De-Carbonization / DER Report for NYSRC Executive Committee Meeting 10/14/2022

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The October 2022 edition of the De-Carbonization / Distributed Energy Resources (DER) Report includes the following items:

- NERC September Newsletter:
  - NERC Launches First Reliability Vignette
  - NERC Publishes Inverter-Based Resource Strategy Document
  - Aggregated Cold Weather Preparations Report posted
- Joint NERC / EPRI / NAGF / ESIG Workshop on Generator Interconnection Process
- PJM working with States to Advance Offshore Wind and Other Renewables
- NYISO Blog: Explainer: Impact of National & Global Conditions on Electricity Prices in New York
  Press Release: NYISO Report Examines Pathways to Reach State Policy Objectives
- Snapshot of the NYISO Interconnection Queue: Storage / Solar / Wind / Co-located Storage

Highlights from the September NERC Monthly Newsletter (Link) include:

NERC is launching a new product called Reliability Vignettes, which can be found on the Event Analysis, Reliability Assessment, and Performance Analysis page of NERC's website. These documents are intended to capture current operating incidents of interest and project the circumstances of the incidents into the future as think pieces for system planning and operating considerations. NERC will publish Reliability Vignettes on an occasional basis as interesting system occurrences are identified.

The first Reliability Vignette is entitled Future Wind Planning Informed by Current Operating Experience. It covers the real-world operating experiences of two Balancing Authorities in a high-wind event as the basis for consideration of a future system that is wind- and solar-generation dominant. The document's objective is to provide future resource planning considerations for registered entities to ponder, consider and/or implement as they design future operations of their system assets.

NERC Publishes Inverter-Based Resource Strategy Document

NERC has developed an Inverter-Based Resource Strategy document for addressing inverter-based resource performance issues that illustrates current and future work to mitigate emerging risks in this area. The strategy, which was developed to ensure industry awareness and alignment regarding ERO Enterprise and NERC Reliability and Security Technical Committee activities, also addresses the Member Representatives Committee's policy input requesting enhancements in this area. The strategy includes four key focus areas: risk analysis, interconnection process improvements, sharing best practices and industry education and regulatory enhancements. Each focus area includes specific activities and work items that are described in more detail throughout the document. Related material can be found here: Quick Reference Guide: Inverter-Based Resource Activities.

Aggregated Cold Weather Preparations Report Posted

NERC posted an aggregated report on the Level 2 Recommendation to Industry: Cold Weather Preparations for Extreme Weather Events, which was published originally on August 18, 2021. NERC posted the aggregated report to help industry better prepare for challenges due to extreme winter weather. Two requirements related to renewables and ambient air ratings include:

- Utilize additional transmission capacity using transmission limits based on real-time system conditions
- GOs with wind and solar resources should track and advise regarding units that can mitigate the impacts of cold weather (e.g., de-icing capability) to better assess generating unit availability.

Joint NERC / EPRI / NAGF / ESIG Workshop on Generator Interconnection Process

This 3-day online workshop covering the relationships between interconnection process reforms and new capability and performance standards for inverter-based resources was held in August. The event was hosted by ESIG (Energy Systems Integration Group), with additional sponsorship from NAGF (North American Generation Forum, NERC and EPRI. ESIG has provided a Brief Introduction, Detailed summary of the event, and Agenda, as well as a library of Video Recordings from previous sessions,

The goals of the workshop included:

- Identify gaps and recommended best practices related to the generation interconnection process, interconnection studies and modeling, and interconnection requirements and standards
- Inform industry comments to the FERC NOPR on Improvements to Generator Interconnection Procedures and Agreements
- Bring awareness to the developer community about power system reliability needs shaping the studies, modeling, and interconnection requirements
- Bring awareness to ISOs, RTOs, utilities, and policymakers around challenges facing IBR project developers
- Inform the broader engineering, policymaker, and decisionmaker audience about generation interconnection issues and possible solutions

Session 1: Generation Interconnection vs Transmission Planning, Why the Difference?	Recordings - 1 & 2
• Transmission Upgrades: Interconnection Process vs Transmission Planning Process	Brattle Group
• Roadmap for Modernizing & Integrating Interconnection and Transmission Planning	Enel
• Dispatch Assumption for the Interconnection Studies, NRIS and ERIS	Elec Pwr Engineers
Session 2: Integrating Interconnection & Transmission Planning, Benefits of Transmission	
• SPP Consolidated Planning Process Task Force: Planning & Criteria	NextEra, SPP
• Joint Targeted Interconnection Queue Study	MISO
• Pro-Active Planning	Brattle Group
• Multi-benefits of Transmission	Telos Energy
Session 3: Interconnection Studies	Recordings 3 & 4
• Interconnection Process vs Project Development Timeline	Ørsted
• ERCOT Interconnection Study Process, Focus on Reliability	Enel Green Power
• Control Tuning as Alternative to Transmission Reinforcement	Vestas
• Interconnection study process, reliability implications & improvements Needed	EPRI
Session 4: Importance of Modeling	
• Importance of Models, Model Validation and Lack of Follow-up Past Commissioning	PEACE
• IBR Models and Modeling Needs	EPRI
• EMT Modeling Experience at ISO-NE	ISO New England
Session 5: IEEE-2800	Recordings 5 & 6
• IEEE 2800 and Roadmap to Adoption	NREL
• IEEE 2800 vs Existing ERCOT Interconnection Requirements, Gap Analysis Learnings	ERCOT
Session 6: DOE i2x Initiative	
• DOE i2x Overview, Roadmap and Feedback	U.S. DOE
• Closing Remarks: Summary of Workshop Next Steps, White Paper	ESIG

Some of the key messages from the workshop are given below:

- Integrating generation interconnection processes with transmission planning processes can move the industry toward more optimized least-regrets, scenario-based, proactive, cost-effective, multi-value transmission solutions, an approach that can address the wide range of future needs, facilitate competition, and reduce the costs and time necessary to interconnect low-cost, low-carbon generation.
- Cost allocation does not need to dictate the design of the process or be a barrier to the process improvements. If we arrive at a cost-effective, integrated generator interconnection and transmission planning methodology, a cost allocation methodology can be developed. Recent initiatives presented at the workshop offer possible solutions.
- System impact studies need to align better with project development timelines to ensure that reliability studies are carried out with models reflective of the equipment as will be installed in the field. This will increase the value of these studies and benefit the reliability of the power system. Carrying out stability assessment later in the interconnection process is recommended.
- While hosting capacity maps proposed by the FERC NOPR are helpful, information about short circuit strength and harmonics at prospective points of interconnection would further help to reduce iterations of project design.
- Further model improvements and improvements to model validation processes are needed to ensure that models are reflective of the equipment in the field and include controls and protective functions relevant for studied phenomena. All types of models need proper validation and parametrization, and the appropriate type of models should be used for the appropriate studies.
- Widespread disturbance events are not a technology issue per se but are rather due to a lack of comprehensive interconnection requirements and conformity assessment before, during, and after projects' commissioning.
- The equipment manufacturers and developers who participated in the workshop welcome the effort to harmonize interconnection requirements in the form of the IEEE 2800 standard, as it provides certainty, provides cost-efficiency, and improves grid reliability.
- State-of-the art equipment already has the majority of the capabilities required by IEEE 2800; however, there are requirements for some capabilities that are more challenging to develop and test in their equipment ahead of IEEE 2800.2, which is currently under development.
- Some ISOs, including ISO-NE and ERCOT, have already started the piecemeal adoption of IEEE 2800 to address high priority gaps in their existing interconnection requirements. Wholesale adoption of this standard is also possible, both now and, especially, at a later stage once IEEE 2800.2 becomes available.
- Tight collaboration between developers, OEMs, and grid operators is needed to ensure conformity of new plant design with applicable standards and interconnection requirements, to share necessary data and models in a timely manner, and to reduce the number of interconnection study iterations, while ensuring reliable interconnection and efficient use of engineering time.
- ESIG's Reliability Working Group, NERC's Inverter-based Resource Performance Subcommittee, the IEEE 2800.2 Working Group, and the NERC Reliability Standard Drafting Teams are great resources for education and collaboration.
- The recently launched DOE i2X initiative will convene a broad range of industry stakeholders to enable simpler, faster, fairer interconnection of wind and solar resources while boosting the reliability, resilience, and security of the grid.

Additional informative material from the ESIG website can be found at the ESIG Reports and Briefs page include:

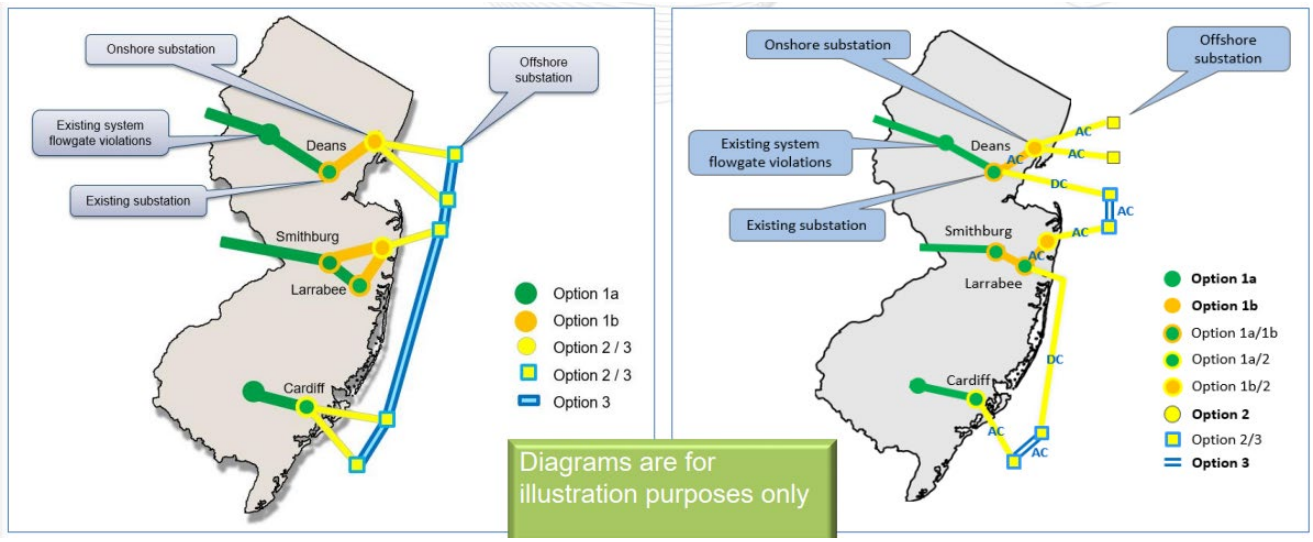
- Proactive Planning for Generation Interconnection: A Case Study of SPP and MISO
- Lessons Learned for the U.S. Context: An Assessment of UK and Australian Open Networks Initiatives
- The Transition to a High-DER Electricity System: Creating a National Initiative on DER Integration for USA

ESIG Article: PJM working with States to Advance Offshore Wind and Other Renewables

This article from the ESIG (Energy Systems Integration Group) website summarizes the latest activities at PJM with respect to expediting, evaluating and encouraging the development of offshore wind supporting the regions under PJM jurisdiction. Additional Information can be found at this publication: Grid of the Future: PJM's Regional Planning Perspective, published on May 10th, 2022.

PJM and the New Jersey Board of Public Utilities (NJBPU) are collaborating in a groundbreaking initiative using PJM's competitive regional planning process to advance New Jersey's goal of delivering 7,500 MW of offshore wind generation to its residents by 2035. New Jersey requested, and the Federal Energy Regulatory Commission approved, first-time use of an existing provision in PJM's Operating Agreement to solicit proposals envisioning the necessary transmission infrastructure to move electricity generated offshore to the existing grid. This path is called the State Agreement Approach (SAA) and is similar to New York's Public Policy Transmission Plan.

The provision enables a state, or group of states, to propose a project for inclusion in PJM's Regional Transmission Expansion Plan that assists in realizing public policy requirements, as long as the requestor agrees to pay all costs of any state-selected build-out. The SAA process is complementary to the interconnection planning process and well suited when looking to accomplish a significant resource build-out over a number of years, as is the case in New Jersey. PJM received 80 project proposals from 13 different entities in the competitive transmission window that ran April 15 to September 17, 2021.



In October 2021 PJM published the Phase 1 Results of its Offshore Wind Transmission Study, a collaborative effort with state agencies to identify transmission solutions across the PJM footprint to deliver the PJM coastal states' anticipated offshore wind generation under multiple scenarios.

PJM recently Announced the release of the Study Results of its initial screening of these submissions for reliability performance, economic performance, constructability, and financial aspects.

Current offshore wind policy targets among the PJM states total 14,268 MW. The study scenarios included sensitivities for injection points and capacity totals ranging from 6,416 MW to 17,016 MW of offshore wind injection under one short-term scenario modeled out to 2027, and four long-term scenarios modeled out to 2035. The study also incorporates the renewable portfolio standards of all PJM states, in order to determine potential ripple effects throughout the region of each state's proposed build-out of renewable resources.

NYISO: Announcements on the Blog Page of the NYISO Website:

The latest features from the NYISO Blog Page include the following:

The NYISO has announced the publication of a white paper entitled Explainer: Impact of National & Global Conditions on Electricity Prices in New York, which explores the various factors and cost drivers behind recent and projected increases in electricity costs. The NYISO is warning of a sharp rise in wholesale electric costs expected this winter due to several economic and geopolitical factors that continue to impact the market cost of natural gas used in the production of electricity. As part of its effort to prepare consumers for this winter, the NYISO released an updated white paper, first released in May, that explores the cost drivers behind commodity increases of the past year and predicts further commodity cost increases this winter.

The report presents information from a variety of sources, including the Energy Information Administration, the New York State Public Service Commission, the U.S. Department of Labor as well as NYISO's 2022 Power Trends Report and Datasheet.

Press Release: NYISO Report Examines Pathways to Reach State Policy Objectives:
The NYISO released the report entitle 2021-2040 System & Resource Outlook, a new report that identifies the unprecedented level of electrical system investment necessary to achieve New York State's climate policy requirements. Developed in collaboration with stakeholders and state agencies, the Outlook uses several scenarios to identify potential pathways for transmission and supply investments that will support a reliable transition of the electric grid. The Outlook will be updated every two years. Key Findings include:

- State climate mandates are driving the need for unprecedented levels of investment in new generation to achieve decarbonization and maintain system reliability. By 2030 an estimated 20 gigawatts (GW) of additional renewable generation must be in-service to support the energy policy target of 70 percent renewable generation. By 2040, between 111-124 GW of total generating capacity will be needed to support the CLCPA mandate of an emissions-free grid. For reference, New York currently has approximately 37 GW of generating capacity. 12.9 GW of new generation has been developed since wholesale electricity markets began more than 20 years ago in 1999.
- Extensive transmission investment will be necessary to deliver renewable energy and address new constraints that appear across the electric system.
- Electrification of buildings and transportation required by state policies will rapidly increase peak and annual energy demand.
- As more wind, solar, and storage plants are added to the grid, Dispatchable Emission-Free Resources (DEFRs) must be developed and added to the system at scale to reliably serve demand when intermittent generation is unavailable. The lead time necessary for research, development, permitting, and construction of DEFR supply will require action well in advance of 2040 if state policy mandates under the CLCPA are to be achieved. Fossil generation will likely need to be retained past the 2040 mandates to keep the system reliable if DEFR technology is not in operation.

The report concludes by stating that the scope of the additional renewable resource need is remarkable. The installation rate in the next 20 years must increase significantly to achieve state law climate change requirements. State agencies should consider releasing a more detailed procurement schedule for renewable resources to guide the long-term system planning and provide clarity to the market.

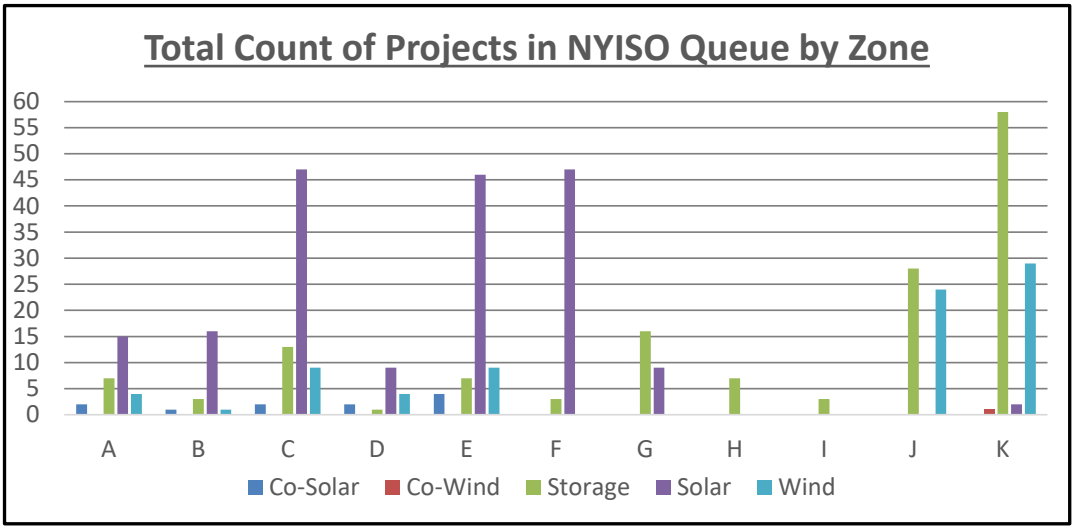
Interconnection Queue: Monthly Snapshot – Storage / Solar / Wind / CSRs (Co-located Storage)

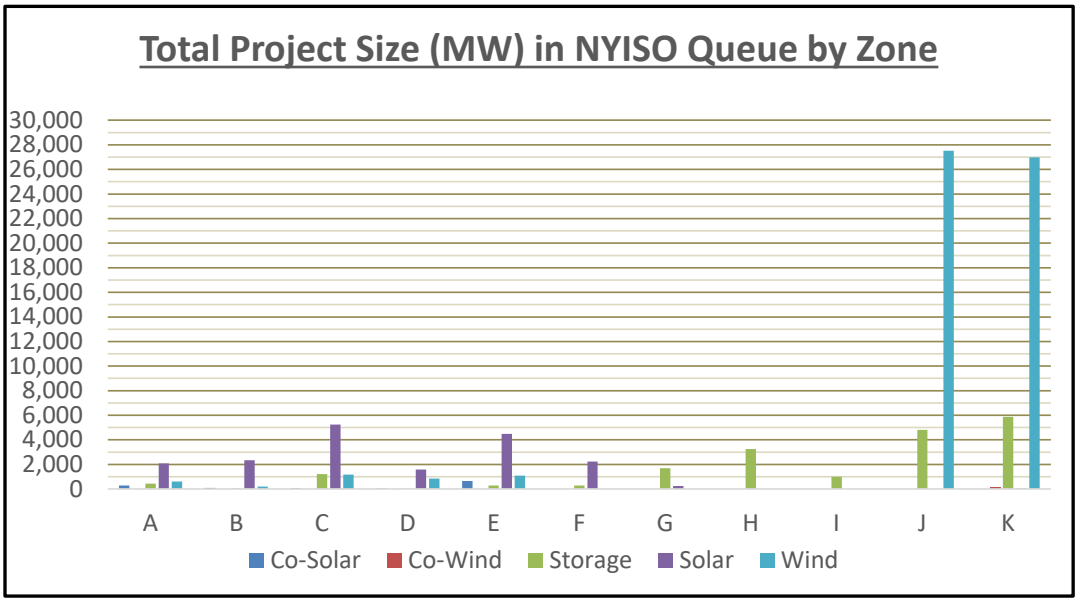
The intent is to track the growth of Energy Storage, Wind, Solar and Co-Located Storage (Solar and Wind now in separate categories) projects in the NYISO Interconnection Queue, looking to identify trends and patterns by zone and in total for the state. The information was obtained from the NYISO Interconnection Website, based on information published on September 19th, and representing the Queue as of August 31st. Note that 17 projects were added, and 7 were withdrawn during the month of August. Results are tabulated below and shown graphically on the next page.

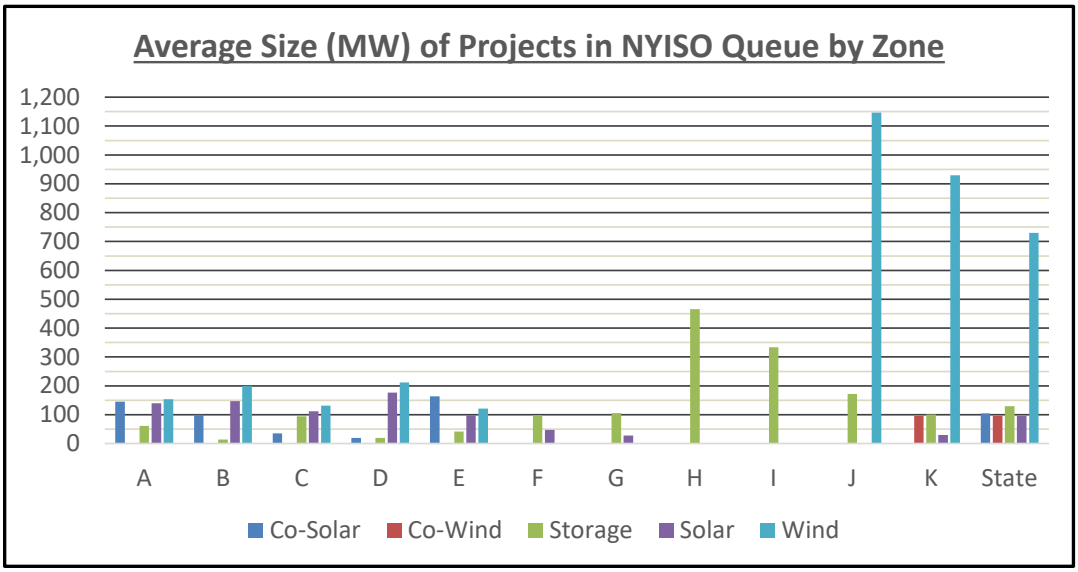
Total Count of Projects in NYISO Queue by Zone					
Zone	Co-Solar	Co-Wind	Storage	Solar	Wind
A	2		7	15	4
B	1		3	16	1
C	2		13	47	9
D	2		1	9	4
E	4		7	46	9
F			3	47	
G			16	9	
H			7		
I			3		
J			28		24
K		1	58	2	29
State	11	1	146	191	80

Total Project Size (MW) in NYISO Queue by Zone					
Zone	Co-Solar	Co-Wind	Storage	Solar	Wind
A	290		430	2,090	615
B	100		41	2,347	200
C	70		1,223	5,254	1,184
D	40		20	1,589	847
E	654		292	4,492	1,087
F			295	2,237	
G			1,686	250	
H			3,260		
I			1,000		
J			4,815		27,526
K		96	5,872	59	26,968
State	1,153	96	18,935	18,318	58,428

Average Size (MW) of Projects in NYISO Queue by Zone					
Zone	Co-Solar	Co-Wind	Storage	Solar	Wind
A	145		61	139	154
B	100		14	147	200
C	35		94	112	132
D	20		20	177	212
E	163		42	98	121
F			98	48	
G			105	28	
H			466		
I			333		
J			172		1,147
K		96	101	29	930
State	105	96	130	96	730


Total Count of Projects in NYISO Queue by Zone
60
55
50
45
40
35
30
25
20
15
10
5
0
A
B
C
D
E
F
G
H
I
J
K
Co-Solar
Co-Wind
Storage
Solar
Wind


Total Project Size (MW) in NYISO Queue by Zone
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
A
B
C
D
E
F
G
H
I
J
K
Co-Solar
Co-Wind
Storage
Solar
Wind


Average Size (MW) 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
Co-Solar
Co-Wind
Storage
Solar
Wind