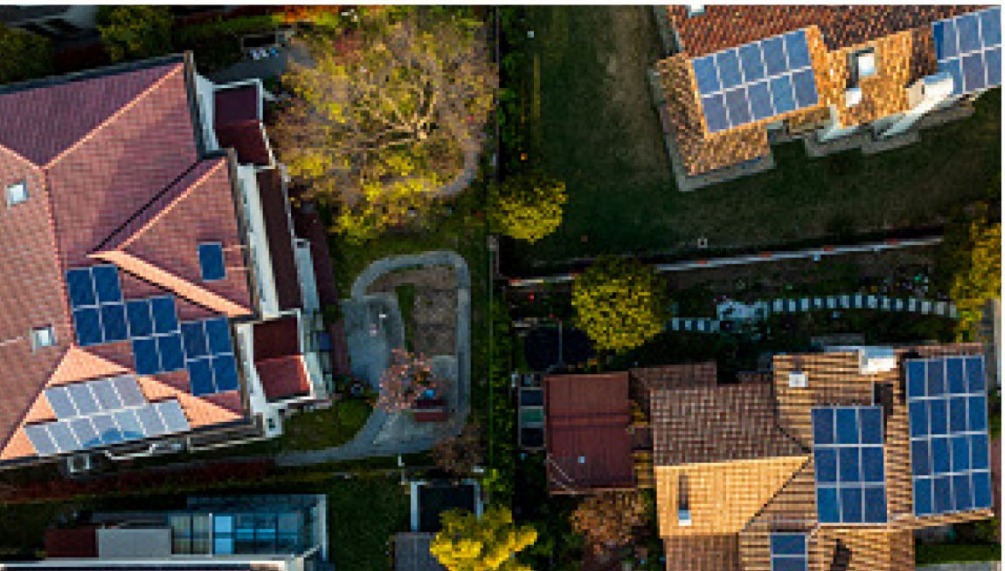
Orange & Rockland

Long-Range Plan

An Integrated View of Our Energy System through 2050



January 2024

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Disclaimer

This document and the statements and analysis contained within are based on information available as of December 2023.

Executive Summary

Orange and Rockland Utilities, Inc. ("O&R" or the "Company") provides electric service to more than 300,000 customers in southeastern New York State ("NYS") and areas of northern New Jersey ("NJ") through our subsidiary, Rockland Electric Company ("RECO"). O&R also provides gas delivery service to more than 141,000 customers across Orange and Rockland counties in NYS. In 2022, O&R's $1.9 billion of total economic output supported 1,130 jobs at the company itself and its economic activity generated an additional 2,280 jobs in its service area.[1]

O&R revisits and revises its Long-Range Plan ("LRP") every three years in support of base rate case filings, to reflect the most up-to-date strategies, actions, and investments to advance its business objectives. Since O&R's last LRP in January 2021, the energy and utility industries have continued to experience significant transformation particularly to mitigate and adapt to the impacts of climate change. NYS and NJ remain at the forefront of new policies and regulations that support a transition to clean energy and decarbonization. We recognize that the transition to clean energy offers an unprecedented opportunity to deliver value for our customers and the communities we serve. The Company's actions and investments through 2050 and beyond will require significant partnership with regulators, stakeholders, and customers. Our proactive LRP describes the transformational programs and investments required to meet NYS's and NJ's ambitious clean energy goals.

In this LRP we present the major economic, technological, and societal trends and the current policy environment that drives our strategy, investments, and engagement with stakeholders. We present our analysis of several decarbonization pathways that show the level and combination of technologies, customer adoption, and fuel sources required in a decarbonized economy to achieve NYS's and NJ's clean energy targets. We also describe our strategy to support achieving net-zero greenhouse gas ("GHG") emissions goals. We can clearly see that the path forward requires significant changes for our Company, our customers, and society, and we describe the investments and policies necessary to make those changes.

Our Vision and Objectives

In planning for the future, the Company's strategies are influenced by ongoing evaluation of the industry and societal trends that affect evolving policymaking such as customer and stakeholder expectations, advances in clean energy technologies, and impacts of climate change including the disproportionate impact on various socioeconomically disadvantaged communities. The purpose of this LRP is to present the actions, strategies, and investments needed to transform our electric and gas businesses with a focus on cost effectiveness and equity. O&R will continue to seek a balanced approach, weighing technical and cost implications that can have a profound effect on our customers and the communities we serve. O&R and its parent company, Con Edison, Inc., share the following four strategic objectives:

- **Clean Energy:** Economy-wide net-zero GHG emissions in our service territory by 2050.
- **Climate Resilience:** Increased resilience of our energy infrastructure to adapt to climate change.

[1] Orange & Rockland 2022 Impact Study, December 2023, Available at https://www.oru.com/-/media/files/oru/documents/about-us/company-information/economic-impact-report.pdf.

- **Core Service:** World-class safety, reliability, and security, while managing rate impacts and equity challenges of the energy transition.
- **Customer Engagement:** Industry-leading customer experience and facilitation through the clean energy transition.

O&R will have to evolve the way it manages its business to achieve net-zero goals—for example, by proactively planning to expand the workforce skill set to include an understanding of new electric offerings and advanced customer solutions. The Company is dedicated to supporting its customers as well as its employees as we adopt changing business practices and incorporate new technologies.

Representative Pathways to Net-Zero

The societal transition to net-zero is currently expected to take more than two decades as technology matures and customers adjust to changing approaches to their energy needs, from home heating and cooling to transportation. As with any long-term planning effort, a host of uncertainties will affect the ultimate path to net-zero GHG emissions. Continuous review and appropriate modification of this LRP will allow the Company to modify its efforts in specific programs to maximize operational efficiency, optimally allocate resources, and achieve future value for our communities and customers. We have developed multiple "representative" pathways to advance our strategy and to satisfy both customer energy needs and policy goals. However, these pathways differ substantially in levels of electrification, cost, complexity, required policy actions, and the degree of reliance on gas infrastructure. The development of future scenarios, looking at the evolution of technology and markets and the anticipated costs, is a long-standing part of the utility business, and results in strategies that are more robust regardless of which future scenario materializes. Assumptions and resulting demand projections for these pathways were determined using internal models that integrate internal and external customer data, technology performance, emissions rates, and other relevant information.

As a baseline, our teams plan toward a Reference Pathway, which is based on current legislation and regulations. The Reference Pathway represents the current trajectory, factoring in all existing and planned demand reduction programs, as well as the current regulatory and legislative environment. The Company will iteratively revise the Reference Pathway as market and regulatory conditions change. It is important to note that the Reference Pathway currently does not result in the achievement of NYS and NJ policy goals in 2050. The Company recognizes the need for additional programs, investments, and policy actions that will support a pathway that achieves societal goals.

To meet ultimate net-zero GHG emissions goals and customer energy needs, the Company identified two additional pathways: Deep Electrification and Hybrid. These pathways reflect longer-term NYS and NJ policy and regulatory goals and describe the assumptions associated with just two of the possible end states that meet clean energy policy goals. The actual path to meeting clean energy goals may look different than either pathway.

While the Deep Electrification and Hybrid Pathways both meet state policy goals, they differ in their strategies to meet net-zero GHG emissions. Deep Electrification relies heavily on decarbonization and substantial growth of the electric supply sector, as well as customer adoption of clean energy solutions such as heat pumps and energy efficiency ("EE") measures to meet energy needs. The Hybrid Pathway retains a role for the gas delivery system by

displacing traditional fossil gas with low-carbon fuels ("LCFs"). The level of adoption and type of technology assumed drive the required energy infrastructure changes and investment levels needed to achieve the outcomes of each pathway. The pathways consider several factors, including the complexity of customer adoption of new energy technologies, climate challenges, and alignment with policy direction. Both pathways assume that clean energy supply will be adequate to meet electric demand.

Our Approach

To achieve these ambitious GHG emissions reduction goals, NYS and NJ regulators, utilities, and customers will need to fundamentally change how energy is sourced and consumed. The transition to decarbonization will require significant changes in how we serve our customers. We recognize that the gas system of 2050 will look significantly different than it does today, including the potential delivery of LCFs. We know that the electric grid will need to support the increased demand from EV and electric heating expansion while gaining agility to manage a more distributed ecosystem. While the energy sources we use to serve our customers and communities may change, the Company will remain steadfast in our role as a provider of safe and reliable energy throughout the transition.

As a utility, O&R is uniquely suited to apply our expertise and invest in a wide range of solutions as we continue to deliver energy safely, reliably, and with increased resilience to address the projected impacts of climate change. A successful energy transition is dependent on customers adopting significant levels of new technology by 2050, particularly in the heating and transportation sectors. We will support our customers' decision-making along this journey through programs and educational offerings.

The Company's strategy to achieve its vision and strategic objectives centers on three main pillars, outlined in Table ES-0-1 below.

Table ES-0-1. Achieving a Clean Energy Future

Enable a Change in Energy Consumption	We will offer building decarbonization and electrification programs and incentives that support customer adoption of new technologies to facilitate their own energy transition journey, which will reduce energy consumption and change the nature of heating buildings and powering industry and transportation.
Build the Energy System of the Future	We will continue to invest in core programs that provide safe, reliable, and resilient electric and gas service while deploying technology solutions that enhance efficiency and customer service. We will reduce the level of gas investments by right-sizing the gas system to meet targeted customer and energy needs.
Facilitate Supply Transformation	We will invest in transmission to deliver predominantly renewable electricity and enable distributed energy resources ("DERs") through distribution system investments. We will advocate for utility participation in

	and ownership of renewables and support the development of LCFs to facilitate the decarbonization of the gas system.

Investments to Deliver Value

To achieve the sweeping transformation to a net-zero GHG emissions future envisioned by policymakers, investments are required across our strategy of changing consumption, building the energy system of the future, and transforming supply. The Company will leverage alternative funding sources wherever possible to support cost-effectiveness while meeting societal objectives and delivering value to customers. O&R will continue to work collaboratively with stakeholders to implement and maintain programs that support our most vulnerable customers and avoid disproportional impacts, including on low- and moderate-income ("LMI") customers. Supportive and constructive regulatory and legislative treatment will be necessary to deliver value while maintaining affordability for customers.

A higher share of customers' energy costs will move onto their electricity bill as they switch from fossil-based energy sources to electricity for home heating and cooling, cooking, and transportation. For example, customers who adopt EVs will no longer pay gasoline bills, and those who move to electric building heating technologies will reduce or eliminate heating oil or natural gas costs. We view this as an opportunity to deliver even more value to our customers.

The significant investments targeted at our long-term strategy will be introduced over time as needed to achieve net-zero targets by 2050. Just as the transition toward a more electric-powered future will not happen overnight, investments and impacts to customer costs will evolve over time. Rate cases typically look at the next three years, while this plan addresses investments on a longer timeline. In this plan we estimate that $5.7 billion of investment is needed over the next 10 years to continue to deliver energy safely and reliably, to increase resilience from the adverse effects of climate change, to enable the proliferation of higher-efficiency electric end-use solutions, and to reduce GHG emissions that will improve air quality and health in the communities we serve today and for future generations.

The Road Ahead

O&R is committed to enabling a clean energy future across its service territory while actively managing the uncertainties that come with such a transformation. The actions described in this LRP will deliver value to customers and will support the achievement of NYS and NJ targets, but they will require significant investments to help realize another paradigm shift in society's use of technology and energy. Our pathways portray how the transition may occur and highlight factors that could impact the course, including advances in clean energy technologies and their relative cost impacts on customers. We have developed a series of indicators and signposts that will be instructive to our progress toward the net-zero GHG emissions goal in 2050. We will continually engage with our customers, communities, and regulators to critically examine our collective progress.

1. Introduction

This section provides an overview of O&R's electric and gas system today along with a summary of the priorities and trends guiding the roadmap for change across NYS and NJ.

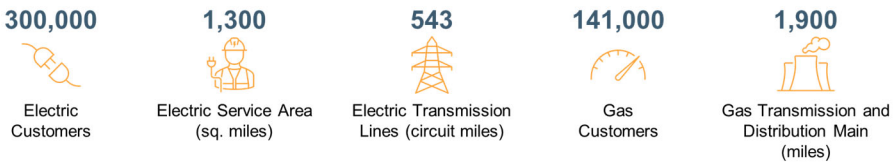
1.1 Background

As illustrated in Figures 1-1 and 1-2, O&R owns and operate 543 circuit miles of transmission lines, 15 transmission substations, 63 distribution substations, approximately 88,000 in-service line transformers, nearing 4,000 pole miles of overhead distribution lines, and 2,320 miles of underground distribution lines.

O&R provides gas delivery service to more than 141,000 customers across 66 communities through two separately integrated gas distribution systems, one in Orange County and the other in Rockland County. O&R owns and operates nearly 1,900 miles of gas transmission main, with approximately 107,000 services to customer meters.

Figure 1-1. O&R Territory

Figure 1-2. O&R by the Numbers



1.2 Industry and Societal Trends

The energy industry is undergoing significant transformation, and the current regulatory environments in NYS and NJ reflect policies supporting energy system decarbonization and resilience. In addition to the impacts of a changing climate, changes to the energy system are driven by both industry and societal trends, including new government policy, customer expectations, and technology improvements. These trends are monitored and considered during the Company's Long-Range Planning process.

- **A Changing Climate:** In the face of climate change, understanding the impact of extreme events and climate hazards on the electric system is increasingly important. From rising average temperatures to more frequent and intense storms, the changing climate has begun affecting O&R customers. The Company uses climate science and advanced climate models to develop forward-looking projections that aid in evaluating potential vulnerabilities to O&R assets, operations, and systems. The Company is committed to using the best available climate science to inform planning decisions using relevant data as it becomes available. Further discussion of our plans to address climate change resilience can be found in Section 3.2.4.

- **Clean Energy Legislation:** Ambitious clean energy goals set by the Climate Leadership and Community Protection Act ("CLCPA") and the NJ Energy Master Plan ("EMP"), specifically achieving the required GHG reductions of 85% (from 1990 levels) and 80% (from 2006 levels) by 2050, will require significant Company investments throughout the transmission and distribution ("T&D") system. The Company operates under the assumption that delivering the requirements of a clean energy future will be strongly impacted by new policies or changes to existing policies. The State Regulatory Affairs and Corporate Affairs organizations of O&R's affiliate, Consolidated Edison Company of New York, Inc. ("CECONY"), lead the Company's advocacy efforts through recurring engagement with key legislative stakeholders (e.g., NYS Department of Public Service ["DPS"] Staff and NJ Board of Public Utilities ["NJBPU"] Staff, city agencies, and local municipalities) on important issues that affect the Company. The Company will continue to seek out opportunities and participate in studies that will help set policy direction (e.g., CLCPA Working Group initiatives).

- **Customer and Stakeholder Expectations:** Customers increasingly expect the Company to deliver safe, reliable, resilient, and cost-effective energy in new and innovative ways, pushing the Company to play an increased role in realizing a clean energy future. The Company must personally engage customers, giving them more choice, control, and convenience over their source of energy and their interactions with the Company.

- **Technological Advancement:** The increasing availability of clean energy technologies could present significant opportunities for the Company to advance their deployment and to leverage their capabilities to enable a dynamic, reliable, electric grid, and to educate stakeholders (e.g., developers, municipalities, and customers) about potential benefits. The Company must monitor costs of these technologies as economies of scale can present opportunities. At the same time supply costs and scarcity could pose cost challenges.

- **Equity and Environmental Justice ("EJ"):** EJ refers to the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[2] In New York, the Climate Justice Working Group was tasked with developing criteria to identify DACs so that the benefits of the energy transition are equitably distributed.[3] EJ and consideration of DACs is interwoven with O&R's overall goal to build the energy system of the future as the Company continues productive collaboration with customers, regulators, policymakers, and other stakeholders. The Company strives to achieve this objective by engaging EJ advocates to build bridges within areas of opportunities and enhancing Company efforts to provide equitable distribution of benefits when designing programs and implementing projects.

- **Cybersecurity:** Cybersecurity is one of the biggest risks impacting business and society, and it is an even bigger factor for businesses operating critical infrastructure and managing sensitive data. Cyber incidents and cyber probing are increasing and present a clear warning sign of the potential for future harm. The Company is committed to mitigating the risks of cyber threats, data loss, and service disruption while continuing with digitization initiatives that support customer engagement. In addition to mitigating the threat of data breaches and cyber threats, the Company's security framework allows for enhanced automation, remote control, and data acquisition. The Company is investing in cybersecurity programs through 2030 and beyond to manage this risk effectively.

- **Workforce Changes:** The Company is committed to advancing employee engagement, diversity, equity, inclusion, and training. The Company has made significant progress in attracting and hiring a workforce that reflects the diversity of the communities it serves and will continue to pursue that goal. To benefit fully from the knowledge, skills, and experience of its employees, O&R has been working for over a decade to establish and nurture an inclusive environment where all employees feel valued, supported, and motivated to contribute to their fullest potential. This includes preparing employees for the critical role they will play in delivering a clean energy future. In addition, the Company's labor resources will have to develop new skills to accommodate the planned energy transformation. O&R is working with community colleges to help guide the development of electric vehicle ("EV") technician programs to build the EV workforce that will support the growth in vehicles and infrastructure.

1.3 NYS and NJ Policy and Regulatory Landscape

The Company's LRP and analysis are based on clean energy policies as of December 2023, shown in Figure 1-3. However, the Company recognizes that NYS, NJ, and local municipalities continue to enact nation-leading clean energy policies and may continue to develop future legislation.

[2] New Jersey State Department of Environmental Protection, Environmental Justice Law, September 2020, available. Available at https://dep.nj.gov/wp-content/uploads/ej/docs/ej-law.pdf.

[3] NYSERDA, Disadvantaged Communities, available at https://www.nyserda.ny.gov/ny/Disadvantaged-Communities.

Figure 1-3. NYS and NJ Clean Energy Goals[4]

	New York			New Jersey		
	EVs	Energy Storage	Clean Generation	EVs	Energy Storage	Clean Generation
2025	850,000 EVs on the road (33,000 for O&R) 35% of Light-Duty Vehicle sales are EV			330,000 EVs on the road 25% of State-owned Light-Duty Vehicles are EV		
2030	30% of new Medium and Heavy-Duty Vehicle sales are EV	6 GW	70% of electricity from renewables		2 GW	50% of electricity from renewables
2035	100% of Light-Duty Vehicle sales are Zero-Emission Vehicles 100% of school bus fleet are EV		9 GW offshore wind	100% of Light-Duty Vehicle sales are Zero-Emission Vehicles 100% of State-owned Light-Duty Vehicle are EV		100% clean energy 7.5 GW offshore wind
2040			100% emissions free electricity generation			11 GW of offshore wind
2045	100% of Medium and Heavy-Duty sales are Zero-Emission Vehicles Sale of Internal Combustion Engine vehicles banned in NYS					
2050				75% of Medium-Duty and 50% of Heavy-Duty Vehicles are electric		
	Net-zero emissions economy wide			80% emissions reduction from 2006 levels		

New York State

NYS's CLCPA,[5] enacted in 2019, established decarbonization targets and policies to support reaching net-zero GHG emissions by 2050, with an emphasis on transportation electrification, building decarbonization, and directing benefits to DACs. In 2020, the Climate Action Council ("CAC") was formed and began work on a Scoping Plan to serve as a framework for NYS to achieve its nation-leading clean energy goals. In December 2022, the Climate Scoping Plan[6] was released outlining recommended sector-specific and economy-wide actions that utilities, as well as other industries, need to take to deliver on climate mitigation, EJ, economic opportunity, and long-term job opportunities for New Yorkers.

- **Transportation Electrification:** The transportation sector is the second-biggest contributor of GHG emissions in NYS.[7] Multiple sources of transportation regulation exist in NYS, including:

[4] This table contains a selection of policy goals in O&R's service territory as of December 2023 and should not be considered exhaustive.

[5] NYS, New York Climate Leadership & Community Protection Act, July 2019, available at https://www.nysenate.gov/legislation/bills/2019/S6599.

[6] NYS, New York's Scoping Plan, December 2022, available at https://climate.ny.gov/resources/scoping-plan/.

[7] NYS Department of Environmental Conservation, 2022 Statewide GHG Emissions Report, available at https://www.dec.ny.gov/energy/99223.html.

- **Zero-Emission Vehicle ("ZEV") EV Memorandum of Understanding ("MOU"):** 850,000 electric light-duty vehicles on the road ("LDVs") by 2025; O&R's portion of this goal is 33,000 LDVs.
- **NYS Legislation:** 100% of LDVs sold are ZEVs by 2035; 100% of medium- and heavy-duty vehicles ("MHDVs") sold are ZEVs by 2045.
- **NYS Department of Environmental Conservation – Advanced Clean Cars II:** 35% of sales are ZEVs in 2025; 100% of sales are ZEVs by 2035.
- **NYS Department of Environmental Conservation – Advanced Clean Trucks:** Original equipment manufacturers must sell an increasing portion of EVs (30%-50% by 2030 starting in 2024-25 model year and 40%-75% by 2035); 100% of sales are ZEVs by 2045.
- **NYS 2022-2023 State Budget:** All district-owned and contract-provided school buses must be electric by 2035.

- **Renewables/Energy Supply:**
  - 70% of electricity provided from renewables by 2030.
  - 100% emissions-free electricity generation by 2040.
  - 6,000 MW ("Megawatts) of energy storage by 2030.

- **Building Decarbonization:** Given that buildings contribute approximately one-third of NYS's total direct carbon emissions, electrification and energy efficiency ("EE") upgrades in both new construction and existing buildings are critical to achieving decarbonization goals. The CLCPA puts NYS on the path to 100% zero-emissions electricity in 2040 by:
  - Reducing statewide GHG emissions by 85% by 2050 relative to 1990 levels.
  - Converting over 200,000 homes to all-electric and making energy efficiency upgrades each year starting from 2030.
  - Requiring 600,000 commercial, institutional, and multifamily buildings to use renewable energy sources by 2050.[8]

NOTE

We will refer to the following units of demand and energy in this plan (shown as demand/energy):

- kW/kWh = kilowatt and kilowatt-hour (1000 watts)
- MW/MWh = Megawatt and Megawatt-hour (one million watts)
- GW/GWh = Gigawatt and Gigawatt-hour (one billion watts)
- Btu = British Thermal Unit
- MMBtu = One million Btu
- TBtu = One trillion Btu

[8] NYSERDA Carbon Neutral Buildings Roadmap: Achieving a Carbon Neutral Building Stock in New York State by 2050, June 2021, available at https://www.nyserda.ny.gov/All-Programs/Carbon-Neutral-Buildings.

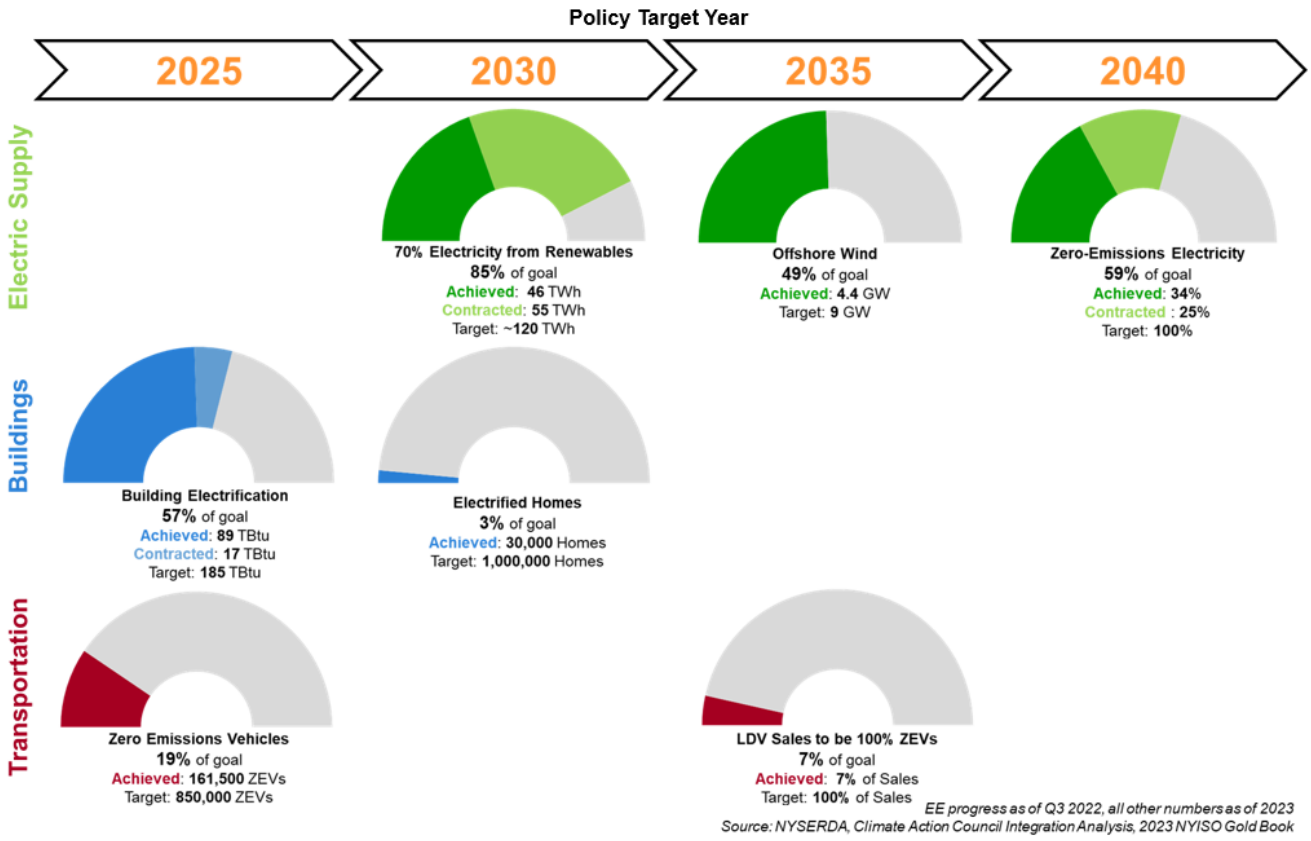
- Electrifying a minimum of 1 million homes and making up to 1 million homes electrification-ready by 2030.[9]

- **DACs:** For NYS's clean energy policies to deliver equitable benefits, the Climate Justice Working Group ("CJWG") developed the following criteria:

  - At least 35% of overall benefits of spending must be delivered to residential and business customers in DACs or in income-qualified households.[10]

Figure 1-4 shows NYS's progress toward some of these targets. Progress is being made across many of the electric supply metrics, including the goal of 70% of electricity provided by renewables by 2030. As we discuss later in this plan, significant penetration of renewables onto the system stresses the need for enhanced infrastructure to accommodate the added load, which is often two-way flow (Section 3.2.2).

Figure 1-4. NYS Progress on Policy Targets



[9] Governor Hochul's Office, 2022 New York State of the State Book, available at https://www.governor.ny.gov/sites/default/files/2022-01/2022StateoftheStateBook.pdf.

[10] NYS Draft Disadvantaged Communities Criteria, available at https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria.

New Jersey

NJ's EMP[11] was published in 2019 to address the state's energy system—including electricity generation, transportation, and buildings, and their associated GHG emissions and related air pollutants. Since then, the Murphy Administration accelerated the target for 100% clean energy from 2050 to 2035.[12] Additionally, the Global Warming Response Act ("GWRA") mandated the reduction of state GHG emissions by 80% below 2006 levels.[13] The administration also introduced the EJ Law, which requires that the environmental and public health impacts of certain facilities on overburdened communities ("OBCs") be evaluated when reviewing certain applications for new facilities. The EMP defines 100% clean energy as 100% carbon-neutral electricity generation and maximum building and transportation electrification, which have been identified as the greatest carbon-emission-producing sectors in the state. As in NYS, utilities in NJ have a key role to play in transforming energy production, distribution, and consumption, as well as educating and facilitating opportunities for NJ residents and businesses.

- **Transportation Electrification:** In NJ, the transportation sector accounts for 42% of net GHG emissions, making it the largest emissions source in the state. To achieve GHG reduction goals by 2050, NJ has committed to:
    - Deployment of 330,000 LDVs by 2025;[14] RECO's portion of this is 16,500 LDVs.
    - All new passenger vehicle sales are electric by 2035.
    - Electrification of the state's LDV fleet and 100% electric school buses by 2035.
    - Electrification of 75% of medium-duty vehicles "(MDVs") and 50% of heavy-duty vehicles ("HDVs") by 2050.
- **Renewable Energy and Distributed Energy Resources ("DERs"):** To reduce NJ's climate emissions and meet the state's clean energy needs successfully, Governor Murphy has committed to:
    - 7.5 GW of offshore wind energy by 2035; 11 GW by 2040.
    - 2,000 MW of energy storage by 2030.
    - 100% clean energy generation by 2035.
- **Building Decarbonization:** The building sector accounts for a combined 62% of the state's total end-use energy consumption. The EMP requires this sector to be largely

[11] State of New Jersey, New Jersey's Energy Master Plan, 2019, available at https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf.

[12] State of New Jersey, Governor Phil Murphy, 2023, available at https://www.nj.gov/governor/news/news/562023/20230215b.shtml#:~:text=%E2%80%9CGovernor%20Murphy's%20new%20goal%20of,percent%20clean%20energy%20goal%20in.

[13] New Jersey Department of Environmental Protection ("NJDEP"), New Jersey Global Warming Response Act, 2020, available at https://dep.nj.gov/wp-content/uploads/climatechange/nj-gwra-80x50-report-2020.pdf.

[14] NJDEP, State Zero-Emission Vehicle Programs Memorandum of Understanding, 2019, available at https://nj.gov/governor/news/news/562019/docs/MOU_6.3.19.pdf.

decarbonized and electrified by 2050, with an early focus on new construction and the electrification of oil- and propane-fueled buildings.

- **EE and Peak Demand Reduction ("PDR"):** NJ is promoting EE and managing peak load, including clear energy reduction goals and accountability, such as enforcing the requirement that electric and gas utilities reduce consumption by at least 2% and 0.75%, respectively and that utilities develop direct load control and curtailable load programs.

- **Low- and Moderate-Income ("LMI") and EJ Communities:** The state has committed to supporting and incentivizing local, clean power generation, especially rooftop solar and community solar, and prioritizing clean transportation options in LMI and EJ communities.

- **Clean Energy Innovation Economy:** The state has committed to expanding on its existing 52,000 clean energy jobs and investing in developing clean energy knowledge, services, and products that can be exported to other regions.

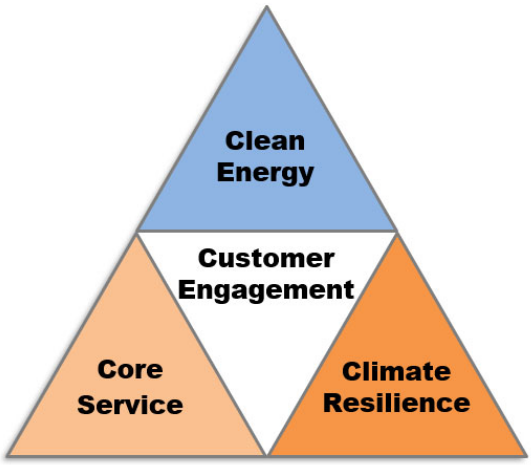
2. Our Vision and Objectives

O&R is committed to enabling a clean energy future for its customers and society while continuing to provide safe, reliable, and increasingly resilient delivered energy service. The Company's vision for the future leverages both the gas and electric systems and allows for a balance of technology complexity and maturity, customer needs, and costs.

2.1 Strategic Objectives and the Clean Energy Commitment

This LRP articulates the outcomes to be achieved and the strategy to be used to achieve them. O&R shares the four key objectives under the Con Edison, Inc. framework in Figure 2-1, which continue to represent the Company's priorities.[15]

Figure 2-1. Con Edison, Inc. Strategic Objectives

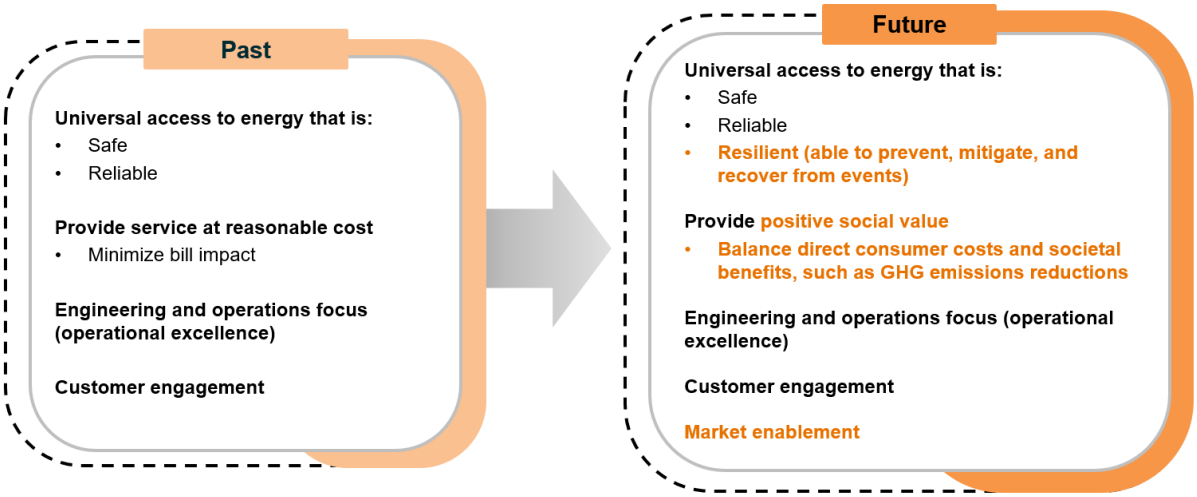


- **Clean Energy:** Support economy-wide net-zero GHG emissions in our service territories by 2050.
- **Climate Resilience:** Increased resilience of our energy infrastructure to adapt to climate change.
- **Core Service:** World-class safety, reliability, and security, while managing the rate impacts and equity challenges of the energy transition.
- **Customer Engagement:** Industry-leading customer experience and facilitation through the clean energy transition.

Driven by industry and societal trends presented in Section 1.2, these strategic objectives also represent the evolving role of utilities (see Figure 2-2 below) in not only providing customers universal access to safe, resilient, and reliable energy at a reasonable cost, but also, to delivering clean energy solutions and providing positive societal value. Utilities must become more flexible, expand their offerings, and enable or facilitate new markets in response to market forces and evolving customer expectations. Consistent throughout these past and future roles are the core principles of safety, reliability, operational excellence, and customer experience.

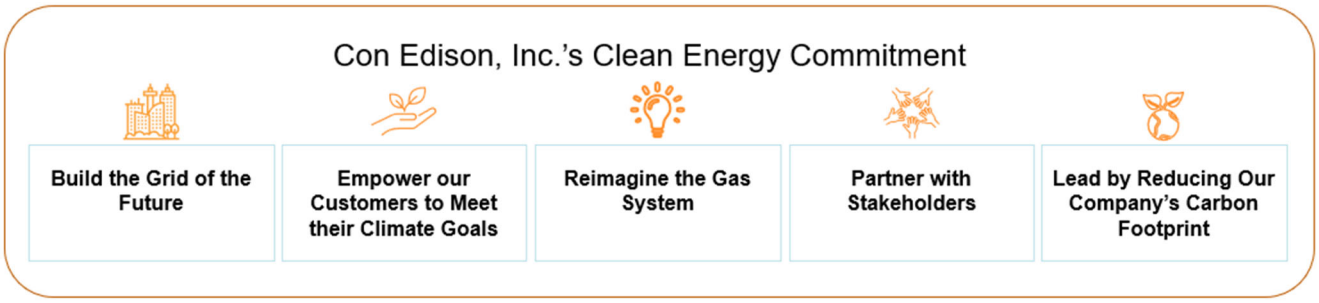
[15] O&R's Strategic Priorities as of January 2024.

Figure 2-2. Changing Role of Utilities



O&R's Clean Energy Commitment, shown in Figure 2-3 below, also acts as a guide to prioritizing the actions and investments presented throughout this LRP that are necessary to achieve our strategic objectives and changing role.[16] This commitment includes investing in, building, and operating reliable, resilient, and innovative energy infrastructure; advancing the electrification of heating and transportation; and aggressively transitioning away from fossil fuels to a net-zero economy by 2050.

Figure 2-3. Clean Energy Commitment



2.2 Uncertainties, Risks, and Signposts

The path to net-zero GHG emissions will contain risks and uncertainties. Transitioning to a future powered by clean energy will require substantial investments in new energy sources, grid infrastructure, and technologies. It is unclear when and whether the policies and regulations

[16] O&R, O&R's Clean Energy Commitment, 2022, available at https://www.oru.com/en/our-energy-future/our-energy-vision/our-energy-future-commitment.

required for the necessary utility actions in the Hybrid and Deep Electrification Pathways that will occur on the planning horizon.

The Company actively addresses risk and uncertainty through a flexible pathways framework that informs and enables a dynamic planning environment. Signposts are the indicators that allow us to check and adjust our plans as conditions change and opportunities arise. These signposts continuously inform our planning strategy and allow for maximum operational efficiency and optimal allocation of resources, giving us the optionality and flexibility needed to achieve the future value our communities and customers expect.

Table 2-1 below includes an overview of our analysis of potential signposts for the Hybrid and Deep Electrification Pathways. Each signpost's timing and level of impact can influence the Company's ability to respond to the changing condition. For example, if a signpost is reached in the near term, the Company and customers may benefit from the increased optionality that arises from having a longer time horizon.

Table 2-1. Signposts by Pathway

Signpost Type	Hybrid	Deep Electrification	Examples
Policy	Policies support decarbonization while being technology agnostic.	Policies mandate electrification in NYS and NJ.	• Approval to interconnect and purchase renewable natural gas ("RNG") • Policy supporting bundling electrification with building envelope upgrades
Technology	Electric building heating technology and low-to-zero-carbon gaseous fuels decline in cost and improve in quality as expected; low-to-zero-carbon gaseous fuels are viable for difficult-to-electrify buildings.	Electric building heating technology rapidly declines in cost and improves in quality.	• Market growth for RNG produced by anaerobic digestion • Development of an interstate hydrogen production and transportation network
Customer Adoption	Most customers rapidly adopt electric building heating technologies, with many customers in difficult-to-electrify buildings opting for low-to-zero-carbon gaseous fuels.	All customers rapidly adopt electric building heating technologies.	• Increased participation in programs for improved controls and demand response ("DR")
Macroeconomic and Market Trends	Global and national economic conditions and market trends impact the energy industry.	Global and national economic conditions favor electrification.	• Inflationary pressures • Supply chain disruptions • Geopolitical influences

The assumptions used to develop the pathways also serve as indicators of the levels and types of actions that will be needed to achieve the targeted outcomes by 2050 (see Appendix). We remain open to considering all decarbonization solutions that may advance societal goals of combatting climate change and increasing value for our customers as industry and societal trends evolve. Though the ultimate pathway is presently uncertain, we can use these representative pathways to prepare our energy systems for projects and programs we will need to meet our customers' needs, to determine the near-term investments we should make at scale, and to identify the technologies we should research and pilot.

2.3 Representative Pathways to Net-Zero

O&R is committed to supporting NYS's and NJ's GHG emissions reduction goals. Achieving these targets will require a significant rebalancing of the types of energy we deliver to

customers, as gas sales are expected to decline by 58%-92%, while electric sales increase 75%-110% between 2023 and 2050. This rebalancing is driven primarily by electrification of heating and transportation across our customer base. To plan for this future, we have developed a set of pathways or possible futures for the gas and electric business to reach the 2050 target.

Decarbonization Pathways

O&R evaluates two representative pathways and a Reference Pathway. The Reference Pathway acts as a baseline reflecting current legislation, investments, and operating environment. The Hybrid Pathway takes a moderate path that relies on a combination of clean electricity and low-carbon fuels, and the Deep Electrification Pathway almost exclusively relies on electrification to achieve net-zero greenhouse gas emissions.

Our analysis shows multiple pathways to a clean energy future that can satisfy both customer energy needs and policy goals. However, it is important to recognize that each pathway has inherent uncertainty in terms of customer economics, market complexities, policy and regulatory landscape, and technical constraints. The pathways consider several factors, including the complexity of customer adoption of new energy technologies, climate challenges, and alignment with policy direction. We will continually assess these factors using a set of signposts, or indicators that will show us and our stakeholders how the evolution of technology, customer economics, and market factors are impacting each pathway to 2050.

The Company evaluates two representative pathways as potential end states to achieve net-zero GHG emissions: Hybrid and Deep Electrification. The assumptions for these pathways vary in the level of adoption of different energy technologies and explore the impacts of varying levels of policy evolution and investment needs. In addition to these two pathways, the Company evaluates a Reference Pathway that does not achieve net-zero GHG emissions by 2050 and primarily reflects the current legal and policy framework. O&R expects that updates to the Reference Pathway, which reflects current rate case funding requests and existing legislative and regulatory requirements, will evolve over time.

The Hybrid and Deep Electrification Pathways both deliver net-zero GHG emissions through different end-use and supply technologies. O&R has not selected a single, preferred pathway because we strongly believe it is premature to do so. We need to continue planning and preparing for a range of possible outcomes to meet our obligations to provide safe and reliable service to our customers. Both pathways have benefits, challenges, and costs associated with them and will require further regulatory and legislative actions to align more closely with a pathway that achieves NYS and NJ decarbonization goals. The future trajectory of important factors, such as legislation/regulation, technology, and customer behavior, will develop over time and are not entirely within our control. Significant changes in all three of these areas will be supported by continued stakeholder collaboration and are required to drive high levels of electrification, to achieve a reasonable balance between affordability and emissions reductions, and to realize the development of LCFs.

While both the Hybrid and Deep Electrification Pathways result in increases to customer bills, the Hybrid Pathway is expected to be a more cost-effective approach than the Deep Electrification Pathway. The Deep Electrification Pathway end state matches analysis by the New York State Energy Research and Development Authority (“NYSERDA”), but it is difficult to predict the true end state due to the uncertainty in customer adoption rates and policy and

regulation. Assumptions and resulting demand projections for these pathways were determined using internal models that integrate internal and external customer data, technology performance, emissions rates, and other relevant information. Additional detail around these assumptions can be found in the Appendices to this LRP.

Table 2-1. Pathways to Achieve Net-Zero GHG Emissions by 2050

	Reference	Hybrid	Deep Electrification
Description	• O&R's planning scenario informed by planned clean energy investments that are consistent with current legislation and expected operating environment • Does not meet 2050 emissions reduction targets • Reflects current market conditions, legal and policy framework	• Relies on both clean electricity and LCFs to meet state GHG goals • Many difficult-to-electrify[17] buildings will still retain a gas connection for LCFs • Designed to accomplish goals for which a legal and policy framework is not finalized	• Aligns with NYSERDA analysis that supports the CAC Scoping Plan • Relies on clean electricity and extremely limited volume of LCFs to meet State's GHG goals • Heavy electrification of buildings
Electric Supply (2050)	100% clean electricity by 2040, per CLCPA goals		
Gas Supply (2050)	100% fossil gas (5% certified natural gas ["CNG"])	Replacement of both fossil gas and CNG with LCFs	
LCF Supply Level (2050)	None	40% of today's gas sales	10% of today's gas sales
Transportation Electrification (2050)	85% of vehicle miles traveled are from EVs	90% of vehicle miles traveled are from EVs	95% of vehicle miles traveled are from EVs
Heat Pump Adoption (2050)	40% of floor space	65% of floor space	95% of floor space
Energy Efficiency (2050)	20% reduction in building energy	30% reduction in building energy	40% reduction in building energy

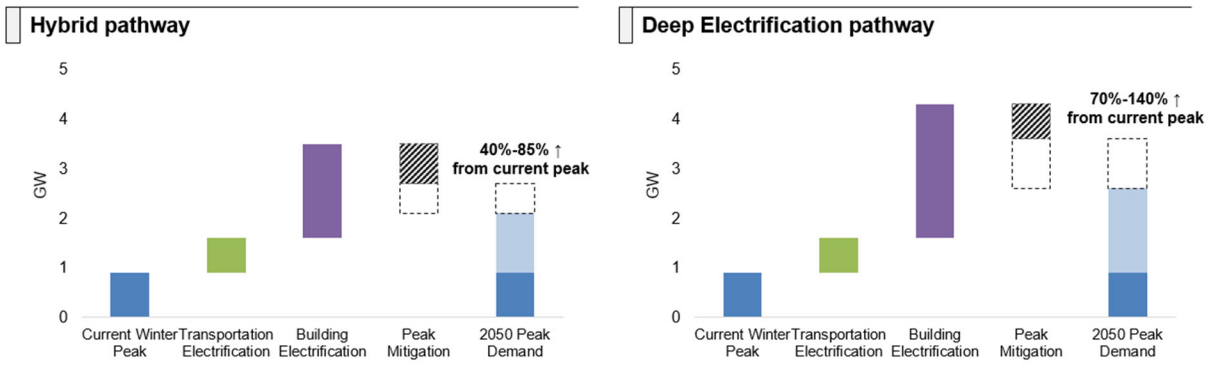
[17] Our definition of difficult-to-electrify buildings include those that are either prohibitively expensive to retrofit with electric heating technologies, inclusive of available subsidies/incentives, or are technically impractical to retrofit with electric heating technologies due to engineering or design characteristics of the building.

As noted in Table 2-2 above, policy action that eliminates exemptions for new building connections and allows utilities to transition existing customers off the gas system is required to realize the Hybrid and Deep Electrification Pathway end states. Deep Electrification achieves further emissions reductions and relies on more aggressive customer adoption of EE and building electrification ("BE"). As a result, managing a declining gas business will require changing the Company's investment strategy, addressing residual system risk, and employing strategies to mitigate customer impacts while maintaining equitable recovery of costs.

O&R performs an annual 20-year forecast of load growth on the Reference Pathway which informs investments and energy supply. In recent years, O&R performed not only summer peak demand forecasts, but winter peak forecasts as well. This includes forecasts of the winter load growth most recently experienced and the growth expected to be realized over a 20-year period from known projects, the economy, and consumer behavior. It also includes residential and commercial growth and accounts for EE/Demand Side Management ("DSM") programs, natural conservation, and other modifiers such as distributed generation/combined heat and power, oil-to-gas conversion, electrification of heating and non-heating appliances/equipment, and any additional adjustment as required.

In the Hybrid Pathway, the electric system is expected to transition from summer-peaking to dual-season peaking by 2040; Deep Electrification will accelerate this transition while further increasing the winter peak. This emphasizes the need for proactive planning of electrification-enabling investments in our service territories. The potential increase in electric peak and the sources are shown in Figure 2-4.

Figure 2-4. 2050 Electric Utility Winter System Peak Demand



2.3.1 Reference Pathway

The Company's energy forecasting, supply, and system planning teams currently plan toward a Reference Pathway, which reflects today's legislated policy and regulatory framework and does not achieve net-zero GHG emissions reduction goals. The clean energy investments that our regulators have approved and existing legislation, including limited regulatory, technological, and market changes during the next two decades, inform Reference Pathway assumptions.

The Reference Pathway will continue to inform our short-term rate case funding requests, long-term capital investment planning, and energy supply contracts. The Company believes that as

NYS makes more progress in implementing the clean energy transition and as customer adoption of clean energy changes, the planning scenario will continually evolve.

Significant policy and regulatory changes over the next decade may alter the Reference Pathway to put us on track to achieve net-zero GHG emissions by 2050. This expected change in the Reference Pathway is not a new trend, as the Company's peak demand forecasts reflect the dramatic shift in recent years, driven by both policy changes and the programs the Company has implemented to reduce demand.

In the Reference Pathway, gas system peak demand is projected to decrease, and electric system peak demand continues to grow, but neither is expected at the pace that achieves the NY and NJ's clean energy goals. Gas sales are also projected to decline based on projected customer counts and modifiers to the base period volumes while electric sales are projected to increase.

2.3.2 Hybrid Pathway

The Hybrid Pathway is designed to achieve net-zero GHG emissions through increased electrification and targeted use of LCFs. This pathway relies on an expanded electric grid and a reduced gas distribution system that balances electrification with the use of LCFs. The Hybrid Pathway delivers lower customer costs/complexity than the Deep Electrification Pathway, while maintaining reliability and grid resilience.

The Hybrid Pathway will result in significant impacts on energy delivered, sales, and peak demand. This includes a gas-sector emissions reduction of 63% by 2043 and an electric peak increase of 29%-67% by 2043 (both of these comparisons are made using 2023 data). O&R's electric system will serve more of customers' energy needs as it becomes the backbone of the clean energy transition. This means that the Company's role will change, with O&R serving heating and transportation.

Although there is a role for the gas system in the Hybrid Pathway, sales are expected to decline considerably. Gas usage will be limited but will remain important with the use of LCFs to further reduce emissions. With regulatory intervention under this pathway, the gas system will see a 58% reduction in volume from 2023 levels by 2050. The Hybrid Pathway continues to serve all regions of the O&R service territory with LCFs where customers are difficult to electrify.

2.3.3 Deep Electrification Pathway

The Deep Electrification Pathway relies heavily on transportation electrification, BE, and EE retrofits for over 90% of the buildings in the O&R service territory. It reflects a faster pace of adoption of electric heating solutions compared to the Hybrid Pathway.

As in the Hybrid Pathway, the electric system peak is projected to shift to the winter (see Figure 2-4 above). However, in the Deep Electrification Pathway, the electric system peak demand doubles, as electricity makes up 95% of energy delivered by the Company.

Both the Hybrid and the Deep Electrification Pathways assume that clean energy supply will be adequate to meet electric demand.

Gas usage in this pathway is extremely limited and results in 50% lower capital expenditures and significant changes to how the business is managed. Further, the pathway envisions eliminating almost all gas system infrastructure except select regulator stations, supply mains, and distribution radials to serve a few remaining large-consumption, extremely difficult-to-electrify customers.

Higher heat pump adoption will increase projected electricity demand, especially under this pathway. The Company will look to mitigate impacts using peak optimization strategies, which would require significant building retrofits, coordination across customer end uses, and increased customer participation and changes in behavior.

2.4 Managing the Business Transformation

While O&R's exact path to net-zero by 2050 is uncertain, we recognize that the business will undergo significant transformation. To prepare for these changes, the Company will need to adapt to changing conditions and technology. The processes and tools used by the Company and its employees will look different in 2050 from those that are in use today.

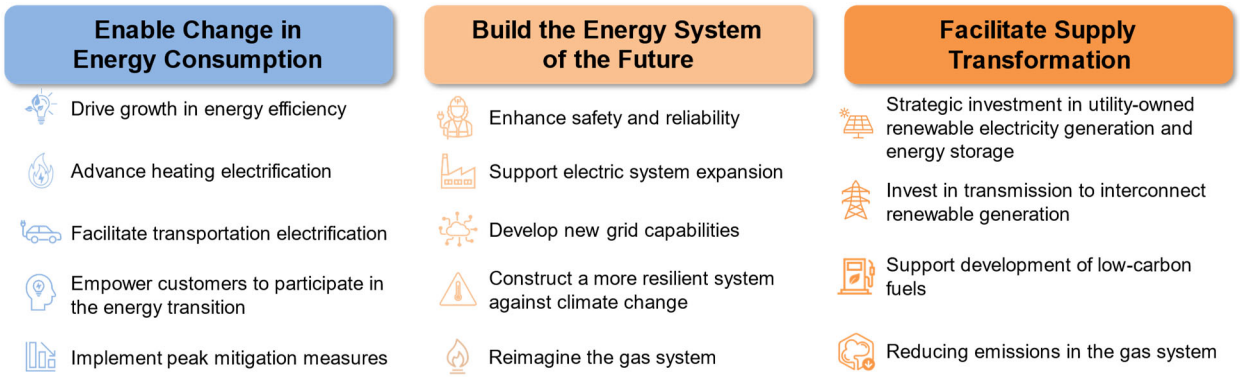
We are proactively managing our internal processes and tools to effectively aid employees and customers in the clean energy transition. Section 3, 'Our Approach', lays out the activities and investments in technology, infrastructure, and programs that will allow us to enable a change in energy consumption, build the grid of the future, and facilitate supply transformation. The nature of the energy system's day-to-day operations will be more dynamic in a DER-driven environment. To convert customers to new energy solutions at scale will require new approaches to customer engagement. O&R's ability to execute this strategy and enable the pace of adoption required to meet state policy goals depends on having the appropriate level and type of skilled labor.

The Company's labor resources will have to grow and evolve in skill to accommodate the planned business transformation. O&R has been successful in increasing its hiring rate by 14% in the past year but will need to increase to meet the needs specific to the growing electric business. Currently, the labor market is highly competitive, and while we know some of the skills that are needed, priorities may shift as technology evolves through 2050. O&R will work closely with its operations team to identify hiring and training needs and remain flexible in how labor and skill gaps are addressed.

3. Our Approach

O&R understands that regardless of which pathway to net-zero GHG emissions in 2050 is pursued, electricity consumption is going to increase as our customers electrify transportation and heating. Our affirmative strategy is to leverage electric distribution to be a purveyor of clean energy to our residential, commercial, and industrial customers. Electric utilities will be the backbone of the energy transition by providing clean electricity from renewable generation for expanded use by customers, primarily through transportation and heating. The role of our gas utility will evolve as demand declines and existing infrastructure is used to deliver LCFs to meet targeted difficult-to-electrify (gas to electric) customers. Our approach to achieving the strategic objectives is centered on the three pillars outlined below in Figure 3-1.

Figure 3-1. Achieving Strategic Objectives



Achieving NYS and NJ state policy goals will result in changes to the types of energy customers consume and will subsequently shift the nature of peak electric demand. Figure 3-2 and Figure 3-3 below presents our projection for total energy consumed by resource across the Company's service territory under the Hybrid and Deep Electrification Pathways. By 2030, electric utility sales are expected to increase between 13% and 20% compared to 2023, highlighting the short-term need for increased electric supply.

Figure 3-2. Projected Energy Consumed under the Hybrid Pathway

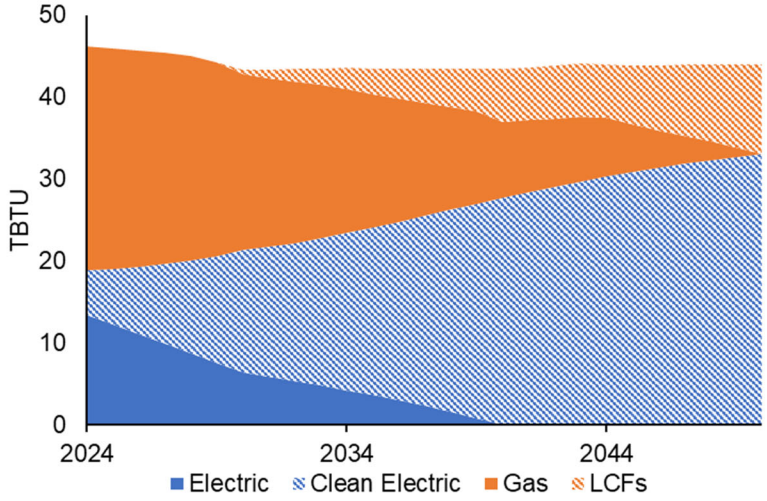


Figure 3-3. Projected Total Energy Consumed under the Deep Electrification Pathway

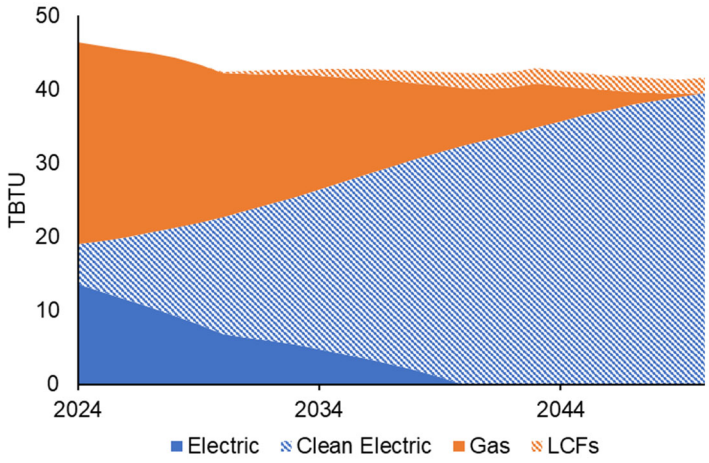
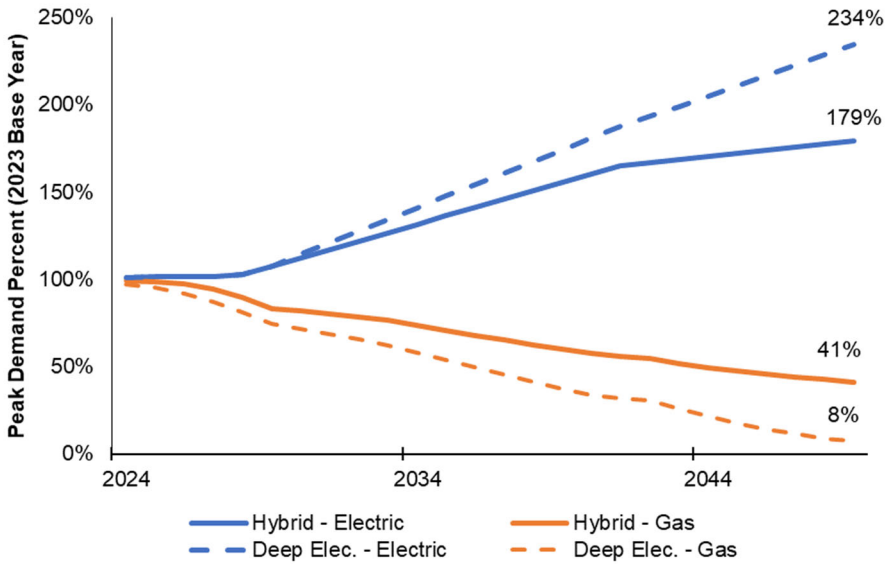


Figure 3-4 shows accompanying electric peak demand through 2050 under the Deep Electrification and Hybrid Pathways. By 2050 the electric peak could increase by 79%-134% because of increased electrification. Concurrently, the demand for gas could decrease by 58%-92% from today's winter peak, further demonstrating the evolving roles of gas and electric utilities going forward.

Figure 3-4. Projected 2050 Electric and Gas Utility Peak Demand



The following sections describe the Company's strategy to facilitate the changes to the energy landscape needed to reach NYS and NJ policy goals and address the changing nature of energy consumption shown in Figure 3-2 and Figure 3-3 above, and the actionable tactics we will employ to achieve our strategy.

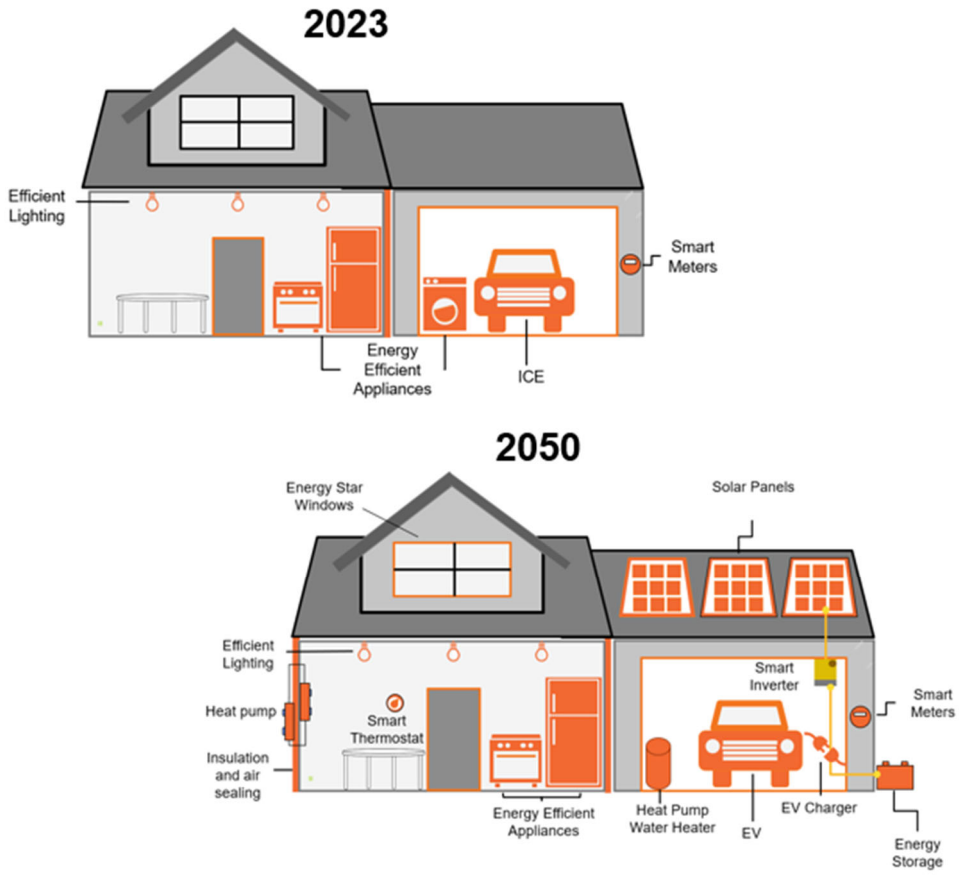
3.1 Enable Change in Energy Consumption

O&R recognizes its important role in supporting customers as they implement EE and electrification measures and shift to electric transport and heating from fossil sources. Each of the supporting tactics that enable changes in energy consumption are described in this section.

Reducing energy consumption has been a focus over the last few decades through the introduction of EE incentives and other programs. These EE incentives will slowly be reduced or phased out in favor of beneficial electrification initiatives as O&R moves toward an electrified future. Many customers today have efficient appliances, lighting, and smart meters that provide data for customers and the utility to better understand how they use energy. As we transition to electrified forms of heating and transportation, energy needs will shift from fossil fuel sources to the electric grid, and electric demand will increase. Customers will rely more on electricity in 2050 than they do today. For example, heat pumps, EVs, and DERs will be the norm, not the exception. Figure 3-5 below shows the changing profile of the average home from 2023 to 2050.

While supporting our customers with their changes in energy consumption, O&R is similarly working to change its own energy use. Through Con Edison Inc.'s Clean Energy Commitment O&R is committed to decarbonizing our facilities. These facilities equate to approximately 3 million square feet of office space and work locations. In anticipation of 2030, O&R is implementing clean energy solutions at both existing facilities and new construction projects. In addition, the Company is electrifying its LDV fleet.

Figure 3-5. Average Residential Home in 2023 and 2050



Peak mitigation strategies will still be critical to manage demand increases while safely eliminating the use of carbon resources to meet these fluctuations. We will reimagine the way we use the gas system, looking to incorporate LCFs and prioritizing electrification.

O&R will pursue reductions in energy use by increasing customer awareness of EE programs and electrification benefits. We will reduce building emissions by supporting building heating electrification, building envelope, and EE upgrades, and we will support customer adoption of EVs by offering make-ready infrastructure and managed charging programs.

3.1.1 Drive Growth in Energy Efficiency

The Company's EE programs focus on reducing both electric and gas usage to produce savings for customers and realize GHG emissions reduction targets. EE is a cornerstone of advancing a clean energy future for both NYS and NJ. EE and load management are often the most cost-effective means for meeting customer needs.

O&R currently offers a portfolio of EE programs to its NYS customers based on the New Efficiency New York ("NENY") Order. However, the budget constraints imposed on the NENY programs will limit the energy savings achievable through 2030 and result in a significant gap between expected savings and those needed to achieve 2030 state policy goals. As such, the

O&R offers a variety of Energy Efficiency programs to customers based on New York's New Efficiency Order and New Jersey's Board of Public Utilities' Energy Efficiency and Peak Demand Reduction programs. O&R submitted its Energy Efficiency and Building Electrification (EE BE) portfolios based on these programs for 2026-2030 with an energy savings goal of 8.7 million MMBtu.

strategies and measures in the current portfolio will need to change both in focus and scale to continue progressing toward NYS policy goals.

O&R submitted its EE BE portfolios for 2026-2030, as required by the New York State Public Service Commission's ("NYPSC") Order Directing Energy Efficiency and Building Electrification Proposals ("EE BE Order").[18] O&R is committed to assisting NYS in meeting its ambitious clean energy goals by growing and improving its EE BE programs. These EE BE programs are critical tools to help customers reduce their energy consumption and thereby reduce overall GHG emissions. In this section, we describe the EE programs submitted with the portfolios. The BE programs are discussed in detail in Section 3.1.2.

In the EE BE Order, the NYPSC establishes a 'Strategic Framework' designating programs and measures as strategic, neutral, or non-strategic according to their alignment with NYS policy objectives. Notably, lighting measures will be considered 'non-strategic' starting in 2026 as focus shifts to the development of electrification and building envelope programs. Lighting efficiency solutions have been a steady part of utility efficiency programs for decades and are expected to represent more than 75% of the total electric portfolio savings in 2023. However, with the economy-wide acceptance of efficient lighting, first with compact fluorescent bulbs and now light-emitting diodes ("LEDs"), and with federal action to limit incandescent bulbs, the need for customer incentives on lighting is ending. This change represents a policy and market success while calling for a major shift in EE strategy going forward.

On June 10, 2020, the NJBPU issued its order directing each electric and gas distribution company in NJ to establish EE and peak demand reduction ("PDR") programs on a three-year cycle pursuant to the EE provisions of the Clean Energy Act of 2018.[19] In August 2023, the NJBPU approved the Order to implement the next three-year cycle for EE programs.[20] This Order builds on the programs from the previous three-year cycle by including BE and DR. O&R submitted its proposed EE plan for 2025-2027 in December 2023.[21] The proposed programs are discussed further in the section 'Energy Efficiency Program Offerings in NJ' below.

O&R estimates that over half of the energy savings needed to meet the CLCPA's 2030 energy savings goal could come from building electrification.

[18] New York State Public Service Commission, Order Directing Energy Efficiency and Building Electrification Proposals, 2023, available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={06B0FDEC-62EC-4A97-A7D7-7082F71B68B8}.

[19] New Jersey Legislature, Bill A3723, May 2018, available at https://www.njleg.gov/bill-search/2018/A3723.

[20] In re the Implementation of P.L. 2018, c. 17 Regarding the Establishment of Energy Efficiency and Peak Demand Reduction Programs, BPU Docket Nos. QO19010040, QO23030150, QO17091004, Orders dated May 24, 2023, July 26, 2023, September 27, 2023, and October 25, 2023 ("Triennium 2 Orders").

[21] RECO Petition, filed December 2023 in BPU Docket Nos. QO19010040, QO23030150, and QO17091004

The Company is deploying comprehensive EE, electrification, and building envelope EE programs designed to deliver cost-effective benefits to customers, support energy savings and GHG emissions reduction objectives in NYS and NJ and build customer awareness of available EE programs through outreach and education. In accordance with the policy discussed above, while O&R is transitioning the current portfolio of lighting, appliance rebates, and behavioral energy programs to those focused on building envelope, weatherization, and electrification, RECO will continue with commercial lighting, appliance rebates, and behavioral programs in combination with electrification and building envelope measures.

Energy Efficiency Program Offerings in NYS

O&R is committed to assisting NYS and NJ in meeting their ambitious clean energy goals by growing its EE programs. The Company's EE programs are critical tools to help customers reduce their energy consumption and thereby reduce overall GHG emissions. The current portfolio of EE programs is designed to generate energy and peak demand savings across the Company's service territory.

The current EE programs available in our NYS service territory through 2025 are described in Table 3-1.

Table 3-1. Energy Efficiency Programs in NYS

Program Name	Current Offering (2023-2025)	Focus for 2026-2030
Residential Electric Behavioral Program	This program uses Home Energy Reports ("HERs") to target energy savings through voluntary behavioral changes personalized to each customer.	Discontinued after 2025.
Residential Efficient Products Program	This program targets energy savings through rebates for ENERGY STAR® appliance upgrades, recycling of refrigerators, freezers and room air conditioners, and other ENERGY STAR® products.	By 2026, this program will focus exclusively on building envelope projects, such as insulation and air sealing.
Residential Electric Midstream Program	Launched in 2019, this program leverages existing distributor networks to promote and provide instant rebates for ENERGY STAR® appliance purchases at retailers.	In 2026, this program will transition to electrification and building envelope midstream measures.

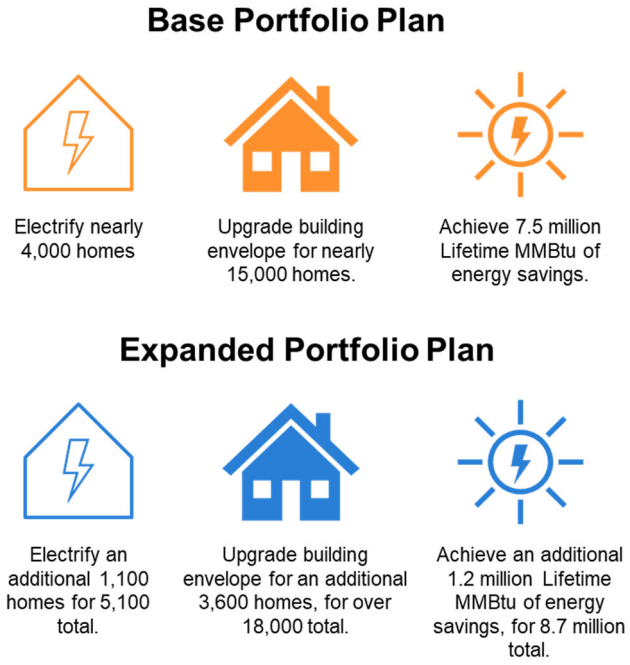
Residential Weatherization Program	New program beginning in 2026	Offers incentives to increase the adoption of insulation, air sealing, and duct sealing for residences. Customers can work with participating contractors to install eligible measures and receive a discount on the contractor's final invoice.
Commercial and Industrial ("C&I") Electric Midstream	Over 39 distributors participate in this point-of-sale instant lighting incentive, providing contractors with indoor and outdoor LED lighting equipment at reduced prices.	Discontinued after 2025
C&I Electric Rebate Program	This program provides prescriptive and custom rebates that encourage C&I customers to identify energy saving opportunities, develop long-term building performance improvement plans, and implement upgrade projects that are cost-effective to retrofit.	Focus on growing envelope and electrification savings by developing calculation tools to help capture total possible energy savings. O&R will focus on growing savings from waste heat recovery, controls paired with heat pumps, refrigeration upgrades, and window inserts as a practical building envelope measure for commercial buildings.
Business Direct Install ("BDI") Program	O&R's BDI program offers a free on-site audit, an audit report with specific recommendations, and up to 70% of the installed cost of lighting, refrigeration, and cooling projects for business customers.	

In July 2023, the NYPSC ordered NYS utilities to conduct an interim EE and BE review including EE and BE proposals for 2026-2030. O&R responded to this order with a Base Portfolio proposal for its NYS territory that expands on existing successful programs to continue to deliver energy-efficient solutions to customers across our territory and is aligned with budgets and other guidelines in the EE BE Order. The proposed programs and focus areas are described in Table 3-1. The change in focus to more expensive electrification and building envelope projects, however, will reduce overall portfolio savings over time as the cost per Million British Thermal Units ("MMBtu") of savings increases. Current rebates for residential gas fossil fuel appliances will no longer be rebated in 2026.

The budget constraints imposed on the NENY programs will limit the achievable energy savings for 2026-2030, resulting in a significant gap between expected savings and 2030 policy goals. As such, O&R prepared an 'Expanded Portfolio' proposal that requests the additional incremental program costs to support bridging that gap. The Expanded Portfolio plan is a

potential scenario that builds on the Base Portfolio, scaling the programs and markets served to deliver more than triple the savings from BE and 40 times the savings from building envelope measures in 2030 compared with 2023. The Base Portfolio plan and the Expanded Portfolio plan are compared in Figure 3-6 below.

Figure 3-6. Benefits of O&R's Base and Expanded Portfolio Plans



Energy Efficiency Program Offerings in NJ

O&R submitted its proposal for post-2023 EE and PDR programs in NJ in December 2023. The proposal consists of eight Core programs and three additional Utility-Led Initiatives to support NJ's ambitious EE goals and to support the 2019 EMP. The Core programs proposed are: Whole Home, Income-Qualified, Energy Efficient Products, Behavioral, Energy Solutions, C&I Prescriptive & Custom, C&I Direct Install, and Multi-Family Programs. The three additional Utility-Led Initiatives are the Next Generation Savings, Building Decarbonization, and Demand Response Programs. The Company requested $55 million dollars for these programs over the three-year period. The proposed projects are projected to achieve a total of around 56,825 Megawatt hours ("MWh") of savings over the same period. Descriptions of the proposed programs are included in Table 3-2 below.

Table 3-2. Energy Efficiency Programs in NJ

NJ EE Program Name	Description
Whole Home Program	Provides a holistic approach for residential customers to explore and invest in the efficiency and comfort of their homes and includes a Home Energy Assessment. Consists of a qualified audit to provide an EE action-plan with access to low-interest financing.

Income-Qualified Program	Offers same products and services as the Whole Home Program, but at no cost to LMI customers.
Energy Efficient Products	Promotes installation of ENERGY STAR and other high-efficiency equipment through a variety of channels, including an online marketplace, downstream customer rebates, reduced point of sale costs, a midstream network of trade allies, and collaborations with local foodbanks and non-profits serving customers in need.
Behavioral Program	Provides customers with a home energy report that benchmarks energy usage against historical usage and similar homes in the area to prompt reduction through simple energy-saving tips.
Energy Solutions Program	Encourages large C&I customers to pursue comprehensive energy upgrades within their facilities by providing incentives toward the cost of conducting an American Society of Heating, Refrigeration and Air-Conditioning Engineers (“ASHRAE”)-level energy audit and completing the installation of the recommended electric and/or natural gas efficiency measures. Participation is tiered based on facility size.
C&I Prescriptive & Custom Rebate Program	Focused on the installation of efficiency measures for small businesses, non-profits, municipalities, schools, and faith-based organizations that typically lack the time, knowledge, or financial resources necessary to investigate and pursue EE. Program pays a percentage of the up-front cost to install recommended measures.
Multi-Family Program	Addresses multi-family structures with five or more units which leads to significant variation in structures served under this Program. As such, the program will provide a structured screening review to identify and develop the project plan for each customer. Potential projects include EE education, no-cost installation of simple efficiency measures, prescriptive incentives, custom incentives, and access to no-interest financing.
Next Generation Savings Program	Develops critical insights that can help NJ with longer term strategies for reaching its clean energy and climate related goals. Supports new technologies and approaches that are ready for broader adoption, but need enhanced contractor training, customer incentives, and marketplace evolution for broad implementation.
Building Decarbonization Program	Promotes the installation of clean heat pump and electrification technologies by residential, multi-family, and C&I customers. Modeled after NYS Clean Heat Program Framework.

Demand Response Program	Encourages customers to make temporary reductions of their electricity usage during peak demand periods during the summer. Includes Bring Your Own Device programs, behavioral programs, Commercial System Relief Programs, and advanced metering infrastructure.

The December 2023 proposal includes the justification for transitioning the current Comfort Partners program to be fully administered by the NJ Utilities. The Comfort Partners program helps income-eligible homeowners reduce their energy bills by implementing cost-effective measures that save energy and money while improving their home's comfort, including a home energy audit, energy education, efficient lighting and appliances, and building envelope improvements. Currently, this program is managed under a partnership between the NJBPU and the NJ Utilities. Under full utility administration, program design, implementation, and evaluation will be consolidated across the low-income and moderate-income segments, which will streamline the customer experience and allow for the alignment of marketing.

Disadvantaged Communities and LMI Customers

O&R recognizes the importance of providing equitable access to EE and BE to all interested customers. Including DACs and LMI customers in EE programs both supports carbon reduction goals and helps improve energy affordability for participating households. A typical residence's biggest energy loads are for space heating, air conditioning, and water heating. Therefore, programs targeting these loads are the most efficient way to reduce overall household energy costs. The Company looks to increase DAC engagement through initiatives such as targeted marketing, dedicated support, community partnerships, and contractor incentives to increase the percentage of jobs in DACs.

O&R will consider common challenges to DAC customer participation in EE BE programs, including those identified by NYSERDA. These challenges include limited participant access to credit or capital needed to upgrade old buildings; lack of awareness of available programs and services; and administrative requirements for participation. The Company has offered targeted incentives for LMI customers and will further promote DAC participation by:

- Improving digital and language accessibility.
- Reviewing feedback from stakeholders to identify program design and engagement improvement opportunities.
- Leveraging the marketplace to provide targeted offerings to DAC customers, with higher rebates to help overcome the upfront cost of energy-efficient measures.
- Simplifying program design and participation by working with NYSERDA to better align its FlexTech technical assistance offering with utility program eligibility and data requirements.
- Making efforts to recruit additional contractors who work within underrepresented DACs.
- Tailoring marketing and outreach strategies to community needs in various DACs, through measures including in-person community outreach events, door-to-door outreach for small and medium businesses, and partnerships with local organizations.

- Offering higher incentives in DAC areas when needed.

Uncertainties and Risks

The Joint Utilities of New York[22] ("JU") conducted an analysis to quantify the energy savings necessary to stay on track with the New York Climate Scoping Plan's goals and to assess the contribution of existing policy incentives and interventions toward meeting that goal. The analysis found that existing NYS and local initiatives coupled with the extension of NENY programs through 2030 at their 2025 funding levels will achieve approximately half of the needed energy savings, leaving a substantial gap between achievements and energy savings targets to be realized. O&R submitted an 'Expanded Proposal' for additional funding that it believes is necessary to address this gap, as discussed in the sections above.

3.1.2 Advance Heating Electrification

BE is a key aspect of achieving the CLCPA's ambitious goals. The CAC's Climate Scoping Plan[23] concluded that within seven years, 1 to 2 million energy-efficient homes and 10%-20% of commercial space must electrify their heating with heat pumps to meet NYS goals. O&R will play an important role in enabling customers' transitions to cleaner heating sources and continues to integrate clean heat technologies and programs into its existing business practices.

NYS Clean Heating Program

In its Order Authorizing Utility EE and BE Portfolios Through 2025 ("2020 NENY Order"),[24] the NYPSC initiated a common statewide heat pump framework for NYS: the NYS Clean Heat program. The NYS Clean Heat program is designed to guide the efforts of NYS utilities and NYSERDA in this area. O&R, in partnership with other NYS area utilities and NYSERDA, supports NYS's ambitious clean energy policies, and in particular, its efforts to advance the development of BE technologies. The Company currently administers its Clean Heat portfolio in alignment with its System Energy Efficiency Plan and LMI programs.

The 2020 NENY Order established targets for heat pump deployment by 2025 at each of the NYS utilities in support of the NYS goal to reduce 3.6 TBtu of energy through heat pump deployment. For O&R, this translates to a total energy savings target of 86,657 MMBtu in heat pump deployment through 2025 and a $15 million budget.[25] In 2022, O&R exceeded its annual NENY target for its heat pump deployment by achieving 25,890 MMBtu in energy savings compared with a target of 13,027 MMBtu, or 199% of the goal.[26] As a result of this active program management, O&R has achieved 88% of its 2020-2025 cumulative NENY targets, while only using 66% of its cumulative NENY budget for the same time period. However, recognizing the role that heating electrification and BE has in the clean energy transition, O&R anticipates expanding the scope and budget of its clean heat programs.

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[22] Joint Utilities of New York, Forging the Energy Future for New York State, available at https://jointutilitiesofny.org/.

[23] New York State, New York's Scoping Plan, 2023, available at https://climate.ny.gov/resources/scoping-plan/.

[24] New York Public Service Commission, Case 18-M-0084, A Comprehensive Energy Efficiency Initiative, 2020, available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={06B0FDEC-62EC-4A97-A7D7-7082F71B68B8}.

[25] Ibid.

[26] Consolidated Edison, Distributed System Implementation Plan, 2023, available at https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/distributed-system-implementation-plan.pdf.

In 2022, O&R has exceeded its annual NENY target for heat pump deployment by **199%** (25,890 MMBtu in savings).

The JU conducted an analysis to quantify the energy savings necessary to stay on track with the Climate Scoping Plan's[27] goals and to assess the contribution of existing policy incentives and interventions toward meeting that goal. The analysis found that existing interventions, coupled with the extension of NENY programs through 2030 at their 2025 funding levels, will only achieve roughly half of the needed energy savings, leaving a substantial gap. O&R is reevaluating its EE, LMI, and Clean Heat portfolios to adjust these programs to align with the market and to utilize additional solutions to convert harder-to-reach customers.

The July 2023 NYPSC EE BE Order required the NYS utilities to file EE and BE proposals for 2026-2030. The Company's proposal was previously discussed in the section, 'Drive Growth in Energy Efficiency' above. O&R recognizes that it will need a 6.4 TBtu 2024-2030 total energy savings goal,[28] compared with the Company's 2020-2025 NENY energy savings goal of 1.8 TBtu, to stay on track with the CLCPA's goals. Approximately half of that 2024-2030 energy savings target would be derived from BE.

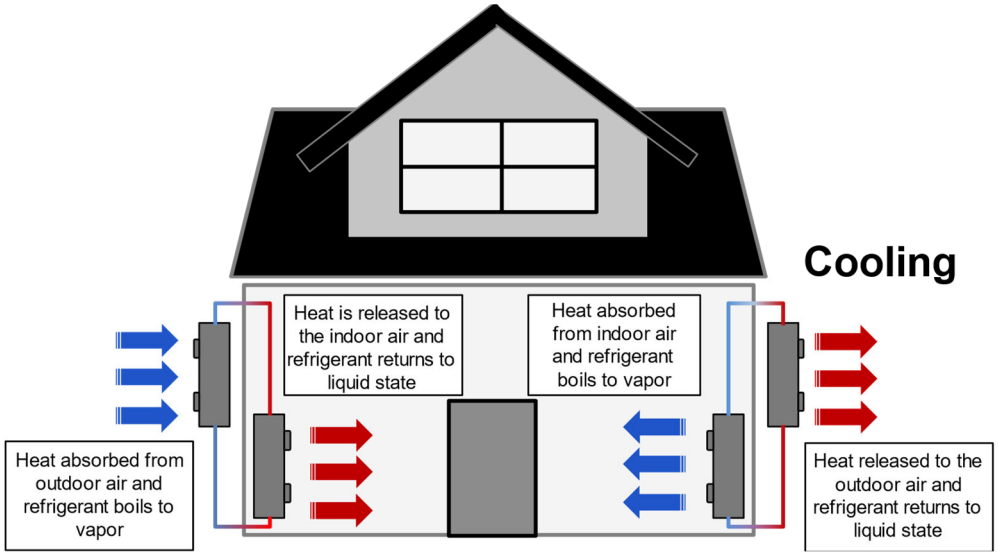
By adopting a statewide approach in NYS, the JU are aligned on transforming the market to promote heat pumps as a primary heating solution instead of traditional gas technologies to meet the CLCPA's goals. Through the NYS Clean Heat Program and O&R's online Marketplace, the Company provides a suite of incentives to support customer participation in its EE BE programs. By providing instant rebates for space and water heating equipment upgrades, weatherization, and strategic measures, the Marketplace pairs customers directly with trade allies to facilitate participation and overcome the complex nature of these upgrades. In doing so, the Marketplace reinforces O&R's relationship with its customers as a trusted advisor for the adoption of clean heating technologies, described in the list below.

Air Source Heat Pumps ("ASHPs"): ASHPs provide space heating and cooling, using electricity through a vapor-compression refrigeration cycle. ASHP systems extract heat from outdoor air and transfers the extracted heat into the conditioned spaces by various means. They provide space cooling by reversing the cycle to extract heat from a building and transferring the heat to the outside air, as shown in Figure 3-7. To be eligible for incentives under the NYS Clean Heat Program, ASHP systems must (1) be listed on the Northeast Energy Efficiency Partnership ("NEEP") Cold Climate ASHP Product List, or (2) meet the criteria established for ASHPs in the Implementation Plan and the Program Manual for product classes that are commercially available and not covered by the NEEP Specification and Product List.

[27] New York State Joint Utilities, Approach for Estimating Energy Savings from Energy Efficiency Programs, 2021, available at https://dps.ny.gov/system/files/documents/2022/11/technical-resource-manual-version-8-filed-august-11-2020-effective-january-1-2021.pdf.

[28] NENY Proceeding, Comments of Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc. On The New Efficiency New York Interim Review (filed March 27, 2023), available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={D0B22487-0000-CC59-8F9F-A9431EE24167} (pp. 4).

Figure 3-7. Air Source Heat Pump Process



Ground Source Heat Pumps ("GSHPs"): GSHPs achieve high-efficiency space heating and cooling by transferring heat with the ground or groundwater instead of outside air. GSHP systems work in cold climates because of their ability to maintain heating capacity and efficiency at low ambient air temperatures. GSHPs are used in all building sectors and are sized to provide heat to the whole home or whole building.

Heat Pump Water Heaters ("HPWHs"): HPWHs are storage tank-based water heaters that typically replace electric resistance storage tank water heaters or fossil fuel-fired storage tank water heaters. These systems provide most of the heat for domestic hot water through a heat pump with a secondary electric resistance coil as a back-up so that the water temperature meets the desired set point during high-demand periods. HPWHs can be installed in a variety of conditioned or unconditioned spaces, where there is adequate air supply for heat exchange. HPWHs are available to customers through appliance retail channels and through heating and plumbing contractors. HPWHs can be used in any type of building.

Heat Recovery Ventilator ("HRV"): HRVs are a type of ventilator system that exchanges indoor air with outdoor air while recovering some of the heat energy from the exhaust air in order to increase efficiency and decrease energy load. HRVs employ air-to-air heat exchangers to recover energy from the exhaust air to pre-condition the outdoor air prior to supplying it to the indoor space, either directly or as part of an air conditioning system. HRVs reduce heating and cooling loads while maintaining required ventilation rates by facilitating both sensible (heat content) and latent (moisture content) heat transfer between outgoing conditioned air and incoming outdoor air.

Energy Recovery Ventilators ("ERVs"): ERVs are another type of ventilator system that exchanges indoor air with outdoor air while recovering some of the heat energy from the exhaust air to increase efficiency and decrease energy load. Like HRVs, ERVs employ air-to-air heat exchangers to recover energy from the exhaust air to pre-condition the outdoor air prior to supplying it to the indoor space, either directly or as part of an air conditioning system. ERVs reduce heating and cooling demands while maintaining required ventilation

rates by facilitating sensible heat transfer between outgoing conditioned air and incoming outdoor air; however, unlike HRVs, ERVs do not transfer latent heat (moisture content) between supply and exhaust air streams.

To realize the full energy and cost savings potential of BE, the Company will also be expanding its weatherization offerings. Weatherization upgrades reduce energy loss through building envelopes enhancements, primarily by increasing insulation and sealing air leaks, and are an important consideration to enhance EE savings impact. The Company is exploring opportunities to combine these home improvements with other program offerings. This will be beneficial to both customers' realized savings and the net demand reduction of beneficial electrification on the electric grid.

Utility Thermal Energy Networks

The NYS Utility Thermal Energy Network ("UTEN") Order allows utilities to build and own networks that distribute thermal energy.[29] While geothermal loops can be prohibitively expensive for a single customer, economies of scale may be achieved with utility-owned infrastructure serving multiple customers and reducing the burden of upfront infrastructure costs on the individual customer.

O&R proposed a UTEN pilot project in Haverstraw, a DAC, to test the potential of the technology and service model.

In response to the UTEN Order, O&R is exploring UTEN as a new clean energy offering to support its NYS customers in heating electrification. UTENs allow customers to receive the benefits of a geothermal loop without the expensive ground bore investments. The Company would own and operate the shared networked pipe infrastructure as well as the necessary thermal resources to provide a constant temperature coolant to customers. The system utilizes the constant temperature coolant in the geothermal loop to heat and cool buildings. Like the electric or gas utility business line, the customers would pay the utility for the thermal energy that they extract from the UTEN. The UTENs offer an alternative to heat pumps that reduces the upfront investment cost for the system.

UTENs can be even more efficient than individual heat pump systems because they can utilize and exchange thermal energy from various thermal resources (e.g., ground, rivers, and wastewater) as well as neighboring buildings (e.g., a commercial customer's excess heat). This may allow the utilities to electrify customers' heating demand in a cost-effective manner while also reducing their energy use for cooling purposes.

In November 2023, O&R submitted a final pilot project proposal[30] for a UTEN pilot in the Village of Haverstraw. The proposed pilot in the Village of Haverstraw consists of two independent ambient loops that will provide thermal energy to both newly constructed and retrofitted buildings. This pilot would test several potential thermal resources, including boreholes, wastewater, and surface water. It would also connect the UTEN to an elementary school with

[29] New York State Senate, Senate Bill S9422, 2021, available at https://www.nysenate.gov/legislation/bills/2021/S9422.

[30] Case 22-M-0429, ORU Final UTEN Pilot Proposal, filed on November 30th, 2023, available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={D057228C-0000-CE3A-9CAC-992A4ED84594}.

rooftop solar, providing important lessons on the interactions of multiple renewable energy technologies. As its UTEN pilot is implemented, it will be sunsetting its Geothermal Neighborhood Reforming the Energy Vision ("REV") Demonstration project, as they both have similar objectives.

O&R, along with NYS, is just starting to investigate the potential of UTENs. The Company plans to gather data and learnings from each initiative to develop improvements. The applicable scope and scale by which UTENs can be deployed economically (when compared to GSHPs and ASHPs) is uncertain at this time and evaluation of the pilot is underway to better understand the cost, suitability to their service areas, and implementation requirements of this technology.

Impact on Gas Customers

Despite incentives, not all customers are likely to electrify in the near term, and infrastructure downsizing cannot occur until all customers utilizing the gas infrastructure in an area have transitioned off the system, which will take time and require policy change.

As 2050 approaches, decarbonization policies that reduce the number of customers served by the gas system will cause the revenue requirement per customer to increase at an exponential rate. Failing to increase depreciation in the near term will produce significant intergenerational inequity as gas demand and the number of customers decline. Customers remaining on the gas system will bear a significantly higher share of the costs of the Company's assets. Accelerating depreciation of gas assets can help with recovering investment costs and reducing intergenerational inequity.

We will advocate for innovative rate recovery mechanisms to protect customers that remain connected to the system from paying significantly higher rates for their service. O&R is committed to working with regulators and stakeholder groups to identify a path forward that leaves no customers behind.

Non-Pipeline Alternatives

O&R is beginning to utilize non-pipeline alternatives ("NPAs") to support customers with electrification of their gas needs (e.g., electric heat pump for heating and cooling). An NPA project can replace a customer's need for gas service and enable their disconnection from existing gas infrastructure. In other cases, NPAs can be used to avoid expanding the gas system to serve new customer gas demand. For more discussion on the use of NPAs, see Section 3.2.5.

Elimination of New Gas Customer Connections

The Company's ability to reduce the use of natural gas and associated emissions over the next two decades will depend on appropriate regulatory policies and the level of customer adoption of alternative technologies. O&R will continue to advocate for cost-effective and technology-agnostic policies that support decarbonization.

To achieve GHG emissions reductions targets by 2050, we will support initiatives that will slow the growth of the gas system, in alignment with Con Edison Inc.'s Clean Energy Commitment. To fully embrace this change, we seek to revise several provisions in our gas tariff that go beyond the statutory requirement for new gas connections. These include eliminating:

- Our obligation in NYS to provide an extra 100 feet of service or main to residential heating customers.
- The ability of multiple connecting customers to pool their main/service allotments.
- The “revenue test” that allows customers to avoid charges for exceeding their allotment if they can show they will generate revenues above a certain level.
- The reimbursement customers currently receive for new main installations above their allotment when additional, subsequent customers connect to the new main. Because these existing tariff provisions artificially lower the upfront connection cost to the customer, these provisions will be increasingly at odds with electrification and decarbonization.

While the Company recognizes the need for electrification of heating, maintaining a safe and reliable gas system is key to mitigating some of the risks associated with electrification. For example, if the pace of adoption of electric alternatives is not as strong as anticipated, customers will still be served with a source of safe and reliable energy. In addition, the gas system mitigates the risks associated with missing targets for clean electricity generation. The emissions reduction benefits associated with electrification are not fully realized without a clean supply of electricity to serve customers.

With this balance of electrification and reliability in mind, O&R has taken steps to slow the growth of new gas customers, including suspending gas marketing and providing information to new gas customers so that they are aware of electric alternatives and their benefits. To reimagine the gas system, O&R will support policy reforms and programs to reduce fossil gas consumption while continuing to provide customers with the safe and reliable service they deserve. We are committed to reducing the growth of the natural gas system by advocating for policy reform that eliminates our obligation to serve and ends the statutory requirements for new gas connections within 100 feet of an existing main.

Uncertainties and Risks

The transition to electrified forms of heating is important for our energy transition. As seen with other technologies, customer adoption typically begins slowly and increases as customers are educated, technology improves, and costs reduce over time. The Company recognizes that customer adoption of clean heating solutions will take place over an extended period.

O&R continues to focus on customer and contractor engagement to bolster this market and is addressing cost concerns through its rebate program. However, the current level of funding for the clean heat program puts NYS policy targets at risk. As evidenced by its Expanded Portfolio plan responding to the EE BE Order, additional funding is needed to expand programs and realize policy targets.

We are in coordination with NYS efforts to grow a quality skilled labor force and continuously grow the pool of clean heat technology contractors. This may enable electrified heating technologies to be offered alongside traditional heating solutions when a customer decides to upgrade or replace their current systems.

Cost and complexity of clean heat electrification upgrades are barriers to heat pump adoption for many customers, particularly in larger buildings, buildings that qualify for LMI programs, and

buildings in DACs. The Company is coordinating with NYSERDA to evaluate and scale LMI customer electrification through 2030.[31] This includes working toward a BE Roadmap outlining key policy approaches to scale LMI electrification through 2030.[32] We are also looking to increase awareness and education on clean heat technologies for the LMI community. This harder-to-reach customer segment will require additional consideration for community engagement events, and we will continue to market and promote clean heat and EE technologies together as an efficient customer outreach strategy to minimize confusion. Work with customers to educate them on the potential energy and cost savings opportunities presented by the adoption of clean heat technologies will also continue.

The Company also recognizes the value in marketing and packaging clean heat technologies with other EE offerings and weatherization services. Bundled offerings simplify customer and partner engagement, allow for more comprehensive offerings, reduce perceived competition between programs, and streamline program operations. Additionally, we are exploring opportunities to support our large C&I customers as they develop energy management strategies by providing whole building solutions, including clean heat technologies.

Through these initiatives, O&R strives to meet the goals of CLCPA and the NENY Order and further enable equitable access to comfortable, affordable, safe, and energy-efficient homes and businesses across its service territory.

3.1.3 Facilitate Transportation Electrification

Over the coming decades, the adoption of EVs is forecast to increase dramatically. The Electric Power Research Institute ("EPRI") estimates that by 2030 more than 50% of all light-duty passenger vehicle sales in NYS will be EVs, accounting for approximately 2.3 million light-duty EVs on NYS roads. The electrification of transportation is a critical component for both NYS's and NJ's plans to meet their GHG emission reduction goals. Transportation contributes to baseline GHG emissions more than any other source in both states (29% in NYS and 39% in NJ)[33] and is a key policy target for reductions in both states. By 2050, 75% of all passenger vehicle miles traveled in NYS will be fueled by electricity.[34] Likewise, NJ has an established target of two million light duty EVs by 2035.

Focus on EV adoption goes beyond the CLCPA to include other NYS and federal initiatives. These initiatives are summarized in Table 3-2. At the state level, NYS and NJ are signatories of the multi-state ZEV MOU, which established a collective deployment target of 3.3 million ZEVs on the road by 2025. NYS's share of the ZEV MOU target is 850,000 light-duty ZEVs. Moreover, NYS expanded its goal of 35% of new sales of LDVs to be ZEVs in 2025, to 100% by 2035, and established a target of 100% of new sales of MHDVs to be zero emissions by 2045. In addition,

[31] EE Proceeding, LMI Statewide Portfolio Annual Report 2022, April 2023, available at https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/LMI/2022-LMI-Statewide-Portfolio-Annual-Report.pdf.

[32] Ibid.

[33] New Jersey Department of Environmental Protection ("NJDEP"), 2022 Statewide GHG Emission Report, September 2023, available at https://dep.nj.gov/wp-content/uploads/ghg/2022-ghg-inventory-mcu_final.pdf.

[34] EPRI, Electrification Scenarios for New York's Energy Future, February 2020, available at https://www.epri.com/research/products/000000003002017940.

the 2022-2023 NYS budget included a requirement that all district-owned and contract-provided school buses be electric by 2035.[35]

Table 3-2. Electric Vehicle Policy in our Territory

Organization	Policy	Impact
Northeast States for Coordinated Air Use Management[36]	ZEV MOU	Commits signatories to a collective target of at least 3.3 million ZEVs on the road by 2025. This represents 850,000 across NYS and 330,000 across NJ.
NYS	Legislation (A.4302/S.2758)	Target for all new passenger cars sold in NYS to be zero tailpipe - emissions by 2035. Trucks classified as MHDVs have a target of 2045.
NYS Department of Environmental Conservation	Advanced Clean Truck Rule[37]	Requires original equipment manufacturers sell an increasing portion (30-50% by 2030 starting in 2024-25 model year and 40-75% by 2035) of EVs. Additionally, a reporting requirement for large fleets to report their vehicle numbers and use patterns for planning purposes.
NYS	2022-2023 State Budget	Requirement that all district-owned and contract provided school buses be electric by 2035.

O&R continues to play an essential role in achieving state and federal goals by enabling EV adoption and increased charging infrastructure deployment in its service territory. This role and enablement are central to O&R's delivery mission, resulting in O&R being awarded the 2023 Association of Edison Illuminating Companies Achievement Award for Innovative Approaches to Customer Service and Electric Vehicle Charging. These innovative program offerings focus on increasing customer awareness and enablement, increasing charging infrastructure, and relieving operating costs. Applying these principles and its core capabilities, the Company has focused its efforts in three key areas:

- **Customer Awareness and Enablement:** Providing customers with information and tools to understand the various EV makes and models available, the total cost of ownership, federal and state rebates available, charging options, and environmental benefits.

[35] NYS Senate Bill S8006C. Full text of the legislation is available online. See https://www.nysenate.gov/legislation/bills/2021/S8006.

[36] Northeast States for Coordinated Air Use Management, Memorandum of Understanding, November 2015, available at https://www.nescaum.org/documents/mou-nescaum-usdoe.pdf.

[37] Details on NYS Department of Environmental Conservation efforts to control air pollution can be found at https://www.dec.ny.gov/chemical/8394.html#ZEV.

- **Charging Infrastructure:** Supporting, via incentives and facilitating interconnection, the foundational charging infrastructure comprised of public Level 2 ("L2") and public direct current fast charging ("DCFC") facilities as well the at-home L2 charging.

- **Grid-Efficient Charging**: Developing and promoting a culture of grid-efficient charging required to support the clean transportation energy future.

The Company's specific programs and planned improvements are described below.

Customer Awareness and Enablement

O&R is in a unique position to facilitate the adoption of EVs in its service territory through community outreach and education activities. The Company continues to engage customers, municipalities, and developers. In 2022, the Company attended 15 outreach events, including two Ride and Drive events and the annual New York International Auto Show. In addition, the Company hosted 10 municipality meetings to discuss EV projects and initiatives**.** The Company's approach to customer awareness and enablement is described below.

Ride and Drive Events. Experienced electric car drivers and educators manage the Ride and Drive events. The event provides guests with drives of currently available production electric cars. Product demonstrations and education are conducted by EV owners and event staff who are product experts. The events have introduced thousands of attendees to the many benefits of EVs. Because the drives are conducted by EV owners, attendees can have all their questions answered about the driving experience in a no pressure environment.

Municipal Outreach. Outreach to municipal leaders aims to better equip them to implement regional goals for a sustainable future through EV charging infrastructure and fleet planning. Subject matter experts meet with municipal representatives to educate them about available incentive programs, discuss their fleet electrification plans, and help them navigate planning next steps.

Online Tools. Achievement of state EV growth targets will require efficient, and effective investment in EV charging infrastructure. The best charger placement will increase value for all stakeholders, maximize utilization, reduce capital costs, and improve the driving experience. To lower the obstacles to more rapid EV adoption, O&R developed an EV charger siting tool that allows users to see what capacity is available in the service territory and what additional incentives may be available in opportunity zones.

Opportunity Zones: The Company continues to focus on providing access to charging and clean transportation in opportunity zones through program incentives and targeted outreach.

In NYS, DACs are defined by the CLCPA Working Group, and in NJ, Overburdened Communities are defined by NJBPU maps.[38]

O&R recognizes that to expand equitable EV opportunities in these areas, we need to pursue solutions other than LDVs and at-home charging, both of which may not be readily accessible for all customer segments. The Company is exploring micro mobility and MHDV solutions beneficial to DACs. This will support the NYS's target of 100% of new sales of MHDVs to be zero emissions by 2045 and further enable the NYS's focus on investments in DACs.

The Company plans to continue to build on its strong relationships with its customers and communities for EV engagement. The multifaceted approach conducted over the last two years has been effective at reaching and educating customers, developers, and municipalities regarding the benefits and opportunities of EVs and available program offerings. Given the recent EV policy initiatives, the Company will continue to leverage its in-person and digital channels to be informative on program offerings. Program information, including Frequently Asked Questions, instructional videos, and program guides will be posted on O&R's EV website. Outreach opportunities will be reviewed on a rolling basis to focus on events with high impact returns to program enrollment.

Charging Infrastructure

O&R and RECO are making significant infrastructure investments to facilitate installation of thousands of EV chargers across our service area. Both companies offer incentives to EV station operators and drivers to ease the impact of EVs on the electric grid and make transition to EVs more affordable.

O&R continues to be on pace to meet the NJ Make Ready Order goal of 1,488 residential Level 2 EV chargers, 413 commercial Level 2 Electric vehicle chargers, and 30 commercial Direct Current Fast Electric Vehicle chargers by the end of 2026.

The Company has four programs targeting public-charging infrastructure development, the Commercial & Residential Make-Ready Programs ("MRP"), Fleet Assessment Services ("FAS"), and Medium-Duty and Heavy-Duty Fleet Make-Ready, to encourage the development of public DCFC and L2 chargers. These programs will support the development of public-charging infrastructure by reducing the upfront cost to customers of developing EV-charging sites. Each of these is expected to advance the growth of public-charging infrastructure, and by extension, EVs in the Company's service territory. O&R's current programs in support of expanding charging infrastructure are described below.

Commercial Make-Ready Program. The Company has commercial MRPs in both NYS and in NJ. The program is called "PowerReady" in NYS and "ChargerReady" in NJ. The Commercial MRPs support the adoption of light-duty EVs within the Company's service territory by providing incentives for eligible L2 and DCFC charging stations to reduce the upfront costs of charging station deployment by covering certain costs at levels up to and ranging from 50-100%. Infrastructure eligible for incentives includes equipment and labor for utility and customer-side work up to the EV charger. As of November 2023, O&R's

[38] NJ DEP, What are Overburdened Communities (OBC), 2023, available at https://dep.nj.gov/ej/communities/.

PowerReady Program has supported 255 publicly available L2 plugs and 14 DCFC plugs and has over 140 applications in queue. The Company continues to work toward its Make Ready Order goal of 1,546 L2 plugs and 340 DCFC plugs. In addition, RECO's ChargerReady Program has two publicly available L2 plugs and zero DCFC plugs but has 12 applications in queue totaling 33 L2 plugs and 24 DCFC plugs. The Company continues to work toward its NJ Residential Make Ready Order goal of 1,488 L2 plugs Commercial goal of 413 L2 plugs and 30 DCFC plugs by the end 2026.

Residential Make-Ready Program. In addition to its Commercial MRP, RECO's ChargerReady program has a residential component. ChargerReady makes it more affordable for RECO's customers to install L2 EV chargers at their home by offsetting the costs of EV charging infrastructure. This program offers incentives to offset the cost of both customer- and utility-side infrastructure needed to operate an EV charger. RECO's Residential ChargerReady Program has supported 115 L2 plugs and has over 15 applications in queue. The Company continues to work toward its NJ Make Ready Order goal of 1,488 residential L2 plugs, 413 commercial L2 plugs, and 30 commercial DCFC plugs by the end 2026. The Company is advocating for this program in NYS due to the success it has been seeing in NJ.

Fleet Assessment Services ("FAS"). The electrification of commercial fleets is crucial for decarbonizing the transportation sector. O&R supports customers throughout all stages of their fleet conversions. This includes providing educational resources (discussed in the 'Customer Awareness and Enablement' section above), assessment tools to evaluate costs and benefits of fleet conversion, tools to inform charger siting, incentive programs to support upfront costs, and rate options to manage charging. The Company is advocating for fleet incentives in NJ to continue to work toward its NJ goals.

MHDV Fleet Make-Ready. O&R continues to accept applications for its MHDV Fleet Make-Ready Pilot Program through 2025. The $2 million program is designed to reduce diesel emissions by encouraging the conversion of MHDV fleets to EVs and facilitating the installation of make-ready equipment for fleet charging infrastructure. The program focuses on opportunity zones and offers incentives to mitigate the cost of developing EV charging capacity for qualifying MHDV fleets. The incentives cover up to 90% of the utility-side make-ready costs. O&R currently has one enrolled project, which is in a DAC, with a fleet of four heavy-duty school buses. The Company is engaged in proceedings to make this a program rather than a pilot.

Go Electric Team. O&R is dedicated to helping to progress new service projects that include EV chargers. These projects are more complicated than typical projects due to the large size and short desired interconnection timelines, as compared to building interconnection. Additionally, there are more stakeholders involved with EV projects (e.g., site host, EV incentive administrator, electric contractor, EV Supply Equipment ("EVSE") manufacturer / cloud services administrator), as compared to the single point of contact typical for new services. These projects require a specialized skill set and increased levels of coordination to manage effectively.

In addition to its current programs, O&R is exploring opportunities in other areas, as discussed below.

O&R was awarded the **2023 Association of Edison Illuminating Companies Achievement Award** for Innovative Approaches to Customer Service and Electric Vehicle Charging.

Facilitating Charging Infrastructure (Micro Mobility): As part of the Staff Midpoint Review Whitepaper, DPS Staff recommended allocating $20 million to downstate utilities for charging infrastructure that supports micro mobility. Micro mobility refers to lightweight and low-speed devices, including electric bikes, electric scooters, and electric skateboards. This space has seen rapid ridership growth in recent years and may be a more prevalent mode of transportation than higher-cost EVs in DACs. The Company is engaging the community to explore micro mobility opportunities and interest in the O&R service territory and has secured five letters of interest from NYS municipalities. To continue understanding the space, O&R recently released a Request for Information to begin connecting with vendors.

Load Management Technology Incentive Program ("LMTIP"): The LMTIP is designed to provide incentives for eligible technologies such as energy storage projects, including on-site energy storage and energy storage integrated directly into charging equipment, as well as other advanced demand management technologies and software. The JU recommend[105] a broad approach to LMTIP equipment eligibility to enable a high level of program participation and to effectuate demand management at more sites. Remaining per plug incentive funds will be allocated to the LMTIP.

Grid Efficient Charging

In addition to the incentives and rebates provided by non-utilities to support EV purchases and by the Company for infrastructure deployment, managed charging programs have launched that pair with rate design and DSM initiatives focused on reducing the cost of customer charging and encouraging customers to charge during grid beneficial times by providing incentives to charge off-peak. The results from these programs will be used to inform and shape future programs.

Managed Charging Programs

To manage potential peak demand growth because of EV adoption effectively, the Company encourages efficient grid-charging behavior. The programs below are offered to support efficient charging and increase the affordability of owning an EV.

Residential Managed Charging. O&R developed its managed charging program, designated SmartCharge NY ("SCNY") for residential customers in response to the Managed Charging Order.[39] SCNY promotes grid-beneficial charging behavior and aligns with the Company's efforts to minimize system reliability risks, provide customer benefits, and support NYS's clean energy and decarbonization goals. SCNY offers participants two types of on-going incentives: (1) a primary incentive for avoiding on-peak (2:00 p.m. to 6:00 p.m.) EV charging during summer weekdays (June through September) and (2) a secondary incentive to encourage overnight off-peak (midnight to 8:00 a.m.) charging year-round. The Company will provide participants with software-based solutions that monitor charging behavior. The

[39] Case 18-E-0138, Order Approving Managed Charging Programs with Modifications, July 2022, available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={54239C5C-8AB9-4E22-8190-CF3E8BD921C1}.

Company is collaborating with ev.energy, a leading EV technology company, to implement SCNY. ev.energy's responsibilities include application processing, incentive disbursement, and charging data gathering. Eligible residential customers with qualifying EV(s) or EVSE must take service under O&R's standard residential rate, i.e., cannot take electric service on a time-of-use ("TOU") rate. The Company launched SCNY in April 2023 and will continue it through 2025. RECO is seeking approval to offer a similar program, designated as SmartCharge NJ ("SCNJ") in NJ. RECO filed a petition with the NJBPU in December 2022. Offering this value to RECO's NJ customers while promoting grid beneficial charging behavior aligns with the Company's efforts to minimize system reliability risks, provides customer benefits, and supports NJ's clean energy and decarbonization goals.

Commercial Managed Charging Program ("CMCP"): O&R's CMCP will incentivize commercial chargers to be used during times that minimally impact the electric grid. The CMCP includes core incentives for on/off peak charging and use case-specific adders to address key scenarios such as transit fleet charging. O&R's proposed core incentives are (1) a kW-based Peak Avoidance Incentive that encourages participants to reduce their peak demand during a substation four-hour peak period and (2) an Off-Peak charging kWh-based incentive that further incentivizes participants to charge their EV during the overnight off-peak period. The Company will offer use case-specific adders for transit and publicly accessible DCFC and L2 chargers. All adders will sunset after an EV Phase-In Rate Solution is implemented; however, the CMCP will continue to be available. The NJBPU recognizes the benefits of a CMCP in their Straw Proposal on electric MHDVs.[40] RECO fully supports implementation of such a program to minimize the impact of EV charging on the electric grid.

Rates and Incentives

In addition to managed charging programs, the Company offers rates and incentives to manage demand growth from EVs in its territories.

EV Rate Design: EV rate design encompasses various programs that encourage beneficial charging behavior and/or provides operating cost relief to EV drivers and EV charger operators. Some of the solutions work together to provide a short-term interim solution to permanent rates that can be coupled with managed charging to encourage beneficial driver behavior. O&R and RECO offer programs that target EV drivers and charger owner/operators. O&R has proposed a Demand Charge Rebate and a Phase-In Rate to be paired with and supplement the CMCP discussed above. The EV Rate Design Order[41] reclassified O&R as a "downstate utility," along with CECONY, recognizing the differing grid conditions and EV penetration rates across the utilities in NYS.

Time of Use/Day Rates: Since 2019**,** O&R has offered an EV TOU rate and a TOU rate for separately metered in-home chargers. Both rates encourage EV drivers to charge their EVs during off-peak times at home, thereby minimizing the impact on the electric grid and supporting resiliency. EV drivers who register their vehicle with O&R will receive a one-year

[40] NJBPU, New Jersey Electric Vehicles Infrastructure Ecosystem 2021 – Medium And Heavy Duty Straw Proposal, August 2021, available at https://www.nj.gov/bpu/pdf/publicnotice/Notice%20Medium%20Heavy%20Duty%20EV%20Straw%20Proposal.pdf.

[41] Case 22-E-0236, Order Establishing Framework For Alternatives To Traditional Demand-Based Rate Structures, issued January 19, 2023, available at https://documents.dps.ny.gov/search/Home/ViewDoc/Find?id=%7B2043A628-EC7D-4064-9F32-662D82598760%7D&ext=pdf.

price guarantee that allows them to test the TOU rate while paying no more than they would on a standard residential rate. While the EV TOU rate is applied to the entire home, the TOU rate for separately metered chargers is applicable to the charger only. However, no price guarantee is available for this latter rate. In NJ, RECO offers a TOU rate for the entire residence. Available since 2022, EV drivers who register their EVs with the Company will receive a one-year price guarantee, like that offered in NYS.

Demand / Operating Cost Relief: The Company encourages the deployment of publicly accessible DCFCs by offering programs that minimize the costs to operate the chargers, all these solutions are a bridge to permanent rate solutions and can be paired with managed charging programs that encourage beneficial charging behavior and seek to minimize the impact of EV charging demands on grid reliability.

DCFC Per Plug Incentive ("PPI") Program: The DCFC PPI Program encourages the deployment of publicly accessible DCFCs by providing customers an annual, declining incentive to offset the cost of operating public DCFC charging stations in the early years of operations, when charger utilization is expected to be low. This program is offered in both NYS and NJ. In NYS, O&R is not accepting any new enrollments; instead, the Demand Charge Rebate will be available to these DCFCs.

Basic Generation Service – Commercial Industrial Energy Pricing DCFC PPI Program: This incentive program is intended to address cost barriers, and encourage DCFC deployment, by effectively lowering operating costs through capacity charge relief in the short-term to promote increase in station utilization. This program is offered in NJ.

Demand Charge Rebate: As part of a more near-term solution, O&R will implement a 50% Demand Charge Rebate for public DCFC customers who do not participate in the DCFC PPI, based on their charging ratio, calculated by dividing a customer's EV charging capacity by its maximum demand from all on-site demands. The resulting Charging Ratio will be used to determine customer eligibility and the proportion of demand that will be available for the rebate. Customers with a Charging Ratio of 50% or more are eligible for a rebate. The Demand Charge Rebate will be offered to EV charging customers until the EV Phase-In Rate Solution becomes available.

EV Phase-In Rate: O&R filed an EV Phase-In Rate in July 2023, which will replace the Demand Charge Rebate and use-case-specific adders described above. The EV Phase-In Rate can offer operating cost relief in the near term and should be paired with managed charging, which plays a critical role in encouraging grid beneficial charging behavior. The EV Phase-In Rate will start as a TOU energy-only rate structure and will phase in an increasing level of demand charge as a customer's load factor increases, until the customer's annual load factor reaches a level of 25% or greater. After the highest load factor tier, customers will be subject to traditional demand rates. Customers with EV charging demand that is not separately metered must have a charging ratio of 50% or more to be eligible. See the discussion of charging ratio above under Demand Charge Rebate.

O&R Fleet Electrification

In support of the Clean Energy Commitment, 100% of new LDVs purchased by O&R are EVs. Through the retirement of existing fossil fuel vehicles, our goal is that 80% of our light-duty fleet

will be electrified by 2030 and 100% by 2035. As of December 2023, 25% of O&R's light-duty fleet consists of EVs. We are also pursuing alternative technologies to reduce fossil fuels for MHDVs. In December 2022, O&R introduced the first all-electric bucket truck for use in its service territory.

Uncertainties and Risks

System Strain: The Company supports NYS's light-, medium-, and heavy-duty ZEV goals. Achievement of these goals could lead to a significant increase in peak loads, transformer and substation impacts, and reliability issues. EV adoption is currently incorporated as demand increase into forecasting and planning processes and methodologies continue to be refined to align with market demands. The Company is engaging stakeholders to proactively plan for and meet customer and system short- and long-term needs in the service territory.

EV Adoption v. State Goals: A strong partnership among EV market players, the community, and the electric utility will form the underpinning of a successful long-term EV program. Electric utilities rely on third-party entities to support the EV consumer market and to deploy public and private charging infrastructure to enhance EV growth. External factors, such as economic conditions, may negatively impact the private sector's investment in EVs and EV promotion, which in turn may impact the pace of adoption needed to reach the ZEV targets and support the clean energy transition.

3.1.4 Empower Customers to Participate in the Energy Transition

Our customer experience initiatives include a portfolio of projects that deliver customer value. These projects are designed to provide an impactful customer outcome and to give our customers accurate information to make informed energy choices. We aim to provide easier access to program information for customers who want to manage how and what type of energy they use, manage their GHG emissions profile, and/or transition to new clean energy solutions.

The Company will expand the use of digital resources, including the Digital Customer Experience program ("DCX") and interactive tools, alongside in-person engagement to amplify our clean energy offerings. Further, our investment in Advanced Metering Infrastructure ("AMI") and customer interaction process improvements aim to enable seamless and personalized interactions for an enhanced customer experience. This unified customer journey will allow greater visibility across our business and better enables us to empathize with our customer needs. An enhanced customer experience will lead to customer options and personalization, better adoption of clean energy solutions, more choice through rate reform, reduced service restoration times, and enhanced outage communications among other positive outcomes.

Finally, we will collaborate with stakeholders including local municipalities and real estate professionals to identify changes needed to foster a more electrification-ready environment. This will include advocating for policies and programs to overcome the current challenges in community planning, land use, and building codes that are needed for a more seamless energy transition.

Facilitating Customer Energy Choices

The Company is committed to investments in technologies, communications, and innovations that align to its expectations of choice, control, and convenience, and processes that allow the Company to better serve customers.

We aim to reduce friction in the many personal decisions and changes that our customers will make in the future, especially as they relate to adopting lower carbon products and services. O&R acknowledges that customers face several challenges when considering clean energy programs and technologies. Customers also may be hesitant to use certain technologies or efficiency upgrades due to upfront costs or lack of available and informed contractors.

O&R will integrate the end-to-end experience we have with customers and overcome these challenges by:

- Enabling the customer to make the best individual energy choices in alignment with NYS's climate goals.
- Serving as a trusted advisor to our customers by establishing trust and respect. For example, we provide calculators that can help customers save energy by making certain choices about their energy use and behaviors.
- Developing an energy products and services marketplace through contractor and ecosystem relationships. For example, we are collaborating with NYSERDA to integrate workforce training programs to align with the needs of the clean energy transition.

This strategy is the impetus behind large-scale customer investments such as our customer service system enhancement, which allows us to aggregate, collect, and analyze data across our customers' various utility services to provide personalized recommendations and insights.

As discussed in the sections above, the Company is investing significant effort and resources to realize NYS and NJ state goals and energy objectives through EE programs, EV infrastructure development, and electrification of heating. An important element of the success of these efforts is dependent on our customers' willingness to adopt and access these clean solutions and replacing technologies they have been using for many years. It is imperative that the Company provide the tools and guidance necessary to help customers make informed energy decisions.

The Company will use technology to provide customers with the information and means needed to participate in a clean energy future. O&R will increase customers' understanding of how these technologies interrelate, how they are adopted, why they are beneficial, and how they support achieving GHG reduction goals.

Sharing Data with Customers and Developers

Sharing customer and system data is a powerful tool that customers, DER developers, and other third parties can use to support market development and achieve NYS's and NJ's ambitious clean energy goals. O&R makes both customer and system data available to customers and to developers, subject to the appropriate privacy and cybersecurity standards, to enable third-party development of products and services that provide benefits to customers and the electric grid.

Providing customers access to their data empowers them to take greater control of their energy usage and bills. Making data available to DER providers and other third parties enable their participation and investment in cleaner energy solutions. Moreover, the Company is collaborating with stakeholders and supporting the Integrated Energy Data Resource ("IEDR"),[42] a NYS statewide data platform that provides useful data and information to authorized third parties. The IEDR is expected to increase customer participation in the clean energy market by increasing available products and services, as well as support additional clean energy policy initiatives.

Customer privacy and data security are at the forefront of all data sharing activities and strategy at O&R. In addition to implementing the appropriate cybersecurity and other information security protocols, customer data sharing protocols are essential to maintaining customers' trust.

The Company is committed to sharing useful and user-friendly system and customer data that meets additional needs of providers and third parties in facilitating DER market development, while maintaining information security and customer privacy standards. Our data sharing strategy includes the following:

- **Empowering Customers and Developers:** O&R shares data with customers to make informed decisions about their energy behavior and engage with third party companies offering energy solutions.
- **Maintaining accessible system data:** The Company is committed to facilitating DER market development by sharing data that reflects the needs of providers and third parties, including hosting capacity, beneficial locations for DERs, and distribution system data.
- **Supporting the NYSERDA IEDR platform:** O&R, along with the other members of the JU, is supporting the development of the IEDR platform. O&R is working with the NYSERDA development team to deliver the datasets as outlined in the IEDR order[43] and will continue supporting the additional use cases through 2026.
- **Maintaining Data Privacy and Cybersecurity:** O&R shares the NYPSC's interest and long-standing policy of protecting the confidentiality of customer information and evaluating disclosure exceptions as the Company continues to increase the amount of available customer and system data.

These strategies are discussed in further detail in the sections below.

Empowering Customers and Developers

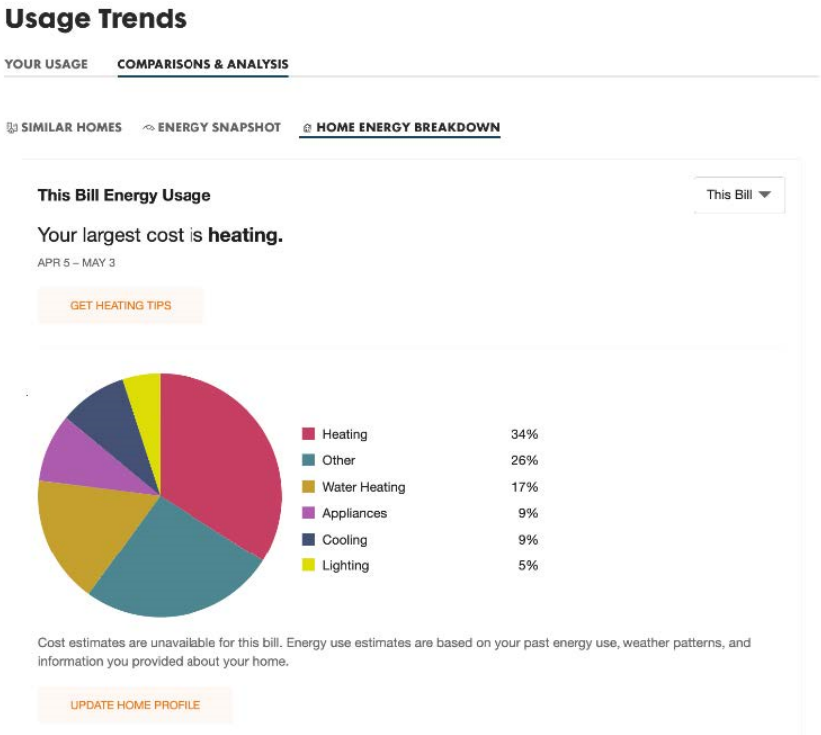
The Company offers and/or has enhanced multiple data sharing platforms and tools to provide both customers and approved third-party providers greater access to customer data. Sharing additional data with customers is critical to empowering customers to make informed energy choices and with DER developers to develop products and inform business decisions. Providing customers with their own specific data and useful recommendations, benefits both customers

[42] NYSERDA, Integrated Energy Data Resource, 2023, available at https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard/Clean-Energy-Standard-Resources/Integrated-Energy-Data-Resource.
[43] Ibid.

and the electric grid by enabling customers to take an active role in managing their energy consumption.

To enhance the customer experience and place more control in customers' hands, the Company produces a variety of reports that customers can rely on to inform their energy decisions and provide greater control. For example, the Company provides Home Energy Reports ("HERs"), water assessment reports, and High Bill Alerts through My Account portals. HERs provide customers with their energy consumption along with a comparison to similar homes, recommendations with energy savings tips, and easy enrollment in energy savings programs offered by the Company. The comparison is intended to make customers more aware of their energy use and prompt them to reduce their consumption voluntarily. Personalized messages motivate customers to improve from their previous month's usage and benchmark against their neighbors. Figure 3-8 presents a screenshot of information available to customers on their usage from the My Account portal.

Figure 3-8. Usage Information Available to Customers on Their My Account Portal



O&R provides customer data to third parties via a variety of methods, including the following:

- **Green Button Connect ('Share my Data'):** The Company implemented the Green Button Connect protocol for sharing interval usage data with DER providers, branded as Share My Data, and continuously looks for additional enhancements to the data shared.
- **Electronic Data Interchange ("EDI"):** Platform enabling exchange of routine business information in a standard form between the Company and energy service companies

("ESCOs") in its service territory. EDI transactions in a retail access environment include requests to switch customers from one commodity supplier to another and the transfer of customer's history, usage, or billing data.

- **Green Button Download**: Customers can download up to 13 months of their energy usage data in an Extensible Markup Language standard format file, making it easier for them to analyze their data and share with third parties.
- **Utility Energy Registry ("UER"):** O&R continues to provide data semi-annually to NYSERDA's UER platform that makes aggregated electricity and natural gas data segmented by customer type, municipality, and county, available to the public, subject to privacy standards.

In addition, the Company provides subscriber level data to community distributed generation ("CDG") Hosts to support CDG projects, including those participating in Net Crediting ("NC"). CDG Hosts seeking information on potential subscribers can access customer data via Green Button Connect, which requires customer consent to obtain that data. Moreover, building owners can obtain aggregated consumption data for their entire building, subject to privacy standards established by the NYPSC, and use this data for EE monitoring and other clean energy implementation purposes.

The Company anticipates that the granular data that it gathers can be used by customers to evaluate offerings by third parties, such as an analysis of the cost savings or impact of EV ownership or the deployment of energy storage products. These offerings may reside on the Company's Marketplace, MY O&R Store, or other Company-administered platforms. The Company will continue to evaluate how it can make customer data available in a manner and method that will support customers' evaluation and adoption of increased electrification technologies, including EE and DR, while maintaining the appropriate levels of data privacy and security.

The Company will continue to evaluate the types of reports and information that customers can use to make informed decisions about their energy consumption. The Company continues to work with DPS Staff, the JU, and other stakeholders to understand the needs of customers and other third parties, and to explore methods and processes to improve access to additional customer data, subject to the applicable privacy standards. Specifically, the Company maintains an online process for building owners to request aggregated, anonymized usage data for their buildings, subject to the approved terms and conditions. This supports energy planning opportunities for these owners, by allowing them to evaluate offerings and make more informed decisions.

Maintaining Accessible System Data

The Company's Hosting Capacity Map ("HCM") is an important tool for DER developers investigating potential project locations. Hosting capacity is the amount of DERs that can be accommodated without adversely impacting power quality or reliability under existing control configurations and without requiring infrastructure upgrades to the electric distribution system. Sharing hosting capacity data helps guide DER investments and third-party marketing activities. This information allows prospective interconnection customers to make more informed business decisions.

O&R, in alignment with the JU, currently offers HCMs with specific analyses for Solar Photovoltaic ("PV"), energy storage, and EV interconnections. The storage HCM reflects existing DERs in circuit load curves and allocations, and present feeder-level hosting capacity (min/max), additional system data, downloadable feeder-level summary data, and sub-transmission lines available for interconnection. The EV HCM serves as a guide for developers, indicating areas where the cost for service upgrades to accommodate integrated electric charging stations is low. The Company is evaluating and integrating increasingly granular and complex data into its hosting capacity analysis.

Through engagement in various working groups, such as the International Technical Working Group ("ITWG"), the Company focuses on updates to online portals and refining and/or expanding system data use cases to better meet stakeholder needs. In addition to maintaining access to the system data and information already being collected and shared, as identified above, the Company is continuing to increase its collection of granular system data through supervisory control and data acquisition ("SCADA") as part of the Company's grid modernization effort. Granular data collection is being accomplished in part through the deployment of additional and improved substation-level metering data, new automated distribution devices, and through meter data collected by AMI.

O&R is focusing on the addition of a visual display of sub-zones, which are sub-territories of New York Independent System Operator ("NYISO") load zones, to its HCMs. Providing this information can support third party participation in the wholesale market. In addition, the Company must provide a DER aggregator with access to its participant's consumption data. The Company continues to develop processes and procedures to support wholesale market participation by its customers.

Support data sharing to the NYSERDA IEDR Platform

The NYS IEDR program seeks to provide stakeholders with "useful access to useful energy data" and will contain both utility and non-utility data from organizations across NYS. The IEDR will offer data analytic tools that will enable the deployment of clean energy solutions in furtherance of NYS's clean energy goals. The establishment of the IEDR is focused on identifying and prioritizing use cases that provide value to stakeholders. Implementation of the IEDR is divided into two phases.

Phase One includes an initial public version ("IPV") and a minimum viable product ("MVP"). The IPV went live on March 31, 2023, with three use cases, and the MVP is expected to go live in the fourth quarter of 2023 with an additional five use cases. O&R is participating in the Utility Coordination Group meetings and working toward the MVP milestone with NYSERDA. Phase Two, beginning in 2024 and continuing through 2026, will expand on Phase One by enabling approximately 40 additional use cases. These use cases will continue to enable the data access that DER developers and other third parties value.

The implementation of future use cases for the IEDR or other data sharing protocols and mechanisms could be affected by system integration issues, cybersecurity risks, and changing priorities. Transmitting and storing customer-protected data customer protected data in the IEDR presents a data loss risk. The Company is closely monitoring implementation of the IEDR use cases and will assist in addressing potential issues where there are risks to customer data.

Enhancing Data Privacy and Cybersecurity

Maintaining the security and privacy of customers' information is a priority for the Company. The Company has robust cybersecurity protections in place and continuously monitors and responds to emerging cybersecurity risks. However, the challenge grows as more customer systems are linked to the Company's systems (e.g., smart appliances, EV chargers and vehicles, rooftop solar) and more data is made available. Together with the JU, O&R uses a common Data Access Framework ("DAF") for cybersecurity and data privacy standards to manage risks associated with expanded data sharing. The DAF provides a single source of NYS data access standards along with uniform guidance on what is needed for access to energy-related data. It establishes a Data Ready Certification process whereby a Data Ready Certification Provider will evaluate Energy Service Entities, subject to cybersecurity and privacy requirements, and authorize their access to certain types of data. The DAF focuses on people, processes, and technology as being the foundation for a comprehensive cybersecurity and privacy governance program.

With the increase in data sharing, there is also the risk of security breaches, including loss of customer data. Loss of customer data poses both legal and reputational risks for the Company and IEDR administrators. O&R follows current cybersecurity practices to protect individual customer data, which require express customer consent for data to be released to parties other than utility contractors or vendors or by law or regulatory order.

O&R and the other JU share the NYPSC interest and long-standing policy of protecting the confidentiality of customer information and evaluating disclosure exceptions as the Company continues to increase the available customer and system data. O&R continues to collaborate with the JU members and stakeholders to strike the right balance between advancing clean energy objectives and maintaining customer privacy and data security, using actual data user needs and requests to inform privacy standards.

Improving the Customer Experience

With expanding customer expectations, customers are continually seeking new and improved options when addressing their energy needs. Customers want an increasing range of solutions, such as energy management options, innovative rate plans, incentives and rebates, and EE solutions, that are personalized to their needs and deliver cost savings. Customers are asking for both a broader array of clean energy solutions and the ability to access data, information, and new program options at their fingertips. The Company has positioned itself both in the near- and long-term to be the customers' trusted energy advisor.

As customers are demanding direct and continual access to their data, the Company has incorporated additional features, such as self-service applications, enhanced digital communications, smart metering technologies, and advanced data analytics to assist them in making their selections. O&R, in coordination with CECONY, is deploying a series of customer experience improvements as part of the DCX initiative to carry out and meet the commitment to improve the customer experience. The DCX program is part of Con Edison's Strategic Customer Experience ("SCX") Portfolio of projects, which seeks to deliver a dynamic customer experience that will both meet evolving customer and stakeholder expectations and enable the Company to lead the transition to a clean energy future.

The DCX program is a multi-year program that continually refines and builds upon the Company's core digital platform. Since its start in 2017, the DCX program has consistently delivered customer value by increasing adoption of digital self-service across key customer transactions. This program continues to identify customer experience enhancements to meet changing customer needs and support customers' own journey to adopting clean energy technologies.

Customer Analytics Reporting and Engagement Program ("CARE")

In addition to the SCX portfolio of projects, the Company is implementing the CARE program, a suite of tools that will improve the digital experience and reflect the differing needs and experiences of customers. To meet NYS and NJ and local clean energy goals, O&R must expand and enhance its existing clean energy webpages and tools to provide customers with a more personalized and interactive experience to help customers better engage in the clean energy transition. The CARE Program will deliver an improved online experience by offering a suite of tools, refined by customer feedback, to facilitate decision-making and adoption of clean energy programs.

Modelled after CECONY's program, the O&R CARE program seeks to deliver a dynamic customer experience that will educate and enable stakeholder involvement in the clean energy transition. The tools will all facilitate decision-making, educate customers on clean energy adoption and increase customer and stakeholder satisfaction. The program will support state-wide clean energy goals by delivering a simple and seamless user experience, which includes offering tailored assessment tools and recommendations. While the current clean energy information and tools have expanded gradually over the years, there is need for greater integration and expansion of the capabilities.

Through surveys, interviews, and journey mapping, customers will play a key role in the Company's development of these tools. This program will be an ongoing project that will continue to refine the recommendation and analysis tools based on customer and stakeholder feedback, clean energy program changes, regulatory changes, and technological advances.

The CARE Program addresses the needs of customers during the energy transition and will facilitate participation in clean energy programs, including by DACs. As program participation increases, phaseout of fossil fuel technologies will expand with substitution to electrification, reducing GHG emissions and moving us toward meeting our clean energy goals.

Virtual Assistants

To further improve the digital experience, O&R will provide an interactive and streamlined option for customers to obtain answers and assistance across multiple channels, 24 hours a day, 7 days a week, 365 days a year. Virtual Assistants simulate a live customer service representative ("CSR") through automated text functionality in a chat option available on digital platforms including websites and mobile applications – useful in managing low-touch, high-frequency tasks to instantly respond to customer inquiries. Virtual assistants can utilize these instant responses to facilitate the initial steps of a complex task before handing off the interaction to a CSR, thus reducing the necessary work for a CSR and ultimately improving customer experience and increasing operating efficiencies. CSRs will be able to focus their efforts on higher-value, more complex customer service interactions that are happening now, and will continue increase in the future.

Virtual Assistants will provide customers with a new form of frontline support that automates many simple interactions, such as Start/Stop/Transfer service, payment, and payment assistance, currently performed by a CSR on the phone. With this project, the Company will expand the channels of interactions that are already available to customers across the company, increasing customer options and supporting the Company's mission to enhance the customer experience.

The Virtual assistant technology will leverage some of the knowledge and experience gained by CECONY and will focus on the following interactions:

- **Identify/Authenticate Customer** - confirm the customer identity and authenticate them for self-service use cases.
- **Create/Modify Payment Agreement** - aid customers in developing and coordinating their payment agreement.
- **Stop Service** - assist customers in setting up a stop service date.
- **Start Service** - provide customers with self-service to start service and schedule or update field appointment for a new connection.
- **Transfer Service** - assist customers in transferring their O&R services to another location; and
- **Bill/Payment Inquiry** - allows customers to inquire about their balance, due date, payment status, payment amount necessary to maintain service, and any other bill or payment related inquiries.

3.1.5 Implement Peak Mitigation Measures

As customers' energy consumption patterns shift, the Company will implement programs and measures that mitigate the increase in peak demand. Peak demand is the amount of capacity required during the moment when the grid experiences the highest demand for power. With increasing electrification, grid capacity will need to increase to meet the increase in peak demand. To mitigate the total increase in capacity required and the cost of upgrades, O&R is looking to utilize peak mitigation measures that will decrease the peak impact by shifting the timing of certain energy demands and dispatching energy storage. The measures currently planned include:

- **Grid Efficient EV Charging Programs:** To manage potential peak demand growth because of EV adoption, the Company encourages efficient grid-charging behavior through managed charging programs and special EV rates. The Company's programs and rate offerings are discussed above in Section 3.1.3.
- **Dynamic Load Management ("DLM") and Demand Response Programs:** O&R implements three types of DLM programs which support a reduction in the system peak and targeted area peak load: a direct load control program; peak shaving programs; and contingency programs. These programs are discussed in the Demand Load Management and Demand Response Programs section below.
- **Energy Storage and Non-Wires Alternatives ("NWAs"):** The Company plans to utilize energy storage systems to provide energy if the load growth continues past each

substation's capacity in future years. These systems increase system reliability and will be used for peak load shaving.

As clean generation expands, energy storage will significantly increase utilization of renewable resources by storing excess intermittent electric supply during periods of over-generation. This avoids stranded energy and provides additional resources to serve peak demand needs. Energy storage also enables the Company to respond quickly to real and reactive power changes, making it an important operational tool that provides reliability benefits and reduces the need to operate traditional fossil fuel-fired peaking units. Smart inverters in the energy storage system enable sub-transient response, making them adaptable to real-time grid conditions and planning.

Dynamic Load Management and Demand Response Programs

We recognize that the success of the clean energy transition will depend on the availability of adequate electric infrastructure to meet a transformational increase in energy use. Our analysis projects an increase in electricity use as electric transportation and electric building heating grow dramatically over the next three decades.

We anticipate summer system peak demand will grow by 35% to 45% by 2050. Additionally, by 2035 we project our system will experience a winter demand peak exceeding the summer peak due to an increase in electric building heating. Hence, there is a need to not only build new system capacity to meet increases in customer demand but to provide adequate DLM. DLM refers to managing and balancing the supply of electricity on the network with the electrical load by adjusting or controlling the load rather than the power station output. We will use peak DR programs, such as direct load control and distribution load relief, to optimize the need for new capacity where possible.

In 2020, the NYPSC increased the length of DR program terms from one year to at least three years in effort to encourage the development of energy storage and DLM resources.[44] One year performance terms in DR programs result in a bias toward short-term, low-capital investment solutions, while the longer-term, three-year contracts could help capital-intensive projects move forward. Since this NYPSC adjustment, O&R is working on updating its DR programs as part of its DLM capabilities.

O&R implements three types of DLM programs, operating during the summer period May 1 through September 30 (the "Capability Period"): a direct load control program; peak shaving programs; and contingency programs:

- **Direct Load Control Programs ("DLCP"):** Consists of the Bring Your Own Thermostat ("BYOT") and a proposal to add residential energy storage for the 2024 Capability Period. This program allows for remote control by the Company of central heat pump and central air condition equipment in residential customers' homes and small businesses during peak shaving or contingency events.

[44] Utility Dive, New York Sets Minimum 3-Year Term for New Load Management Programs to Drive More Energy Storage, 2020, available at https://www.utilitydive.com/news/new-york-sets-minimum-3-year-term-for-new-load-management-programs-to-drive/585745/.

- **Peak Shaving Programs:** The Commercial System Relief Program and Term-DLM participants can be called on a day-ahead basis when the next-day forecasted load approaches the Company's forecasted summer electric system peak load.
- **Contingency Programs:** Distribution Load Relief Program ("DLRP") and Auto-DLM program participants can be called to address local reliability issues in specific defined circuits or geographic areas.

These programs and their incentives are described further in Table 3-3 below.

Table 3-3. Summary of DLM Programs

Program	General Information	Incentive
DLCP	Activated by O&R in system critical contingency situations or peak shaving events. Participation limited to O&R residential, religious, and small business customers with central AC. Allows O&R to remotely control the device (smart thermostat) settings. The Company is proposing to add Residential Energy Storage to the DLCP for the 2024 Capability Period.	**Company Provided Thermostat Option:** customers receive a free or low-cost controllable device (smart thermostat). **BYOT Option:** customers enroll an eligible smart thermostat through a Service Provider and receive an enrollment payment of $85 and an annual Participation Payment of $25 starting the second summer. **Residential Energy Storage Option:** The Company is proposing to add a residential energy storage option for the 2024 Capability Period. Customers will enroll eligible battery storage devices through a Service Provider and receive a Participation Payment of $50/kW-year based on calculated load shed.
CSRP	Activated by O&R when the day-ahead forecast is 92% or greater of forecasted summer electric system peak to relieve system peak loads. Events last four-hours. Reservation and Voluntary Payment Options.	**Reservation Payment Option:** customers receive $3 per kW-month pledged and performed for months with fewer than five events and $4 per kW-month for months with five or more events. Performance payment is $0.50 per kWh provided during a Planned Event or $1.00 per kWh for Unplanned Events. **Voluntary Participation Option:** customers receive a Performance Payment of $1.00 per kWh provided during Planned Events or $1.50 per kWh provided during Unplanned Events.
DLRP	Activated by O&R in response to a system emergency or voltage reduction of 5% or greater. Events last four or more hours. Reservation and Voluntary Payment Options.	**Reservation Payment Option:** customers receive a $3 or $5 per kW-month pledged and performed depending on location for months with fewer than five events and $4 or $6 per kW-month pledged and performed depending on location for months with five or more events, and a Performance Payment of $0.50 per kWh provided during events. **Voluntary Participation Option:** customers receive a Performance Payment of $1.00 per kWh provided during events.
Term-DLM	Activated by O&R when the day-ahead forecast meets or exceeds a specified percentage of forecasted system peak, as specified by the Program Agreement.	**Reservation Payments:** equal to the applicable Reservation Payment Rate per kW multiplied by the Direct Participant or Aggregator's kW of Portfolio Quantity multiplied by the Performance Factor (as described in the Program Agreement). Reservation Payments to Aggregators or Direct Participants are determined per aggregation based on the Aggregator's kW of Portfolio Quantity in that aggregation.
Auto-DLM	Activated by O&R in response to a system emergency or peak shaving purposes under the same activation criteria as Term-DLM.	**Reservation Payments:** equal to the applicable Reservation Payment Rate per kW multiplied by the Direct Participant or Aggregator's kW of Portfolio Quantity multiplied by the Performance Factor (as described in the Program Agreement). Reservation Payments to Aggregators or Direct Participants are determined per aggregation based on the Aggregator's kW of Portfolio Quantity in that aggregation.

In 2023, O&R successfully implemented three DLM programs and completed its eighth full Capability Period. Requests for proposal for the Term- and Auto-DLM programs were issued, though these programs did not have enrollment during the 2023 Capability Period. MW enrollment decreased in the commercial programs, but the BYOT program continued to

demonstrate strong growth. The Company expects that the decrease in enrollment in the commercial programs is a deviation from typical growth trends and expects positive enrollment growth to continue in the 2024 Capability Period.

While MW enrollment declined in both Commercial System Relief Program ("CSRP") and DLRP, the number of customers enrolled increased in both programs. The need for outreach and engagement with aggregators and direct participants remains a key component of the programs' success, and the Company will continue to work with these stakeholders to increase enrollment and improve performance. Despite the reduction in MW enrollment, better and more predictable performance indicates that DR will be a reliable, consistent, and useful resource for managing summer peak demand and contingencies at O&R. Additionally, the benefit cost analysis indicates that all DLM programs are cost-effective. In 2024 and beyond, O&R will build upon its successes and continue to promote the DLM programs through a variety of marketing and outreach activities, as well as new Company initiatives.

O&R will continue to work with the NYPSC and other stakeholders to further develop cost-effective programs and incorporate new technologies as they become available. The Company will also align new initiatives with existing programs to maximize customer benefits and engage customers in new ways. The DLM programs today will be instrumental in the delivery of longer-term benefits to O&R customers, including avoiding or delaying T&D system investment, promoting EE, and improving the reliability and resiliency of electricity delivery systems.

Energy Storage and Non-Wires Alternatives

As NYS and NJ work to incorporate greater amounts of renewable resources, energy storage systems are expected to provide the needed flexibility to help integrate these resources into both T&D systems. The Company expects storage at both system levels to enhance the reliability, resiliency, and flexibility of its electric system and will have an important role in facilitating the integration of these resources into the planning and operation of the T&D system.

Recognizing this critical value, both NYS and NJ have mandated energy storage deployment. The NJ EMP established energy storage deployment goals of 2,000 MW by 2030.[45] The NYPSC 2018 Storage Order[46] established NYS goals for energy storage of 1,500 MW by 2025 and 3,000 MW by 2030. The CLCPA codified these targets into law and directed NYS's administrative agencies to develop policies to accomplish these goals. As part of the 2018 Storage Order, in December 2022, DPS Staff and NYSERDA filed "New York's 6 GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage"[47] ("Roadmap 2.0") in alignment with Governor Hochul's stated intention to double the NYS's 2030 energy storage deployment target from 3,000 MW to 6,000 MW. Roadmap 2.0 "assesses needed market reforms and cost-effective procurement mechanisms to achieve the increased storage target, identifies research and development ("R&D") needs to accelerate technology innovation, particularly for long-duration energy storage, and recommends approaches to storage

[45] State of New Jersey, New Jersey Environmental Management Plan, 2019, available at https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf.

[46] Case 18-E-0130, Order Establishing Energy Storage Goal and Deployment Policy issued December 2018, available at https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=55960.

[47] NYSERDA, Energy Storage Proceeding, December 2022, available at https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Energy-Storage/ny-6-gw-energy-storage-roadmap.pdf.

deployments in a manner that furthers the state's efforts in replacing NYS's most polluting fossil-fuel facilities."[48]

In addition to energy storage, NWA projects offer an opportunity to defer traditional utility infrastructure investments, resulting in cost savings and broader societal benefits for customers while maintaining system reliability and resiliency. NWAs are an emerging market, but the Company is gaining experience by deploying projects, sourcing NWAs in the planning process, and exploring additional NWA use cases.

O&R utilizes four approaches to energy storage procurement: demonstration projects, direct procurement, NWAs, and bulk solicitation.

- The Company uses **demonstration projects** to test storage use cases, so that lessons learned from the demonstrations can be applied to develop programs.
- The Company pursues **direct procurement** options in the integrated planning process. Direct procurement means that O&R as a utility directly obtains storage for its own supply portfolio. The planning process indicates when a battery may help with load and circuit relief.
- The Company also pursues **NWAs** in the integrated planning process. A NWA is any investment that is intended to defer or remove the need to construct or upgrade components of a distribution and/or transmission system, or "wired investment."[49] If a need for traditional infrastructure on the distribution system can be met with batteries or deferred by EE improvements and the traditional infrastructure can be delayed, an NWA can be pursued, so long as it passes the Company's NWA Suitability Criteria. Sometimes NWAs are paired with traditional investments to produce hybrid solutions.
- Pursuant to the Storage Order, the Company uses **bulk solicitation** to competitively procure dispatch rights for bulk-level energy storage services.

Moreover, the Company continues to pursue bulk energy storage and direct procurement and has additional NWAs in various stages of implementation. O&R internal stakeholders, including system operators and planners, will leverage energy storage technology to offer more flexibility to manage the electric grid while maintaining system reliability.

The Company's currently identified NWA projects include:

- The **West Warwick NWA** is a 12 MW/60 MWh energy storage project that consists of three individual third-party owned battery systems. It satisfies load relief and emergency contingency needs and improves reliability by providing additional capacity on three of the five circuits fed from the Wisner substation. The project is accompanied by a substantial educational outreach program. This includes outreach and education discussions held with local organizations such as Sustainable Warwick and the Warwick Chamber of Commerce as well as O&R sponsoring and staffing a booth on Earth Day at the Warwick Library in April 2023.

[48] Ibid, pg. 6.

[49] National Grid, What is an NWA, 2022, https://www.nationalgridus.com/Business-Partners/Non-Wires-Alternatives/What-is-an-NWA.

- The **Sparkill NWA** is a battery project that will aim to defer costly infrastructure upgrades and provide up to 3MW of load reduction on the Sparkill Substation. The Sparkill Energy Storage System is expected to be online by 2Q26.

In addition to the NWA projects at West Warwick and Sparkill, the Company pursues energy storage demonstration projects including the ongoing deployment of customer installations in the Innovative Storage Business Model ("ISBM"), which is a virtual power plant ("VPP") demonstration project combining rooftop solar panels with on-site batteries. We describe the ISBM further below.

Innovative Storage Business Model

To better understand the potential benefits of residential battery storage projects, the Company launched the ISBM. O&R launched this project in January 2021 and is aggregating behind-the-meter ("BTM") residential battery storage to test the hypothesis that batteries can provide a range of services across multiple use cases, including maximizing the use of battery storage, improving economics, and increasing battery deployments.

The Company's ISBM demonstration project is a partnership with Sunrun Inc. ("Sunrun") to provide residential solar plus storage to customers in O&R's service territory. Sunrun develops, designs, installs, owns, and maintains assets within this program. Sunrun's residential solar plus storage system is being offered to customers within O&R's service territory and will be supported by Sunrun's distributed energy resource management system ("DERMS"), which will aggregate and optimize the assets based on the highest value application at the time.

The business model being tested allows for the sharing of costs and benefits across multiple stakeholders. Stakeholders include the residential host customers who receive resiliency benefits during a power outage; O&R, which will realize peak reduction and shared wholesale revenues; and Sunrun, which will benefit from peak services payments and shared wholesale revenues. This project will provide actionable data on how an aggregation of BTM batteries can generate benefits for the Company's distribution system, NYISO markets, and the host customer.

The overall project goal is 300 systems, and as of September 2023, the Company and Sunrun had installed 144 systems. O&R and Sunrun have executed an agreement that provides O&R with the right to call on an aggregation of BTM batteries to meet its electric distribution needs. The agreement is the first of its kind for O&R and will serve to inform and streamline future DER programs and contracting efforts. From a marketing perspective, although Sunrun will own and operate the batteries, O&R and Sunrun jointly developed materials and messaging that are consistent with the Company's focus on a beneficial customer experience.

Hybrid Substation Energy Storage Pilot

As the electric load on O&R's distribution system grows, there will be a need to construct new substations to bring additional electric capacity to where it is needed. A substation reduces high transmission line voltages to lower voltages for the distribution system, which serves O&R's end-use customers. The new substation satisfies the load demand at that point in time, but load growth will continue. Pairing battery energy storage systems ("BESS") with the new substation, adds additional capacity for the customers connected to the circuits which the substation serves. The battery can also be used for peak load shaving and market participation. This concept takes advantage of the fact that the site is being prepared for the substation and placing a battery on the same footprint adds only incremental construction costs since the work is already being performed.

There are several substation projects which can be paired with a battery for the benefit of both O&R and its customers, totaling an additional 22 MWs of capacity and 99 MWh of duration to the electric grid:

- Blooming Grove (6MW/24MWh)
- Bullville (5MW/20MWh)
- Forest Ave (5MW/25MWh)
- Goshen (6MW/24MWh)
- Otisville (6MW/24MWh); and
- Pomona (expansion of currently operating 3MW/12MWh BESS to 3MW/18MWh).

Additional energy capacity in the form of a BESS will be able to provide energy if the load growth continues past each substation's capacity in future years, and they will be used for peak load shaving and system reliability. These battery storage systems will also contribute toward NYS's CLCPA goals, as well as the storage goals outlined in the NYS Storage Roadmap. In addition, when not being operated for system reliability, the Company will operate its energy storage systems to bid energy, capacity, and/or ancillary services into the NYISO wholesale markets.

The push for net-zero GHG emissions and the associated electrification efforts will increase the need for load management at critical times of the day. The push for moving residential heating from natural gas to electricity will also result in changing demands for electricity during the winter, which the new and expanded storage systems will help address.

The REV Track 1 Exceptions for Utility DER Ownership include projects consisting of energy storage resources integrated into distribution system architecture. In addition, because the energy storage equipment is intended to enhance electric distribution reliability and is installed

at critical Company facilities, O&R proposes to own and operate the equipment for physical and cybersecurity reasons. The Company also believes that utility-owned energy storage has a higher availability than third-party owned energy storage when called upon to respond network contingencies.

Uncertainties and Risks

O&R identified some of the uncertainties, barriers, and risks associated with the deployment of energy storage in our service territory. First, siting and permitting processes often take years for traditional utility projects. Because energy storage technology is new to most local municipality decision makers, permitting may take even longer, as novel zoning laws and building code issues are addressed, and external stakeholders, including the public, engage with the technology. Energy storage technology presents new opportunities to coordinate with authorities having jurisdiction to inform them of the technology's benefits and risks. The Company has taken the initiative to address these concerns by meeting with local officials earlier in project lifecycles. Those discussions have focused on battery technology, its role in a reliable and safe electric system, and its impact on local communities. The Company continues to engage vendors, city officials, and other stakeholders early in the process to facilitate energy storage development.

Fire safety is an important consideration with lithium-ion battery storage. To mitigate the risk of fire, O&R works with third-party partners to deploy emergency management systems which monitor system conditions and activate various countermeasures if a safety risk is identified. In addition, O&R hosted multiple fire safety meetings with local fire departments and first responders to highlight industry best practices. In 2022, O&R held three battery fire safety training sessions with fire departments in Orange, Rockland, and Sullivan Counties as part of the ISBM project. This collaboration with fire departments will continue annually. O&R expects to support the development of the standardized safety practices and equipment standards with Governor Hochul's fire safety board.

Fire safety risk may change as battery technology evolves. Different battery chemistry may mitigate the risk of thermal runway. Although a fire incident occurred in the O&R service territory at the battery storage system located in Warwick, NY, the damage from this fire incident was minimal and resulted in no injuries. Of note, there have been no safety incidents associated with residential battery systems installed through the ISBM program thus far. Despite this, fire safety remains of great importance to both O&R and the public. The Company continuously explores advancements in battery technologies to improve the safety of systems being installed.

Specific to O&R-led projects, the Company mitigates safety risk through numerous measures, including placing signage and alarms outside of the facility to signal to the first responders the status of the asset(s), and developing Emergency Response Plans ("ERPs") in collaboration with first responders. In addition, O&R asks potential vendors to highlight the HVAC and fire-suppression systems that are built into the energy storage assets themselves. O&R will continue to update processes and procedures related to fire safety as best practices related to energy storage fire safety evolve.

3.2 Build the Energy System of the Future

In parallel to enabling change in energy consumption O&R is responsible for maintaining and operating a safe and reliable electric and gas system throughout the energy transition. The “grid of the future” will manage a more dynamic environment where DERs, customer sited solar, storage and EV charging will be at scale, changing the long-time physics of the electric grid from a single directional power system to a two-way power flow system (See Section 3.2.3, ‘Develop New Grid Capabilities’). At the same time, because of conversion to electric heating and transport, the electric grid will need to accommodate greater electric supply and demand, adjust to decarbonized supply and a reimagined gas system, adopt enhanced capabilities to meet new customer needs, and become more resilient to the impacts of climate change. It must do all these things while not compromising the safety and reliability of the electric system.

As electrification continues to expand, customers’ dependence on electricity as an essential service will increase, driving the importance of even greater reliability and resiliency from the electric system. Core Investments are necessary to keep the system safe and reliable now and to prepare it for a clean energy future. Many Core Investments will also make the system more resilient in the face of extreme weather events. Having reliable electric and telecom services has become an ever-greater priority to our customers in an increasingly virtual world where many are working from home.

Our strategy to achieve a safe, reliable energy system of the future is as follows:

- **Enhance Safety and Reliability**: Maintain core programs and infrastructure so that energy is delivered safely and reliably.
- **Support the Expansion of the Electric Grid:** Prepare the grid for increased demand due to electrification.
- **Develop New Grid Capabilities:** Implement technology solutions that enhance operating efficiency and modernize the grid.
- **Construct a More Resilient System Against Climate Change:** Invest in energy infrastructure that delivers clean energy and is resilient to climate change.
- **Reimagine the Gas System:** The Company is committed to reducing the amount of natural gas consumed by customers by supporting electrification of buildings, decarbonizing the gas provided to customers.

We outline our plans to implement this strategy in the sections below.

3.2.1 Enhance Safety and Reliability

We have a foundational role in powering the communities we serve with safe, secure, and reliable energy while managing rate impacts and equity challenges. Highly reliable energy delivery is an expectation of our customers and stakeholders and one we fully embrace. Our commitment to reliability will only grow as customers rely more on the delivered energy services, we provide to improve their daily lives, including powering their selected mode of transportation, heating and cooling their homes and businesses, connecting their digital devices, and lighting their homes.

Representative of our focus on reliability and resiliency for our customers, O&R received the **2023 ReliabilityOne** Award for Outstanding Reliability Performance in the Northeast Suburban/Rural service area.

We will enhance core infrastructure while managing costs, sharing benefits, and promoting the cost-effectiveness of the energy transition. We have defined sub-strategies to continue delivering operational excellence and safety and reliability while supporting a managed transition.

Core Investments

Core Investments are required for safe and reliable service to satisfy company design standards and many of the projects also provide resiliency. Among other things, they include investments to address load growth, replace equipment and assets that can no longer be maintained, keep assets in safe working condition, and enhance physical and cybersecurity. They are essential to maintaining the electric T&D systems. O&R's continual efforts toward maintaining a safe and reliable system were recognized as a recipient of the 2023 ReliabilityOne Award for Outstanding Reliability Performance in the Northeast Suburban/Rural service area.

We will enhance our core services while managing costs, sharing benefits, and promoting the cost-effectiveness of the energy transition. We have defined sub-strategies to continue delivering operational excellence and safety and reliability while supporting a managed transition.

Safety

Maintaining public and employee safety is imperative. A key to maintaining safety is having plans in place to respond to an event, should it occur. The Company carefully plans all operations around a zero-harm culture with consideration for public and employee safety as our top priority. This is emboldened by a consistent partnership and coordination between the Company, developers, and first responders. Our safety programs are designed to minimize safety incidents for our employees and to promote public safety for the customers and stakeholders that interact with O&R's electric and gas systems.

From an employee perspective, we do so by promoting a first-class safety culture, proactively identifying, and addressing high-risk hazards and leveraging data and tools to drive us to an incident-free workplace. We prioritize a zero-harm culture for employee safety by implementing

corporate policies and engineering designs to protect the environment and maintain health and safety.

From a public perspective, we invest in engineering design that prevents and detects safety incidents from occurring in the first place, including manhole and transformer explosions, electric shocks, and carbon monoxide releases. Prevention efforts include a comprehensive inspection program, proactive replacement of high-risk components with modern alternatives, and installation of vented and latching manhole covers. Detection efforts include stray voltage scans and monitoring sensors; data analytics prioritize response times using deployed sensors. Additionally, we educate the public on safety, like what to do in the event of a gas leak or a downed power line.

Examples of specific safety initiatives include:

- **ERP Enhancements:** The Company recognizes the value of assessing its performance after each storm event to identify opportunities for improvement. To develop robust emergency response plans, the Company's internal emergency response experts have worked with third-party vendors to draft emergency response plans, followed by review by first responders. Where gaps were identified, designs were modified, and safety and communications mitigations were implemented to address them. The Company works with regulators, customers, and municipal partners to determine ways to strengthen future storm preparation and restoration performance. The Company also seeks to continuously learn and improve its processes through interactions with industry groups (e.g., Edison Electric Institute ("EEI"), the Association of Edison Illuminating Companies ("AEIC")) and benchmark peer utilities to evaluate and apply storm restoration best practices. The Company incorporates appropriate changes into its ERP and other policy guidelines and procedures to improve its preparation and restoration efforts, continually improving its storm response capabilities to better serve its customers.
- **Overhead Emergency Response Program:** This Overhead Emergency Response program supports system reliability, reducing safety risk to the public and employees associated with failing equipment and minimizing risk of regulatory penalties related to reliability.
- **Critical Facility Program:** For targeted critical customer and municipal facilities, the Critical Facility program allows for minimized risk to employee and public safety via proactive replacement of high-risk components and use of data science and analytics to prioritize our response to any potential problems revealed.

Separate from these specific programs is the Company's overall focus on physical security. Corporate Security's core mission is that of a comprehensive security program that allows for a proactive partnership with both our operating and support organizations along with external law enforcement, and governmental and regulatory agencies. To meet our mission, we have incorporated comprehensive security processes to protect critical infrastructure. These processes encompass a wide array of functional responsibilities including policies and procedures, investigative and tactical responses, cyber forensic investigations, electronic security systems, physical security measures, central station monitoring, compliance with governmental and regulatory initiatives and standards, security awareness training, and regular interaction with law enforcement at every level.

To safeguard our facilities, we continue to incorporate comprehensive security processes to protect us, our employees, and our physical assets. Our security strategy is defense in depth, continually adding layers to mitigate risk. We deploy a range of mitigation measures which tie into our security platform all coordinated through our 24/7 Security Operations Center ("SOC"). These include over 800 cameras, various intrusion detection systems, anti-cut / anti-climb fencing, various alarms, and a card access system which incorporates layers of restrictions within our facilities. We also employ numerous contract guards throughout our Company. The SOC coordinates incoming security events with the appropriate response protocols.

3.2.2 Support Electric System Expansion

Accommodating greater electric supply and demand requires an expansion of the O&R electric system. System capacity upgrades are necessitated by growth in customer demand. Projects to increase system capacity reduce risks related to facilities that are not expected to meet design standards during the 10-year planning period under normal and/or system contingency operating scenarios. These projects typically include new substations, feeder cables, and transformer load relief. O&R is committed to continuing the delivery of safe and reliable gas and electric service to customers as the electric system expands.

The Company is planning both substation and transmission system expansion projects that address the significant load growth expected in many areas of O&R's service territory while also adding additional hosting capacity for renewable interconnection and capacity for customer adoption of beneficial electrification. In addition, a number of these system expansion projects are part of a larger multi-value plan designed to improve transmission/distribution reliability, address aging infrastructure, and increase hosting capacity.

The Company is proposing a combination of transmission and substation projects to construct a new 69kV transmission system to replace the existing 34.5kV lines/station. In the DPS Staff's Initial Report on the New York Power Grid Study[50] (filed January 2021, in Case 20-E-0197), O&R's Western Division was identified as a future Renewable Energy Zone due to its open spaces and available farmlands in the Sullivan County area. In this report, DPS Staff recommended upgrading these facilities from 34.5kV to 69kV to support growth and hosting capacity. O&R's planned station and line upgrades eliminate bottlenecks and aligns feeder, substation, and transmission capacity.

DERs can provide distribution and system capacity that could otherwise require investment in generation and transmission assets. DERs may displace the need to produce energy from traditional fossil fuel-based sources both avoiding energy production costs and avoiding line losses on the T&D system. To achieve these benefits, O&R aims to facilitate the connection of DERs to the electric grid by streamlining and automating the interconnection application process, participating in industry groups and research projects, and promoting and facilitating the installation of additional solar and energy storage projects.

DER Interconnection

O&R is committed to offering a robust, customer-oriented interconnection process that facilitates the interconnection of renewable energy and distributed resources. O&R seeks to reduce

[50] Case 20-E-0197, 2023, available at https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=20-E-0197.

barriers to clean energy interconnections by maintaining a streamlined and efficient interconnection process for developers. The Company continues to work to improve and simplify the interconnection process to enhance the customer experience. O&R's interconnection process serves to reduce barriers and facilitate greater penetration of DERs – all efforts that help support market growth. As of December 2023, the Company has interconnected 196 MW at 12,049 installations in its service territory.

The Company has approved 11,376 PV installations, interconnecting a total of 186.47 MW.

The Company is increasingly evaluating and leveraging DERs as a non-traditional solution to mitigate distribution system deficiencies. The Company has developed programs to deploy DERs in beneficial locations, including DR and EE programs, value of distributed energy resource tariffs, and NWA solicitations. Beneficial locations are identified through the Company's capital budgeting process.

For assets that the Company determines to be at risk of becoming overloaded during system peak conditions and under various contingencies, O&R identifies traditional infrastructure, non-traditional solutions, or hybrid solutions to mitigate the deficiency. O&R is committed to facilitating significant expansion of DERs on the electric grid.

The interconnection of DERs is a key component to building a resilient, modern electric grid that delivers 100% clean energy by 2040 and supports the Company's strategic objective to transition to a net-zero economy by 2050. Renewable energy sources like wind and solar offer energy production with fewer emissions than traditional fossil fuel generation. The Company's interconnection process and participation in related working groups and research projects will help unlock additional installations and reduce the barriers for developers.

O&R is committed to easing the barriers of clean energy by maintaining a streamlined interconnection process for developers. O&R will continue to demonstrate its commitment to interconnection efforts through continued portal and process enhancements, innovation project participation, industry participation, and stakeholder engagement. The Company's innovation projects that are testing various technologies will lead to additional process improvements and lessons learned that will inform future refinements.

O&R supports the expansion of DERs on the electric grid by:

- **Streamlining the Interconnection Application Process:** PowerClerk is a critical component of the Company's interconnection process for developers to bring projects online, both in NYS and NJ. O&R continues to improve the customer experience by incorporating the NYS's Standardized Interconnection Requirements updates into PowerClerk and by adding new features as they become available. For example, the Company is expanding the functionality to support the participation of aggregated DERs in the NYISO market. In 2023, the Company updated its software modeling tool and implemented its new customer care and billing system. The Company's focus is now on the integration of the interconnection process with the distribution planning process in the same software platform.

- **Participating in Industry Groups and Research:** O&R participates in several industry working groups related to interconnection and DERs. The Company works with other members of the JU in the Interconnection Policy Working Group ("IPWG") to discuss and implement interconnection best practices. In addition, O&R will continue to be an active member of the EPRI, the Interconnection Technical Working Group, and the Institute of Electrical and Electronics Engineers ("IEEE"). As pursuit of the CLCPA's goals results in an increase in energy storage solutions and EVs, the JU will continue to discuss these items in future JU working group discussions.
- **Promoting and Facilitating the Installation of additional Solar and Energy Storage Projects:** The Company is facilitating the deployment of renewables and DER by:
    - Developing and executing comprehensive education and outreach programs targeting both end-use customers and their communities.
    - Actively engaging and working with the developer and contractor community to identify solar opportunities, helping with the siting and permitting process, and educating them on how to best work with the Company and to manage the interconnection process at both the T&D levels.
    - Working with various agencies and the Company's utility peers to evaluate new technologies that will facilitate the integration of DERs onto the electric grid more effectively and support electric grid operations.

Now that new standards are in place requiring smart inverters, the Company's future efforts will focus on working with vendors to develop functionality that enables O&R to validate that inverters use the proper settings. O&R has best postured itself for this work, receiving EPRI's 2023 Power Delivery and Utilization award for its collaborative work analyzing the technical impacts and benefits of the advanced functions of smart inverters.

O&R received EPRI's **2023 Power Delivery and Utilization award** for its collaborative work analyzing the technical impacts and benefits of the advanced functions of smart inverters.

Future Energy Storage Opportunities

In addition to the energy storage projects previously discussed in Section 3.1.5, the Company engaged in various outreach and education activities to promote energy storage adoption and inform external stakeholders throughout its service territory about the benefits of energy storage. O&R will continue to educate customers in their service territory about the benefits of energy storage. The Company is considering additional storage opportunities to support NYS and NJ's Energy Storage goals and support the electric grid on the path to net-zero carbon emissions. There are other types of storage that the Company could potentially use strategically to reduce the cost of operations. The Company is considering whether the following five types of storage could be economical and reliable and is identifying potential use cases.

- **Long-Duration Storage:** The United States Department of Energy ("DOE") defines long-duration storage as a system capable of producing electricity for 10 hours in duration.[51] O&R has applied for federal funding to explore this technology.
- **Microgrids:** The DOE defines microgrids as localized grids that can disconnect from the traditional electric grid to operate autonomously.[52] A large battery can provide backup and reinforcement to the system, and power a small section of the electric grid if it becomes disconnected.
- **Combination Storage and EV Charging:** The combination of energy storage with EV charging infrastructure can provide energy during peak times and allow certain system upgrades to be postponed.
- **Mobile Storage:** Mobile storage is a battery that can be moved. Potential use cases are integration with EVs and leasing to provide backup power in specific areas.
- **Vehicle-to-Grid:** Vehicle to grid is a new use case where energy stored in an EV's battery can be used to supply energy through the vehicle owner's home.

O&R will monitor the development of these technologies and continue to investigate their potential benefit on the energy system of the future.

3.2.3 Develop New Grid Capabilities

The future electric grid will need to support real-time operations across a diverse resource mix including traditional assets, DERs, and large-scale intermittent renewable generation connected to the bulk electric power system. Together this diverse mix of resources at the edge of the electric system will require increasingly sophisticated electric operations to allow for visibility to and dispatch of distributed resources. In addition, with the Company's implementation of AMI, O&R can transmit and analyze extraordinary amounts of data shared from thousands of devices. This will allow the Company to facilitate coordination between wholesale and distribution markets, while continuing to deliver reliability and resiliency to customers. O&R's approach to grid modernization prioritizes investments to develop these capabilities, deliver resiliency, and simultaneously support the CLCPA's decarbonization and DER deployment goals.

The Company is investing in new capabilities to support grid modernization which improve the reliability, resiliency, efficiency, and automation of the T&D system. These investments include (1) the sensors, data, and communications networks that enable enhanced visibility and understanding of the behavior of the network; (2) technologies and equipment that facilitate greater customer engagement regarding energy usage and alternatives; and (3) the underlying systems, data management and analytics that facilitate situational awareness, asset management, contingency and risk analysis, outage management and restoration. These necessary core investments underpin the required focus on grid reliability and resiliency. They provide the basis for increased operational flexibility, can enable efforts toward achieving the

[51] Department of Energy, Long Duration Storage Shot, available at https://www.energy.gov/eere/long-duration-storage-shot.

[52] Department of Energy, The U.S. Department of Energy's Microgrid Initiative, 2012, available at https://www.energy.gov/sites/prod/files/2016/06/f32/The%20US%20Department%20of%20Energy%27s%20Microgrid%20Initiative.pdf.

NYS's policy goals, including the integration of various types of DERs, and are beneficial for any resource mix.

With the increasing penetration of DER, visibility into and reliable control of all aspects of electric grid operations are essential. These capabilities are unlocked through the acquisition of near-real time data, expansion of high-speed communication, and automation of actionable field devices.

O&R is focusing on expanding high-speed communication, collecting, and utilizing near real-time data, and automating field devices. Efforts include:

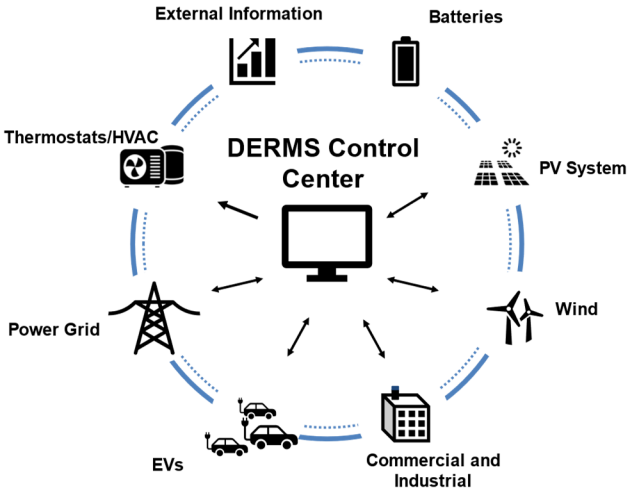
- Implementing smart grid devices to enhance monitoring, control, and optimization of the electric distribution grid.
- Advancing communications infrastructure to support the transmittal of robust and secure data.
- Updating the geographic information system ("GIS") system and supporting the development of an enterprise-wide GIS.
- Collaborating with sensor vendors to improve capabilities to provide visibility into the system.
- Developing, integrating, and implementing a sophisticated ADMS.

These investments, which are described in more detail below, are critical to supporting the electric distribution system's ability to support the additional energy storage and solar capacity needed to achieve the CLCPA's targets.

ADMS/DERMS

An ADMS is a key tool to provide visibility into how the electric grid is operating and to coordinate how the electric grid responds to DERs to maintain power quality and reliability. The ADMS can monitor system performance, identify system disturbances, perform real-time analysis, and record data from abnormal system conditions resulting from planned and unplanned events that modify the design configuration of the electric delivery system. An ADMS will enhance situational awareness, and through monitoring and control, improve reliability, resiliency, and system efficiency.

Figure 3-9. Technologies Managed by DERMS



The Company completed its distribution supervisory control and data acquisition ("DSCADA") and ADMS Phase 1 and 2 rollouts in 2022 and 2023, laying the foundation for monitoring and control of an advanced, digitally enhanced, and dynamically managed electric delivery system. ADMS eventually will integrate with a DERMS to monitor and optimize the control of DERs and smart inverters that will harmonize with Company devices and provide appropriate and improved electric delivery system operation.

Starting in 2024, the Company will begin a multi-year effort to develop a DERMS, increasing functionality to allow near-real time monitoring of DERs. DERMS is a software-based solution that will start out as a planning tool and will evolve over time to add operations and market facilitation capabilities. DERMS functionality is to monitor, control, and optimize the operation of DERs and other technology, as shown in Figure 3-9 above. This functionality is available as a module within an ADMS or as a separate standalone application. DERMS monitoring and control functions require tight coupling to the legacy distribution management system and DSCADA or ADMS operations because they can have significant load and capacity impacts on grid operations as the number of DERs increases. A DERMS also optimizes functions related to operations and markets. The DER capacity that is or is not encumbered through market transactions can have significant financial impacts to the Company and to customers or DER owners. A DERMS will optimize DER market operations to the benefit of both.

Through a DERMS platform, O&R will achieve a heightened level of control and flexibility necessary to manage the two-way power flow of the evolving distribution system. A DERMS platform can enable management of DERs through bi-directional exchange of information. A DERMS will also support and facilitate optimized market-based transactions. O&R also has an important role in enabling participation of aggregated DERs in the NYISO market and a DERMS will be needed to manage the impact of a DER system while simultaneously maximizing the benefits provided to customers and to the grid.

Distribution Automation and Smart Grid Sensors

Building on the implementation of the DSCADA system and ADMS, the Company plans to expand its deployment of distribution automation ("DA") devices and communication

infrastructure. These systems, devices, and communications infrastructure will support the full functionality of the DERMS and provide the visibility, monitoring, and control required to effectively plan for and manage the DER assets on the grid, accommodate bi-directional flow of power, and provide market and customer services.

Geographic Information Systems

A GIS is a repository that maps utility equipment, power lines, and gas lines and stores descriptive information about each. The GIS provides critical visibility to utility operations and field crews to prevent and respond to electric grid outages.

Because O&R's current GIS is approaching its end of useful life, O&R is synchronizing with CECONY to implement an enterprise-wide GIS. This common enterprise-wide GIS will consolidate the mapping and visualization system across the business. The platform will enable quicker and more accurate access to data, a platform for common processes between CECONY and O&R, and enhance operations and field tools for outage management, damage assessments, and storm response.

The common enterprise GIS will more effectively use resources by eliminating functional and data redundancies, decrease the total cost of ownership through licensing and maintenance costs, and increase data access and quality to improve responsiveness and resiliency by using a single product architecture and common processes. It will improve the location accuracy of all assets on the electric grid and aid our operators and field crews in restoring customer outages more rapidly. It will also enable advanced analytic capabilities when integrated with other systems, including integrating with AMI data to forecast outage locations using predictive analytics, integrating with spatial mobile data for crowdsourced damage assessments, integrating with unmanned aerial vehicle systems for situational awareness during emergency events. The plan to deploy a common GIS platform enterprise-wide is needed to efficiently plan and optimize a modern, reliable, and resilient energy system.

The enterprise-wide GIS will provide consolidated mapping and visualization that stores physical location and operating characteristics of facilities and assets. This will be the "backbone for the connectivity model." O&R's GIS platform also supports the Company's hosting capacity maps and analysis, described in more detail in Section 3.1.4 above. To continue informing future hosting capacity development, O&R will need to continue to invest in Esri's ArcGIS tool to allow for greater automation, timelines of updates, and identification of areas on O&R's datasets that will be refined further toward improved hosting capacity.

Data Analytics

Technological solutions that enable a clean energy future will expand business capabilities and increase the availability of data that can be leveraged for actionable insights. Analytics uses quantitative and statistical techniques to gain insights into data that answer complex problems to improve operations. The Company's data analytics program supports optimization and governance of the Company's collective investments in advanced analytics.

The Company's ability to effectively consume, organize, and analyze the large volume of granular data associated with customers, smart meters, grid devices and operations, and DER will increase in importance through 2050. Data analytics will support continuous monitoring of grid safety, performance, and reliability optimization. Data mining will be used to provide insights

across multiple sources of public, private, and enterprise data. The Company will use data to optimize cost and performance of investment and expense dollars and support the end-to-end affordability of power to customers.

Analysis on the vast array of customer data available will support better understanding of a customer's preferences and behaviors, which is critical for customer adoption of new technologies and participation in clean energy programs. O&R will continue to leverage AMI data to inform system investments, improve operations, identify, and communicate about outages, and recommend EE and other programs to customers.

3.2.4 Construct a More Resilient System against Climate Change

As society becomes increasingly dependent on resilient, reliable electricity, climate change is bringing more frequent and severe storms, flooding, icing events, and heat waves that impact the electric delivery equipment and cause outages that impact our customers. NYS and NJ have both experienced detrimental climate events that have caused damage to many of its communities and infrastructure. These events threaten the safe, reliable service that customers deserve and expect. Temperatures in NYS and NJ have increased almost 2.5° F since the beginning of the 20th Century. In July 2023, O&R counties experienced intense flooding and strong winds, causing power outages and severe damage to homes and infrastructure. Research shows that a range of climate hazards, including temperature, precipitation, and winter storms, will continue to affect our territories and are projected to increase in severity due to climate change.[53]

Over the past year alone, O&R has spent nearly $180 million to increase the reliability and resiliency of the electric system.

Recognizing the potential impact of climate change on the energy system, NYS requires each of the electric and gas utilities to publish a Climate Change Vulnerability Study[54] ("CCVS") and a Climate Change Resilience Plan[55] ("CCRP"). O&R's initial CCVS provides a detailed review of the threat climate change poses to O&R's electric system infrastructure and customers. The study highlights the need to incorporate future climate projections when planning assets and designing our energy systems to address expected risks and to maintain the service that our customers expect in a changing climate. In the CCVS, O&R has identified four key hazards based on their potential to impact the Company's assets and their potential future magnitude and frequency, shown in Table 3-4 below.[56]

[53] IPCC, Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate, 2021, available at https://www.ipcc.ch/report/ar6/wg1/.

[54] O&R, Climate Change Vulnerability Study, 2023, available at https://cdnc-dcxprod2-sitecore.azureedge.net/-/media/files/oru/documents/energy-future/our-energy-vision/our-climate-change-resiliency-plan/2023-vulnerability-full-study.pdf?rev=90807787d38a40a0882e83a781cd0cf6&hash=96FEE34D06BEA80E950B49DC1826C942

[55] O&R Climate Change Resiliency Plan, November 2023, available at https://www.oru.com/-/media/files/oru/documents/energy-future/our-energy-vision/our-climate-change-resiliency-plan/2023-climate-change-resilience-plan.pdf

[56] O&R, Climate Change Vulnerability Study, 2023

Table 3-4. Priority Hazards

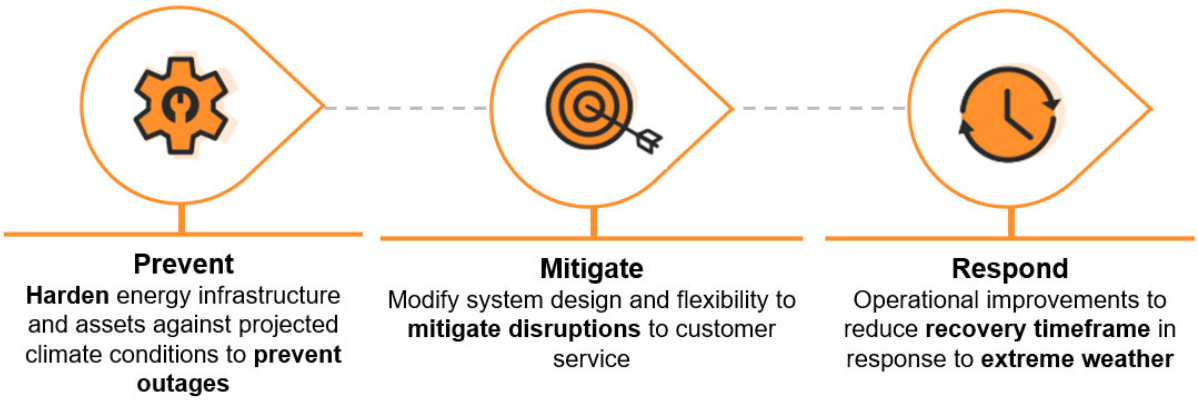
Hazard	Climate Projections
Temperature and Humidity	Both **average air temperatures** and **extreme heat** will increase. For example, the number of days where maximum temperatures exceed 95°F could reach 35 days per year by 2050 in Dobbs Ferry, compared to the baseline of 4 days.
Flooding	**Precipitation**: Projections show a shift relative to historical norms. This could increase deluge precipitation events—short-duration, high-intensity rainfall—that may impact municipal stormwater systems and result in inland flooding. **Sea Level Rise:** O&R's service area is expected to experience 16 inches of sea level rise by 2050. Sea level rise will heighten flooding along the banks of the Hudson River, potentially increasing the perpetual inundation of coastal assets.
Wind and Ice	**Wind:** A review of external scientific studies indicates that the O&R service area is likely to experience stronger wind gusts in the future due to intensifying storms, particularly during tropical cyclones. While the frequency of the most extreme wind speeds during tropical cyclones is not expected to increase in the North Atlantic basin, more frequent high wind gusts could be observed during thunderstorms, although the magnitude of this trend is uncertain. **Icing:** There is potential for higher intensity radial icing events to increase in intensity in the winter months.
Extreme Events	**Hurricanes** are expected to increase in intensity with a higher probability of northeast tracks. **Snow and ice** events will decrease in frequency but when they do occur, they may be more intense. **Cold snaps and polar vortex** conditions could become more frequent due to a weakening of the polar vortex. **Lightning and thunderstorms** could increase in frequency and intensity. **Drought** may increase. **Wildfires** may increase in frequency and intensity due to increasing temperatures and drying patterns. **Concurrent and successive extreme events** are expected to increase in frequency and intensity.

In NYS, O&R invested over $83 million in resilience initiatives to strengthen its system over the last decade. O&R has learned from CECONY's 2020 Climate Change Implementation Plan, which was developed to incorporate climate change systematically and intentionally into its planning, design, operations, emergency response, and investment planning practices; changing the culture of the organization to embed resilience as a priority. O&R also incorporated a joint corporate-wide (i.e., CECONY and O&R) climate change governance into its processes as part of developing its first CCRP, published in November 2023.

In its CCRP, O&R outlines its resilience management framework. This framework employs a multi-pronged, forward-thinking resilience strategy that emphasizes the need for adaptable, resilient infrastructure and operational practices that anticipate and adjust for changing climate conditions. This approach extends beyond individual assets and isolated incidents to holistically address the spectrum of potential climate impacts across Company operations. The objectives of the framework and O&R's investments are to mitigate climate change impacts, reduce restoration time and cost, and enhance reliability.

The main strategies of O&R's resilience management framework are to prevent, mitigate, and respond to the priority hazards identified in the CCVS, described in Table 3-4 above. Figure 3-10 below describes the "Prevent", "Mitigate" and "Respond" strategies further. O&R also classifies its resilience investments into three strategic areas: resilience-driven investments, incorporating resilience into planning, design, and operations, and application of new technologies. Investments in each of these strategic areas can align with any of the three pillars.

Figure 3-10. Resilience Management Framework Strategies

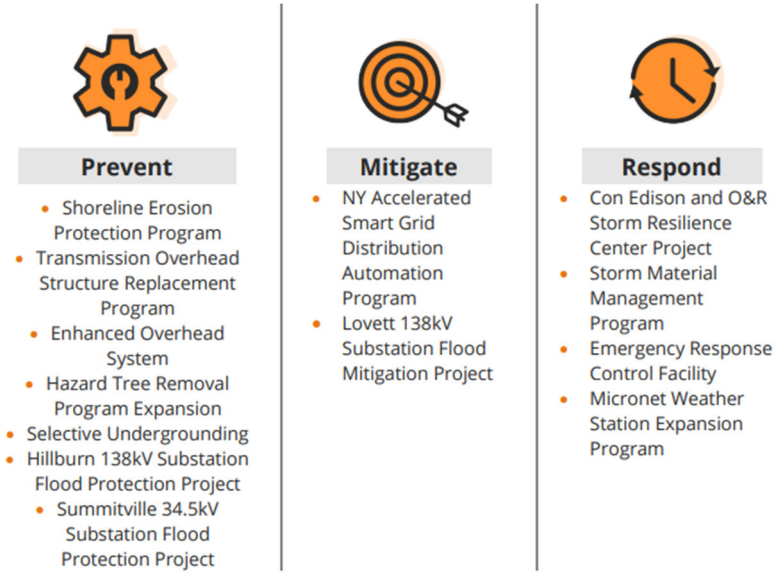


The Company continues to invest in programs in NYS and NJ that harden the electric grid, increase the Company's resiliency during storms, and respond to emergencies. While Infrastructure investments are discussed fully in Section 4 below, the programs and actions that support the Company's resiliency strategy are described in this section. In summary, O&R expects to spend approximately $411M in NYS in the years 2025-2029 implementing its portfolio of resiliency investments. For the following years, 2030 through 2044, the Company will continue to study the impacts of climate change and implement resiliency programs at an estimated order of magnitude cost of $1.1 billion. These programs will allow O&R to mitigate and respond to current and projected climate risks such as heat waves, extreme weather events, sea level rise, and inland flooding to prevent outages, minimize customer impact, and restore service faster in the event of an outage.

The resilience-driven investments proposed in the CCRP are shown in Figure 3-11 below. We highlight a selection of these proposed projects under the subsections describing the "Prevent," "Mitigate," "Respond" strategy. The projects described are illustrative selections and do not

reflect the full list of those submitted with the CCRP. For the details on projects in the full list, please see the O&R CCRP.[57]

Figure 3-11. Resilience Driven Investments



Prevent: Harden Energy Infrastructure

The "Prevent" strategy encompasses proactive measures to both reduce climate change risks and enhance the reliability and resilience of O&R's electric system. "Prevent" investments are not necessarily a one-time event. Rather, the ability to prevent climate change impacts must be integrated and revisited throughout the life cycle of O&R's assets. Doing so requires changes in the planning, design, and construction of new infrastructure, ongoing data collection and monitoring, and investment in the upgrade of existing infrastructure using forward-looking climate information.

Two projects submitted in the CCRP that utilize the "Prevent" strategy, the Hillburn 138kV Substation Flood Protection Project and the Selective Undergrounding Program, are highlighted below. For additional details on these and the full list of projects, please see the CCRP.

Hillburn 138kV Substation Flood Protection Project

The Hillburn substation's location within the current FEMA 500-year floodplain, combined with the escalating frequency of heavy precipitation and flood events due to climate change, puts it at risk of flooding from stream/river overflow from the Ramapo River during extreme rainfall events. Climate change may lead to more intense hurricanes in the North Atlantic bringing stronger winds, storm surge, and rainfall, increasing the possibility of an adverse event.

O&R will adopt a phased approach to flooding risk mitigation that coordinates with the Company's other planned investments at the Hillburn substation. Initial efforts will focus on

[57] O&R Climate Change Resiliency Plan, November 2023, available at https://www.oru.com/-/media/files/oru/documents/energy-future/our-energy-vision/our-climate-change-resiliency-plan/2023-climate-change-resilience-plan.pdf

immediate, cost-effective solutions to address the most pressing flood vulnerabilities. O&R will prioritize the installation of a perimeter berm, which is a raised barrier or embankment designed to prevent or control the flow of water. In the medium term (2029-2032), upgrades are scheduled for the Hillburn substation to increase capacity. The plan includes two new transformers, new switchgear, and control building modifications. This work will utilize O&R's new Climate Change Planning and Design Guideline to incorporate climate change considerations into the design, including but not limited to elevating the new equipment, waterproofing cabinets, and increasing the site grade for new equipment.

Selective Undergrounding Program

The O&R electric system includes over 500 miles of electric transmission lines and almost 4,000 miles of overhead electric distribution lines which are exposed to potential outages and interruptions due to wind and ice events. As a result of climate change, the O&R service territory is likely to experience more frequent and intense wind and ice events, which can damage overhead lines through failing or wind-blown debris or contact with surrounding vegetation.

Undergrounding refers to relocating overhead electrical lines and equipment below ground, reducing their exposure to an array of external and extreme hazards. The Selective Undergrounding Program is aimed at enhancing the durability and reliability of O&R's system by undergrounding specific lines. This is a continuation of O&R's successful undergrounding efforts.

By investing in this program that will underground over 30 miles of distribution and 5.5 miles of transmission lines, the Company will avoid the need to repair or replace Company assets damaged by climate hazards. This program will provide non-financial benefits by improving public safety (reduces risks from fallen lines during storms) and supporting a more reliable power delivery system for the communities O&R serves, specifically with many of the undergrounding projects serving DACs.

Mitigate: Reduce Disruption from Adverse Events

"Mitigate" includes strategies and actions to reduce the consequences of climate events when they occur, because O&R cannot harden its energy systems for every possible future low-probability, high-impact extreme weather event. These actions serve to reduce damage during events and to protect exposed systems from further damage. While the CCRP contains the full list and details of projects that use the "Mitigate" strategy, one such project, the NYS Accelerated Smart Grid Distribution Automation Program, is highlighted below.

NYS Accelerated Smart Grid Distribution Automation Program

Distribution Automation and Smart Grid technology includes sensors, processors, and communication networks that the Company can use to collect, automate, analyze, and optimize data for improving the operational efficiency of O&R's distribution system. To improve system resiliency and harden the distribution system, the Distribution Automation/Smart Grid program will accelerate the installation and commissioning of DSCADA (discussed previously in Section 3.2.3) controlled devices (reclosers, smart capacitors, remotely operated switches, and power quality sensors) on a feeder-by-feeder basis. Paired with the installation of ADMS (also discussed in Section 3.2.3), the goal of this program is to be able to identify service interruptions automatically and sectionalize customers into segments of 250 customers or less. This program

will also install and upgrade field devices with command-and-control schemes to improve system resiliency and reliability.

Data gathered from DSCADA controlled devices provides better visibility of momentary outages in terms of frequency and location, which can be analyzed to direct tree trimming crews more proactively to areas where branches may already be encroaching on lines and have a higher probability of a major storm event resulting in that same branch causing a sustained outage. Distribution automation can provide financial benefits by improving the speed, cost, and accuracy of distribution system processes.

Respond: Improve Recovery Response Times

"Respond" refers to improvements to reduce recovery times. Activities in this category involve the continuous improvement of O&R's emergency response efforts and outage management system to support swift response to power outages.

Two projects submitted in the CCRP that utilize the "Respond" strategy, the Emergency Operations and Control Facility and the Storm Material Management Program, are highlighted below. For additional details on these and the full list of projects, please see the CCRP.

Emergency Response Operations and Control Facility

Extreme events, including hurricanes, snow and ice, cold snaps and polar vortex events, lightning and tornadoes, drought, and wildfire, are projected to increase in intensity in the future. Projections indicate that hurricanes in the service territory will likely become more intense in the future, with higher rainfall amounts relative to historical hurricanes, stronger winds, and coastal storm surge.

This project will construct a dedicated emergency response control facility on existing land owned by O&R across from the Blooming Grove Operating Center, adjacent to the proposed Storm Material Management Program facility. This position is centrally located within the O&R service territory and has easy highway access for emergency response events, which are projected to increase in frequency and severity based on the latest climate projections. Having a dedicated space that will be permanently configured as an emergency response control facility will save time while mobilizing in preparation for storm coordination and response. The new facility will provide necessary office space for emergency planners and personnel in a location adjacent to where storm equipment is stored. This arrangement is expected to improve overall workflow and communication within and between departments, as well as improve efficiencies in storm preparations.

Storm Material Management Program

As extreme weather events increase in the O&R service territory, it will be essential to maintain critical spare inventory, which will reduce customer outage times. Additionally, current industry supply chain issues are elongating lead times for critical components and delaying shipments of equipment, making it more important that O&R has the necessary level of inventory to respond to storm events, especially in the event of multiple storm events occurring closely in time to one another.

This program will construct a dedicated storm material warehousing facility on existing land owned by O&R across from the Blooming Grove Operating Center. This location is centrally

positioned within the O&R service territory and has easy highway access for emergency storm response events, which are projected to increase in frequency and severity based on the latest climate projections.

The storm material warehousing facility will house critical spare equipment, including procurement of $5 million in materials for the transmission system and an additional $9 million in materials for the distribution system over the first five years. A list of critical spare equipment has been identified based on prior storm events in which specific items were either significantly depleted or not available and therefore were delaying restoration of outages. Maintaining a critical spare list and inventory will provide a non-financial benefit by improving restoration times for customers by having the required equipment on hand to support restoration after for major storm events, thereby reducing outage durations and improving reliability.

3.2.5 Reimagine the Gas System

Under all pathways analyzed, O&R will continue to provide safe and reliable energy service in our communities. Decarbonization represents a major shift toward electrification and decreased dependence on fossil gas. We will reimagine the gas system by right sizing it to a lower level of demand over time and utilize LCFs over a reduced footprint.

O&R plans to pursue a robust decarbonization plan that meets NYS and NJ decarbonization goals, advocate for and support legislative and policy developments that support decarbonization efforts in NYS and enable the clean energy future using all available initiatives. We recognize that all pathways that achieve NYS and NJ decarbonization goals will result in significant changes to the natural gas business and O&R's gas delivery infrastructure.

To further enable change in energy consumption from gas to electric, the size of the gas system will need to decrease. The first step is to eliminate new gas customer connections and utilize Non-Pipe Alternatives ("NPAs") where possible. For difficult-to-electrify buildings and customers, O&R recognizes that LCFs are an opportunity to achieve societal goals in a cost-effective way. O&R considers the use LCFs in its supply portfolio under the Hybrid and Deep Electrification Pathways, discussed in Section 3.3.3.

Right-Sizing the Gas System

We plan to support initiatives that will slow growth on the gas system and eventually support the reduction of the system to an appropriate size and supply mix that benefits society and our customers. Our ongoing strategy of right-sizing the system is in alignment with our Clean Energy Commitment and we will continue serving new customer connections with electric and gas energy in accordance with current regulatory requirements. Specifically, the Company's commitment calls for us to reimagine our gas delivery system between now and 2050, including:

- Substantial reductions in the amount of natural gas consumed by customers.
- Significant growth in the use of electricity to heat buildings.
- Meaningful increases in overall building efficiency to reduce the need for energy for heating and shrinking the geographic scope of the gas delivery system.
- Decarbonizing the gas provided to the remaining customers.

- Continued investment in the safety and environmental efficacy of the remaining gas delivery system; and
- Instituting policy changes that will provide remaining customers with affordable service.

In all three of our representative pathways, we project total gas sales to decline as buildings get more efficient, adopt electrification, and new buildings connect to electric instead of gas service. In the near term, we will focus on increasing adoption of electric alternatives while providing safe and reliable gas service for all customers. O&R expects gas demand to peak around 2027, after which point it will decline. As demand decreases, O&R (in coordination with CECONY as part of the joint-supply portfolio) will evaluate opportunities to reduce the number of capacity contracts needed to supply our customer base.

As firm peak demand slows and begins to decrease, O&R will begin reducing the supply portfolio to match the changing needs of customers. The Company will accomplish this by first reducing and then eliminating the procurement of delivered services.[58] The Company will then target the least flexible pipeline capacity contracts, with no access or association with storage. This will create a smaller but more flexible portfolio over time, which could be critical if the balancing requirements of the remaining customers increase at times during the transition to clean energy.

In addition, O&R will reduce level of gas investments by right-sizing the gas system to meet targeted customer and energy system needs while managing the gas safety risk. Select and continued modernization of gas infrastructure to prepare the system for integration of LCFs will improve safety, reduce emissions, and support the reimagined use of gas infrastructure. For example, reducing leak prone pipes reduces emissions in the near term and helps prepare the system for future integration of LCFs.

Safety

Enhanced safety continues to be a top priority no matter what the future holds. Accordingly, we have several initiatives, including a first-of-its-kind natural gas detector program, where we are installing these devices at the point of entry to the customer premise. These alarms notify the customer via a local alarm as well as being able to automatically notify our control room if there is a gas leak via the AMI network to minimize response time. We employ best-in-class practices for emergency response to odor calls and leak management. Through our main replacement program, we will replace leak-prone pipe with more resilient materials, further improving system safety and reducing fugitive methane emissions. Additionally, we conduct system inspections, including service line inspections to identify if there is corrosion in indoor piping and take necessary remedial action. We also conduct comprehensive training and testing as part of the O&R Gas Operator Qualification Program. This is designed to enhance the knowledge and skills of employees to maximize productivity, prevent incidents, and prepare them to safely perform their job duties.

Preventing distribution events also involves educating the public about natural gas safety, particularly how to recognize and respond to a natural gas odor or release. Persons engaged in excavation-related activities are educated on the use of the one-call notification system,

[58] Delivered services are contracts with counterparties that can prove they have access to the required primary firm pipeline capacity necessary to make supply deliveries reliably to gate stations in the Company's service territories.

possible hazards, physical indications of a gas release, steps that should be taken to protect public safety in the event of a release (including emergency response plans for emergency officials), procedures for reporting such an event, how to follow safe excavation practices. Additionally, as part of the *Smell Gas, Act Fast* public outreach initiative, O&R provides information to customers on how to identify the odor of natural gas, how to report a suspected gas leak, and how to safely evacuate in the event of a gas emergency.

Non-Pipeline Alternatives

Defined as a "technology or market solution that helps utilities and energy systems planners to delay or avoid entirely large investments in energy infrastructure," NPAs are a viable tool that can be used to decarbonize parts of the gas system and avoid the use of capital spend on gas expansion.[59] NPAs may provide customers with electrification of their gas needs (e.g., electric heat pump for heating and cooling) and result in disconnecting them from existing gas infrastructure, or avoid system expansion to serve customer gas demand. Additionally, they can be used to advance cost-effective EE and DSM.

While the use of NPAs is still relatively new at O&R, we can leverage successes from our affiliate, CECONY, and use the Company's shared resources to initiate its own pilot projects. CECONY's NPA projects successfully alleviated several supply constraints in 2019 and reduced winter peak load in 2020, being one of the first distribution utilities in the nation to use demand-side alternatives to offset the need for pipeline capacity and local distribution infrastructure.[60]

NPAs present an important tool that the Company can use to lower emissions associated with the gas system and align with NYS climate goals. NPAs represent opportunities to defer or avoid traditional investments in gas, reducing emissions and maintaining the highest standard of safety and reliability. There are rigorous standards for NPA implementation, including service territory features, demographics, budgeting processes, and technical systems features. Project type, timeline, cost, safety, and reliability are also considered. There are multiple drivers for NPAs including natural gas infrastructure constraints and NYS policy.

O&R plans to begin implementing NPA projects in the first half of 2024. As an initial step toward NPA implementation, O&R has identified an initial set of potential NPA projects and will investigate NPAs as a potential substitute of specific aged or leak-prone pipe replacement projects. Additionally, although O&R is not currently projecting any area load constraints, O&R has identified three near-term gas system projects that might also be good candidates for NPAs. Finally, when feasible, O&R will investigate the possibility of utilizing NPAs for large new gas business projects. The amount of time needed to consider and effectively deploy NPAs will vary depending on the magnitude of load reduction required and the size of the geographic area that needs to be addressed. Many times, when it is realized that an NPA is viable, there is insufficient time between realization and the project's needed

NOTE

O&R has identified several initial NPA projects slated to begin implementation in early 2024.

[59] Rocky Mountain Institute, New York can Meet its Energy Needs Without a New Pipeline, February 2020, available at https://rmi.org/new-york-can-meet-its-energy-needs-without-a-new-pipeline/.

[60] O&R, Gas Long Term Plan (pg. 29), May 2023, available at https://www.oru.com/en/our-energy-future/our-energy-vision/long-range-plan/updates-to-our-natural-gas-system-planning-process.

launch to avoid investment for a traditional solution. Anything less than two years is not feasible, and anything less than three years is very unlikely to be realized.

Another uncertainty is the marketing and funding of NPAs. While they are currently funded by the gas system, the solutions themselves are typically based on electrification. While NPAs are presently an important tool the Company can utilize in decarbonizing the gas system, as they grow in popularity the Company will look to refine their marketing and funding.

3.3 Facilitate Supply Transformation

For a sustainable future, the energy supply must be transformed. In NYS, the CLCPA sets a target for 100% clean electric generation 2040. In NJ, Governor Murphy aims to reach 100% clean electricity by 2035. As we examine progress to net-zero, we will need to consider diverse strategies to reshape the energy supply. We see opportunities for the Company to invest directly in ownership of renewable energy and energy storage to support the achievement of net-zero GHG emissions at the pace that is needed, while reducing costs to consumers and improving integration into the electric grid. In addition, the Company is making investments in the transmission system so that the electric grid has the capacity to integrate these sources of clean electricity like wind and large-scale solar that are likely to be built remotely and require connections to demand centers.

Achieving economy-wide net-zero GHG emissions by 2050 will require significant reductions in gas sales as well as the decarbonization of gas supply. LCFs are considered clean energy technologies that will play a role in both our Hybrid and Deep Electrification Pathways in replacing natural gas to achieve state decarbonization goals. These Pathways introduce how LCFs could be used in the gas distribution system in 2030, leading to a fossil-free gas supply mix by 2050.

In its Clean Energy Commitment, the Company has committed to reducing fugitive methane emissions from our natural gas delivery system. The pathways rely heavily on EE and BE that would reduce gas sales by 50%-96%. These reductions in sales both mitigate the volume of LCFs required and the amount of gas infrastructure that will need to be maintained.

Utilities are uniquely qualified to invest in the ownership of renewable energy which could support achieving clean energy targets and accelerating the scale of renewable generation.

The Company will actively be tapping increasing supplies of renewable energy for our customers through strategic investments in transmission to transfer energy from often remote renewable sources to the communities we serve and by reducing carbon emissions from the gas infrastructure. Additionally, due to the variability of renewables, a combination of long-duration storage and low-to-zero carbon gaseous fuel-fired generation will be needed to meet the reliability requirements of the bulk power system.

3.3.1 Strategic Investment in Utility-Owned Renewable Electricity Generation and Energy Storage

The imperative of net-zero emissions and the host of challenges that the Company, customers and policymakers will confront to achieve our shared goals is such that diverse solutions will need to be considered. The generation fleet will need to transition away from fossil fuel-fired generation. In the future, we expect continued cost declines for these solutions as the policy goal will push the markets to mature and technologies to improve.

We project that a significant increase in renewable energy generation capacity within the O&R service territory is necessary to achieve clean energy targets. Utility ownership of renewables is an important strategy in further accelerating the scale of renewable generation in the state. Utility ownership of renewable energy best connects customers with the long-term value of clean generation, which would not be realized in a traditional power purchase contract. Distinct benefits of utility-owned renewables include the following:

- Developing new clean generation to benefit all customers for the life of the project.
- Generating bill credits for low-income customers through revenue generated from selling renewable power and using renewable energy credits.
- Installing clean generation on the electric system where it balances demand and transmission capacity.
- Providing customers ongoing benefits for the full life of the project, while maintaining utility standards for safety and reliability.

Some immediate benefits that renewable generation can provide to customers include greater air quality achieved with the reduced operation of fossil fuel generation and jobs created for the construction and maintenance of renewable generation. Allowing utility ownership will enable us to develop renewable projects, significantly expanding potential development and increasing the likelihood of reaching NYS and NJ goals.

In addition to the significance of utility-owned generation is utility-owned storage. Utility-owned storage projects address power quality challenges that are not efficiently addressed by traditional equipment. Additional utility-owned energy capacity in the form of storage will be able to provide energy if the load growth continues past each substation's capacity in future years, and they will be used for peak load shaving and system reliability. In addition, when not being operated for system reliability, the Company will operate its energy storage systems to bid energy, capacity, and/or ancillary services into the NYISO administered wholesale markets.

Renewable Generation

As the Company continues to make progress on the customer-centric interconnection of renewables, comprehensive customer education and outreach, and siting and permitting processes for renewable projects, it is making strides toward utility-owned renewable generation in tandem. One such program, "Solar Benefits for All" is proposed to advance the CLCPA's goals by producing requests for proposals on a yearly basis to acquire a total of 5 MW of solar project(s) each year, with scheduled operations starting in 2026, and 2027. The 5 MW target can be from a single facility or multiple facilities. Each solar facility would be selected via a competitive solicitation with the winning bidder(s) responsible for designing, permitting, constructing, interconnecting, and commissioning an operating solar facility which would be transferred to and owned by O&R on the commercial operating date of the facility. The "Solar Benefits for All" program seeks to maximize the potential for solar in NYS.

In the site selection process, the Company will prioritize locations that are in or near DACs, or that would help offset gas power plant emissions. The Company will also prioritize those locations that would increase electric distribution reliability, improve load management, and better integrate new technologies. While these solar assets will bring significant benefits to customers, they will be small enough to connect easily to existing distribution architecture and

can be placed strategically throughout the system. The Company will leverage existing Company owned facilities and will continue to consider larger future substation parcels that can support utility-owned solar/Energy Storage.

Long- and Short-Duration Energy Storage Solutions

Utility ownership of storage and renewables can help accelerate storage procurement and reduce the energy burden on low-income electric customers. As clean generation expands, energy storage will significantly increase utilization of renewable resources by storing excess intermittent electric supply during periods of over-generation. This avoids production of energy that can't be used and provides additional resources to serve peak demand needs.

The push for net-zero GHG emissions and the associated electrification efforts will increase the need for load management at critical times of the day. Electrification of residential heating from natural gas will eventually change patterns of peak demand. Renewable energy generation, particularly from DERs, are intermittent sources of energy that need to be balanced among consistent generation. Utility-owned energy storage will enable to utility to better respond to these conditions on the grid by dispatching power and improving power quality.

Utility-owned energy storage systems can also offer advantages over traditional substation equipment. System voltage fluctuates based on demand but must be kept within a set range for the power system to work properly and safely. If voltage is too high, equipment can be damaged by waste heat. If voltage is too low, equipment can operate poorly. Traditional T&D solutions, including equipment like capacitor banks and reactors, only offer support for situations of high or low voltage, but not both. Energy storage systems, however, can compensate for both high and low voltages, providing more operational flexibility to maintain grid reliability and power quality. It can also lead to improved EE by reducing line losses and can support reductions in peak demand on the electric distribution grid.

NOTE

O&R is investing in co-located energy storage system pilot programs at substations to add additional capacity for peak load management and innovative energy storage solutions.

Implementing energy storage will provide value to a range of stakeholders and support our strategic objectives. We also benefit in resource adequacy, transmission congestion relief, and transmission or distribution capital investment deferral. Finally, the NYISO receives greater electric grid benefits such as frequency regulation, voltage support, and reserve capacity.

3.3.2 Invest in Transmission to Interconnect Renewable Generation

We recognize that transmission is critical to integrating renewable energy as clean electricity generation resources such as offshore wind and large-scale solar must be built remotely and require transmission infrastructure to connect to demand centers. We also recognize that demand for electricity in our service area is only expected to grow. As such, we are investing in multi-value transmission and storage projects within the O&R service territory that can deliver electricity supplied by remote intermittent renewables and balance increasing demand to help facilitate the achievement of clean energy goals.

In December 2022, the NYS JU filed a proposal for the Coordinated Grid Planning Process framework. The JU plans for the process to repeat every three-years and engage local transmission owners in planning their own systems, designed to gain an overall assessment of the NYS electric grid. It will also identify critical electric grid expansions that can aid in unlocking renewable generation capacity and provide guidance on meeting the State's clean energy goals, identified in the CLCPA. O&R plans to contribute to this mission.

O&R is planning several transmission projects that support system expansion for increased reliability. For example, proposed upgrades to the Western Division transmission system will support load growth, allow the integration of renewables, and provide transmission backup to the Washington Heights substation.

The Company is also conducting a pilot of Hybrid Substation Energy Storage projects. In these pilots, energy storage systems are co-located at substations to add additional capacity for the customers connected to that substation's circuit. The battery can also be used for peak load shaving and market participation. For more details about these pilots, see the discussion of energy storage projects in Section 0 above.

3.3.3 Support Development of Low-Carbon Fuels

While all pathways are possible, we see continued value for the gas system in the future, especially if LCFs become viable for injection into the current infrastructure. The gas distribution system is a large and already existing asset that can be repurposed in a decarbonized world; this could be more cost-effective than Deep Electrification and play a specialized role for difficult-to-electrify buildings.

Our pathways consider the introduction of LCFs into our gas distribution system in 2030, and a gradual phase-in of LCFs to fully phase out fossil natural gas in the gas system by 2050. O&R has identified three LCFs to potentially utilize in our pathways: renewable natural gas, clean hydrogen, and synthetic natural gas.

RNG is a pipeline-compatible gaseous fuel derived primarily from anaerobic digestion and thermal gasification. Anaerobic digestion is the process in which bacteria break down organic matter from animal manure, food waste, landfill gas, and water resource recovery facilities to produce biogas. Thermal gasification is the breakdown of biomass material from agricultural residue, energy crops, forestry residue, and municipal solid waste into component gases and ash in an enclosed reactor.

Although RNG is already being produced at considerable quantities in the US today and is expected to scale up, our adoption of RNG would be supply-limited based on our share of gas in the region. The maximum amount of RNG that could be sourced for O&R is 6 TBtu per year, which is included in the Hybrid Pathway assumptions. In the Deep Electrification Pathway, RNG is the only LCF considered, at a level of 2 TBtu per year.

Clean Hydrogen is a form of hydrogen fuel that is produced using low-carbon methods. It has the potential to reduce GHG emissions from gas consumption significantly because it does not include methane. The Company's plans explore utilizing fully clean hydrogen produced via electrolysis powered by renewable energy, sometimes called "green hydrogen," and potentially nuclear energy ("pink hydrogen"), as necessary.

The Company is considering the use of hydrogen-blended natural gas as a strategy to reduce carbon emissions and transition to a cleaner energy system. Assuming that the maximum potential amount of hydrogen that can be blended into natural gas infrastructure before significant utility and customer upgrades are required is ~20% by volume (7% by energy), hydrogen blending would represent the smallest share of LCFs potentially used in a Hybrid Pathway. While low levels of blended hydrogen do not require significant infrastructure investments, it would require some investment in infrastructure that endures the compatibility and integrity of the system.

SNG is manufactured by combining hydrogen with captured CO_2 to produce methane and is designed to mimic the properties of natural gas and have similar end-uses. When SNG is produced using clean hydrogen and captured CO_2, the fuel has low, or net-zero GHG emissions associated with its production, delivery, and combustion. We consider SNG produced through this process, called methanation, as one of the fuels used within the Hybrid Pathway.

The role of the gas system will depend on the development of LCFs over the next 30 years. The supply availability and cost of these fuels are currently uncertain, particularly for use in our service territory. Further, there are several barriers to using LCFs in the market, including upstream infrastructure and alignment on GHG emissions accounting methodology. As such, our plans do not include wide adoption of these fuels until after 2030. However, in the near term, we support the development of LCFs and are working toward adopting them as they become available. While interconnection costs are prohibitively expensive today, the marketplace for LCFs is expected to continue to develop, with a focus on cost, availability, and regulatory support needed to scale these technologies.

LCF adoption would require significant action by O&R and its regulators. The Company has identified some of the actions it needs to take to enable the use of each LCF (see Table 3-5 below).

Table 3-5. Actions to Enable LCFs

LCF	Action Needed
RNG	• Interconnect anaerobic digestion facilities within service territory and in the rest of the Eastern US • Explore local thermal gasification pilot and purchase RNG from local thermal gasification facilities
Hydrogen	• Collaborate with industry to enable clean H_2 cost declines and to build regional H_2 supplies, pipelines, and storage • Determine potential for safe blending of H_2 in the gas system
SNG	• Support industry research to help enable technology cost declines

Low-Carbon Fuels in the Decarbonization Pathways

Many difficult-to-electrify buildings will retain a gas connection to minimize the customer cost of delivered energy and strengthen energy resilience. Customers in these buildings will be encouraged to transition through a variety of incentives, but many, depending upon location, will retain the option to use LCFs as an energy source that produces fewer GHGs when compared to traditional fossil fuel sources. LCFs can support decarbonized gas consumption for difficult-to-electrify customers in both the Hybrid and Deep Electrification Pathways. LCFs release fewer emissions, are less harmful to the environment, and can support a low-carbon future.

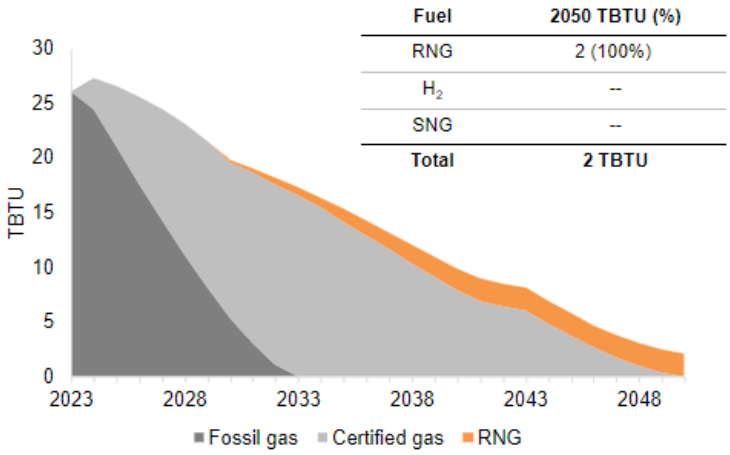
Table 3-6. Utilization of LCFs in the Hybrid and Deep Electrification Pathways

	Hybrid	Deep Electrification
Volume of Natural Gas delivered (2023-2050)	Decreased by 57%	Decreased by 95%
System Footprint (2023-2050)	Major infrastructure reduction to serve select areas with high concentrations of large commercial and multi-family buildings	Only select regulator stations, supply mains and distribution radials remain
Customers remaining on system	70,000	Only select large volume, difficult-to-convert customers
LCFs utilized	RNG Clean Hydrogen SNG	RNG

Table 3-6 above highlights the differences in the level of LCFs expected in the Deep Electrification and Hybrid Pathways. A net-zero GHG emissions system under the Deep Electrification Pathway relies much less on LCFs and their market development, although they are still used for a small number of select, large consumers with extremely difficult-to-electrify needs.

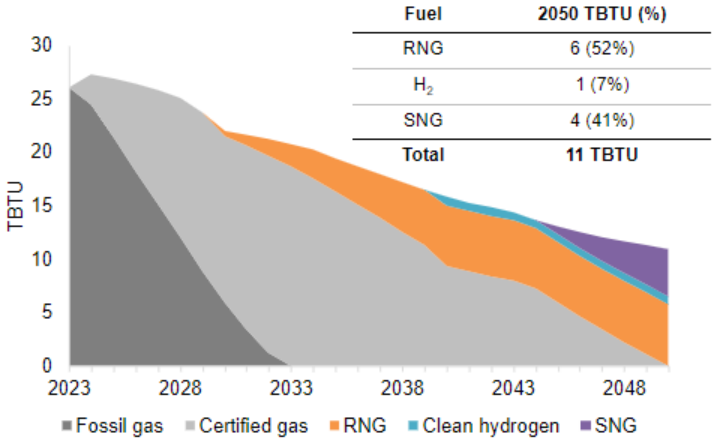
The Company's analysis of the pathways introduces LCFs into the system beginning in 2030, starting with RNG. In the Deep Electrification Pathway, nearly all customers adopt electric heating while RNG serves the select customers remaining on the gas system. Figure 3-12 below shows the reduction in energy supplied in the gas system and the introduction of RNG through 2050.

Figure 3-12. Fuel Mix for Deep Electrification Pathway



In the Hybrid Pathway, RNG is similarly added to the fuel mix beginning in 2030. Over time, H_2 and SNG are added to achieve a supply mix free of fossil-fuels by 2050. The fuel mix modeled for the Hybrid Pathway is shown in Figure 3-13 below.

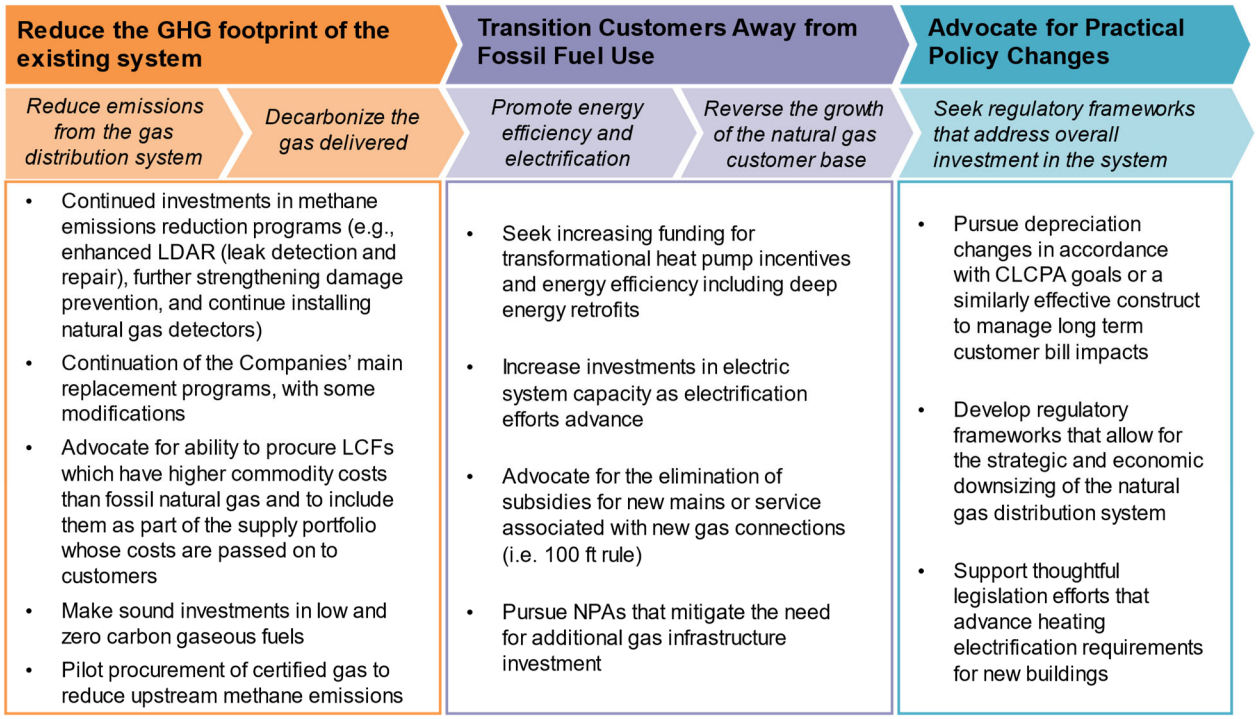
Figure 3-13. Hybrid Pathway Fuel Mix



3.3.4 Reducing Emissions in the Gas System

O&R is working to reduce emissions associated with the gas supply and fugitive emissions from the natural gas delivery system to support net-zero by 2040. Our continued actions have already resulted in a 40% reduction in emissions since 2005. This has been achieved through the application of leak detection, repair best practices, and continued acceleration of our main replacement program. O&R believes that CNG can play a part in reducing emissions associated with the gas supply in the near term. O&R's overall gas decarbonization strategy is shown in Figure 3-14 below.

Figure 3-14. Gas Decarbonization Strategy



Certified Natural Gas

While the widespread adoption of LCFs is not expected to take place until after 2030, the Company believes that there is a role for CNG to support near term decarbonization. CNG is natural gas that has been deemed to be produced according to criteria determined by an independent third party, with a focus on minimizing leaks of methane throughout the production process. The three most prominent certifying agencies in North America today are Equitable Origin, MiQ, and Project Canary.[61] CNG is advantageous as incorporating it into the Company's portfolio can reduce emissions. This is evidenced as CNG was found to reduce upstream emissions factors associated with natural gas usage by 47%.[62]

Under both the Hybrid and Deep Electrification Pathways, procuring CNG is included in the portfolio of fuels in 2024. In the Hybrid and Deep Electrification Pathways, approximately 73% of fossil natural gas delivered is CNG by 2030, and by 2033 all remaining fossil natural gas needs are met through the procurement of CNG. LCFs are blended into the distribution system (with the same mix delivered to all distribution customers) starting in 2030 in Hybrid and Deep Electrification and fully displace fossil natural gas by 2050.

[61] Natural Gas Intelligence, What is Certified Gas, 2023, available at https://www.naturalgasintel.com/what-is-certified-gas/.

[62] CLCPA Implementation Proceeding, GHG Inventory Proposal, 2022, available at https://dps.ny.gov/system/files/documents/2023/07/clcpa-annual-report-session-presentation-v3.pdf.

O&R is continuing to work toward reducing emissions associated with the gas supply and fugitive emissions from the natural gas delivery system. This work has already resulted in a 40% reduction in emissions since 2005.

Main Replacement Program

In 2022, O&R replaced over 22 miles of leak-prone pipe in NY. Under all pathway scenarios, O&R plans to replace all leak prone pipes. O&R continues to meet its current target of replacing at least 66 miles over the current three-year rate case period. The 2023 year-end inventory of leak prone pipe will be approximately 142 miles. Per the current plan, O&R will have all remaining leak-prone pipes replaced by approximately 2030. This is supported by increased leak detection, response, and management protocol in tandem with replacement.

The leak-prone pipes program has been successful in reducing fugitive methane emissions. To cost-effectively deliver emissions reductions for customers, O&R will balance the replacement of leak-prone pipes with anticipated electrification on that part of the system through NPAs and other incentives.

4. Investments to Deliver Value

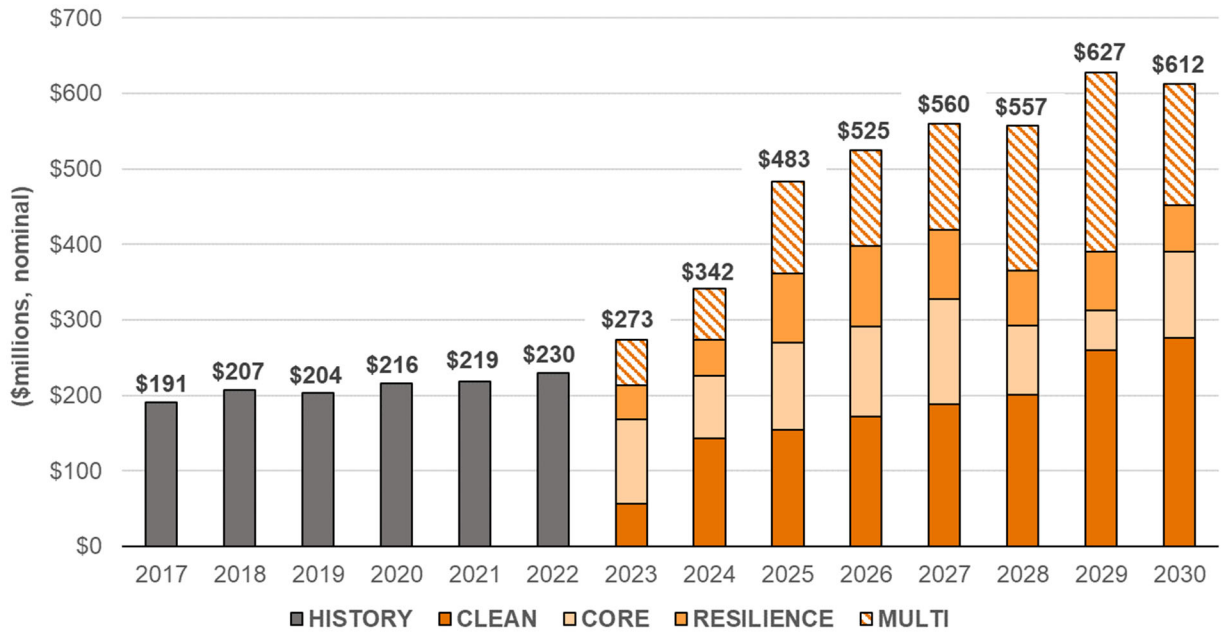
O&R understands that achieving decarbonization goals will require significant investment across the economy. The Company believes utility investments are a cost-effective means to meet societal objectives and deliver value to customers. NYSERDA analyses estimate that societal benefits due to avoided GHG emissions and improved health are expected to outweigh the costs needed to get to net-zero GHG emissions by 2050.[63] Regardless of the path followed, the Company will need to significantly increase investments that enable the change to a clean energy future, including investments in infrastructure and customer programs.

A proactive, multipronged approach is required to build an energy system of the future that can serve increased and more complex customer demand. Our plans will mitigate and respond to current and projected climate risks such as heat waves, extreme weather events, sea level rise, and storm surge to help prevent outages, minimize customer impact, and restore service faster in the event of an outage. Our core business will provide continued safety and world-class reliability, in addition to being more operationally efficient. At the customer level, our programs will improve customer experience and engagement. The Company believes that the benefits of our investments in the energy transition will outweigh the costs.

Grouped by strategic objective (clean energy, climate resilience, and core service), O&R's overall combined gas and electric investments for both NJ and NY territories under the Reference Pathway are expected to increase through 2030 relative to the past six years (see Figure 4-1 below). Investments labeled as multi-value support more than one strategic objective category and, like core investments, are foundational initiatives that are critical or necessary to continue delivering safe and reliable service.

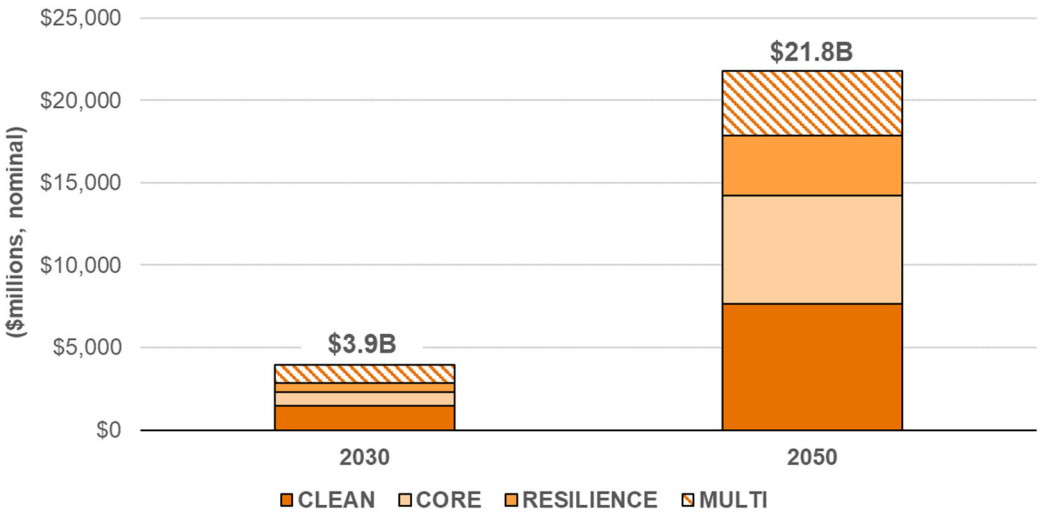
[63] NYSERDA, A Strategic Outlook 2022 Through 2025, 2022, available at https://www.nyserda.ny.gov/About/Publications/Program-Planning-Status-Reports/Strategic-Outlook.

Figure 4-1. O&R Investments through 2030



With inflation and year-over-year increase over the time horizon, the projected cumulative investment level is $21.8 billion through 2050 (see Figure 4-2 below).

Figure 4-2. Total O&R Investments (2050)

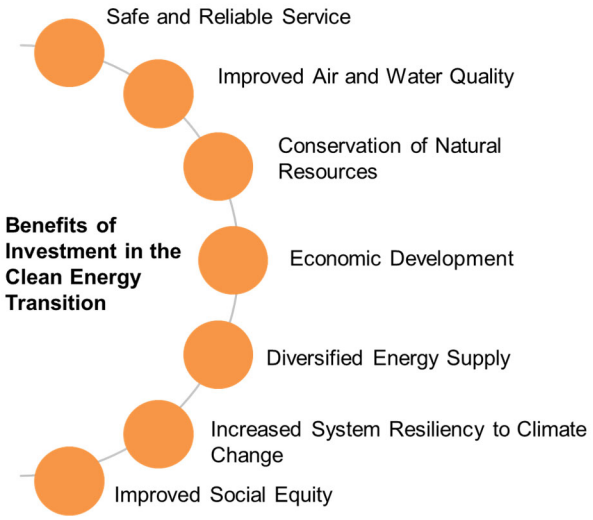


To fund required investments, customer costs are expected to increase. We estimate that the identified utility investment plan will increase the overall revenue requirement—a proxy for overall customer costs—by approximately 9% per year through 2033 under the Reference

Pathway.[64] This cost estimate is based on assumptions that can change and excludes such items as increased costs resulting from changes in NYS policy and unanticipated events.

While the level of investment needed to facilitate the energy transition will increase over time, these investments are expected to provide significant benefits to both customers and society. Some of the expected benefits are shown in Figure 4-3 below.

Figure 4-3. Benefits of O&R's Investments in the Clean Energy Future



4.1 Potential Bill Impacts

Across the industry, the transition to a clean energy future will put pressure on customer rates because of the level of investment needed to support the new technology and energy sources required. Some of the investments, like electrified heating technology and electric vehicle infrastructure, will offset existing costs incurred by customers that are incurred outside of the utility bill. While transportation and heating costs will move to the electric utility bill because of the transition to EVs and electric heat pumps, they will offset existing costs customers currently pay elsewhere. For example, customers who adopt EVs will no longer pay gasoline bills and similarly, heating oil or natural gas costs will be eliminated for customers moving to electric building heating technologies. In addition to the shifting of costs onto the utility bill, these technologies may offer customers additional savings because of increases in efficiency and lower maintenance costs over their fossil-fuel powered counterparts. The Company continues to address bill pressure through low-income discounts and efforts to mitigate bill increases.

Beyond the energy costs presented on utility bills, customers will incur significant incremental upfront costs to improve the efficiency of their building envelope and convert to higher efficiency electric equipment like heat pumps. Although incentives are available for certain technologies, it is likely that there will still be costs incurred by the customer. Building size, typology, vintage, and other existing conditions within the building will dictate the cost and complexity associated

[64] Revenue requirement estimates are based on identified investment plans, financial assumptions derived from other company filings, outcomes, and prior experience.

with the retrofit needed to enable electrified heating and transportation. In the near-term, customers will also incur a price premium for total cost of ownership of EVs compared to internal combustion vehicles. However, due to market development and policy support, the price premium for EVs is expected to diminish by 2030.

Cost by Pathway

The Company expects customer utility bills to increase under each of the pathways modeled. Investment levels in 2034 are projected to be up to 3.5 times higher than the level in 2023. These projections only include investments made by the utility and do not include any potential costs that customers may incur for upfront investments in clean energy systems and vehicles. In all cases, the cost increase represents a reshaping of the traditional energy budget for customers from fossil fuel-based sources (such as gasoline or home heating oil) to clean electricity (like EVs or heat pumps).

Customers will incur costs outside of rate increases and these costs differ significantly between the Hybrid and Deep Electrification Pathways. The Deep Electrification Pathway requires higher numbers of difficult-to-electrify customers to convert at a faster pace, increasing the complexity and costs that customers will incur. The Hybrid Pathway relies on less overall building electrification and fewer conversions of difficult-to-electrify customers at a slower pace and utilizes the existing gas system, which may be more cost effective for customers. The comparative cost levels associated with the Hybrid and Deep Electrification Pathways are shown in Table 4-1 below. O&R will continue to work collaboratively with stakeholders to support programs that aid our most vulnerable customers and avoid disproportionately impacting customers who can least afford the transition.

The annual level of capital investment in the gas system under both the Hybrid and Deep Electrification Pathways is projected to decline compared to the Reference Pathway due to the significant decrease of the Company's main replacement programs and other capital-intensive programs as system use declines and portions of the distribution system is decommissioned. Annual operations and maintenance expenditures begin to decline starting in 2028 consistent with timing for significant abandonment of main and service assets.

Table 4-1. Comparative Cost Levels of the Energy Transition by Pathway

	Hybrid	Deep Electrification
Customer – Bill Impact	$$	$$$$$
Customer – Equipment Upgrades	$$	$$$$$
Utility Infrastructure	$$$	$$$$$

Alternative Recovery Methods

While the gas system costs will decline significantly, so will the base of customers to which such costs apply. The pace of customer conversion under the pathways (more acutely in Deep Electrification Pathway than Hybrid Pathway), may establish untenable rate increases for the remaining gas customers. The exponential increase in gas rates is projected to continue through full achievement of NYS's economy-wide clean energy objectives in 2050 in both pathways. In both cases, O&R will look to utilize an alternative rate recovery mechanism.

The clean energy transition will shorten the standard lifecycle of gas investments. Without a change in policies that direct utility depreciation practices, gas customers that remain on the system could be forced to bear rapidly escalating costs as electrification efforts take effect. Alternative depreciation approaches can help to address this unintended result of decarbonization policies.

O&R submitted a joint filing with CECONY to the NYPSC in November 2022 that examined the structure of accelerated depreciation and its potential impact on customers through 2050.[65] The analysis sought to provide illustrative examples for how the CLCPA may impact the Companies by applying four depreciation methodologies to three scenarios with varying levels of gas sales, ranging from business as usual to medium and high levels of electrification of customers. The analysis showed that, absent a policy intervention to facilitate an alternative depreciation strategy, as 2050 approaches assertive decarbonization policies will cause the revenue requirement per customer to increase at an exponential rate. Failing to increase depreciation in the near term will produce significant intergenerational inequity as gas demand and the number of customers decline. Customers remaining on the system will bear a significantly higher share of the costs of the Companies' assets.

Accelerating depreciation can help with recovering investment costs and reducing intergenerational inequity. However, it is unlikely to alleviate the problem entirely. The Companies' analysis showed that even depreciating over a period shortened by 10 years or depreciating all assets through 2050 will still result in a significant amount of remaining rate base due to capital expenditures that will be required to maintain a safe and reliable system for customers.

A range of appropriate cost recovery mechanisms should be explored to address the potential unrecovered costs that are likely to remain in 2050. Other potential cost reduction mechanisms include securitization using bonds issued to finance plant balances, a trust fund created to support these future obligations and a public benefits charge, which would be applied to fund costs associated with new policies that provide a societal benefit.

[65] O&R, Updates to Our Natural Gas System Planning Process, November 2022, available at https://www.oru.com/en/our-energy-future/our-energy-vision/long-range-plan/updates-to-our-natural-gas-system-planning-process

4.2 Cost-Effectiveness

Customer utility bills will increase to meet clean energy goals. However, the Company believes that utility investments are a cost-effective means to meet societal objectives and deliver value for customers. Regardless of the eventual path followed to deliver a clean energy future, there will be significant increases in investment required so that the Company can continue to provide safe, reliable, and resilient delivery of clean energy. As customers adopt clean technologies, they will see additional costs because of the investments needed to meet GHG reduction targets. The Company will work with stakeholders, including state regulatory bodies, customers, and customer advocacy groups, to manage costs while providing value to its customers. The Company is committed to managing its costs diligently and will employ sustainable cost management processes that will benefit its customers, its employees, and the Company as a whole.

O&R is committed to mitigating the financial impact to customers throughout the energy transition. Table 4-2 below includes some of the strategies and programs that mitigate rate impacts for customers.

Table 4-2. Strategies to Mitigate Customer Rate Impacts

Program	Description	Customer Benefit
Increased electrification	Electrification of heating and building sectors will increase demand, load factor	Downward rate pressure
Utility-owned storage	Dispatching utility-owned storage into wholesale market will increase revenue	Revenue
LMI programs	Variety of programs will support LMI customers through incentives / subsidies	Lower LMI bills
Customer DERs	Customer-sited DERs will mitigate peak impacts and create a two-way grid relationship	Peak mitigation
Federal funding	Leveraging additional funding resources will decrease costs covered by ratepayers	Lower revenue requirement

4.2.1 Pursuing Alternative Funding Sources

O&R will look to mitigate customer rate impacts using alternative funding mechanisms. Because of this, we will continue to look at alternate funding mechanisms through non-rate case avenues

like the Inflation Reduction Act ("IRA")[66], Infrastructure Investment and Jobs Act ("IIJA")[67], State programs, and other DOE grants to provide maximum affordability for customers.

Federal policy is spurring investments in infrastructure to facilitate the clean energy transition. In the past two years, Congress has passed the IIJA and the IRA, which both expand federal funding for clean energy projects. The IIJA funds programs for grid resilience and smart grid capabilities, transportation electrification, cybersecurity, transmission, energy storage, and EE. O&R will look to utilize NYS and federal grants and funds, as applicable, for the advancement and benefit of its service territory and customers. For example, O&R applied for a DOE grant for a long-duration storage demonstration project that would split the project's cost between O&R and the DOE. The Company will continue to identify and apply for similar programs and opportunities that support realizing a clean energy future at the lowest cost to customers.

As part of the IIJA, the National Electric Vehicle Infrastructure ("NEVI") program provides funding to states to deploy EV charging stations with non-proprietary plugs at publicly accessible, strategic locations along designated alternative fuel corridors. NYS will receive approximately $175 million over five years through NEVI. Further, federal tax credits outlined in the IRA include up to $7,500 per passenger vehicle, and 30% for commercial LDVs and MDVs (up to $7,500) and HDVs (up to $40,000). For more information on EV Programs that support the electrification of transportation, see Section 3.1.3 above.

4.2.2 Supporting an Equitable Transition for All Customers

O&R is committed to supporting programs so that LMI customers and those in DACs are not disproportionately impacted by the clean energy transition. This commitment is highlighted by partnership with and alignment to NYS and NJ goals regarding EJ, DACs, Overburdened Communities, and LMIs. Regarding EJ, NJ has declared that "all (NJ) residents, regardless of income, race, ethnicity, color, or national origin, have a right to live, work, and recreate in a clean and healthy environment; and that, historically, NJ's low-income customers and communities of color have been subject to a disproportionately high number of environmental and public health stressors, including pollution from numerous industrial, commercial, and governmental facilities located in these communities".[68]

DACs are those identified by the Council on Environmental Quality's Climate and Economic Justice Screening Tool,[69] as "those that are marginalized, underserved, and overburdened by pollution."[70] This Screening Tool uses a methodology and datasets that identify communities that are economically disadvantaged and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care. A community

[66] Text – H.R.3684 – 117th Congress (2021-2022): Infrastructure Investment and Jobs Act. (November 15, 2021). https://www.congress.gov/bill/117th-congress/house-bill/3684

[67] Text – H.R.5376 – 117th Congress (2021-2022): Inflation Reduction Act of 2022. (August 16, 2022). https://www.congress.gov/bill/117th-congress/house-bill/5376/text

[68] New Jersey, C.13:1D-157 (Environmental Justice), available at https://dep.nj.gov/wp-content/uploads/ej/docs/ej-law.pdf.

[69] Council on Environmental Quality, Climate & Economic Justice Screening Tool, available at https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

[70] Executive Office of the President, Climate and Economic Justice Screening Tool: Frequently Asked Questions, available at https://www.whitehouse.gov/wp-content/uploads/2022/02/CEQ-CEJST-QandA.pdf.

qualifies as “disadvantaged” if the census tract is above the threshold for one or more environmental or climate indicators *and* the tract is above the threshold for the socioeconomic indicators.[71]

As evidenced by NJ’s Act concerning the disproportionate environmental and public health impacts of pollution on overburdened communities[72] and the CLCPA’s Climate Justice Working Group’s DAC Criteria,[73] it is legislatively required to provide equal care for DACs and to acknowledge the tenets of EJ throughout all parts of the O&R service territory. This is a benefit to all customers of the O&R service territory and beyond.

4.2.3 Efficient Rate Design

An important consideration for delivering a cost-effective energy transition and mitigating the costs of needed investments is rate design. Growth in peak electric demand due to electrification of transportation and building heating will require new electric delivery infrastructure. Cost-based rates would provide customers with price signals that promote the efficient use of the electric delivery system and help mitigate required system cost increases. Our work to develop these rates related to electrified transportation is discussed in Section 3.1.3 above.

Delivery system costs are primarily fixed or driven by customer demand, not volumetric (per kilowatt-hour) use, so demand-based rate structures with an appropriate level of fixed cost recovery through fixed charges better align prices with costs. This improves the economic efficiency of the rate structure and encourages customer technology adoption and operation that reduces delivery system costs for the benefit of all customers.

The demand-based rate construct exists today for the medium and large C&I customers, and these rates encourage demand management and efficient use of the delivery system. Mass market customers should be similarly incentivized through demand-based rates. Redesigning our mass market rate structure will encourage more efficient use of the electric delivery system, lower customers’ bills, and distribute delivery costs more equitably, all while allowing us to recover costs in an equitable manner.

O&R is looking at modern rate designs to encourage more efficient use of the electric delivery system, lower customers’ bills, and distribute delivery costs more equitably.

The desire for electrification of transportation and building heating can generate proposals for special technology-specific rates to improve the economics of electrification technologies. However, properly designed cost-based rates can be technology-neutral and special rates for specific technologies can be avoided. Rate design should send appropriate price signals that encourage customers to use and generate electricity in ways that benefit the system as a whole

[71] Ibid.

[72] New Jersey, C.13:1D-157 (Environmental Justice), available at https://dep.nj.gov/wp-content/uploads/ej/docs/ej-law.pdf.

[73] New York State, List of Disadvantaged Communities, available at https://climate.ny.gov/-/media/Project/Climate/Files/Disadvantaged-Communities-Criteria/List-of-Disadvantaged-Communities.pdf.

and thereby benefit all customers. To the extent that technologies may require support for economic viability, direct and separate incentives are transparent, effective, and nimble tools. Incentive programs outside the rate structure can reduce cost burdens on customers because they can be tailored to meet specific needs and policy objectives cost-effectively.

5. The Road Ahead

The Company remains committed in supporting the goal of net-zero GHG emissions by 2050 while meeting and exceeding the evolving expectations of our customers. To meet expectations for energy delivery and meaningfully advance progress toward our goals, we need to act now. The strategies, investments, and actions described in the sections above are required to bring a clean energy future to reality.

Realizing this vision for our customers and the communities we serve will require significant market transformation in all sectors, particularly energy, buildings, and transportation, as well as continued policy action. We will continuously review and appropriately modify this LRP for maximum operational efficiency and optimal allocation of resources. The Company will continue to support programs that assist our LMI customers and those in DACs to avoid disproportionately impacting those who are most vulnerable.

The decarbonization pathways rely on high levels of EV and heat pump adoption to drive the shift of energy consumption to the electric grid. We will support the development of these markets to mitigate the costs of the transition and promote adoption. The substantial infrastructure upgrades required are an opportunity for investments that support higher levels of electricity demand and promote the interconnection of offshore wind and other DERs. O&R is investing in technologies that enhance our foundational systems, modernize the electric grid, and improve data-driven decision-making. These advanced technological solutions will continue to expand electric grid capabilities and moderate operating costs.

The Company recognizes the need to reimagine the gas business to help meet long-term carbon emissions targets. As gas customers convert their heating and cooking equipment to electric appliances, we will pursue alternative LCFs to deliver to our remaining customers. Therefore, our fundamental business model as an electric and gas utility will take on a new form where gas delivery considerably declines, some customers utilize LCFs, and our electric business dramatically increases. Our business model will still center around energy delivery, but the type of energy and services offered will look different than it does today.

The path to this new operating environment in the coming years will not be a straight line. It will be affected by a range of uncertainties regarding such factors as the pace of technological change, the cost of fuel sources, and the continued evolution of policy and regulation. To manage for uncertainty, we will look to our signposts as indicators of where we are on the net-zero journey and use them to assess our preferred course of action. We recognize the criticality of engaging with stakeholders and will continue to communicate our plans and their implications with the customers and communities we serve.

5.1 A Cleaner Future

Supporting this strategy will deliver value to our customers and society, but it will require significant investment over time. We are well-positioned to enable these changes and partner with stakeholders to enact significant, meaningful change. Utility investments are a cost-effective means to meet societal objectives, and we are determined to seek out cost-effective benefits through:

- Continuing operational improvements
- Advocating for solutions that focus on cost-effectiveness, including investments that deliver on multiple strategic objectives
- Building timely infrastructure that balances the lead time required to meet anticipated demand and potential for underutilization of assets

O&R understands the importance of our energy services and embraces the immense responsibility of enabling the daily lives of the communities we serve. Providing our customers with safe and reliable energy to light their streets, commute, power their appliances, heat and cool their homes, and operate their businesses is a source of pride for the Company and our employees.

The clean energy transition requires cooperation, collaboration, and innovation from different parties and market participants. We will enhance our collaboration and interactions with our customers and stakeholders to accelerate the clean energy transition in a cost-effective, equitable, and timely manner. This includes:

- Advocating for policies that address societal goals in ways that partner the strengths of a regulated utility with the capabilities of the market to provide choices for customers.
- Pursuing energy solutions that are cost-effective and mitigate complexity for customers.
- Continuing to support rate reform that promotes customer choice.
- Continuing to engage key stakeholders and seek their alignment with our strategic objectives, plans, and investments.

The Company acknowledges there is more work to be done with respect to equity and EJ. We are committed to reviewing and revising our programs and will also reach out to EJ groups and other stakeholders as we do so.

5.2 Managing the Transition

Planning this far into the future involves uncertainty regarding industry and societal trends in policy, technology, and customer adoption. To account for this uncertainty, we look to our pathway framework, which allows the flexibility to stay on track to achieve net-zero GHG emissions by 2050. Signposts within this framework will inform our strategy and planning for maximum operational efficiency and optimal allocation of resources.

When it comes to policy, we understand that NYS, NJ, and local municipalities continue to enact nation-leading clean energy goals and may continue to develop future legislation. Accordingly, this LRP is based on clean energy policies as of December 2023.

O&R is planning so that the electric grid, gas system, and customers are prepared for the evolving energy landscape. We are proactively identifying investments in infrastructure and programs that are critical to a safe and equitable transition while maintaining reliability. As we implement our plans, we will look for signposts that indicate the need for a shift in strategy and remain flexible in our approach to meeting state goals. This new phase of the clean energy transition is a challenge, but we have evolved many times before. We are proud to have served

NYS and NJ customers for multiple generations and will continue to be there for our customers and stakeholders throughout this transition.

Our LRP represents a major step forward in our continued commitment to meeting societal goals and our customers' expectations. We are acting now to deliver on our comprehensive utility strategy and to support NYS's and NJ's energy and policy goals. We look forward to working with our many stakeholders, regulators, customers, and constituents to bring this future into reality.

Acronyms and Abbreviations

ADMS: Advanced Distribution Management System

AEIC: Association of Edison Illuminating Companies

AMI: Advanced Metering Infrastructure

ASHP: Air Source Heat Pump

ASHRAE: American Society of Heating, Refrigeration and Air-Conditioning Engineers

BDI: Business Direct Install

BE: Building Electrification

BESS: Battery Energy Storage System

BIL: Bipartisan Infrastructure Law

Btu: British Thermal Unit

BYOT: Bring Your Own Thermostat

C&I: Commercial and Industrial

CAC: Climate Action Council

CARE: Customer Analytics Reporting and Engagement Program

CCRP: Climate Change Resilience Plan

CCVS: Climate Change Vulnerability Study

CDG: Community Distributed Generation

CECONY: Consolidated Edison Company of New York, Inc.

CHP: Combined Heat and Power

CJWG: Climate Justice Working Group

CLCPA: Climate Leadership and Community Protection Act

CMCP: Commercial Managed Charging Program

CNG: Certified Natural Gas

CSR: Customer Service Representative

CSRP: Commercial System Relief Program

DA: Distribution Automation

DAC: Disadvantaged Community

DAF: Data Access Framework

DCFC: Direct Current Fast Charge

DCX: Digital Customer Experience

DER: Distributed Energy Resource

DERMS: Distributed Energy Resources Management System

DG: Distributed Generation

DLCP: Direct Load Control Program

DLM: Dynamic Load Management

DLRP: Distribution Load Relief Program

DOE: Department of Energy

DPS: Department of Public Service

DR: Demand Response

DSCADA: Distribution Supervisory Control and Data Acquisition

DSM: Demand Side Management

EDI: Electronic Data Interchange

EE: Energy Efficiency

EE BE: Energy Efficiency and Building Electrification

EEI: Edison Electric Institute

EJ: Environmental Justice

EMP: Energy Master Plan

EPRI: Electric Power Research Institute

ERM: Enterprise Risk Management

ERP: Emergency Response Plan

ERV: Energy Recovery Ventilator

ESCO: Energy Service Companies

ESS: Energy Storage System

EV: Electric Vehicle

EVSE: Electric Vehicle Supply Equipment

FAS: Fleet Assessment Services

GHG: Greenhouse Gas

GIS: Geographic Information System

GSHP: Ground Source Heat Pump

GW: Gigawatt

GWRA: Global Warming Response Act

HCM: Hosting Capacity Map

HER: Home Energy Report

HPWH: Heat Pump Water Heater

HRV: Heat Recovery Ventilator

HVAC: Heating, Ventilation, and Air Conditioning

IEDR: Integrated Energy Data Resource

IEEE: Institute of Electrical and Electronics Engineers

IIJA: Infrastructure Investment and Jobs Act

IPV: Initial Public Version

IPWG: Interconnection Policy Work Group

IRA: Inflation Reduction Act

ISBM: Innovative Storage Business Model

IT: Information Technology

ITWG: International Technical Working Group

JU: Joint Utilities

kV: Kilovolt

LCF: Low-Carbon Fuels

LDV: Light-Duty Vehicle

LED: Light-Emitting Diode

LMI: Low and Moderate Income

LMTIP: Load Management Technology Incentive Program

LRP: Long-Range Plan

MHDVs: Medium- and Heavy-Duty Vehicles

MMBtu: Million British Thermal Units

MOU: Memoriam of Understanding

MRP: Make-Ready Program

MVP: Minimum Viable Product

MW: Megawatt

MWh: Megawatt Hours

NC: Net Crediting

NEEP: Northeast Energy Efficiency Partnership

NENY: New Efficiency New York

NEVI: National Electric Vehicle Infrastructure

NJ: New Jersey

NJBPU: New Jersey Board of Public Utilities

NPA: Non-Pipe Alternative

NWA: Non-Wires Alternative

NYISO: New York System Independent Operator

NYS: New York State

NYSERDA: New York State Energy Research and Development Authority

NYPSC: New York State Public Service Commission

OBCs: Overburdened Communities

O&R: Orange and Rockland Utilities, Inc.

OMS: Outage Management System

PDR: Peak Demand Reduction

PPI: Per Plug Incentive

PTO: Permission to Operate

PV: Photovoltaic

R&D: Research and Development

RECO: Rockland Electric Company

REV: Reforming the Energy Vision

RNG: Renewable Natural Gas

SCADA: Supervisory Control and Data Acquisition

SCNJ: SmartCharge New Jersey

SCNY: SmartCharge New York

SCX: Strategic Customer Experience

SNG: Synthetic Natural Gas

SOC: Security Operations Center

T&D: Transmission and Distribution

TBtu: Trillion British Thermal Units

TOU: Time of Use Rate

UER: Utility Energy Registry

US: United States

UTENs: Utility Energy Thermal Networks

VM: Vegetation Management

ZEV: Zero-Emission Vehicle

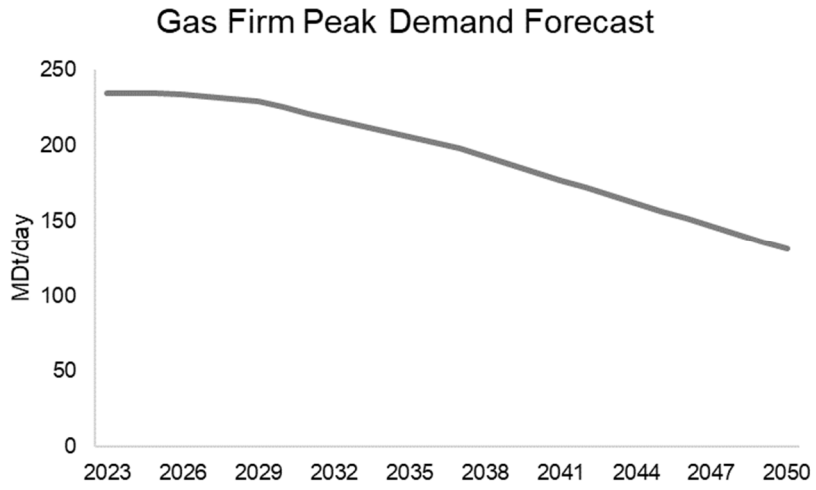
6. Appendices: Reference, Hybrid and Deep Electrification Pathway Assumptions, Models, and Data Sources

6.1 Appendix A: Reference Pathway Assumptions, Models, and Data Sources

The Reference Pathway Forecasts and associated details are as follows:

Firm Gas Peak Demand Forecast

The Firm Gas Peak Demand Forecast is developed based on several models and analyses that are customized to provide a bottom up look ahead, where appropriate, as well as applying other specific forecasting applications or models that may apply econometric factors, stock and flow, potential study information, customer behavioral patterns, policies, and customer economics. The forecast is as follows:



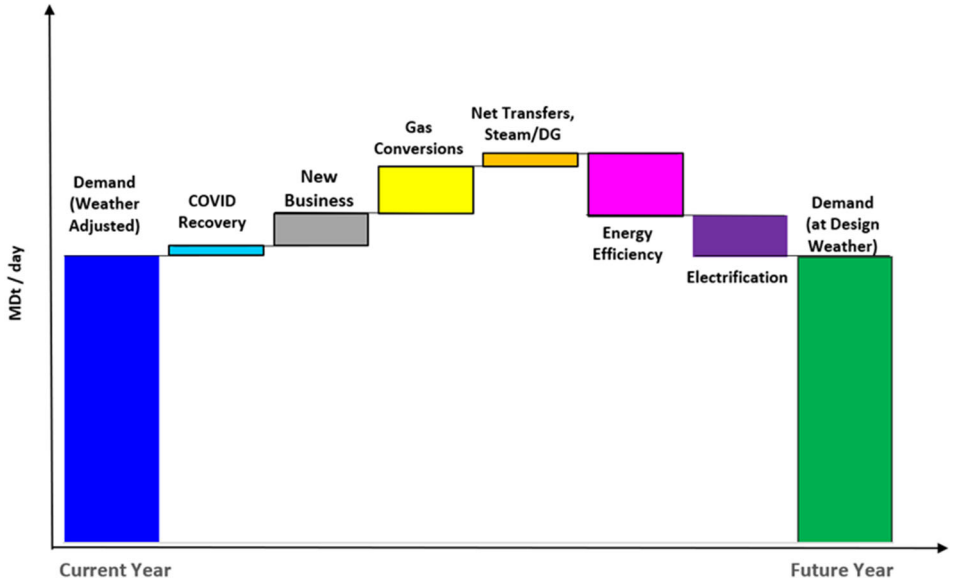
The primary models and primary data sources utilized at the time of this forecast are as follows:

Models	Data Sources
• Customized overall Peak Excel Model • Econometric model based on EViews and Moody's economic data • Electrification of Heating (EoH) Analytic Engine • Weather Adjusted Peak Regression Models (Python based – OLS and RANSAC)	• DSS and PI for demand data • Maxar weather • New project and oil to gas list provided by O&R new business team • EE reductions from O&R EE Department (NENY / NYSERDA) • Gas DG/CHP list from O&R DER Group • Clean Heat Program Data • GDO Data

O&R's Firm Gas Peak Demand Forecast is an annual twenty-year forecast of load growth. For the purpose of this LRP, the forecasts have been extended through 2050. It is the combination of the winter load growth most recently experienced and the growth expected to be realized over a twenty-year period from known projects, the economy, and consumer behavior. It also includes residential and commercial growth and accounts for Energy Efficiency/ DSM programs, Natural Conservation, and other modifiers such as DG/CHP, Oil to Gas Conversion, EoH and Electrification of Non-Space Heating (EoNH) appliances/equipment, and any additional adjustment as required (e.g., recovery from the COVID-19 pandemic).

The natural gas peak demand forecasting process involves the following steps: 1) establish the weather adjusted base peak demand from the most recent winter period; 2) quantify incremental demand growth; 3) add the incremental demand growth discretely to the base peak demand; and 4) generate transmission regulator forecasts. "Growth" could be positive or negative over the forecast horizon.

The foregoing contributing factors are exhibited through the O&R Firm Gas Peak Forecast Methodology as follows:



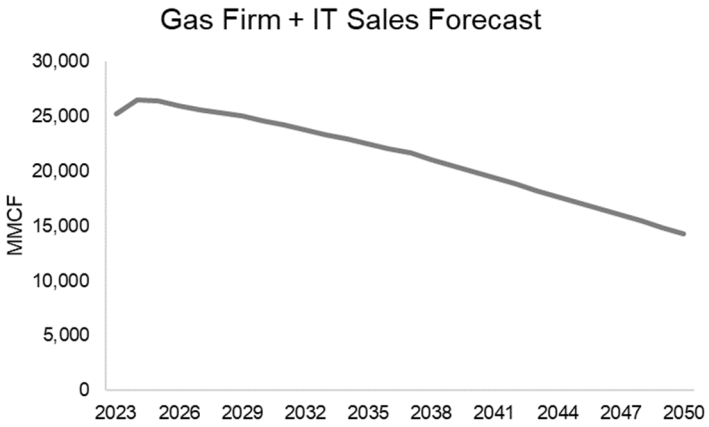
The confidence level for the O&R Peak Forecast is highest in the near term of the 26-year outlook. As with all forecasts, the confidence level diminishes over time.

For more detail on Reference Case Firm Gas Peak Forecasting methodology, inputs, assumptions, policies, and data sources please see the Reference Pathway section in Chapter 5 of the Gas System Long Term Plan filed November 29, 2023.[74]

Gas Delivered Volume Forecast

The Gas Delivered Volume Forecast is developed based on several models and analyses that are customized to provide a bottom up look ahead, where appropriate, as well as applying other specific forecasting applications or models that may apply econometric factors, stock and flow, potential study information, customer behavioral patterns, policies, and customer economics. O&R's Gas Delivered Volume Forecast is an annual six-year forecast of load growth. For the purpose of this LRP, the forecasts have been extended through 2050. The delivered gas volume forecast is made up of firm and interruptible (IT) customers and is as follows:

[74] Con Edison Inc., Gas System Long Term Plan, 2023, Available at https://www.oru.com/en/our-energy-future/our-energy-vision/long-range-plan/updates-to-our-natural-gas-system-planning-process

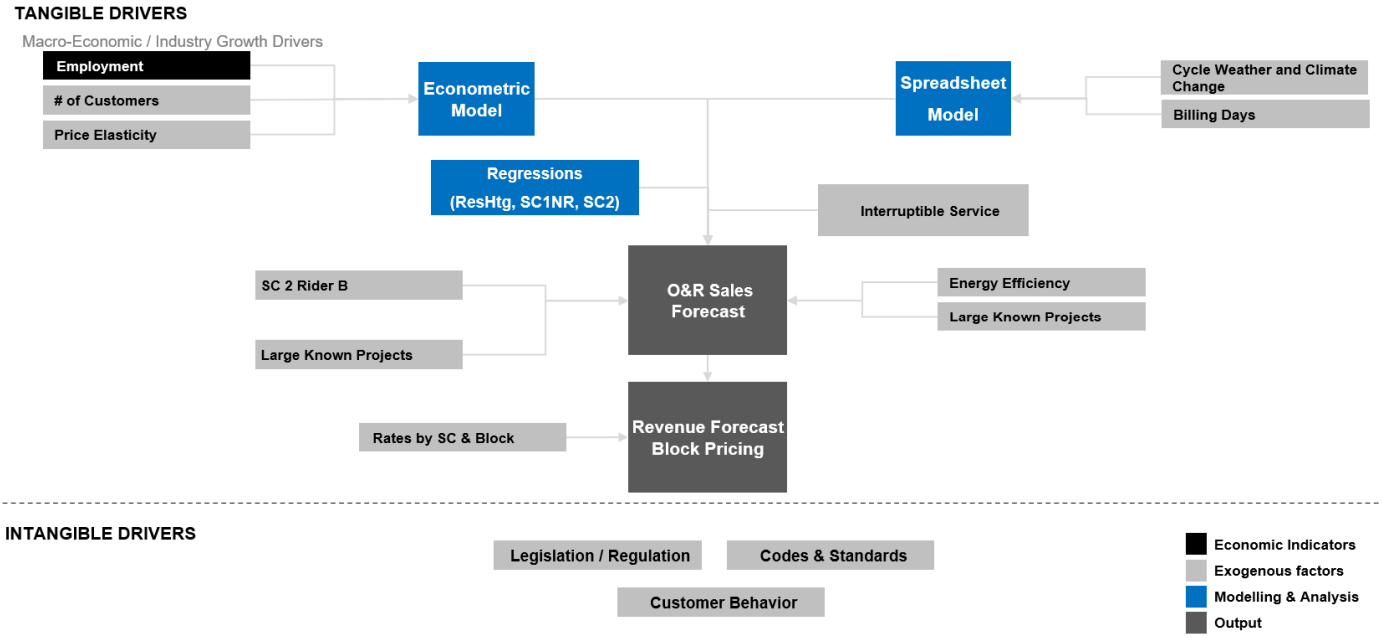


O&R Gas Delivered Volume is forecasted applying historical customer counts, economic data and industry growth drivers including employment using time-series regression equations. These equations are on a class-by-class basis. O&R actual base period volumes may be adjusted, as described by the following general assumption details:

Detail	Description
Weather Impact	Adjustment to normalize base period volumes in an effort to account for change in volumes due to deviations from normal weather (heating degree days).
Billing Days	Number of billing days
Employment	Adjustment reflects prevailing economic conditions and the state of the economy.
Price Impact	Reflects price elasticity
Energy Efficiency	Volumes for relevant service classes are adjusted to reflect the best knowledge of the impact from gas conservation including O&R and NYSERDA programmatic efforts in addition to organic energy efficiency.
Electrification	Volumes lost due to electrification of heating and non-heating appliances are currently derived from our peak demand forecast and converted into volumes across the corresponding service classes. Commodity Forecasting currently uses an in-house model to obtain these numbers. The Company is currently working to create an electrification tool for O&R similar to the one used for Con Edison, based on the EOH Analytic Engine.
Interruptible Services	Service Class 8 and Service Class 9 are normalized as if no interruptions have occurred, and this becomes the forecast
Known Projects	The new business forecast reflects the projected delivery volumes in the forecast years associated with new business customers anticipated to take

Detail	Description
	service in each of the forecast years. Estimated volume is derived by bills/customer forecast.

The O&R Gas Delivered Volume Forecast Methodology and Background are as follows:



The primary models and primary data sources utilized at the time of this forecast are as follows:

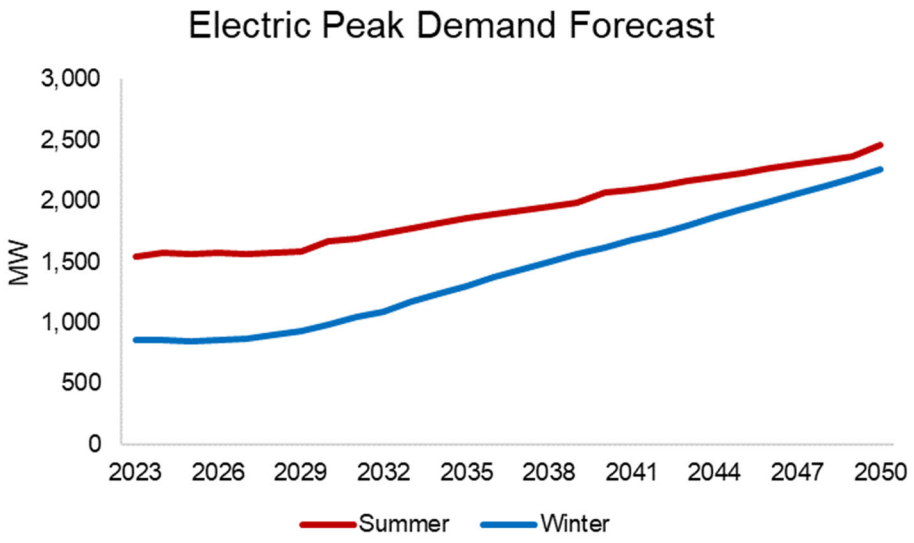
Models	Data Sources
• Customized overall Volume Excel Model • Econometric model utilizing EViews and Moody's economic data • EViews Employment Model impact on Gas Sales • EoH Analytic Engine	• DSS and PI for demand data • NOAA weather data for HDD and CDD • Customer Billing Cycle Data • New Business projects and oil to gas list • EE reductions from O&R EE Department (NENY / NYSERDA) • Gas DG/CHP list from O&R DER Group • Clean Heat Program Data

The confidence level for the O&R Delivered Gas Volume Forecast is highest in the near term of the 26-year outlook. As with all forecasts, the confidence level diminishes over time.

For more detail on Reference Case Gas Delivered Volume Forecasting methodology, inputs, assumptions, policies, and data sources please see the Gas System Long Term Plan filed November 29, 2023.[75]

Electric Peak Demand

The O&R Electric System Peak Demand Forecast is developed for the summer and the winter and includes the RECO service area. These forecasts are developed using a customized hybrid of top-down and bottom-up methodologies, that employ several models, forecast tools, and are driven policies and studies. These forecasts extend out 20-years. For the purpose of this LRP, these forecasts have been extended through 2050. The O&R Electric Peak Forecast for the summer and winter are as follows:



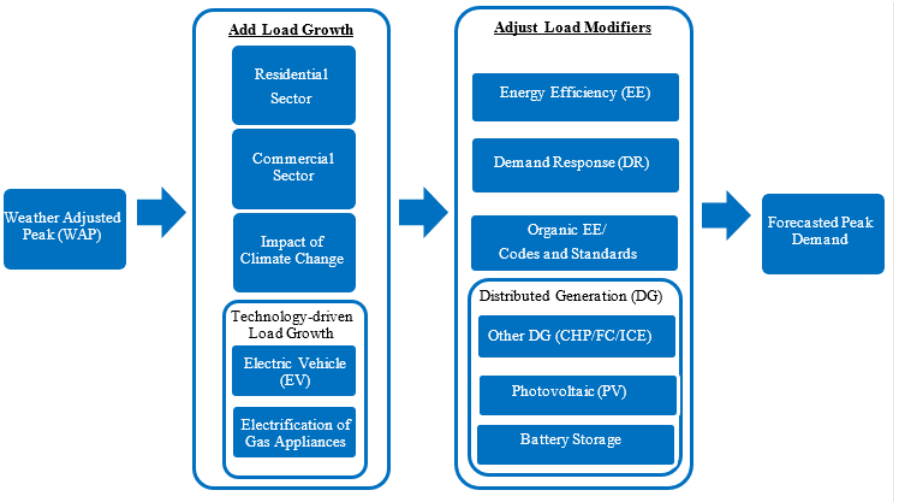
The electric system peak demand forecasts are produced by adding the incremental MW demand growth for the residential and commercial sectors to the most recent summer Weather Adjusted Peak. In addition to sector demand growth, non-sector-specific technology-driven load growth is also added, such as EVs.

The primary models and primary data sources utilized at the time of this forecast are as follows:

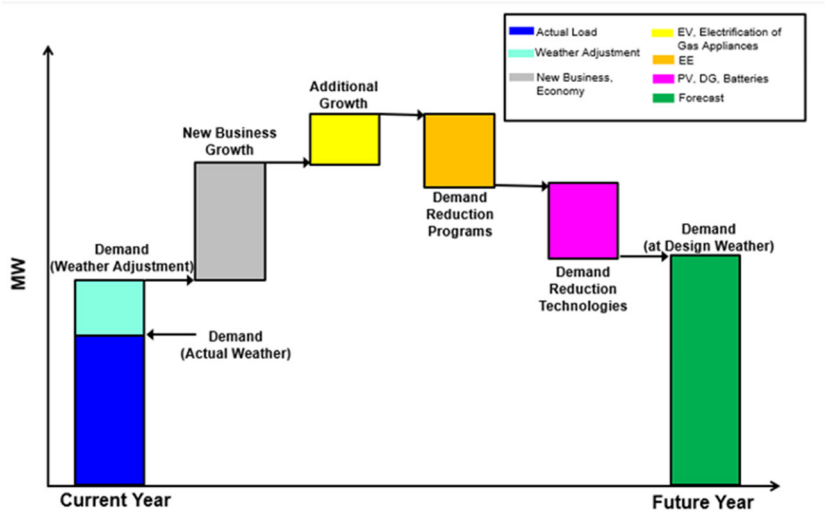
[75] Con Edison Inc., Gas System Long Term Plan, 2023, Available at https://www.oru.com/en/our-energy-future/our-energy-vision/long-range-plan/updates-to-our-natural-gas-system-planning-process

Models	Data Sources
• Customized overall peak Excel model • Econometric model based on EViews and Moody's economic data • EoH Analytic Engine • Weather Adjusted Peak Regression Models (Python based – Ordinary Least Squares [OLS] and Random Sample Consensus [RANSAC]) • Solar Break-Even Model	• Power Clerk DG/PV/Battery jobs in queue • DSS and PI for demand data • Maxar weather • New project list provided by O&R new business services team • EE reductions from O&R EE Department (NENY / NYSERDA) • Clean Heat Program Data • DMV Data, EPRI Studies, and Other Studies – for EV • Bloomberg New Energy Finance Long Term Battery Outlook

The following figure shows the basic process of producing an electric summer system peak forecast:



The following figure demonstrates the electric summer peak forecast methodology:

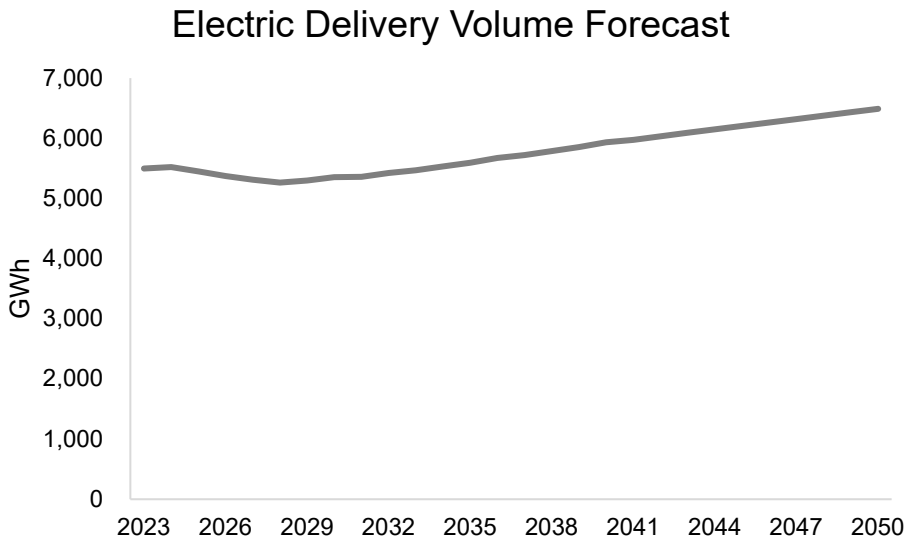


The winter electric peak forecast methodology is very similar. The confidence level for the O&R Electric Peak Forecasts is highest in the near term of the 26-year outlook. As with all forecasts, the confidence level diminishes over time. For more detail on Reference Case Electric Peak Forecasting Methodology, inputs, assumptions, policies, and data sources see O&R DSIP filed June 30, 2023.[76]

Electric Delivery Volume Forecast

The Company develops its Electric Delivery Volume Forecast using internally built econometric models with inputs from both internal and external sources. O&R's Electric Delivery Volume Forecast is an annual six-year forecast of load growth. For the purpose of this LRP, the forecast has been extended through 2050 and includes the RECO service area. These models are developed at the major service classification level and include economic variables to account for economic fluctuations; weather variables to account for delivery variations due to weather conditions; and other explanatory variables to account for structural breaks in the data. The Electric Delivery Forecast is as follows:

[76] O&R Distributed System Implementation Plan. June 30, 2023. Chapter 2, Advanced Forecasting and Appendix A, Peak Load and DER Forecast Details. Available at https://www.oru.com/en/our-energy-future/our-energy-projects/distributed-system-platform



The forecast is adjusted for Energy Efficiency Programs (EE) to reflect the estimated impact of EE programs under Orange and Rockland's current Electric Rate Plan, New Efficiency New York (NENY) electric and gas programs and the New York State Energy Research and Development Authority (NYSERDA) programs. The electric delivery volume forecast is also adjusted for large businesses, standby service, and the following delivery volume modifiers:

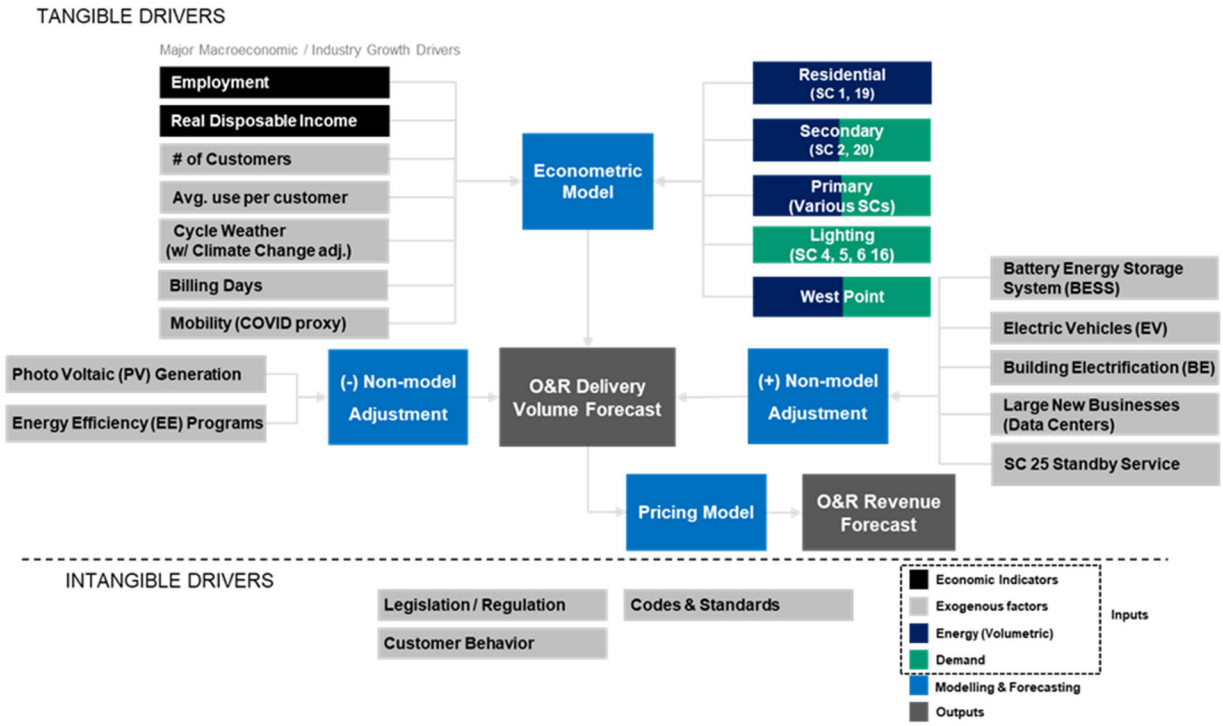
- Solar/Photovoltaic (PV) Generation – to account for the projected reduction in delivery volumes associated with the installation of solar panels by customers who will then generate a portion or all of their energy requirements.

- Electric Vehicles (EV) – to capture the projected delivery volumes to customers who will be operating EVs.

- EoH/EoNH - Building Electrification (BE) - to capture the delivery volume to customers who install electric heating systems and other electric appliances to replace their oil or gas heating systems and other gas appliances, or new dwelling installations.

- Battery Energy Storage System (BESS) - to capture the delivery volume to and from customers who might install battery storage.

The Electric Delivery Volume Forecasting Process is as follows:



The primary models and primary data sources utilized at the time this forecast are as follows:

Models	Data Sources
• Customized overall Volume Excel Model • Econometric model based on EViews and Moody's economic data • EoH Analytic Engine • Solar Break-Even Model	• Power Clerk DG/PV/Battery jobs in queue • DSS and PI for demand data • Maxar weather • New project list provided by O&R new business services team • EE reductions from O&R EE Department (NENY / NYSERDA) • Clean Heat Program Data • DMV Data, EPRI Studies, and Other Studies – for EV • Bloomberg NEF Long Term Battery Outlook • National Oceanic and Atmospheric Administration weather data for Heating Degree Days and Cooling Degree Days • Google Mobility Data

The confidence level for the O&R Electric Delivery Volume Forecast is highest in the near term of the 26-year outlook. As with all forecasts, the confidence level diminishes over time.

For more detail on Reference Case Electric Delivery Volume Forecasting methodology, inputs, assumptions, policies, and data sources see Distributed System Implementation Plan (DSIP) filed June 30, 2023.[77]

[77] O&R Distributed System Implementation Plan. June 30, 2023. Chapter 2, Advanced Forecasting and Appendix A, Peak Load and DER Forecast Details. Available at https://www.oru.com/en/our-energy-future/our-energy-projects/distributed-system-platform

6.2 Appendix B: Hybrid and Deep Electrification Pathway Assumptions, Models, and Data Sources

The Hybrid and Deep Electrification pathways' outputs are developed in an excel-based model that uses a top-down approach to calculate electric and gas commodity sales and emissions in the service territory from today through 2050 and ensures these pathways achieve CLCPA economy-wide emissions reduction targets. The Hybrid pathway uses assumptions from internal and external sources on items such as but not limited to adoption of heating technologies and energy efficiency measures over time. For the Deep Electrification pathway, the model applies assumptions from NYSERDA's Integration Analysis in the Climate Action Council's Scoping Plan (December 2022) to the O&R service territory.

6.3 Appendix C: Hybrid and Deep Electrification Building Electrification Assumptions and Dependencies

For the Hybrid Model: In 2050, adoption of electric space heating is 65% on a square foot basis per the 2022 CECONY LRP analysis. In 2050, adoption of electric water heating is 80% on a square foot basis, which is assumed to be the minimum electrification required to achieve CLCPA goals per the 2022 CECONY LRPs. Electrification of water heating is assumed to be more feasible and less complex/expensive than electrification of space heating. In-between years are modeled using a linear increase in percentage of floorspace using electric heat pumps/water heaters.

For the Deep Electrification Model: Percentage of floorspace using electric heat pumps and electric water heaters aligns with the adoption rates in the CAC Integration Analysis (Scenario 3).

Assumed adoption (% of floorspace)

		Hybrid	Deep
2030			
Electric heat pump adoption	SFH	26%	28%
	MFH	16%	25%
	COM	16%	26%
	Total	**21%**	**27%**
HP water heater adoption	SFH	32%	28%
	MFH	21%	25%
	COM	21%	26%
	Total	**26%**	**27%**
2043			
Electric heat pump adoption	SFH	56%	73%
	MFH	46%	72%
	COM	46%	90%
	Total	**50%**	**77%**
HP water heater adoption	SFH	67%	73%
	MFH	57%	72%
	COM	57%	90%
	Total	**62%**	**77%**
2050			
Electric heat pump adoption	SFH	70%	92%
	MFH	60%	91%
	COM	60%	98%
	Total	**65%**	**93%**
HP water heater adoption	SFH	85%	92%
	MFH	75%	91%
	COM	75%	98%
	Total	**80%**	**93%**

Dependencies for assumed adoption

		Hybrid	Deep
**	**Ongoing:** Develop the skilled workforce necessary to deliver upgrades at the required pace and scale	✓	✓✓
**	**Ongoing:** Facilitate deployment of innovative third-party financing models	✓	✓✓
*	**Ongoing:** Protections for low-income customers who do not currently pay directly for heating	✓	✓✓
**	**Ongoing:** Policy support for technical innovations to enable electrification of difficult-to-convert customers		✓
**	**Ongoing:** Dual-fuel heating solutions are leveraged to mitigate peak demand impacts	✓	
*	**By 2030:** Compression of building permitting cycle for building electrification and envelope upgrades	✓	✓✓
*	**By 2030:** Ability to gradually modify the gas footprint by eliminating any new customer connections and requiring existing customers in targeted areas to disconnect from the gas system	✓	✓✓
*	**By 2030:** Regulations that phase out fossil fuel use in **new buildings**, without exceptions	✓	✓✓
*	**By 2030:** Policies that support bundling electrification with building envelope upgrades	✓	✓✓
*	**By 2030:** Adoption of ultra-low GWP refrigerants		✓
*	**By 2030:** Expanded incentives for early retirement of old heating systems		✓
*	**By 2030:** All new sales of heating systems for low-rise residential buildings are heat pumps		✓
*	**By 2035:** Regulations that phase out fossil fuel use in **existing buildings**, without exceptions		✓
*	**By 2035:** All new sales of heating systems for MFH and COM are heat pumps		✓
*	**By 2040**: Zero emission power sector	✓	✓✓

* = relies on regulatory/policy development; ** = relies on market/technology development
✓ = required to achieve pathway; ✓✓ = deeper intervention will be required relative to the other pathway

Explicitly modeled in pathways analysis

6.4 Appendix D: Hybrid and Deep Electrification Energy Efficiency Assumptions and Dependencies

Assumed energy efficiency savings[1]

	Hybrid	Deep
2030	9%	18%
2043	23%	34%
2050	30%	43%

[1] Reflects average total energy savings applied to all building types.

Dependencies for assumed adoption.

	Hybrid	Deep
* **Ongoing:** Coordination of utility program offerings with state and city programs for LMI customers	✓	✓✓
* **Ongoing:** Codes and standards to improve energy efficiency, reduce emissions, and enhance building resilience in new construction and major retrofits	✓	✓✓
* **By 2030:** Expanded funding for EE incentives to target building envelope improvements	✓	✓✓
** **By 2030:** Increased participation in programs for improved controls and demand response	✓	✓✓
* **By 2035:** Expanded EE funding for low and moderate-income customers	✓	✓✓
* **By 2035:** Codes and standards to improve energy efficiency, reduce emissions, and enhance building resilience in existing buildings	✓	✓✓

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Explicitly modeled in pathways analysis

6.5 Appendix E: Hybrid and Deep Electrification Low-Carbon Fuel Assumptions and Dependencies

Assumed adoption in gas system (TBTU)

	Hybrid	Deep
	2030	
RNG	0.5	0.2
H_2	0	0
SNG	0	0
	2043	
RNG	5.7	2.0
H_2	0.8	0
SNG	0	0
	2050	
RNG	5.7	2.0
H_2	0.8	0
SNG	4.4	0

Dependencies for assumed adoption

		Hybrid	Deep
*	**Ongoing:** Support for continued use of our gas system to deliver low-carbon fuels for heating needs and dispatchable generation as an integral part of maintaining system reliability / resource adequacy	✓✓	✓
*	**By 2030:** Recognition and awareness of low-carbon fuels as a decarbonization solution and regulatory establishment of LCF definitions certification processes	✓✓	✓
**	**By 2030:** Market growth for RNG produced from anaerobic digestion (AD) facilities, including government incentives to support the development of projects (e.g., tax credits)	✓✓	✓
*	**By 2030:** Approval to interconnect with and purchase RNG from AD facilities within our service territories	✓	✓
*	**By 2030:** Approval for pilots for LCF to test the impacts of these fuels in gas system planning (e.g., RNG interconnection)	✓✓	✓
*	**By 2030:** Approval to pass through costs of LCF to the customer	✓	✓
*	**By 2030:** Approval to purchase RNG from AD facilities in other parts of NYS and the Eastern US	✓	
**	**By 2035**: Commercialization of and market growth for RNG produced from thermal gasification (TG) facilities, including government incentives to support the development of projects	✓✓	✓
*	**By 2035:** Approval to interconnect with and purchase RNG from TG facilities within our service territories	✓✓	✓
*	**By 2035:** Approval for construction of dedicated hydrogen pipeline that delivers hydrogen to CECONY service territory and approval to recover costs	✓	
**	**By 2040:** RNG is fully scaled from all feedstocks available to us at an average price of $19/MMBTU	✓✓	✓
*	**By 2040:** Approval for pilots for LCF to test the impacts of these fuels in gas system planning (e.g., hydrogen blending) and proven means to control emissions from hydrogen combustion	✓	
*	**By 2040:** Regional hydrogen supply chain and scale-up of renewable generation fleet to power hydrogen production	✓	
**	**By 2045**: Significant cost declines and market scale-up of methanation processes	✓	

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Explicitly modeled in pathways analysis

6.6 Appendix F: Electric Vehicle Assumptions and Dependencies

Assumed adoption
(% of vehicle miles traveled)

		Hybrid	Deep
2030			
EV adoption	LDV	22%	33%
	MHDV	13%	6%
	Total	**22%**	**32%**
2043			
EV adoption	LDV	63%	83%
	MHDV	50%	39%
	Total	**63%**	**82%**
2050			
EV adoption	LDV	91%	96%
	MHDV	75%	59%
	Total	**90%**	**95%**

Dependencies for assumed adoption

		Hybrid	Deep
**	**Ongoing:** Policy support for increased model availability, charging accessibility, technology innovation, and scale-up of market	✓	✓
**	**Ongoing:** Develop the skilled workforce necessary to deliver upgrades at the required pace and scale	✓	✓
*	**By 2027:** Majority of LDV sales are ZEVs	✓	✓
*	**By 2030:** Nearly half of MDV and HDV sales are ZEVs	✓	✓
*	**By 2035:** All LDV sales are ZEVs	✓	✓
*	**By 2045:** All MDV and HDV sales are ZEVs	✓	✓
**	**Ongoing:** Majority of MDV and HDV sales are electric	✓	
**	**Ongoing:** MDV sales are both electric and fuel-cell, and majority of HDV sales are fuel-cell		✓
**	**Ongoing:** Managed charging is leveraged to mitigate peak demand impacts	✓	✓✓

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✓ = required to achieve pathway; ✓✓ = deeper intervention will be required relative to the other pathway

Explicitly modeled in pathways analysis


Orange & Rockland