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New York State Energy Plan objectives mandated in the Clean Energy Standard

Public Policy Need for transmission that:

- ✓ Enables incremental hydropower into New York
- ✓ Relieves congestion in the North Country to allow the full delivery of renewable resources

CLEAN. Operates a 36 GW fleet of which 99% is renewable

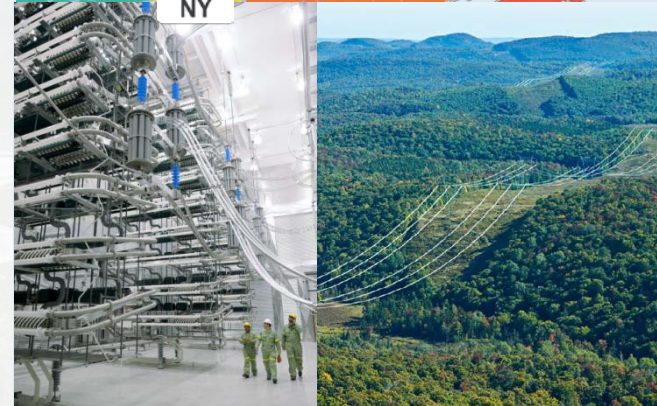
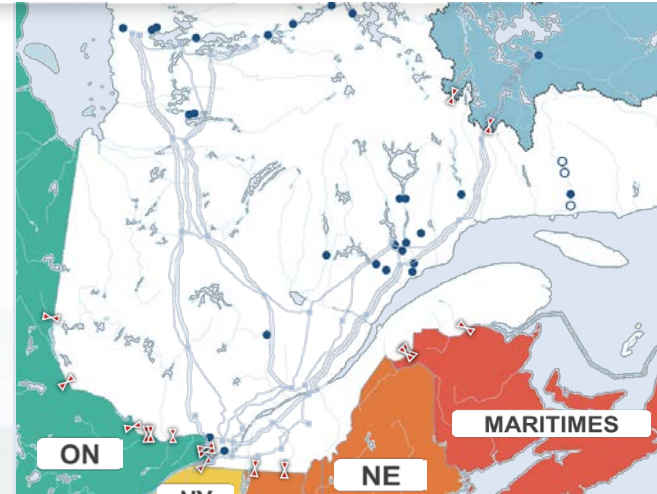
ROBUST. The largest electric utility in Canada and the most extensive transmission system in North America. Recent hydro buildout enables sufficient export capability to deliver historical import quantities over existing interfaces plus additional energy supply over new transmission

AS AN EXPORTER

15 interconnections with neighboring systems. With historical annual exports up to 30 TWh

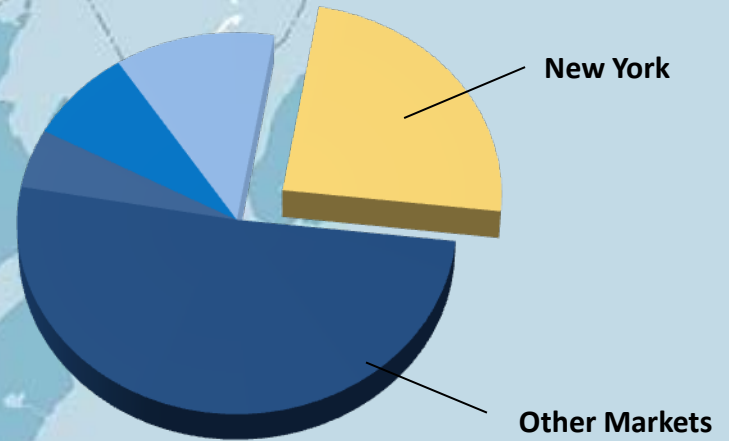
- ✓ 7 – 10 TWh traditionally sold into New York
- ✓ 20 year capacity commitment
- ✓ Intra-hourly scheduling

HQ Sales	2014	2015
In Quebec (TWh)	165	160
Outside Quebec (TWh)	27	29



Moving clean energy into New York

HQ currently has 2 interconnections into New York, capable of sinking up to 1500 MW each hour

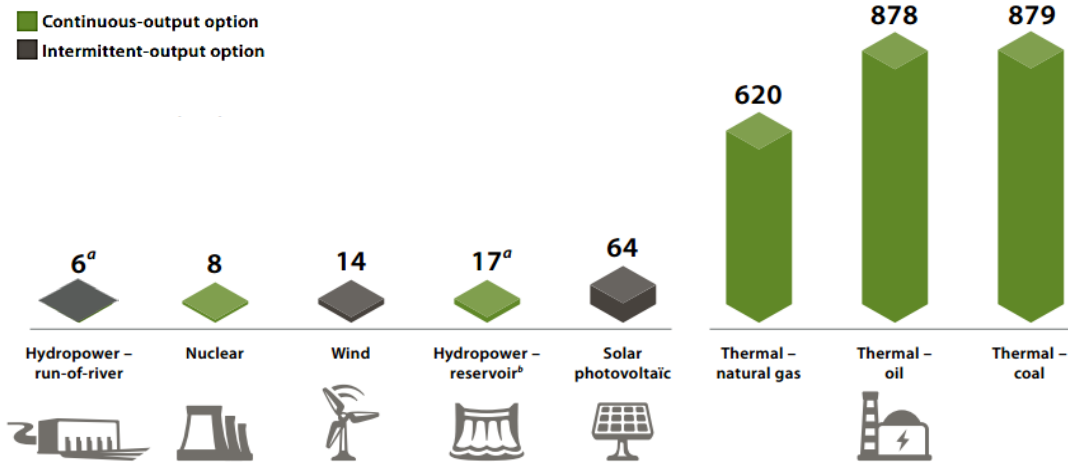


Transmission lines between Quebec and NY fully utilized during peak periods

New transmission will enable incremental deliveries of renewable energy and reduce GHG emissions within New York

GHG EMISSIONS – POWER GENERATION OPTIONS BASED ON LCA (g CO₂ eq./kWh)

- Continuous-output option
- Intermittent-output option



a) Hydro-Québec's results.

b) Reservoir hydropower differs from run-of-river hydropower with respect to GHG emissions. After it is impounded, a reservoir releases GHG emissions, the emission rate diminishing gradually over the following ten years. This is why GHG emission rates are higher for reservoir hydropower than for run-of-river hydropower.

HQ hydro resources have an emissions profile less than solar and similar to wind on a lifecycle basis

LCA – Lifecycle assessment

Clean Energy Standard (CES)

Creates a mandate to meet **objectives identified in the State Energy Plan**, final order on August 1, 2016

- ✓ 50% of New York's energy supply using renewable resources by 2030
- ✓ Reduce GHG emissions by 40% by 2030

Clean Power Plan (CPP)*

Federal program issued by the EPA to reduce CO2 emissions from existing fossil fuel generators in the United States 32% by 2030

*Implementation of the CPP currently under stay pending a decision on legality

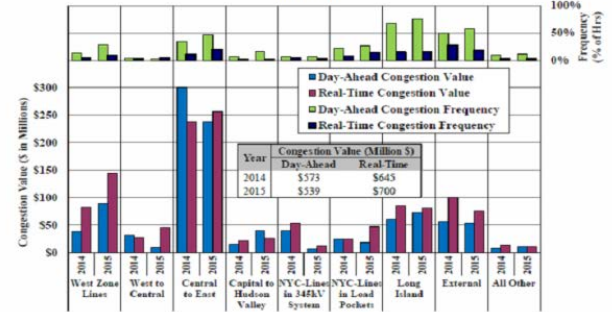
Regional Greenhouse Gas Initiative (RGGI)

Multi-state cap and trade program requiring fossil fueled generators to purchase allowances equal to their emissions

Total East and UPNY/SENY interfaces



Figure 2: Day-Ahead and Real-Time Congestion by Transmission Path 2014-2015



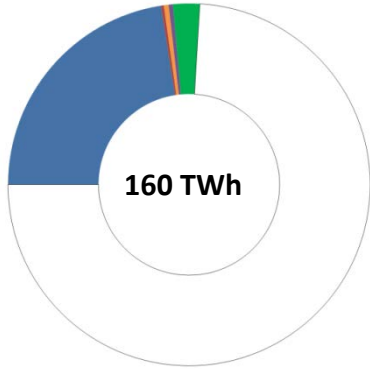
“Much of New York’s renewable energy capability is located in upstate New York, with additional potential in the Canadian provinces of Ontario and Quebec, **requiring upgrades to the bulk transmission system to deliver the renewable energy to load**” (beyond the AC Transmission and Western New York public policy initiatives no underway)

NYISO supplemental comments on the CES filed July 8th in case Number 15-E-0302

	New Resource Type (MW)	Estimated Resource Unavailability (%)	Additional ICR impact (MW)	Estimated IRM Impact (%)
Existing Fleet	N/A	N/A	N/A	17.5%
Land-based Wind	3,500	86%	3,010	9%
Utility-scale Solar	6,800	55%	3,740	11%
Hydro	600	47%	283	<1%
Biomass/ADG	360	21%	77	<1%
Offshore Wind	200	53%	107	<1%
Imports	450	61%	N/A	N/A
BTM Solar	3,000	55%	1,650	5%
TOTAL	14,910		8,867	~ 40-45%

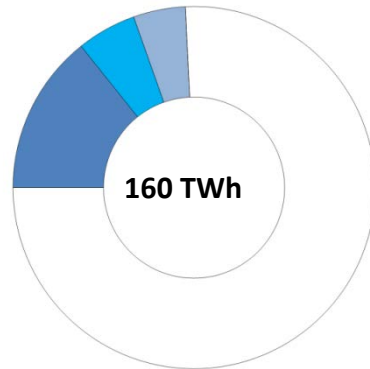
“The NYISO estimates that the DPS SEIS resource mix will increase the IRM from **17.5%** to between **40% and 45%**. The estimated increase in the IRM resulting from the DPS SEIS resource mix will require the State to maintain an additional amount of nameplate capacity (i.e., Installed Capacity) significantly greater than required today”

Source: NYISO supplemental comments on the CES filed July 8th in case Number 15-E-0302



Current Renewable Mix

Hydro	22.5%
Biogas	.2%
Solar	.4%
Biomass	.4%
Wind	2.4%



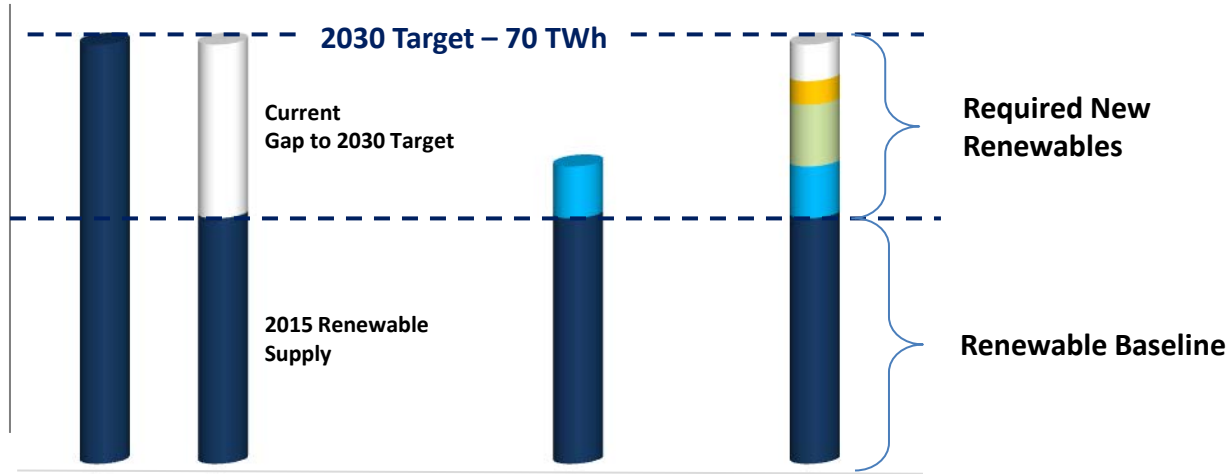
Hydro Mix

NYPA	13.51%
Other Suppliers	5.03%
HQ Imports*	4.00%

- Current renewable mix predominantly hydro
- No new substantial hydro facilities planned in New York
- Incremental hydro supplies will need to come from adjacent regions delivered over new transmission

*Not under long-term contract to New York

CES 2030 Target



Renewable baseline includes HQ imports not under contract to New York

New HQ Hydro
Incremental HQ Imports



New Wind
Projected at \$1-5B, NYSERDA LSR Report (300%)



New Solar
Projected \$1-5B, Clean Energy Fund (500%)



To reach the 50% by 2030 target, New York will need to take an “all of the above” approach, which includes all clean technologies. HQ can provide a substantial contribution towards this goal, by supplying energy and attributes over new transmission projects

New York should determine a public policy need for transmission that enables incremental renewable energy deliveries to New York and relieves congestion in the North Country

- Provide substantial quantities of incremental renewable energy to meet targets mandated through the CES
- Relieve congestion between existing renewable supply and load centers
- Retain bulk system reliability and performance while transitioning to a 50% renewable supply mix

To retain bulk system reliability and performance within the CES program:

- New transmission will be needed to deliver renewables developed in Western and Northern New York to load centers downstate
- Firming resources (such as large-scale dispatchable hydro) can help to integrate an increasing penetration of intermittent resources