De-Carbonization / DER Report for NYSRC Executive Committee Meeting 7/9/2021

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The July 2021 edition of the De-Carbonization / Distributed Energy Resources (DER) Report covers recent events and publications from NERC, NPCC, Joint Utilities, EPRI, NREL (National Renewable Energy Labs), and the NYISO. The Interconnection Queue has been updated to reflect the End-of-May values for energy storage, solar and wind. The topics in this newsletter are covered in the following order:

- NERC June Newsletter
- NPCC June Forum on Offshore Wind
- Joint Utilities Announces New Website
- EPRI Study: Analyzing Value Streams of Energy Storage in Con Edison Territory
- NREL Report: Blending Hydrogen into Natural Gas Pipeline Networks
- NYISO Blogs – Latest articles and videos covering renewables, DERs, and energy storage
- Snapshot of the NYISO Interconnection Queue: Storage / Solar / Wind

The June issue of the NERC Monthly Newsletter can be found here. This newsletter highlights FERC's two-day Technical Conference on June 12, which examined the impact of extreme weather and climate change on electric system reliability. The newsletter refers to NERC's 2021 Summer Reliability Assessment, as well as the 2019 ERO Reliability Risk Priorities Report, which ranks extreme natural events among the top four emerging risks to reliability (In order: Grid Transformation, Extreme Natural Events, Security Risks (Physical, Cyber and EMP), and Critical Infrastructure Interdependencies) While the damage from the usual extreme events tend to impact distribution system more than bulk power systems, it should be noted that extended cold and hot weather, wildfires, and widespread solar/wind/moisture droughts impact large amounts of energy resources.

The newsletter also noted an upcoming webinar on BPS-Connected Batteries / Hybrid Power Plants on July 15th. Registration is required to attend.

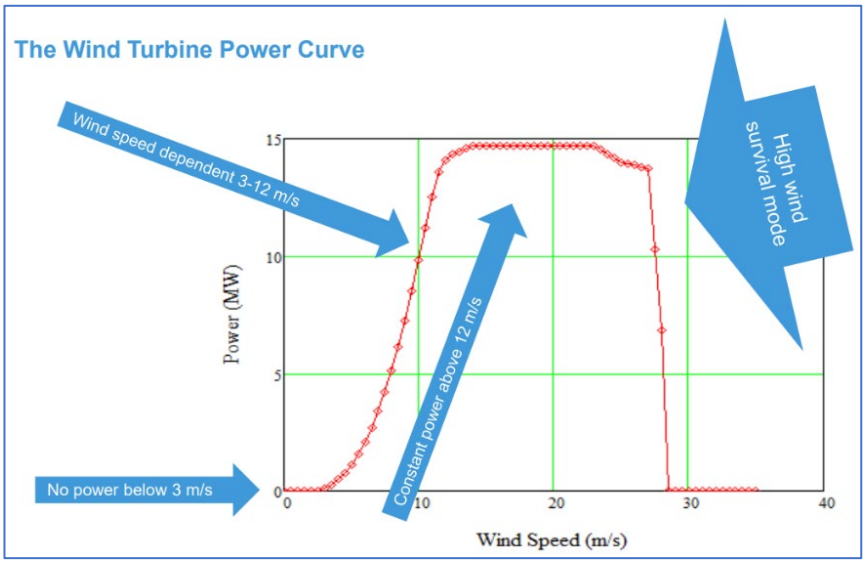
NPCC Offshore Wind Forum (June 24th)

Presentation material from the NPCC Offshore Wind Forum can be found here, while the two part Video recording of the session can be found here: Part 1 and Part 2.
Presenters and topics included:

- Ørsted — Offshore Wind Considerations – Operations, Design, and Interconnections
- National Grid — Perspectives on the Future of Offshore Wind
- Avangrid — Vineyard Wind Project
- Ørsted/Eversource — Revolution Wind, South Fork Wind, and Sunrise Wind: Basics of Offshore Wind, Projects, Siting, and Routing

Each of these presentations contain compelling graphics that represent their current Offshore Wind projects as shown on the following pages.

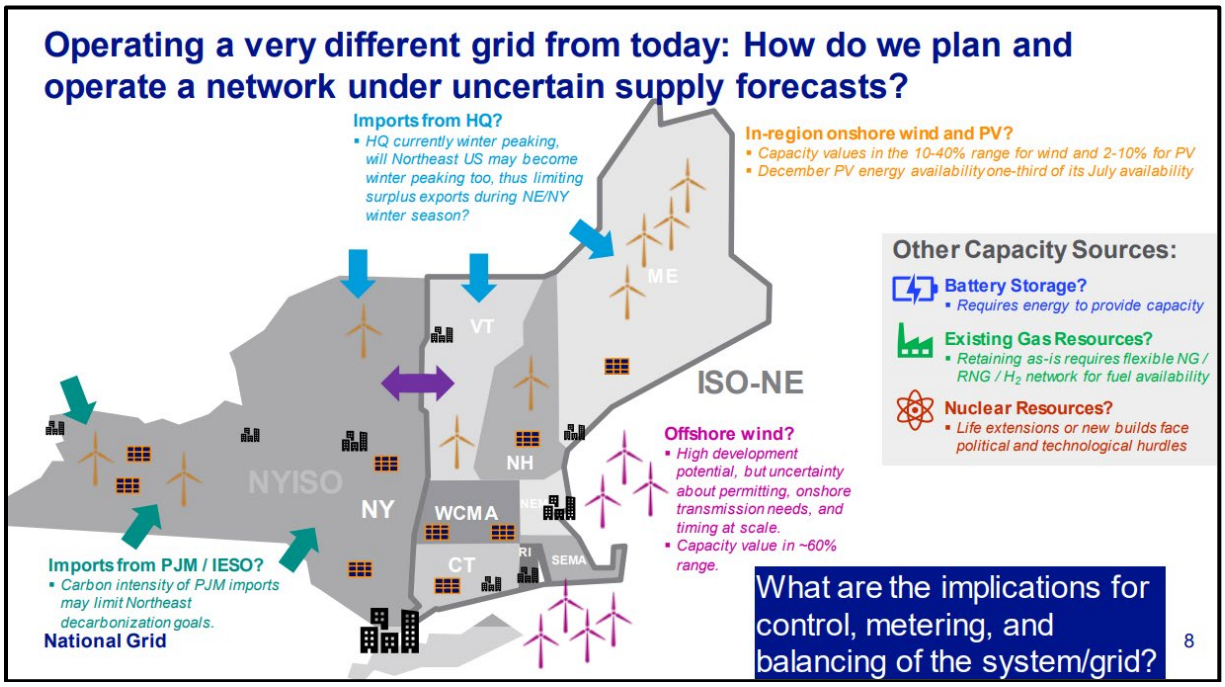
Starting with Ørsted, the size of the turbines anticipated for these projects are on the order of 13 - 15 MW. The below left photo shows the interior of the nacelle's rotor hub for the Siemens unit, with workers below indicating its relative size. The graphic below right shows this wind turbine's MW output as a function of impacting wind. Note the rapid rate of increase as windspeed increases, followed by a wide (almost 20 mph window of almost constant power output.



Both Ørsted and National Grid make the case for Public Policy Transmission processes to develop efficient transmission solutions to meet their energy policy goals, such as those under development in New York and New Jersey. Individual generator lead lines represent inefficient use of available cable routes and landfall locations, each representing a one-off system network upgrade that will become increasingly more expensive as early projects take up a limited number of points of interconnection. Instead, long term, mesh solutions utilizing interconnected controllable offshore (and onshore) HVDC transmission systems will allow higher reliability and more efficient transmission from offshore wind production areas to load centers.

National Grid pushes further with the idea that if offshore wind is to play a meaningful role, we need "wet" transmission to penetrate deeper into "dry" networks. The graphic below shows their concerns for several challenges facing an integrated northeast regional grid, including:

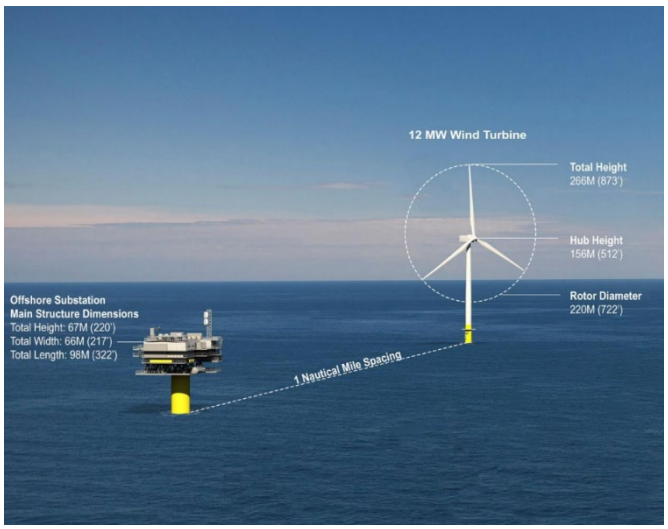
- The impact of local winter peaking on power imports from Canada
- Limited Solar Power at high latitudes and during winter months
- Carbon intensity of PJM imports will impact the New York State's environmental goals
- Uncertainty in scheduling, permitting and supply chain

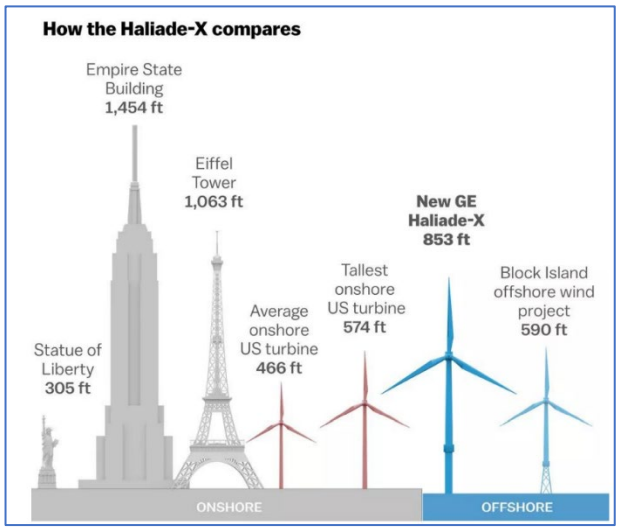


National Grid's suggestions for things that can be done at the present time include:

- Planning for integration of "wet" and "dry" transmission networks. Comprehensive assessments of existing transmission networks collaborating with State/Federal policymakers in an open and transparent stakeholder process.
- Consider more transport and industrial electrification and changes to load demand especially during winter and shoulder seasons.
- Deploying "grid enhancing technologies" such as power flow control, dynamic ratings devices, and topology optimization software.
- Utilize advanced energy storage (especially long duration) to create firm supply resources and operationalize such use cases as "storage as transmission".

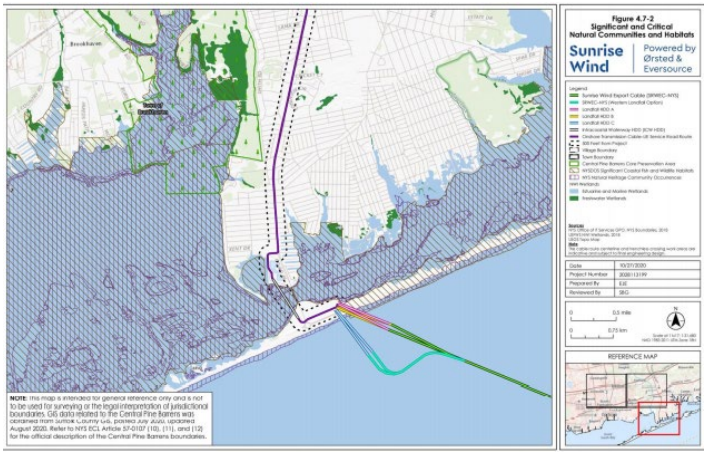
The Ørsted/Eversource presentation contained illustrations showing the relative size of offshore wind turbines and substations, along with a comparison to some well-known structures.





The presentation also focused on environmental and regulatory challenges. Using the example of the Sunrise Wind project, considerations for Export Cable Routing and Landfalls dealt with a variety of environmental issues, some quite obscure and esoteric:

- Wrecks and Obstructions
- Existing Submarine Cables
- Sand Borrow Areas
- Tug-Tow lanes and maintained channels
- Eelgrass / Seagrass
- Artificial reefs
- Significant Historic locations
- Geology

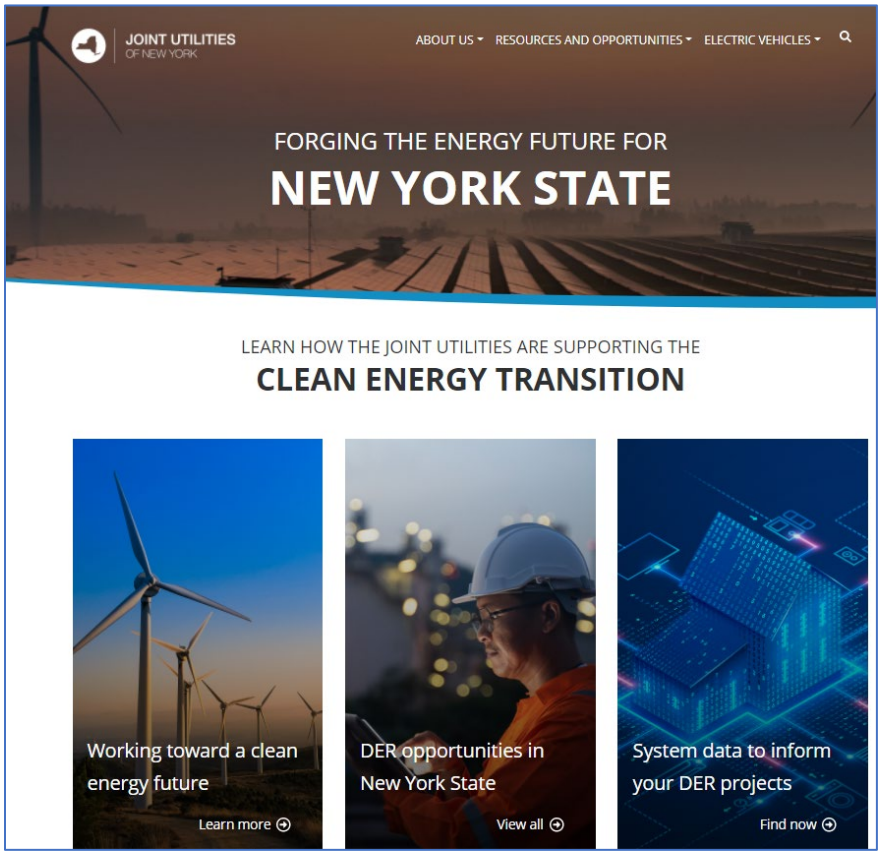


In addition, Stakeholder engagement included a wide range of federal, state, and local organizations:

- Bureau of Ocean Energy Management
- National oceanic and Atmospheric Administration Fisheries
- U.S. Army Corp of Engineers
- U.S Fish and Wildlife Service
- Department of Defense
- U.S. Coast Guard
- State Coastal Management Agencies
- State Environmental Management Agencies
- Local Stakeholders

Joint Utilities Announces New Website

The Joint Utilities have revamped and updated their Website to present a more organized and informative set of displays. The site provides information on and individual utility programs such as Hosting Capacity, Non-Wires Alternatives, and the EV Make Ready program. A library of material on CLCPA resources and DSIP filings are readily accessible. Additional links are provided to NYSERDA for relevant information on their programs and opportunities.



Major Areas of Interest that are linked to the landing page include

- Working toward a clean energy future (who we are)
- DER Project Resources and Opportunities in New York State
- System Data to Inform Your DER Projects

The new "Resources and Opportunities" page provides a launch pad for customers and businesses to navigate to the statewide utility programs, constructs, and data that will help them successfully deploy DER projects. The display provides quick access for the website's most valuable services under the categories of Distribution Generation (interconnection), Non-Wires Alternatives, Utility (including Data Portal & Hosting Capacity) and regulatory resources.

The latest issue of the Joint Utilities Quarterly Newsletter contains several articles of interest:

- Utilities Advance Deployment of Electric Vehicles in New York
- New Capabilities Released on Hosting Capacity Maps
- Utilities Coordinating Responses to IEDR and DAF orders
- Utilities receive Extension for Bulk Energy Storage Solicitations

EPRI Study: Analyzing Value Streams of Energy Storage in Con Edison Territory

This publicly available White Paper summarizes a study performed by EPRI specifically for Con Edison to review potential methods for assessing the comparative values of energy storage resources (or "value stack") within a matrix of various services.

EPRI used their Distributed Energy Resources Value Estimation tool (DER-VET) for analyzing and optimizing the value of energy storage, based on technical parameters and operational constraints. Site-specific assessments were conducted for a variety of configurations to optimize dispatch on an hourly basis, using the results to maximize benefits based on site conditions and the values determined from the targeted use cases. Modeling variations included ownership, location, interconnection type, and alternative program participations. The diagram below shows various grid services considered in the model.

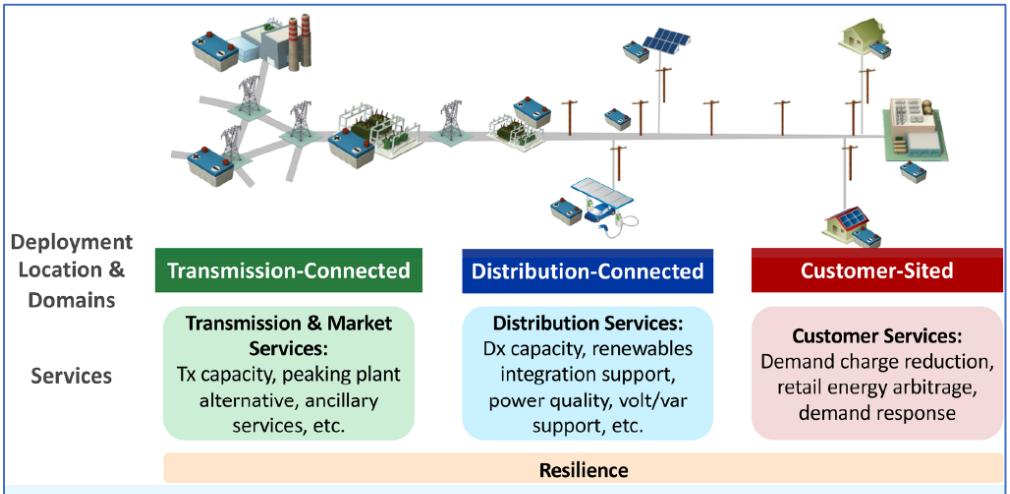


Figure 1 – Energy storage use across electric system. Source: EPRI

The DER-VET tool collected project inputs, constraints, and hourly prices to optimize and yield the dispatch profile that maximizes economic benefit. From there, revenue streams, tariffs, and charging costs are calculated. Together, the results provide an operational profile and revenue results for one year of activity.

The report contains many examples showing the impact of market incentives and penalties on various energy storage strategies. For example, the diagram on the right shows the impact of energy storage for implementing load shifting to reduce customer demand during a particular window of time. Results varied for different resources based on the program incentives that were available for those resources.

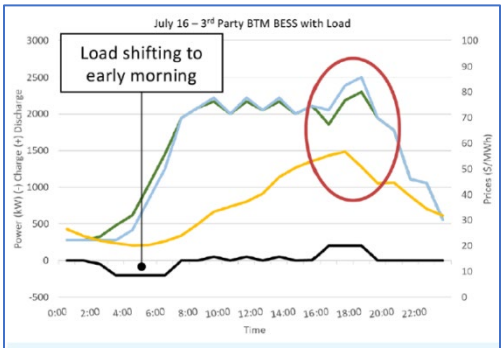
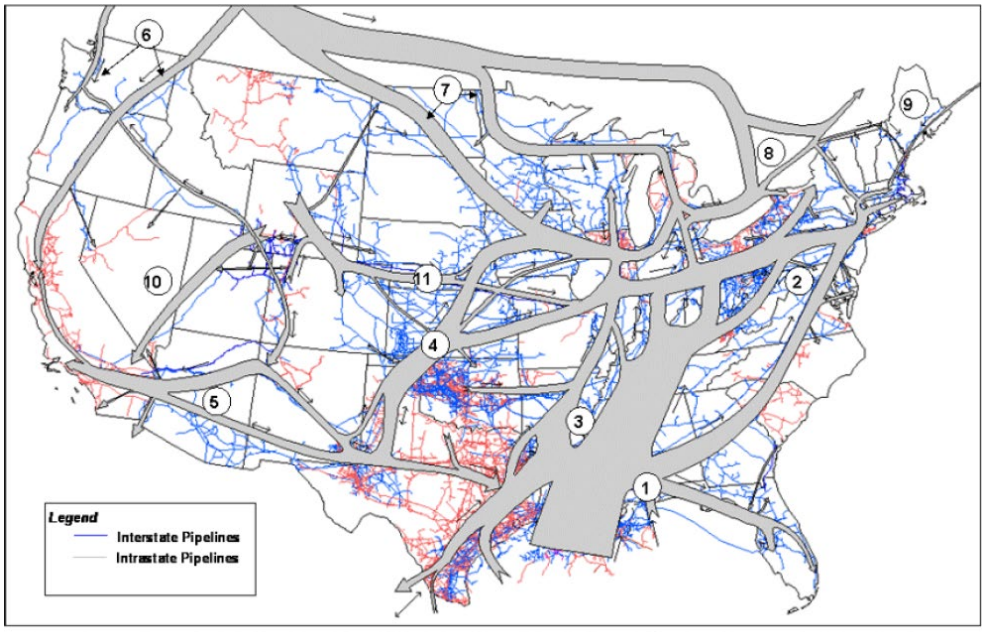


Figure 10 – Third-party-owned BTM energy storage system operating for load shifting to reduce customer demand and energy charges

The report represents an exploration into the sensitivity of energy storage components to marketing and regulatory forces and was not meant to be conclusive. However, it is does show the significant impact of these forces on the practice and utilization of energy storage for achieving decarbonization goals, and reinforces the need to ensure that policies are properly vetted and monitored as they are implemented.

NREL Report – Blending Hydrogen into Natural Gas Pipeline Networks

This Report was published by the National Renewable Energy Labs (NREL) and has been included in EPRI's LCRI (Low Carbon Resources Initiative). It reviews some of the key issues related to the concept of blending hydrogen into natural gas pipeline networks. Hydrogen blending may prove to be a viable means of increasing the output of renewable energy facilities, such as wind farms, by providing a hydrogen storage and delivery pathway across a broad range of geographic locations. Given the large geographic scope and scale of the existing natural gas infrastructure, even very low blend levels (less than 3%–5%) could absorb very large quantities of otherwise curtailed or uneconomical wind or solar power. Under appropriate conditions and at relatively low hydrogen concentrations, blending may require only minor modifications to the operation and maintenance of the pipeline network. This report provides a thorough review of the extent of the U.S. natural gas pipeline network, and examines the impact on end-use systems, leakage, safety, material durability, and extraction. Diagrams like the one shown below provide insight into the structure and function of the nation's gas transmission grid.



Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

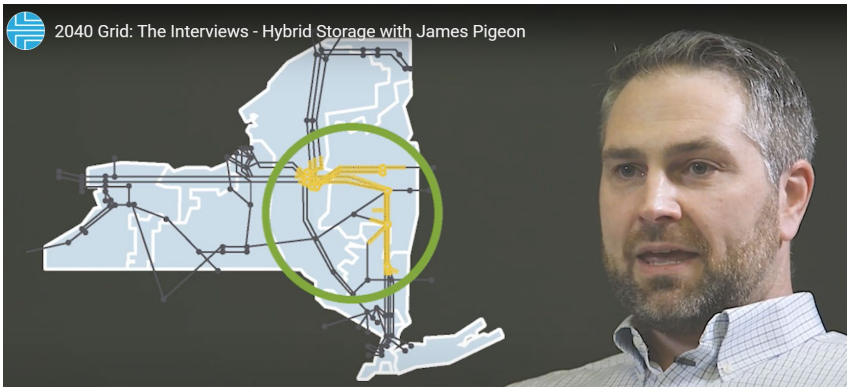
Two new features have been published on the Blog Page of the NYISO Website

Article: Offshore Wind and the Role of New Transmission:
New York State has currently contracted with developers for renewable energy credits for 5 offshore wind projects totaling 4.3 GW. Currently, New York City's summer peak demand is estimated to be around 11 GW, while Long Island's projected peak is about 5 GW. If offshore wind is built out to the level the CLCPA envisions, windy conditions on lower-demand days could result in sending surplus power upstate.

Offshore wind is only one public policy requirement necessitating changes to the grid in New York. Achieving a zero-emissions grid by 2040 will also require increased flow of clean energy from upstate to downstate. Current projects include:

- The Western New York public policy project that will be added to an existing right-of-way from Niagara to Erie counties. The estimated 20-mile project, when complete, will make the 2,700 MW of renewable energy from Niagara Falls fully available, and transfer up to an additional 1,000 MW from Ontario following retirement of fossil-fueled power plants in Western New York.
- The AC Transmission Upgrade project, which is made up of two facets:
    - 93 miles of high voltage transmission lines from Oneida to Albany counties
    - 54 miles of high voltage transmission lines from Rensselaer to Dutchess counties
- The New York Power Authority (NYPA) is currently undertaking the Northern New York Project, which includes rebuilding nearly 200 miles of transmission in the North Country and Central New York areas to a higher voltage. In addition to "unbottling" existing renewable energy in the region, NYPA estimates the project will result in significant production cost savings, emissions reductions, and decreases in congestion.

Video on the Advantages of Hybrid Energy Storage: This interview with James Pigeon, Manager of Distributed Resources Integration at NYISO, looks at Hybrid Energy Storage and its ability to resolve potential congestion issues from the perspective of the 2040 Grid.



Interconnection Queue: Monthly Snapshot - Energy Storage / Wind / Solar Project Tracking

The intent is to track the growth of Energy Storage, Wind and Solar projects in the NYISO Interconnection Queue, looking to identify trends and patterns by zone and in total for the state. The information was obtained from the NYISO Interconnection Website, based on information published on June 16th, and representing the Queue as of May 31st. Note that 28 projects were added and 6 were withdrawn during the month of April. Results are tabulated below and shown graphically on the following page.

Total Count of Projects in NYISO Queue By Zone

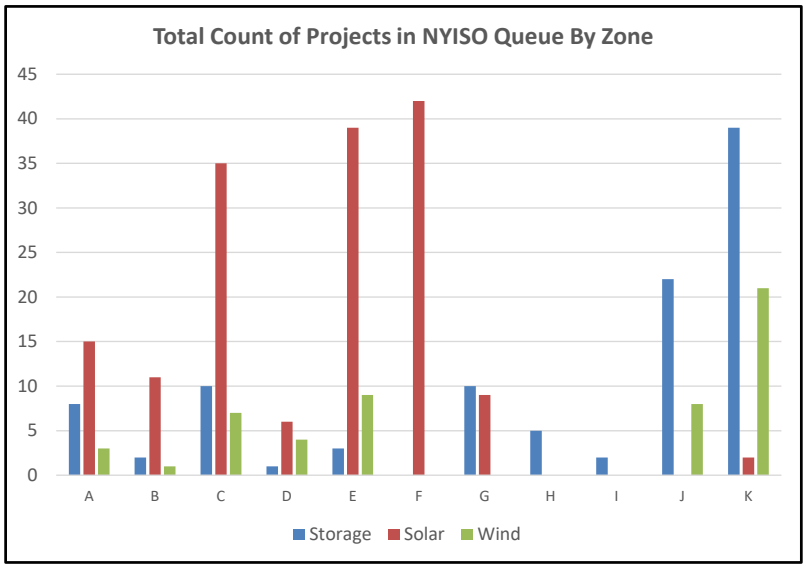
Zone	Storage	Solar	Wind
A	8	15	3
B	2	11	1
C	10	35	7
D	1	6	4
E	3	39	9
F		42	
G	10	9	
H	5		
I	2		
J	22		8
K	39	2	21
State	102	159	53

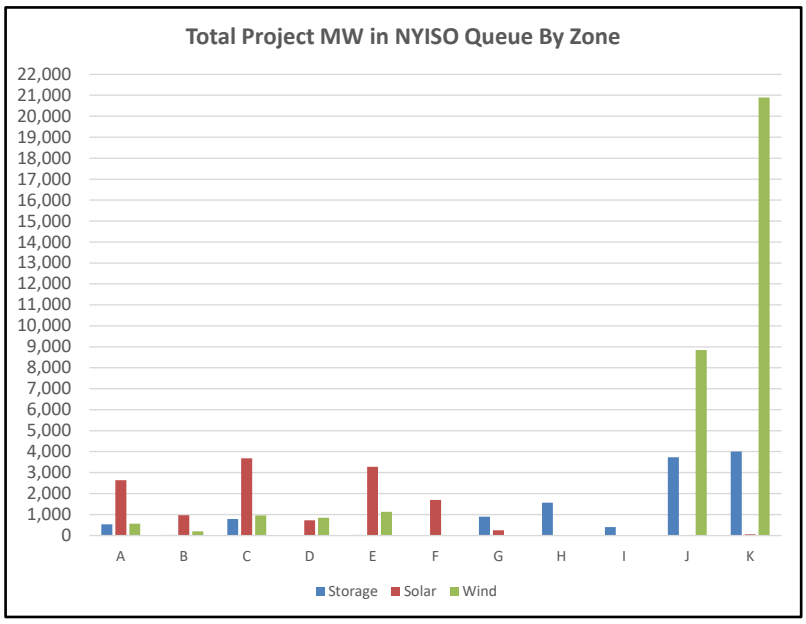
Total Project MW in NYISO Queue By Zone

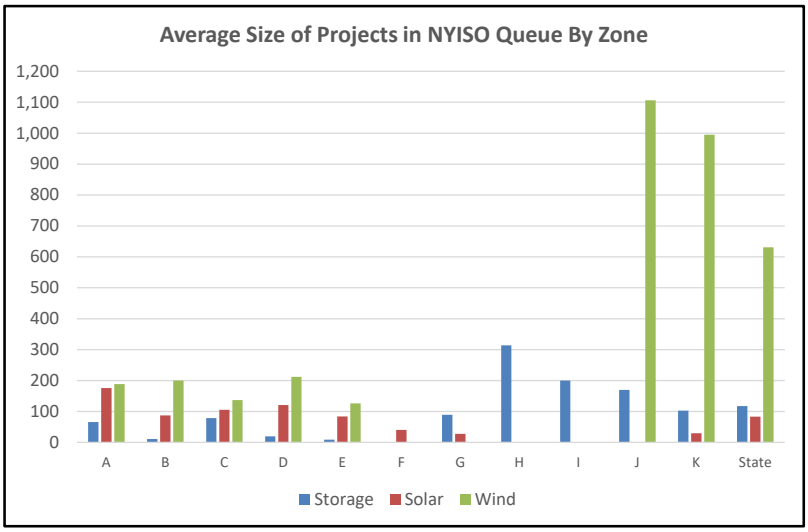
Zone	Storage	Solar	Wind
A	530	2,640	566
B	21	965	200
C	784	3,682	960
D	20	727	847
E	28	3,279	1,135
F		1,700	
G	897	250	
H	1,569		
I	400		
J	3,736		8,848
K	4,009	59	20,898
State	11,994	13,302	33,454

Average Size of Projects in NYISO Queue By Zone

Zone	Storage	Solar	Wind
A	66	176	189
B	11	88	200
C	78	105	137
D	20	121	212
E	9	84	126
F		40	
G	90	28	
H	314		
I	200		
J	170		1,106
K	103	29	995
State	118	84	631


Total Count of Projects in NYISO Queue By Zone
45
40
35
30
25
20
15
10
5
0
A
B
C
D
E
F
G
H
I
J
K
Storage
Solar
Wind


Total Project MW in NYISO Queue By Zone
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
A
B
C
D
E
F
G
H
I
J
K
Storage
Solar
Wind


Average Size of Projects in NYISO Queue By Zone
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
A
B
C
D
E
F
G
H
I
J
K
State
Storage
Solar
Wind