



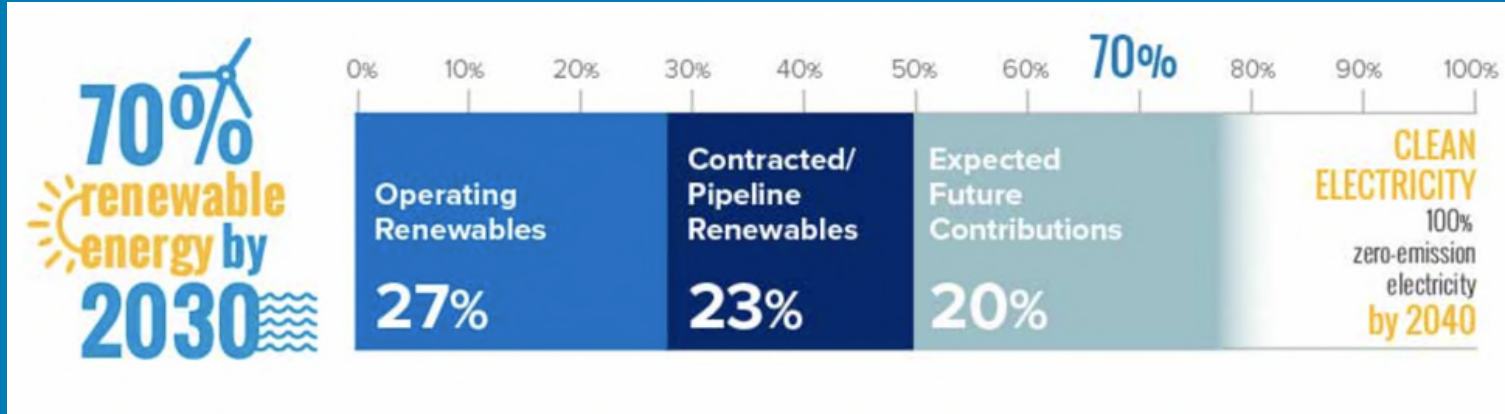
Strategy for Enhancing the Electric Grid and Increasing Accessibility to Renewable Energy

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October 24, 2024

Climate Leadership & Community Protection Act (CLCPA)

- Signed into law July 2019
- **70% Renewable by 2030**
- **100% Zero-Emission by 2040**
- Renewable vs. Zero-Emission



- **Renewable:** “naturally replenishing”
 - Solar thermal, photovoltaics (PV), on land and offshore wind, hydroelectric, geothermal electric, geothermal ground source heat, tidal energy, wave energy, ocean thermal, and fuel cells which do not utilize a fossil fuel
- **Zero-Emission:** Includes nuclear

NYPA by the Numbers

17

Generating
Facilities

1,550

Circuit-Miles of
Transmission
Lines

1,091

Customers

2,000+

Employees

2,700+

Customer
Projects



NY Power
Authority



“OUTSTANDING ENGINEERING ACHIEVEMENTS”

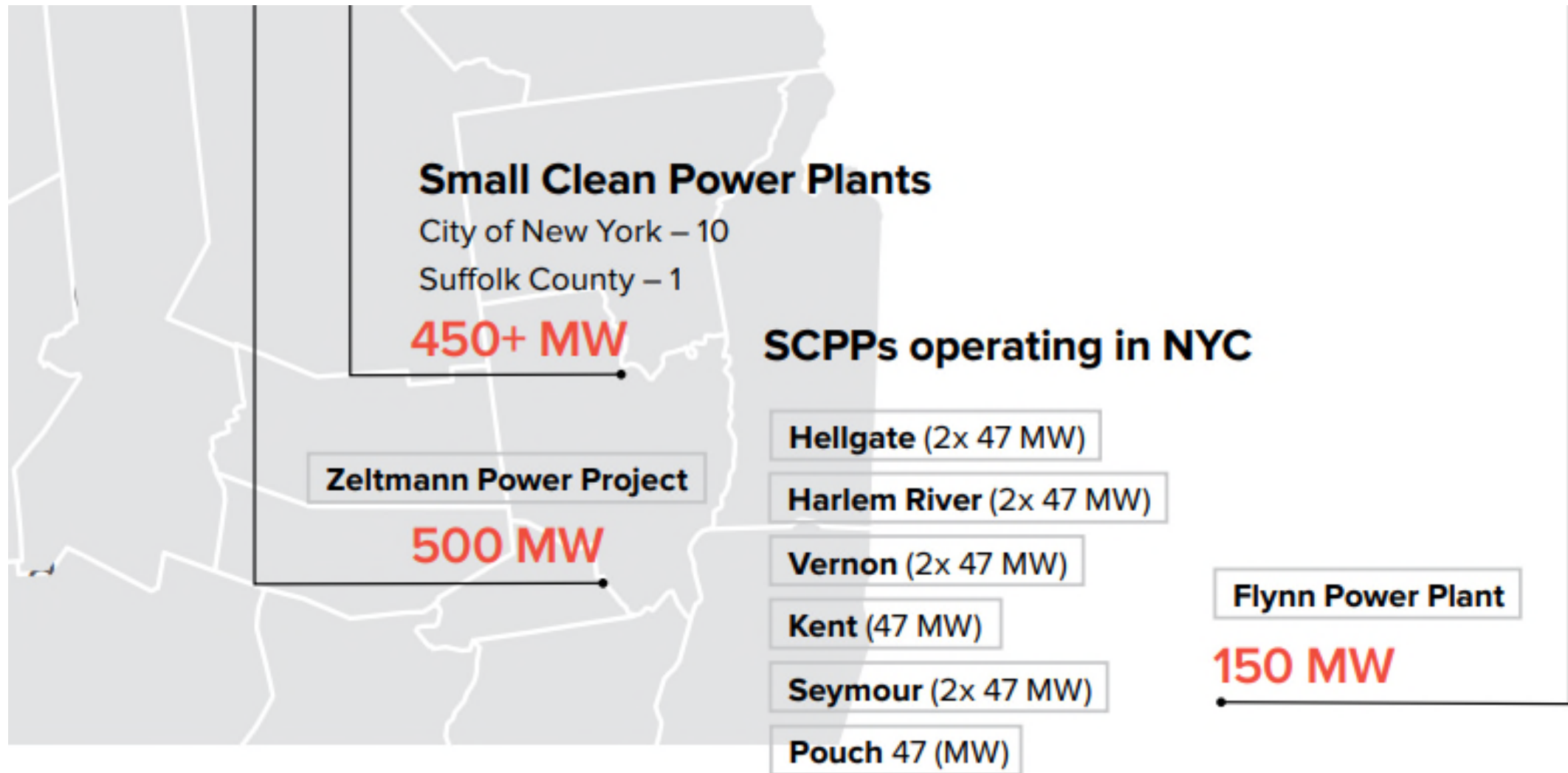


St. Lawrence-Franklin D. Roosevelt Power Project
First Power: 1958

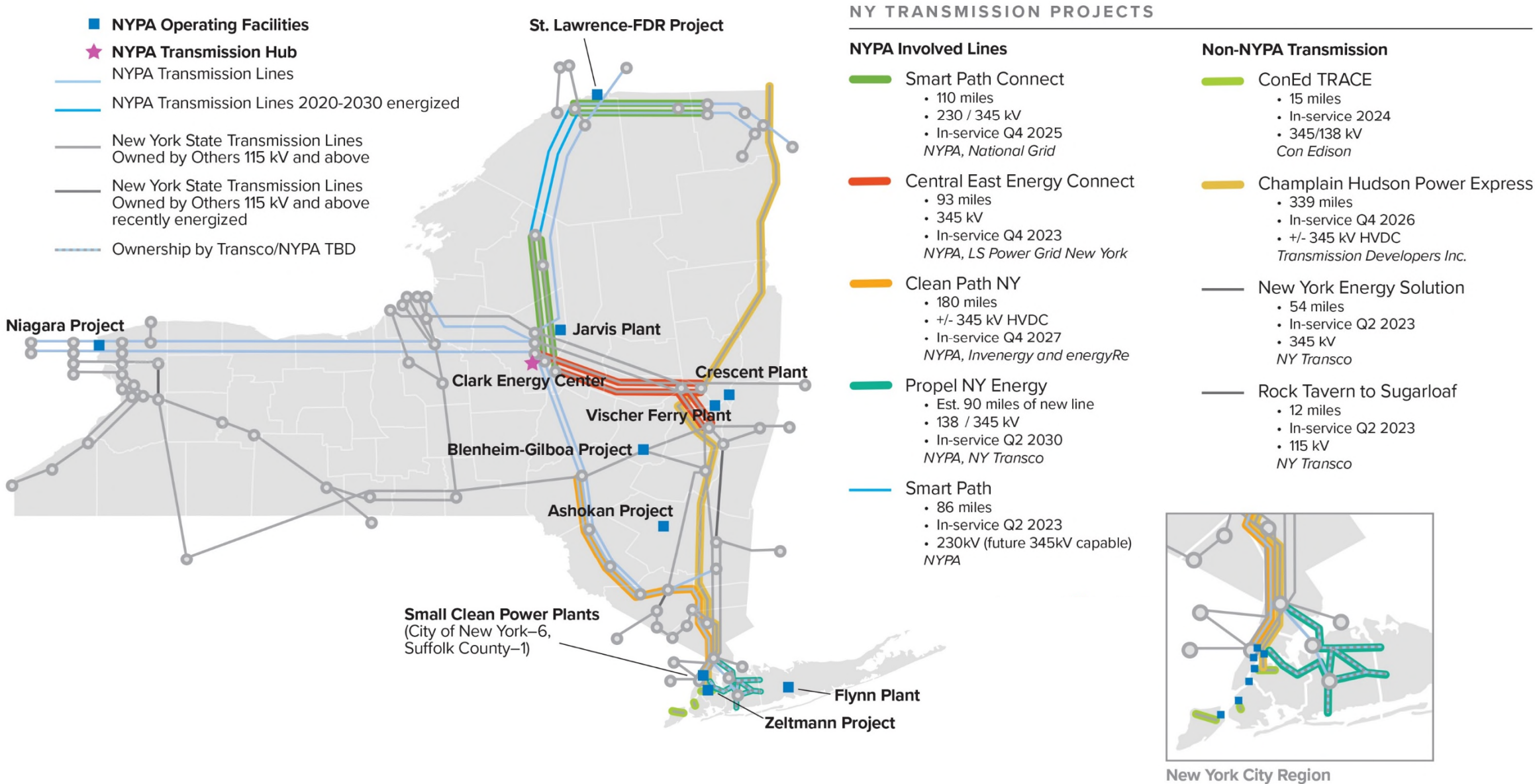


Niagara Power Project
First Power: 1961

Fossil Fuel Power Generation



Growing Transmission Capacity in New York State



NYPA's Unique Attributes



Largest supplier of renewable energy in the State through hydroelectric



In-depth knowledge of the NYISO system and robust grid modernization efforts



Proven experience in 3P through competitive transmission business

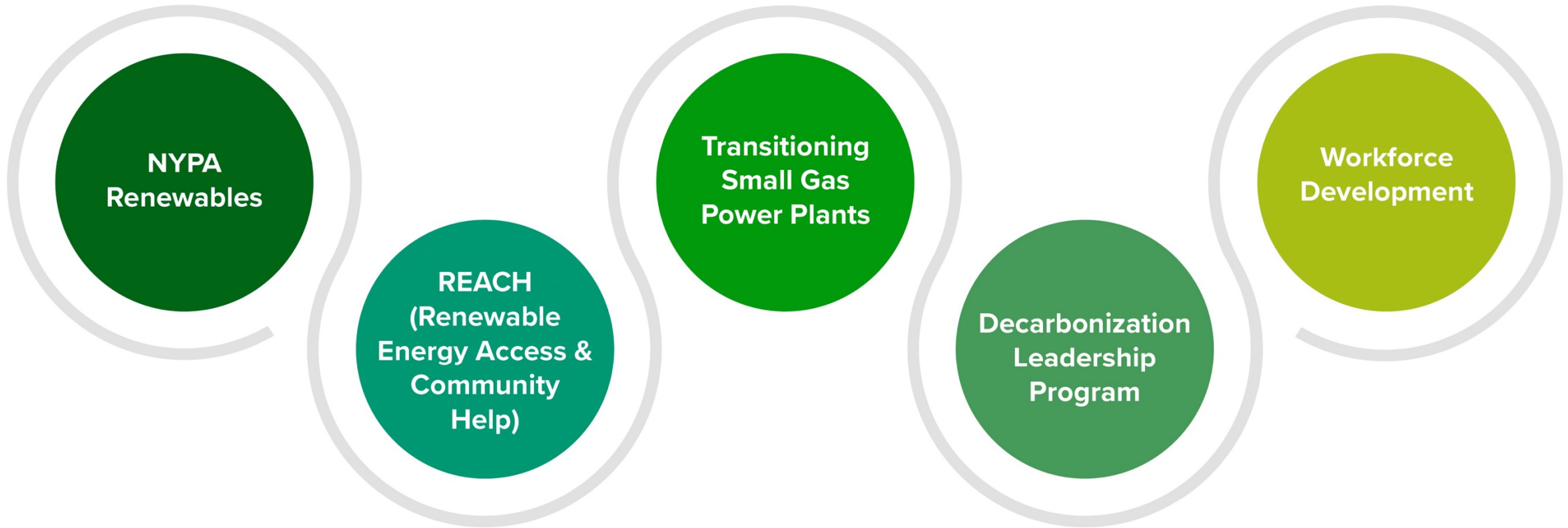


Experience developing distributed solar and BESS projects on customer sites



Strong community relationships, inclusive stakeholder engagement; and statewide customer base

NYPA's Expanded Authority: Our Opportunity & Clean Energy Promise



NY State Enacted
Budget 2023-24

Expanded Authority

Build New Renewables

Authorizes and directs NYPA to develop new renewable energy generation projects

- Either alone, or jointly with other entities through public-private agreements;
- NYPA or NYPA subsidiary **must have majority ownership** of any renewable energy generating project;
- Development on farmlands, if any, will be limited to **agrivoltaics**
- Annual **stakeholder conferral process and bi-annual strategic plan**

NY State Enacted Budget 2023-24

Expanded Authority

Renewable Energy Access and Community Help (REACH)

Renewable Energy Access and Community Help or “REACH” Program

- Provide **low-income or moderate-income end-use electricity consumers in disadvantaged communities** with bill credits
- Bill credits to be derived from a portion of the revenues generated from new renewable energy projects*
- Program to be developed and implemented along with the Public Service Commission
- For more info <https://www.nypa.gov/reach>

*Distributed scale projects such as Community Solar will automatically follow the typical bill credits mechanism per current State policy.

Current Timeline

Pre-qualified developers
and investors for co-
development and
investment opportunities

Summer'24



Q4'24



Public commenting
period for draft 2025
Renewables Strategic
Plan

Project Identification and
Evaluation

On-going



Publication of NYPA's
2025 Renewables
Strategic Plan

By Jan'25

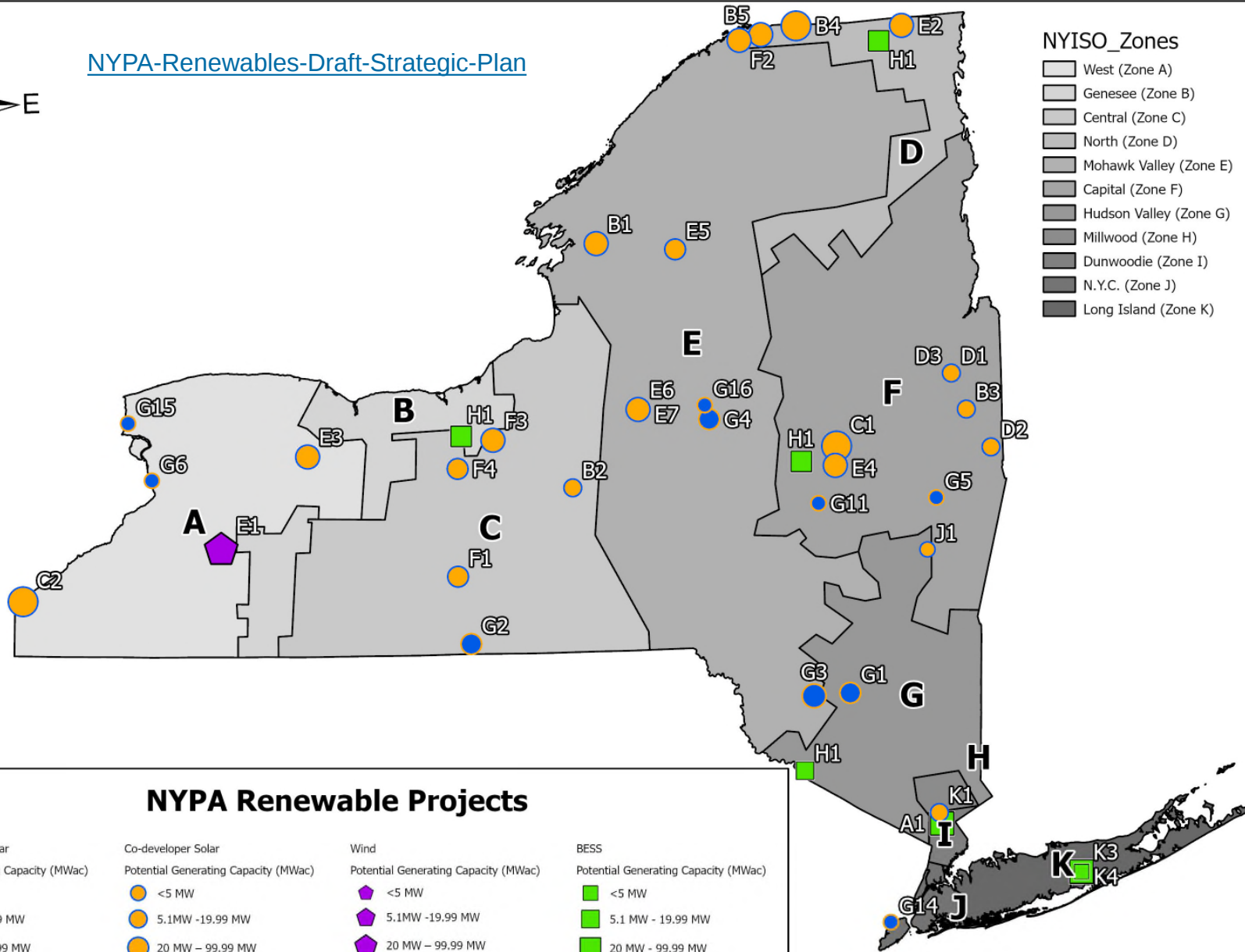




NYPA-Renewables-Draft-Strategic-Plan

NYISO_Zones

- West (Zone A)
- Genesee (Zone B)
- Central (Zone C)
- North (Zone D)
- Mohawk Valley (Zone E)
- Capital (Zone F)
- Hudson Valley (Zone G)
- Millwood (Zone H)
- Dunwoodie (Zone I)
- N.Y.C. (Zone J)
- Long Island (Zone K)



NYPA Renewable Projects

NYPA Greenfield Solar

Potential Generating Capacity (MWac)

- < 5 MW
- 5.1MW -19.99 MW
- 20 MW – 99.99 MW
- 100 MW – 200 MW
- >200 MW

Co-developer Solar

Potential Generating Capacity (MWac)

- <5 MW
- 5.1MW -19.99 MW
- 20 MW – 99.99 MW
- 100 MW – 200 MW
- >200 MW

Wind

Potential Generating Capacity (MWac)

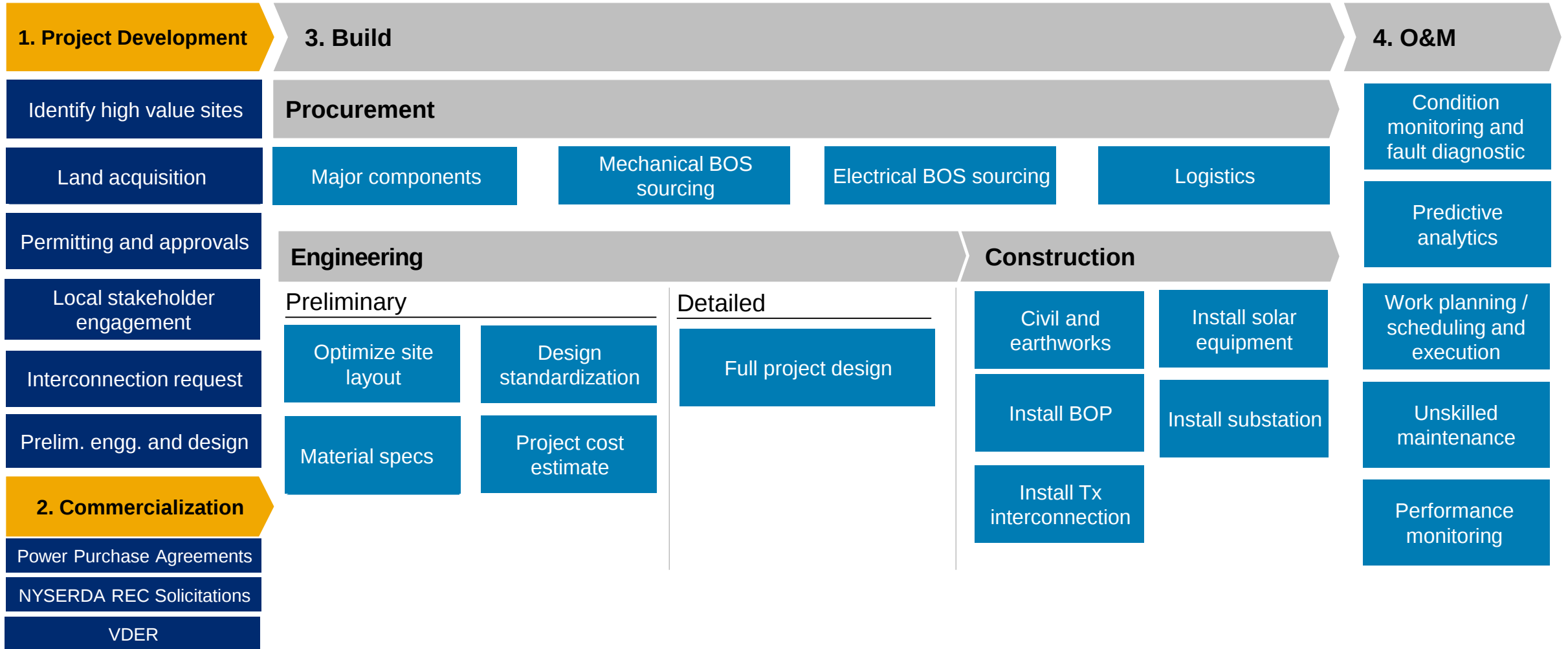
- ◆ <5 MW
- ◆ 5.1MW -19.99 MW
- ◆ 20 MW – 99.99 MW
- ◆ 100 MW – 200 MW
- ◆ >200 MW

BESS

Potential Generating Capacity (MWac)

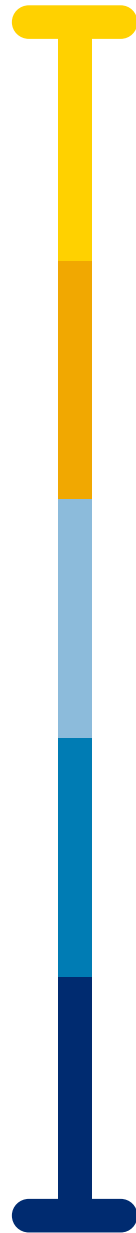
- <5 MW
- 5.1 MW - 19.99 MW
- 20 MW - 99.99 MW
- 100 MW - 200 MW
- >200 MW

Renewable Project Development Process



Development Phase

A combination of business development and early-stage engineering, this phase of a project involves aspects from site identification to preliminary feasibility assessments to submitting interconnection application packages



Identify High Value Sites

Sites could vary from large land parcels to rooftops and parking lots. High value is assessed based on topography, proximity to interconnection, value of project output, among other aspects.

Land Acquisition

Site control could take many different forms ranging from option agreements to lease or purchase or easement. Must meet NYISO's requirements for site control demonstration

Pre-Feasibility Studies

Includes developing preliminary layouts, desktop analysis for any environmental issues such as wetlands, endangered species, etc., and other critical issues analyses.

Interconnection Application

Includes development of electrical one/three lines, and performing other technical studies such as power flow and short circuit analysis, and other requirements as dictated by the NYISO to be submitted as part of the interconnection application*

Stakeholder Engagement

Prelim assessment and early engagement of communities involved and impacted to ensure community buy-in of the project from the get-go.

*Interconnection application process differs for DER projects in NY state and go through the SIR process.

An Opportune Time



Macro-Economics



Grid modernization



Permitting



Supply Chain

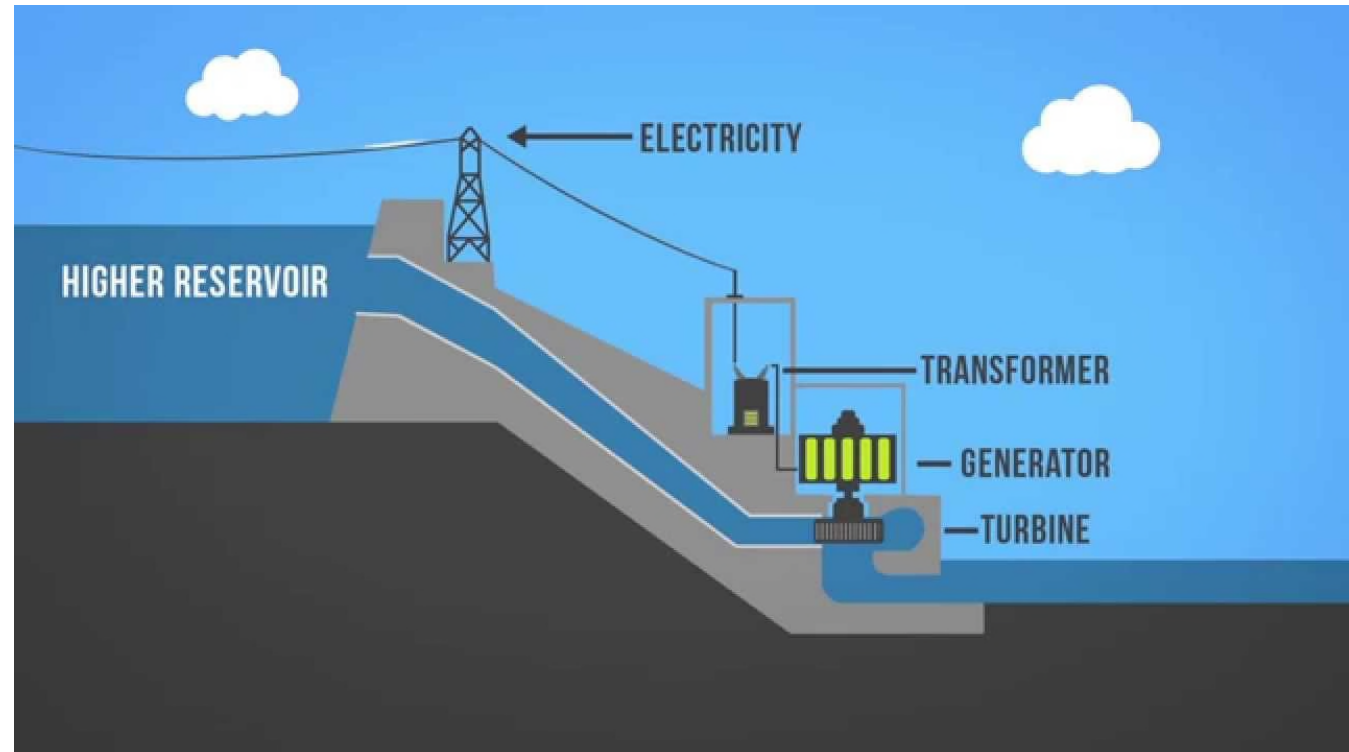
A complex challenge
but an opportunity for a
**RENEWABLE
RENAISSANCE**

Renewable Energy Technologies

Hydropower

NYPA is continuing to preserve & enhance the value of its existing hydropower assets, which currently generate ~80% of the electricity NYPA puts on the grid

- Over 5 GW (more than 5 million homes)
- Pumped Storage (PSH)
 - > 90% of global energy storage
 - Turbines can act as pumps
 - River Diversion
- Run-of-River
 - “Natural” hydropower
 - Harness the energy of a flowing river
 - St. Lawrence & Niagara Rivers

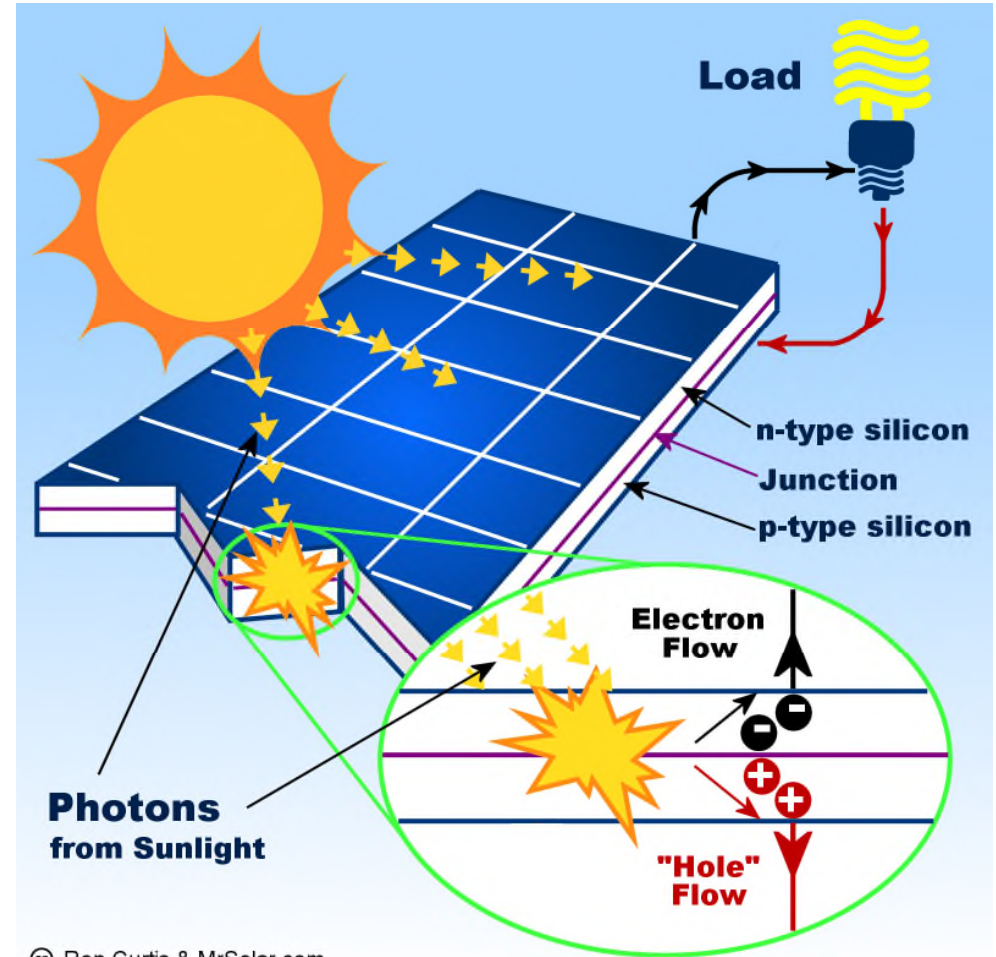


<https://www.youtube.com/watch?v=q8HmRLCgDAI>

Solar Photovoltaic (PV)

NYPA has experience deploying distributed solar projects and is now adding much larger projects to the mix under its Expanded Authority to help the State achieve its clean energy goals

- CLCPA: 6 GW distributed solar by 2025 (complete)
- No specific goal for utility-scale, but: **70x30, 100x40**
- Panels are *typically* between 15% and 20% efficient
- Has been used to power satellites since the 50s
- Electrons release from the semiconductor
- Electrons flow through the material, creating an electric current
- The current is captured by wiring in the panel and sent to an inverter



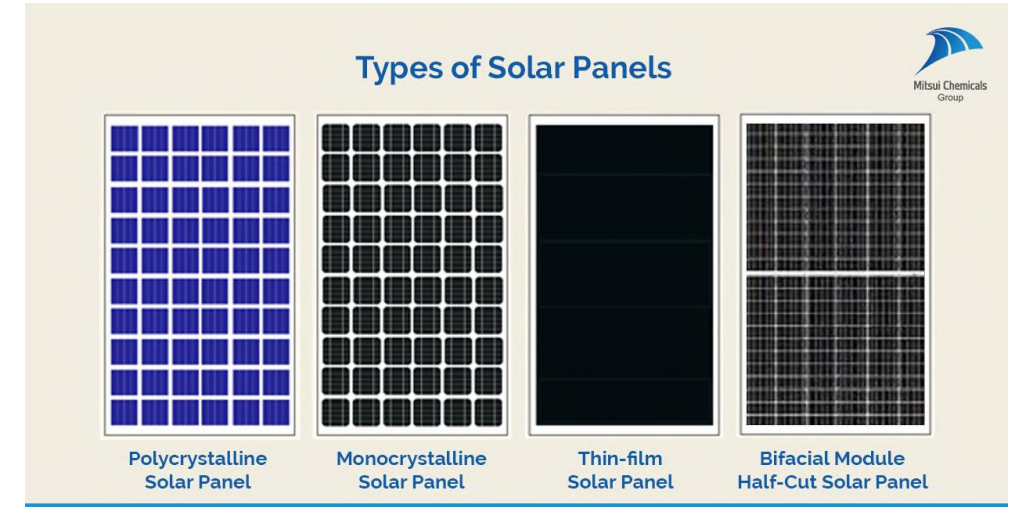
© Ron Curtis & MrSolar.com

<https://www.mrsolar.com/what-is-a-solar-panel/>

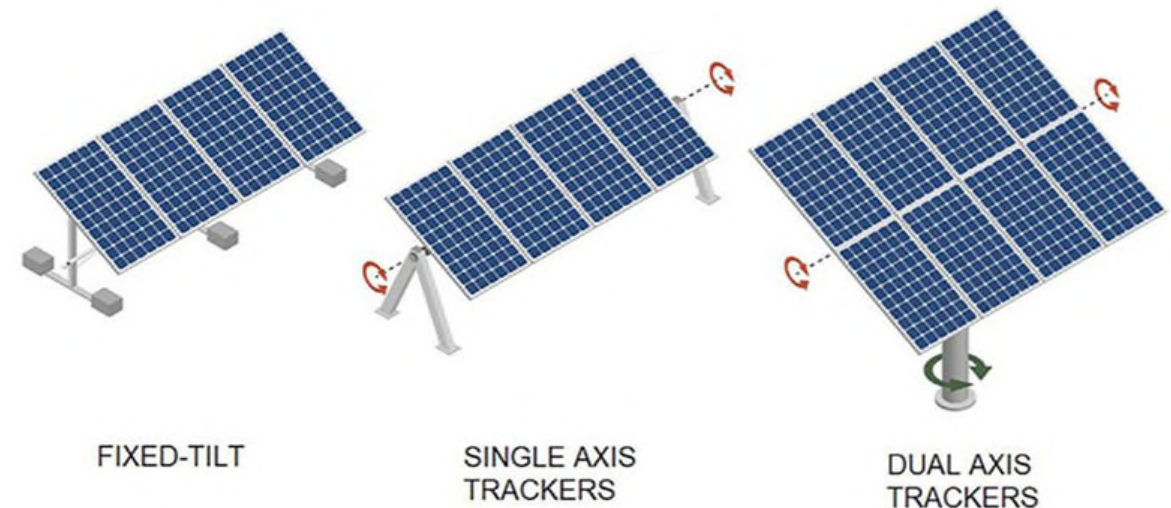
Solar Photovoltaic (PV)

Currently, the vast majority of NYPA Renewables' pipeline is solar PV. Solar PV is not a one size fits all technology, there are several system variations based on application.

- Panels (i.e., "Modules")
 - Monocrystalline 15-22%
 - Polycrystalline 15-17%
 - Thin-film 10-13%
 - Bifacial (mono/poly) 22-23%
- Tracking
 - Fixed-tilt, Single axis, Dual axis
- Systems
 - Ground-mount, Rooftop, Carport, Agrivoltaics, Floating Solar (FPV)



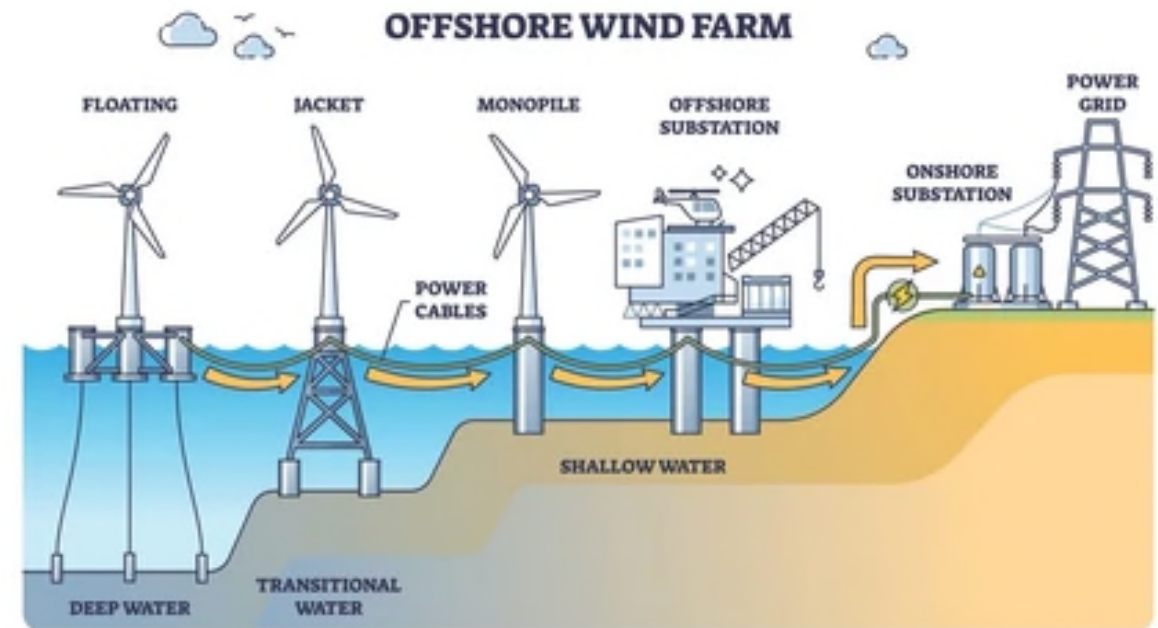
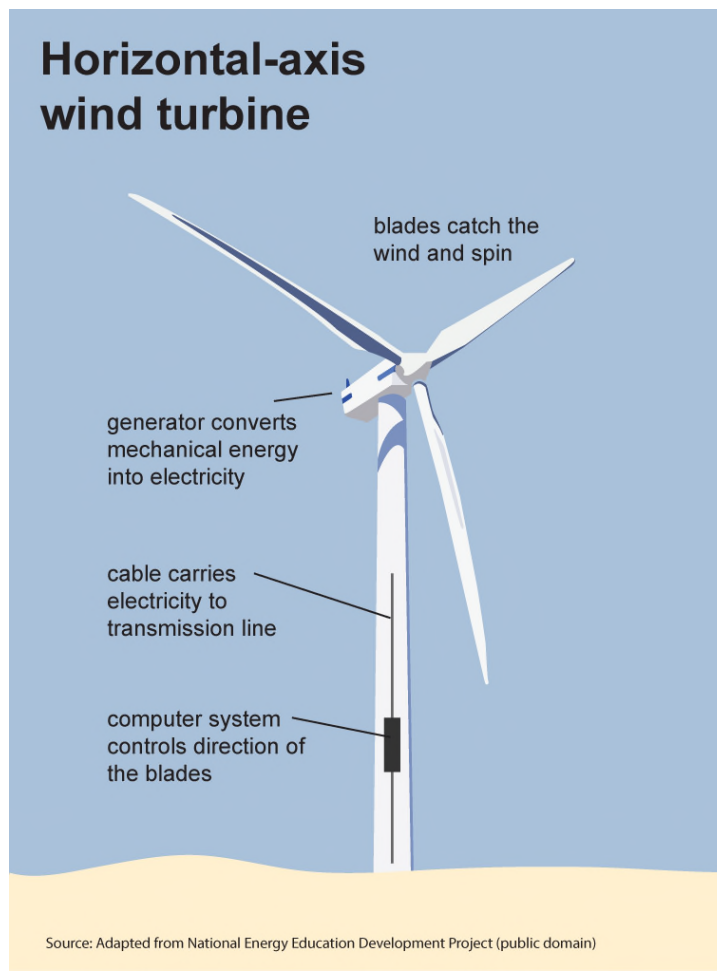
<https://in.mitsuichemicals.com/blog/types-of-solar-panels-cost-and-efficiencies/index.htm>



<https://vuphong.com/solar-tracker-system/>

Wind

Currently, NYPA Renewables is pursuing land-based wind development. NYPA is also developing new transmission on Long Island under Propel NY Energy, which has the potential to bring offshore wind power onshore.



shutterstock.com · 2222026269

Energy Storage

NYPA also has experience deploying distributed storage projects and is now adding much larger projects to the mix under its Expanded Authority to help the State achieve its clean energy goals

- CLCPA: 6 GW by 2030
- North Country Energy Storage System (NCES)
 - 20 MW / 20 MWh
- Power (MW) / Energy (MWh)
- Electrochemical
 - Lithium-ion, lead-acid, redox flow, zinc, etc.
- Thermal
 - Crushed stone, concrete, molten salt, etc.
- Mechanical
 - Flywheel, gravitational, compressed air (CAES), PSH, etc.



<https://cleanpower.org/resources/what-is-energy-storage/>

Energy Storage

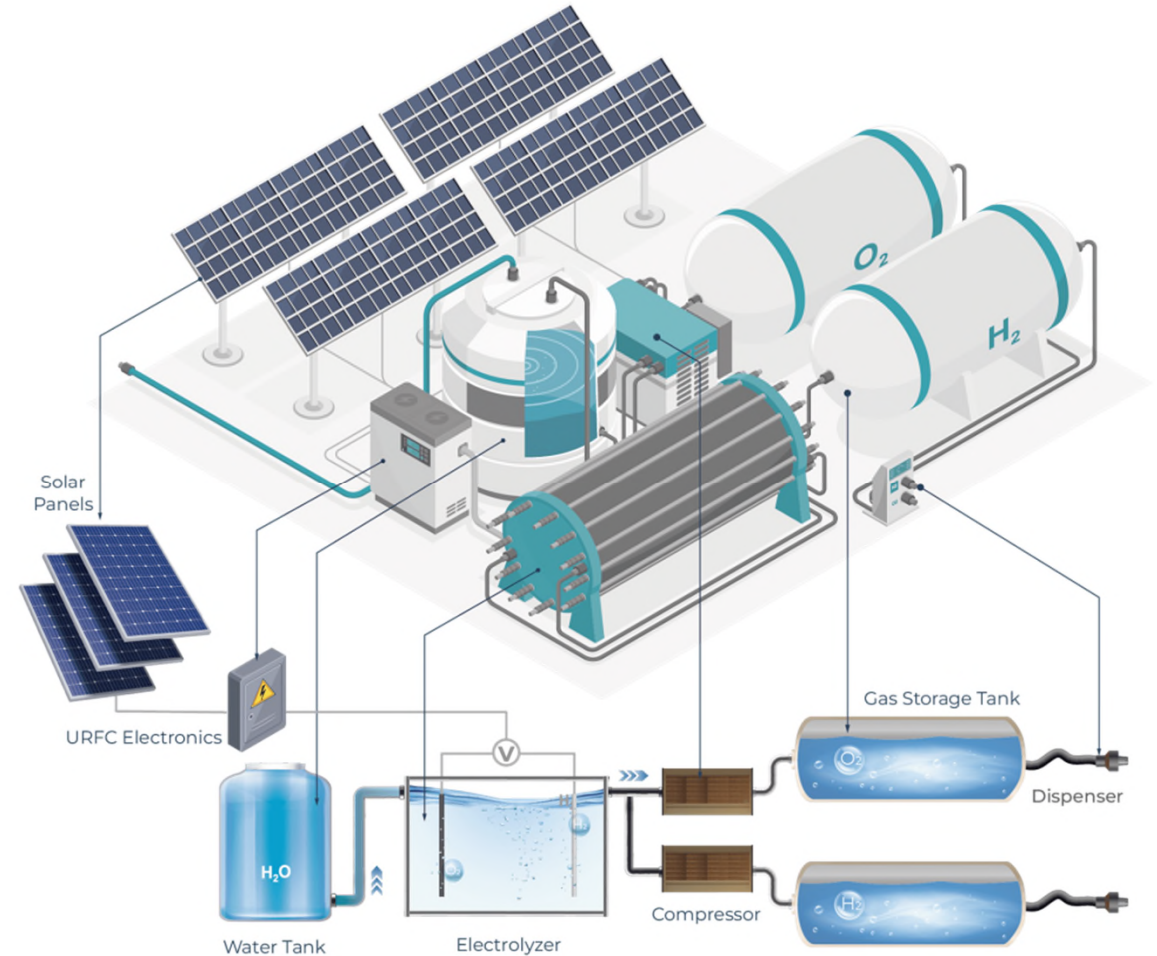
	Short duration	Inter-day LDES	Multi-day / week LDES	Seasonal Shifting
Duration of dispatch	0-4 hours	10-36 hours	36-160 hours	160+ hours
Storage technologies	• Batteries • Flywheels • Some mechanical technologies	• Most mechanical technologies • Some electrochemical technologies	• Many thermal technologies • Many electrochemical technologies	• Chemical storage (e.g., hydrogen)
Primary end-use	• Intra-day energy shifting (e.g., day to night) • Frequency regulation	• Inter-day energy shifting (e.g., one point in a day to another point the next day)	• Resilience for extended shortfall of power	• Shifting energy over months (e.g., summer to winter)

Green Hydrogen

- Brentwood Hydrogen Demonstration
 - Up to 44% blend, emissions reduced by 14%
- Most hydrogen today is produced using fossil fuels
- **GREEN: Electrolysis powered by renewable energy**
- Fuel for transportation, energy storage, or industrial processes – currently best for drop in applications
- Economic Development



Brentwood Peaker Plant, 47MW



<https://jenningsanodes.com/applications/hydrogen-production-by-water-electrolysis/>

Key Takeaways

- State Goals (CLCPA) – 70x30, 100x40
- NYPA's role to date – Hydro, Peakers, Transmission
- NYPA's Expanded Authority – Renewables Development
- What it takes – Development Process, Challenges
- Technologies involved and how their evolving – Solar, Wind, Storage, etc.



**NY Power
Authority**

VISION

A thriving, resilient New York
powered by clean energy

