBCs) and Disadvantaged Communities (DACs) as defined by the State of New Jersey and the State of New York, respectively. While these state-level tools were not used to define LIDACs for the benefits analysis, they are included in the analysis to provide supplemental, state-level data.

A complete list of identified LIDACs with Census Tract ID (from CEJST) and Census block group numbers (from EJScreen) is provided as an attachment in Excel format.

Figure 17. LIDACs within the NY-NJ MSA

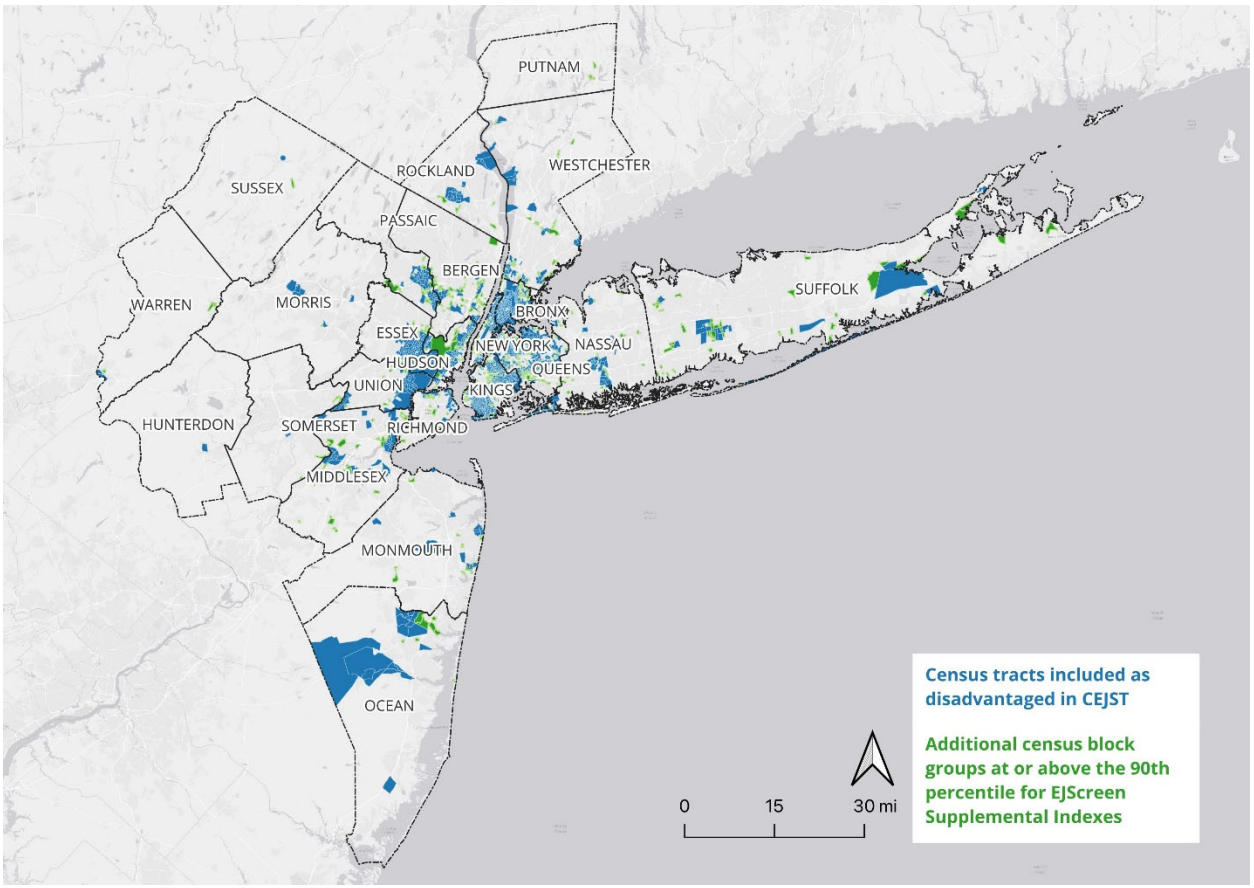
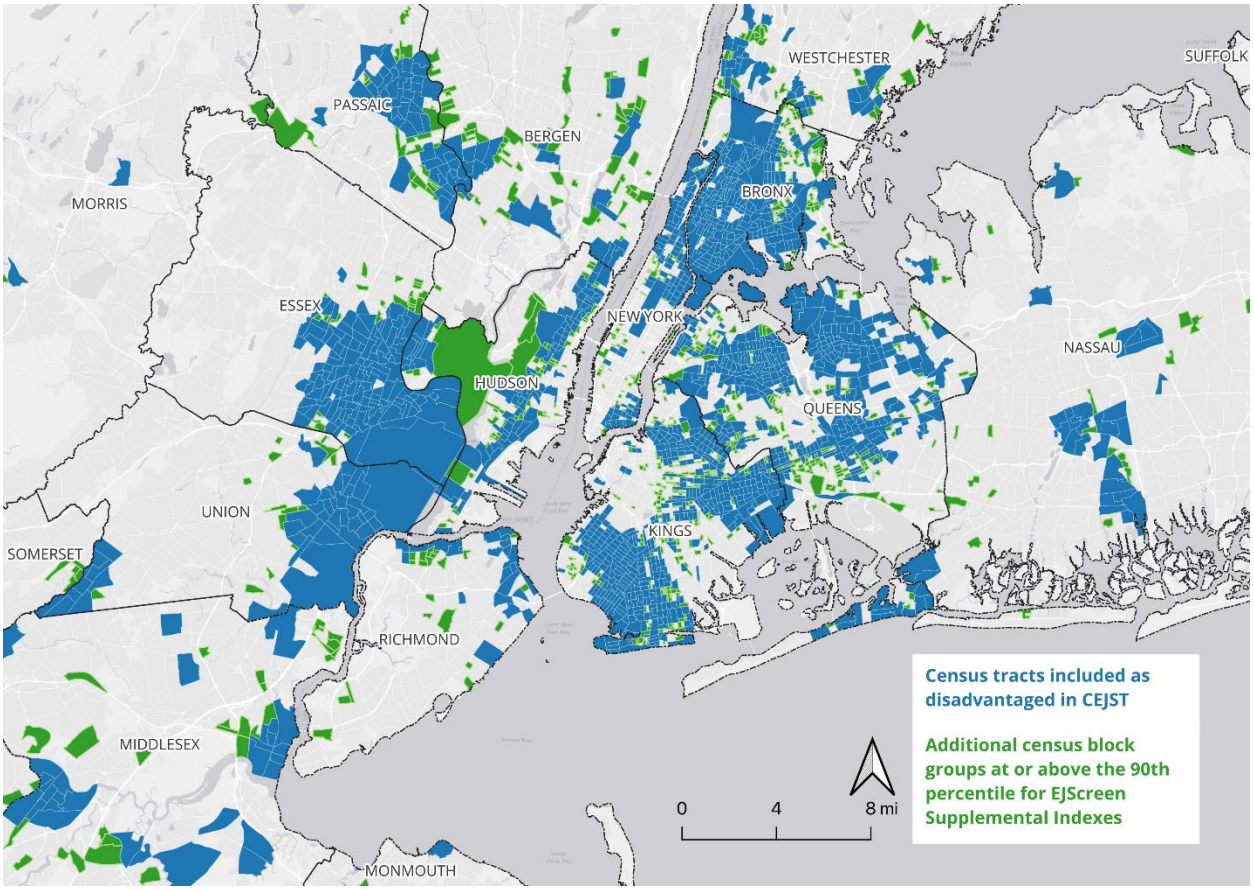


Figure 18. LIDACs within the urban core



Climate and Economic Justice Screening Tool (CEJST)

The Climate and Environmental Justice Screening Tool (CEJST) was developed by the White House Council on Environmental Quality to identify disadvantaged communities as part of the Biden-Harris Administration's Justice40 Initiative. The tool uses indicators of burdens in the following eight categories:

- Climate change
- Energy
- Health
- Housing
- Legacy pollution
- Transportation
- Water and wastewater
- Workforce development

Most of the burdens are measured against national data, ascribing a percentile to each Census Tract which compares it to other tracts across the United States. To be designated as a disadvantaged community in CEJST, at least one of the burden indicators must be above the 90th percentile. Income considerations are incorporated into the CEJST in all categories of

burdens. The CEJST methodology includes the data sources and percentile thresholds for each of the burdens.

A total of 2,879 Census Tracts have been identified as disadvantaged within CEJST and are LIDACs for the purposes of the PCAP. These represent 37.7% of all Census Tracts and 35.5% of the population within the NY-NJ MSA. The table below displays the total population of each county in the NY-NJ MSA, as well as the percentage of Census Tracts identified as disadvantaged within the CEJST.

The percentage of Census Tracts identified as low-income is also presented for informational purposes. More Census Tracts are identified as disadvantaged than low-income; this can partially be explained by the higher incomes in the NY-NJ MSA relative to the United States overall. The CEJST measures low income as the percent of a census tract's population in households where household income is at or below 200% of the Federal poverty level, not including students enrolled in higher education. As a national dataset, the Federal poverty level does not reflect the relatively higher cost of living in the NY-NJ MSA.

A closer look at the data also reveals unique local conditions. In Queens County, for example, 52% of Census Tracts are identified as disadvantaged, but only 20% are identified as low-income. This signifies an area with lower-than-average poverty levels but greater than average levels of environmental, climate, and other burdens.

Land within the boundaries of Federally Recognized Tribes is also to be included as disadvantaged, a decision that was made after consultation with Tribal Nations. In the MSA, the Shinnecock Reservation on the eastern end of Long Island qualifies as a LIDAC under this definition.

Environmental Justice Screening and Mapping Tool (EJScreen)

EJScreen is EPA's environmental justice mapping and screening tool that uses national datasets for environmental and socioeconomic indicators. Unlike the CEJST, it does not identify disadvantaged communities outright. However, EJScreen provides comparisons of environmental and demographic indicators showing how a selected area compared to the state or the nation. It also uses Census block groups, which are smaller geographic units than Census tracts. There are a total of 15,001 Census block groups within the NY-NJ MSA.

In accordance with LIDAC Technical Guidance, the project team used the EPA's Environmental Justice Screening and Mapping Tool (EJScreen) as a supplement to CEJST to identify smaller geographic areas that may be disadvantaged within a larger non-disadvantaged area. Within non-disadvantaged areas, Census block groups are identified as communities that are at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state. This analysis identified an additional 889 block groups that have a combined population of 1,173,822 residents.

Table 36. *LIDAC* Summary Statistics

State	County	Total Population (CEJST)	Census Tracts Identified as LIDACs	Pop. of LIDAC Census Tracts	Pop. of EJScreen Additional Block Groups	Total Pop. in LIDACs	Percent of Pop. in LIDACs
New Jersey	Bergen	930,390	10%	99,036	72,217	171,253	18%
	Essex	795,404	59%	414,584	25,242	439,826	55%
	Hudson	670,046	54%	370,648	76,180	446,828	67%
	Hunterdon	124,823	4%	4,608	0	4,608	4%
	Middlesex	825,920	17%	161,348	52,441	213,789	26%
	Monmouth	621,659	11%	54,385	16,223	70,608	11%
	Morris	493,379	7%	31,035	1,598	32,633	7%
	Ocean	596,415	15%	116,655	19,401	136,056	23%
	Passaic	503,637	51%	321,962	25,211	347,173	69%
	Somerset	329,838	4%	11,521	16,706	28,227	9%
	Sussex	141,483	2%	1,870	658	2,528	2%
	Union	554,033	40%	207,543	20,315	227,858	41%
	Warren	105,862	9%	7,555	3,945	11,500	11%
New York	Bronx	1,435,068	73%	1,112,161	98,880	1,211,041	84%
	Kings	2,589,974	54%	1,520,408	235,568	1,755,976	68%
	Nassau	1,356,509	11%	147,529	32,489	180,018	13%
	New York	1,631,993	34%	599,228	110,210	709,438	43%
	Putnam	98,787	0%	0	3,655	3,655	4%
	Queens	2,287,388	52%	116,655	201,906	318,561	14%
	Richmond	474,893	21%	88,775	27,995	116,770	25%
	Rockland	324,422	28%	98,888	3,434	102,322	32%
	Suffolk	1,483,832	5%	11,521	73,941	85,462	6%
	Westchester	968,890	21%	95,141	55,607	150,748	16%

New Jersey Overburdened Communities and New York State Climate Justice Working Group (CJWG) Disadvantaged Communities

The State governments in New Jersey and New York have their own mapping tools for identifying overburdened and disadvantaged communities, which are like but distinct from the CEJST and EJScreen tools at the federal level. While these State tools have not been used to

identify LIDACs for purposes of the PCAP, they are being referenced by the project team to provide supplemental state-level data that can inform GHG emission reduction measures and potential State funding eligibility.

In New Jersey, Governor Phil Murphy's Executive Order No. 23 (2018) requires the executive branch to ensure that the principles of environmental justice are "at the heart" of its programs and policies. Following this executive order, the New Jersey Department of Environmental Protection issued "Furthering the Promise: A Guidance Document for Advancing Environmental Justice Across State Government," which provides a path for New Jersey's executive agencies to weave the principles of environmental justice into their core functions, including the development of action plans. It additionally established an Interagency Council to coordinate State efforts to increase environmental and public health benefits for those in overburdened communities (OBCs). The OBCs are visualized in the State's EJMAP tool.

In New York, the legislature passed the Climate Leadership and Community Protection Act (CLCPA or Climate Act) in 2019. The Climate Act established a goal that disadvantaged communities (DACs) – defined by the Act as low-income and/or minority communities that bear disproportionate burdens of negative public health effects, environmental pollution, and impacts of climate change – will receive "40% of the overall benefits of spending on clean energy and energy efficiency programs." The Climate Act also charged the CJWG to develop criteria to identify DACs, which are visualized on the Climate Act website.

Figure 19. Census tracts identified as overburdened communities within the NY-NJ MSA

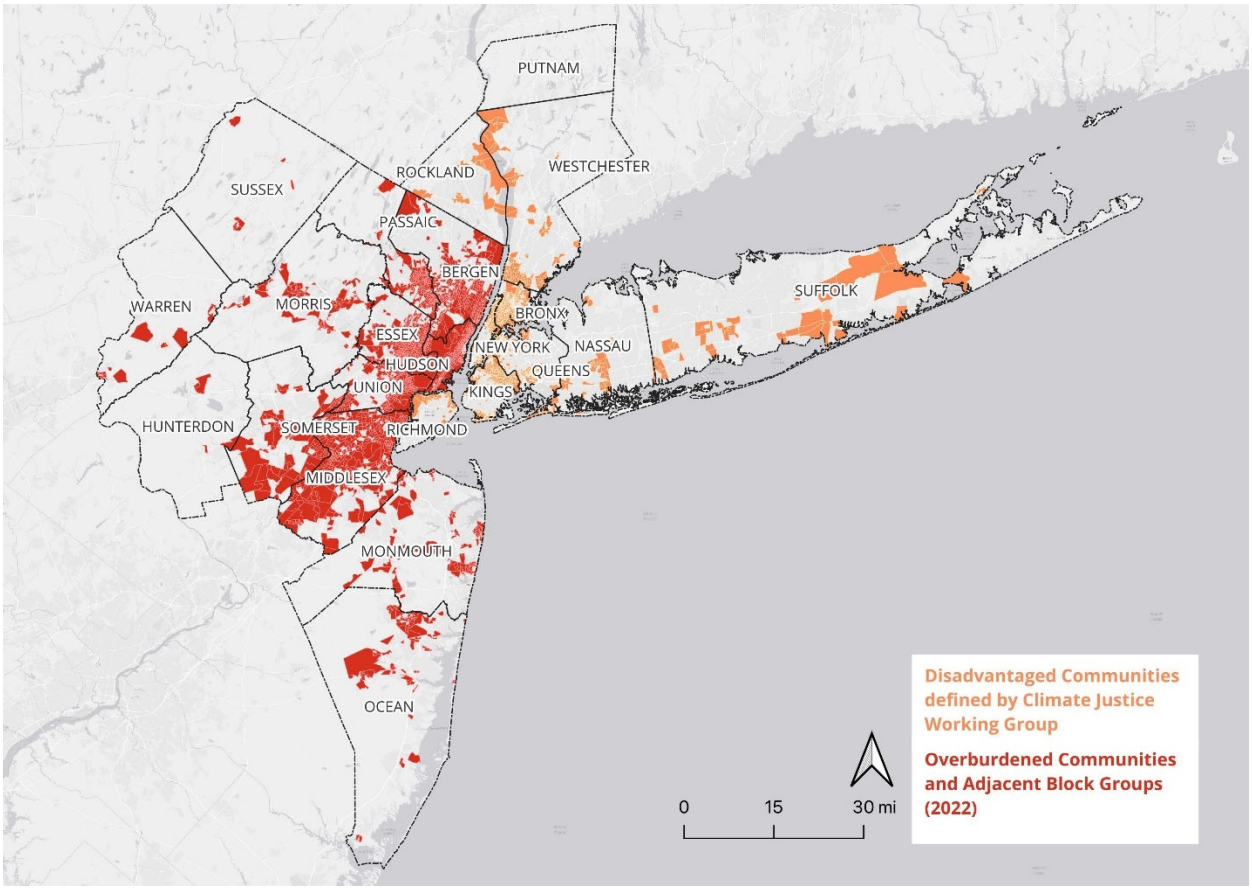
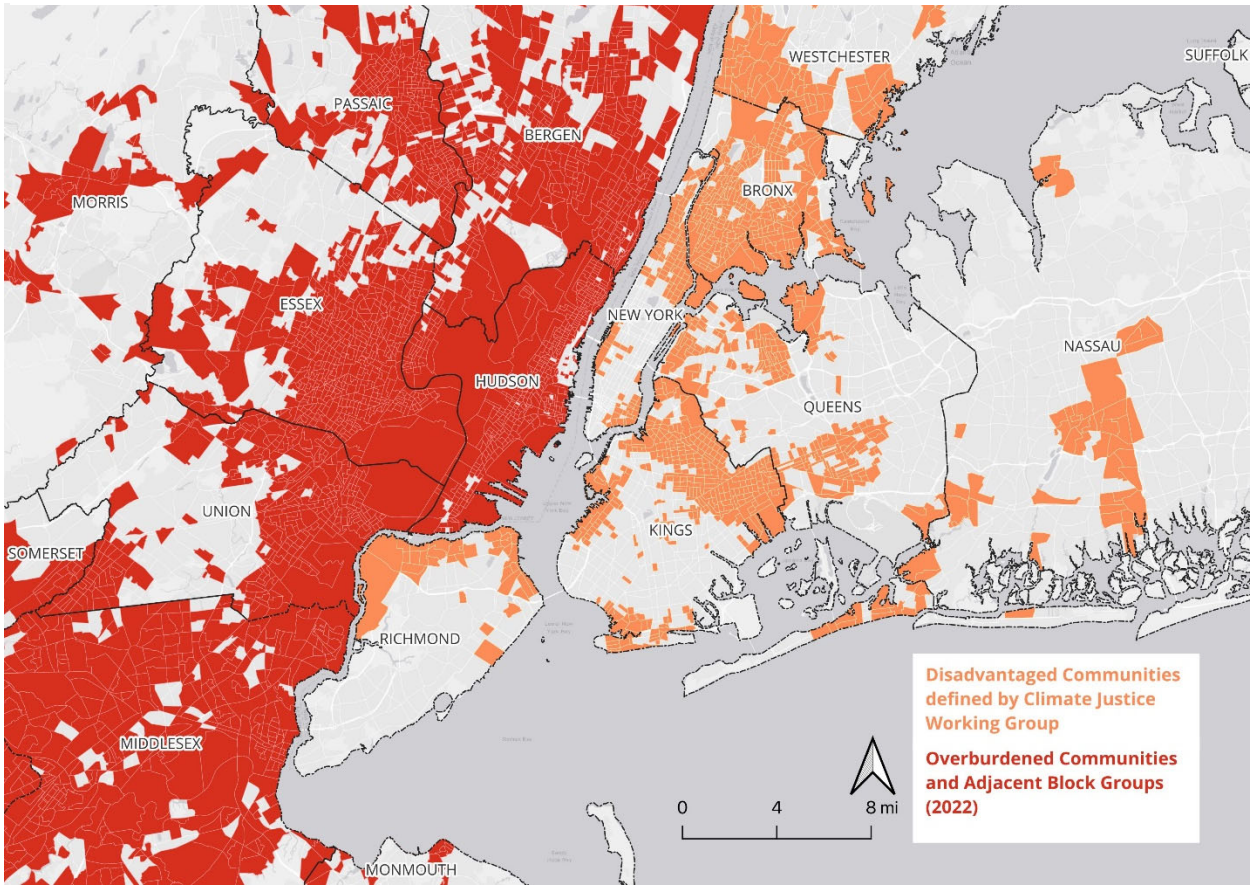


Figure 20. Census tracts identified as overburdened communities within the urban core



Both the New Jersey OBCs (including adjacent block groups) and New York DACs are visualized in the figures above. Comparing these with the LIDAC maps previously shown, the New Jersey criteria identify more communities as overburdened than the LIDACs identified with CEJST and EJScreen criteria. The opposite is the case in New York State, where the disadvantaged communities criteria developed by the Climate Justice Working Group identify fewer communities than the LIDACs identified with CEJST and EJScreen criteria.

Estimating Benefits to LIDACs

This sub-section leads with a qualitative discussion of expected benefits to LIDACs, including a table listing those associated with each GHG reduction measure (see Appendix 6.5). The project team will seek to fully quantify benefits to LIDACs in the analyses for the CCAP and Status Report.

Air Pollution Mitigation and Public Health Improvements

Air pollution has significant health impacts in the NJ – NY MSA, with the New York City health department having estimated 6% of deaths per year, with more than 3,400 deaths related to

PM2.5 and ozone.[127] From 2015-2017, there were more than 5,000 emergency department visits for asthma in New York City alone.[128]

GHG reduction measures that reduce or eliminate fossil fuel combustion will lead to fewer greenhouse gas emissions and co-pollutants such as fine particulate matter (PM2.5), ground-level ozone, sulfur dioxide, nitrogen oxides, and volatile organic compounds. In turn, there will be a reduction in respiratory and cardiovascular disease, neurological effects and mortality rates. These measures may also have the benefit of reducing noise pollution, which will also benefit human health and well-being.

Green infrastructure can also contribute to localized air quality improvements with trees and vegetation that filter air pollutants. Access to transportation alternatives, parks, and open spaces also contribute to physical and mental health improvements.

Energy Cost Savings and Stabilization

GHG reduction measures focused on energy efficiency, such as building upgrades, appliance replacements and industrial process improvements can reduce total energy consumption and contribute to cost savings over the life of the investment. While fossil fuel prices can be volatile due to market fluctuations, renewable energy technologies can provide more stable and predictable energy costs over the long term.[129] Additionally, these cost savings will not happen in the near term, so policy makers and planners need to consider the energy cost-burden for households in their communities. There will be initial technology/infrastructure investment to capture these benefits in the long term.

Economic Development and Job Creation

Transitioning to renewable energy will stimulate growth in the sector. This expansion leads to the creation of jobs in manufacturing, installation, maintenance and research and development. Energy efficiency and electrification of the buildings, industries, and transportation systems in the region will also create job opportunities to retrofit buildings and upgrade power infrastructure. Ecosystem restoration and preservation create opportunities for construction and maintenance. Intentional workforce development can direct many of these green economy jobs to organizations and people in LIDACs.

Community Capacity Building

Climate action enhances the ability of communities to understand, adapt to and mitigate the impacts of climate change. It often involves educational initiatives, participatory approaches to planning and decision-making and training and skill development opportunities such as workshops on sustainable practices. Government-led initiatives that contribute to capacity building include improving transparency in engagement processes, collaborating with community-based organizations, and providing training resources to support leadership

[127] Air Pollution and the Health of New Yorkers: The Impact of Fine Particles and Ozone. NYC Department of Health and Mental Hygiene. https://www.nyc.gov/assets/doh/downloads/pdf/eode/eode-air-quality-impact.pdf
[128] Environment and Health Data Portal. The City of New York. https://a816-dohbesp.nyc.gov/IndicatorPublic/
[129] "Renewable Power Remains Cost-Competitive amid Fossil Fuel Crisis." IRENA. July 2022. https://www.irena.org/news/pressreleases/2022/Jul/Renewable-Power-Remains-Cost-Competitive-amid-Fossil-Fuel-Crisis

development. Providing access to funding and other resources for community-led climate action projects can also strengthen social cohesion and thereby improve communities' ability to respond to climate impacts.

Reduction of Climate Impacts and Risks

Climate change can amplify existing burdens in LIDACs. Due to existing social and economic discrimination, as well as the uneven distribution of climate impacts, LIDACs are often more vulnerable. They are frequently located in areas with exposure to pollution and/or environmental risks such as flooding. Residents living in these areas may also have less access to both essential services and environmental assets (such as parks and open space), making it more difficult for these communities to withstand the shocks and stresses of climate hazards.

In the NY-NJ MSA, the climate hazards of greatest concern include extreme heat, extreme rainfall, coastal flooding (including both coastal storm surge and chronic tidal flooding) and riverine flooding. Climate pollution reduction measures reduce the greenhouse gas emissions that drive global climate change. They can also mitigate local climate impacts in LIDACs in ways such as:

- Reducing urban heat island (UHI) effect through:
    - Building energy efficiency measures that reduce heat absorption on roofs, as well as those which reduce heat rejection from cooling and other mechanical systems
    - Transportation initiatives that reduce the usage of combustion engines
    - Renewable energy investments that replace electricity generation from fossil fuel power plants
- Enhancing the resilience of buildings, roadways and stormwater management systems with green infrastructure
- Protecting and/or enhancing natural ecosystems, such as wetlands that act as carbon sinks and buffer vulnerable communities from the impacts of storms and rising sea levels

More climate impacts and risks include:

- Increasing Temperatures (Average and Maximums)
- Heat Waves and Cold Waves (Increasing Frequency and Duration)
- Changing Precipitation Patterns (Total Precipitation and Heavy Precipitation Events)
- Increasing Ocean Temperatures
- Sea Level Rise
- Extreme Storms
- Wildfire Smoke
- Shoreline Erosion
- Higher Storm Surge
- Coastal Flooding
- Riverine Flooding
- Ocean Acidification
- Biodiversity and Ecosystem Loss
- Saltwater Intrusion

- Vector-Borne Disease

Other Priority Benefits to be Identified Through Further Community Engagement

As the project team conducts community engagement activities, additional benefits are expected to surface and will be incorporated into the CCAP and Progress Report.

See Appendix 6.5. for the draft list of expected benefits to LIDACs.

Preliminary Quantified Benefits

A preliminary benefits analysis allowed the project team to better understand the distribution of benefits resulting from the full suite of priority climate actions. This was conducted utilizing EPA's Co-Benefits Risk Assessment (COBRA) screening model, a free tool which helps state and local governments to explore how air quality changes affect human health at the county, state, regional, and national levels. Based on a series of inputs about expected changes in air pollution ($PM_{2.5}$, SO_2, NO_x, NH_3, and VOCs), COBRA estimates the economic value of health benefits at various geographic scales. Most of the economic value comes from changes in mortality, but the tool also calculates the value from changes in nonfatal heart attacks, infant mortality, hospital admits, respiratory issues, minor restricted activity days and work loss days. High-level pollution reduction estimates were entered into the COBRA tool, representing the expected reductions in 2030 and 2050 from implementation of major GHG reduction measures. The basic assumptions were as follows:

2030 COBRA Scenario Assumptions

- Location: 23 counties within the NJ – NY MSA
- Sectors:
    - Fuel Combustion: Electric Utility (28.57% reduction)
    - Fuel Combustion: Other (34.21% reduction)
    - Highway Vehicles (15.98% reduction)
- Discount Rate: 3%

Estimated pollutant reductions for the sectors listed above are based on GHG reductions estimated for the implementation of grid decarbonization, building electrification (commercial/institutional and residential), and vehicle electrification, respectively. These estimates do not include subsector-specific reduction estimates (e.g., slower adoption of electric heavy-duty vehicles relative to electric light duty vehicles). Due to limitations of the web tool interface, the project team did not include climate action measures such as waste diversion, electric ground support equipment at airports, VMT reductions, and alternative freight modes.

Nevertheless, this high-level modeling effort provides a useful picture of the overall magnitude and distribution of benefits per capita. Total health benefits in 2030 are estimated to range between $2 billion and $5 billion. The county-by-county health benefits are listed in the table below, alongside the demographic characteristics presented earlier. The low estimate of total health benefits is presented for brevity; the high estimate is not shown but follows a similar pattern. As a visual aid, within each column the top 40 percent most intensive data points (e.g., largest population, greatest total health benefits) are highlighted in yellow.

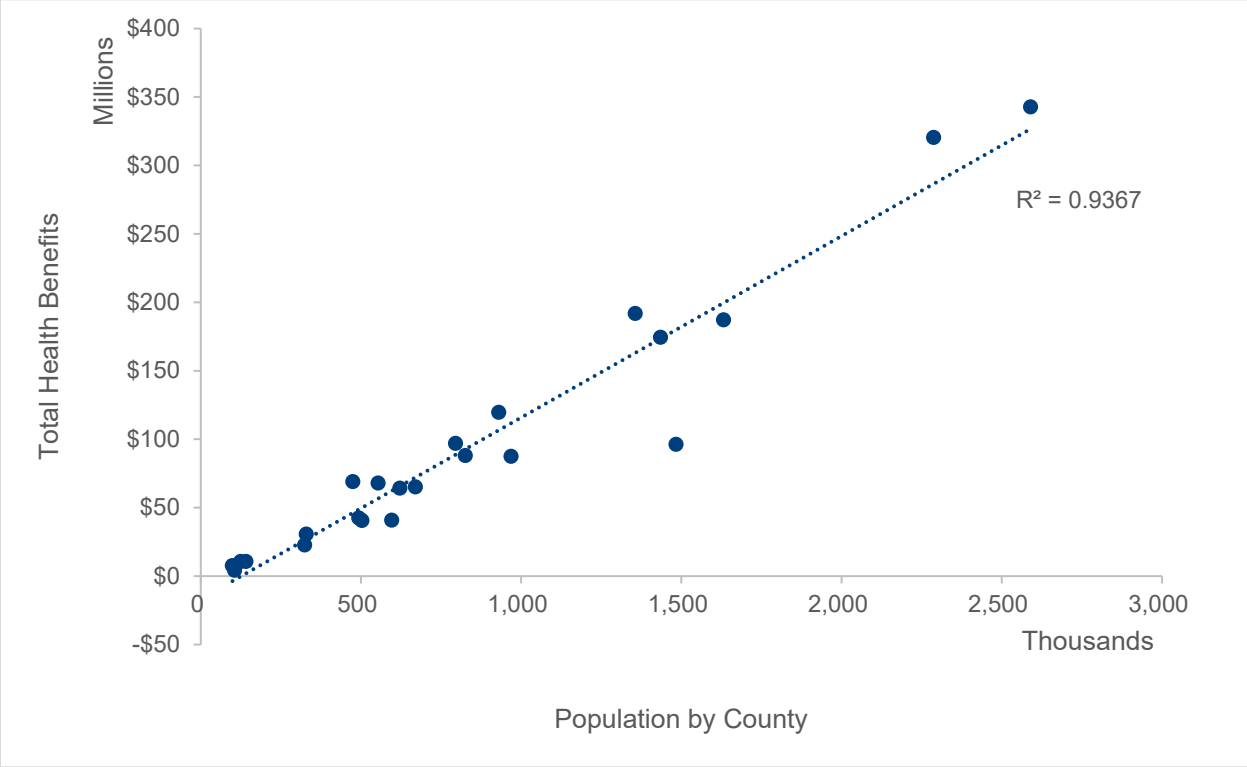
Table 37. County Characteristics and Total Health Benefits (2030 Scenario)

State	County	Population	Pop Density	Total Pop. In LIDACs	Percent of Pop. In LIDACs	Total Health Benefits (low estimate)	Benefits per capita (low estimate)
New Jersey	Bergen	930,390	4,106	171,253	18%	$119,607,968	$129
	Essex	795,404	6,850	439,826	55%	$96,983,128	$122
	Hudson	670,046	15,692	446,828	67%	$65,162,237	$97
	Hunterdon	124,823	301	4,608	4%	$10,723,601	$86
	Middlesex	825,920	2,791	213,789	26%	$88,070,278	$107
	Monmouth	621,659	1,375	70,608	11%	$64,163,562	$103
	Morris	493,379	1,105	32,633	7%	$42,514,218	$86
	Ocean	596,415	1,014	136,056	23%	$40,843,392	$68
	Passaic	503,637	2,818	347,173	69%	$40,601,262	$81
	Somerset	329,838	1,144	28,227	9%	$30,643,357	$93
	Sussex	141,483	278	2,528	2%	$10,739,034	$76
	Union	554,033	5,599	227,858	41%	$67,948,281	$123
	Warren	105,862	308	11,500	11%	$4,253,166	$40
New York	Bronx	1,435,068	34,920	1,211,041	84%	$174,407,653	$122
	Kings	2,589,974	39,438	1,755,976	68%	$342,732,871	$132
	Nassau	1,356,509	4,905	180,018	13%	$191,796,001	$141
	New York	1,631,993	74,782	709,438	43%	$187,196,324	$115
	Putnam	98,787	424	3,655	4%	$7,653,273	$77
	Queens	2,287,388	22,125	318,561	14%	$320,473,057	$140
	Richmond	474,893	8,618	116,770	25%	$69,035,988	$145
	Rockland	324,422	1,951	102,322	32%	$22,714,527	$70
	Suffolk	1,483,832	1,675	85,462	6%	$96,230,913	$65
	Westchester	968,890	2,332	150,748	16%	$87,528,596	$90
MSA-Wide		**19,344,645**	**3,087**	**6,766,878**	**35%**	**$2,182,022,686**	**$113**

Several observations can be made at first glance. The most populous counties in the MSA are expected to have the greatest total health benefits, which is logical as the health benefits are a function of the number of people impacted by air pollution. As expected, four of the top six counties in terms of health benefits are New York City boroughs, followed by neighboring

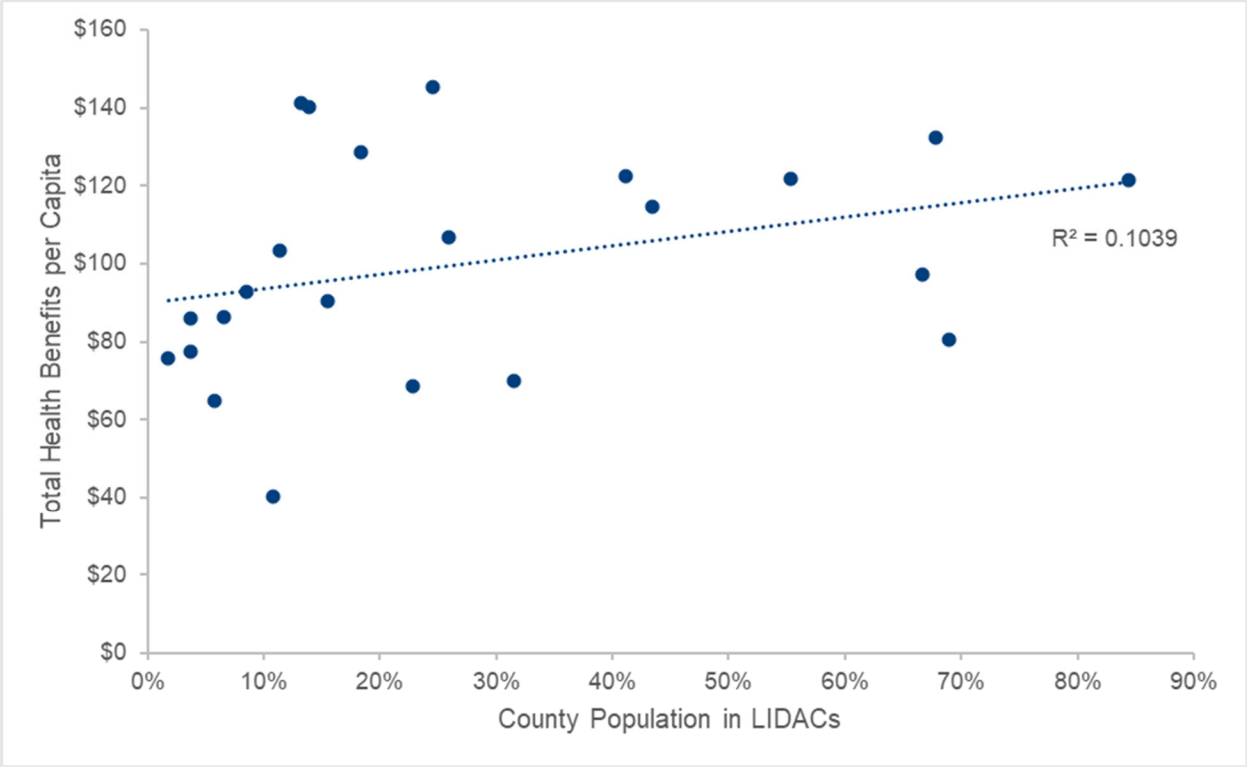
Nassau and Bergen Counties. Notably, Nassau and Bergen have fewer people living in LIDACs than the MSA as a whole; they are relatively affluent but their proximity to pollution sources in the urban core may be the reason for this modeled outcome. A linear regression analysis shows that total population and total expected health benefits are closely related, with an R-squared value of 0.9.

Figure 21. County Population vs Total Health Benefits (2030 Scenario)



We are also interested to understand the distribution of benefits relative to LIDAC communities, particularly to align with the Justice40 Initiative and allocate at least 40 percent of the benefits of climate action implementation to LIDACs. One way to understand this area of interest is to examine the total health benefits on a per capita basis. Ideally, equitable climate action implementation will allocate greater benefits per capita to counties with a greater proportion of residents living in LIDACs. However, the benefits analysis currently shows a relatively equal distribution of benefits per capita. A linear regression analysis shows that the proportion of residents in LIDACs has a weak correlation with health benefits per capita, with an R-squared value of just 0.1.

Figure 22. County Population in LIDACs vs Total Health Benefits (2030 Scenario)



The suburban counties of Bergen, Nassau and Richmond have relatively high per capita benefits and relatively few residents in LIDACs, likely for proximity reasons previously discussed. More dispersed counties with significant LIDAC populations, such as Passaic and Rockland, appear to receive fewer per-capita benefits. Perhaps the most surprising result of this analysis is the urban communities of Hudson County not appearing in the top 40 percent of per capita health benefits. The CCAP and its corresponding analyses should consider and incorporate GHG reduction opportunities in the industrial sector, nonroad sources such as commercial maritime vehicles, and major point sources such as Newark Liberty International Airport and the Port of Newark. This would also direct benefits to LIDAC communities impacted by industrial facility operations elsewhere in the region, including but not limited to the Bronx, Brooklyn (Kings), Queens, and the North Shore of Staten Island (Richmond).

Overall, the LIDAC benefits analysis demonstrates that the benefits of climate action will largely be a function of population, but a more concentrated focus on co-pollutant sources will yield a greater proportion of benefits to be allocated to LIDACs.

3.6 Review of Authority to Implement

The size, scope, and interconnectedness of the NY-NJ MSA make implementation planning for the identified GHG reduction measures particularly critical for the region. The 22-county metropolitan area contains over 550 municipalities (e.g., townships, villages, cities) and ownership of some (if not all) of these reduction measures is subject to local authority.[130] In fact,

[130] Municipality counts by county data from New Jersey and New York State

many of these climate actions fall under the authority of a cross-section of elected officials, local administrators, and quasi-governmental organizations. Understanding the operational contexts, legal justification and local dynamics is critical for selecting measures that will have the largest near-term impact on our communities. Regional coordination is instrumental in making these plans a reality.

Despite the jurisdictional complexity of the region, the MSA also has some advantages on the issue of authority to implement. One of these advantages is that the region's priority GHG reduction measures should have solid precedence for implementation as New Jersey, New York, and New York City all have climate policy agendas in place that avail jurisdictions within them some degree of consideration as they pursue local climate actions that are in alignment with state goals (noted in previous sections, e.g., Section 2.2 Climate Action Policy Landscape).

This review of the authority to implement in NY-NJ MSA thus begins with an exploration of the jurisdictional environment, organized by relevance to primary GHG emissions sectors in the region. From that point, we summarized our findings along with a list of implementation considerations for each measure.

Table 38. Potential Collaborating Entities by Emissions Sector

Sector	Potential Authorities Required	Potential Entities Involved
Stationary Energy	Emissions from commercial and residential buildings are primarily managed by state and municipal environmental entities. The large urban centers of the MSA: NYC, Jersey City, and Newark likely represent a large share of stationary energy emissions given the number of in-scope infrastructure such as apartment buildings, government buildings, hospitals, and schools. Many of these building typologies are monitored and controlled by local laws, building codes and city ordinances.	**State: NJBPU,** NJDEP, NYSDEC, NYSERDA **Local:** Counties and municipalities, DCAS (NYC), NYCHA, NYC Housing Preservation & Development (NYC HPD), and other municipal administrative and/or building management entities
Transportation	Across the NY-NJ MSA, the transportation sector is governed by a complex network of cross-jurisdictional stakeholders. Regulation, oversight, and administration are owned by multiple quasi-governmental organizations, each delivering a transportation-specific function or service to the community, including public transportation (passenger), system management and freight. Nevertheless, with transportation being the significant source it is for the NY-NJ MSA, coordination across all possible entities involved is crucial for the successful implementation of identified reduction actions.	**State:** NJDOT, NYSDOT, Public authorities: NJ TRANSIT, MTA, PANYNJ, **Regional:** NYMTC, NJTPA **Local:** Counties and municipalities, NYC DOT and county DOTs, NYCEDC **Other:** Amtrak

Sector	Potential Authorities Required	Potential Entities Involved
Waste	While protecting the environment is a collective concern at all levels of government, waste regulation and management are largely owned by local authorities. Individual municipalities have established clear guidance for waste management and disposal in their communities. Given the way in which waste travels throughout the region, localities will be key collaborators for the implementation of any GHG reduction measure associated with this plan. Still, large agencies from the three major sub-regions in the MSA are expected to play key roles as well.	**State:** NYDEC, NJDEP **Local:** Counties and municipalities, NYC DEP, DSNY, other municipal sanitation/public work agencies
Electricity	The delivery of electricity to customers is complex. The authority to implement must maintain a careful collaboration between local governments, statewide regulators, and energy providers who distribute energy to consumers.	**State:** NJBPU, NYPA, NYSERDA **Utilities**: PSEG, National Grid, Consolidated Edison **RTOs:** NYISO, PJM **Local:** Counties and municipalities
Other	While this PCAP prioritizes considerations around authority to implement for the four sectors discussed above, emissions from other sources such as industrial processes and natural/working lands also merit some delineation of the entities likely involved in implementing emissions reduction measures for these sectors. The wider geographic scope of emissions from these sources will likely require collaborating entities at the state level to manage and administer.	**State:** NYSDEC, NJDEP **Local:** Counties and municipalities, NYC DEP, NYC DOB

While the table above highlights a sample of entities relevant to specific emissions sectors, it should be noted that there may be jurisdictional overlap. For instance, the economic development corporations/authorities of the two states (NJEDA, ESD) and New York City MOCEJ are often drivers of climate policies and actions through the introduction of innovative programs responsive to the needs of their communities. Pollution authorities like NYDEC and NJDEP take a similar, policy-driven approach. The multitude of local municipalities in the MSA will likely also require coordination and collaboration to enact any measures with local legislative approval considerations.

The table below summarizes additional details on the authority to implement priority GHG reduction measures and implementation actions. The table describes the authority to implement

status and milestones for each implementation action. The ‘status’ column provides a qualitative indication of the extent to which implementing agencies identified for each action should be able to execute the proposed activities. There are three status levels in total, defined below. Finally, the ’milestones’ column notes any additional considerations for the implementation of a given action. Characterizations of authority to implement for each action here and throughout the PCAP are representative of the current best knowledge of the circumstances and may be subject to change throughout CPRG planning process as more information becomes available.

Authority to Implement Status Levels	
	Agencies can likely implement with existing authorities
	Agencies can likely implement with existing authorities, contingent on some dependencies
	Additional authorities are likely needed for implementation (i.e., approval from local or state governing bodies)

Table 39. GHG Measures Implementation Considerations

Sector	Measure	Implementation Action	Implementing Agencies	Authority to Implement Status	Authority Milestones
Transportation	Zero Emissions Passenger Vehicle Adoption	Increase the purchase of new zero-emissions vehicles	**State**: NYSDEC, NJDEP, NJBPU **Local:** County and municipal government **Cross-jurisdiction**: NJT, MTA, PANYNJ		Contingent on actions of private entities (e.g., vehicle owners, etc.)
		Increase passenger vehicle charging infrastructure	**State:** NJDOT NYSDOT, NJTA, NYSTA, NJBPU, NJDEP **Local**: County and municipal agencies (e.g., NYC DOT, etc.) **Cross-jurisdiction**: NYMTC, NJTPA, PANYNJ		N/A
		Support the provision of incentives for taxis and other for-hire fleet electrification	**Local:** NYCDOT, NYC TLC **Cross-jurisdiction:** PANYNJ		N/A
	Zero Emissions Bus and Truck Adoption	Electrify school bus fleets, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)	**State:** NJDEP, NYSDEC **Local**: Municipal school districts and education departments (e.g., NYC DOE)		Private entities (i.e., school bus fleet operators[131], [132])
		Electrify transit fleets, including provisions for supporting	**State:** NJDEP, NJEDA, NJBPU		N/A

Sector	Measure	Implementation Action	Implementing Agencies	Authority to Implement Status	Authority Milestones
		infrastructure (e.g., chargers, T&D upgrades)	**Local**: County and municipal agencies (e.g., Nassau Inter-County Express Electrification, Somerset County Electric Shuttle) **Cross-jurisdiction**: MTA, NJT, PANYNJ, NJTPA, NYMTC		
		Electrify freight trucks, including provisions for supporting infrastructure (e.g., chargers, T&D upgrades)	**State**: NYSDOT, NJDOT, NJTA, NYSTA, NJBPU, NYSERDA, NJDEP, NJEDA **Local**: County and municipal agencies (Municipal transportation and/or public works departments) **Cross-jurisdiction:** PANYNJ		Contingent on actions of private entities (e.g., private fleets, etc.)
	Alternative Freight Modes	Provide additional resources to sustain and expand the Blue Highways Initiative	**Local**: NYC DOT, NYCEDC **Cross-jurisdiction**: PANYNJ		Private entities (e.g., container shipping companies)
		Expand the use of commercial cargo bikes for last-mile delivery	**Local**: County and municipal agencies (e.g., NYC DOT) **Cross-jurisdiction**: PANYNJ, NJTPA		N/A
		Establish additional micro-distribution centers for last-mile delivery (i.e., Microhub Pilot Expansion)	**Local**: County and municipal agencies (e.g., NYC DOT, NYCEDC) **Cross-jurisdiction**: PANYNJ, NJTPA		N/A
	Travel Demand Management and Reduction	Expand active transportation infrastructure and access to micro-mobility modes	**State:** NJDOT, NJDEP, NYDEC, NYDOT **Local:** County and municipal agencies (e.g., Municipal engineering, planning,		While agencies largely have a basis for implementation, certain efforts may

Sector	Measure	Implementation Action	Implementing Agencies	Authority to Implement Status	Authority Milestones
			and/or other infrastructure-related departments) **Cross-jurisdiction**: NYMTC, NJTPA, PANYNJ		require public approval (i.e., community hearings, civic panels, etc.) to execute
		Enable greater public transit adoption (e.g., increased service, low/no-cost fare programs)	**Local**: County and municipal agencies (example services include Suffolk County Transit, Nassau Inter-County Express, Westchester County Bee-Line, Somerset County Shuttles, etc.) **Cross-jurisdiction**: MTA, NJT, PANYNJ		N/A
		Support sustainable land use practices (e.g., Smart Growth planning, zoning reform, Transit-Oriented Development) through opt-in grant programs and developer incentives	**State:** NJOPA, NJDCA, NJDOT, NJDEP, NYDOT, NYDEC, NYOPD **Local:** County and municipal agencies (Municipal planning departments such as NYC DCP, local governing bodies with oversight over zoning ordinances) **Cross-jurisdiction**: NJT, MTA, PANJYNJ, NYMTC, NJTPA		Land use changes may require additional approval from localities' governing bodies; determined case-by-case
		Support strategies that reduce and/or optimize travel demand (e.g., Transportation Systems Management and Operations Strategies (TSMO) mobility-as-a-service	**State:** NJDOT, NYDOT **Local:** County and municipal agencies (municipal transportation and planning departments) **Cross-jurisdiction**: NJT, MTA, PANJYNJ, NYMTC, NJTPA		While agencies largely have basis for implementation, certain efforts may require public approval (i.e., community hearings, civic panels, etc.) to execute
	Maritime and Aviation Emissions	Electrify ground support and shore equipment, including	**Cross-jurisdiction:** PANYNJ		N/A

Sector	Measure	Implementation Action	Implementing Agencies	Authority to Implement Status	Authority Milestones
		provisions for charging infrastructure			
		Explore pilots and commercialization potential of advanced low-carbon alternative fuels while providing industry support to enable a smooth transition	**Local:** NYCDOT, NYCEDC **Cross-jurisdiction:** PANYNJ		N/A
Stationary Energy (Combustion, Steam)	Building Electrification and Energy Efficiency	Address the financing gap to decarbonize schools (public k-12 and higher education institutions)	**State:** NJBPU, NYSERDA **Local:** County and municipal agencies such as NYC DOE, school districts		N/A
		Address the financing gap to decarbonize buildings owned by local governments and other public entities	**State:** NJBPU, NYSERDA **Local:** County and municipal agencies (NYC DCAS) **Cross-Jurisdiction:** NJT, MTA, PANYNJ		N/A
		Address the financing gap to decarbonize public housing	**State**: NJBPU, NYSERDA **Local:** County and municipal agencies (housing authorities such as NYCHA, NHA; housing related agencies such as NYC HPD, NYC DOB, etc.)		N/A
		Address financing gap to decarbonize privately owned buildings, especially for low-to-moderate income (LMI) families	**State:** NYS DHCR, NJ DCA, NYSERDA, NJBPU **Local:** Municipal and county governments/agencies (e.g., NYC HPD, NYC DOB)		May require additional coordination and collaboration with private entities (i.e., landlords, developers, etc.) in actioning
		Provide technical and financial assistance for municipalities to bolster capacity for	**State:** NJBPU, NJDEP, NYSERDA		N/A

Sector	Measure	Implementation Action	Implementing Agencies	Authority to Implement Status	Authority Milestones
		owners and tenants of small buildings	**Local:** County and municipal agencies (MOCEJ, NYC HPD)		
Stationary Energy (Electricity)	Grid Decarbonization	Make critical investments in the grid to accommodate anticipated increases in demand (e.g., T&D upgrades, renewable energy sources integration, microgrids, energy storage innovations, etc.)	**State:** NYISO, NYSPSC, NJBPU **Local:** County and municipal agencies like NYC OMB or municipal electric utilities **Cross-jurisdiction:** Electric utilities		Public authority is available, but coordination with private utilities may be an additional component of execution
		Enable offshore wind transmission capabilities at key power sites (e.g., South Brooklyn & Arthur Kill Terminals)	**Local:** NYCDSBS, NYCEDC		N/A
		Support public solar projects	**State:** NYSERDA, NJBPU **Local:** County and municipal administrative agencies (e.g., NYC DCAS)		N/A
		Support non-public (i.e., private, non-profit) solar projects	**State:** NYSERDA, NJBPU **Local:** County and municipal agencies with oversight of building and real estate related affairs (e.g., NYC DOB)		Contingent on participation and coordination with private entities (e.g., private solar installation companies)
		Decrease regulatory barriers for solar project implementation	**State:** NYSERDA, NJBPU **Local:** County and municipal regulatory, permitting agencies (e.g., NYC DOB)		
Waste	Waste Disposal Reduction	Provide grants to municipalities to expand composting, recycling, and reuse programs	**State:** NYSDEC, NJDEP **Local:** County and municipal waste		N/A

Sector	Measure	Implementation Action	Implementing Agencies	Authority to Implement Status	Authority Milestones
		Support programs that enhance public knowledge of sustainable consumption and waste disposal practices	management agencies (e.g., DSNY)		N/A
		Pilot and expand organics waste management programs for municipalities			N/A
		Pilot opportunities to enhance composting efforts (e.g., compost to fuel initiatives)			N/A
Cross-cutting	Incorporates reductions and actions from multiple sectors	Fund municipal programs that would provide technical assistance, financing, and other support for municipalities to adopt a suite or package of GHG reduction measures	Dependent on measure/action selection- inclusive of previously listed agencies		Likely involve additional authorities to implement given high variation in types of measures/actions selected
		Decarbonize large events (e.g., sports tournaments, concerts, parades, celebrations, etc.)	Dependent on measure/action selection- inclusive of previously listed agencies		Likely involve additional authorities to implement given high variation in types of measures/actions selected

3.7 Funding Availability

Funding for climate action is ascendant in the United States. The federal government has made once-in-a-generation investments across multiple pieces of landmark legislation to enable state and local governments to carry out ambitious climate policy. The CPRG program is just one of hundreds of funding opportunities to have emerged out of recent legislative action at the federal level. The Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) alone invest trillions of dollars into programs that fund emission reductions across every sector of the economy. Through the Justice40 Initiative, at least 40% of funds will impact LIDACs, and programs such as the Clean Communities Investment Accelerator will bring 100% of funds to LIDACs.

Critically, most of the funding is distributed through State, Local and Tribal governments, requiring these institutions to be the key driver of unlocking emission reductions economywide. Careful evaluation of funding opportunities will enable government entities and regions to emerge as climate leaders as they compete for – and manage – billions of dollars to meet their emission reduction goals. As the nation's largest MSA by population, the NY-NJ MSA is keenly focused on braiding together federal, state, and local funding sources to further position itself as a climate leader.

This section catalogs current and upcoming funding opportunities that can be leveraged by the MSA to reduce GHG emissions in the region in addition to the CPRG Implementation Grants Program. While the CPRG Implementation Grants Program is a critical funding stream for the NY-NJ MSA, the MSA also recognizes that even the largest award – $500M – could not fund each emission reduction measure alone nor solely achieve the MSA's GHG targets. The sample opportunities in the table below have allocated nearly $33 billion through IIJA and IRA. In alignment with the priority measures for this PCAP, regional CPRG partners are particularly tracking opportunities pertaining to stationary energy and transportation as CPRG-related pursuits continue. A more detailed review of the funding opportunities can be found in the Appendix.

Table 40. Funding opportunities for priority GHG emission reduction measures, by sector

Program Name	Description	Transportation	Stationary Energy	Electricity	Waste/ Other
Environmental Justice and Community Change Grants	Funds a variety of emission reduction measures; Direct impact to LIDACs	✓	✓	✓	
National Clean Investment Fund (NCIF)	Funds zero-emissions vehicles, distributed energy generation and storage, and net-zero buildings	✓	✓	✓	
Charging and Fueling Infrastructure (CFI) Discretionary Grant Program	Funds the deployment of publicly accessible EV charging and alternative fueling infrastructure	✓			
Clean Heavy-Duty Vehicle Program	Funds zero-emission vehicles, charging infrastructure, and workforce development	✓			
Clean Ports Program	Funds zero-emission port equipment and infrastructure	✓			
Clean School Bus (CSB) Program	Funds the replacement of school buses with zero-emission and low-emission models	✓			
Clean Vehicle Tax Credits	Tax credits for low- and zero-emission vehicles	✓			

Program Name	Description	Transportation	Stationary Energy	Electricity	Waste/ Other
Congestion Mitigation and Air Quality (CMAQ) Improvement Program	Funds projects that help meet the requirements of the Clean Air Act by reducing mobile source emissions and regional congestion on transportation networks	✓			
Diesel Emissions Reduction Act (DERA) Program	Funds upgrading or retiring diesel engine fleets	✓			
Electric or Low-Emitting Ferry Program	Funds the transition of passenger ferries to low or zero-emissions technologies	✓			
Port Infrastructure Development Program	Funds port electrification	✓			
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants	Funds road, rail, transit, and port projects	✓			
Reduction of Truck Emissions at Port Facilities	Funds testing, evaluating, and deployment of projects that reduce port-related emissions	✓			
Safe Streets and Roads for All (SS4A) Grant Program	Funds projects that prevent roadway deaths and serious injuries (e.g., adding protected bike lanes)	✓			
Surface Transportation Block Grant Program	Funds state and local transportation needs	✓			
Assistance for Latest and Zero Building Energy Code Adoption	Funds adopting and implementing the latest energy codes		✓		
Energy Efficiency Conservation Block Grant Program	Funds the implementation of strategies to reduce energy use, reduce fossil fuel emissions, and improve energy efficiency		✓		
Grid Innovation Program	Funds projects that use innovative approaches to transmission, storage, and distribution infrastructure to enhance grid resilience and reliability			✓	
Smart Grid Grants	Funds projects that increase the flexibility,			✓	

Program Name	Description	Transportation	Stationary Energy	Electricity	Waste/ Other
	efficiency, and reliability of the electric power system				
Compost Food and Waste Reduction (CFWR) Cooperative Agreements	Funds projects that develop and test strategies for composting food and reducing waste				✓
Consumer Recycling Education & Outreach Program	Funds projects that improve the effectiveness of residential recycling programs through education and outreach				

Regional partners from the NY-NJ MSA will also collaborate closely with New York State and New Jersey to implement numerous programs where the state is the direct recipient, but the programs support the MSA's emission reduction measures. A sample of these programs is included in the table below.

Table 41. Select funding opportunities the NY-NJ MSA may work with NYS and NJ to implement, by sector

Program Name	Description	Transportation	Stationary Energy	Electricity
National Electric Vehicle Infrastructure (NEVI) Program	Funds the deployment of EV charging stations	✓		
Promoting Resilient Operations for Transformative, Efficiency, and Cost-Saving Transportation (PROTECT) - Formula	Funds transportation infrastructure upgrades to improve resiliency to future weather events	✓		
Energy Efficiency Revolving Loan Fund Capitalization Grant Program	Funds a state revolving loan program to provide loans and grants for energy efficiency audits, upgrades, and retrofits to increase energy efficiency		✓	
Home Energy Performance-Based, Whole-House Rebates (HOMES)	Funds consumer rebates and energy efficiency		✓	
High-Efficiency Electric Home Rebate Program (HEEHRA)	Funds consumer rebates and home electrification		✓	
Low-Income Home Energy Assistance Program (LIHEAP)	Fund energy efficiency upgrades for low-income households		✓	
Weatherization Assistance Program (WAP)	Funds energy efficiency upgrades		✓	

Solar for All	Funds residential solar investment, including community solar			✓
Grid Resilience State and Tribal Formula Grant Program	Funds projects that strengthen and modernize the grid			✓

Lastly, regional representatives will also support efforts to educate its residents and businesses to take advantage of tax credit opportunities established in the IRA to make GHG reductions more affordable.[133] For example, contractors who build or reconstruct energy-efficient homes can claim up to $5,000 in tax credits per home. In addition, residents can qualify for up to $7,500 in tax credits by purchasing a new plug-in EV or fuel cell vehicle.[134]

Over the next decade, the NY-NJ MSA can tap into a myriad of federal funding opportunities to support the MSA's emission reduction measures. From grants to electrify port equipment to residential home retrofits, navigating these financial avenues can significantly bolster the region's commitment to a more sustainable and resilient future. By strategically tapping into these resources, the MSA can not only achieve emission reductions but also contribute to the broader national agenda for a greener and more sustainable future in the places where people live, work and play.

[133] Credit for builders of new energy-efficient homes. Internal Revenue Service. https://www.irs.gov/credits-deductions/credit-for-builders-of-energy-efficient-homes
[134] Clean Vehicle Tax Credits. Internal Revenue Service. https://www.irs.gov/clean-vehicle-tax-credits

4 Coordination and Engagement

The NY-NJ MSA is looking to use the EPA's CPRG program to encourage collaboration of agencies across the MSA to reduce GHG emissions significantly. This PCAP represents an opportunity for agencies and stakeholders across the region to use their combined expertise and familiarity with climate actions to craft a regional strategy to reduce emissions. In addition to robust jurisdictional engagement, gaining broader community involvement and input across the MSA is an important feature of the CPRG program. It is important to capture input from the public to ensure that the analysis and identified priorities are responsive to the needs of diverse communities across the region. Collecting feedback from a continuum of community members will be critical to the ongoing work of the PCAP and CCAP – contributing to an in-depth exploration of the critical steps required to reduce regional GHG emissions.

4.1 Regional Coordination

In designing an approach to address the CPRG program's goals, regional partners built a governance structure to start the collaboration process in late spring/early summer 2023. The project team started to organize stakeholders and collect data supporting existing GHG inventories and initiatives while also developing a process for identifying LIDACs throughout the MSA. The project partners received a notice of award for planning efforts and engaged a consultant team to support the development of the PCAP.

To execute the CPRG planning grant and deliver a PCAP that best represents the climate pollution reduction priorities of the region, the NY-NJ MSA brought together a coalition of entities in a formal, interagency partnership to oversee progress. These entities include the following:

- **New York City Mayor's Office of Climate and Environmental Justice (MOCEJ):** Emerging out of the consolidation of multiple city agencies in 2022, MOCEJ works on strategies for a healthier, more resilient, and more sustainable New York City. The office collaborates across city departments and agencies, touching on topics like building efficiency, infrastructure resilience, livable spaces, and energy efficiency.[135] MOCEJ is charged with completing PlaNYC, the city's climate action plan.
- **New York City Economic Development Corporation (NYCEDC, EDC):** Taking a comprehensive approach to New York City's economy, NYCEDC works to strengthen confidence in the city as a great place to do business; grow innovative sectors, with a focus on equity; build neighborhoods as places to live, learn, work, and play; and deliver sustainable infrastructure for communities and the city's future economy.
- **New York Metropolitan Transportation Council:** As the metropolitan planning organization for NYC, Long Island, and Lower Hudson Valley, NYMTC provides a collaborative planning forum to address transportation-related issues, develop regional plans, and make decisions on the use of federal transportation funds for its planning area.

[135] About MOCEJ. https://climate.cityofnewyork.us/about/

- **North Jersey Transportation Planning Authority**: The metropolitan planning organization for the 13 -county, northern New Jersey region, (12 of which are in the MSA), provides a forum for interagency cooperation and public input.

Together, these four entities represent over 22 counties (including the five boroughs of New York City) and two planning regions, making their jurisdictional purview among the largest in the nation. This organizational structure for the CPRG planning grant further acknowledges the significant degree of interconnectedness of how people live, work, and travel across the region and how GHG reductions across the region can only be fully addressed through an intentional and coordinated effort across jurisdictional lines as a result.

This PCAP builds off the previous work and sustained technical expertise of these project partners. Development efforts included the collection of GHG emissions data and measures from MSA-wide stakeholders (e.g., municipalities, MPOs, quasi-governmental organizations) to further the regional analysis and climate action planning processes. Additionally, project partners sourced data from previously developed independent GHG inventories within the jurisdiction in which the MSA is located. Unifying these inventories required the identification of methodological approaches and analogous data sets across the MSA's geography. Where methodologies diverged, the project partners selected a common approach to be used for this analysis. Similarly, the climate actions identified for this PCAP were developed from the extensive climate planning work already done in the region. This compilation of regional climate action plans formed a foundation upon which to develop consensus measures for the PCAP.

4.2 Community and Stakeholder Engagement

Climate change will continue to have a profound impact on our communities, especially those that have faced historic underinvestment and neglect. To capture more diverse voices in the climate action discussion, the project partners established an outreach approach that encompasses engagement with individuals and organizations of all types – private sector, non-governmental, advocacy, community-based, interested government partners and more. Designed for transparency, inclusivity, and collaboration, this approach ensures that the PCAP, as well as the forthcoming CCAP, are not just plans, but a shared vision shaped by our local stakeholders' diverse priorities and lived experiences.

As planning organizations and program managers, the NY-NJ MSA regional partners have consistently engaged the public through various forums. Each organization has its own approach to engaging the public; some organize public meetings to work through different topics of concern, while others have created coalitions of issue-minded community organizations to coordinate on regional initiatives. In fact, the two metropolitan planning organizations are required to have plans for engaging the public under federal law. These plans provide a concrete framework for outlining how the public can participate in the long-term transportation planning process. This framework was used as a foundation for the CPRG community engagement efforts.

Climate actions, broadly defined, have historically been important topics for these regional planning organization. Over the past year, the MSA project team members have collectively met with state and federal partners, led working sessions with municipalities, distributed climate

action information to various stakeholders and provided their communities with opportunities to provide commentary on public documents. Amongst other community outreach measures specific to the CPRG process, NYMTC distributed letters to local municipality leaders and other project partners and initiated contact with non-governmental organizations (NGOs) that have a high impact in LIDACs and throughout the MSA. Additionally, NJTPA held and participated in several transportation stakeholder meetings to capture their feedback for regional climate action planning efforts. This work culminated in the regional partners' approval and initial execution of an on-the-ground community engagement campaign in LIDACs. The described public engagement effort will continue to evolve over the next few months to not only capture additional feedback and perspective on the priorities surfaced in the PCAP, but to further inform deeper climate action discussions in the CCAP.

Outreach and engagement will take multiple formats to facilitate more collaboration with a wider audience. In addition to building and executing an initial community engagement plan for the PCAP, the project team leveraged engagement with NJTPAs, NYMTCs, and NYC MOCEJs' boards and committees to spread awareness of the CPRG initiative. These efforts will continue to be enhanced through specific identification and engagement with stakeholders in LIDACs to ensure the measures and reduction measures are responsive to the needs of overburdened communities that are disproportionately impacted by GHG emissions.

As part of the CPRG framework, the project partners will continue to develop the approach to climate action planning at the MSA level to ensure that the document is inclusive of initiatives that will impact the most people. The following objectives underlie the approach to community engagement throughout this CPRG planning grant:

1. Gather valuable community feedback
2. Identify stakeholders throughout the NY-NJ MSA
3. Explore additional reduction programs and opportunities for inclusion in planning documents

With these goals in mind, the project partners have developed a community engagement plan that prioritizes transparency, inclusivity, and collaboration.

4.2.1 Planning / Engagement Approach

The organizations comprising the project partners routinely engage key stakeholders in a manner consistent with their missions, including on climate planning and action topics. For example, NYMTC and NJTPA regularly connect with their member organizations (e.g., transit providers, Port Authority, MTA, and local government) on various issues and initiatives. Following the award of the CPRG planning grant, project partners started to incorporate CRPG discussions into their agendas and expanded outreach to develop new pathways and programming to support the planning process. Furthermore, NY-NJ MSA partners kept lines of communication open with the entities involved with developing New Jersey and New York State CPRG planning initiatives, to align efforts.

In particular, the community engagement plan provisioned specific activities to identify and engage with LIDACs. This engagement ensured the region met the goals and objectives of not

only identifying and delivering climate benefits to LIDACs but also ensuring that their feedback, perspectives and lived experiences are considered as we work to make more climate-minded, livable communities that prioritize equitable distribution of benefits.

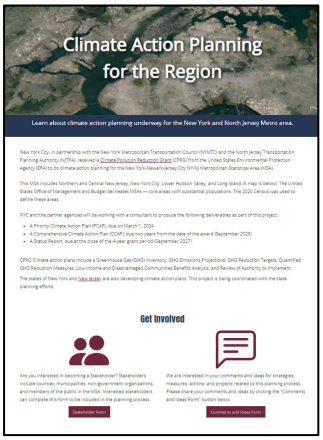
To create a foundation for sustained outreach, the region's PCAP-centered community engagement plan focused on further educating stakeholders and the public on pollution reduction measures while starting climate action conversations with diverse voices found within the NY-NJ MSA. The community engagement plan set forth specific strategies for local engagement, including, but not limited to, distribution of CPRG literature, administration of a community engagement survey, development of social media posts, webinars and other individual meetings with key stakeholders. The community engagement plan also folded in geospatial analytics to better identify and target the most impacted communities across the NY-NJ MSA.

Additionally, project partners engaged key entities (e.g., municipalities, quasi-governmental organizations) across the MSA to share the latest information on the CPRG program, start collecting their feedback on the initiatives and projects that would support the regional goal of GHG emissions reductions. These stakeholder discussions resulted in the compilation of a list of key points of contact who should be engaged throughout the CPRG community engagement process. This list is extensive and includes local governments, NGOs, LIDAC representatives, quasi-governmental organizations, and other potential partners and/or beneficiaries in implementing any climate actions. Engagement with these groups and organizations will continue through each phase of the CPRG program, evolving and expanding in scope as time allows. Preparing for and drafting the CCAP will allow for even greater coordination with the public and community organizations as we look to incorporate their feedback and perspective into the narrative components of this regional climate action planning initiative.

The first phase of this community engagement effort has been designed to inform stakeholders and kick-off the collaboration process. As work begins on the CCAP, the solid foundation built here will enable meaningful and recurring dialogue with local communities, engagement with community leaders and the provision of detailed planning sessions with strategic stakeholders.

Conducting Community Outreach

Strategic outreach has been supported by the delivery of communications artifacts like survey questions, a flyer, a website and other assets. These materials are used to illustrate how climate action initiatives can reduce pollution through an environmental justice framework.



NY-NJ MSA Regional Climate Action Planning Website
https://ny-nj-msa-cprg-njtpa.hub.arcgis.com/

For more information on the community engagement initiatives conducted to date, as well as our plan for the CCAP, please see Appendix 6.3 Community Engagement Supplementary Materials.

4.2.2 Engagement of LIDAC Communities

As part of this community engagement plan, the NY-NJ project partners deployed on-the-ground community outreach specialists between February 12th and February 19th to a targeted set of LIDACs distributed across the NY-NJ MSA. Each of the community outreach specialists are deeply rooted in the NY-NJ MSA, ensuring cultural sensitivity and a deep understanding of community values. The outreach specialists canvassed community centers, major transit areas, libraries, and other public locations in each LIDAC. Throughout these community touchpoints, the outreach specialist guided participants through promotional material to educate them on the CPRG program and the potential impact it could have on their community. For examples of these assets, see the CPRG outreach literature and Public Survey in Appendix 6.3 *Community Engagement Supplementary Material*.

These materials were carefully crafted to encourage a two-way dialogue where community members can begin to identify the climate pollution issues that matter most to them. These materials include an explanation of the CPRG process, survey questions focused on the most concerning climate pollution challenges in the community and directions on how to stay involved. Both documents were made available in English and Spanish.

The NY-NJ project partners' outreach efforts resulted in significant engagement. Highlights include:

- Made individual contact with approximately 1,450 individuals and shared with them the CPRG literature,
- Identified at least 75 future stakeholders for future CCAP engagement, and
- Received 100+ survey responses from interested community members.

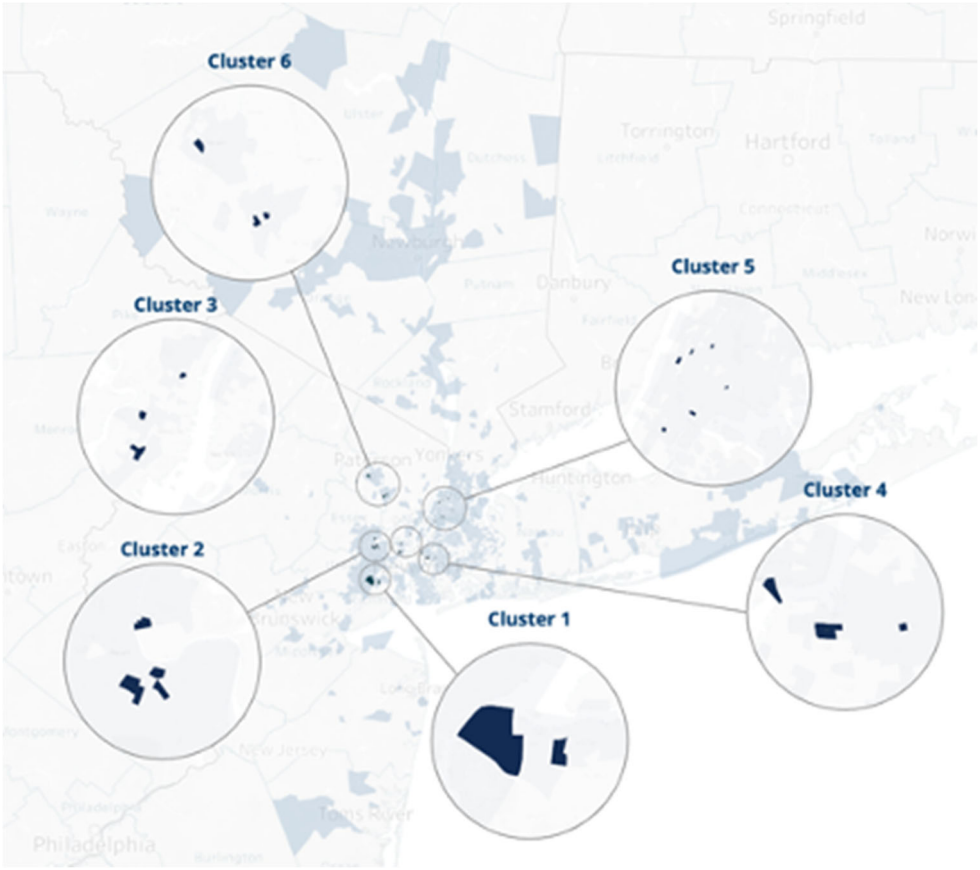
Although there are not enough survey responses to understand all the NY-NJ MSA, nearly 67% of survey respondents are either “Very” or “Extremely Concerned” about greenhouse gas emissions. Over 70% of respondents cited cars as the primary source of greenhouse gas emissions in their communities, and 60% want the NY-NJ MSA to introduce programs to help disadvantaged communities make their buildings more efficient and fossil fuel-free.

Using the analysis derived from this initial outreach, the NY-NJ project partners will conduct more robust and refined community outreach activities to a broader set of LIDACs throughout the CCAP process.

Engagement Methodology

The project partners identified an initial list of 26 LIDACs using the methodology set in the LIDAC Benefit Analysis.[136] To increase the efficiency of the LIDAC community engagement, the project partners organized the 26 LIDACs into six clusters, three in New Jersey and three across all five boroughs in New York City. Appendix 6.3 includes an additional analysis of each targeted LIDAC.

Figure 23. Targeted LIDACs



[136] MSA partners used a combination of variables to identify these 26 LIDACs, including population density, thresholds exceeded, PM 2.5 in the air, and traffic proximity and volume.

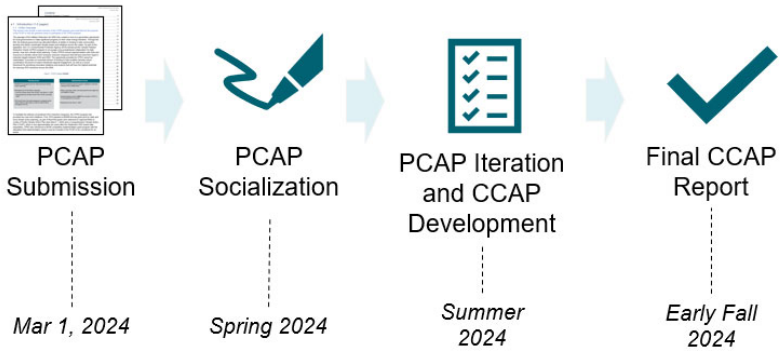
5 Next Steps

Responding to climate change is one of the defining challenges of the 21st century. This challenge will require in-depth coordination between the public and private sectors to collectively and meaningfully reduce GHG emissions, lower energy costs, address environmental injustices, empower community-driven solutions and build a green workforce.

Partners from across the NY-NJ MSA region collaborated for months to develop a detailed document that captures a collective vision for a sustainable future. A vision that is centered on identifying and elevating ambitious, yet achievable GHG reductions through 2030 and 2050. These initiatives are intended to further position communities within the MSA as national and global leaders in establishing climate-forward policies and strategies, while also giving these entities a strong case for competitive funding opportunities. Even with these objectives in mind, the NY-NJ MSA regional partnership recognizes that this work does not end with the PCAP. Stakeholders have already begun identifying a more comprehensive set of actions, activities and ideas for the development of the region's CCAP. In addition to further detailing strategies to reduce climate pollution in the region, the CCAP will also serve as a declaration of how stakeholders across the MSA will coordinate on ways to truly innovate and address the climate challenge.

Throughout 2024, the partner organizations leading this CPRG planning effort will continue to expand and iterate on the strategies introduced in the PCAP, to develop a more in-depth look at the sources of GHG emissions and the necessary plans to reduce them. This effort will be informed by meaningful stakeholder and community engagement, serving as the foundation for a compelling CCAP that furthers the region's position as a climate leader, and keeps the nation's largest metropolitan area on track to decarbonize by midcentury.

Figure 24. High-Level CPRG Planning Timeline



6 Appendix

6.1 Additional GHG Inventory Details

See attachments for additional GHG inventory details:

- Simplified GHG inventory
- GHG inventory data sources

6.2 Additional GHG Reduction Measure Details

6.2.1 GHG Measure and Implementation Actions Long List

Sector	Measure	Potential Implementation Actions
Transportation	VMT reduction & travel demand management	Support active transportation infrastructure
		Expansion of public transit service
		Support Smart Growth planning and land use/zoning reform
		Support for Transit-Oriented Development -- opt-in grant program, developer incentives?
		Support for travel demand management, including TSMO, congestion pricing, and mobility-as-a-service
		Create/expand regional greenways
		Additional funding for low/no-cost public transportation programs
		Increased access to New York City through non-motorized modes
	Medium & heavy-duty fleet decarbonization	Pilot or expand first, middle, and last mile solutions (e.g., commercial cargo bikes, NYC Blue Highways initiative, e-trucks)
		Clean freight incentives, clean air/noise pollution district establishment, etc.
		Charging and alternative fuel infrastructure for private freight carriers and other heavy-duty modes
	School bus electrification	Bus purchase and charging depot build-out
	MTA bus electrification (pending data acquisition)	Bus purchase and charging depot build-out
	NJ TRANSIT zero emissions bus program	Bus purchase and supporting infrastructure build-out
	Other transit fleet electrification	Bus purchase and charging depot build-out
	Light-duty vehicle electrification	Incentives and pilots for light-duty taxi and ride-hail electrification
		Fund efforts to electrify municipal vehicle fleets and related infrastructure (e.g., depots)
		Programs to support curbside and municipal parking lot EV charging infrastructure

Sector	Measure	Potential Implementation Actions
		Programs to support residential and commercial EV charging.
	Maritime & air travel emissions reductions	Support for expansion of Marine highways for freight / improving port infrastructure
		Electrification pilots (including ferry, cruise ship electrification, or hybrid conversions)
		Infrastructure for charging and alternative fuels
		Other improvements and efficiencies?
Stationary Energy	Eliminate fuel oil and propane use in residential buildings	Incentive program for fuel-switching
	Eliminate fossil fuel use in new construction	Incentive program for developers
	Electrify specific building typologies	Incentive program to electrify private buildings and municipal buildings (e.g., schools, government facilities, public housing, public libraries, etc.)
	Energy efficiency upgrades for specific building typologies	Non-utility rebates (to defray on-bill cost increases for all ratepayers)
	Decarbonize large buildings	Technical assistance for regional municipalities to adopt a version of Local Law 97?
Electricity	Decreasing average grid emissions factor (sub-MSA)	Critical T&D upgrades to enable the use of clean energy in congested areas of the NYISO grid (i.e., NYC)
		Investments in key power sites (e.g., South Brooklyn & Arthur Kill Terminals) to enable OSW deployment
		Support municipal solar projects
		Pilots for emerging technologies, such as microgrids, geothermal systems, and advanced "smart" grid/meter options
		Other projects -- e.g., those identified by PowerUp NYC
	Large-scale renewable energy projects	A pilot that leverages Solar for All funding for NY and NJ
	Distributed energy resource deployment	A pilot that leverages Solar for All funding for NY and NJ
Waste	Reduce total disposal to landfills (disposal per capita)	Grants to municipalities to expand composting, recycling, and reuse programs
		Support programs that enhance public knowledge of sustainable consumption and waste disposal practices
	Convert municipal waste to energy (e.g., “gas to grid”)	Pilot and expand organics waste management programs for municipalities
		Pilot opportunities to enhance composting efforts (e.g., compost to fuel initiatives)
Other		Increase tree canopy coverage in urban municipalities

Sector	Measure	Potential Implementation Actions
	Protect carbon sequestration amounts from natural carbon sinks (e.g., forests, tidal wetlands, etc.) in the region	Preserve/ expand greenspaces and other natural lands, particularly in more rural/suburban areas of the MSA
		Expand Land use opportunities (i.e., land management to promote sustainable communities)
	Reduce Short-Lived Climate Pollutant (SLCP) emissions	Design policies to better address the impacts of fugitive methane in heating buildings

6.2.2 GHG Reduction Measure Prioritization Exercise Results

Sector	Measure	Average Score
Transportation	VMT reduction & travel demand management	**4.33**
	Medium & heavy-duty fleet decarbonization	**5.00**
	School bus electrification	**4.00**
	MTA bus electrification	**3.67**
	NJ TRANSIT zero emissions bus program	**3.67**
	Other transit fleet electrification	**3.67**
	Light-duty vehicle electrification	**4.17**
	Maritime & air travel emissions reductions	**4.00**
Stationary Energy	Eliminate fuel oil and propane use in residential buildings	**4.17**
	Eliminate fossil fuel use in new construction	**3.00**
	Electrify specific building typologies	**4.50**
	Energy efficiency upgrades for specific building typologies	**4.17**
	Decarbonize small buildings	**5.00**
	Decarbonize large buildings	**3.50**
Electricity	Decreasing average grid emissions factor (sub-MSA)	**3.83**
	Large-scale renewable energy projects	**3.00**
	Distributed energy resource deployment	**3.00**
Waste	Reduce total disposal to landfills (disposal per capita)	**2.71**
	Convert municipal waste to energy (e.g., “gas to grid”)	**3.14**
Other	Protect carbon sequestration amounts from natural carbon sinks (e.g., forests, tidal wetlands, etc.) in the region	**2.75**
	Reduce Short-Lived Climate Pollutant (SLCP) emissions	**3.00**
AVERAGE		**3.73**

6.2.3 GHG Reduction Measure Quantified Benefits

See attachments for additional quantified GHG reduction measure details:

- GHG reduction measure modelling

6.3 Community Engagement Supplementary Materials

See attachments for following auxiliary community engagement materials:

- Community Engagement Plan
- Outreach material
- Public survey
- LIDAC outreach fact sheets

6.4 Funding Details

Program	Description	Related Emission Reduction Measures	Eligible Entities	Total Funding Available	Timeframe
Carbon Reduction Program	Funds projects that reduce transportation emissions	• VMT Reduction and Travel Demand Management	States	$6.4B	FY22-26
Charging and Fueling Infrastructure (CFI) Discretionary Grant Program	Funds the deployment of publicly accessible EV charging and alternative fueling infrastructure	• Passenger Vehicle Electrification	MPOs, local govts., port authorities, Tribes	$2.5B	Funding available FY22-26
Clean Communities Investment Accelerator (CCIA)	Funds zero-emissions vehicles, distributed energy generation and storage, and net-zero buildings	• Bus and Truck Electrification • Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	Several entities can be sub-awardees, including regional, local, or Tribal agency	$6B	Funds must be expended within 6 years of July 2024
Clean Heavy-Duty Vehicle Program	Funds zero-emission vehicles, charging infrastructure, and workforce development	• Bus and Truck Electrification • Maritime and Aviation Emissions	Municipalities, Tribes, and Non-profit school transportation associations	$1B	Funding is available until Sept 2031
Clean Ports Program	Funds zero-emission port equipment and infrastructure	• Alternative Freight Modes • Maritime and Aviation Emissions	Port Authority; Regional, local, or Tribal agency	$3B	NOFO anticipated Feb 2024
Clean School Bus Program	Funds the replacement of school buses with zero-emission and low-emission models	• Bus and Truck Electrification	State or local governments, Tribes	$5B	Available until expended
Clean Vehicle Tax Credits	Tax credits for low- and zero-emission vehicles	• Passenger Vehicle Electrification	Consumers, businesses, and more	Up to $7,500 per vehicle	Available until expended
Compost Food and Waste Reduction (CFWR) Cooperative Agreements	Funds projects that develop and test strategies for composting food and reducing waste	• Waste Disposal Reduction	Local governments	About $10M/yr.	Available until expended
Congestion Mitigation and Air Quality (CMAQ) Improvement Program	Funds projects that help meet the requirements of the Clean Air Act by reducing mobile source emissions and regional	• VMT Reduction and Travel Demand Management	States, MPOs	$13B	FY22-26

Program	Description	Related Emission Reduction Measures	Eligible Entities	Total Funding Available	Timeframe
	congestion on transportation networks				
Consumer Recycling Education & Outreach Program	Funds projects that improve the effectiveness of residential recycling programs through education and outreach	• Waste Disposal Reduction	States, Territories, local governments, non-profits, public-private partnerships	$75M	FY22-26
Diesel Emissions Reduction Act (DERA) Program	Funds upgrading or retiring diesel engine fleets	• Bus and Truck Electrification • Maritime and Aviation Emissions	Port Authority; Regional, local, or Tribal agency	$60M	Funding is available until Sept 2031
Electric or Low-Emitting Ferry Program	Funds the transition of passenger ferries to low or zero-emissions technologies	• Maritime and Aviation Emissions	TBD	$250M	TBD
Energy Efficiency and Conservation Block Grant Program	Funds the implementation of strategies to reduce energy use, reduce fossil fuel emissions, and improve energy efficiency	• Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	States, local govts., and Tribes	$550M	Available until expended
Energy Efficiency Revolving Loan Fund Capitalization Grant Program	Funds a state revolving loan program to provide loans and grants for energy efficiency	• Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	States	$250M	Available until expended
Grid Innovation Program	Funds projects that use innovative approaches to transmission, storage, and distribution infrastructure to enhance grid resilience and reliability	• Grid Decarbonization	States, Tribes and Territories, local governments, and public utility commissions	$5B	FY22-26
Grid Resilience State and Tribal Formula Grant Program	Funds projects that strengthen and modernize the grid	• Grid Decarbonization	States, Tribes	$2.5B	FY22-26
Home Energy Performance-Based While-House Rebates (HOMES)	Funds consumer rebates and energy efficiency	• Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	States	$4.3B	Funding is available until Sept 2031
High-Efficiency Electric Home Rebate Program (HEEHRA)	Funds consumer rebates and home electrification	• Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	States	$4.5B	Funding available until Sept 2031
Low-income Home Energy Assistance Program (LIHEAP)	Fund energy efficiency upgrades for low-income households	• Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	Local service providers	$8B	Annual

Program	Description	Related Emission Reduction Measures	Eligible Entities	Total Funding Available	Timeframe
National Clean Investment Fund (NCIF)	Funds zero-emissions vehicles, distributed energy generation and storage, and net-zero buildings	• Bus and Truck Electrification • Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	Several entities can be sub-awardees, including regional, local, or Tribal agencies: Private entity	$14B	Funds must be expended within 7 years of July 2024
National Electric Vehicle Infrastructure (NEVI) Program	Funds the deployment of EV charging stations	• Passenger Vehicle Electrification	States	$5B	Funding available FY22-26
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants	Funds road, rail, transit, and port projects	• VMT Reduction and Travel Demand Management	State, Territories, local government, port authority, Tribes	$7.5B	Funding available FY22-26
Smart Grid Grants	Funds projects that increase the flexibility, efficiency, and reliability of the electric power system	• Grid Decarbonization	Higher ed, non-profits, States, local governments, and Tribes	$3B	Funding available FY22-26
Solar for All	Funds residential solar investment, including community solar	• Grid Decarbonization	States, Non-profits	$7B	Funds must be expended within 5 years of July 2024
Surface Transportation Block Grant Program	Funds state and local transportation needs	• VMT Reduction and Travel Demand Management	States	$72B	Funding available FY22-26
Weatherization Assistance Program (WAP)	Funds energy efficiency upgrades	• Electrification and Energy Efficiency in Residential, Commercial, and Government Buildings	States, Tribes	$3.5B	Available until expended

6.5 Expected Benefits to LIDACs

Sector	Measure	Expected Benefits to LIDACs
Transportation	VMT reduction & travel demand management	Improved availability of transportation alternatives (i.e., non-passenger vehicle modes of travel- public transit, active transportation, etc.) Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants)[137]

[137] For instance, the environmental assessment for NYC's congesting pricing scheme estimates a decrease in nitrogen oxides by at least 5.6%, carbon monoxide by 3.6%, and particulate matter pollution by over 10% throughout Manhattan from the program.

Sector	Measure	Expected Benefits to LIDACs
		Increased access to employment, services, and amenities Reduced noise pollution
	Medium & heavy-duty fleet decarbonization	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Reduced noise pollution
	School bus electrification	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Reduced noise pollution
	MTA bus electrification	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground-level ozone, and hazardous air pollutants) Reduced noise pollution
	NJ TRANSIT zero emissions bus program	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground-level ozone, and hazardous air pollutants) Reduced noise pollution
	Other transit fleet electrification	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Reduced noise pollution
	Light-duty vehicle electrification	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Reduced noise pollution
	Maritime & air travel emissions reductions	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Reduced noise pollution
Stationary Energy	Eliminate fuel oil and propane use in residential buildings	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground-level ozone, and hazardous air pollutants) Creation of high-quality jobs and workforce development opportunities

Sector	Measure	Expected Benefits to LIDACs
		Improved housing quality, comfort, and safety
	Eliminate fossil fuel use in new construction	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Improved housing quality, comfort, and safety
	Electrify specific building typologies	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Creation of high-quality jobs and workforce development opportunities[138] Improved housing quality, comfort, and safety
	Energy efficiency upgrades for specific building typologies	Improved public health resulting from reductions in co-pollutants (PM2.5, PM 10, ground-level ozone, and hazardous air pollutants) Decreased energy costs and improved energy security from energy efficiency improvements and more resilient energy sources Creation of high-quality jobs and workforce development opportunities Improved housing quality, comfort, and safety
	Decarbonize large buildings	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Creation of high-quality jobs and workforce development opportunities Improved housing quality, comfort, and safety
Electricity	Decreasing average grid emissions factor (sub-MSA)	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground-level ozone, and hazardous air pollutants) Creation of high-quality jobs and workforce development opportunities Improved grid reliability
	Large-scale renewable energy projects	Improved public health resulting from reductions in co-pollutants (PM2.5, PM 10, ground-level ozone, and hazardous air pollutants) Creation of high-quality jobs and workforce development opportunities

[138] In alignment with parameters set forth in the U.S. Department of Labor's Good Jobs Initiative, which is also cited in the EPA's guidance on Workforce Planning Analysis for the CCAP

Sector	Measure	Expected Benefits to LIDACs
		Improved grid reliability
	Distributed energy resource deployment	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground level ozone, and hazardous air pollutants) Creation of high-quality jobs and workforce development opportunities Improved grid reliability
Waste	Reduce total disposal to landfills (disposal per capita)	Improved public health resulting from reductions in co-pollutants (PM2.5, PM10, ground-level ozone, and hazardous air pollutants) Enhanced community engagement, increased public awareness of projects and results, and community capacity building Reduced impacts of waste movement
	Convert municipal waste to energy (e.g., “gas to grid”)	Reduced impacts of waste movement
Other	Protect carbon sequestration amounts from natural carbon sinks (e.g., forests, tidal wetlands, etc.) in the region	Creation of high-quality jobs and workforce development opportunities
	Reduce Short-Lived Climate Pollutant (SLCP) emissions	Improved public health from the reduction in emissions of methane and black carbon

6.6 Additional MSA Details

6.6.1 Regional Transportation Assets

TRANSPORTATION SYSTEM

In a region as large, diverse, and economically robust as the multi-state region, a transportation system that reliably moves goods and people is vital to supporting economic activity and enhancing the quality of life for its residents. The transportation system of the multi-state metropolitan region is large, complex, and aging. The system is tied together by a network of highways and rail lines, while its topography and water bodies are crossed by elevated roadways and rail lines, as well as bridges and tunnels. The region’s transportation system is outlined below.

Major Roadways

- Major roadways include Interstate highways I-78, I-80, and I-280, which extend from New York City west through New Jersey and Pennsylvania; I-84, which extends from Pennsylvania through both New York and Connecticut; I-87, which becomes the New York Thruway between New York City and Albany; I-287, which forms a partial belt around New York City through Westchester County, Rockland County and northern New Jersey; I-91, a north-south highway between New Haven and the Canada-United States

border; I-95, a north-south highway of which portions are the New Jersey Turnpike, the Cross Bronx Expressway and the New England Thruway; and I-495, known as the Long Island Expressway.

Bridges and Tunnels

- Given the multi-state region's topography, bridges and tunnels are common, carrying both roadways and rail lines across or under large numbers of rivers and other water bodies. Major crossings include four bridges and two tunnels crossing the East River between Manhattan and Brooklyn and Queens, one bridge and two tunnels crossing the Hudson River between Manhattan and northern New Jersey, three bridge crossings between Staten Island and northern New Jersey, various significant bridge crossings of water bodies in northern New Jersey and the Hudson Valley, and rail tunnel crossings as part of the Metropolitan Transportation Authority, NJ TRANSIT and Port Authority Trans-Hudson systems.

Passenger Rail Facilities

- Rail services are provided by NJ TRANSIT, the Metropolitan Transportation Authority's MTA Metro-North Railroad (MNR), and MTA Long Island Railroad (LIRR) commuter rail networks; the CTrail Hartford Line and Shore Line East commuter rail service; MTA New York City Transit's (NYCT) subway network; the Port Authority Trans-Hudson (PATH) rail rapid transit service; and NJ TRANSIT's Hudson-Bergen Light Rail and Newark Light Rail systems. The National Railroad Passenger Corporation (Amtrak) provides intercity rail services along the Northeast Corridor.

Freight Rail Facilities

- Three Class I railroads operate in the multi-state region: CSX, Norfolk Southern, and Canadian Pacific Railway. In addition, Conrail Shared Assets, a switching carrier jointly owned by Norfolk Southern and CSX, operates in much of northern New Jersey and in Staten Island. Various short-line railroads also serve the region.

Port Facilities

- Maritime freight facilities are located at the Port of New York and New Jersey in Brooklyn, Staten Island, and northern New Jersey, and at John F. Kennedy International Airport, as well as at reliever ports in Bridgeport, New Haven, and New London, Connecticut.

Airports

- The multi-state region is served by four major commercial airports; John F. Kennedy International Airport and LaGuardia Airport in Queens, New York; Newark Liberty International Airport in Newark, New Jersey; and Bradley International Airport outside Hartford, Connecticut. A variety of smaller commercial and general aviation airports also service the area, including Lehigh Valley International Airport in Lehigh County, Pennsylvania; Long Island MacArthur Airport and Republic Airport in Suffolk County, New York; Westchester County Airport in Westchester County, New York; Stewart

International Airport in Orange County, New York; Trenton-Mercer Airport in Mercer County, New Jersey; and Tweed New Haven Regional Airport in New Haven, Connecticut.

Transportation Investments

Due to the continued growth of the region and the aging state of many key pieces of infrastructure that require renewal, several regionally significant improvements to the transportation infrastructure are either planned or are being implemented in the multi-state metropolitan region. Major New York City-focused projects include the second phase of the Second Avenue Subway in Manhattan, various trans-Hudson River rail and vehicular crossing improvements, the reconstruction of the Brooklyn-Queens Expressway central triple cantilever, the Interborough Express in Brooklyn and Queens and commuter rail improvements involving Penn Station.

While passenger transport is critical, these important projects are not limited to the movement of people. In such a densely populated and economically active region, freight transportation is critical as well, and several major projects are dedicated to freight in the region. For example, the Port Authority's Cross Harbor Freight Program is seeking to address the difficulty of moving freight from one side of New York Harbor to the other by examining a wide range of alternatives, including railcar and truck floats, container barges, and a cross-harbor rail tunnel.

A variety of improvement projects in the multi-state metropolitan region, including those mentioned above, are designated as boundary projects whose impacts cut across planning areas and state lines. Critical boundary projects include the following:

Trans-Hudson Sector

- **West-of-Hudson transit improvements,** including improvements to the Port Jervis Line in Orange County, New York.
- The **Restore the George Program** is a $2 billion, decade-long project to rehabilitate and replace major components of the George Washington Bridge.
- The **Lincoln Tunnel Helix Replacement** in Weehawken, New Jersey.
- The **Hudson Tunnel Project** intends to create an additional rail tunnel that would preserve the current functionality and strengthen the resiliency of the Northeast Corridor's Hudson River rail crossing between New Jersey and New York.
- The Amtrak **Gateway Program's** strategic rail infrastructure improvements are designed to improve current services and create new capacity that will double passenger trains running under the Hudson River.
- The **Cross Harbor Freight Program** for rail freight across New York Harbor.
- The **Port Authority Bus Terminal Replacement** and the **redevelopment of Penn Station** on Manhattan's west side

- Construction of the **Bergen Loop track** in Secaucus, New Jersey, will enable a one-seat commuter rail ride to Manhattan from West of Hudson communities in New York State and New Jersey, including Rockland and Orange counties.
- The **expansion and modification of Secaucus Junction Station** in New Jersey.

New York City Sector

- **Phase II of the Second Avenue Subway Project** to extend the subway to the Upper East Side and Eastern Harlem sections of Manhattan.
- Reconstruction of the Brooklyn Queens Expressway central triple cantilever to bring this critical stretch of roadway into a state of good repair and meet local and regional transit needs.
- The **Interborough Express Project** to develop surface transit along the Bay Ridge Line in Brooklyn and Queens.
- **Airport access improvements**, including public transit service to Newark Airport, transit and roadway improvement for John F. Kennedy International Airport and bus service improvements to LaGuardia Airport.

Northern New Jersey/Eastern Pennsylvania Sector

- The **Port Street Corridor Improvement Project** is a projected $176 million rehabilitation and modernization project to improve safety and truck access at the northern end of Port Newark.
- **Newark Bay-Hudson County Extension** from New Jersey Turnpike Interchange 14 in Newark, New Jersey to Jersey Avenue in Jersey City, New Jersey.

Regional

- **Several multi-use trails** are planned or under construction that connect to the greater regional greenway network, including studies to evaluate connections between the Norwalk River Valley Trail, Still River Greenway, and New Milford River Trail as well as to the Maybrook Trail, the Empire State Trail, the Norwalk River Valley Trail and the Pequannock River Trail.

Regional Rail Corridors

The following rail corridors were selected as part of the IIJA-created Corridor Identification and Development Program:

- **Reading-Philadelphia-New York Corridor** connecting Reading with Philadelphia, PA, and New York, NY, with new intermediate stops at Pottstown, Phoenixville, and potentially Norristown, PA, then using the Northeast Corridor between Philadelphia and New York.

- **Scranton to New York Penn Station Corridor** connecting Scranton, PA, and New York, NY, with intermediate stops at Stroudsburg and Mt. Pocono, PA, and Blairstown, Dover, Montclair, Morristown, and Newark, NJ.
- **Amtrak to Long Island Corridor** connecting Long Island, NY, to the national intercity passenger train network by extending three existing daily round trips between Washington, D.C., and New York, NY, east to Ronkonkoma, NY.

Regional Water Transport

- **The State Island Ferry** is operated by NYC DOT and provides free service connecting Manhattan and Staten Island
- **NYC Ferry, administered by NYCEDC,** is comprised of a network of public routes operated by private service provider Hornblower Cruises. Routes run between all five boroughs of the city.
- **PANYNJ controls ferry terminals at Hoboken and Battery Park City.** In a public private partnership with operators like NY Waterway, the authority supports water transport options across the Hudson between NJ and NYC.

6.6.2 Implementing Agency Names

Acronym	Entity
DSNY	The City of New York Department of Sanitation
MOCEJ	The New York City Mayor's Office of Climate and Environmental Justice
MTA	The Metropolitan Transportation Authority
NHA	The Newark Housing Authority
NJBPU	The New Jersey Board of Public Utilities
NJDEP	The New Jersey Department of Environmental Protection
NJDOT	The New Jersey Department of Transportation
NJEDA	The New Jersey Economic Development Authority
NJOPA	New Jersey Office of Planning Advocacy
NJT	The New Jersey Transit Corporation
NJTA	The New Jersey Turnpike Authority
NJTPA	The North Jersey Transportation Planning Authority
NYC DOB	The New York City Department of Buildings
NYC DOT	The New York City Department of Transportation
NYC HPD	The New York City Department of Housing Preservation and Development
NYC OMB	The New York City Office of Management and Budget
NYC TLC	The New York City Taxi and Limousine Commission
NYCDOE	The New York City Department of Education

NYCDSBS	The New York City Department of Small Business Services
NYCEDC	The New York City Economic Development Corporation
NYCHA	The New York City Housing Authority
NYISO	The New York Independent System Operator
NYMTC	The New York Metropolitan Transportation Council
NYSDEC	The New York State Department of Environmental Conservation
NYSDOT	The New York State Department of Transportation
NYSERDA	The New York State Energy Research and Development Authority
NYSPSC	The New York State Department of Public Service
NYSTA	The New York State Thruway Authority
PANYNJ	The Port Authority of New York and New Jersey