

NET ZERO ROADMAP

SEPTEMBER 2023

**PORT
AUTHORITY
NY NJ**

AIR LAND RAIL SEA

Letter from Our Leadership

On October 28, 2021, the Port Authority announced an ambitious new goal to achieve net-zero greenhouse gas emissions by 2050, aligning with the Biden-Harris Administration's climate goals. We also shared the agency's new target to reduce direct emissions by 50% by 2030. These two policies were subsequently adopted by the Board of Commissioners, formalizing our commitment to address climate change and making the Port Authority the nation's first transportation agency to adopt a net-zero target for all emissions.

Over the past year, in partnership with the Office of Sustainability, staff from across departments have been developing a roadmap for how we will achieve these goals. We are pleased to deliver on this document in the pages that follow—the Net Zero Roadmap addresses the climate crisis and reflects a renewed commitment to prioritizing sustainability across the agency.

The Port Authority is a unique organization. We build, operate, and maintain a complex network of aviation, ground, rail, and seaport facilities across two states, in cooperation with various public and private partners. As the Net Zero Roadmap will illuminate, the size and scope of our operations demand agency-wide mobilization to meet our ambitious goals.

The Net Zero Roadmap details the specific near-term strategies and actions that get us to our goal of reducing direct emissions by 50% by 2030 and put us on the path to net zero by 2050. Implementation is already underway. We are expanding efforts to reduce emissions from the agency's own operations. This work includes converting our fleet to electric, decarbonizing our buildings, developing solar power at our facilities, and buying more electricity from renewable generation. We are also taking critical steps with our stakeholders, including airlines, terminal operators,

concessionaires, and shipping companies, to target emissions reductions. Working in tandem with these partners, we will strive to replace diesel-powered heavy equipment, ease the transition to sustainable fuels for aircrafts and ships, and exclusively purchase clean, renewable energy from the grid.

The challenges and opportunities presented by climate change require a collaborative effort. We are lucky to operate in a region with climate leadership. The States of New York and New Jersey are at the forefront of cutting-edge policies, and local governments and community and environmental justice organizations are advancing dynamic, place-based strategies and solutions. We have partners across our business lines that are leaders in their respective industries. Together, we can play a critical role in mitigating the worst impacts of climate change and build next-generation transportation systems that will serve us well in the 21st century.

These are complex and dynamic times, with uncertainty abounding, but the important work of transitioning to a clean energy future is underway. Our talented agency staff, a forward-looking board, and innovative stakeholders will remain focused on achieving our emission reduction goals. We are proud of this renewed commitment to addressing climate change and present this Net Zero Roadmap as the first step in a collaborative effort to provide a sustainable future.

Sincerely,



Rick Cotton
Executive Director



Kevin J. O'Toole
Chairman



One World Trade Center from the Hudson River

Published by
The Port Authority of New York and New Jersey
4 World Trade Center, 18th Floor
New York, NY 10007
panynj.gov

Prepared by
AECOM
KO2 Consulting
Lion Advisors for Community and Environment



Disclaimer

This Net Zero Roadmap Report has been prepared by the Port Authority to inform interested parties of our current intention to improve the environmental profile of our transportation facilities and to present a plan for doing so. The information and expressions of opinion in this Report (including the Net Zero plan, itself) are subject to change without notice, and future use of this Report should be made with the understanding that there may have been changes in the matters referred to since the date hereof. To the extent the information in this Report contains statements including forecasts or views of our and others' operations in the future, such statements may involve known and unknown risks, uncertainties, and other factors which may cause the current intention (including elements of the Net Zero plan, itself) to be materially different from those expressed or implied by the information herein. The Port Authority disclaims any obligation to update or keep current this Report, which speaks only of the date hereof.

No part of this publication may be reproduced, stored in a retrieval system or database, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of The Port Authority of New York and New Jersey.

Contents

06 Executive Summary

08 PART 1
Introduction

Mission & History
Leading in Sustainability
Growing Our Climate Ambition
Climate Action in Context
Existing Emissions
Our Net Zero Roadmap
Pathways to Net Zero

26 PART 2
Reducing Port Authority-Controlled Emissions Sources

Transportation & Equipment
Buildings & Facilities
Energy Supply & Infrastructure

46 PART 3
Enabling Our Stakeholders to Reduce Total Emissions

Transportation & Equipment
Buildings & Facilities

68 PART 4
What's Next
Delivering on Our Commitment to Net Zero

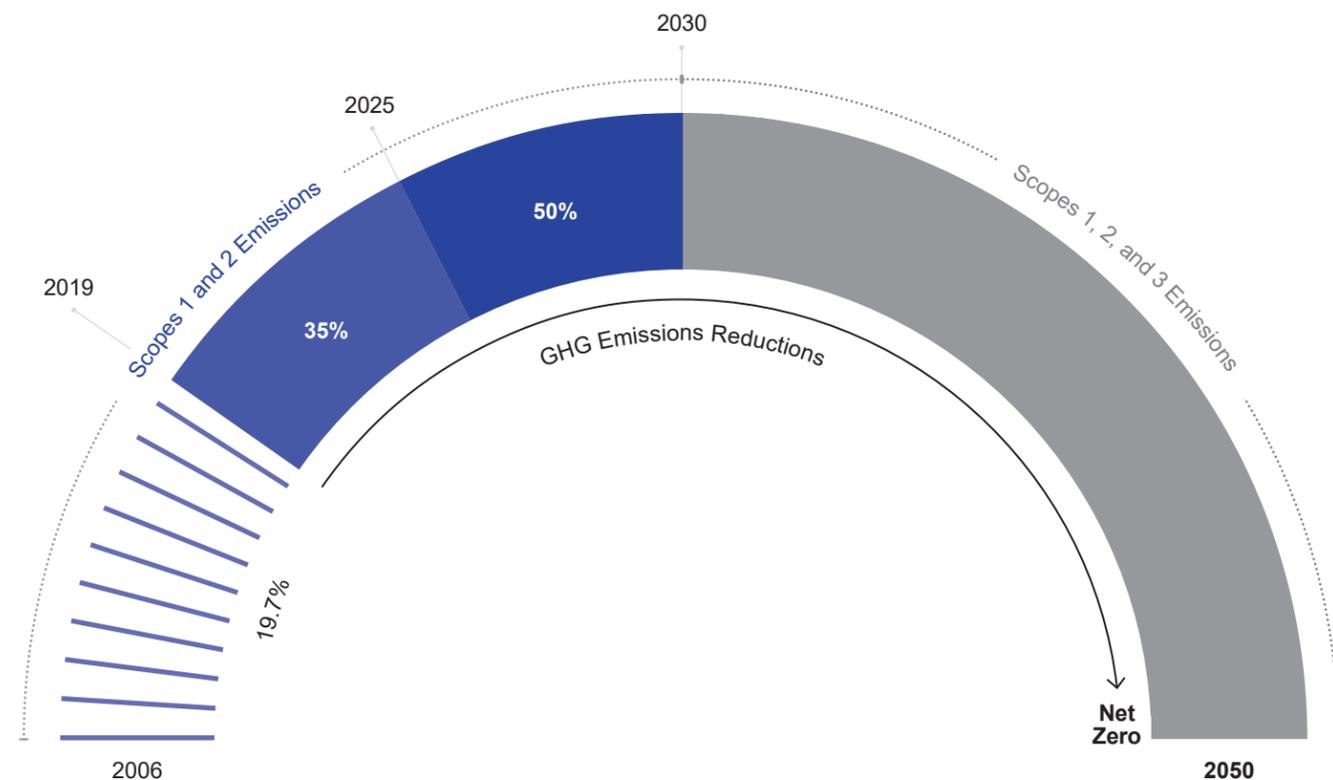
Executive Summary

Introduction

We are on a mission to keep one of the world's most economically vital regions moving—by air, land, rail, and sea—and to do so in a way that's efficient, equitable, resilient, and sustainable. Building on our longstanding sustainability and climate work, the Port Authority has set a goal of achieving net zero greenhouse gas (GHG) emissions by 2050.

We have already made significant progress in reducing our GHG emissions. The Port Authority's recent GHG inventory reported decreases in Scopes 1 and 2 emissions that are directly under the Port Authority's operational control, and in Scope 3 emissions that are outside of our direct control, detailing a steady reduction trajectory. This work builds on momentum to address climate change at the federal, state, and local levels, and technological advancements that are transforming construction standards and the movement of people and goods.

Where We Are Now & Where We Are Going



Port Authority Emissions

Our initial GHG reduction efforts primarily focused on reducing direct Scopes 1 and 2 emissions. This includes sources such as Port Authority-owned and controlled vehicles, air conditioning equipment, and purchased electricity for Port Authority operations. We're taking care of our own house first, making first-in-the-nation cuts to emissions for the operations we control.

The net zero goal we set in 2021 expands our ambition to include Scope 3 emissions—those dependent on the actions of tenants, customers, and employees. This includes sources such as aircraft movements during landing and take-off, emissions from tenant construction, and vehicular movements across Port Authority bridges and tunnels. We are working with our stakeholders in sectors such as aviation, shipping, and bus transit to support them as they pursue their own ambitions to cut emissions.

The graphic below shows the Port Authority's GHG emission reductions from 2006 to 2019, our interim goals of 35% and 50% reductions for 2025 and 2030, respectively, and our 2050 goal of net zero emissions.

Net Zero Strategies Overview

Meeting our targets will require decarbonizing our own facilities and infrastructure, while partnering with tenants and operators to drive further change across the transportation sector. The Net Zero Roadmap charts a path from where we are now to 2050, by identifying 12 concrete strategies and 42 actions that we can take to address the remaining Scope 1 and 2 direct emissions to achieve our 2025 and 2030 goals, and work with stakeholders to address Scope 3 indirect emissions to scale and accelerate toward 2050. The actions outline specific commitments for what we will accomplish by 2030 to achieve our interim goals and lay the groundwork for achieving our 2050 goal.

Port Authority-Controlled Emissions

Transportation & Equipment

- 1 Zero-Emission Port Authority Vehicles**
Transition all Port Authority shuttle buses, fleet vehicles and specialized equipment to zero-emission alternatives.
- 2 Expanded Charging Infrastructure**
Install the necessary charging infrastructure to support the timely rollout of new electric vehicles in the Port Authority fleet.

Buildings & Facilities

- 3 Existing Building Decarbonization & Energy Efficiency**
Drive building decarbonization efforts at Port Authority facilities through energy efficiency retrofits, while transitioning away from the use of fossil fuels.
- 4 Sustainable Construction & Major Redevelopment**
Ensure all new construction and major redevelopment projects are constructed with the most efficient equipment and designed to the latest sustainability standards.
- 5 Improved Building & Facility Operations**
Implement sustainable operations and maintenance best practices across Port Authority facilities to optimize building performance.

Energy Supply & Infrastructure

- 6 Renewable Energy**
Scale up renewable energy generation, energy purchasing, and alternative energy sources.
- 7 Electrical Infrastructure Upgrades**
Expand existing electrical infrastructure in a phased approach to meet our net zero vision.
- 8 Central Plant Decarbonization**
Transition central plants, which provide energy for heating and cooling for various buildings on Port Authority properties, to resilient, net zero emission systems.

Stakeholder-Controlled Emissions

Transportation & Equipment

- 9 Zero-Emission Airport Operations**
Accelerate the adoption of third-party zero-emission vehicles that are stationed at and travel to and from our airports, support airlines' transition to zero-emission aircraft and sustainable aviation fuel, and reduce emissions from aircraft operations.
- 10 Zero-Emission Seaport Operations**
Accelerate the adoption of zero-emission material handling equipment (MHE) and zero-emission drayage trucks, expand alternative freight movement options, and support the transition to zero-emission fuels for oceangoing vessels and harbor craft.
- 11 Regional Transportation & Congestion Management**
Partner with other regional transportation agencies to accelerate the region's shift to less carbon-intensive forms of transportation, including improving public transit availability, and bicycle and pedestrian infrastructure, while reducing traffic congestion and idling.

Buildings & Facilities

- 12 Green Tenant Buildings & Facilities**
Align Net Zero Roadmap goals and objectives into Port Authority lease agreements, procurement processes, energy supply, and waste management across all facilities to assist with tenant GHG emissions reductions.



1

Introduction

Mission & History

Mission

We are dedicated to getting people and goods where they need to go and to delivering the world-class, 21st century infrastructure that our region needs to thrive.



Night Shot of the George Washington Bridge

A Brief History

The Port Authority of New York and New Jersey was established in 1921 to oversee the creation of vital infrastructure to serve the New York-New Jersey metropolitan region.

One hundred years ago, there was no aviation industry and no mass use of cars and trucks. PATH service was just beginning. The Holland Tunnel was still in the planning stages. The great bridges had yet to be designed. The Port Authority built the world-class infrastructure that has enabled the region to become the global center of commerce and trade that it is today. That growth and development was—and largely still is—powered by fossil fuels.

We are proud of where we've been and are excited about where we're heading next.

Our mission now is to keep the region moving while transitioning to a carbon-free future.

Today, we manage an extensive network of transportation infrastructure assets that moves millions of people and millions of tons of cargo across the region and the world, including airports, tunnels, bridges, transit facilities, and marine terminal properties across two states.

Climate action is at the center of the Port Authority's priorities and standards. We bring together our stewardship of the long-term vitality of the region with our incomparable ability to meet New York and New Jersey's critical infrastructure needs—and a commitment to sustainability, equity, innovation, and partnerships.

Leading in Sustainability

Timeline of commitments we have made to sustainability over the past 30 years.



Growing Our Climate Ambition

To confront the scale and urgency of the climate crisis and to realize the benefits of a low-carbon future, we must reduce our GHG emissions to zero.

With time and experience, our climate ambition has grown. The Port Authority was the first U.S. transportation agency to formally and publicly commit to the Paris Climate Agreement in 2018. In 2021, we announced a goal to achieve net zero carbon emissions by 2050 across the agency's full footprint of operations and facilities and established a new interim target to reduce Scope 1 and Scope 2 emissions by 50% by 2030.

We did not stop there.

We also committed to achieving net zero for indirect scope 3 emissions. These commitments build upon and expand the Port Authority's Paris-aligned goals and bring us in line with current science and best practice. In committing to net zero, we join a growing coalition in the region and across our industries.

Defining Net Zero

Achieving **net zero** means cutting GHG emissions to as close to zero as possible and absorbing additional carbon dioxide from the atmosphere so that human activity is no longer contributing to global climate change.

Defining Zero-Emission Vehicles

According to the U.S. Department of Energy, a **zero-emission vehicle** is defined as "a vehicle that produces no criteria pollutant, toxic air contaminant, or GHG emissions when stationary or operating." A near-zero-emission vehicle is "a vehicle that uses zero emission technologies, uses technologies that provide a pathway to zero emission operations, or incorporates other technologies that significantly reduce vehicle emissions." For the purposes of this document, "zero-emission vehicle" is used broadly to include both zero- and near-zero-emission technologies.

Definitions of Scopes 1, 2, and 3 Emissions

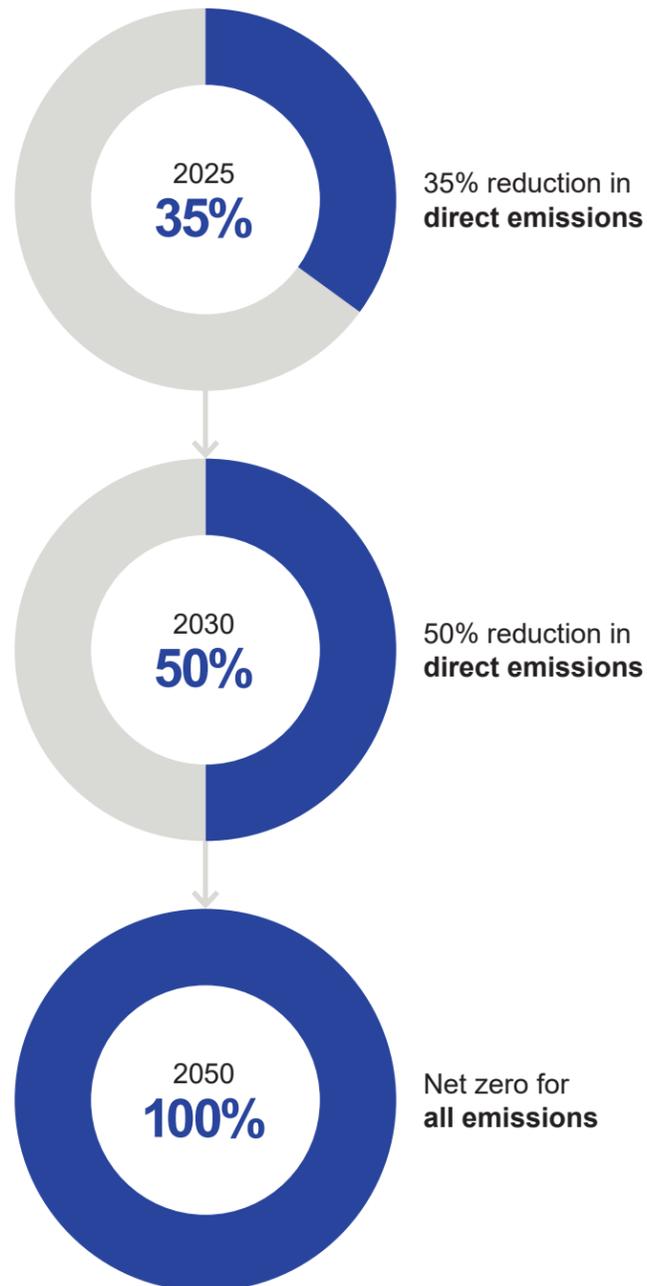
Emissions are organized into three scopes:

Scopes 1 and 2

Operational emissions in the Port Authority's direct control, such as use of fuel for our fleet (Scope 1) and purchased electricity to power our buildings (Scope 2).

Scope 3

Indirect emissions under the Port Authority's influence, such as use of electricity and fuel by our tenants.



Our Objective

To be a net zero, climate-resilient agency that leads the global transportation industry in stewardship of our natural resources.

Scaling Our Impact

The challenge that we are confronting is one that many large, complex organizations face: most emissions that result from Port Authority operations are from sources that are not owned or controlled by the Port Authority itself. In our case, approximately 96% of total emissions are outside of our direct control (Scope 3).

In recent GHG inventories, we have *reported* Scope 3 emissions, but the 2021 announcement of our net zero goal represented the first time that we *committed* to taking action to reduce them. As we take this leap forward, we are being careful to distinguish between direct and indirect emissions, recognizing that the strategies we take will vary considerably as one pathway leans heavily into agency-wide implementation and the other into enabling our stakeholders through partnerships.

The Port Authority as a Driver of Change

Recognizing our responsibility as an agency that operates across two states and multiple sectors and modes of transportation, we believe that we have an important role to play in contributing to the climate ambition and progress of the region, as well as in our industries. What we do will be an important influence locally, regionally, nationally, and globally.

Maximizing the Benefits of Net Zero

Over the coming years and decades, our GHG emission reduction efforts will generate a diverse array of benefits. We believe that investment in climate change mitigation strategies will improve the performance of our operations while creating thousands of high-quality jobs, promoting economic competitiveness, and advancing environmental justice. Throughout this document, we outline the benefits of each of our strategies and how each will improve our service to tenants and customers and enhance the health and vitality of the region.

Expected Benefits

<p>Improved Air Quality and Noise Reduction in Neighboring Communities</p>	<p>Resiliency Improvements</p>
<p>Enhanced Customer Experience</p>	<p>Greater Operational Efficiency</p>
<p>Creation of High-Quality Jobs</p>	<p>Technology Innovation and Advancement</p>
<p>Regional Economic Competitiveness</p>	<p>Improved Access for Underserved Communities</p>
<p>Conservation of Resources</p>	<p>Healthier Watershed</p>

Climate Action in Context

Economic, political, and technological advances form an important backdrop to the efforts of the Port Authority and our industry partners.

We are working in a dynamic environment. Recognizing this, we are tracking and assessing the broad landscape of changes and innovations to keep abreast of what's happening and what might happen next. Our current assessment of trends is reflected in this Roadmap; ongoing monitoring of evolving policies, markets, technologies, and public priorities will be a critical component of implementation.

Leadership Across Our Industries

The transportation sector is the largest contributor of GHG emissions in the U.S. according to the Environmental Protection Agency (EPA). Most transportation-related emissions come from burning fossil fuel for cars, trucks, ships, trains, and planes.

The Port Authority is a part of the global movement to mitigate the effects of climate change. There is a growing push towards net zero across our related industries and sectors. Increasingly, climate and sustainability are being connected to core mission and strategy for organizations and are being tied to competitiveness as well as to risk mitigation.

Striving for Net Zero in a Period of Historic Federal Investment

Since we announced our net zero goal in October 2021, two major pieces of federal legislation have been signed into law: the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), and the Inflation Reduction Act (IRA). Taken together, they represent a massive investment in low carbon infrastructure and widespread clean energy adoption, establishing a 10-year set of policies, programs and tax credits that are intended to catalyze the transition towards transportation electrification and infrastructure decarbonization.

Market Trends and Technological Innovations

Looking ahead to 2050, market forces and advances in technology are expected to continue to support and accelerate a transition towards clean energy and climate action.

Key trends that we are anticipating will have major implications for the pace and scope of our progress include:



Cost competitiveness of clean energy

The Inflation Reduction Act, alongside other drivers, is anticipated to dramatically bring down the cost of renewable energy over the next decade, catalyzing investments across supply chains and making clean energy projects easier to finance.



Broad adoption of electric passenger vehicles

Electric passenger vehicles are becoming commonplace as a sustainable alternative to cars powered by fossil fuel. Factors such as increased fuel prices, government regulations and tax credits, model availability, reduced vehicle costs, and increased charger availability are leading to an increase in sales.

In early 2023, the EPA proposed new tailpipe emissions limits that could require EVs to account for two-thirds of all new vehicles sold in the United States by 2032.



Transition to Sustainable Aviation Fuel (SAF) and eco-friendly practices

Sustainably-produced alternative jet fuels are beginning to enter the supply chain. SAF has the potential to reduce emissions by up to 80% compared to standard jet fuel.

Many partner airlines have set their own ambitious net zero goals and are signing long-term supply contracts for SAF. In the summer 2022, the first direct pipeline delivery of SAF arrived at LaGuardia Airport.



Adoption of zero-emission drayage trucks and equipment

Zero-emission trucks are relatively new to the U.S. commercial market; however, as purchase commitments grow and regulatory policies expand, these vehicles are poised to be deployed widely.

In 2021, six major auto manufacturers—representing more than a quarter of global vehicle sales—pledged to phase out sales of new fossil-fuel-powered vehicles globally by 2040, and by no later than 2035 in leading markets.



Transition to sustainable maritime fuels and vessels

Shipping companies, governments and non-governmental organizations are working to cut the intensity of global shipping operations. Market trends include the transition to zero-emission marine vessels and sustainable maritime fuel.

Industry leaders are setting aggressive climate goals. In 2022, Maersk, the world's second-largest shipping line, pledged to make its business carbon-neutral by 2040—a decade ahead of its initial 2050 goal — along with pledges to meet associated 2030 targets. MSC and CMA CGM, the largest and third-largest shipping lines, have both pledged to hit net zero carbon emissions by 2050.



Increase in renewable energy supply

As states set targets for electricity suppliers to procure from renewable energy sources, it is expected that this will lead to increased investment in clean energy technologies and expanded renewable energy generation.



Passenger Airplane at JFK International Airport

The State Regulatory Environment

The Port Authority operates across New York and New Jersey, two states working to take aggressive climate action. The increasing activity on sustainability commitments by the Governors of the States of New York and New Jersey with a focus on climate change mitigation and adaptation, on environmental justice, and on the transition toward a green economy have been important drivers to push forward the Port Authority's sustainability strategy. With our net zero goal, we are aligning with our host states and communities throughout the region.

▼85%

85% Reduction in GHG Emissions by 2050 and an interim goal of 40% Reduction by 2030¹



▼80%

80% Reduction in GHG Emissions by 2050 (2007 Global Warming Response Act) and an interim goal of 50% Reduction by 2030 (Executive Order No. 274)

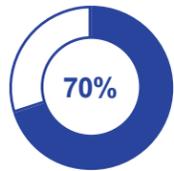


2040: 100% Zero-Emission Electricity¹

2035: 100% Clean Energy

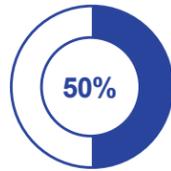
Executive Order No. 315

2030



70% Renewable Energy by 2030¹ and specific targets for solar generation, energy storage, and offshore wind

2030

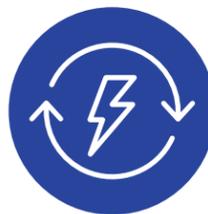


50% of the energy sold in NJ to come from qualifying energy sources by 2030 (NJ Renewable Portfolio Standards)

85% of homes and commercial building space statewide electrified by 2050 (New York State Climate Action Council Scoping Plan)



Largely decarbonizing and electrifying the building sector by 2050, with an early focus on new construction and the electrification of oil- and propane-fueled buildings



100%

All new passenger vehicle sales to be zero-emission by 2035, and new medium-duty and heavy-duty vehicles to be by 2045 (A.4302/S.2758)

100%

Initiated process to ensure 100% of light-duty vehicles sold in 2035 are zero-emission vehicles



Both States of New York and New Jersey, together with several other states, adopted the **Advanced Clean Trucks (ACT)** rule in 2021, which requires manufacturers to phase in clean electric commercial trucks to reduce air pollution.

¹ Climate Leadership and Community Protection Act (CLCPA)

Local Climate Action

At the local government level, we are seeing jurisdictions of all sizes across the region creating climate action plans. Our host communities are local leaders in setting ambitious climate action goals and focusing on climate resilience and environmental justice. Examples of how our host communities are taking action include:

Newark, NJ

80% GHG emissions reduction below 2006 levels by 2050 (2013 Sustainability Action Plan)

Elizabeth, NJ

100% Renewable Energy (2017 Sierra Club Mayor for 100 Clean Energy campaign pledge)

Jersey City, NJ

80% reduction in GHG emissions below 2015 by 2050 (Jersey City Climate Action Plan)

New York, NY

Carbon neutrality by 2050 (OneNYC 2050 and the Climate Mobilization Act of 2019)

The Climate Mobilization Act included a package of climate legislation to reduce GHG emissions and improve energy efficiency in buildings, including Local Law 97 which requires most buildings over 25,000 square feet to meet energy efficiency and GHG emissions limits.

Environmental and Climate Justice

Across the region, low-income communities and communities of color have been disproportionately exposed to higher levels of air, water, and soil pollution. The cities of Newark and New York City, the states of New York and New Jersey, and the federal government have initiatives underway to help address environmental justice. These initiatives include efforts to define and invest in environmental justice communities, address the cumulative impacts they experience, help build residents' capacity, and elevate their voices in policy, program, and project developments.

In addition to helping to advance these efforts at the regional level, the Port Authority is working to identify and alleviate the environmental impacts on affected communities as part of all our major redevelopment projects.

“

New York isn't just joining the climate change fight—we're leading the charge on a global scale. I commend the Port Authority's important commitment and visionary roadmap to reach Net Zero greenhouse gas emissions by 2050. Together, we can be the catalyst inspiring cities, states, and nations to think bigger, act bolder, and spark monumental change to protect our people and the planet.



Kathleen Hochul
Governor of New York

“

The Port Authority's bold net zero goal represents one crucial element of New Jersey's all-of-government approach to comprehensive climate action. Through its sustainability strategy and alignment with New Jersey's vision for a clean energy future, the Port Authority will continue to help advance the Garden State's pursuit of a 100% clean energy economy by 2035. This determined pursuit is especially urgent to safeguard our environmental justice communities from the intensifying impacts of the climate crisis.



Phil Murphy
Governor of New Jersey

Existing Emissions

The Port Authority's GHG emissions inventory estimates the quantity of emissions generated by agency-related activities. This section provides a snapshot of the sources and quantities of GHG emissions for the year 2019. (Our 2020 and 2021 emissions inventories are not included because they are not indicative of overall trends due to lower activity levels during the COVID-19 pandemic).

The Port Authority's emissions stem from two broad categories of activities: operational emissions that are under our direct control (Scopes 1 and 2) and indirect emissions under the Port Authority's influence, such as emissions from fuel and electricity use by our tenants (Scope 3).

Scope 1 and 2 Direct Emissions

Our climate action is rooted in a commitment to leading by example. Between 2006 and 2019, the Port Authority achieved a 19.7% emissions reduction from activities under our operational control (Scopes 1 and 2) through changes in operations and implementation of numerous sustainability initiatives, as well as continued decarbonization of the electricity grid. Additional reductions have taken place since then: while our 2022 inventory is still underway, we expect that Scope 1 and 2 emissions were at least 24% below 2006 levels in 2022—even as operations had rebounded to near pre-pandemic levels.²

While our Scope 1 and 2 emissions represent just 4% of total emissions, those emissions still represent a substantial footprint. We will continue to prioritize achieving reductions in our own emissions to drive deeper reductions while also expanding our efforts to take on stakeholder emissions.

Scope 3 Indirect Emissions

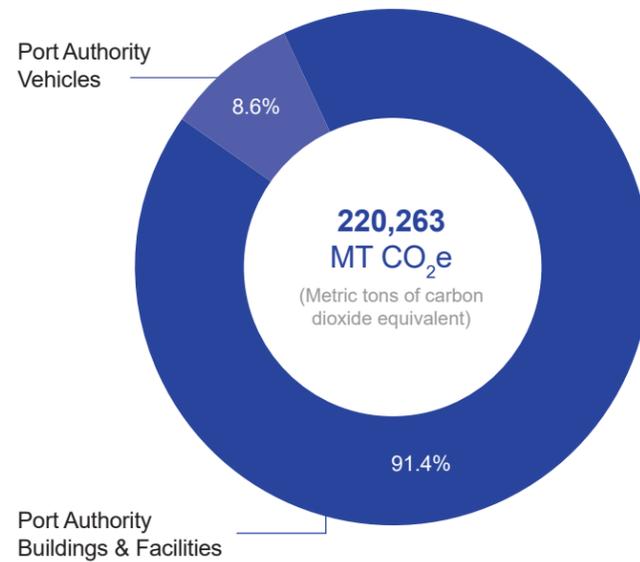
Like many large, complex organizations, most emissions that result from Port Authority operations are outside of our direct control. In our case, 96% of total emissions are outside the Port Authority's operational control, but are related to Port Authority facilities, such as actions of tenants, customers, and employees. In our 2019 GHG inventory report, we reported that Scope 3 emissions decreased 8% compared to our 2006 base year.

To successfully achieve net zero for Scope 3 emissions, we will play an active role in enabling and supporting our partners and stakeholders to meet their commitments. The Roadmap seeks to create an action agenda for collaboration with partners and stakeholders.

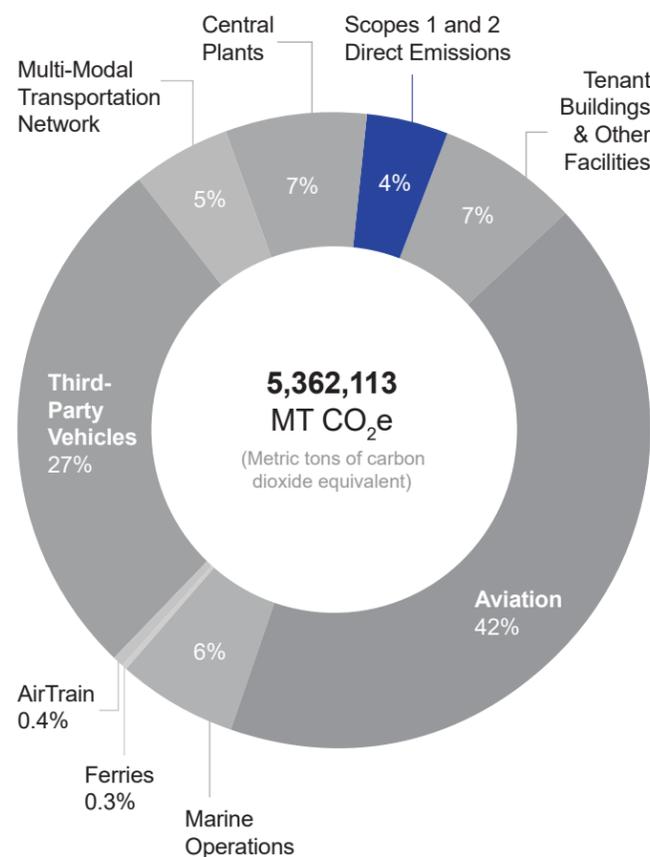
² Our inventories for 2020 and 2021 showed emissions reductions over 35% compared to 2006, but are not reflective of overall trends due to reduced operations during the pandemic.

Port Authority GHG Emissions at a Glance

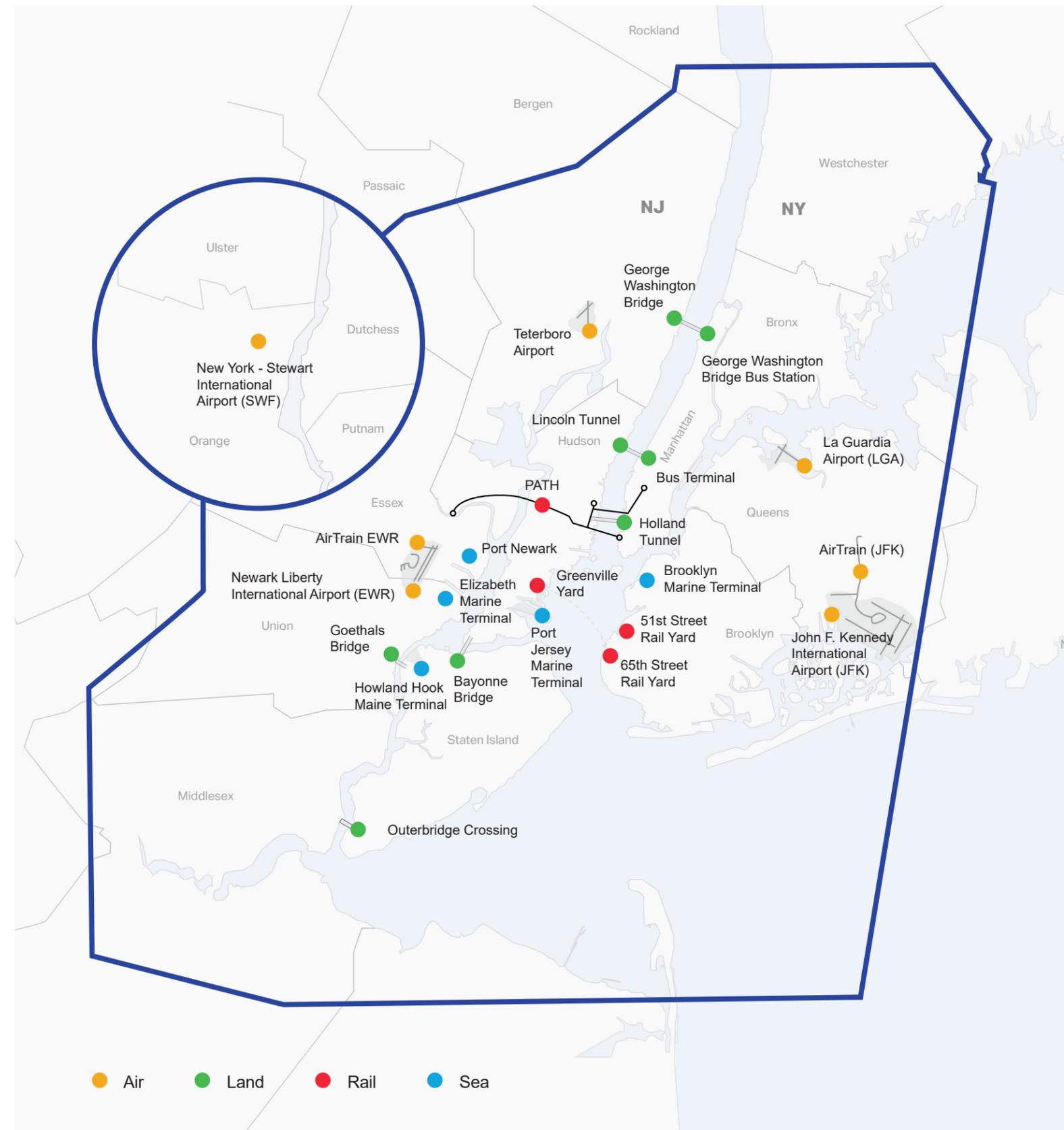
Scopes 1 and 2 Direct Emissions



Scopes 1, 2, and 3 Emissions



Our Facilities



Our Net Zero Roadmap

We developed this document to translate our ambition into action.

The Net Zero Roadmap will help us communicate our vision and goals by connecting our commitment to reduce GHG emissions to our agency mission, priorities, and standards. This document outlines the next set of concrete actions to put us on a path to achieve net zero emissions by 2050 and sets up the path to implementation. We provide a framework for how we will align strategy, decision-making, and operations with our net zero goal and identify future actions to get us there.

How the Roadmap is Organized

In the following sections, we share how we plan to get to net zero by 2050.

Parts 2 + 3 Strategies & Actions

To clearly distinguish between the areas where the Port Authority does and does not have direct control, our net zero strategies and actions are divided into two sections: Reducing Port Authority-Controlled Emission Sources (Part 2), and Enabling Our Stakeholders to Reduce Total Emissions (Part 3).

In each section, we detail a series of strategies and actions:

- **Strategies:** The Port Authority has identified 12 strategies that address all emission sources to get us to net zero by 2050. The strategies are grouped into three categories: Buildings and Facilities, Transportation and Equipment, and Energy Supply and Infrastructure
- **Actions:** Under each strategy is a set of specific actions that the Port Authority has identified and is committed to taking. Actions are projects, policies, regulations, and partnerships that will set us and our partners on the path to net zero. Each action outlines specific short- and long-term steps that will be completed by 2025 or 2030, in line with emissions reduction targets.

Part 4 What's Next

Implementation of many of the actions detailed in Parts 2 and 3 are already underway. We share key elements of our approach to implementation which we intend to publicly report, and disclose our progress over time.

Strategy Overview

Part 2

Reducing Port Authority-Controlled Emission Sources

Where we have direct control over capital investments and development, operating budget decisions and procurement, and operations and equipment—such as for our buildings and fleet, we will act to directly reduce our GHG emissions.

- 1 Zero-Emission Port Authority Vehicles
- 2 Expanded Charging Infrastructure

- 3 Existing Building Decarbonization & Energy Efficiency
- 4 Sustainable Construction & Major Redevelopment
- 5 Improved Building & Facility Operations

- 6 Renewable Energy
- 7 Electrical Infrastructure Upgrades
- 8 Central Plant Decarbonization

Part 3

Enabling Our Stakeholders to Reduce Total Emissions

Where we do not have direct control—such as for airline, port, bus service, tenant operations, and vehicular travel to, from, or on our infrastructure and facilities, we will work aggressively with our partners to move the region toward a sustainable and net zero future.

- 9 Zero-Emission Airport Operations
- 10 Zero-Emission Seaport Operations
- 11 Regional Transportation & Congestion Management

- 12 Green Tenant Buildings & Facilities

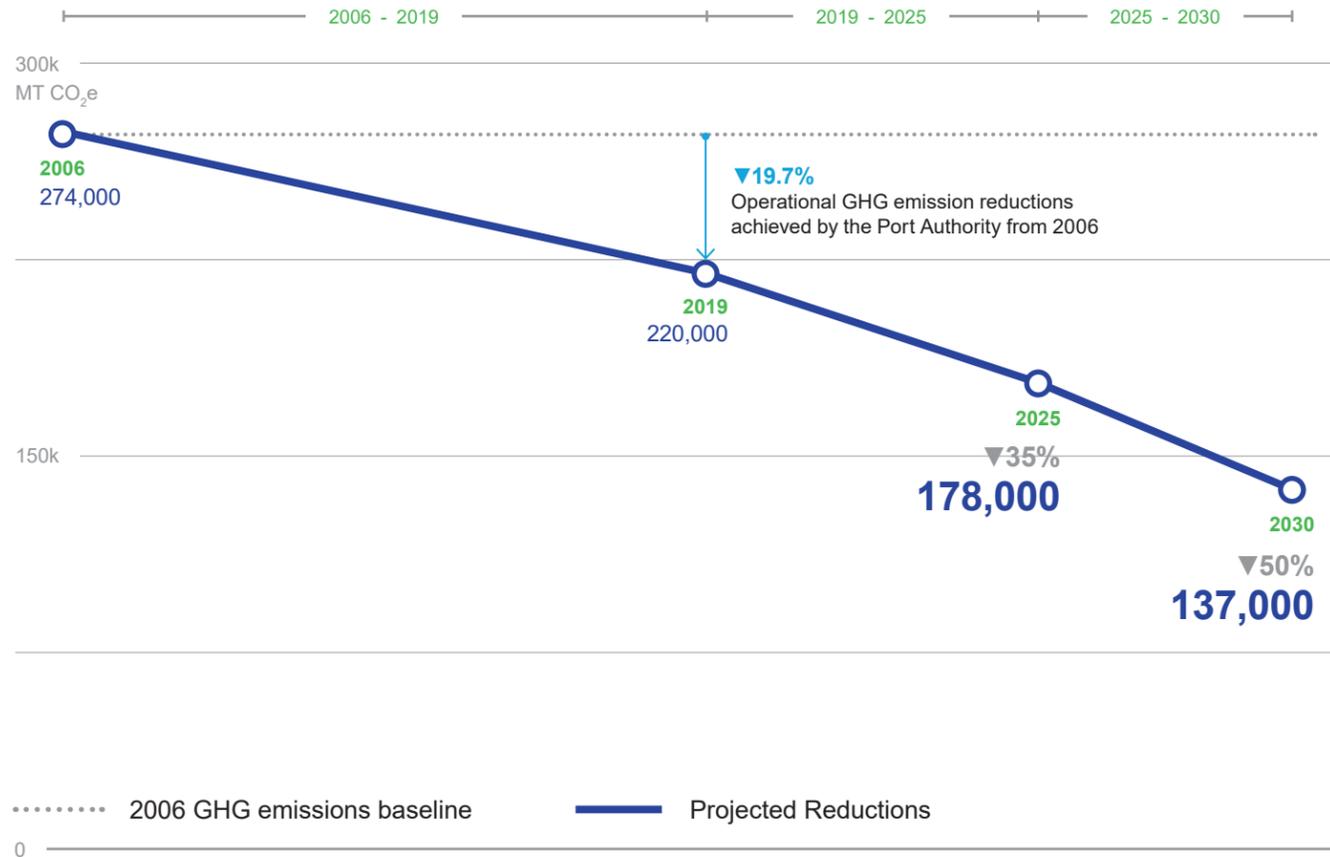
- Transportation and Equipment
- Buildings and Facilities
- Energy Supply and Infrastructure



Commuters at the Exchange Place PATH Station in New Jersey

Pathways to Net Zero

Projected Reductions in 2025 and 2030 for Scopes 1 and 2 Direct Emissions



This Roadmap includes actions to help us achieve our 2025 and 2030 interim goals for operational emissions as well our 2050 net zero goal for all emissions.

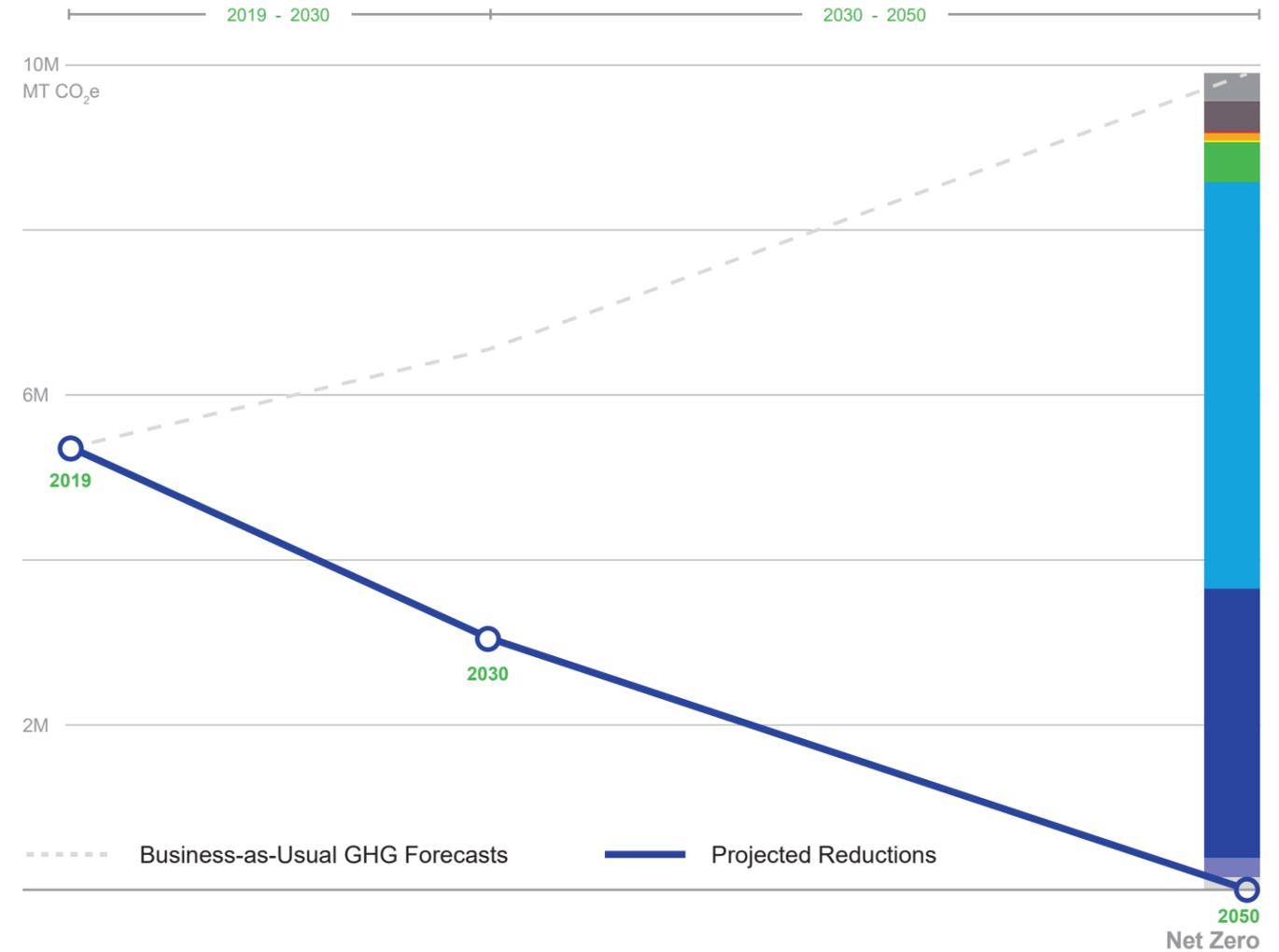
As noted earlier in this document, the strategies we must implement to meet our short- and long-term goals will be different.

The figure above illustrates our trajectory to achieving our 2025 and 2030 goals. The pathway to meeting these interim goals is fairly straightforward. Through our Clean Dozen 1.0 and 2.0 initiatives, the Port Authority has already begun to implement specific policies and projects that put us on a trajectory to meet the goal of reducing our operational emissions by 35% below 2006 levels by 2025. These initiatives will also contribute to achieving many of the reductions needed to meet our 2030 goal of 50% reduction in operational emissions below 2006 levels.

For our new net zero goal we must take a different approach, one that moves beyond our operational emissions to one that relies on our stakeholders and future technological advances to reduce our indirect emissions as well.

The figure on the right illustrates how we can meet our 2050 net zero goal by decarbonizing our own facilities and infrastructure while partnering with tenants and operators to take advantage of their existing momentum and drive further change across the transportation sector.

Projected Reductions in 2050 for Scopes 1, 2, and 3 Emissions versus Business-as-Usual GHG Forecasts



The top dashed line is business-as-usual growth in Scopes 1, 2, and 3 emissions if no further action is taken.³ The colored bars represent emissions reductions from implementing the plan's strategies based on expected market and technological trends, current industry commitments, and the additional actions that the Port Authority will take to meet our reductions target.⁴ External factors such as decarbonization of the electric grid under New York and New Jersey's respective Renewable Portfolio Standards (RPS) and improved vehicle efficiency as required by the federal Corporate Average Fuel Economy (CAFE) standards are shown at the top of the bar and will partly help us achieve our goals.

³The business-as-usual line assumes no growth for Scopes 1 and 2 emissions, and 2.1% annual growth for Scope 3 emissions based on assumptions about industry-wide growth factors.

⁴Note that Strategies 2 and 7 (Expanded Charging Infrastructure and Electric Infrastructure Upgrades) will facilitate emissions reductions, but do not directly result in emissions reductions.

Projected GHG Reduction Sources

- External Regulations
 - Decarbonize Electric Grid (RPS)
 - Vehicle Efficiency (CAFE Standards)
- Net Zero Roadmap Strategies
 - Zero-Emission Port Authority Vehicles
 - Existing Building Decarbonization & Energy Efficiency; Improved Building & Facility Operations
 - Sustainable Construction & Major Redevelopment
 - Central Plant Decarbonization
 - Zero-Emission Airport Operations
 - Zero-Emission Seaport Operations
 - Regional Transportation & Congestion Management
 - Green Tenant Buildings & Facilities



**Reducing Port
Authority-Controlled
Emissions Sources**

STRATEGIES & ACTIONS

Reducing Port Authority-Controlled Emission Sources

SPOTLIGHT

Zero-Emission Vehicle Roadmap



Port Authority EV fleet parked in front of George Washington Bridge

The Port Authority is currently developing an agency-wide strategy for transitioning to zero-emission technologies for vehicles and equipment owned by the Port Authority, Port Authority tenants, and other users of Port Authority facilities. To develop the roadmap, we engaged with vehicle owners, operators, and other key stakeholders to understand the existing commitments of our industry partners, challenges they face, and potential solutions. We also released a “Getting to Zero” Request for Information and Sustainability Request for Innovation to gain a better understanding from manufacturers and service providers about the current market availability and upcoming innovations in zero-emission vehicle and supporting infrastructure technology. We will continue to collaborate with stakeholders as we implement zero-emission vehicle strategies, identify funding opportunities, and explore technical solutions to accelerate the transition to zero-emission vehicles and equipment.

The Port Authority builds and operates a complex transportation network that includes three major airports, one of the world’s busiest bus terminals, several interstate bridges and tunnels, the PATH system, and one of the Nation’s biggest ports—all of which require that the Port Authority employ an extensive fleet. Most of our direct (Scopes 1 and 2) emissions come from the operation of our fleet, buildings, and facilities and from purchasing electricity to power our facilities. We are taking the lead to reduce our own emissions and setting an example for our tenants and partners that contribute to the overall emissions of the Port Authority.

Transportation & Equipment

- Transition our fleet to zero-emission vehicles, including our airport shuttle bus fleet, to phase out fossil fuels.
- Deploy charging infrastructure to support fleet vehicle electrification.

Buildings and Facilities

- Implement energy conservation measures and eliminate fossil fuel-burning equipment to ensure new projects align with our net zero ambition.
- Strengthen net zero requirements for new construction.
- Implement best practice operations and maintenance procedures, including improved waste management.

Energy Supply & Infrastructure

- Assess capacity, forecast demand, and add electrical capacity at our facilities to allow us to electrify our equipment, vehicles, and buildings.
- Accelerate the adoption of clean energy and improve our resilience through the installation of renewable energy and energy storage systems on our properties.
- Scale up implementation of efficient, clean, and electric solutions at scale by assessing and piloting low- and zero-emission technologies.
- Identify pathways to decarbonizing our five central energy plants.

Transportation & Equipment

STRATEGY 1
Zero-Emission Port Authority Vehicles

Transition Port Authority vehicles to zero-emission alternatives

Transitioning our fleet of over 2,000 cars, trucks, shuttle buses, and specialized vehicles to zero-emission alternatives is a key part of the path to carbon neutrality. Port Authority fleet vehicles include light-duty sedans, airport passenger shuttle buses, trucks, and specialized maintenance vehicles. These include vehicles owned and operated by the Port Authority, such as specialized tunnel maintenance trucks, as well as vehicles that the Port Authority owns and are operated by others, such as the airport shuttle buses.

The Port Authority has already committed to transitioning 100% of our non-emergency-response light-duty vehicles to electric by 2030 and transitioning 50% of non-emergency-response medium- and heavy-duty vehicles to zero-emission by 2035. Although many electric options for light-duty vehicles are currently available, the same is not true for all medium- and heavy-duty vehicles. For those vehicles for which electric options are not readily available, multiple zero-emission options—such as vehicles powered by hydrogen or alternative fuels—will be assessed as they become available to see which best meet operational needs. This work will reduce our Scope 1 and Scope 2 emissions, while improving the air quality of the region, driving innovation, and providing a cleaner, quieter customer experience.

In alignment with our goals, the Port Authority is a member of EV100, a global initiative to catalyze the uptake of electric vehicles, and we have won various fleet awards, including the #1 Green Fleet Award from the NAFA Fleet Management Association in 2016 and 2019 for our efforts to transition to EVs and integrate enhanced environmental practices.

ACTION 1.1

Electrify Light-Duty Fleet

Electrify all non-emergency-response, light-duty fleet vehicles by 2030.

The Port Authority’s fleet includes over 800 non-emergency-response light-duty fleet vehicles, which are defined as vehicles under 10,000 pounds, including sedans, sport utility vehicles (SUVs) and light-weight pickup trucks. These vehicles are located at nearly every facility and are used by facility operations and maintenance staff to move around their facilities and perform basic job functions.

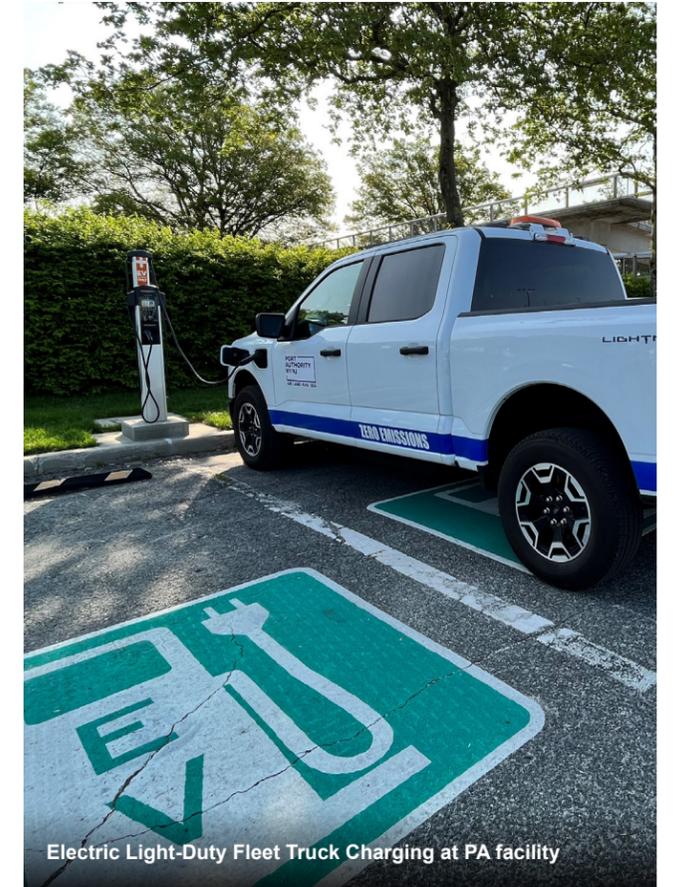
Complete by 2025

Take delivery of electric vehicles to meet interim milestone of transitioning 50% of our non-emergency-response light-duty fleet vehicles to EVs by end of 2025.

Provide training materials and resources on the operations and maintenance of EVs for Port Authority staff.

Complete by 2030

Implement procurement plan for all remaining vehicles.



Electric Light-Duty Fleet Truck Charging at PA facility

ACTION 1.2

Electrify Port Authority Shuttle Bus Fleet

Fully electrify Port Authority airport shuttle bus fleet by replacing all diesel and hybrid shuttle buses with zero-emission alternatives.

The Port Authority has already electrified the 46 airport shuttle buses in day-to-day use. However, approximately 70 backup diesel and hybrid shuttle buses remain in the fleet for emergency purposes or when the AirTrain is out of service.

Complete by 2025
Establish a phased procurement plan to replace remaining diesel and hybrid shuttle buses with zero-emission alternatives.

Complete by 2030
Ongoing transition of the shuttle bus fleet to zero-emission alternatives.



Electric Shuttle Bus at LaGuardia Airport



PA Electric Attenuator Truck

ACTION 1.3

Transition Medium- and Heavy-duty Port Authority Fleet Vehicles to Zero-Emission Alternatives

Replace 50% of non-emergency response medium- and heavy-duty vehicles to zero-emission alternatives by 2035 and establish plan for transitioning the remainder.

The Port Authority has a diverse fleet of over 1,000 medium and heavy-duty vehicles. In line with Federal Highway Administration (FHWA) vehicle category classifications, a medium- to heavy-duty vehicle is defined as any vehicle weighing over 10,000 pounds. These fleet vehicles are used for facility operations, maintenance, construction, and snow clearing and are required to handle extensive workloads. Medium- to heavy-duty vehicles most frequently run on diesel and have more significant air quality impacts on surrounding communities than light-duty vehicles.

The Port Authority's medium- and heavy-duty vehicles include heavy-duty pickup trucks, bucket trucks, de-icer trucks, dump trucks, a high-speed plow truck, rack trucks, a tanker truck, tow trucks, and utility trucks. Many of these vehicles currently have limited zero-emission alternatives, although that is expected to change in the coming years.

Complete by 2025
Draft procurement plan for first round of medium- and heavy-duty zero-emission vehicles.

On an ongoing basis, explore the commercial availability, feasibility, and safety of emerging alternative low- and zero-emission vehicle technologies, such as alternative fuels and hydrogen fuel cells.

Complete by 2030
Procure and deploy zero-emission medium- and heavy-duty non-emergency-response vehicles on a rolling basis to meet goal of 50% zero emissions by 2035.

Provide training materials on the operations and maintenance of medium- and heavy-duty zero-emission vehicles.

Pilot the use of alternative fuels and/or hydrogen fuel cell vehicles as they become commercially available and are determined to be safe, compatible with operational needs, and cost-effective.

ACTION 1.4

Transition Port Authority Emergency-Response Vehicles to Zero-Emission Alternatives

Develop a strategy to eliminate emissions from Port Authority emergency-response vehicles.

Emergency-response vehicles such as police-cruisers have specific requirements and operational constraints that make them more difficult to replace with zero-emission models compared to similarly sized vehicles. Emergency-response vehicles must be prepared at all times to react and respond to crises or life endangerment situations. To transition these types of vehicles to zero emission, there must be sufficient evidence that the vehicle technology and infrastructure can support this operation. For some emergency response needs, no zero-emission vehicle model is currently commercially available or operationally feasible.

The Port Authority Central Automotive Division tracks development and implementation of emerging zero-emission "pursuit-rated" police vehicle technologies nationally. Whenever possible, hybrid emergency response vehicles are used. Hybrid vehicles account for approximately 20% of the current emergency response fleet.

Complete by 2025
Develop and implement 6 to 12-month pilot of 5 to 10 EVs, use telematics to test for operational suitability, and include a plan for necessary charging infrastructure.

Complete by 2030
Develop short-term plan for expanding pilot to multiple facilities.

Pilot alternative fuels and/or hydrogen fuel cell vehicles as they become commercially available.

Develop a long-term plan and goals for transitioning to zero-emission Port Authority emergency-response vehicles.

Integrate low- and zero- emission vehicles into the emergency-response fleet.

ACTION 1.5

Transition Off-Road Vehicles and Specialized Equipment to Zero-Emission Alternatives

Research technologies and develop an implementation approach to identify alternative fuel options for off-road vehicles and specialized equipment used at Port Authority facilities.

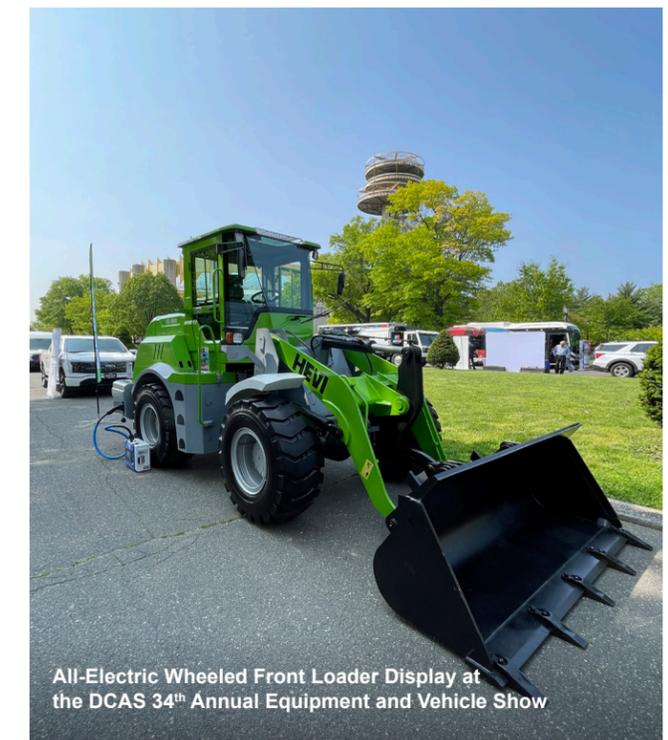
Common off-road vehicles and equipment include backhoe loaders, skid steer loaders, wheel loaders, tractors, Aircraft Rescue and Firefighting (ARFF) trucks, snow removal trucks, and forklifts.

Complete by 2025
Research low- and zero-emission alternatives for specialty equipment and consider technologies for pilot projects.

Demonstrate zero-emission alternatives for off-road vehicles and specialized equipment, including hydrogen fuel cell technology.

Pilot renewable diesel and consider use as interim strategy.

Complete by 2030
Expand use of zero-emission alternatives for off-road vehicles and specialized equipment, including hydrogen fuel cell technology, as they become commercially available and operationally feasible.



All-Electric Wheeled Front Loader Display at the DCAS 34th Annual Equipment and Vehicle Show

STRATEGY 2
Expanded Charging Infrastructure

Install necessary charging infrastructure to support the timely rollout of new electric vehicles in the Port Authority fleet.

The transition to zero-emission electric vehicles will require an extensive network of charging infrastructure across the Port Authority’s multiple facilities. Installing this infrastructure at our facilities is a critical step to facilitate the transition to zero-emission vehicles and equipment. This work presents a range of challenges, including limited or aging existing electrical infrastructure at many facilities, constraints on grid capacity and stability, extensive coordination needed with utility providers, as well as high upfront costs, and the ability to maintain operations during the transition period. In addition, different types of vehicles, such as light-duty sedans, passenger shuttle buses, and heavy-duty maintenance trucks, often have different charging needs and standards.

Any new charging infrastructure must meet the operational needs of each facility, provide resiliency during emergency situations, be cost-effective, and be available as new vehicles are added to the fleet.

The Port Authority recently completed an agency-wide EV-charging fleet planning study to assess vehicle utilization rates and optimize the number and placement of chargers. This effort has kicked-off a series of projects to install additional fleet chargers to achieve one of our interim milestones—replace 50% of the non-emergency-response light-duty fleet with electric vehicles by 2025.

Broader efforts to improve electrical infrastructure at Port Authority facilities will be done in coordination with building electrification efforts, as noted in Strategy 7, Electrical Infrastructure Upgrades.

ACTION 2.1
Install Fleet Charging Infrastructure

Provide charging infrastructure for fleet vehicles that balances operational, infrastructure, and capital constraints.

Charging infrastructure will be strategically deployed based on where fleet vehicles operate and park. The Port Authority has evaluated over 60 different parking locations across over 20 facilities for charging infrastructure requirements to meet fleet electrification goals. This assessment has informed the number of chargers that are being installed to support the 2025 fleet electrification goals.

As part of the transition to an electric fleet, we are upgrading electrical infrastructure, installing EV chargers, and testing new technologies. To date, over 140 Level 2 charging ports have been installed at over 25 locations to support fleet vehicles. We are also testing other new approaches to EV charging, including portable EV chargers, a charging valet pilot, and stand-alone solar powered chargers for back up resiliency. We piloted load management and power management strategies for peak load shaving and improved power utilization.

Complete by 2025

Deploy charging infrastructure to support near-term delivery of electric vehicles, including those to help meet the Port Authority’s 2025 interim milestone of replacing 50% of the non-emergency response light duty fleet with electric vehicles.

Continue piloting new, innovative zero-emission solutions (such as demand management optimization, battery storage, energy purchasing strategies, and alternative fuels) as well as emerging charging technologies (such as EV inductive charging and mobile grids).

Complete by 2030

Plan for additional charging needs to support our 2030 and 2035 fleet electrification goals.

Add electrical capacity at Port Authority facilities as determined by electrical capacity and demand studies to support the deployment of EV charging infrastructure that meets medium- and long-term electrification goals.

ACTION 2.2
Assess Electrical Infrastructure Needs and Make Necessary Upgrades for Vehicle Electrification

In coordination with larger electrical infrastructure effort, evaluate current electrical capacity and future demand, with a focus on upgrades and solutions necessary to support the transition to electric vehicles and building systems.

Complete by 2025

Assess future electrical requirements for electric vehicles and electrical capacity at relevant Port Authority facilities.

Identify gaps and develop technical solutions, including demand management optimization, battery storage, energy purchasing strategies, and new charging technologies (such as EV inductive charging and mobile grids), to address these gaps on a timely and cost-effective basis.



LaGuardia Airport Electric Shuttle Bus Charger



EV Fleet and Solar Charging Station

Buildings & Facilities

STRATEGY 3 Existing Building Decarbonization & Energy Efficiency

Drive building decarbonization efforts at all existing Port Authority facilities through robust energy efficiency retrofits, while transitioning away from the use of fossil fuels.

The Port Authority is committed to eliminating fossil fuels at our buildings and sites throughout the agency. For optimum impact and cost effectiveness, we are implementing a phased strategy that considers the life cycle of building equipment and optimizes decarbonization approaches accordingly. For buildings with near- and medium-term life expectancies that are candidates for energy efficiency optimization, we are focusing on energy efficiency upgrades and other retrofits to reduce overall energy usage. Buildings with longer-term life expectancy will undergo electrification or transition to another clean energy technology that may become available in the future. This will reduce our Scope 1 and 2 emissions while improving air quality and resilience. This approach will enable the Port Authority to reach our net zero goals while ensuring continued exceptional customer service and world-class operation of our facilities.

4Rs for Building Energy Transformation



Reduce

Lower the energy needs of buildings by implementing energy-efficient heating and cooling, and optimizing insulation, lighting, and appliances.



Reclaim

Capture and use waste energy through heat recovery systems and cogeneration technologies to increase energy efficiency.



Replace

Transition from fossil-fuel-burning equipment to non-carbon, clean energy solutions such as heat pumps and solar panels.



Renewables

Use renewable energy sources like solar and wind power to cover remaining energy needs and achieve net zero emissions.



LED Lights in Holland Tunnel



Installing LED Lights at WTC PATH Station

ACTION 3.1

Reduce and Reclaim Building Energy Use

Optimize building performance by minimizing energy demand and maximizing energy recovery.

The major energy demands within our buildings are for lighting and space heating and cooling. Lighting energy demand can be addressed through smart controls and conversion to new LED lights. Space heating and cooling demand can be addressed through optimized building operations, improved building management controls and parameters, more efficient equipment and alternative technologies, as well as improvements to the building envelope. We are also committed to fully taking advantage of all heat recovery opportunities, such as extracting waste heat from exhaust systems and heat recovery ventilation systems in all building evaluation and designs.

Complete by 2025

Complete a comprehensive asset inventory to gather information on the condition and remaining useful life of buildings, facilities, and equipment to determine what investment relative to the net zero 2050 goal is appropriate.

Identify priority building and facility retrofit and upgrade opportunities in coordination with ongoing construction and redevelopment programs.

Implement energy efficiency upgrades where feasible within the building and facility portfolio, in line with scheduled equipment upgrades to meet 2025 and 2030 goals of reducing operational emissions.

Complete by 2030

Benchmark facilities and conduct energy master planning to optimize shared utilities and systems.

Expand the application of energy efficiency requirements in alignment with regional standards.

ACTION 3.2

Replace Fossil Fuel Systems and Pair with Renewables Where Possible

Decarbonize building systems with electric equipment or other clean energy solutions and strategically pair with the installation of renewable projects.

The Port Authority is working to transition away from fossil fuel by replacing fossil fuels with electrical equipment and incorporating other technologies such as air source and geo-exchange heat pumps. Expanding our renewable energy generation in parallel with our ongoing electrification efforts is essential to reducing reliance on fossil fuels. On-site renewable energy generation can help lower operating costs and aid in the greening of the grid. When paired with battery storage, on-site renewables provide added resiliency in our operations, allowing us to maintain world-class service in the case of disruptions to the grid. For these reasons, on-site renewable energy along with energy efficiency projects will be included in the building design or retrofit of every feasible site.

Complete by 2025

Pilot decarbonization strategies to assess scalability across the agency. Potential projects include utilizing air, ground, and water sourced heat pumps, energy reclamation and heat transfer optimization, solar thermal and PV opportunities, and adding sophisticated building management and control systems.

Begin rolling out building decarbonization projects as part of capital replacement cycles, in combination with energy conservation measures and renewable energy projects to maximize efficiency while minimizing demand on the utility grid.

Explore the use of geo-exchange heat pump systems to maximize heating and cooling efficiency.

Complete by 2030

Develop a phasing plan for transitioning to zero-emission refrigerants across Port Authority operations.

Accelerate building decarbonization projects as part of capital replacement cycles.

SPOTLIGHT

New Port Authority Bus Terminal Aims for Net Zero

Preliminary planning is underway for a complete overhaul of the 73-year-old Port Authority Bus Terminal, with sustainability serving as a central focus for the \$10 billion redevelopment project. The planned terminal will bring an array of benefits to commuters and the surrounding community. Congestion and pollution will be reduced through a bus staging facility, which removes idling intercity buses from city streets. Autonomous vehicle technologies and AI-aided traffic management will ensure efficient operation of bus movements within the terminal. Light and noise pollution will be reduced through enhanced designs. The new terminal is being designed to accommodate 100% electric bus fleets.

To achieve net zero for the new facility, building decarbonization strategies will be included in all facets of the design. We are considering geothermal-based solutions where they are best suited. We are also considering heat recovery and extraction from wastewater being generated at the facility. As an amenity for the community, approximately 3.5 acres of new public open space will be added as part of the development of this new best-in-class transportation facility.



Present-Day Port Authority Bus Terminal



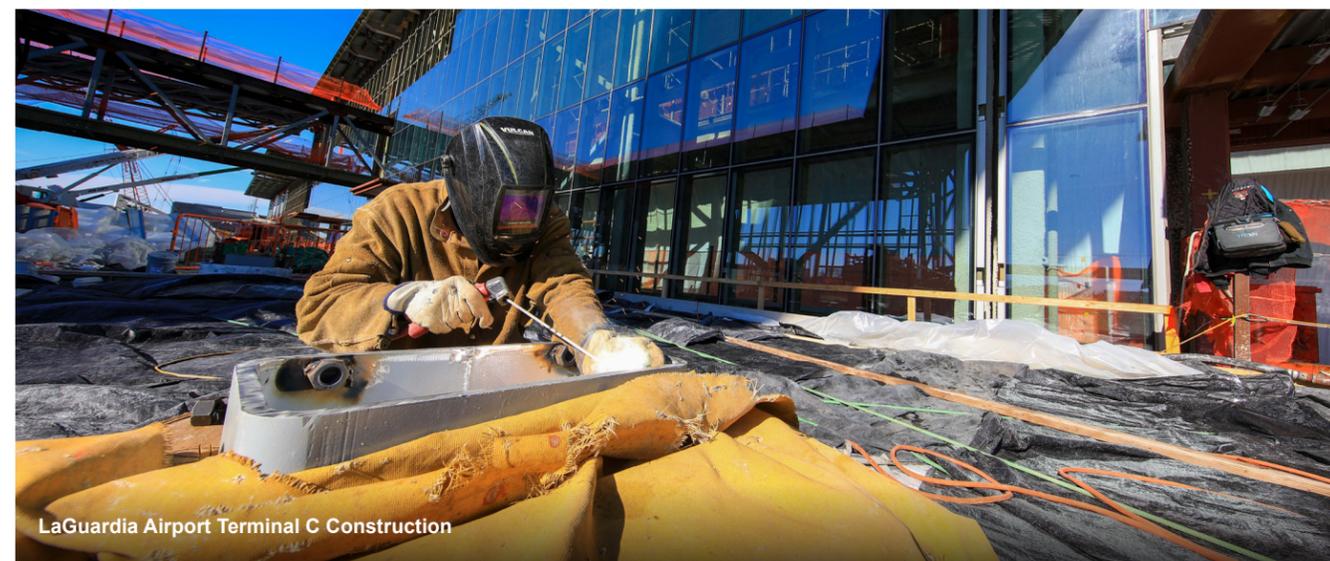
Rendering of the New Port Authority Bus Terminal

STRATEGY 4
Sustainable Construction & Major Redevelopment

Ensure all new construction and major redevelopment projects are constructed with the most efficient equipment and designed to the latest sustainability standards.

In many ways, new construction is less challenging to decarbonize than existing buildings. The Port Authority will phase in design and construction requirements to eliminate the use of fossil fuels and decrease energy demand through increased efficiency in energy usage, material usage, and construction practices. At the same time, we will conduct infrastructure planning to ensure the most sustainable design possible can be implemented.

The Port Authority views every new construction project as an opportunity to demonstrate our commitment to sustainability. Sustainable design can help conserve resources, improve waste management and air quality, and contribute to an enhanced customer experience. We are demonstrating this sustainability commitment in various active phases of development for the new Midtown Bus Terminal, EWR Vision Planning, and JFK Redevelopment with more major redevelopment opportunities coming in the near future. The Port Authority will continuously challenge and raise the bar for sustainability for every new construction opportunity. These actions will help us reduce our Scope 1, 2 and 3 emissions.



LaGuardia Airport Terminal C Construction

ACTION 4.1

Enhance Design and Construction Requirements

Align existing sustainable design and construction requirements with net zero targets.

The Port Authority's Engineering Design Guidelines set the requirements for all new construction and renovations completed by the Port Authority and tenants. These guidelines take a comprehensive view of environmental performance, including project siting, water, energy and emissions, construction practices, materials, indoor environments and project lifecycle. The Engineering Design Guidelines will continue to be updated to align with the Port Authority's sustainability goals.

Complete by 2025

Update Engineering Design Guidelines and construction specifications to align with Net Zero Roadmap objectives, including phasing in new guidelines over time as appropriate.

Develop Building Energy Modeling Guidelines and Building Energy Modeling Component Library to optimize energy performance in building design.

Develop estimates of existing and anticipated electrical capacity requirements to understand the increased electrical demand associated with building electrification.

Complete by 2030

Encourage the use of geo-exchange heat pump systems to maximize heating and cooling efficiency.

Pursue alignment with local laws promoting decarbonization and electrification of buildings.

ACTION 4.2

Expand Clean Construction Program

Develop actions to decarbonize materials, reduce emissions from construction equipment and vehicles, and reduce landfill-bound construction and demolition waste.

The Port Authority has already implemented many best practices for clean construction. These include a performance-based concrete specification for the decarbonization of our concrete mix designs. In addition, since 2019, only construction equipment that meets the EPA's Tier 4F engine standards may be used on construction sites. We also require a 90% landfill diversion rate for concrete, asphalt, and steel leaving our construction projects. The environmental impacts associated with the existing Port Authority strategies, and clean construction activities are being measured in order to determine where the agency stands and have begun to be added to the Port Authority's overall GHG and CAP Inventory under upstream emissions.

Embodied carbon refers to the GHG emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.

Complete by 2025

Review and revise engineering standards and processes to reduce the emissions and embodied carbon associated with the manufacturing and construction processes, and incorporate low-carbon material specifications.

Advance the development of Life Cycle Assessment tools, templates and methodology to better document embodied carbon in building design and construction.

Track sustainability metrics reported on Environmental Products Declarations for construction and building materials.

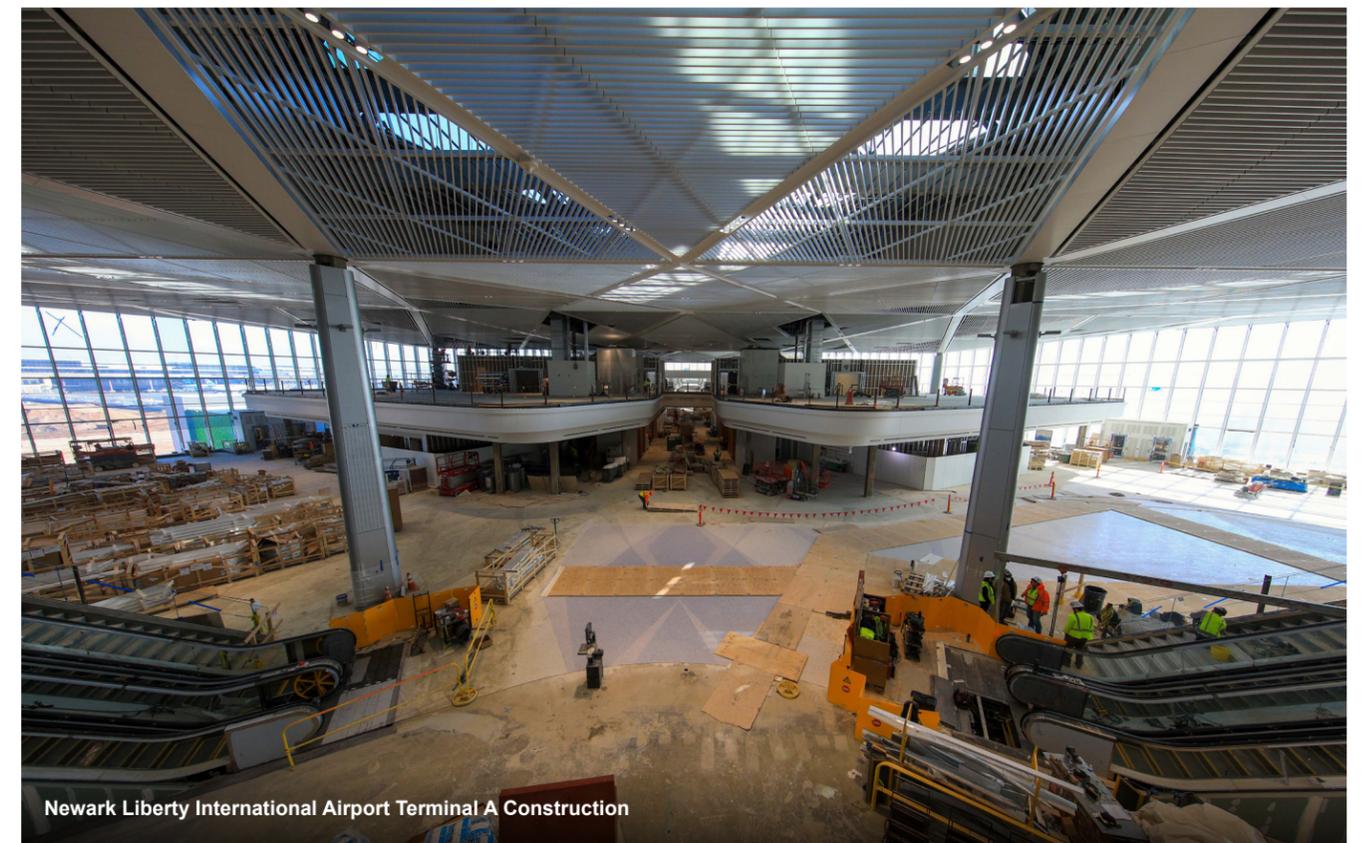
Implement embodied carbon limits from concrete based on raw material mix designs.

Complete by 2030

Develop advanced tools for tracking landfill-bound construction and demolition waste.

Establish baselines and track and set limits for embodied carbon emissions, including transportation emissions, to encompass the full life cycle of materials.

Continue testing new low-carbon materials and strategies in alignment with industry innovations.

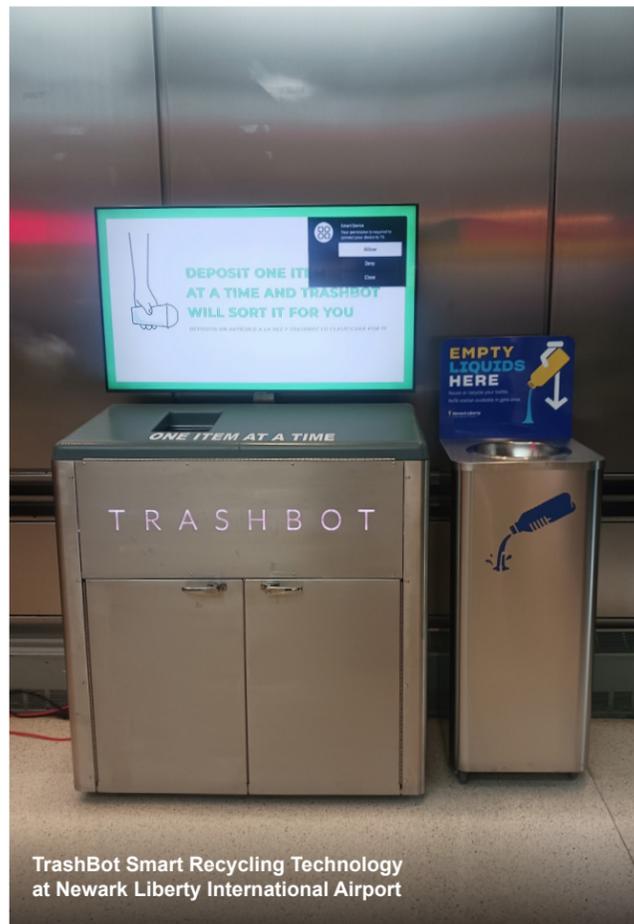


Newark Liberty International Airport Terminal A Construction

STRATEGY 5
Improved Building & Facility Operations

Implement sustainable operations and maintenance best practices across Port Authority facilities to optimize performance.

In addition to the installation of efficient, clean energy equipment, the Port Authority is working to optimize the way our facilities operate. Optimizing building performance requires constant data collecting and monitoring, automated building control systems, and strong maintenance and operating work practices. Optimizing the energy performance of our PATH and AirTrains requires reducing electrical demand through energy efficient equipment and operational efficiencies and integrating innovative energy technologies. Optimizing waste management requires new procedures, training, outreach, and service contracts. Overall these actions will reduce our Scope 1, 2 and 3 emissions while also conserving resources, improving air and water quality, and enhancing occupant comfort.



TrashBot Smart Recycling Technology at Newark Liberty International Airport

ACTION 5.1
Deploy Best-in-Class Building Operation Practices & Leverage Innovative Technology

Establish building maintenance practices and standard operating procedures to reduce energy consumption and optimize building performance.

The Port Authority is leveraging advanced technologies to optimize operational performance. For example, we are installing auto-sensing equipment in the door bays of our maintenance and operation facilities to keep them closed where possible to reduce heat loss. We are also installing intelligent demand-controlled ventilation systems that monitor air quality to maximize energy efficiency while maintaining a high quality indoor environment.

Complete by 2025

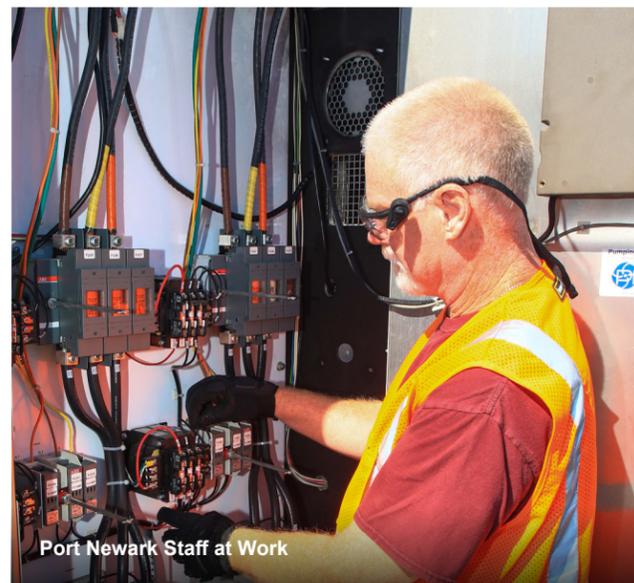
Create baseline of facility energy use and building operations to identify poor-performing buildings that require optimization.

Establish best-in-class building operation and maintenance practices.

Commission and retro-commission buildings to ensure building operational performance meets established goals.

Complete by 2030

Deploy Intelligent Metering and sophisticated Energy Management Systems to maintain sustainable building equipment operation, provide early predictive indication of replacement or maintenance needs, and optimize energy use.



Port Newark Staff at Work

ACTION 5.2
Explore opportunities to reduce emissions from PATH and AirTrain operations

Optimize energy consumption of Port Authority trains through operational efficiencies and new technologies, such as energy storage, peak load shaving, and regenerative braking.

The PATH rail system operates entirely on electric power. Therefore, the system has lower emissions than it would if it were run on diesel or other fossil fuels. As the electric grid becomes greener, emissions associated with the PATH rail system will decline over time. Interim emission reductions will rely on identifying new operational efficiencies, and exploring innovative technologies, such as regenerative braking coupled with energy storage.

The Port Authority has already begun experimenting with regenerative braking on its PATH trains to capture and reuse energy used in everyday operations. The agency will continue to look at the potential of regenerative braking and other technologies that can reduce energy use and better use energy resources.

Complete by 2030

Explore and implement operational efficiencies.

Explore opportunities to responsibly use power and reduce peak demands through energy storage technology.

Continue to explore regenerative braking, coupled with energy storage, as a method of reducing overall energy consumption.

Continue to seek energy-efficient equipment to reduce overall electricity load as operations grow to meet continued demand.



Newark AirTrain

ACTION 5.3
Reduce Waste Diverted to Landfills

Reduce landfill-bound waste to decrease the generation of GHGs such as carbon dioxide and methane associated with waste generation, handling, transportation, and disposal processes.

In 2022, the Port Authority established uniform recycling policies at the airports to make recycling more convenient for travelers and staff. We are exploring innovative solutions and establishing standards to reduce landfill-bound waste at all facilities through the creation of a Port Authority-wide Zero Waste Roadmap. The roadmap will include diversion goals, a waste tonnage and diversion rate baseline, an agency-wide strategy for organics collection and recycling, and suggested improvements in waste management procedures, service contracts, and infrastructure.

Complete by 2025

Create a Port Authority-wide Zero Waste Roadmap.

Maintain compliance with the newly expanded airport recycling policy.

Replace all bins and signage throughout Port Authority facilities with consistently labeled, color-coded containers to encourage waste separation and recycling.

Complete by 2030

Review procurement opportunities and processes to facilitate sustainable purchasing and innovation.

Expand advanced recycling policies to all facilities.

Continue to explore innovative technology and approaches to improve reduction, reuse, and recycling rates, such as on-site waste digestion, automated robotic sorting, and plastic film recycling.

Explore certification and verification of waste diversion performance opportunities across facilities.



Waste Audit Being Conducted at Port Authority Facility

Energy Supply & Infrastructure

STRATEGY 6 Renewable Energy

Scale up renewable energy generation, energy purchasing, and alternative energy sources.

Over the long term, utilities will be transitioning from fossil fuels to cleaner energy sources to meet New York and New Jersey's renewable portfolio standard requirements. In the meantime, the Port Authority is committed to accelerating the shift to clean energy sources by installing on-site renewables and purchasing additional renewable electricity.

The Port Authority is committed to maximizing on-site renewable generation at its facilities. For example, the Port Authority has completed installation of a 5 MWdc solar canopy at Newark Liberty International Airport, the largest single solar rooftop project at a U.S. airport. In addition to pursuing solar generation, the Port Authority will also consider alternative generation and storage technologies, such as fuel cells, small-scale wind power, and battery storage. We will include stand-alone projects as well as integrated hybrid solutions such as microgrids. These systems will help reduce our Scopes 1, 2, and 3 emissions while improving air quality and resilience.



Workers Inspecting Solar Panels

ACTION 6.1

Increase On-Site Solar Photovoltaic (PV) Installations

Develop additional on-site solar energy installations at Port Authority facilities, including community solar, and streamline process for solar adoption at Port Authority facilities.

On-site solar lowers operating costs and contributes to a cleaner grid. The Port Authority will continue to deploy solar in a variety of contexts, including rooftop and carport canopy solar systems, and will explore the feasibility of new platforms such as floating systems. In addition, when paired with microgrid technology or battery storage, on-site solar provides added resiliency in our operation, allowing us to maintain world-class service in the event of disruptions to the grid.

Some of our facilities may also be able to host community solar projects, which are solar power installations that serve local households and businesses that benefit from energy generated by the solar panels. In addition to providing renewable energy to communities that may not be able to deploy solar on their own facilities, consumers may be able to benefit from reduced monthly bills. The Port Authority aims to implement community solar projects or act as the anchor subscriber for community solar projects near Port Authority facilities whenever feasible.

Complete by 2025

Pursue solar installations on all new rooftops, where feasible.

Complete solicitations for a package of solar projects at each major facility.

Streamline project delivery from concept to completion.

ACTION 6.2

Explore Clean Energy & Storage Technologies

Evaluate opportunities to implement clean energy and storage technologies at Port Authority facilities, such as fuel cells, small-scale wind, and battery storage.

In addition to exploring additional renewables and the use of battery storage, the Port Authority will support regional efforts to develop a green hydrogen economy and other efforts aimed at low carbon fuel sources such as renewable natural gas.

Complete by 2025

Partner with industry leaders and other stakeholders to explore the feasibility of clean energy technologies for various applications, including thermal systems and transportation.

Participate in the New York-led regional hydrogen hub to coordinate with stakeholders on securing federal funding.

Complete by 2030

Identify innovative renewable and clean energy technology pilot projects to test capabilities and scalability of new technologies.



Terminal A Parking Garage at Newark Liberty International Airport

ACTION 6.3

Increase Purchases of Renewable Electricity

Increase purchases at all our facilities of electricity generated from clean, renewable sources such as solar and wind, particularly as we convert existing fossil fuel equipment to electric.

Coordinate and communicate with energy suppliers and stakeholders to ensure effective energy infrastructure program design, deployment, and operation.

Complete by 2025

Develop strategy for grid-scale renewable energy procurement, including purchase of environmental attributes.

Evaluate and implement long-term options for renewable energy procurement.

STRATEGY 7
Electrical Infrastructure Upgrades

Upgrade our existing electrical infrastructure in a phased approach to meet our Net Zero vision.

Transitioning to electric vehicles and equipment and eliminating fossil fuels in our operations and buildings will result in an increased electrical demand. Understanding the impact on infrastructure is important as it relates to our implementation strategy and timeline. Providing adequate electrical capacity and upgrading energy grid infrastructure are critical foundational steps in achieving our net zero goals.

ACTION 7.1
Assess Electrical Capacity & Future Demand

Evaluate current electrical capacity and future demand for Port Authority, tenant, and stakeholder operations.

To identify the required electrical infrastructure upgrades and associated capital costs to meet Port Authority sustainability goals by 2050, the Port Authority will perform a comprehensive agency-wide electrical capacity study of Port Authority and tenant-operated spaces. Facility-level increases in electrical demand will be estimated based on different scenarios of building and vehicle conversion, and recommendations will be made for necessary electrical upgrades and operational changes.

Complete by 2025

Review the current distribution systems, and inventory electrical capacity at all Port Authority facilities.

Assess future electrical demand requirements for electric vehicles, equipment, and building systems based on implementation of sustainability goals.

Complete by 2030

Develop solutions inclusive of on-site renewable generation, energy storage, energy efficiency, and operational improvements to bridge the infrastructure gaps between the anticipated electrical demand and existing capacity.

ACTION 7.2
Upgrade Energy Grid Infrastructure and Evaluate Use of Microgrids to Meet Demand

Explore cost-effective approaches to upgrade capacity to support the transition to EVs & electric building systems.

The Port Authority will evaluate energy grid infrastructure for opportunities to upgrade and improve network efficiency and resiliency, including microgrid development.

Complete by 2030

Evaluate opportunities to resolve capacity issues, such as battery storage and demand management optimization, to address identified electrical supply gaps.

Evaluate facilities for microgrid deployment opportunities.

Confirm funding strategy for necessary electrical infrastructure upgrades.

Coordinate with utilities to facilitate and complement Port Authority efforts, including through utility infrastructure upgrades.



1.5 MWdc Solar Array on LaGuardia Airport Terminal B Garage

STRATEGY 8
Central Plant Decarbonization

Transition central plants, which provide energy for heating and cooling for various buildings on Port Authority properties, to resilient, net zero emission systems to drive deep carbon reductions.

The Port Authority operates five central plants: one at each of our three largest airports, one at the Port Authority Bus Terminal, and one at the World Trade Center. Our central plants provide energy for facilities directly owned and operated by the Port Authority as well as those of many of our tenants.

The central plants at JFK International Airport, LaGuardia Airport, and Newark Liberty International Airport produce thermal energy (heating and cooling) for the terminals and, in the case of JFK, also produce electricity. The central plants at the bus terminal and WTC produce thermal energy for all buildings on their respective campuses.

Currently, our central plants rely on fossil fuels. Going forward, our central plants will have to change to help us meet our net zero goal. This could mean a change to the fuel used and a redesign of the central plant, or potentially the removal of the central plant altogether and the introduction of a decentralized approach to heating and cooling. To determine the best path forward, we will need to evaluate each of the central plants in the context of new and emerging technologies as well as our changing operational needs. By transitioning central plants off fossil fuels, we will reduce our emissions, while improving air quality and the resilience of the system.

ACTION 8.1
Determine Pathways for Central Plant Decarbonization

Evaluate technological and operational pathways to cost-effectively transition the five existing central plants to net zero emission systems.

The technological pathways to decarbonizing the central plants are currently unclear, and there are operational challenges involving current contract agreements and financial viability. The Port Authority will assess the costs and feasibility of alternative strategies to determine the best solution for each site.

Complete by 2025

In light of useful life and existing contract agreements, develop opportunity timeline to transition central plants to net zero emission systems.

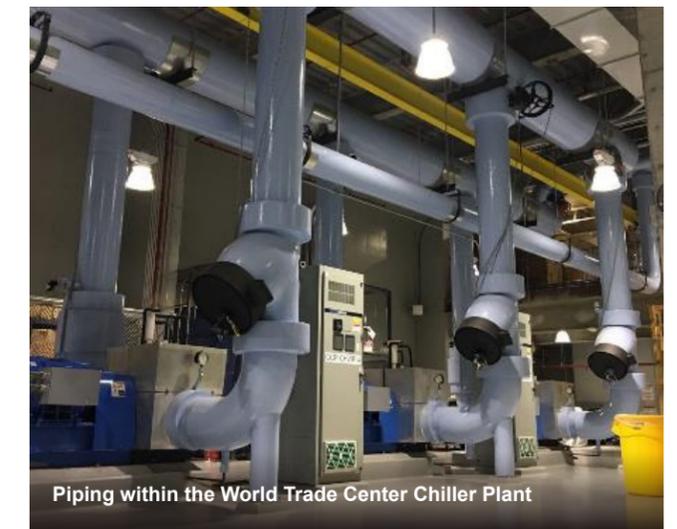
Complete by 2030

Identify and evaluate alternative energy sources and opportunities for energy capture and reuse that can mitigate the consumption of fossil fuels at each central plant.

In coordination with non-PA customers and stakeholders, evaluate the technological feasibility of decentralized alternative configurations to replace each central plant and assess if the alternate configuration is preferable.

Assess energy-as-a-service arrangement opportunities at each facility in comparison to Port Authority-operated and maintained central energy plants.

Determine the right financial and technical solution for each site and begin developing implementation plans.



Piping within the World Trade Center Chiller Plant



**Enabling Our
Stakeholders
to Reduce Total
Emissions**

STRATEGIES & ACTIONS

Enabling Our Stakeholders to Reduce Total Emissions

The largest sources of the Port Authority's overall emissions come from aircraft, marine vessels, and trucks. Emissions also come from the many passenger vehicles that drive through our tunnels and over our bridges, bringing customers and services to our facilities. These are the Scope 3 emissions described in Part 1, over which we have limited control, and they mostly fall into the category of Transportation and Equipment. While we do not directly control these emissions, we still have an important role to play in supporting and influencing our partners and stakeholders and helping the region to achieve collective action toward net zero. Addressing Scope 3 emissions is a critical part of the Net Zero Roadmap.

Transportation & Equipment

- Support the aviation and maritime industries in transitioning to more efficient operations, cleaner technologies, and more sustainable energy sources.
- Help accelerate the adoption of zero-emission trucking technologies and supporting strategies to promote congestion management and sustainable transportation.
- Encourage the reduction of emissions from third-party shuttles, buses, and vans, and from taxis and other for-hire vehicles.
- Facilitate the transition of tenant equipment (e.g., ground support equipment, material-handling equipment) to zero-emission models.
- Provide greater access to low-carbon commuting options, including bicycle and pedestrian access to our facilities, enhanced PATH service, and future-ready bus terminals.

Buildings & Facilities

- Ensure redevelopment projects advance the Port Authority's sustainability goals and incorporate innovative, net-zero-ready solutions.
- Help to transition our tenants' leased building spaces (e.g., offices, retail shops) towards zero-emission operations through updates to new lease agreements.
- Facilitate tenant sustainability initiatives through infrastructure, technical support, planning resources, and engagement to understand and resolve barriers to implementation.
- Enable and encourage the adoption of renewable energy through the development of policies and procurement standards.
- Ensure robust sustainable practices are incorporated in updated design guidelines, construction standards, and alteration processes.
- Reduce tenant landfill-bound waste and GHGs from waste generation, handling, transportation, and disposal processes.

Transportation & Equipment

STRATEGY 9 Zero-Emission Airport Operations

Reduce emissions at our airports by accelerating the adoption of third-party zero-emission vehicles that are stationed at and travel to and from our airports, supporting airlines' transition to zero-emission aircraft and sustainable aviation fuel, and reducing emissions from aircraft operations.

Thousands of fossil-fuel-powered ground support vehicles (e.g., bag tractors, ground power units, aircraft tractors, cargo loaders), trucks and passenger vehicles operate on the secured airside at Port Authority airports. These vehicles emit air pollutants that have environmental impacts for workers and communities. Although the Port Authority does not directly own, operate, or control these vehicles, there are steps that we can take to encourage, accelerate, and enable the use of zero-emission models of these vehicles.

Additionally, millions of cars, buses, and vans travel to and from our airports every year. These include vehicles traveling to our airports on a daily basis, such as hotel and off-airport parking shuttles picking up and dropping off passengers, as well as vehicles that visit less frequently, such as personal passenger vehicles. The Port Authority can also help our partners and customers who operate these vehicles to adopt zero-emission models. This will help reduce noise, improve ambient air quality for sound-impacted communities, and reduce our Scope 3 emissions.

Overall, aircraft operations are the largest source of air emissions at the Port Authority and addressing them is a top priority.



JFK International Airport Terminal 5 Electric Airside Vehicle Charging Stations

ACTION 9.1

Transition to Zero-Emission Ground Support Equipment and other Airside Vehicles

Implement the Zero-Emission Airside Vehicle Rule at LaGuardia Airport, John F. Kennedy International Airport, and Newark Liberty International Airport to accelerate the transition to zero-emission fleets by 2030.

In 2022, we established the Zero-Emission Airside Vehicle (ZEAV) rule requiring the transition to zero-emission GSE at three major Port Authority airports, subject to the commercial availability and operational feasibility of zero-emission models and the availability of charging and refueling infrastructure. This rule supports the reduction of GHG emissions, harmful air pollution, soil and water pollution, and noise impacts. GSE are a critical part of day-to-day airport operations. They are used to tow airplanes, transport luggage, de-ice planes and provide other important services in between flights. As this equipment is often powered by diesel engines and other fossil fuels, it is a significant source of GHG emissions and criteria air pollutants at the airports. In 2019, ground support equipment contributed 4% of the Port Authority's Scope 3 emissions.

The new ZEAV rule relies on a phased implementation plan created after extensive outreach with airlines and other GSE owners. Based on commercial availability, certain types of GSE will be required to be zero-emission by 2027, and the bulk of the GSE fleet will be required to be zero-emission vehicles by 2030.

The Port Authority is also demonstrating its commitment to support the transition to electric GSE by the provision of charging infrastructure, requiring GSE charging at all new gates, partnering with tenants to secure grant funds for charging, and working with tenants on their own charging infrastructure plans.

Complete by 2025

Implement ZEAV Rule and assist fleet owners with compliance.

Quantify demand for, and develop strategies to deliver, GSE charging at locations other than aircraft gates.

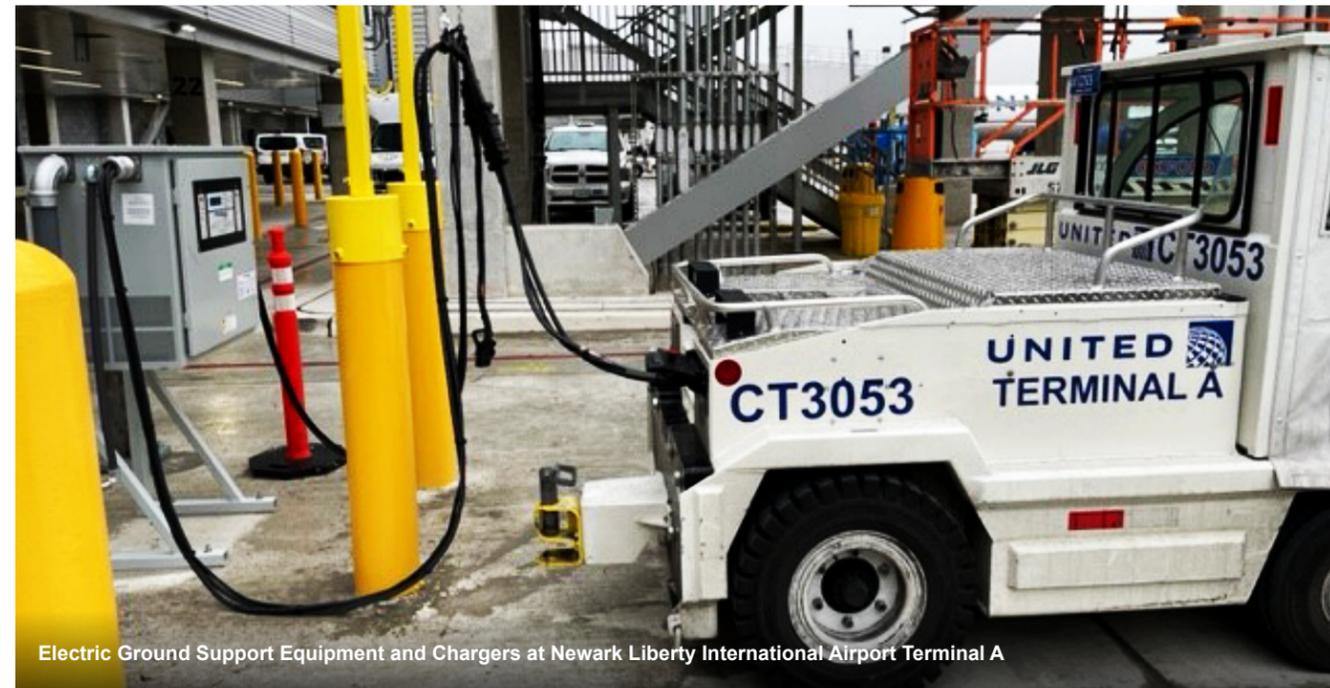
Require charging for GSE and other airside vehicles as part of all new airport construction and redevelopment projects where GSE is operated, and encourage operators of legacy terminals to install charging for GSE and other airside vehicles.

Complete by 2030

Through implementation of the ZEAV rule, completely transition to zero-emission models any GSE that is commercially available in a zero-emission model.

Develop a funding strategy, including identifying potential for grant funding to support Port Authority and tenant charging infrastructure and zero-emission equipment.

Explore the potential for emerging zero-emission airside vehicle technologies such as hydrogen fuel cells.



Electric Ground Support Equipment and Chargers at Newark Liberty International Airport Terminal A

ACTION 9.2

Support Zero-Emission Taxis and For-Hire Vehicles

Install fast-charging infrastructure and consider incentives to accelerate the transition to zero-emission taxis and for-hire vehicle trips.

Taxis, for-hire vehicles (FHVs), and other private car companies provide service to all Port Authority airports and facilities in the region. Together they are a critical part of the transportation network for delivering customers to their destinations.

Many of the FHV companies and organizations that service the airports have set public targets to transition to 100% zero-emission vehicles by 2030. The Taxi and Limousine Commission (TLC), the agency responsible for licensing and regulating New York City's taxis, FHVs, commuter vans, and paratransit vehicles, has committed to supporting an all-electric fleet through prioritizing release of new FHV licenses to EVs. Both Uber and Lyft have zero emission commitments by 2030.

With continuous turnover of arriving and departing vehicles and short dwell times, having direct current (DC) fast chargers at airports is important to allow electric taxis and for-hire vehicles to charge quickly between rides. A fast-charging hub has already been installed at JFK International Airport through the EVolve NY program, and it is accessible to taxis, FHVs, and the public. New fast-charging hubs are planned for Newark Liberty International Airport and LaGuardia Airport.

Complete by 2025

Continue to install DC fast chargers in key locations for taxi and FHVs at airports.

Evaluate potential changes to access fees to encourage adoption of zero-emission vehicles.

Evaluate designating areas for pick-up and queuing locations for zero-emission taxis and FHVs.

Develop a funding strategy for implementation and consider alternative delivery options.

Complete by 2030

Adjust strategies as needed to promote the transition to zero-emission FHVs based on the rate of EV adoption, EV battery evolution, and the expected growth of off-airport charging capacity.

ACTION 9.3

Support Zero-Emission Rental Vehicles

Coordinate with rental car tenants on installation of charging infrastructure and promote adoption of zero-emission rental car vehicles.

Although many models of electric passenger vehicles are currently available, the electrification of rental car vehicles is just beginning in the United States. Some brands have made commitments to purchase new vehicles from EV manufacturers, while other brands continue to evaluate consumer behaviors in key markets that have infrastructure support for EVs.

The Port Authority has already worked with some rental car companies to enable the installation of EV chargers at their facilities and has initiated conversations with some rental car companies about increased electrical infrastructure needs related to the deployment of EVs.

Complete by 2025

Work with rental car tenants to develop coordinated infrastructure plans to support their transition to zero-emission rental vehicles.

Encourage rental car companies to increase EVs in their fleet at Port Authority airports.

Complete by 2030

Adjust strategies as needed to promote the transition to zero-emission rental car fleets based on the rate of EV adoption, EV battery evolution, and the expected growth of off-airport charging capacity.



Hybrid Taxis at JFK International Airport

ACTION 9.4

Transition to Zero-Emission Third-Party Shuttle Buses and Vans at Airports

Develop a policy framework to transition airport-serving third-party shuttle buses and vans to zero-emission vehicles.

Third-party shuttle buses and vans serving hotels, off-airport parking lots and off-airport rental car companies regularly travel to Port Authority airport terminals. Some of these vehicles are commercially available in zero-emission models.

Complete by 2025

Conduct shuttle fleet operator outreach on opportunities and challenges in the transition to zero-emission shuttles and how to support charging needs.

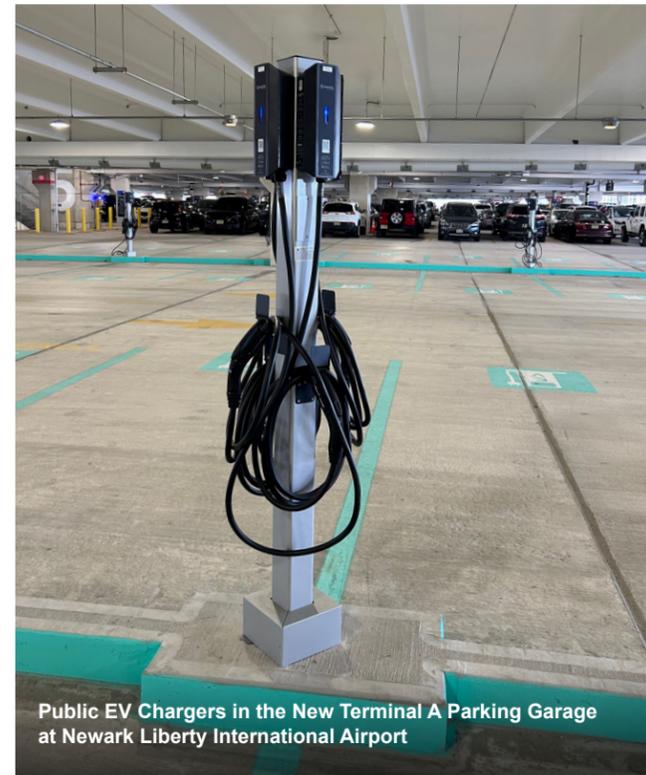
Benchmark peer agencies to inform approach.

Develop policy framework to support the transition to zero-emission third-party shuttles.

Complete by 2030

Adopt and implement policy directives to support the transition to zero-emission third-party shuttles.

Track progress of third-party shuttle operators in transitioning to zero-emission shuttle fleets.



ACTION 9.5

Install Public-Facing EV Infrastructure

Provide infrastructure to enable and encourage the general public to drive EVs to Port Authority facilities.

To support the transition of personal vehicles to electric models, EV charging infrastructure will be needed at or near popular destinations such as regional airports. Unlike for-hire vehicles or third-party shuttle buses and vans, customers visiting the region’s airports may just need supplementary charging. The amount of charging infrastructure needed for customer use at airports and potential fees are still being determined. In the meantime, the Port Authority has been working to increase the availability of infrastructure.

As part of the construction for the parking garage for the new Terminal A at Newark Liberty International Airport, the Port Authority installed more than 150 EV chargers. The charging stations use power from the garage’s level 2 solar energy system and feature sophisticated load management software that ensures appropriate power output for the number of cars charging and the duration of each charging session. The Port Authority has also installed public EV chargers in patron parking lots at JFK International Airport and LaGuardia Airport.

Complete by 2025

Promote existing charging infrastructure to customers through various means, including airport website and clear signage.

Monitor customer usage of existing public EV charging infrastructure at the airports.

Track regional EV charging infrastructure availability to assess the need for additional customer-facing EV charging.

Evaluate strategies to increase public charging infrastructure availability, including through third-party capital investment.

Develop financing strategies to support public-facing charging infrastructure.

ACTION 9.6

Prepare for and Support the Use of Emerging Zero-Emission Aircraft Technologies

Work closely with airlines, aircraft manufacturers, the Federal Aviation Administration (FAA), and other aviation sector stakeholder groups to track emerging zero-emission aircraft technologies, such as electric vertical take-off and landing (eVTOL) aircraft and support the development of infrastructure and facilities to accommodate eVTOL aircraft.

Since eVTOL aircraft were first introduced in 2009, there has been a significant increase in interest among aircraft manufacturers. Powered by batteries, eVTOL aircraft hover and fly much like a helicopter and take off and land going straight up and down. The FAA acknowledges the explosive growth in the Advanced Air Mobility industry including the use of eVTOL aircraft. Commercial airlines have been developing partnerships with eVTOL aircraft manufacturers and announced plans to start consumer flights as early as 2024.

As usage of eVTOL aircraft expands, we will support the completion of planning studies and will partner with stakeholders to ensure that the necessary electrical infrastructure is in place to support it.

Complete by 2025

Study the adoption of eVTOL aircraft in the New York-New Jersey metropolitan area to ensure readiness to accommodate them at our airports.

Develop projections of eVTOL and longer-range electric aircraft usage at our airports.

Track development of longer-range electric aircraft.

Complete by 2030

Support airlines, fixed-base operators and aircraft operators on short-run demonstration flights from nearby locations to Port Authority airports.

Research and track emerging zero-emission aircraft technologies on an ongoing basis.

Partner with stakeholders to ensure the installation of needed infrastructure.

ACTION 9.7

Reduce Emissions Associated with Use of Aircraft Auxiliary Power Units (APU) and Portable Internal Combustion Engine Air-Conditioning Units

Increase the use of fixed and mobile zero-emission ground power and preconditioned air when aircraft are parked at the gate.

Aircraft APUs provide electrical and mechanical power to the aircraft independent of the main engines. Aircraft can turn off the APU and obtain power by plugging into either fixed electric ground power units (the grid) or mobile ground power units that are typically powered by internal combustion engines. When the APU is off, aircraft may heat or cool their interiors by connecting to either fixed air-conditioning units that are connected to the jet bridge (called preconditioned air or PCA units) or, if PCA units are not available, mobile air-conditioning units.

Complete by 2025

Monitor APU usage by aircraft at the gate and track trends.

Encourage airlines and ground handlers to switch to battery electric ground power units where there is no fixed electric ground power.

Implement electric GPU pilot projects.

Pilot service solutions and technologies that ensure the use of fixed electric ground power where it is available and monitor overall usage.

Require installation of fixed electric ground power and pre-conditioned air at all new and redeveloped airport gates and hardstands.

Drive the use of electric ground power units by adding them to the list of GSE that are commercially available in zero-emission models under the ZEAV rule.

Complete by 2030

Encourage the availability of zero-emission ground power and pre-conditioned air, whether fixed or mobile, at all gates and ramp areas.

Require installation of fixed electric ground power and pre-conditioned air at all new and redevelopment airport gates and hardstands.

Develop and implement a policy to minimize use of aircraft auxiliary power units while at the gates.

ACTION 9.8

Support Transition to Sustainable Aviation Fuel

Energize the transition of airlines and aircraft operators to Sustainable Aviation Fuel (SAF) through pilot projects, infrastructure preparedness, and ongoing stakeholder coordination, and by exploring the use of incentives and requirements.

The International Air Transport Association (IATA) considers SAF a key element in the effort to reduce GHG emissions from air travel. The first flight using a blend of SAF and conventional jet fuel took place in 2008. Since then, more than 450,000 flights have used SAF, and more than 50 airlines are using SAF regularly. In 2022, the Port Authority worked with Neste to demonstrate the transport of SAF through an existing pipeline. Neste completed the final processing steps at its Texas refinery that previously produced chemicals. The fuel was loaded into the Colonial Pipeline and transported nearly 1,500 miles across 11 states to LaGuardia Airport where it was used to fuel a Delta Airlines jet. Future trial flights using SAF have been announced by other airlines, including Virgin Atlantic’s plan to fly from London Heathrow to JFK International Airport using 100% SAF.

Our strategy for SAF, like that of other leading airports, will focus on our four areas; infrastructure, partnerships, financing and policy/awareness. By laying the groundwork now, we will be well prepared when state and/or increased federal incentives are in place.

Complete by 2025

Engage with stakeholders relevant to critical regional infrastructure, including SAF producers and suppliers, petroleum terminal operators, and pipeline operators, to ensure their readiness for large-scale SAF supply.

Work with state governments to support SAF policy adoption.



Directing Aircraft at JFK International Airport

ACTION 9.9

Reduce Emissions from Aircraft Movements

Collaborate with airlines, aircraft operators, and the FAA on the development of strategies to reduce emissions from aircraft ground movements.

Zero-emission taxiing technologies and operational changes that reduce delays have the potential to significantly reduce emissions from aircraft movements and improve customer service. The aircraft operator controls aircraft ground movements, but we can collaborate with airlines, aircraft operators, and the FAA on the development of strategies to reduce emissions.

Complete by 2025

Evaluate emissions reduction impact from implementation of Greenlandings, an IT tool that can reduce delays and their associated air emissions by balancing the demand for the airspace with the capacity of the airspace in real time.

Collaborate with airline partners to demonstrate new technologies that enable engine-off taxiing and other ways of reducing emissions related to taxiing and ramp movements.

Complete by 2030

Reduce taxiing time by rolling out departure metering in coordination with the FAA and airlines.

**STRATEGY 10
Zero-Emission Seaport Operations**

Reduce seaport emissions by accelerating the adoption of zero-emission material handling equipment and zero-emission drayage trucks, expanding alternative freight movement options, and supporting the transition to zero-emission fuels for oceangoing vessels and harbor craft.

The Port Authority’s six container terminals, three auto terminals, two cruise terminals, ferry terminal, and numerous public berths handle the world’s largest vessels and all types of cargo. Additionally, the seaport includes four on-dock and near-dock intermodal rail facilities that move containers between the seaport and locations in the Midwest, New England, and Eastern Canada.

Material handling equipment (MHE), also known as cargo handling equipment, is used to transport and handle containers and other port cargo, and perform routine maintenance at marine terminals, rail yards, and other port facilities. MHE includes medium- and heavy-duty equipment such as gantry cranes, forklifts, and yard tractors, most of which are currently powered by fossil fuels.

Approximately 11,000 drayage trucks, which are largely diesel-powered, regularly service the Port. The oceangoing vessel industry is in the early stages of a profound transition of fuels and technology, spurred by a commitment of the International Maritime Organization, a body of the United Nations, to reduce the carbon intensity of ships by 40% by 2030, and by 70% by 2050, and reduce GHGs from international shipping by 50% by 2050. Different ship technologies and practices, such as speed reductions and alternative fuels, are being considered.

On the rail side, incremental improvements in logistics and locomotive technologies have helped make rail freight one of the more efficient modes of transportation. However additional work is needed to identify new propulsion, alternative fuels, energy storage, and charging infrastructure to make deeper reductions in our Scope 3 emissions and improve air and water quality for surrounding neighborhoods.

Although the Port Authority does not directly own, operate, or control marine vessels, drayage trucks, or the MHE used to move cargo, it can support the reduction of their emissions through policies that support the installation of needed infrastructure and through incentives that encourage transitions to zero-emission energy.



Container Ships at Port Newark Container Terminal

ACTION 10.1

Transition to Zero-Emission MHE and Other Vehicles that Support Port Operations

Accelerate the adoption of zero-emission alternatives for the Port's MHE and other vehicles that support port operations.

MHE is used in seaport operations to transport and handle containers and other cargo, and to perform routine maintenance at marine terminals, rail yards, and other port facilities.

The Port Authority updated its Marine Terminal Tariff in 2022 to require the transition to zero-emission MHE, to the extent practicable, at our ports. As certain types of zero-emission MHE are not currently available or operationally feasible for some types of port equipment, the Tariff adopts a phased approach that requires an immediate phase out of the oldest diesel equipment, and sets zero emission requirements for certain types of new MHE. For example, ship-to-shore cranes and rail-mounted gantry cranes newly added to a tenant's fleet past January 1, 2022 must be zero emission. By January 1, 2026 all ship-to-shore cranes and rail-mounted gantry cranes must be zero emissions. The rules established in the Tariff update are expected to help grow demand and demonstrate new zero-emission MHE technologies, while improving air quality and reducing emissions until viable zero-emission alternatives are available in the market for all types of MHE.

The Port Authority also implemented and completed a Cargo Handling Equipment Modernization Program to incentivize terminal operators to replace their older fleets with new, less emitting equipment. The program funded the replacement of one hundred pieces of equipment.



Container operations at Global Container Terminal, NY, Howland Hook Marine Terminal

Complete by 2025

Expand and enhance inventory (registry, tracking, and verification) of tenant MHE operating at port facilities.

Provide support to help tenants navigate zero-emission MHE implementation, including education on potential funding opportunities.

Complete by 2030

Continue implementing zero-emission MHE requirements through regular updates to the Marine Terminal Tariff, subject to the commercial availability and operational feasibility of zero-emission models and the availability of charging and refueling infrastructure.

Explore incentives for zero-emission MHE and other vehicles to support port operations.

Explore new technologies for zero-emission MHE and partner with stakeholders to demonstrate different applications.

ACTION 10.2

Encourage Adoption of Zero-Emission Port Drayage Trucks

Encourage the adoption of zero-emission drayage trucks for the transport of goods to and from the region's marine terminals through supporting infrastructure, operational changes, and outreach.

Drayage trucks transport containers between the port and warehouses, distribution centers, and other locations nearby. Other diesel-fueled trucks such as car carriers, tankers, and dump trucks transport automobiles and other cargo between the Port and further points of distribution or consumption. In 2021, an average of 9,073 trucks visited the port's marine terminals per month.

Due to operational, logistical, and financial concerns, electric drayage trucks are in the early stages of becoming commercially viable, and other zero-emission truck technology is still being developed. Currently, almost all drayage trucks in operation at the port are diesel-powered.

Since 2010, the Port has incentivized drayage truck operators to purchase newer, cleaner models through the Truck Replacement Program (TRP). The TRP has been funded by the U.S. Department of Transportation's Congestion Mitigation and Air Quality Improvement (CMAQ) Program and continues to be funded by EPA's Diesel Emission Reduction Program (DERA) and a Volkswagen Trust Fund grant. It covers up to 50% of the cost of a replacement truck or a maximum of \$25,000, whichever is less. Through the TRP, more than 900 old trucks have been replaced with cleaner, less emitting models. The Port will continue to work with the drayage truck community to support the transition to zero-emission vehicles.

Complete by 2025

Organize educational events and fairs to introduce zero-emission vehicle manufacturers and service providers to drayage truck owners and operators, and engage with all parties to discuss potential obstacles to faster adoption, including battery range, charging infrastructure, and upfront costs of ownership.

Explore potential grants and other ways to lower the cost of adoption of zero-emission drayage trucks.

Complete the installation of four DC fast chargers for drayage trucks that will enable efficient charging of drayage trucks and eliminate the need for lengthy trips outside the Port for charging.

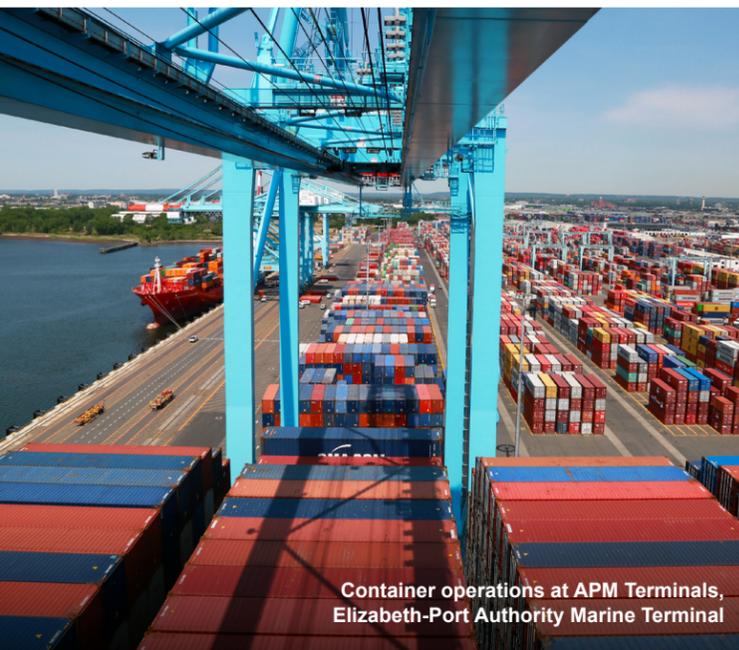
Complete by 2030

Coordinate with marine terminal operators to provide incentives such as dedicated gate lanes for zero-emission drayage trucks.

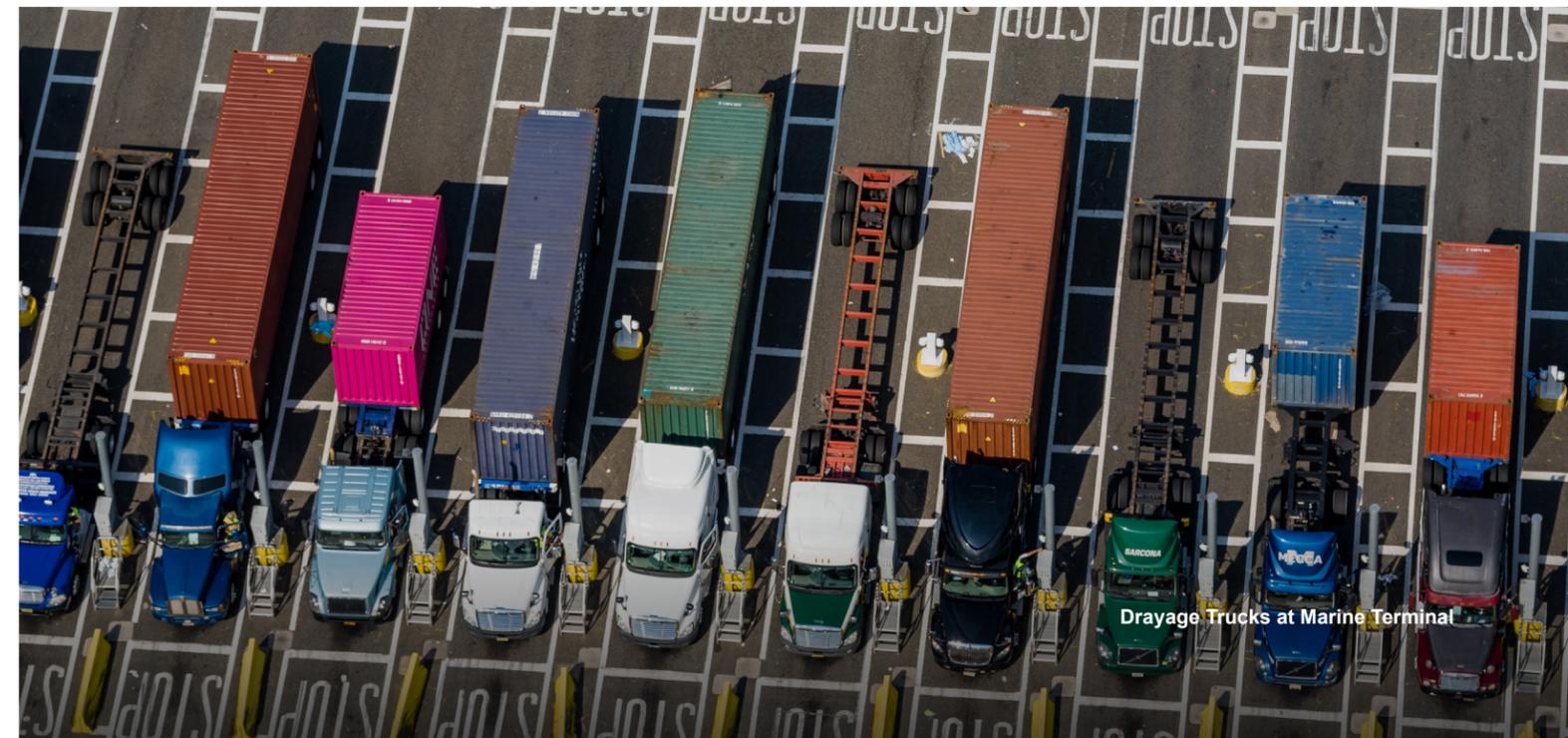
Continue implementing truck phaseouts and registration requirements through regular updates to the Marine Terminal Tariff, subject to commercial availability.

Assess opportunities to locate additional alternative fueling infrastructure and related services at or near existing Port operations.

Roll out upgrades to the DC fast chargers to further enhance their efficiency and effectiveness, subject to funding and commercial availability.



Container operations at APM Terminals, Elizabeth-Port Authority Marine Terminal



Drayage Trucks at Marine Terminal

ACTION 10.3

Increase the Use of Intermodal Rail and the Marine Highway for Freight Transportation

Partner with customers and regional stakeholders to increase the utilization of more energy efficient and less carbon intensive modes of transportation including intermodal rail and short sea shipping.

Once freight arrives at the port on oceangoing vessels, it is transferred to another mode of transportation as it advances towards its destination. This may be a truck, a train, or a barge. Compared to transport by diesel trucks, moving freight via barge or train is more energy efficient and less carbon intensive.

Intermodal rail refers to moving container freight by two or more modes of transportation, such as between ships and rail. Short sea shipping is the movement of cargo and passengers within a harbor, along the inland rivers or along a coast.

The Port Authority supports the transport of freight by rail through its comprehensive rail network, ExpressRail, which includes dedicated rail facilities for each of the port’s major container terminals. The Port also manages New York New Jersey Rail, LLC (NYNJRR), a rail barge that transports domestic freight across New York Harbor and is part of the national rail system.

Less than half of the Port Authority’s ExpressRail system, which has the capacity to handle 1.5 million containers per year, is being utilized. \$600 million was recently invested to increase the capacity and network connectivity of NYNJRR. In partnership with the New York City Economic Development Corporation, the Port Authority launched and manages the North Atlantic Marine Highway Alliance (NAMHA), which is focused on identifying viable routes for short sea shipping from Maine to Virginia, including within NY Harbor and along the Hudson River. The Port Authority will continue to look for opportunities to expand alternative modes for freight movement including rail and short sea shipping.

Complete by 2025
Complete final design for the Southbound Connector project, which will increase the reliability and efficiency of the ExpressRail system.

Complete by 2030
Pursue opportunities to increase NYNJRR volumes.

Identify opportunities to expand the use of short sea shipping.

Work with Class I Railroads to add additional origins and destinations served by our ExpressRail Network (e.g., Lehigh Valley, PA).

Explore opportunities to decarbonize the NYNJRR.

ACTION 10.4

Explore Need for Shore Power and Conduct Feasibility Studies as Needed

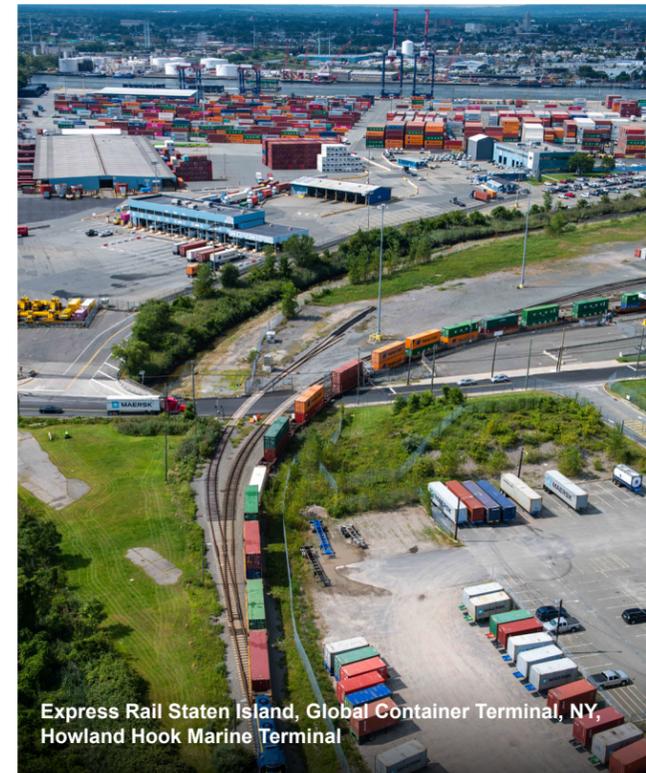
Determine demand for shore power compared with other zero-emission solutions for powering vessels at berth, and perform feasibility studies where applicable.

Shore power, also referred to as “cold ironing” or “onshore power supply,” is the provision of electrical power to a ship at berth while its main and auxiliary engines are shut down. When replacing a diesel-powered or other fossil fuel-powered engine, shore power can significantly reduce vessel emissions at berth. In 2016 the Port Authority installed shore power at the Brooklyn Cruise Terminal for use by cruise ships at berth. Because using shore power requires landside infrastructure and vessel modifications, more study is needed to determine when the installation of additional shore power at our ports would be an appropriate investment.

Complete by 2030
Assess shore power infrastructure needs and conduct feasibility studies as needed.

Explore technology and policy options to address the need for shore power infrastructure.

Explore incentives for use of shoreside electrical power where relevant.



ACTION 10.5

Support Transition to Zero-Emission Oceangoing Vessels and Harbor Craft

Explore opportunities and coordinate with partners to accelerate transition to zero-emission oceangoing vessels and harbor craft and support the transition to alternative fuels, using incentives, infrastructure development, and partnerships.

The shipping industry will need to transition to low- and zero-emission sustainable marine fuels to decarbonize. Industry leaders are in the process of demonstrating and developing many potentially sustainable marine fuels, such as biodiesel, green methanol, and green ammonia. For these fuels to become adopted by ocean carriers and vessel operators, accompanying infrastructure must be in place at every stop along a shipping route.

Since 2012, the Port Authority has been encouraging fuel conservation and voluntary engine, fuel, and technology enhancements to oceangoing vessels through the Clean Vessel Incentive (CVI) Program. The CVI Program requires participating shipping lines to register their vessels in the Environmental Ship Index and awards points for cleaner engines, use of alternative fuels, and reduced fuel usage through vessel speed reduction. In 2021, this program had 21 participating shipping companies and supported the reduction of 25,366 metric tons of carbon dioxide (MT CO₂).

Smaller harbor craft, including tugboats, tow boats, supply boats, launches, and ferries have more alternative energy solutions currently available because they generally homeport in the local harbor each night. In 2023, the Port issued an RFI to understand the market readiness of low- and zero-emission ferry vessels and the feasibility of transitioning to zero-emission ferry operations between Hoboken and Manhattan.

The RFI indicated that 100% electric-capable ferry vessels are currently viable, but there is no access to charging infrastructure, and it will take 3 to 5 years to build new vessels to support the Port Authority’s ferry service.

The Port Authority has no influence or authority over other harbor craft that work at the Port, such as tugs and towboats, and therefore must coordinate with others to identify opportunities to decarbonize these harbor crafts.

Complete by 2025
Investigate the development of one or more Green Shipping Corridors to highlight zero-emission alternatives throughout the supply chain to support sector-wide decarbonization.

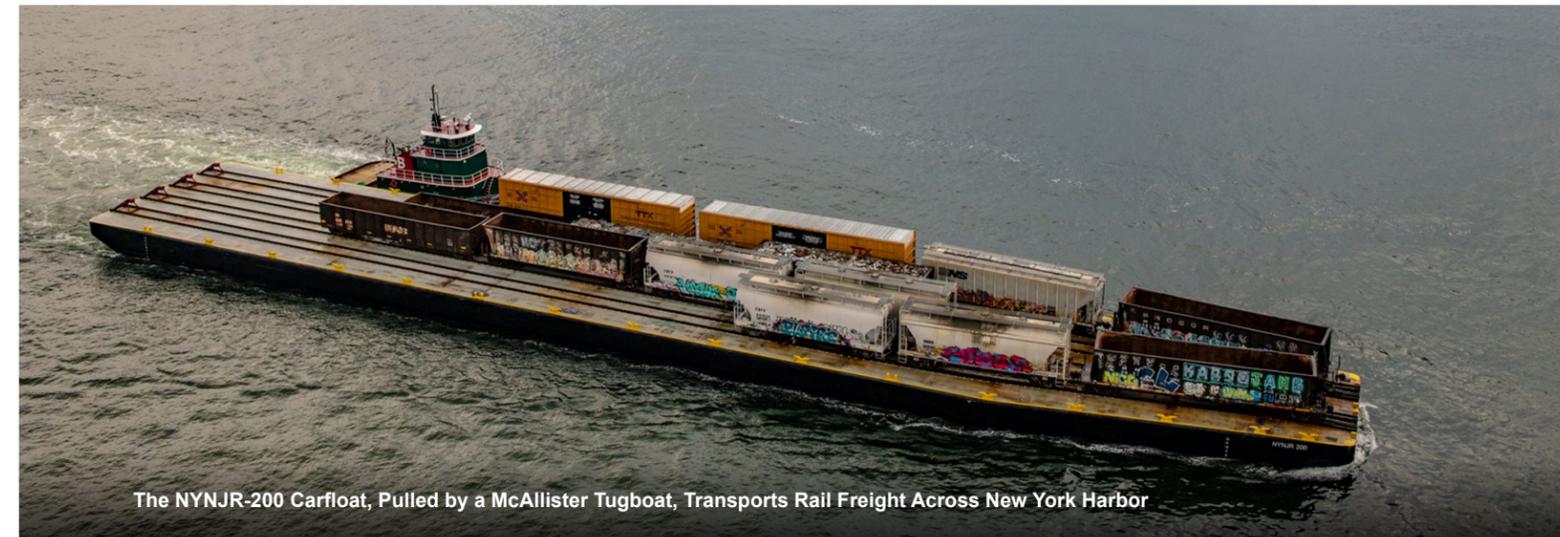
Informed by the responses to the RFI, include new requirements in future Port Authority ferry service contracts to begin transitioning ferries to net zero.

Coordinate with regional partners to compile a more accurate inventory of harbor craft associated with PA facilities.

Complete by 2030
Work with stakeholders and fuel suppliers to assess current and future alternative fuel availability and support the development of associated fuel distribution and storage infrastructure.

Explore systems to further track ship call data, such as fuel consumption and time at berth, to better calculate emissions.

Continue to implement the Clean Vessel Incentive Program and assess additional grants and incentives to encourage and/or assist oceangoing vessels and harbor craft with the transition to net zero operations.



STRATEGY 11
Regional Transportation & Congestion Management

Partner with other regional transportation agencies to accelerate the region’s shift to less carbon-intensive forms of transportation, including improving public transit availability and bicycle and pedestrian infrastructure, while reducing traffic congestion and idling.

The Port Authority is one of several agencies that manage and influence transportation activity within the region. Our bridges and tunnels are a vital connection between New Jersey and New York, serving millions of customers a year. By deploying advanced traffic management technologies, we can improve traffic flow and reduce idling from customer vehicles on bridges, tunnels, and roadways we operate and manage.

However, as GHG emissions from transportation still stem from single-occupancy vehicles like cars and trucks, we must continue to improve and expand regional transit use and other sustainable modes of travel. As more people bike, walk, or use public transportation, fewer vehicles are on the roads adding to traffic congestion. We will expand sustainable transportation access to Port Authority facilities and coordinate with partner agencies to improve transit, bicycle, and pedestrian access at our airports, ports, and PATH stations. This includes a significant expansion of the number of PATH rail cars. We can also support the expansion of sustainable transportation by designing and upgrading Port Authority bus terminals to accommodate the operational needs and infrastructure requirements of zero-emission buses for our bus carriers. This package of actions will help improve transportation access for environmental justice communities as well as improve air quality and reduce our Scopes 1, 2, and 3 emissions.

Overall, the Port Authority has opportunities to support collaborative action to advance sustainable transportation. We will participate in the region’s Metropolitan Planning Organizations and transportation studies led by peer agencies to continue to innovate on sustainable transportation planning.

The Port Authority takes a fully multi-modal approach to improving passenger access to its facilities.

ACTION 11.1

Enable Transition to Zero-Emission Fleets for Bus Carriers

Accelerate transition to zero-emission bus fleets by designing and upgrading Port Authority bus terminals to accommodate the operational needs and infrastructure requirements of zero-emission buses.

The Port Authority is designing the new Midtown Bus Terminal to accommodate a 100% electric fleet. As part of this commitment, design work on the replacement terminal is accounting for the greater weights of battery-electric buses in the design of ramps and terminal floor plates. The Port Authority is also studying the electrical infrastructure requirements needed to support operations of the future fleet. While it is not anticipated that buses would rely on the terminal as their primary base for charging, a midday staging facility will be needed to help buses that serve longer routes prepare for their afternoon runs.

Complete by 2025

Continue engagement with bus carriers and small shuttle companies to advance zero-emission bus adoption and assess needs.

Ensure the design criteria of the Port Authority Bus Terminal Replacement project accommodate an electric bus fleet and consider opportunities for other zero-emission alternatives.

Complete by 2030

Identify steps needed to support zero-emission buses and small shuttles at the Journal Square Transportation Center and George Washington Bridge Bus Station.



Example of Electric NJ Transit Bus that could use PA Bus Terminals

ACTION 11.2

Continue to Improve PATH Service to Encourage Use of Transit

Continue to improve and enhance public transit service in the region to encourage regional transit use.

In 2019, PATH served 82.2 million riders, and while activity is down compared to pre-pandemic 2019 levels, ridership continues to increase, particularly at peak hours. The Port Authority is continuing to look for ways to improve service to encourage more transit ridership. To that end, it is implementing a PATH Improvement Plan to reduce delays and enhance the overall customer experience. In 2022, PATH began to receive the first of 72 new rail cars, which when fully in service by the end of 2024, will expand the current fleet by more than 20%. PATH also began to phase in nine-car trains to increase capacity on the Newark-World Trade Center line.

Complete by 2025

Complete implementation of nine-car service on the Newark-World Trade Center line.

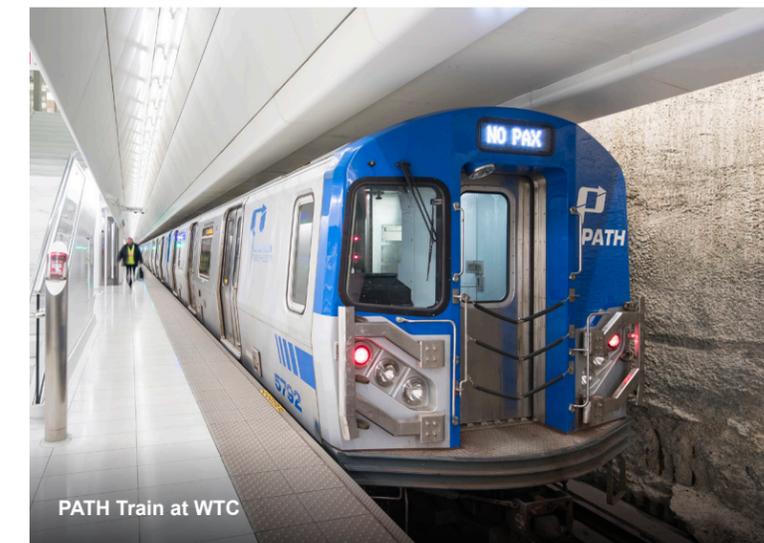
Complete expansion of the current fleet by 72 rail cars.

Reduce delays through equipment upgrades and enhanced maintenance procedures.

Enhance the customer experience through the introduction of new fare payment options, and provision of timely train information.

Complete by 2030

Assess additional opportunities for expanded service and increased off-peak travel.



PATH Train at WTC

New George Washington Bridge Northwalk

ACTION 11.3

Expand Sustainable Transportation Access to Port Authority Facilities

Coordinate with partner agencies to improve bicycle, pedestrian, and transit access to Port Authority facilities for customers and employees, including airports, ports, and PATH stations.

At its airports, the Port Authority has worked to prioritize public transportation services. It has built AirTrain light rail systems connecting air passenger terminals to transit hubs outside Newark Liberty International Airport and JFK International Airport. At LaGuardia Airport, the Port Authority has partnered with the Metropolitan Transportation Authority to offer the LaGuardia Link Q70, a free, 24/7 express shuttle bus service linking the airport with nearby transit hubs.

The Port Authority Board of Commissioners recently authorized \$12 million for the planning and preliminary design of the EWR Station Access Project, which is expected to increase public transit access to EWR and New York City for underserved communities in Newark and Elizabeth, including a one-seat ride to New York Penn Station’s Moynihan Train Hall and on Amtrak and NJ TRANSIT’s (NJT) direct Northeast Corridor services.

At its transit hubs, including many PATH stations, the Midtown Bus Terminal, and the World Trade Center campus, the Port Authority has worked on its own and with partners to improve bicycle access. Depending on the opportunities at each site, the Port Authority has worked to provide safer bicycle access, conventional and secure bicycle parking, and expanded bikeshare availability.

At its bridges, where bridge decks have required rehabilitation or replacement, the Port Authority has sought opportunities to support multi-modal transportation. It has built new shared-use paths to support bicycle and pedestrian access at the Bayonne Bridge, Goethals Bridge, and the George Washington Bridge. And it has included provision for a future transitway on the new Goethals Bridge, should connecting infrastructure be developed on the adjacent roadway networks.



Bicycle Parking at Harrison PATH Station

Complete by 2025

Continue to install additional secure bike parking, protected bike lanes, and other bicycle-related enhancements as outlined in the Port Authority’s Bicycle Master Plan, as well as enhanced pedestrian infrastructure to improve pedestrian access and safety.

Continue to work with regional partners to improve bicycle, pedestrian, and transit access to Port Authority facilities, including workforce access to the ports and airports.

Continue to support Port Authority employees’ use of green transportation alternatives through transit and bicycle commuting benefits, expanded bicycle parking infrastructure, and the expansion of the existing pilot program for workplace EV charging.

Complete by 2030

Complete EWR Station Access Project

Complete construction of the enhanced Southwalk on the George Washington Bridge, providing safer, Americans with Disabilities Act (ADA)-compliant access on both sides of the bridge and enabling separation of bicycle and pedestrian traffic.

Incorporate bicycle, pedestrian, and transit access objectives into the roadway network design process for JFK, LaGuardia, and Newark Airports.

ACTION 11.4

Deploy Advanced Traffic Management Technologies to Reduce Congestion

Deploy advanced technologies to improve traffic flow and reduce idling on bridges, tunnels, and roadways operated and managed by the Port Authority.

Reducing congestion has significant economic, social, and environmental benefits. It reduces emissions of GHGs and air pollutants from idling vehicles, decreases the frequency of crashes and the injuries and property damage that they cause, reduces the costs of living and doing business in the region, and improves the overall experience for travelers. The Port Authority recently completed installation of All Electronic Tolling systems at our bridge and tunnel crossings. These new systems eliminate the congestion created by cash toll collection and instead bill customers automatically by mail or E-Z Pass. By removing queues and unnecessary turbulence as traffic divides and remerges at toll plazas, this initiative has significantly improved traffic flow and reduced crashes at Port Authority crossings. These results, in turn, lessen delays, improve air quality, and reduce GHG emissions.



Installing All Electric Tolling Gantries at Lincoln Tunnel

The Port Authority has also applied best practices in traffic management at the airports and seaport during and after their redevelopment. Its Airport and Seaport Operations Centers deploy extensive sensor networks, monitor all modes and access points, and work with peer agencies to enact quick response strategies to any emerging issues. Other innovations such as remote “cell phone lots,” remote for-hire vehicle queuing areas, and for-hire vehicle pick-up points in parking garages, further help keep terminal frontages clear and eliminate traffic congestion at the airports.

Complete by 2030

Advance projects to improve traffic flow and reduce idling, with special attention to congestion hot spots.

Continue to advance planning for implementation of advanced technologies to improve the flow of buses to and within the Midtown Bus Terminal.

Continue to include projects through airport redevelopment that reduce congestion and idling.



Drop-Off Area at JFK International Airport T4



Traffic Engineers Monitor Regional Mobility from the Agency Operations Center

Building & Facilities

STRATEGY 12 Green Tenant Buildings & Facilities

Align Net Zero Roadmap goals and objectives into Port Authority lease agreements, procurement processes, energy supply, and waste management across all facilities to assist with tenant GHG emissions reductions.

Through the Port Authority's relationship with our tenants, we can collaboratively improve the way buildings and facilities are designed, built, and managed. We are re-envisioning sustainability requirements within our lease agreements, design standards, construction practices, and other procedures to ensure that they reflect the best practices needed to achieve our net zero goals. Major new redevelopment efforts are being planned and executed to transform our regional airports. These once-in-a-generation tenant projects need to integrate the best technologies available today, with net-zero-ready infrastructure to accommodate the continual phase out of fossil fuels and evolution to the cleaner technologies of tomorrow. We will work with our tenants on structured lease agreements with incremental milestones and flexibility to innovate. We will also encourage our tenants' ongoing efforts to make their facilities more energy efficient and sustainable by providing technical resources and updating our building-related policies and standards.

Overall, we can use the Port Authority's leverage to decarbonize buildings, encourage the transition to renewable energy, and reduce landfill-bound waste. These actions will reduce our Scope 3 emissions, improve water and air quality, and help conserve resources.

ACTION 12.1

Align All New Leases with Net Zero Goals

Work collaboratively with tenants to evaluate terms of their use of our facilities and renewals of individual leasing agreements, permits, or other licenses to integrate sustainability goals and requirements, with a special focus on major redevelopment projects.

The Port Authority leases a diverse collection of property and building spaces ranging from offices and retail shops within larger Port Authority buildings to airports and marine terminals. We will re-evaluate our lease agreements to align tenant activities with the Port Authority's sustainability goals and requirements. Through sustainable leasing strategies, the Port Authority will ensure that leases for all tenants, regardless of size, drive emissions reductions and allow for future re-evaluation of sustainability needs in a flexible way. As part of the phased roll-out of these lease revisions, the Port Authority will strive to ensure that the necessary supporting infrastructure is in place.

For our redevelopment projects, we will partner with tenants to implement plans that advance net-zero-ready solutions. Key opportunities include identifying new ways to provide district heating and cooling solutions to tenants as part of large-scale construction projects. We will layer in the necessary commercial restrictions of a lease while also balancing considerations for operational costs, energy efficiency, and our net zero goals.

Complete by 2025

Establish provisions relating to net zero goal in new tenant lease agreements.

Track progress towards net zero goal for each tenant.

SPOTLIGHT



JFK International Airport Terminal

JFK International Airport Terminal 4 Awarded LEED for Existing Buildings Platinum Certification

As part of the transformation of JFK International Airport, Terminal 4 is undergoing a \$1.5 billion modernization and expansion project. Led by JFK International Air Terminal LLC (JFKIAT) and Delta Air Lines, the project will increase Terminal 4's capacity, advance significant renovations, and prepare the terminal for the consolidation of Delta's operations. In 2022, the U.S. Green Building Council awarded Terminal 4 with the Leadership in Energy and Environmental Design (LEED) for Existing Buildings: Operations & Maintenance Platinum certification, making

Terminal 4 the first air terminal in the United States to receive Platinum recognition for existing buildings. The renovation work includes a comprehensive sustainability program focused on energy efficiency, water conservation, waste management, indoor environmental quality, and sustainable transportation. The terminal completed many sustainability-related enhancements, including installing water-efficient fixtures, upgrading lighting to LED fixtures where possible, reducing the waste sent to landfills through recycling and composting programs, and transitioning to EVs and ground support equipment. These efforts will help advance operational efficiency, environmental stewardship, and a commitment to providing an exceptional experience for customers and employees.

ACTION 12.2

Encourage and Enable Solar, Energy Efficiency, and Decarbonization Efforts by Tenants

Support sustainability efforts by tenants through technical support, standards, and planning resources.

Port Authority tenants and operators make thousands of decisions every day that impact energy usage and sustainability outcomes. We can leverage our role to help tenants monitor and modify their energy consumption needs and patterns. The Port Authority will aim to offer energy products and services, including energy monitoring and technical support services, that empower our tenants to make more informed energy choices and reduce consumption. We will also encourage our tenants to establish their own sustainability goals and plans and champion their successes. Through our policies, resources, and support, we can continue to foster tenant-led sustainability efforts and ensure the needed infrastructure is in place.

Complete by 2025

Conduct tenant engagement to assess barriers to the implementation of sustainability projects.

Enable and encourage on-site generation and renewable energy procurement through the development of resources such as a net metering policy and renewable energy procurement standards.

Complete by 2030

Provide technical resources to tenants to assist with reducing energy consumption, including benchmarking of tenant energy usage and providing suggestions to reduce consumption.

Assess future tenant electrical needs for energy transition and include in agency-wide infrastructure planning to ensure infrastructure readiness.



New Terminal B at LaGuardia Airport

ACTION 12.3

Update Design Guidelines and Clean Construction Protocols

Implement enhanced building standards and construction practices for tenant projects to expedite energy efficiency and the decarbonization transition at tenant buildings.

Tenants must follow Port Authority design guidelines, building requirements, and construction protocols when doing new construction or rehabilitation work. Our sustainable design guidelines and clean construction protocols provide clear directions for optimizing project sustainability through integrated design practice, with the goals of enhancing cost-effectiveness, extending the project life span, and reducing operational and maintenance costs, where possible.

We continue to strengthen our internal building and construction requirements to align with regional, national, and global best-in-class industry standards and integrate the latest sustainability rating system and certification requirements. We will extend these updated standards and requirements to tenant buildings to support the transition off fossil fuels and encourage other sustainability upgrades.

Complete by 2025

Apply updated Port Authority design guidelines to tenant buildings, and consider alignment with local laws promoting decarbonization and electrification of buildings.

Apply updated Port Authority construction requirements to tenant-led construction and alteration work, and revise the tenant construction review manual (TCRM).

Complete by 2030

Assess opportunities to encourage sustainability outcomes.

ACTION 12.4

Encourage Waste Management Best Practices by Tenants

Implement programming to maximize the diversion of solid waste from landfills and incinerators through increased recycling, organic waste management, waste minimization, incentives, and other best practices.

The Port Authority plans to enhance recycling, organic composting, and waste minimization. These goals extend to the waste generated by our tenants as well. As part of an agency-wide Zero Waste Roadmap, we are gathering baseline information and looking at strategies and technical solutions to reduce operational and tenant waste.

Complete by 2025

Collect annual data from Port Authority facilities and tenants to track progress and develop a waste and diversion rate baseline.

Engage tenants and stakeholders on best practices related to waste diversion.

Share findings with tenants from the agency Zero Waste Roadmap that identify problem areas and opportunities to improve diversion rate and reduce waste.

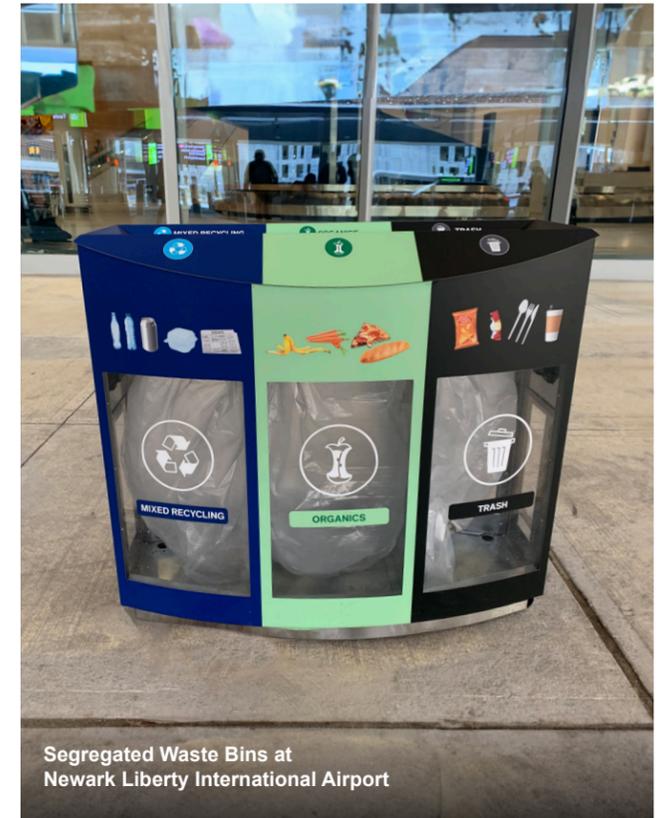
Complete by 2030

Collaborate with stakeholders to implement solutions from the agency Zero Waste Roadmap, identify funding opportunities, and explore pilot programs and technical solutions to reduce landfill-bound waste and its associated emissions.

Explore opportunities to encourage reduction, reuse, and recycling for tenant operations.

Support waste-management related pilot projects and strategies for tenant-led waste reduction efforts.

Encourage tenants to seek certification and verification of waste diversion performance.



Segregated Waste Bins at Newark Liberty International Airport



Public Composting Drop-Off at WTC as part of Smorgasburg



What's Next

Delivering on Our Commitment to Net Zero

The successful implementation of the net zero commitments outlined in this document will require monumental change. These actions will advance progress towards our 2025 and 2030 goals and build toward 2050. With the Net Zero Roadmap to guide us, the Port Authority is already working to align line departments and elevate the major projects that will reduce our emissions. Alongside our internal process, we are engaging our external stakeholders, whose partnerships are key to meeting our net zero goals.



Reporting on Our Impact

We will deliver on the actions in this Net Zero Roadmap with transparency and accountability. Our annual GHG emissions inventory will publicly report progress. We will continue to stay abreast of technological innovations and share lessons learned. Delivering this plan will remain our commitment until we are fully carbon-free.



Ensuring a Skilled Workforce

The net zero transition will affect the duties, responsibilities, and knowledge requirements of personnel working at our facilities. As fossil fuel-burning vehicles and equipment are retired from operation, staff will need to be prepared to manage, maintain, and operate a new generation of vehicles and equipment powered by clean technologies. We will upskill employees through training and knowledge sharing. The landscape of technologies and practices needed to deliver the Net Zero Roadmap will continue to evolve. We will expand specialized training programs for staff to equip them so they are supported and prepared throughout this process.



Investing in Neighborhoods

The historic investments being made to transform our buildings, roadways, ports, and airports as we transition away from fossil fuels provide value directly to communities. By reducing carbon emissions, we will help mitigate the impacts of climate change that are expected to fall most heavily on disadvantaged communities. In addition to improved air quality, noise reduction, and other environmental benefits, we will continue to ensure billions of dollars of contracting opportunities go directly into the pockets of businesses that need it most.

As part of our business diversity efforts, we have awarded record levels of contracts to Minority and Women Business Enterprises (MWBES) and Local Business Enterprises (LBEs) for our major airport redevelopment work. Through the LaGuardia Airport, Newark Liberty International Airport, and the upcoming JFK International Airport redevelopment projects, we have awarded over \$4.1 billion to date to MWBES and over \$1 billion to LBEs. Outside of our major redevelopment projects, payments to MWBES under our core program contracts accounted for 34% of our total payments agency-wide in 2022. We will continue these targeted contract awards as we move forward to ensure our project teams and operations reflect the diversity of our community. We will keep investing in the neighborhoods experiencing the largest environmental impacts from our facilities.



Collaborating to Maximize Our Impact

As we scale up our actions, we must work in lockstep with the regional nexus of stakeholders that this Net Zero Roadmap touches— from drayage truck drivers to airline companies and terminal operators, rental car companies, taxi and for-hire vehicle drivers, marine vessel operators, bus companies, and all of those who rely on Port Authority property to conduct their operations. Effective coordination with these stakeholders is vital to accelerate progress. We will continue to lead in the region through national and international platforms and through sector-based engagement. By partnering with other airports, maritime organizations, fleet partners, trade associations, and other relevant groups at the local, state, national, and global levels, we can align efforts and drive strong climate action.

This Net Zero Roadmap is also an invitation. Through cooperation we will build a community of practice and co-create new solutions and implementation plans. We will foster collaboration, share information, and accelerate action toward tangible outcomes and successes.

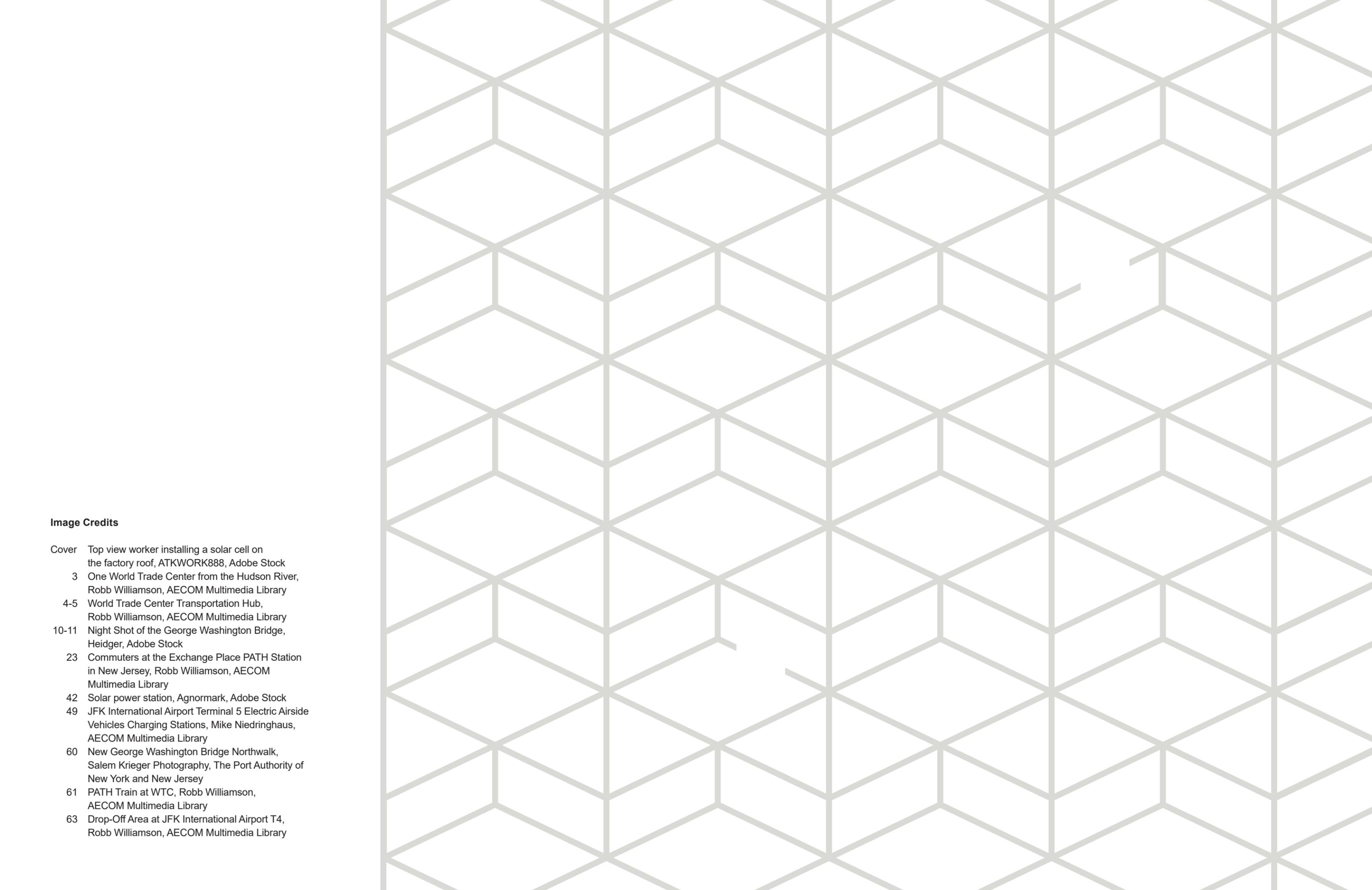


Image Credits

- Cover Top view worker installing a solar cell on the factory roof, ATKWORK888, Adobe Stock
- 3 One World Trade Center from the Hudson River, Robb Williamson, AECOM Multimedia Library
- 4-5 World Trade Center Transportation Hub, Robb Williamson, AECOM Multimedia Library
- 10-11 Night Shot of the George Washington Bridge, Heidger, Adobe Stock
- 23 Commuters at the Exchange Place PATH Station in New Jersey, Robb Williamson, AECOM Multimedia Library
- 42 Solar power station, Agnormark, Adobe Stock
- 49 JFK International Airport Terminal 5 Electric Airside Vehicles Charging Stations, Mike Niedringhaus, AECOM Multimedia Library
- 60 New George Washington Bridge Northwalk, Salem Krieger Photography, The Port Authority of New York and New Jersey
- 61 PATH Train at WTC, Robb Williamson, AECOM Multimedia Library
- 63 Drop-Off Area at JFK International Airport T4, Robb Williamson, AECOM Multimedia Library

