



Toward a Clean Energy Future:

# A Strategic Outlook 2020–2023



NYSERDA

# Message from President and CEO

---

## The call to act on climate change reached new heights

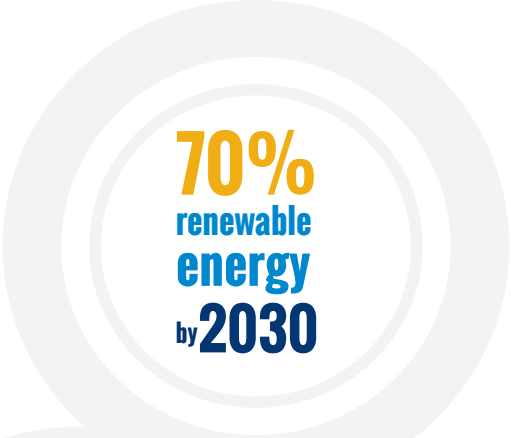
during the September 2019 Climate Week, with the youth movement and climate strikes in New York City and across the nation driving home the urgency and importance of addressing **one of the most pressing matters of our time**.

Governor Cuomo's nation leading **Green New Deal** and the New York State **Climate Leadership and Community Protection Act (CLCPA)** have been at the forefront of creating the framework needed to lower carbon emissions and advance a clean energy future. New York has embraced sweeping change, and with that commitment has launched a plan that will ensure a just transition as we work towards energy efficiency, community resilience, and bringing clean energy jobs to our State.

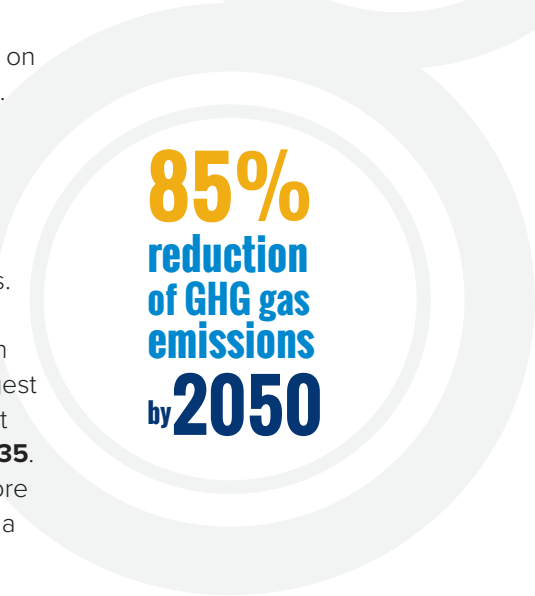
New York State is on the path to achieving a **carbon free electricity system by 2040**, and ultimately a carbon-neutral economy, touching on all areas including transportation, buildings, and industrial production. The CLCPA sets a new standard, codifying New York's goal of **70% renewable energy by 2030**, while also **cutting greenhouse gas emissions 85% by 2050**.

NYSERDA is at the heart of efforts to jump-start progress towards the State's unprecedented clean energy and carbon reduction mandates. In 2019, Governor Cuomo announced NYSERDA's first two offshore wind projects, totaling nearly 1,700 megawatts that will create enough energy to power over 1 million homes. This represents the single largest renewable energy procurement by any state in U.S. history and is just the first step in achieving **9,000 megawatts of offshore wind by 2035**. It solidifies New York State's position as the hub of the nation's offshore wind industry and these awards will **spur more than 1,600 jobs** with a combined **economic activity of \$3.2 billion** across the State.

New York has been building momentum under Governor Cuomo for many years through strong and consistent climate and clean energy actions. This includes scaling up grid modernization, energy storage, and solar to ensure flexibility, reliability, and resilience. This work provides the necessary foundation to support the fast-paced addition of renewables to meet the ramp-up of **3,000 megawatts of energy storage** and **6,000 megawatts of distributed solar**.



**70%**  
renewable  
energy  
by **2030**



**85%**  
reduction  
of GHG gas  
emissions  
by **2050**

# carbon free electricity system by 2040

Just as we are creating the sustainable infrastructures and resources needed to bring renewable energy markets to scale across the economy, we recognize that along with significant changes to the energy system, our own action and the actions of other State agencies play a key role in lasting change. NYSERDA and other State agencies are building resiliency measures into our own operations and programs as part of the comprehensive approach to strategically integrate innovation and resources needed to transition to a carbon-free economy.

Through proper planning we will ensure that the clean energy transition meets the needs of low- to moderate-income workers and families. **35% of the benefits of the State's clean energy and energy efficiency investments will benefit disadvantaged communities**, as well as improve energy affordability for all New Yorkers. As we move from carbon to carbon-neutral, it's critical to identify and plan for a shift in economic and market changes which will ensure that the State and our residents will ultimately be stronger, with a healthier environment and better quality of life.

In light of the CLCPA, as well as a number of other drivers in the energy space, including bold action at the local level and changes in utility strategies, 2020 will be an important year for NYSERDA to reassess strategies to pursue going forward to ensure we are best meeting the needs of a changing energy landscape.

It is a proud time to work in clean energy, the opportunities keep growing and will continue to do so. This Strategic Outlook highlights how we will continue to leverage and build on our success to date showing that good thought leadership combined with new technologies and pushing innovation are at the core of a better, more resilient future.



**Alicia Barton,  
President and CEO,  
NYSERDA**

This forward-looking document reflects State policy and NYSERDA's plans as of January 2020. Because New York's energy policy objectives continue to develop in response to the evidence that aggressive action is needed to combat climate change—and greater ambition is possible—updates to particular targets will be noted on the Strategic Outlook webpage: [nyserdanycgov/Strategic-Outlook](https://nyserdanycgov/Strategic-Outlook).

## Table of Contents



### INTRODUCTION: NYSERDA AND ITS CONTEXT

- 3 NYSERDA's Charge
- 4 State Policies and Commitments That Steer NYSERDA's Work
- 5 NYSERDA's Role
- 6 Policy Framework
- 8 Mission Outcomes and Strategic Focus Areas for 2020-2023



### MISSION OUTCOMES

- 9 Greenhouse Gas Emissions Reductions
- 13 Renewable Energy
- 17 Energy Efficiency
- 20 Clean Energy Economy
- 25 Resilient and Distributed Energy System



### STRATEGIC FOCUS AREAS

- 28 Building a Resilient Energy System
- 30 Energy Affordability and Equity
- 32 Decarbonizing Transportation
- 34 Electrification of Buildings



### FUNDING AND BUDGETS



### APPENDIX: NYSERDA'S STRUCTURE

# NYSERDA and Its Context

## NYSERDA'S CHARGE

### Mission:

**Advance innovative energy solutions in ways that improve New York's economy and environment.**

### Vision:

**Serve as a catalyst — advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.**

NYSERDA develops markets for clean energy, supports technology development, and provides financing—all in support of transforming the energy system to enable economic growth and reduce greenhouse gas emissions, while building sustainable communities.



## STATE POLICIES AND COMMITMENTS THAT STEER NYSERDA'S WORK

New York — a founding member of organizations like the Regional Greenhouse Gas Initiative (RGGI) and the U.S. Climate Alliance — aims to meet the energy-related challenges posed by climate change. Governor Cuomo's Green New Deal, the most aggressive climate and clean energy initiative in the nation, sets New York on a path for a just transition to clean energy, spurring the growth of the green economy while prioritizing the needs of low- to moderate-income New Yorkers.

**As co-chair of the  
State's Climate  
Action Council,  
NYSERDA plays  
a critical role  
in charting the  
direction of  
New York's  
energy policies.**

### **CLEAN ENERGY ECONOMY**

nearly 159,000 clean energy jobs

**now**

### **RENEWABLE ENERGY**

6,000 MW of distributed solar

**by 2025**

### **RESILIENT and DISTRIBUTED GRID**

1,500 MW of energy storage

### **ENERGY EFFICIENCY**

185 TBtu end-use savings  
in buildings and industrial facilities

### **RENEWABLE ENERGY/ CLEAN ENERGY STANDARD**

70% electricity from renewable energy

**by 2030**

### **GHG REDUCTION**

40% reduction in greenhouse  
gas emissions from 1990 levels

3,000 MW of energy storage

30,000 employed in storage sector

## NYSERDA'S ROLE

**As New York's clean energy and innovation agency, NYSERDA leads the way in implementing the State's nation-leading clean energy policy and actions, delivering a cleaner, healthier, and more prosperous future for all New Yorkers.**

NYSERDA is on the front lines of a global energy transition, bringing energy expertise to the challenges of fighting climate change and accelerating the pace to a clean energy future.

NYSERDA works to foster the transformation of markets, pushing them to accurately value clean energy, energy efficiency, and resilience — while encouraging competition and innovation that delivers value to consumers. NYSERDA focuses on:

- De-risking transitions from technological and business model innovation to broad commercialization.
- Reducing hard and soft costs of stimulating clean energy development by coordinating demand and focusing the efforts of key stakeholders, as well as by supporting technological innovation.
- Instilling confidence in markets and consumers through information, credible analysis, and education.
- Increasing market participants' access to capital on commercial terms by creating attractive precedents and standardizing approaches that capital providers can readily replicate and scale up.
- Providing targeted financial support where up-front costs present a persistent barrier, such as for low- to moderate-income consumers.
- Fostering investigation of and capacity to undertake ambitious measures for the long-term.

### RENEWABLE ENERGY

9,000 MW of offshore wind



**by 2035**

### CARBON-FREE

100% clean electricity



**by 2040**

### GHG REDUCTION

85% reduction in greenhouse gas emissions from 1990 levels



**by 2050**

## POLICY FRAMEWORK

The landscape and policy framework surrounding NYSERDA's work has changed rapidly over the past year. Key drivers of change include:

- Passage of New York's Climate Leadership and Community Protection Act (CLCPA). Governor Cuomo signed the CLCPA into law on July 18, 2019, dramatically raising the bar for the level of ambition that New York State needs to achieve.
  - Existing policies have been expanded or accelerated.
  - Initiatives and objectives are now in statute.
- CLCPA places substantially increased focus and priority on:
  - Increasing access to (and benefits from) clean energy for disadvantaged communities and low-income consumers.
  - Creating quality jobs in the green economy and ensuring a "just transition" and protecting ordinary workers as our economy shifts to more sustainable production.
  - Sectors of the economy that require deeper decarbonization (e.g. transportation, buildings).
- Bold action at the local level, particularly the **Climate Mobilization Act** in New York City (NYC), requires unprecedented coordination between the State and local government.
- The transition from dependence on natural gas to clean energy is being actively debated in light of new CLCPA requirements and on-the-ground supply/demand realities.
- Under New Efficiency New York, utility investment in energy efficiency will increase substantially over the next few years — coupled with short timelines for achieving targets, the imperative to align NYSERDA's role and the role of utilities has never been higher.
- The transportation sector contributes the most emissions by category across New York State (36% in 2016); making deep in-roads in this sector will require a comprehensive strategy on decarbonizing transportation.
- Weather events are increasing in frequency and severity, and energy infrastructure will increasingly come under strain.
  - Need to pivot our thinking to make sure we are building clean energy infrastructure that will adapt to changing conditions.

These new drivers of change build upon ongoing challenges and priorities that have not changed and must continue as core areas of focus:

- Aging energy infrastructure and large pre-existing built environment.
- Need to ensure energy affordability for all New Yorkers as energy system changes are implemented.
- Need to leverage market activity and private capital to achieve aggressive policy goals.
- Need to continue building public support for difficult systematic changes such as expanding support for large-scale projects and changing consumer behavior over time.

**NYSERDA needs to align policy and program offerings to these new considerations, including the key strategies and policies outlined on the next page.**

### NYC Climate Mobilization Act

The NYC Climate Mobilization Act is a package of bills which represent a path for NYC to reach carbon neutrality by 2050.

The centerpiece of the law is Local Law 97, which requires buildings over 25,000 square feet to cut climate emissions 40% by 2030.

This requirement covers approximately 50,000 existing residential and commercial buildings and nearly 60 percent of the city's building area — 3.15 billion square feet.



# Climate Leadership and Community Protection Act

affirms Governor Cuomo's Green New Deal's nation leading clean energy targets, while calling for an orderly and just transition to clean energy that creates jobs and continues fostering a green economy — 35% of clean energy and energy efficiency investments will benefit disadvantaged communities

## State Energy Plan

quadrennial interagency policy coordination effort that steers energy policy

## Clean Energy Standard

designed to transform the generation of electricity to carbon-free and renewable resources

## Clean Energy Fund

\$5 billion fund for four key program portfolios:

- > Market Development
- > NY-Sun
- > NY Green Bank
- > Innovation & Research

## New Efficiency: New York

comprehensive set of strategies for delivering energy efficiency gains

## Charge NY

transportation emissions reductions through build-out of electric vehicles market and infrastructure

## U.S. Climate Alliance

bipartisan coalition of 24 states and Puerto Rico committed to achieving the goals of the Paris Agreement

## Executive Order 166

calls on all State agencies to "lead by example" and realize GHG emissions reductions through their operations and programs

## Regional Greenhouse Gas Initiative (RGGI)

a cooperative effort among several states to cap and reduce CO<sub>2</sub> emissions from power plants

# Mission Outcomes and Strategic Focus Areas for 2020-2023

NYSERDA's primary mission outcomes are presented in the following pages. For each outcome, NYSERDA strategies over the planning horizon are presented along with a summary of NYSERDA's unique role in delivering on the critical outcome. Indicators of progress are also presented to ensure that movement in the market and progress toward these goals can be tracked.

**The mission outcomes that NYSERDA seeks to advance to support the energy transformation in New York include:**



**GREENHOUSE GAS  
EMISSIONS  
REDUCTION**



**RENEWABLE  
ENERGY**



**ENERGY  
EFFICIENCY**



**CLEAN ENERGY  
ECONOMY**



**RESILIENT AND  
DISTRIBUTED  
ENERGY SYSTEM**

These mission outcomes cover every aspect of our economy. Over the planning horizon, NYSERDA will focus on the following strategic focus areas which are critical to achieving our long-term energy and greenhouse gas emissions reduction goals:



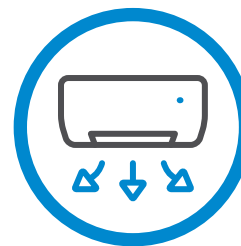
**BUILDING  
A RESILIENT  
ENERGY SYSTEM**



**ENERGY  
AFFORDABILITY  
AND EQUITY**



**DECARBONIZING  
TRANSPORTATION**



**ELECTRIFICATION  
OF BUILDINGS**

# Greenhouse Gas Emissions Reduction

STATE POLICY GOAL  
FOR GREENHOUSE GAS (GHG) EMISSIONS REDUCTION

**The CLCPA sets a greenhouse gas reduction target of 40% by 2030 and 85% by 2050, each below 1990 levels.**

Hitting these targets will enable the State to advance economy wide carbon neutrality. In other words, it would mean that New York is doing its part to reduce the causes of climate change.

## Mission Outcome:

# Greenhouse Gas Emissions Reduction



### NYSERDA'S ROLE

**Co-Chair Climate Action Council** to craft roadmap of policies needed to achieve goals in CLCPA.

**Guide and facilitate the State Energy Plan** development and shape energy policies throughout New York State.

**Identify and implement strategies** for energy sector emissions reductions.

**Develop and track** statewide greenhouse gas inventory.

**Facilitate State agencies' efforts** to Lead-by-Example.

### STRATEGIES FOR 2020–2023

- Develop final Scoping Plan by 2023 to identify path to achieve a 40% reduction by 2030 and 85% reduction in GHG emissions by 2050.
- Develop and publish Carbon Neutral Buildings Roadmap.
- Develop and publish a Clean Transportation Roadmap.
- Educate policymakers and the public through information sharing and connecting individual energy use to climate impacts.
- Advance New York's climate leadership through support of the State's participation in the U.S. Climate Alliance.
- Advance solutions to drive emissions reductions in all areas of New York's economy — electricity, buildings, transportation and beyond — and promote growth of beneficial electrification technologies that meaningfully contribute to the State's emissions reduction goals.
- Help communities across New York implement their own sustainability and clean energy goals, including coordinating with NYC on Local Law 97.



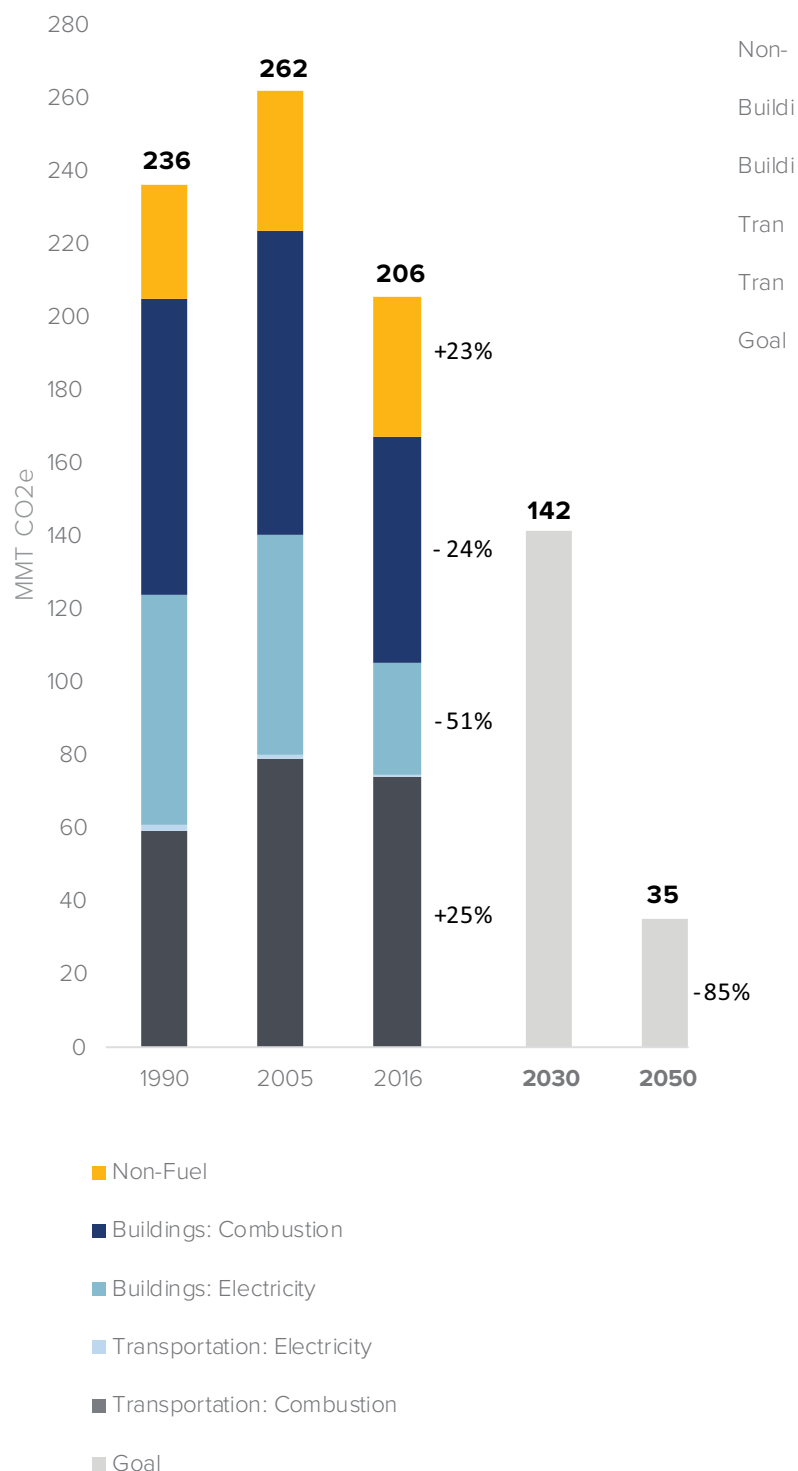
### INDICATORS OF PROGRESS

- Levels and trends in greenhouse gas emissions from sources statewide
- Number of Clean Energy Communities
- Progress on key metrics for renewables, energy efficiency, and beneficial electrification (i.e., electric vehicles, and clean heating and cooling)

**The CLCPA codified Governor Cuomo's historic commitment to transforming New York State's electricity sector to be 100% carbon-free by 2040**

# 2050 target: 85% reduction

from 1990 emissions baseline



## HIGHLIGHTED PROGRAMS AND INITIATIVES

**Clean Energy Fund** accelerates the deployment of clean energy solutions while driving economic development

**Regional Greenhouse Gas Initiative (RGGI)** assigns a price to power plant emissions and directs revenue to clean energy initiatives

**Charge NY** reduces transportation emissions through build-out of electric vehicles market and infrastructure

**Carbon Neutral Buildings Roadmap** will establish path to achieve carbon neutral buildings by mid-century, including interim 2030 milestones for various building sectors

**Clean Transportation Roadmap** will provide a blueprint for actions to support decarbonization of vehicular traffic, including short- and long-term goals for EV sales and charging stations

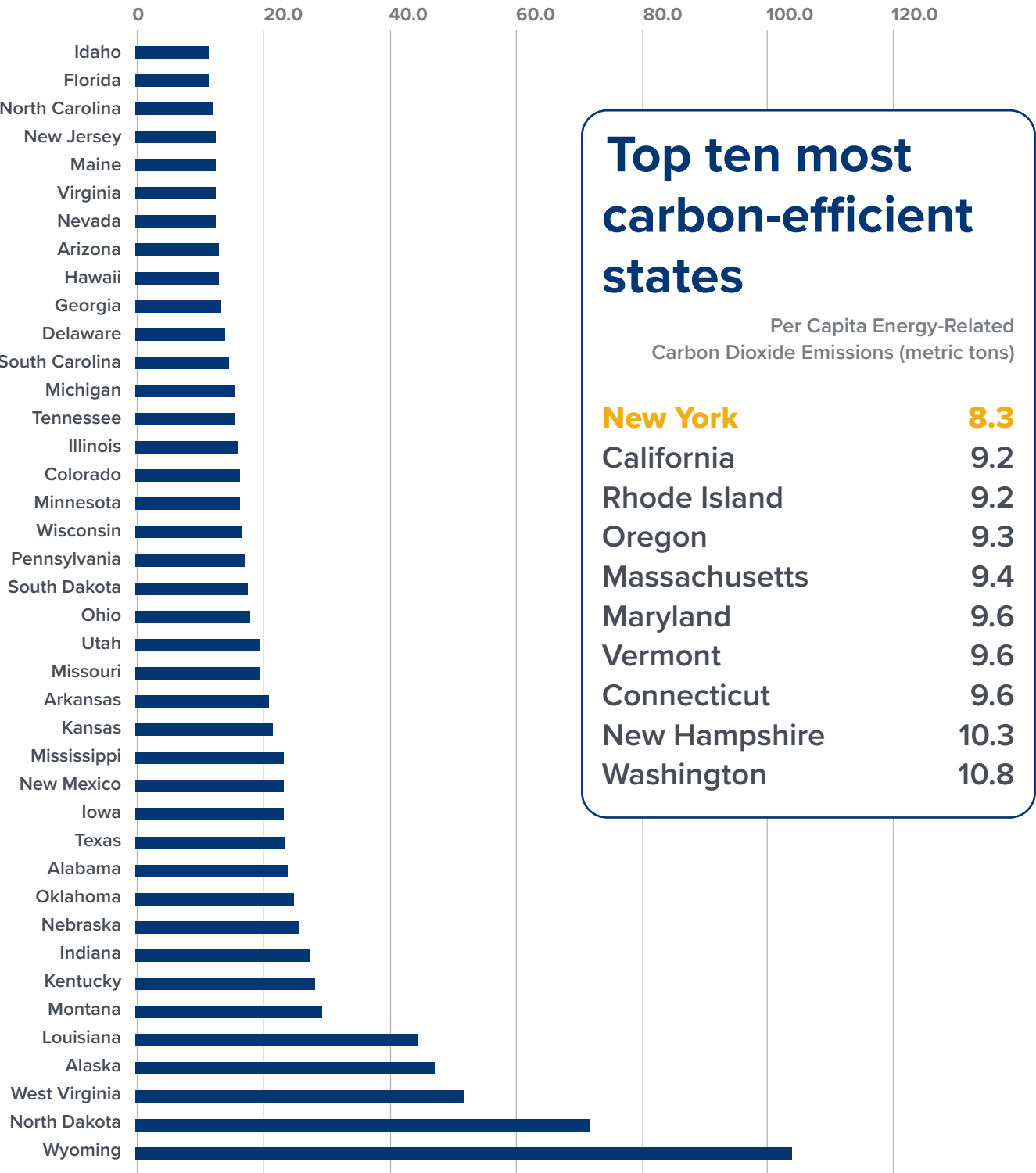
**Blue Ribbon Task Force on EVs** will be co-led by NYSERDA and Professor M. Stanley Whittingham from Binghamton University to identify technology and research and development opportunities for EVs

**Clean Energy Communities** recognizes and rewards communities for implementing clean energy actions that save taxpayer dollars, create jobs, and improve the environment

New York State is the most carbon-efficient state in the United States on a per capita basis and is well on its way to achieving the level of emissions reduction outlined under the Paris Agreement.

Source: U.S. Energy Information Administration, State Energy Data System and EIA calculations made for this analysis.

PER CAPITA ENERGY-RELATED CARBON DIOXIDE EMISSIONS (METRIC TONS)



# Renewable Energy

STATE POLICY GOAL  
FOR RENEWABLE ENERGY

**The CLCPA mandates that at least 70% of New York's electricity come from renewable energy sources such as wind and solar by 2030.**

Achievement of this mandate will move the State closer to achieving its climate goals, improve air quality, and continue to broaden New Yorkers' access to energy sources with low or no fuel costs. This clean electricity system lays the groundwork for decarbonization of the transportation and buildings sector through beneficial electrification.

MISSION OUTCOME

## Mission Outcome:

# Renewable Energy



### NYSERDA'S ROLE

**Facilitate market growth** and sustained markets for renewable and zero-emission generation.

**Reduce renewable soft costs** and barriers to deployment.

**Build community support** for renewables.

**Spur cost reductions** through innovation.

**Build supply chain** and workforce capabilities.

**Provide financing.**

### STRATEGIES FOR 2020–2023

- Accelerate strategies and mechanisms to achieve the new 70% renewable goal, as part of the next generation of the Clean Energy Standard.
- Continue to expand cost effective and competitive solicitations for large-scale renewables, refining program rules to reflect market conditions.
- Continue issuing solicitations for offshore wind that spur competition and cost reductions, including second solicitation for at least 1,000 MW in 2020, and build the supply chain in New York State.
- Develop strategies and mechanisms to achieve the 6,000 MW distributed solar goal by 2025, including strategies to serve low-income communities and consumers.
- Reduce soft costs and siting barriers by assisting local governments, providing financing for new market models via the NY Green Bank, addressing interconnection hurdles, and building support statewide.



### INDICATORS OF PROGRESS

- MWh: progress toward target
- MW and facilities (large-scale and behind-the-meter) completed and in the pipeline
- Solar, onshore, and offshore wind projects' average capital cost and timelines to develop and construct

New York State continues to grow a strong pipeline of projects to meet the 70x30 goal. As of November 30, 2019, there were approximately

**35 GW of active renewable, renewable transmission, and storage projects in the NYISO interconnection queue.**

Additionally, there are currently 39 projects in the active Article 10 Queue, with three applications being approved in the last year, indicating more of the pipeline is coming to fruition.

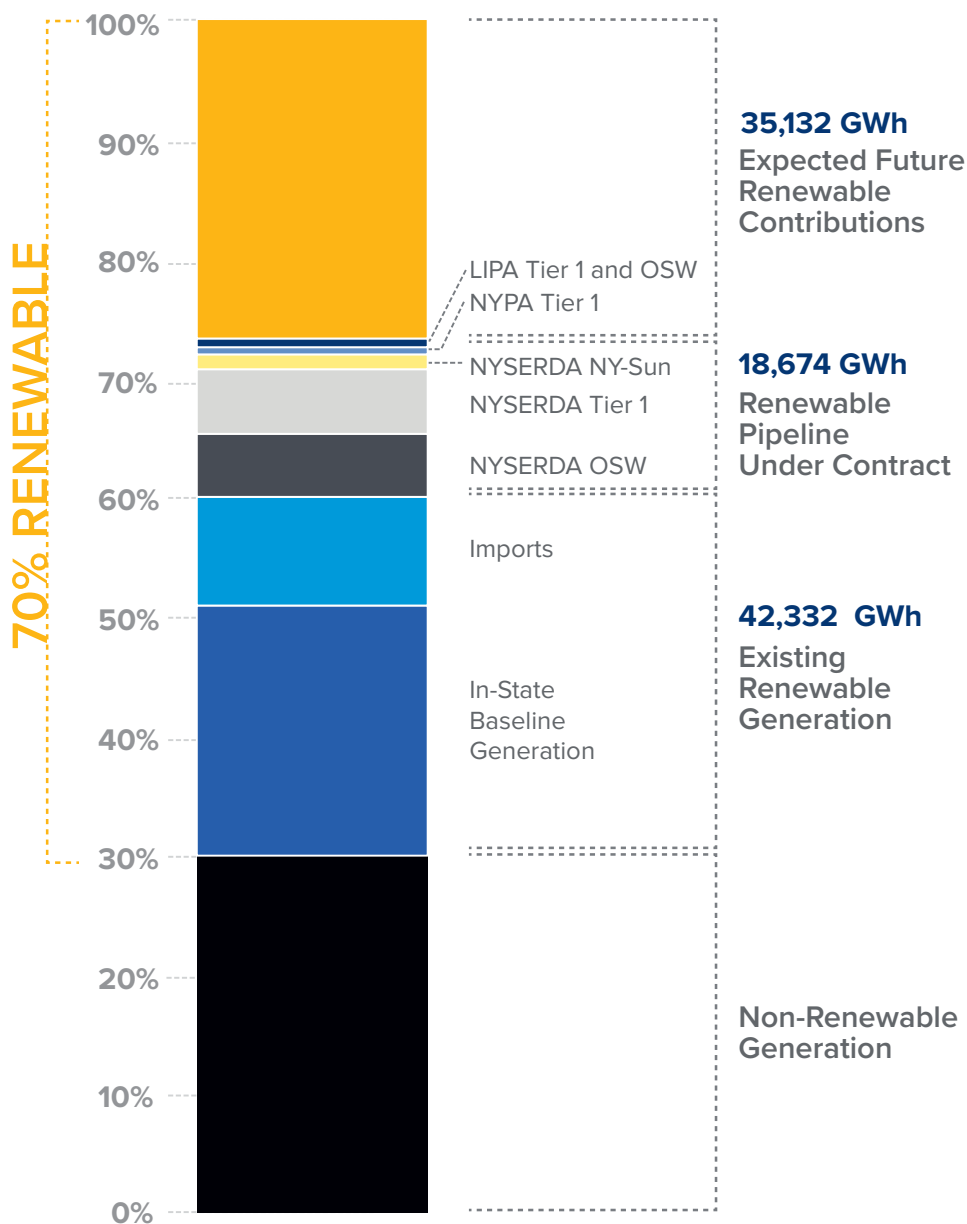


# 2030 Clean Energy Standard target: 70% electricity from renewable sources

PROGRESS TOWARDS 70X30 GOAL

**98,694 GWh to reach goal\***

*\* GWh required to meet goal is based on 2016 Clean Energy Standard Order load projection for 2030 and is subject to change.*



## HIGHLIGHTED PROGRAMS AND INITIATIVES

**Community Solar** makes solar affordable and accessible for all New Yorkers

**Solar for All** makes subscriptions to community solar projects available at no cost for low income consumers

**Solar PV + Storage** funds deployment of solar with onsite storage capacity

**Large-Scale Renewables** supports the development of dozens of large-scale renewable energy projects

**Offshore Wind** establishes significant, cost effective, renewable generation source with promise of new industry in New York

## The CLCPA ramps up renewable energy goals, including:

QUADRUPLING NEW YORK'S OFFSHORE WIND TARGET TO

# 9,000 MW BY 2035

up from 2,400 MW by 2030

DOUBLING DISTRIBUTED SOLAR DEPLOYMENT TO

# 6,000 MW BY 2025

up from 3,000 MW by 2023

New York has awarded a total of approximately **6,000 megawatts** of new large-scale renewable energy contracts since March 2018 through four separate solicitations — a globally significant advancement in renewable energy in just two years. Collectively, these projects will provide enough renewable energy to **power more than two million households** and meet **roughly 10%** of New York's electricity needs by 2025.

### PSC PROCESS TO AMEND CLEAN ENERGY STANDARD AS PER CLCPA

By June 30, 2021, PSC shall establish a program to require that:

- a minimum of 70% of statewide electricity be renewable by 2030.
- statewide electricity be zero carbon emission by 2040.

# Energy Efficiency

STATE POLICY GOAL  
FOR ENERGY EFFICIENCY

**New York set a 2025 statewide energy efficiency target of 185 TBtu of cumulative site energy savings relative to forecasted energy consumption in 2025.**

Hitting this target will mean achieving the energy efficiency goal set in the 2015 State Energy Plan five years early and will deliver nearly one-third of the greenhouse gas emissions reduction needed to meet New York's interim 40x30 climate goal, a necessary milestone in reaching the 85% reduction in GHG emissions by 2050 goal in the CLCPA. Also, energy efficiency through electrification of heating load will put New York's building sector on a course to carbon neutrality.

## Mission Outcome:

# Energy Efficiency



### NYSERDA'S ROLE

**Develop and manage programs** to eliminate barriers and increase adoption of energy efficiency, providing financial and technical assistance to solution providers and consumers, including low-income consumers.

**Develop and demonstrate strategies** to achieve deep energy savings.

**Provide technical assistance through energy codes and appliance standards** to improve energy efficiency across the State.

**Provide financing** for energy efficiency market participants.

### STRATEGIES FOR 2020–2023

- Develop a robust portfolio of programs for low-income consumers and disadvantaged communities, in coordination with utilities.
- Develop a roadmap for a statewide carbon neutral building stock which incorporates deep efficiency, more efficient heating and cooling technologies, and grid-connected capability.
- Drive deeper levels of efficiency and carbon savings in buildings using a variety of strategies including peer-based challenges, support of long-term energy planning within the capital improvement cycle, and development and demonstration of new solutions to deliver higher performing/healthier buildings.
- In partnership with utilities, launch a comprehensive building electrification initiative with consumer incentives and market support to move New York toward all-electric homes and buildings and accelerate transition away from natural gas and fossil fuel.
- Provide support for consumers in gas constrained areas of New York by providing information and assistance to adopt energy efficiency and clean heating solutions.
- Increase consumer awareness and provide decision-quality information on energy efficiency opportunities for building owners and tenants — capitalizing on key points in a building life cycle (e.g., tenant turnover, major renovations, property transfer).
- Advance applications of “Intelligent Efficiency” — using sensors, improved analytics, communications, and streamlined M&V.
- Leverage comparative data and information through strategies such as building benchmarking and labeling to drive consumer adoption of energy efficiency.
- Support statewide improvement in energy efficiency through improved appliance standards and adoption of advanced building codes, with a goal of establishing a statewide mandatory net zero-carbon building code by 2031.

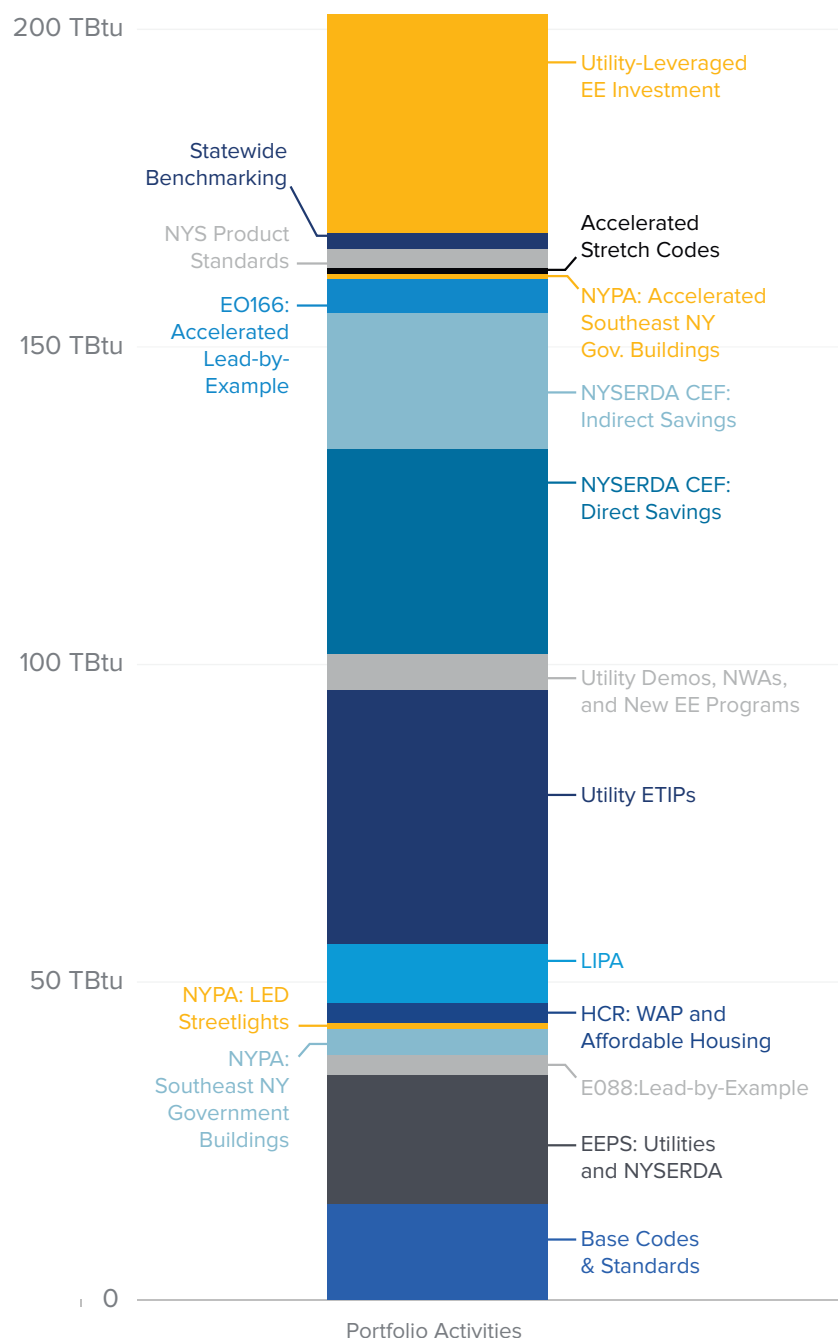


### INDICATORS OF PROGRESS

- Avoided energy use: natural gas, electricity, and combined total in Btu
- New York State's Clean Energy Dashboard, found here: [rev.ny.gov/cleanenergydashboard](http://rev.ny.gov/cleanenergydashboard)

**2025 energy efficiency targets will reduce energy consumption by the equivalent of 1.8 million homes annually and create as many as 50,000 new jobs**

# 2025 target: 185 TBtu of onsite energy savings\*



\* Graphic does not reflect roughly 15 TBtu of overlap between policies

## HIGHLIGHTED PROGRAMS AND INITIATIVES

**Healthy Homes Pilot** with Department of Health to integrate health services with home energy efficiency improvements and safety measures

**LMI Zero Energy Modular Homes** to develop the market for high efficiency modular homes

**Home Comfort** to develop standardized envelope solutions to improve energy performance and make homes heat pump ready

**Buildings of Excellence** competition for creation of net zero multifamily buildings

**New Construction** to support Net Zero Residential and Commercial buildings

**Commercial Tenant** program to improve interior office and leased spaces through design, proactive maintenance and operations, and actionable plans to reduce energy consumption

**Empire Building Challenge** to demonstrate scalable and replicable solutions for high profile commercial and multifamily buildings

**Public Service Commission Orders on New Efficiency**  
**New York more than doubled utility investment in energy efficiency. Through 2025, New York State will invest over \$6.8 Billion in energy efficiency, leveraging utilities and NYSERDA.**

# Clean Energy Economy

STATE POLICY GOAL  
FOR THE CLEAN ENERGY ECONOMY

**As a direct outgrowth of New York's efforts to transform its energy system and reduce its GHG emissions, the State has developed a large and growing green economy.**

With nearly 159,000 clean energy jobs across the State and 8.9% job growth since 2016 — double the statewide job growth average — New York's nation-leading climate policies are driving investment and job-creation in clean energy solutions like wind, solar, energy efficiency, and energy storage. Despite additional growth projected in the near-term (our jobs report forecasts more than 170,000 jobs for next year), NYSERDA and fellow agencies will need to continue to grow this workforce to ensure that companies have access to necessary skilled labor, especially in emerging sectors like clean heating and cooling.

Achieving the CLCPA's nation-leading goals will mean not only expanded deployment of existing technologies, but also substantial investment in the State's clean energy innovation economy to develop entirely new solutions for a low-carbon future. New York's ecosystem of start-ups will develop these technology and business-model solutions for demonstration and use in New York, as well as for export to markets across the globe.

NYSERDA will leverage this demand for new solutions in New York to attract clean energy companies from all ends of the supply chain looking to serve the growing local market, solidifying and expanding New York's status as a hub for companies developing and deploying innovative solutions on a global scale. To help expedite this vision for a clean energy economy, the State is placing new focus on proactive and purposeful cross-agency collaboration to attract clean energy manufacturing and supply chain companies to invest and locate in New York State.

NYSERDA will seek to unlock and mobilize private capital to further build, finance, and grow this clean energy economy. All these efforts will seek to create new economic opportunity and quality jobs for New Yorkers, including those New Yorkers who have been historically disadvantaged and who may be affected by the transition away from fossil fuels.

## Mission Outcome:

# Clean Energy Economy



### NYSERDA'S ROLE

**Address barriers** to mobilization of private capital **and financing** for clean energy projects.

**Foster capital attraction** and support commercialization of products and services from clean energy startups, as well as innovative utility rate structures.

**Unlock new job growth**, such as offshore wind port infrastructure investments and competitions for deep commercial building retrofits.

**Provide workforce development programs** to develop the human resources needed to build the clean energy economy, support a just transition for historically disadvantaged populations and industries affected by the transition away from fossil fuels, and support host communities with a site reuse toolkit and consulting assistance.

### INDICATORS OF PROGRESS

- Clean energy jobs
- Commercialized solutions to building electrification needs and related revenues
- Launch of incubated firms
- “Mobilization ratio” of total capital to NY Green Bank capital

### STRATEGIES FOR 2020–2023

#### NY Green Bank

- Invest in clean energy and sustainable infrastructure, including in support of priority energy efficiency and energy storage initiatives.
- Begin deploying \$100m in EV-related financing, as announced in 2020 State of the State.
- Continue efforts to raise at least \$1 billion in private capital.
- Continue issuing targeted RFPs and organizing convenings in strategic areas to grow the clean energy investment pipeline.

#### Innovation

- Support development of innovative solutions to electrify and reduce the heating and cooling loads of buildings through advanced heating & cooling solutions and advanced building cladding, including phase change materials, and healthy, pollutant-free insulation.
- Develop advanced EV-enabling technologies and smart mobility solutions to reduce GHGs and air pollutants harmful to human health.
- Support integrated grid planning to enable connected buildings, electric vehicles, and other grid edge, including developing the technology and equipment that can enable grid interactivity, as well innovative utility rate structures and tariffs that will drive end users to buy and implement the technology.
- Lead National Offshore Wind R&D Consortium.
- Co-lead Blue Ribbon Task Force on EVs with Professor Whittingham.

#### Workforce Development

- Ensure that individuals working in conventional energy industries are provided with training and opportunities in the growing clean energy economy.
- Ensure training curricula and programmatic support respond to industry needs.
- Provide targeted support to offset risks that might prevent clean energy firms from hiring or training.
- Deploy additional \$40m announced in 2020 State of the State to train 40,000 workers over the next five years.
- Support launch of \$20m Offshore Wind Training Institute and establishment of SUNY partnerships to meet industry ramp-up.



## NYSDERDA'S ROLE: SUPPORT BY STAGE



### Startup Formation

- Proof-of-Concept Centers



### Achieve Proof-of-Concept

- Proof-of-Concept Centers
- Incubators
- Entrepreneurs-in-Residence
- Research, Development, and Demonstration Grants and Collaboration



### Develop and Market Test

- Proof-of-Concept Centers
- Incubators
- Ignition Grants
- Entrepreneurs-in-Residence
- Co-Investment Fund
- Research, Development, and Demonstration Grants and Collaboration



### Commercialize

- Incubators
- Ignition Grants
- Manufacturing Corps
- Entrepreneurs-in-Residence
- NYS Cleantech Venture Exchange
- Co-Investment Fund
- 76West
- Research, Development, and Demonstration Grants and Collaboration



### Launch at Scale

- Manufacturing Corps
- Entrepreneurs-in-Residence
- NYS Cleantech Venture Exchange
- Co-Investment Fund
- 76West
- Business Model Innovation
- Research, Development, and Demonstration Grants and Collaboration

## HIGHLIGHTED PROGRAMS AND INITIATIVES

**NY Green Bank** works with the private sector to increase investments into New York's clean energy markets

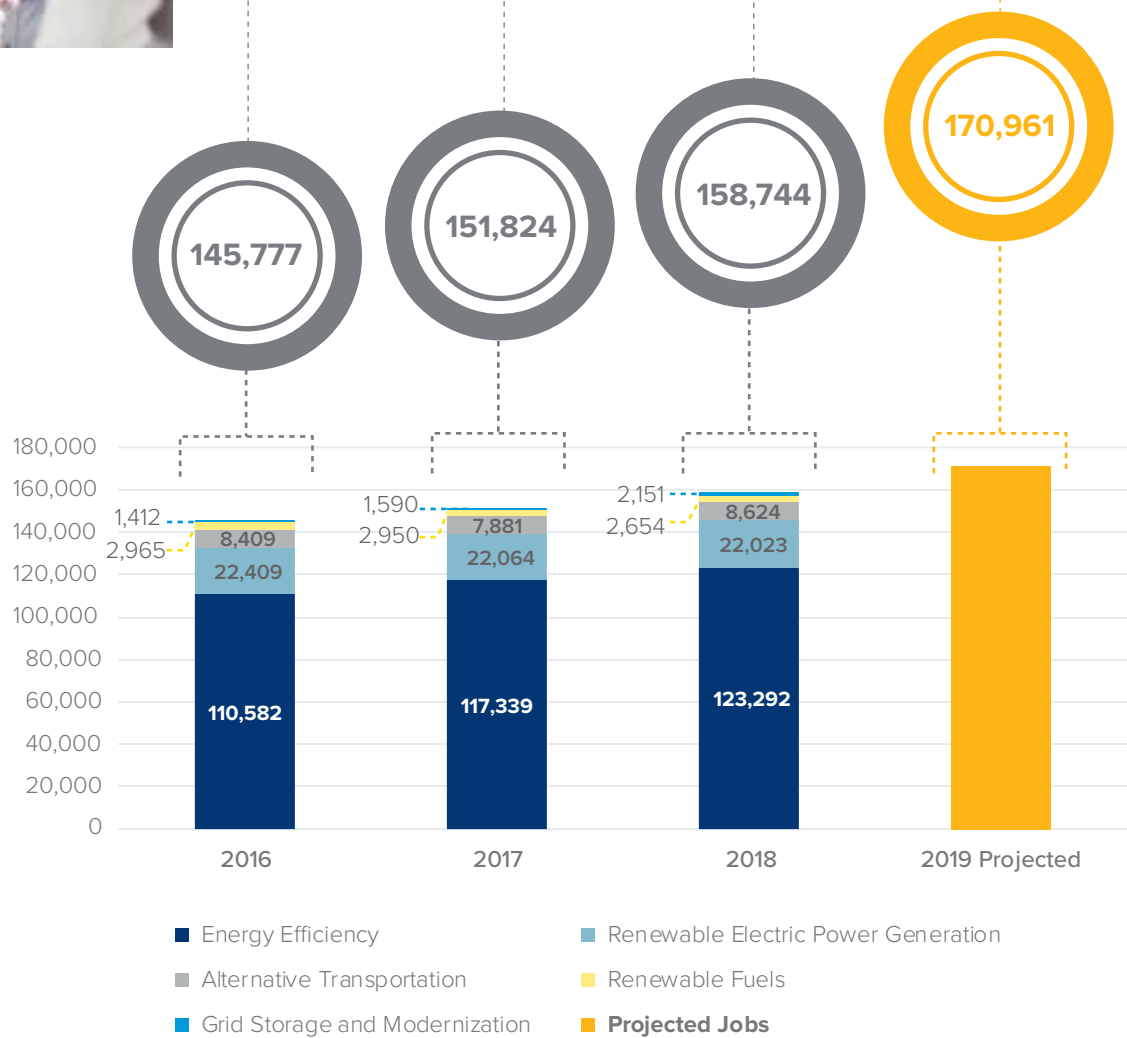
**Innovation** supports companies involved in sustainability and reducing energy usage and carbon emissions, with a focus on those conducting applied research through Series B, with a suite of strategically located resources

**Workforce Development** supports training for building management staff; on-the-job training for new clean energy workers; and clean energy sector talent pipeline

**New York's clean energy industry is already one of the fastest-growing sectors in New York's economy**

# CLEAN ENERGY JOBS ACROSS TECHNOLOGY CATEGORIES, 2016–2018

Source 2019 Clean Energy Industry Report



# Resilient and Distributed Energy System

STATE POLICY GOAL  
FOR THE ENERGY SYSTEM

**New York State aims to modernize the electric grid in ways that improve resilience to disruption, enable greater flexibility, reduce costs, and support the integration of higher volumes of distributed and renewable energy resources.**

These goals stand on their own but are also critical sources of system stability as New York progresses toward its 70x30 renewables target and addresses climate-driven and other hazards to energy system functions.

## Mission Outcome:

# Resilient and Distributed Energy System



### NYSERDA'S ROLE

**Ensure resiliency** is factored into State programs and investment in clean energy infrastructure.

**Spur development and integration** of smart grid technologies.

**Provide information and insight** about distributed energy resource integration for policymakers and stakeholders.

### STRATEGIES FOR 2020–2023

- Incorporate resilience considerations into NYSERDA programs, to ensure that investments are protected against future climate impacts.
- Maximize renewable energy content in resiliency solutions, including pairing renewables, storage and Distributed Energy Resources (DER) for on-site resiliency.
- Explore cost reductions through smart grid technologies.
- Continue to support research and development activities for the State that strengthen our analytical understanding of the energy system in transition and the environmental benefits and impacts that such changes will bring to ensure promotion of robust, well-informed policy measures.
- Promote localization of workforce development and economic benefit opportunities to strengthen socio-economic resiliency in our State's transition to the CLCPA goal, particularly in low-income and disadvantaged communities.



### INDICATORS OF PROGRESS

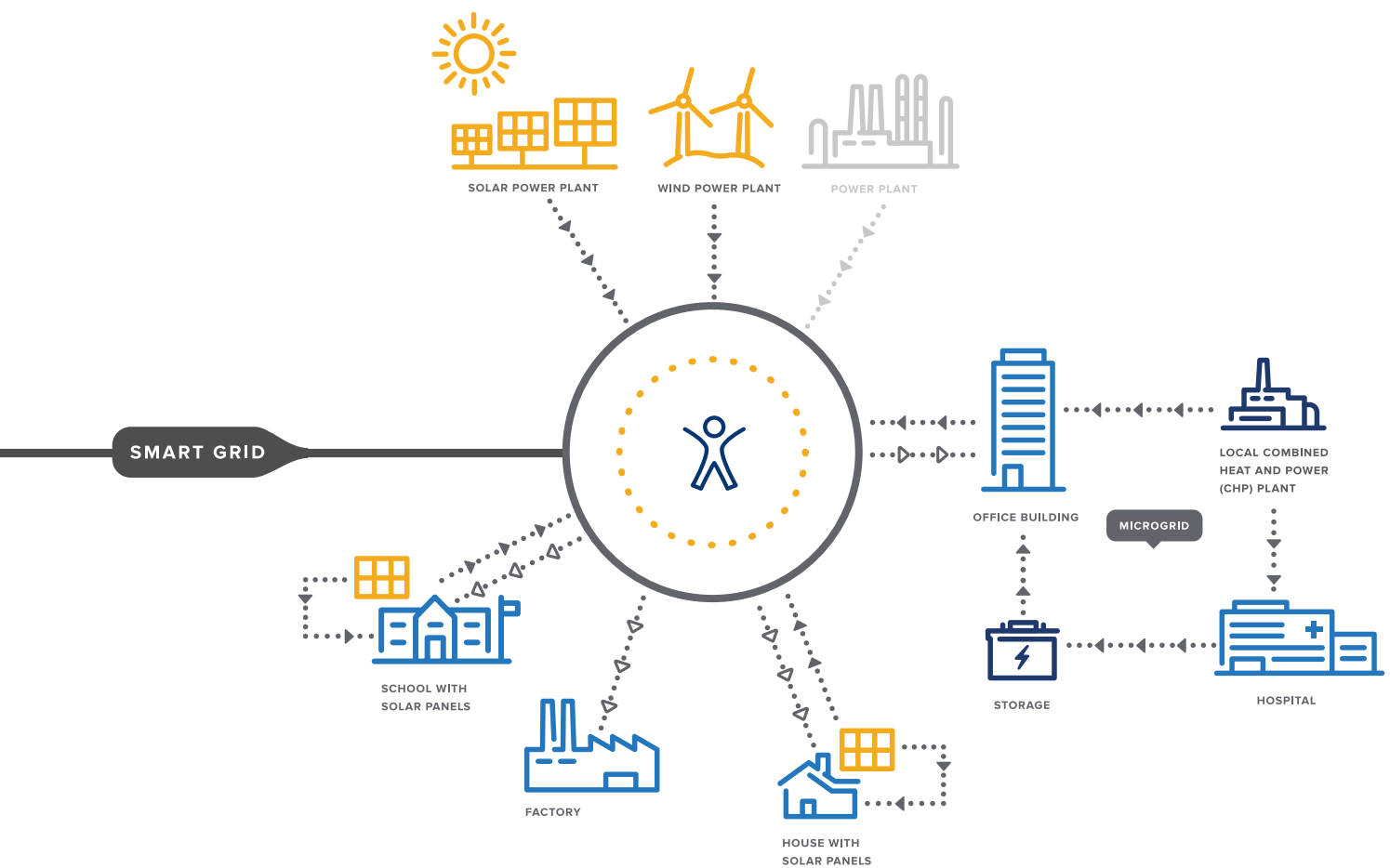
- Progress toward storage deployment goal 3,000 megawatts by 2030
- Solutions to grid challenges developed

### HIGHLIGHTED PROGRAMS

**Future Grid Challenge** helps solve technical challenges utilities face with energy transmission and distribution when integrating renewable energy resources

**Energy Storage** engages those involved in building, installing, integrating, or researching energy storage technology

**Fuel NY** makes fueling stations resilient to power system outages



# Building a Resilient Energy System



## LONG-TERM VISION AND VALUE PROPOSITION

**With billions of dollars committed to the clean energy sector, the State's transition to a carbon-free economy needs to be done in a resilient, sustainable manner that anticipates the long-term impacts associated with climate change.**

## KEY CHALLENGES/BARRIERS

- Climate change is expected to have a diverse range of impacts across New York State within this century—increased temperatures, sea level rise, and increased frequency of extreme events such as heat waves, heavy downpours, and coastal flooding—requiring strategies that allow systems to adapt to future climate conditions.<sup>1</sup>
- Climate resilience is an emerging area of study within clean energy; approaches and methods to bolster resilience in clean energy programs need to be developed.
- A balance needs to be struck in optimizing for maximum resilience benefit without impeding clean energy deployment.
- Difficulty quantifying the full value of resilience.

## PRIORITY ACTIONS FOR NEW YORK

- Improve the State's resilience to the impacts of climate change, including both physical assets and the populations they serve.
- Exercise a global leadership role on both GHG mitigation and climate change adaptation.
- Protect low-income and disadvantaged communities from the impacts of climate change and severe weather events.
- Assess the risks of climate change on proposed energy infrastructure projects in the State.

## NYSDERDA KEY ACTIONS FOR 2020-2023

- **Incorporate resiliency provisions into PV, offshore wind, and large-scale renewables** in order to ensure the investments are protected against future climate impacts. This will include working with the New York State offshore wind regulatory working group to ensure that offshore wind projects are designed and permitted in a way that considers climate resilience (e.g. substation upgrades, cable burial depths), as well as assessing opportunities to better direct large scale renewables siting to areas that present lower land-use and ecosystem conflicts and greater grid resiliency benefits.
- **Develop a framework and toolkit** for deployment across other NYSDERDA infrastructure investments to incorporate resilience into decision-making processes.
- **Accelerate adoption of the resilience framework** and consideration for initiatives with near-term structural decisions such as the CEF, CES and NY-Sun filings with the Department of Public Service.
- **Address siting in high-risk locations** (e.g., future flood zones) and develop guidance for programs such as NY-Sun, Energy Storage, Large-Scale Renewables, and New Construction through provision of information and, where necessary, enhanced technical requirements.
- **Explore passive survivability** (i.e., the ability of a building to maintain critical life-support conditions during a loss of power) to better understand the role of deep efficiency in increasing the ability of building occupants to weather power outages.
- **Identify and articulate the resiliency co-benefits of energy efficiency and clean energy measures** (e.g., passive survivability) to increase market adoption of these measures by demonstrating the multiple benefits to the customer.
- **Explore strategies that maximize resiliency benefits** from on-site energy storage and renewable technologies during grid outages and extreme weather events
- **Explore strategies** to better understand the vulnerability of and increase the resiliency of beneficial electrification and clean heating systems.

<sup>1</sup> [nyserda.ny.gov/ClimAID](https://www.nyserda.ny.gov/ClimAID)

# Energy Affordability and Equity



## LONG-TERM VISION AND VALUE PROPOSITION

**With the signing of the CLCPA, equity in climate outcomes for disadvantaged communities is a co-equal objective to achieving emissions reductions.**

The adoption of clean energy solutions can drive long-term energy affordability impacts and improve the health and safety of residents. As the clean energy economy continues to develop, NYSERDA will work with other State agencies, utilities, industry, and communities to identify solutions to scale the adoption of clean energy technologies and ensure access to clean energy solutions for low- to moderate-income (LMI) residents and disadvantaged communities.



## KEY CHALLENGES/BARRIERS

- 48% of New Yorkers are low- and moderate-income consumers who on-average face significant energy burdens.
- Access to capital, split incentives, and fragmented administration of key programs present barriers to scaling adoption of clean energy solutions in the LMI market segment.
- Size of income-eligible/disadvantaged population requires innovative approaches to achieve scale.

## PRIORITY ACTIONS FOR NEW YORK

- Align State resources and strategy to increase public investment in energy affordability and access.
- Expand reach of energy efficiency and weatherization programs.
- Leverage regulatory, policy, and financing mechanisms to increase adoption of clean energy solutions in affordable housing.
- Introduce energy storage and on-site generation as a measure to provide resilience in disadvantaged communities.
- Advance equity in clean transportation.
- Improve transparency and accountability to stakeholder input; increase participation of community members in decision making.

## NYSDERDA KEY ACTIONS FOR 2020-2023

- **Carry out CLCPA requirements** in coordination with the Climate Action Council and associated working groups.
- **Implement a statewide LMI portfolio** with the investor-owned utilities that increases the impact of ratepayer-funded LMI initiatives.
- **Invest in development of replicable models** for achieving a healthier built environment and carbon neutrality in LMI and otherwise disadvantaged communities.
- **Identify scalable models** for adoption of heat pump solutions/beneficial electrification in the LMI market segment.
- **Invest in the development of carbon neutral and zero energy modular new construction** as an alternative to traditional manufactured housing and an option for urban infill applications.
- **Provide targeted clean energy job opportunities and training** for priority populations to support a just transition, along with support and resources for host communities navigating power plant retirement.
- **Improve community-level outreach and engagement** to increase access to clean energy solutions and improve energy literacy.

**Provide opportunities for under- or unemployed individuals to access clean energy job opportunities.**

**Expand access to solar for LMI households, communities, and affordable housing.**

**Quantify and maximize health and other non-energy benefits associated with clean energy improvements in LMI communities.**

# Decarbonizing Transportation



## LONG-TERM VISION AND VALUE PROPOSITION

**The transportation sector is the largest source of greenhouse gas emissions in New York.**

Achieving New York's emissions reduction goals will require widespread shifts to zero-emission vehicles paired with an expansion of the availability and use of efficient transportation modes, like public transit, biking, and walking. By identifying new market opportunities and facilitating the adoption of new technologies, strategies, and policies, NYSERDA can make electric vehicles and other clean transportation options more affordable, accessible, and widely available across New York State.

## KEY CHALLENGES/BARRIERS

- Federal rollback of fuel economy standards, California waiver.
- High price differential between EVs and gasoline/diesel vehicles, lack of vehicle models available.
- Low consumer awareness and acceptance of EVs, especially among LMI customers.
- Lack of solutions for minimizing grid impacts of fast charging and maximizing grid benefits through off-peak charging.
- Slow expansion of new mobility services and technologies beyond major urban centers due to resource constraints, lack of documented benefits.
- Lack of public transit service outside NYC, stress on the public transit system in NYC.

## PRIORITY ACTIONS FOR NEW YORK

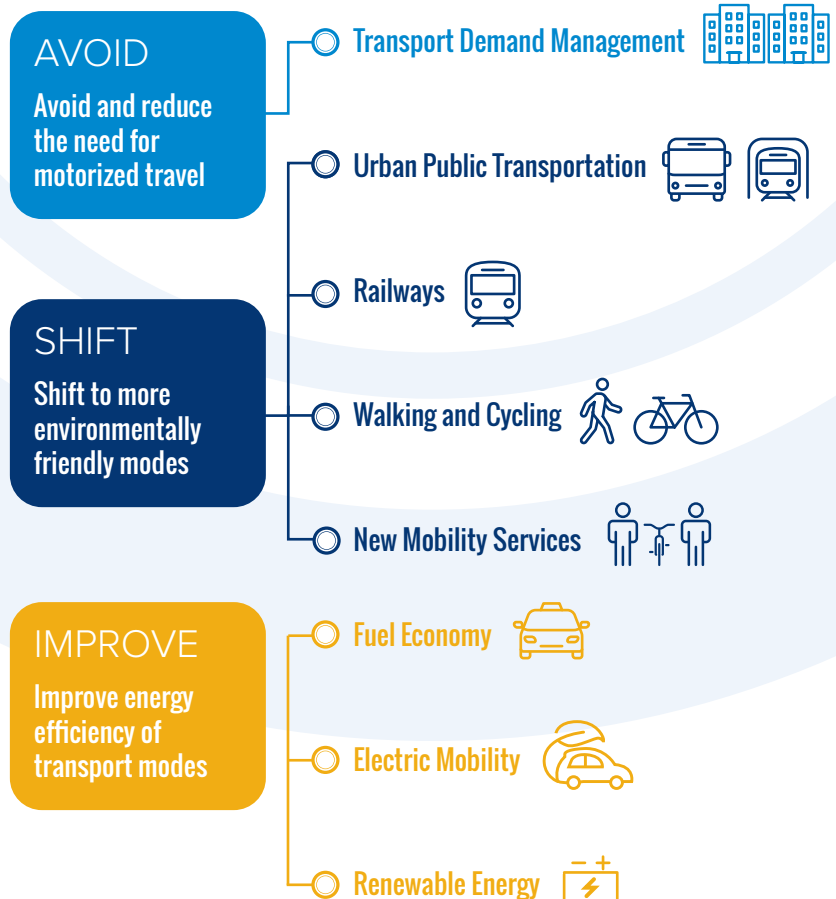
- Develop comprehensive transportation strategy to achieve goals of CLCPA.
- Continue working with CA and other states to protect ZEV mandate.
- Develop new strategies and financing opportunities for vehicle electrification and smart mobility solutions.
- Expand charging infrastructure to support growing number of EVs on the road while minimizing impacts and costs for the electric grid.
- Engage partners to increase consumer awareness and acceptance of EVs.
- Increase availability of clean mobility options and transportation modes — transit, biking, walking, and shared mobility — across urban, suburban, and rural settings, with particular focus on disadvantaged populations.
- Explore and institute market-based mechanisms for reducing transportation sector GHG emissions to support broader investment in clean transportation choices.

## NYSDOT KEY ACTIONS FOR 2020-2023

- **Develop clean transportation roadmap** to identify market needs and policies to meet them.
- **Co-lead Blue Ribbon Task Force on EVs** with Professor Whittingham of Binghamton University, as announced in Governor Cuomo's 2020 State of the State address.
- **Continue flagship Charge NY incentive programs** and expand their reach to more LMI customers.
- **Support new product development** and innovative demonstrations of clean transportation technologies and services.
- **Initiate mobility competition** to support new, integrated mobility options in small- and medium-sized cities.
- **Work with NY Green Bank and private sector partners** to expand financing options for new transportation products and services, begin deploying \$100m in EV-related financing as announced in 2020 State of the State.
- **Support efforts by community-based groups** to engage and educate consumers about EVs and other clean transportation options.

### KEY ELEMENTS

### POLICY EXAMPLES



# Electrification of Buildings



## LONG-TERM VISION AND VALUE PROPOSITION

**New York State will be investing over \$450 million in heat pump incentives through utilities and over \$200 million in market enabling support through NYSERDA.**

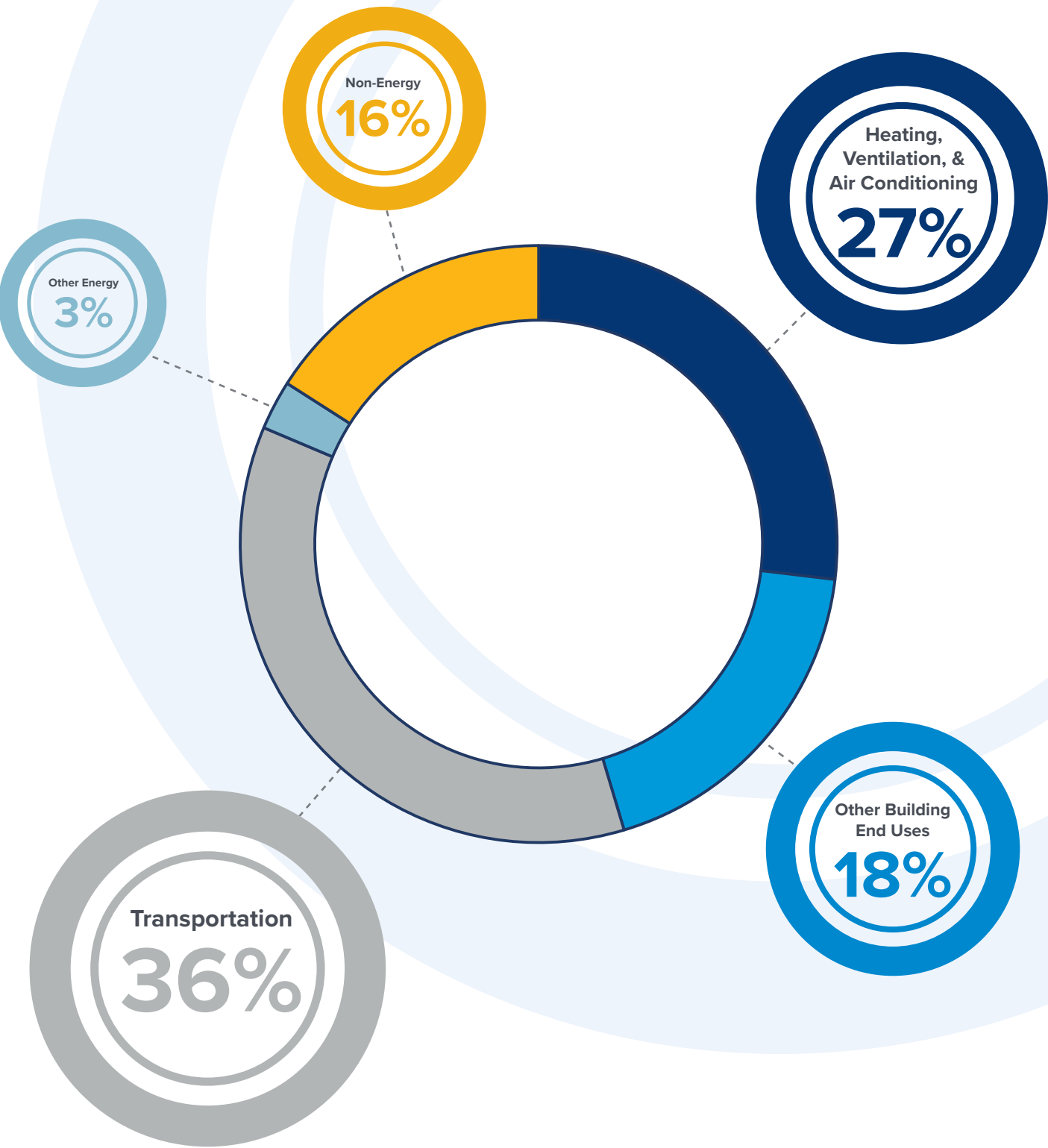
Achieving New York's aggressive emissions reduction goals will require a complete transformation in how New Yorkers heat and cool buildings, moving from fossil fuel-based systems to all-electric clean energy homes and buildings.

This new initiative, called NY-Clean Heat, will pair consumer incentives with market-enabling initiatives to deliver electrification solutions to New Yorkers.

By increasing the adoption of cutting-edge clean energy technologies such as air source and ground source heat pumps, building electrification will become a critical component of the transition to a carbon-neutral economy as directed by the CLCPA. The initiative will transform the marketplace for heating in New York, and initial activities will be designed to grow the clean heat installer market and deliver a 20% reduction in installation cost by 2025, putting New York at the center of the regional market for these technologies in the Northeast.

These efforts will also specifically seek to grow New York's green economy by incorporating efforts to attract global supply chain investments in this new and significant market for the industry. The building electrification initiative will also prioritize investments in and support for low-income New Yorkers, improving energy affordability and health outcomes, and advancing the objectives of the CLCPA.

ESTIMATED GHG EMISSIONS FROM HEATING AND COOLING  
AS A SHARE OF TOTAL NEW YORK STATE EMISSIONS IN 2016



## KEY CHALLENGES/BARRIERS

- High costs to electrify systems compared to fossil fuel alternatives.
- Lack of consumer awareness and education about clean heating and cooling options.
- Shortage of qualified labor such as installation and service technicians needed to rapidly scale the market.
- Reluctance in the HVAC and general contractor communities in transitioning their business and service models away from fossil fuel systems.

## PRIORITY ACTIONS FOR NEW YORK

- Develop a long-term roadmap for advancing all-electric clean homes and buildings in New York consistent with the goals of a carbon-neutral economy.
- Provide consumer incentives through New Efficiency New York to increase the affordability of electrification solutions for residents and businesses in New York while delivering 4.6 Trillion Btu of energy savings.
- Build market capacity, expand product availability, and drive cost reductions in electrification solutions such as air source and ground source heat pumps.
- Review natural gas policy structure to ensure that alternative heating solutions can compete on a level playing field.

## NYSERDA KEY ACTIONS FOR 2020-2023

- **Workforce development for building electrification and energy efficiency** — Increase pool of skilled labor and industry partnerships to rapidly scale the nascent heat pump industry, providing economic opportunity for New Yorkers, including by making use of \$40 million in workforce development funding announced in 2020 State of the State.
- **Beneficial Electrification for Low-and-Moderate Income (LMI) Consumers** — Support development of electrification solutions that can benefit LMI consumers, addressing both affordability and technical issues associated with the low-income building stock.
- **Consumer Awareness and Market Engagement for Clean Heat and Energy Efficiency** — Ensure that New Yorkers are aware of clean energy alternatives for heating and cooling homes and businesses, while reducing energy waste. Build demand and reduce customer acquisition costs for heat pumps and energy efficiency.
- **Clean Heat Community Engagement and Assistance** — Provide support to communities and local groups to stimulate adoption of heat pumps along with building envelope solutions, while leveraging local labor.
- **Clean Thermal District System** — Test and demonstrate potentially scalable models for clean thermal district systems, using a NY-Prize style approach.
- **Clean Heat Supply Chain Development** — Support development activities to draw larger HVAC companies and general contractors into the heat pump business and grow businesses that are selling/servicing heat pumps.
- **Heat-Pump-Ready Buildings** — Build markets for insulation and air sealing services to accompany new heat pump solutions, to reduce thermal load and peak energy demands and increase home comfort.
- **Energy Audits and Financing** — Provide consumers with decision-quality information and financing options to enable uptake of energy efficiency and heat pumps.
- **Innovations/Demonstration of Building Electrification Solutions** — Demonstrate heat pump technologies (and other carbon-reducing solutions) in large commercial/multifamily buildings — working with portfolio property owners to define technical needs and performance specs, engaging manufacturers to deliver/tailor products to meet NY building needs, and supporting cost-shared demonstration of solutions in New York. In addition, support advanced technology development in key areas related to electrification, including thermal storage.
- **Identify Innovation/R&D Needs** to achieve carbon neutral buildings.

# Zero Carbon Buildings



# Funding Commitments

## FUNDING SOURCES

**Several funding sources help NYSERDA advance the State's clean energy goals and achieve the Authority's mission. NYSERDA invests these funds in a fiscally responsible manner that maximizes benefits to New Yorkers, fills critical gaps, and addresses the needs of the market.**



## Clean Energy Fund

Authorized by the Public Service Commission (PSC) and derived from an assessment on retail sales of electricity by State utilities — it is comprised of four portfolios: Market Development, Innovation and Research, NY-Sun, and NY Green Bank.

## Clean Energy Standard

As authorized by the PSC, these funds are realized by NYSEDA through the sale of Tier 1 Renewable Energy Credits (RECs), Offshore Wind Renewable Energy Credits (ORECs), and Zero Emission Credits (ZECs) as well as receipt of Alternative Compliance Payments from New York's Load Serving Entities (LSEs). Through PSC orders, LSEs are obligated to meet annual compliance obligations for RECs, ORECs and ZECs. As needed, utility financial backstop collections may be called upon to meet funding shortfalls.

## Regional Greenhouse Gas Initiative (RGGI)

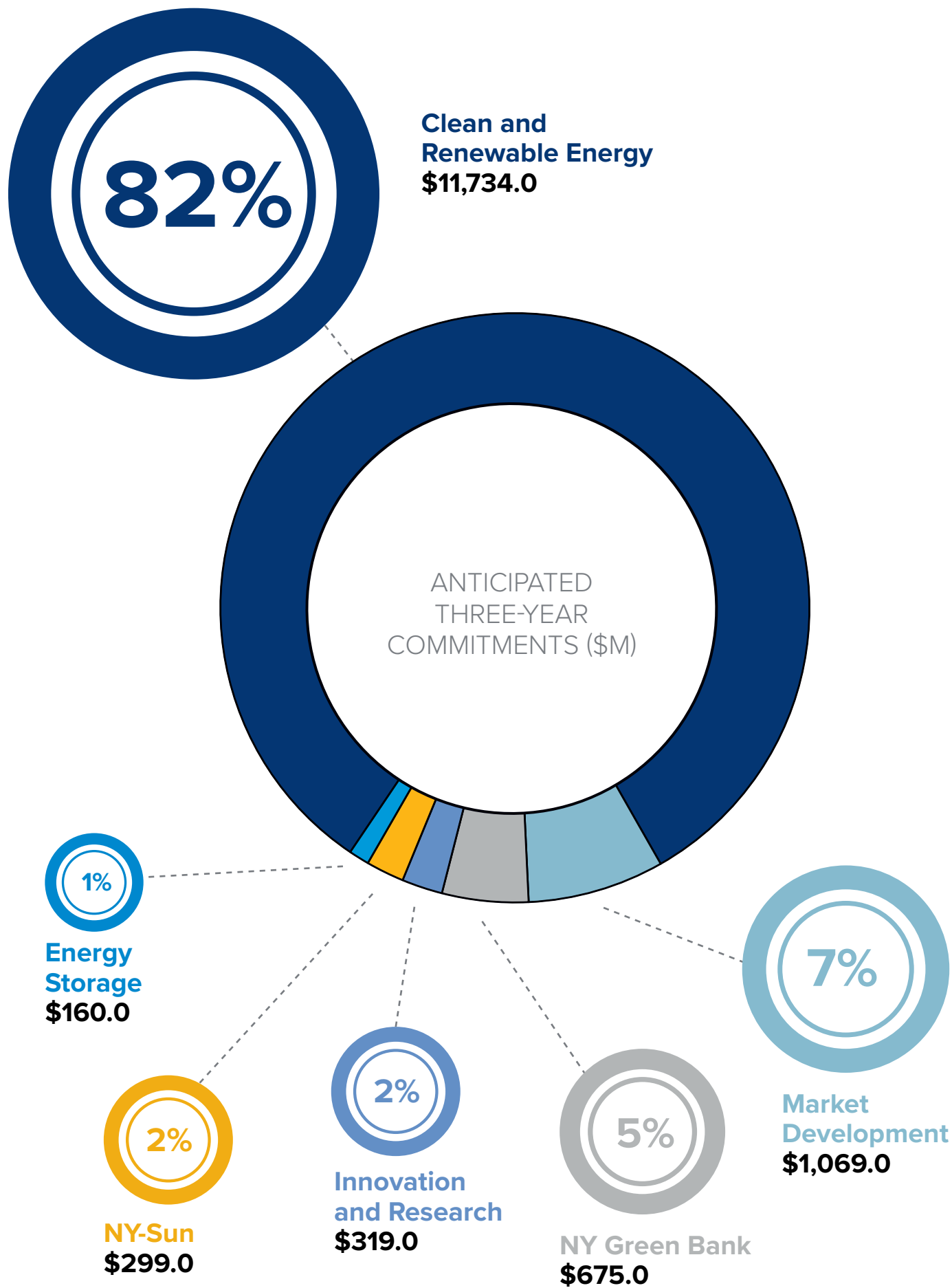
Derived from sale of carbon emission allowances as set forth in 6 NYCRR Part 242 and 21 NYCRR Part 507. The amount of revenues available is dependent on the variable auction prices for the allowances. Per requirements in 21 NYCRR 507, RGGI funds are used to advance energy efficiency, renewable energy, and carbon abatement projects in New York State.

## Other Funds

Includes sources provided by various sponsors used for specific purposes. Public funds are leveraged considerably with private sector funding through NYSEDA programs.

## ANTICIPATED COMMITMENTS (APRIL 1, 2020-MARCH 31, 2023)

INVESTMENT AREAS AND PRIORITY INITIATIVES	ESTIMATED 3-YEAR INVESTMENT LEVEL	% OF TOTAL	<div> RENEWABLES ENERGY EFFICIENCY EMISSIONS REDUCTIONS CLEAN ENERGY ECONOMY DISTRIBUTED ENERGY SYSTEM </div>				
			<div> NYSEDA MISSION OUTCOME(S)  ICONS INDICATE RELEVANCE FOR PLANNED FUNDING </div>				
Renewable and Clean Energy	\$ 11,734,446,000	82%					
Market Development	\$ 1,068,935,000	7%					
NY Green Bank	\$ 675,000,000	5%					
Innovation and Research	\$ 319,021,000	2%					
NY-Sun	\$ 298,692,000	2%					
Energy Storage	\$ 159,894,000	1%					
<b>Total</b>	<b>\$ 14,255,988,000</b>						



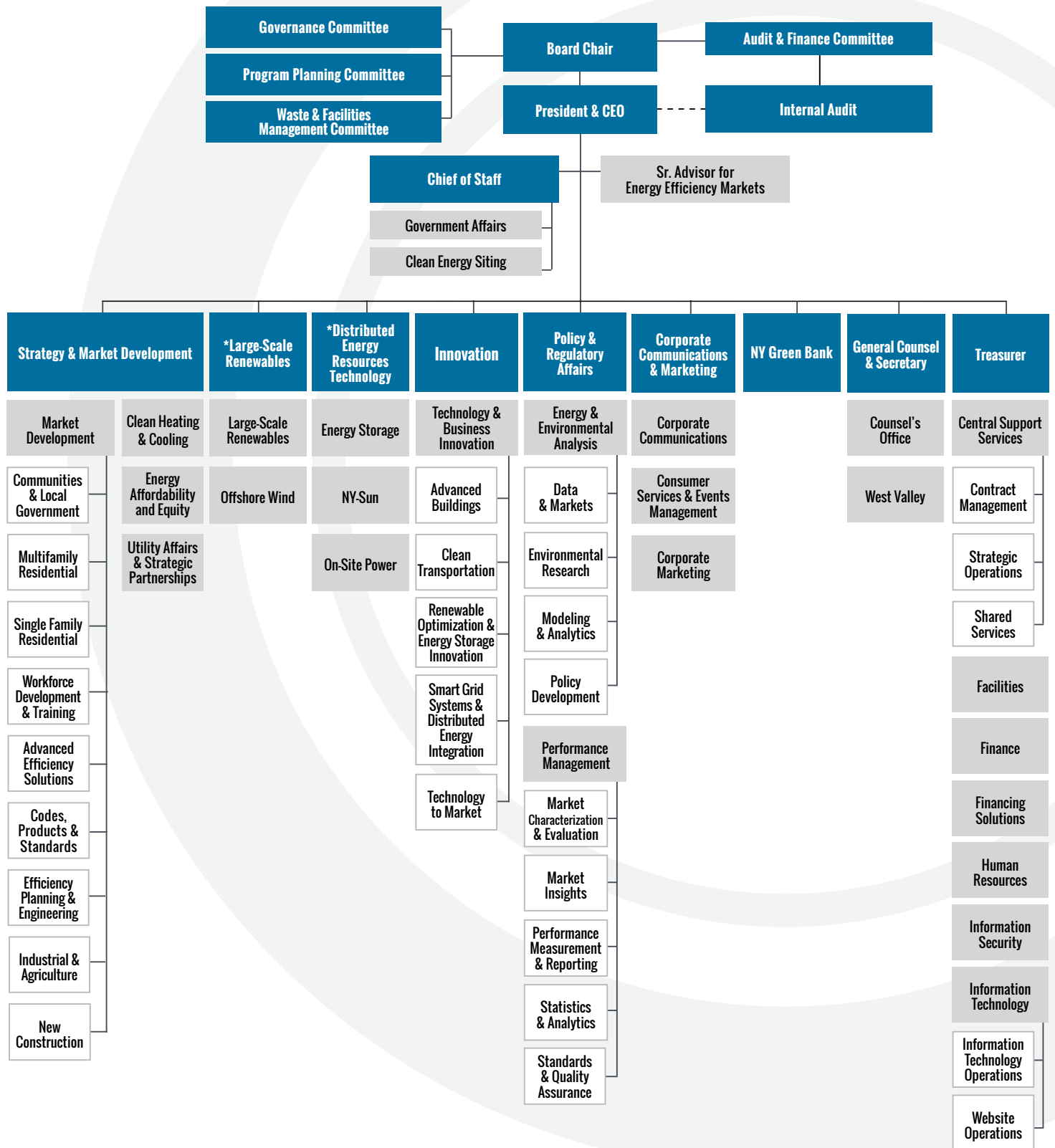
This page intentionally left blank

# Appendix

## NYSERDA'S STRUCTURE

**NYSERDA is a public benefit corporation that was created in 1975 under Article 8, Title 9 of the State Public Authorities Law.**

NYSERDA is governed by a board consisting of 13 members, including the commissioner of the Department of Transportation, the commissioner of the New York State Department of Environmental Conservation, the chair of the New York State Public Service Commission, and the president and CEO of the New York Power Authority, who all serve ex officio. The remaining nine members are appointed by the Governor with the advice and consent of the State Senate and include, as required by statute, an engineer or research scientist, an economist, an environmentalist, a consumer advocate, an officer of a gas utility, an officer of an electric utility, and three at-large members. The board chair is designated by the Governor.



\* While not shown as part of Market Development organization, these areas are included in the Clean Energy Fund Market Development Chapter.

## NYSERDA BOARD MEMBERS

**Richard L. Kauffman**

NYSERDA Chair

**Sherburne B. Abbott**

Vice President for Sustainability Initiatives and  
University Professor of Sustainability Science and Policy, Syracuse University

**Charles Bell**

Programs Director, Consumers Union

**Kenneth D. Daly**

President of New York Business, National Grid

**Kate Fish**

Executive Director, Adirondack North Country Association

**Jay L. Koh**

Managing Director and Founder, Lightsmith Group

**Mark A. Willis**

Senior Policy Fellow, New York University, Furman Center

**Gil Quiniones**

President and CEO, New York Power Authority

**John B. Rhodes**

Chair, New York State Public Service Commission

**Basil Seggos**

Commissioner, New York State Department of Environmental Conservation

**Marie Therese Dominguez**

Commissioner, New York State Department of Transportation

This page intentionally left blank



**State of New York**

Andrew M. Cuomo, Governor

**New York State Energy Research and Development Authority**

Richard L. Kauffman, Chair | Alicia Barton, President and CEO