



# Energy in Transition

The shift to carbon-free sources of energy



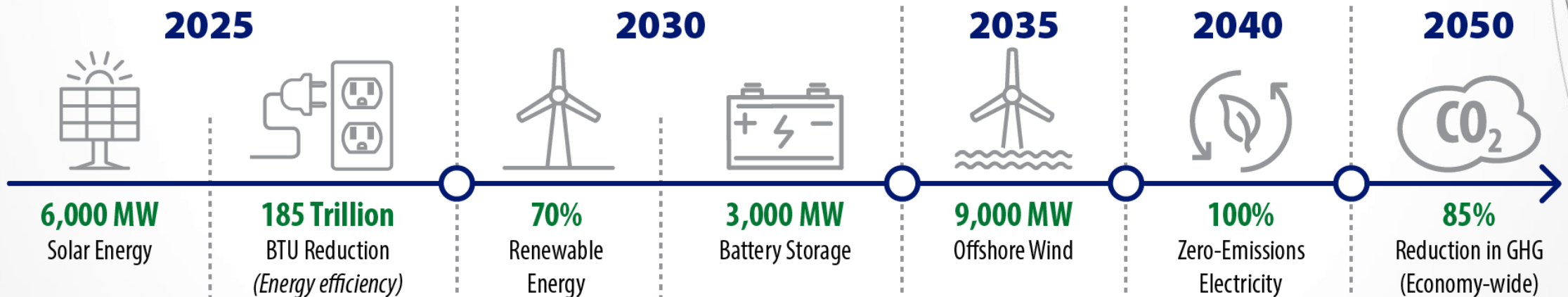
# Climate Leadership & Community Protection Act

**NEW YORK:** Enacted in 2019

**GOAL:** Slash emissions to protect the environment and establish New York as a national leader in combating climate change

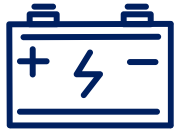
**SCOPING PLAN:** Developed by the 22-member Climate Action Council, Lead by the New York Energy Research and Development Authority and the New York Department of Environmental Conservation

## New York's CLCPA goals:



# Scoping Plan

**Accelerate towards emissions-free renewable energy and electrification of heating and transportation**



*ENERGY PRODUCTION  
(USING RENEWABLES)  
AND STORAGE (USING  
BATTERIES)*



*SUPPORT  
FOR ELECTRIC  
VEHICLES*



*BUILDING HEATING  
TRANSITIONED TO  
HEAT PUMPS*



*ELECTRIFICATION  
OF INDUSTRIAL  
PROCESSES*

# Factors to Consider

We must balance the importance of accelerating the decarbonization of the grid with reliability and affordability for customers.

## PROS:

On paper, moves New York towards a leadership position in reducing emissions to combat climate change.

## CONS:

- Prescriptive measures and tight timeline limit options; raise costs, potentially jeopardize grid integrity;
- Eliminates use of natural gas, and abandons the pipeline system that could deliver newer, emissions-free alternatives;
- Silent on use of emissions-free nuclear resources;
- The \$300 billion estimated cost is likely understated, and could approach or exceed \$1 trillion over the next 30 years;
- Energy intensive businesses and industries representing more than 400,000 jobs may close or relocate out-of-state due to fuel restrictions and high energy costs.

# Our Position



**We agree:**

**Emissions must be reduced to protect the environment.**

- This must be accomplished affordably while also maintaining the integrity of the grid, preserving our economic base and meeting our current and future energy needs.
- New York's climate laws, while laudable, will likely have unintended consequences that raise costs and compromise energy availability.
- Central Hudson, as well as many other stakeholders, offers recommendations on how we can move forward in reducing emissions while ensuring a robust, affordable and viable energy system.

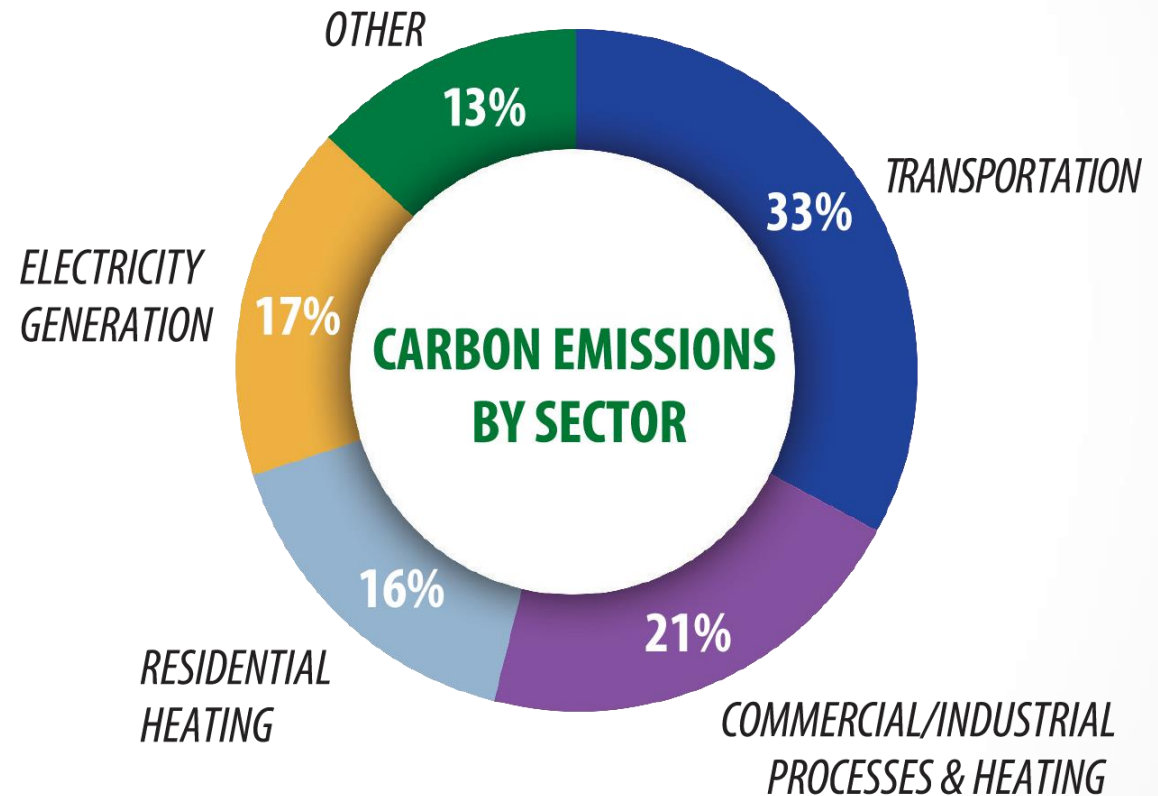
# Sources of Air Emissions in New York

**New York State utilities do not own or operate base-load generating plants.**

Electric generation is provided by private companies since the state deregulated energy production in 2000.

From 1990 to 2019, **emissions from electric generation declined by nearly 65%** due primarily to the switch from coal to natural gas.

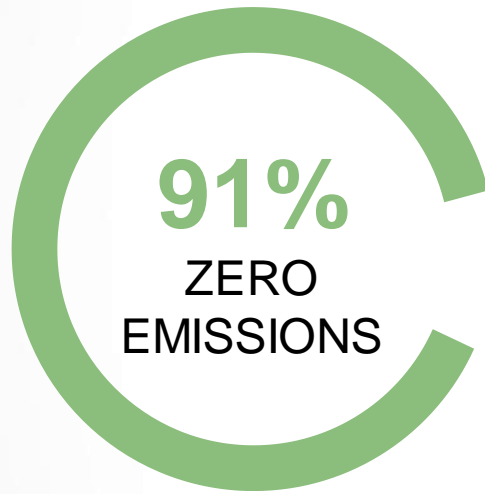
Total carbon dioxide emissions in New York have **declined by more than 40%** from 1970 to 2019, while nationally rose more than 20% during the same period.



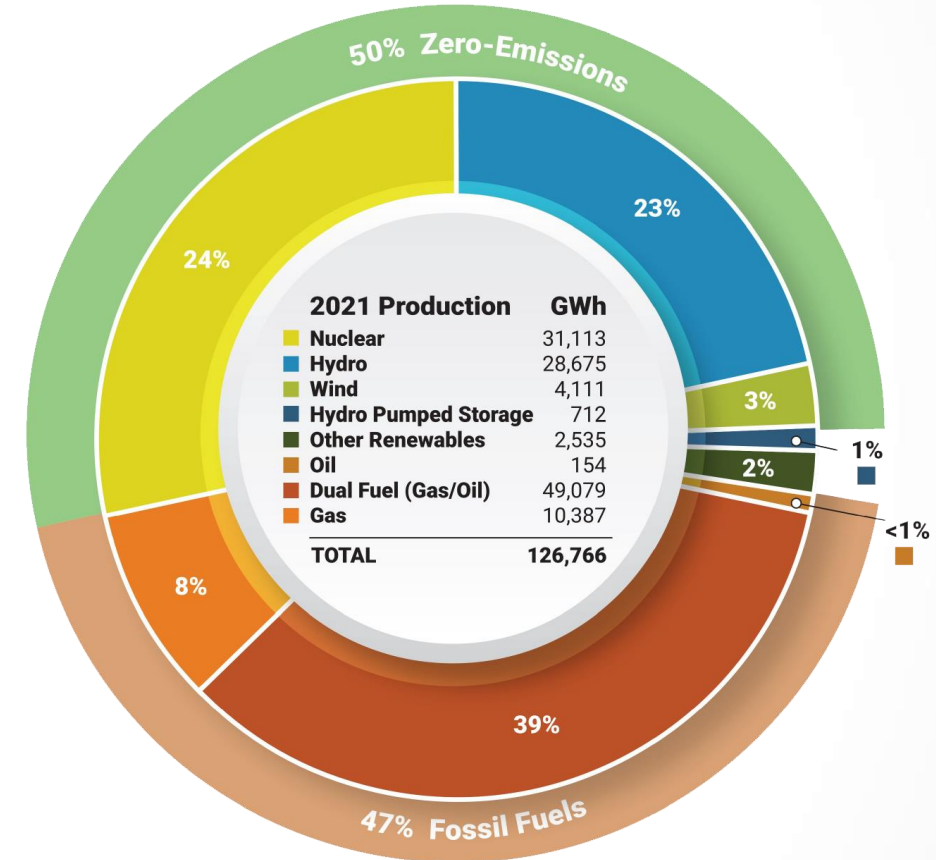
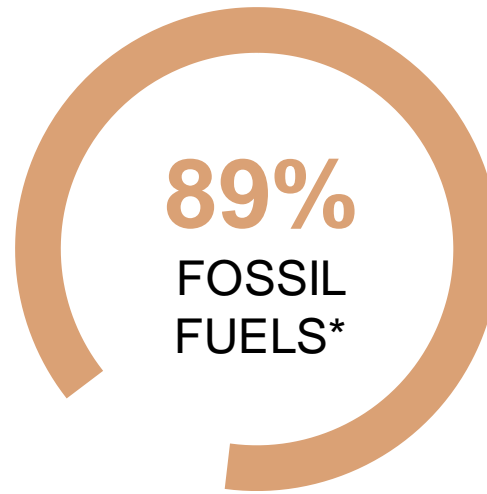


# Current Energy Mix for Electric Generation

## UPSTATE NY

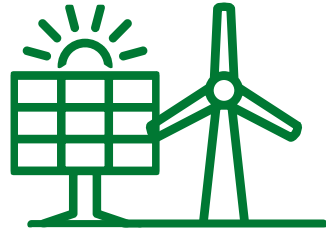


## DOWNSTATE NY

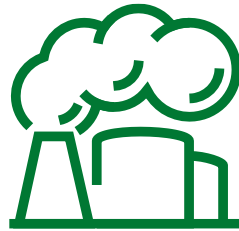


\*Closure of Indian Point lowered emissions-free production of electricity from nuclear resources in New York from 29% to 24% between 2020 and 2021, raised the use of fossil fuels for generation in downstate NY from 77% to 89%, and contributed to an increase in average electricity prices by 85%. *Source: NYISO 2022 Power Trends Report, p. 25 and p. 27*

# Low and Emissions-free Energy Options



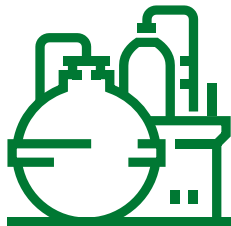
**RENEWABLES**  
*Wind, hydro, solar*



**NUCLEAR**



**CONVENTIONAL  
FUELS**  
*Natural gas*



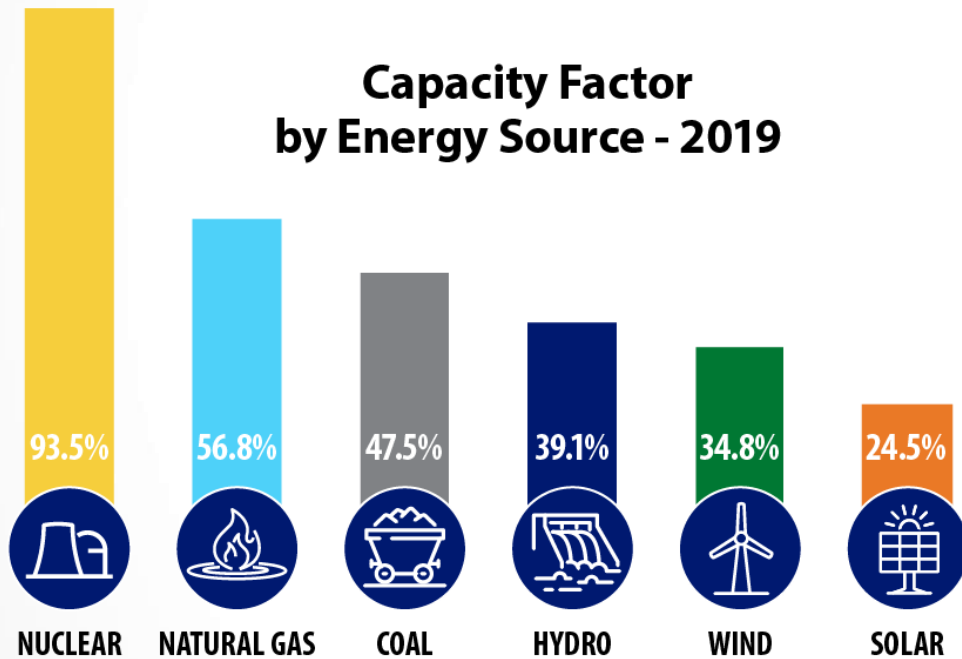
## **EMERGING CLEAN FUELS AND TECHNOLOGIES**

- Renewable natural gas (net zero)
- Hydrogen (zero and net zero)
- Storage systems (batteries, pumped storage, etc.)
- Fuel cells (hydrogen, natural gas)



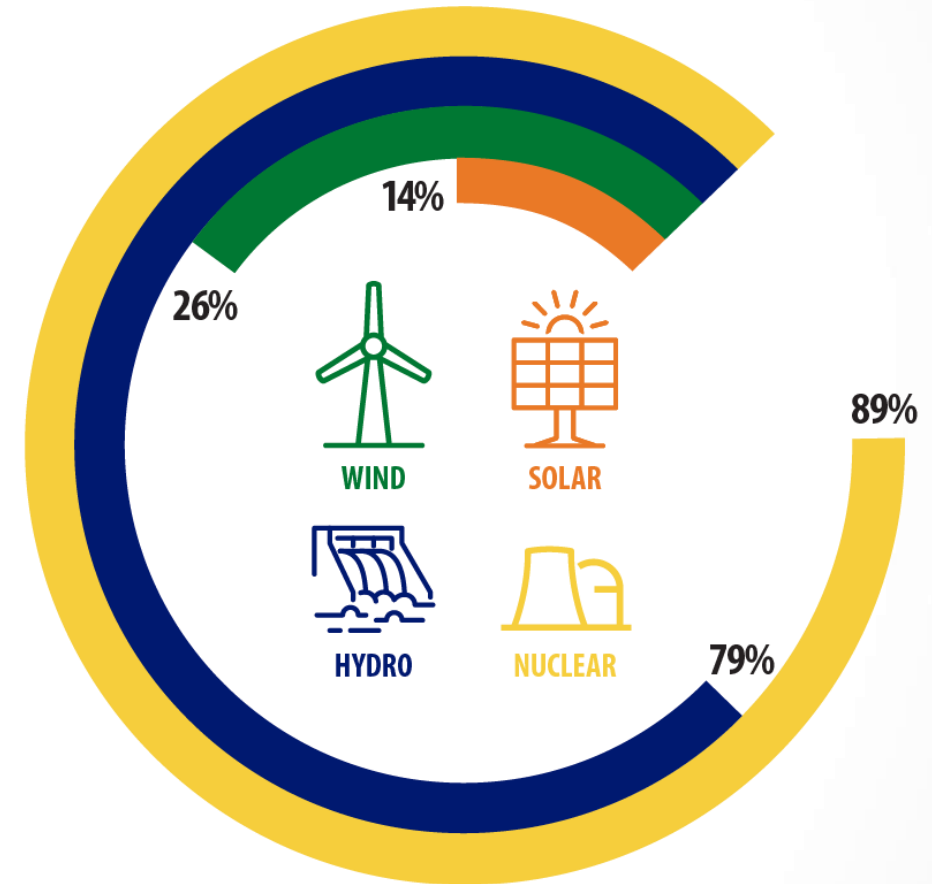
# Availability of Energy Sources

The percentage of time power is produced by various types of power generating facilities.



## NATIONAL AVERAGE

Source: U.S. Dept. of Energy



## NEW YORK AVERAGE

Source: NYISO

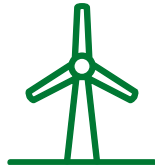
Note: Off-shore wind capacity factor approximately 45%

# Renewables and Intermittency



## SOLAR

- Limited to daytime, sunny days
- Lower winter production
- Large footprint
- Overall capacity factor in NYS about 14%, nationally about 24%



## WIND

- Dependent on wind conditions, location
- Large footprint
- Limited capacity factors
  - *Land-based* – 26%
  - *Off-shore* – 45%



## HYDRO

- Limited large-scale hydro resources available (Niagara Falls, western and Canadian sources)
- Environmental impacts
- Dependent on rainfall, water resources
- Capacity factor 40% (large scale)

# Conventional and Other Resources



## Natural Gas

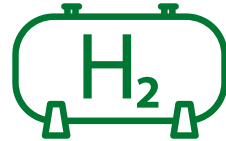
*Natural gas currently provides 2.5 times the energy equivalent of electricity used in New York*

*According to the Brookings Institute, natural gas plants have reduced emissions 2.6 times more than wind and four times more than solar.*



## Renewable Natural Gas

*Net zero emissions from agricultural and municipal sources. Utilizes existing natural gas pipeline system.*



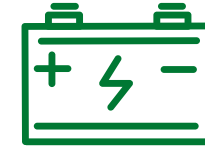
## Hydrogen

*Green hydrogen is emissions-free. Utilizes existing natural gas pipeline system*



## Nuclear

*Emissions free baseload resource, new technologies under development*



## Energy Storage

*Batteries*

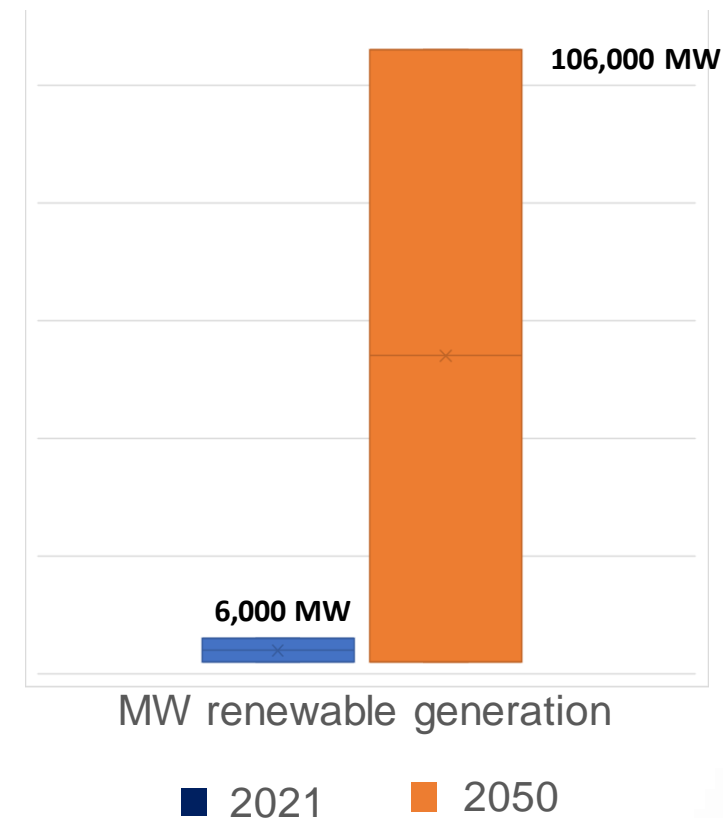
*Pumped Storage*

*Current technologies provide short duration (several hours), high cost and limited availability.*

# How Much More Renewable Generation Is Needed?

- Draft scoping plan: More than **100,000 MW of non-hydro renewables needed** to meet future energy needs.
- Represents an **18-times increase in new renewable generation**, or the equivalent of nearly **1,000** new large-scale renewable and battery facilities occupying nearly **3 million** acres of land plus space for offshore wind farms.
- Requires a buildout of 35 large solar, battery & wind farms **each year for 28 years, or one every 10 days**; today very few if any are built annually.
- As renewables are intermittent resources, the plan assumes **more than 20,000 MW of on-demand generation** by substituting natural gas with hydrogen or other to-be-discovered fuel of the future and **7,800 MW of electric imports** from outside New York.
- Significant interstate **electric transmission** line additions and upgrades will be necessary.

## Renewable Generation, in MW

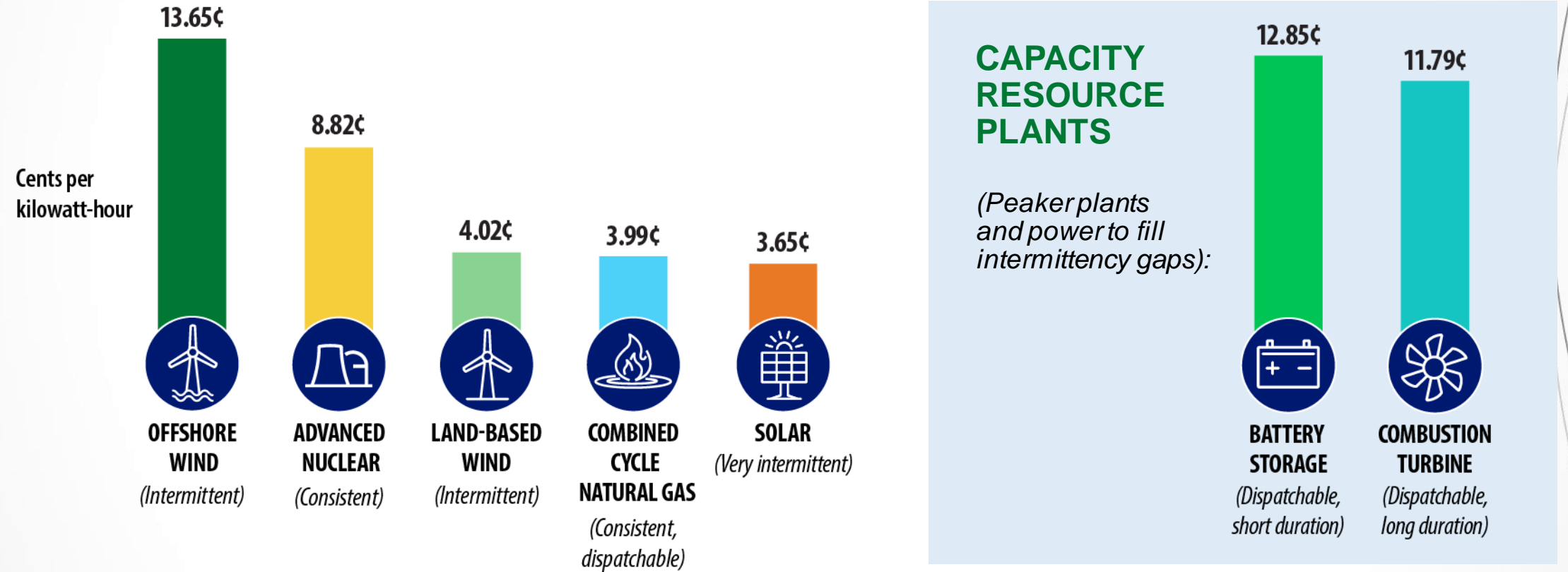


***"The amount of new generation that needs to be built to maintain system reliability in a zero-carbon environment is sobering." NYS Reliability Council***

# Costs to Produce Electricity

## Levelized cost of electricity production for various types of generators\*

(Source: U.S. Energy Information Administration, Dept. of Energy)



\* Levelized cost of electricity (LCOE) refers to the estimated revenue required to build and operate a generator over a specified cost recovery period. LCOE is often cited as a convenient summary measure of the overall competitiveness of different generating technologies. Key inputs to calculating LCOE include capital costs, fixed operations and maintenance (O&M) costs, variable costs that include O&M and fuel costs, financing costs, and an assumed utilization rate for each plant type.

U.S. Energy Information Administration

# Lessons Learned

## New York:

Following Indian Point closure, carbon emissions and prices rise. Natural gas usage in August 2022 set a record on multiple days in Central Hudson service area, the first time gas usage records were reached in the summer. Wind lulls and cloud cover curtailed renewable production in the winter and summer of 2022, and lead to nearly exclusive reliance on natural gas, nuclear and large hydro for power supplies. The underground, under-river Champlain Hudson power line set to bring renewable electricity from Canada to New York City, receives opposition from environmental organizations and delays from local communities.

## New York and New England:

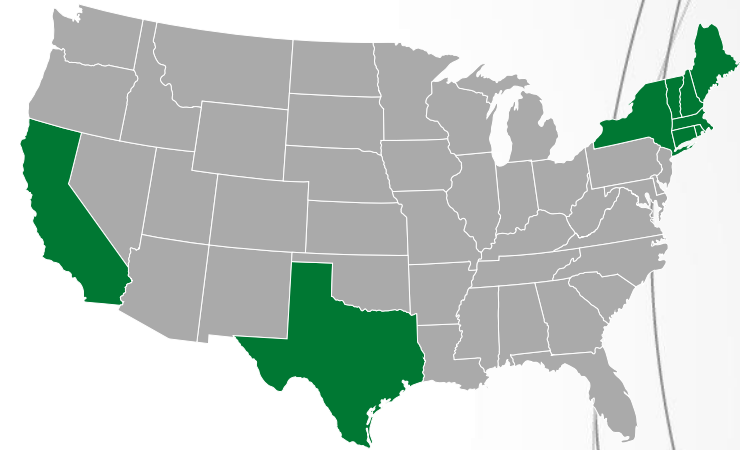
Natural gas supply restrictions. Caused by constraints in pipeline capacity and denial of projects by New York state, resulting in higher costs and even prompting imports of liquified natural gas into New England.

## Texas:

Inadequate grid redundancy. Both conventional and renewable generator failures. Widespread power outages during winter cold snap.

## California:

Rolling blackouts implemented during periods of high electricity use. Re-thinking renewable-only buildout. Postponing retirements of certain natural gas generators and the Diablo Canyon nuclear plant to ensure system integrity.



# Lessons Learned



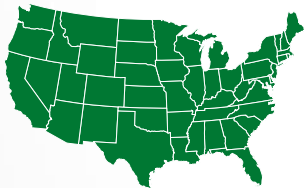
## Germany:

Expansive solar and renewable buildout and closure of nuclear plants resulted in high energy costs and intermittency issues. Access to natural gas is limited, so reactivating coal plants to reduce costs and improve reliability. Curtailment and high cost of natural gas supplies as a result of actions taken by Russia may lead to rationing, which will harm industries, businesses and residents.



## Europe:

Current energy crisis. Energy shortages and high prices as a result of restrictions to natural gas supply, brought about largely by the Russian-Ukrainian conflict.



## Emissions reductions, United States:

Natural gas has now surpassed the use of coal for electricity generation in the United States. Largely as a result, and with a rise in renewable resources, emissions from power generation have declined by about 14% from 2007 to 2019.



## Japan:

The Japanese government is investigating the potential to develop smaller nuclear reactors, announced at a national green transformation conference.



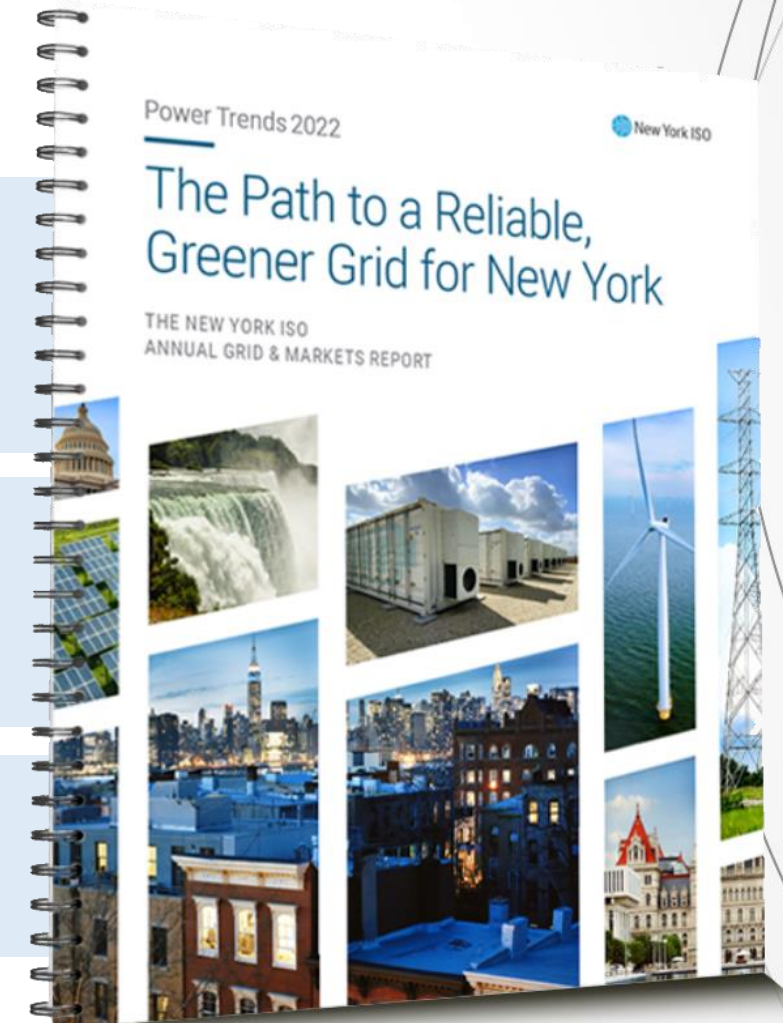
# What The Experts Say

New York Independent System Operator,  
2022 Power Trends report:

“ Until there are enough clean energy resources on the grid to replace the reliability services provided by fossil fueled generation, **natural gas must continue to play an important role in meeting the energy needs in New York to maintain system reliability which supports the health, safety, and welfare of all New Yorkers** (p.27)

**Long-duration, dispatchable and emissions-free resources will be necessary to maintain reliability and meet the objectives of the CLCPA.** Resources with this combination of attributes are not commercially available at this time but will be critical to future grid reliability. (p. 38)

As traditional resources deactivate and are replaced by new clean energy resources that are dependent upon weather conditions to supply the grid, the challenge becomes greater. (p. 6)



# What The Experts Say

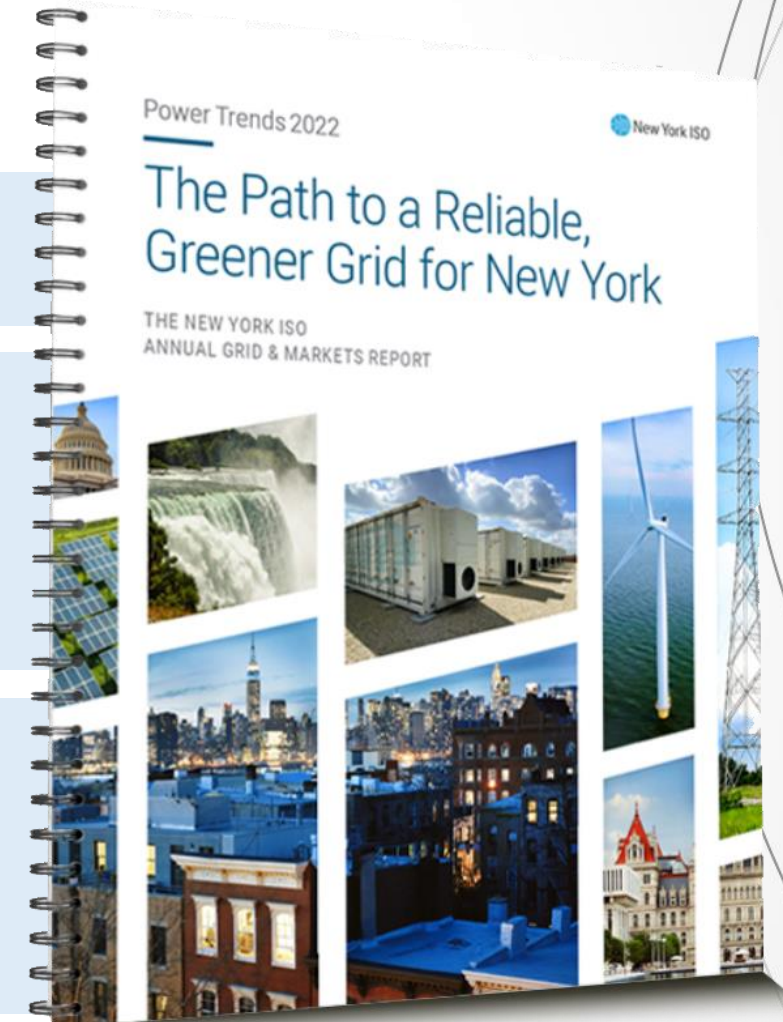
New York Independent System Operator,  
2022 Power Trends report:



**The New York grid faces unprecedented reliability challenges as the clean-energy transition gains momentum.** (p.34)

**Simply deactivating existing generation without having new resources on the system capable of providing comparable attributes risks the ability to maintain a reliable electric system.** Additional transmission capability will lessen constraints and maximize the potential contribution of these renewable resources to meet electric demand and achieve public policy goals. (p. 9)

As we have witnessed recently in other parts of the U.S., **the efforts necessary to achieve electric system reliability, economic efficiency, and environmental benefits are interlinked.** These endeavors can and must coexist in support of our power system, our economy, consumer interests, as well as the health, welfare, and safety of all New Yorkers. (p. 1)



# What The Experts Say



Making use of the [US natural gas] infrastructure already in place could offer a prime route for **speeding up and cost effectively making the considerable changes needed to fully decarbonize the energy sector – while also enabling a just transition for communities that have invested in and rely upon these systems**

 COLUMBIA | SIPA  
Center on Global Energy Policy

“The legislature, either through its silence or total lack of actions, **has given this commission nearly the exclusive responsibility to reach into NY’ers pockets to pay for the CLCPA mandates.**”

- John B. Howard, Commissioner, New York State Public Service Commission

**Given these significant impacts to consumers, in addition to the other costs that will flow from the enormous infrastructure buildout required by the CLCPA, no Scoping Plan can reasonably be considered without the requisite cost analysis that shows practical impacts on consumers and how to afford paying them...**All emissions-reduction technologies should be considered, and bans on existing types of facilities and appliances should not be imposed, especially where such bans would sacrifice reliability, resiliency and cost efficiency.

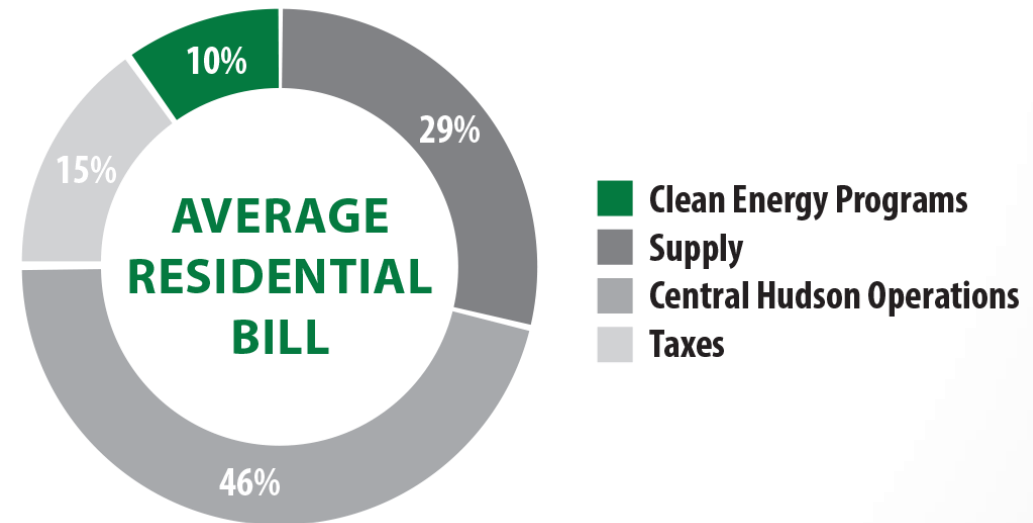
- Independent Power Producers of NY, Business Council of NY, NYS AFL-CIO, NYS Building & Construction Trade Council:  
Advancing New York's Clean Energy Goals

# New York State Clean Energy Initiatives

*Costs to electric customers 2006-2025*

- Utility customers are financially supporting the state's energy goals.
- Currently the state has **committed \$19.5 billion toward meeting these goals** through 2025.
- These figures **do not include** costs for future off-shore wind and energy storage (e.g. large-scale batteries).
- Total costs could be more than **1 trillion dollars** beyond 2025.

Central Hudson customers today are contributing to state energy goals, as approximately 10% of utility bills support the state's clean energy initiatives. These costs are expected to rise.



# 4 Principles for a Successful Energy Transition



## PRINCIPLE 1:

***The electric power grid must meet your energy needs at all times***

- **Why:** Intermittent renewable resources alone cannot provide the necessary around-the-clock energy needed and used by all New Yorkers. Known conventional resources and new technologies will be required.



## PRINCIPLE 2:

***New Yorkers' livelihoods must be enhanced, not harmed by this transition***

- **Why:** High energy costs harms residents and businesses, destabilizes the economy and encourages industries to leave the state. New York should set cost limits on the clean energy transition and recognize that not everything can be electrified. Also, this is a national and global issue; New York should not go it alone. New York has the lowest per-capita emissions in the country and produces only 3.3% of total emissions in the United States and .5% of global emissions. The newly enacted Inflation Reduction Act, which includes climate provisions, is a first step towards a more wholistic national policy approach.



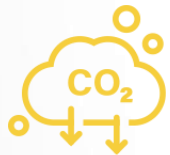
# 4 Principles for a Successful Energy Transition



## PRINCIPLE 3:

***We must reduce emissions at the lowest-possible cost***

- **Why:** Energy efficiency is the most cost-effective way to reduce emissions and save money. New York should continue to support and evaluate further expansion of energy efficiency programs as the least cost and most efficient path to reduce greenhouse gas emissions and lower energy consumption of buildings by improving efficiency codes and standards.



## PRINCIPLE 4:

***All emission reduction solutions should be considered***

- **Why:** The CLCPA is prescriptive, citing the use of specific technologies (wind, solar, batteries). New York should support research and development into low and emissions-free resources like nuclear, hydro, hydrogen, carbon capture, renewable natural gas and emerging technologies to make possible the achievement of the state's climate goals. The state should not implement bans on a technology as this can stifle innovation.

# Energy Options & New Technologies



**Renewables by themselves cannot replace conventional energy**

- Need for continuous and on-demand power sources
- Central Hudson estimates that replacing all oil, gasoline, natural gas, propane with electricity requires more than 5 times the current generating capacity
- Undiscovered technologies required to reach zero emissions



**Advantages and disadvantages exist for all energy options**

- All solutions have drawbacks and benefits



**Different technologies may be needed for different applications**

- Electricity generation
- Transportation: cars vs. long-haul trucks vs. trains vs. aircraft
- Building heating
- Industrial processes/manufacturing



**Must rely on innovation and flexible solutions**

- Must look beyond known and current technologies
- Avoid prescriptive measures
- Allow for market solutions



# What Else Can We Do?

## *Steps we're taking*



### **Energy Efficiency Programs:**

To date saves \$86 million and 1.1 billion pound in emissions annually

- *Air source and ground source heat pump incentives*
- *Discounts at local retailers*
- *Sealed whole house program*
- *Refrigerator recycling*



**ENERGY STAR® Award** for five consecutive years



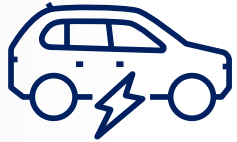
**Local Solar Installations:** Among the highest in New York on a per-capita basis



Community Solar through the **Clean Energy Marketplace**

# What Else Can We Do?

## *Steps we're taking*



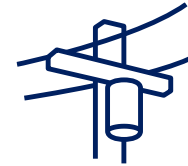
**Electric Vehicles:**  
Facilitate the installation of vehicle chargers in partnership with municipalities and private developers



**Central Hudson's recycling and reuse program,** in partnership with Ulster-Greene ARC

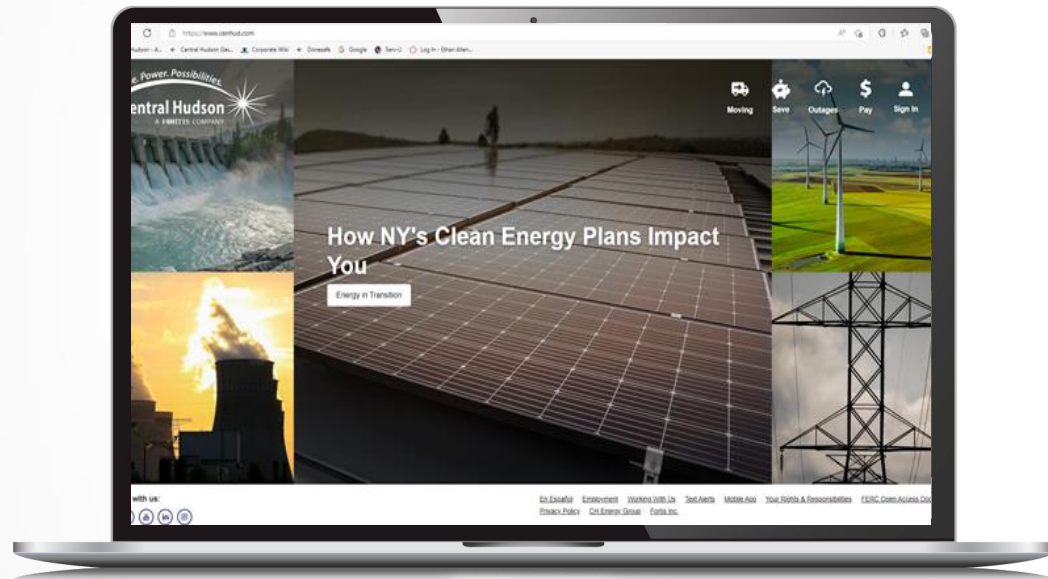


Central Hudson operates **three local hydroelectric generators**



Continued investment in the **local energy infrastructure**, to improve resilience, efficiency and support renewable resources

# Additional Resources



More on the CLCPA and a practical path to a clean energy transition is available at [www.CentralHudson.com](http://www.CentralHudson.com).

Share your concerns with your state representatives or the Governor's office. Contact information available online on Central Hudson's website.