De-Carbonization / DER Report for NYSRC Executive Committee Meeting 5/10/2024

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The May 2024 edition of the De-Carbonization / Distributed Energy Resources (DER) Report includes the following items:

- NERC issues DRAFT Reliability Guideline on BPS Planning under Increasing Penetration of DERs
- NY Times Article: EPA Severely Limits Pollution from Coal-Burning Power Plants
- NY Advances New Offshore Wind Plan After Scrapping 4 GW Over Turbine Size Dispute
- NYISO: Implements Nation's First Market Empowering Distributed Energy Resources
- NYISO: Eclipse 2024: What Happened to Solar Generation Across New York?
- Snapshot of the NYISO Interconnection Queue: Storage / Solar / Wind / Co-located

NERC issues DRAFT Reliability Guideline on BPS Planning under Increasing Penetration of DERs

The NERC System Planning Impacts from DER Working Group (SPIDERWG) has developed a new DRAFT reliability guideline entitled "Bulk Power System Planning Under Increasing Penetration of Distributed Resources". The document contains recommended practices for the study of Distributed Energy Resources (DERs) in the planning horizon, including information sharing practices in a utility that serves both distribution and transmission functions. The document can also be found on the Reliability and Security Technical Committee's (RSTC) Documents and White Papers page. NERC encourages entities to review, validate, adjust, and/or develop a program with the practices set forth in this guideline. Reviewers can provide Comments via this form, up to June 6th.

There are recommendations for each stage of the framework, highlighted in the following steps common to TPs and PCs:

- Developing a Base Case
- Developing credible contingencies
- Developing a sensitivity case
- Performing steady-state simulations
- Performing stability simulations
- Performing short circuit simulations

SPIDERWG has also identified that of focus transmission planning departments are increasing the use of EMT studies within planning assessments. These studies are generally focused on a small area of the transmission system near bulk-connected IBR plants; however, sometimes these studies require translating the positive sequence transmission to distribution interface (T-D Interface) into the EMT domain. As such, SPIDERWG documented specific lessons learned and procedures when incorporating aggregate DER into EMT simulations.

The table below shows priorities for including DER response characteristics in Transmission Studies based on T-D interface DER Penetration:

Qualitative DER level	Percentage	Accounting of DER Response in BPS Contingency Studies (Cumulative)
Low DER Penetration	0 - 5%	
Significant DER Penetration	5% - 15%	Frequency, Volt - VAR, Ride-Through, DER Protection
High DER Penetration	15% - 30%	Impact of PLL Control, Impact of Current Controller Tuning
Extremely High DER Penetration	30% - 100%	Assess Control Interactions, Long Term and Near Term BPS Stability

High level recommendations include:

- TPs and PCs should explicitly identify DER impacts to their steady-state, stability, and short-circuit assessments in their study reports and highlight if they contributed to any steady-state, stability, and short circuit criteria violations. TPs and PCs should review Appendix A of this document and incorporate the study-dependent recommendations.
- TPs and PCs should reflect expected dynamic reactive power performance of DER equipment in stability simulations. Dynamic injection and withdrawal of reactive power by DER during system disturbances can significantly impact study results.
- TPs and PCs should Make sure the DER trip settings in the dynamic model representation are accurate, and account for appropriate levels of DER tripping in their steady state contingency definitions and properly reflect expected DER trip characteristics in stability simulations.
- PCs should ensure neighboring PCs understand the settings of DER (i.e.: share appropriate DER models through interconnection wide case building processes) in their system when coordinating their planning assessments. PCs should also ensure that any DER related impact is highlighted in this coordination of the planning assessment.
- TPs should document any DER-related common mode of failure in their set of contingencies applied to planning assessments. (e.g., cyberattack, cloud cover) TPs should seek to improve their understanding of these common mode failures through studies.
- TPs and PCs should review their planning criteria to ensure that it is accurately flagging areas of risk under increasing penetration of DERs. TPs and PCs should choose relevant criteria57 for their area and refine such criteria for the impact of growing penetrations of DERs in their transmission simulations as found in the Impacts from High Levels of DER on Transmission Studies section.
- When developing Corrective Action Plans, TPs should ensure that the action taken in the plan solves the root cause of the issue and such actions clearly identify how growing DER penetration can impact the plan's viability.

Appendix A of this document provides more detailed information in the following topical areas, each containing a section on overview, base and sensitivity case development, assumptions, approach, and potential solutions:

- Specific steady-state study methods:
    - High Voltage Issues during Light Net Load Conditions due to DER
    - Low Voltage Issues due to DER
    - Thermal Overload studies
- Specific Transient Dynamic Study methods:
    - Angular Stability Studies
    - Transient Voltage Studies – FIDVR
    - Frequency Response Studies with DER
- Other types of studies methods:
    - Protection Setting Studies
    - Motor Start studies
    - Case Validation Studies

Additional links:

- Link: DER Modeling Study: Investigating Modeling Thresholds (November, 2022)
- Link: Reliability Guideline: DER Data Collection and Model Verification of Aggregate DER (August 2023)
- Link: Reliability Guideline: Parameterization of the DER_A Model for Aggregate DER (February, 2023)
- Link: WECC Impact of High Distributed Energy Resources (March, 2022)
- Link to EPRI Landing Page: Analyzing the Impact of Aggregated DER Behavior on Bulk Power System Performance – A Summary of Three Case Studies (Publicly available report)

Two Related NY Times Articles Plus Utility Dive:

Article Link: EPA Severely Limits Pollution from Coal-Burning Power Plants

Article Link: Five Things to Know About the New Power Plant Rules

These related articles describe how new regulations could spell the end for plants that burn coal, the fossil fuel that powered the country for more than a century. On April 25th, the Environmental Protection Agency (EPA) placed the final cornerstone of its plan to tackle climate change: a regulation that would force the nation's coal-fired power plants to virtually eliminate the planet-warming pollution that they release into the air or shut down. The regulation requires coal plants in the United States to reduce 90 percent of their greenhouse pollution by 2039, one year earlier than the agency had initially proposed. The compressed timeline was welcomed by climate activists but condemned by coal executives who said the new standards would be impossible to meet.

The EPA also imposed three additional regulations on coal-burning power plants, including stricter limits on emissions of mercury, a neurotoxin linked to developmental damage in children, from plants that burn lignite coal, the lowest grade of coal. This will tighten the emissions standard for toxic metals by 67% and includes a 70% percent reduction in the emissions standard for mercury from existing lignite-fired sources. Two other rules will impact coal operations. EPA said it finalized a rule to reduce wastewater pollution by more than 660 million pounds per year, and another governing coal ash management that will expand oversight to some storage sites that were previously outside federal regulation.

Taken together, the regulations could deliver a death blow in the United States to coal, the fuel that powered the country for much of the last century but has caused global environmental damage. When burned, coal emits more carbon dioxide than any other fuel source.

The new rules regarding power plants come weeks after the administration's other major climate regulations to limit emissions from cars and large trucks in a way that is designed to speed the adoption of electric vehicles. Transportation and electric power are the two largest sources in the United States of the carbon pollution that is driving climate change.

The coal industry in the United States has been on a precipitous decline for over a decade, as environmental regulations and a boom in natural gas, wind and solar power have made it more expensive to burn coal, and power generation has shifted toward those cheaper, cleaner sources of electricity. In 2023, coal-fired power plants generated 16.2 percent of the nation's electricity, according to the U.S. Energy Information Agency, down from a peak of 52 percent in 1990. There are about 200 coal-burning power plants still operating, with many concentrated in Pennsylvania, Texas, and Indiana.

The limits on power plant emissions would also apply to future facilities that burn gas, requiring them to capture their emissions or to use a fuel that is nonpolluting. Gas-fired power plants that are currently in operation would be exempt. The EPA estimates that the rule controlling greenhouse gases from power plants would eliminate 1.38 billion metric tons of carbon dioxide between now and 2047, which is equivalent to preventing the annual emissions from 328 million gasoline-powered cars.

The agency estimates that the rule would cost industries $19 billion to comply between now and the year 2047, but says the economic benefits during the same period would be far greater. By stopping pollution from reaching the atmosphere, the regulation would help prevent $270 billion in damage to the economy from floods, wildfires, droughts, supply chain disruptions and increased commodity costs linked to climate change.

The EPA expects the regulation would also prevent other pollutants, such as soot, from escaping into the air, resulting in $120 billion in public health benefits between now and 2047. In 2035 alone, the agency projects that the rule will prevent up to 1,200 premature deaths, 870 hospital and emergency room visits, 360,000 asthma attacks, 48,000 school absence days and 57,000 lost workdays.

Republicans, electric utilities, and the coal industry are likely to challenge the regulations. They argue they would decimate jobs, increase blackouts and drive up electricity costs. However, there are only about 42,000 jobs linked directly to coal mining today, down from about 73,000 a decade ago, according to the United States Bureau of Labor Statistics.

Under the plan, coal plants that are slated to operate through or beyond 2039 must reduce their greenhouse emissions 90 percent by 2032. Plants that are scheduled to close by 2039 would have to reduce their emissions 16 percent by 2030. Plants that retire before 2032 would not be subject to the rules.

The aging nature of the country's existing coal plants means that many of the facilities could shut down before they would have to meet the most stringent limits. More than 200 coal plants have closed in the past decade, putting the average age of surviving plants at almost 50. The life span of an American coal plant is about 60 years, according to the U.S. Energy Information Administration, and roughly one-quarter of the existing 200 plants are already slated to retire within the next five years.

The EPA. originally planned to also limit emissions limits from large gas plants that are currently operating. But the agency dropped that strategy after pushback from some moderate Democrats and the gas industry. Environmental justice groups also worried that a crackdown on large gas plants would cause utilities to more frequently run smaller gas units, known as Peaker plants, which are frequently located in poor and minority communities that are already overburdened with pollution.

Under the new regulations, future natural gas plants that generate electricity at the rate of at least 40 percent of their maximum annual capacity would have to reduce their emissions 90 percent by 2032. New gas plants that generate electricity at less than 40 percent of their maximum annual capacity would be required to use low-polluting technology, such as energy-efficient turbines, but the standard would not be so stringent as to force those plants to install carbon capture and sequestration.

The EPA cannot legally require that electric utilities use a specific technology or fuel. Instead, it can set limits on emissions that are so stringent that, in most cases, existing coal and new gas plants would have to install carbon capture technology or switch to a cleaner fuel.

The new regulations allow that in emergencies, such as responding to power outages in large storms, electric utilities could generate additional power from coal or gas plants without having to use carbon capture technology. And if a coal plant is scheduled to shut down by a certain date, but a state can demonstrate that its retirement would violate state rules on power reliability, the coal plant could be allowed to remain open for one additional year.

The crackdown on coal plants is nearly a decade in the making. President Barack Obama tried to limit carbon pollution from coal-fired power plants, but his 2015 Clean Power Plan was blocked by the Supreme Court. The Trump administration then rolled back the rule and imposed its own plan to keep coal plants online longer. In 2022, the Supreme Court found the EPA had the authority to regulate emissions but could not force a nationwide transition away from the use of coal. Instead, it allowed the government to pursue only narrower policies that regulate how individual power plants operate.

NY Advances New Offshore Wind Plan After Scrapping 4 GW Over Turbine Size Dispute

This Article from the Engineering News-Record (ENR) website describes the latest developments associated with New York State's efforts to develop offshore wind capability. On April 19th, The New York State Energy Research & Development Authority (NYSERDA) announced the cancellation of about 4 GW of awards provided to developers of three projects when their turbine manufacturer, GE Vernova, said it had to scale down the size of machines it could deliver.

The three impacted projects are the 1,404-MW Attentive Energy One Offshore Wind Project proposed by TotalEnergies SE, Corio Generation Ltd. and Rise Light & Power; the 1,314-MW Community Offshore Wind Project backed by National Grid Ventures Ltd. and RWE Clean Energy LLC; and the 1,314-MW Excelsior Wind project being developed by Copenhagen Infrastructure Partners P/S.

The projects had specified use of giant 18-MW turbines that were to be built in an Albany, N.Y. area plant with $300 million in state funding, but GE Vernova revised them to 15.5-MW to 16.5-MW capacity, facing industry market challenges. The added redesign cost to include more generation units undermined project economics.

GE Vernova termed its smaller Haliade turbine a "workhorse ... based on proven technology," in a statement, with a prototype set to operate by the end of 2025. An unidentified firm "representative" told industry publication Recharge that the contracts' implosion was due more to "non-turbine project challenges," including lack of large enough installation equipment.

NYSERDA called the manufacturer's decision a "material change" that "resulted in technical and commercial complexities between provisional awardees and their supply chain partners that have rendered projects unable to proceed under the awarded terms."

The agency, which manages New York's energy transition, announced April 23 a request for information to accelerate a new procurement of up to 2.6 GW of offshore wind contracts—likely to include rebids of some awarded projects. About $300 million in state funding toward GE Vernova's plan to build supporting component plants in the state will be repurposed, NYSERDA said.

In comments April 24 at the International Partnering Forum conference in New Orleans sponsored by sector trade group Oceantic Network, NYSERDA President and CEO Doreen Harris noted plans for the new procurement would start "as early as this summer," to include a $200-million solicitation for funding for "supportive supply chain and logistics." NYSERDA's Harris also said the state would ask Interior to lease an added 36,000 acres in the New York Bight waterway south of New York City—the site of a successful federal auction in 2022 of about 488,000 acres. The three cancelled projects had been set to be built there.

State offshore wind development efforts are continuing. Contractor Skanska said that it has received a "final award" of $612 million from a unit of Equinor, another current state offshore wind developer, to complete overhaul of the South Brooklyn Marine Terminal "into one of the largest dedicated offshore wind ports in the USA." The facility is set to support the developer's Empire Wind 1 project to be built about 15 to 30 miles south of Long Island.

Skanska said the contract will involve demolition of existing buildings, dredging of new and existing berths, bulkhead upgrades, installation of new wharf and dock facilities and construction of an offshore wind staging area and new operations and maintenance building. Work under the contract will extend into 2026.

DOE added a boost with $48 million for offshore wind R&D, announced on April 24 as part of the agency's long-term strategy for sector "commercial liftoff."

Press Release: NYISO Implements Nation's First Market Empowering Distributed Energy Resources

On April 18, 2024, the NYISO announced the launch of a first-in-the-nation program to integrate aggregations into the wholesale electric markets of distributed energy resources (DER), such as small-scale solar arrays, residential batteries, and electric vehicles. This follows approval of new market rules by the Federal Energy Regulatory Commission (FERC) to implement the ground-breaking program.

The NYISO's new market rules allow aggregations of DER resources over 10 kilowatts, which will provide reliability benefits and other important services to the electric grid as New York continues its shift to more renewable energy resources. The NYISO forecasts distributed generation in the state to roughly double over the next three decades as the state strives to have 70% of its electricity generated by renewable resources by 2030 and achieve a 100% clean power grid by 2040.

Useful Links:

- Link: Getting Started as a Market Participant
- Link: DER Onboarding Materials (E-Learning, Free Registration required)
  - Introduction to Onboarding
  - Interconnection for DERs
  - NYISO Customer Registration and DER Aggregator Registration
  - Credit
  - DER Information Community Portal (DERIC)
  - End-to-End Communications Testing
  - Market Mitigation & Analysis
  - Outage Scheduling
  - Installed Capacity (ICAP) Enrollment for Participation
  - Metering Requirements
  - Metering for Settlements
  - DER Settlements
  - Resource Appendix: Onboarding of DERs
- Link: Aggregation System User's Guide
- Link: Aggregation Manual
- Link: NYISO Manuals, Technical Bulletins and Guides
  - Link: Installed Capacity (ICAP) Manual
  - Link: Install Capacity (ICAP) Manual Attachments
  - Link: Ancillary Services Manual
  - Link: System Restoration Manual
  - Link: Transmission and Dispatch Operations Manual
  - Link: Transmission Expansion and Interconnection Manual

Additional information about the NYISO DER aggregation and participation model can be found here: https://www.nyiso.com/der-aggregations

FERC's Order accepting the NYISO tariff revisions can be viewed here: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20240415-3070

NYISO E: Library: https://www.nyiso.com/library

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Policy Brief: How Competitive Electricity Markets Power New York State's Clean Energy Goals (Also Press Release and Fact Sheet). This brief covers basic information on the topical areas of the NYISO's Energy Market, Capacity Market and Ancillary Services Market, as well as upcoming market enhancements such as winter reliability capacity enhancements, dynamic reserves, advanced storage modeling, and carbon pricing.

Additional info available on Landing Page for Podcast #27: Master Class in Electricity Markets with Rana Mukerji

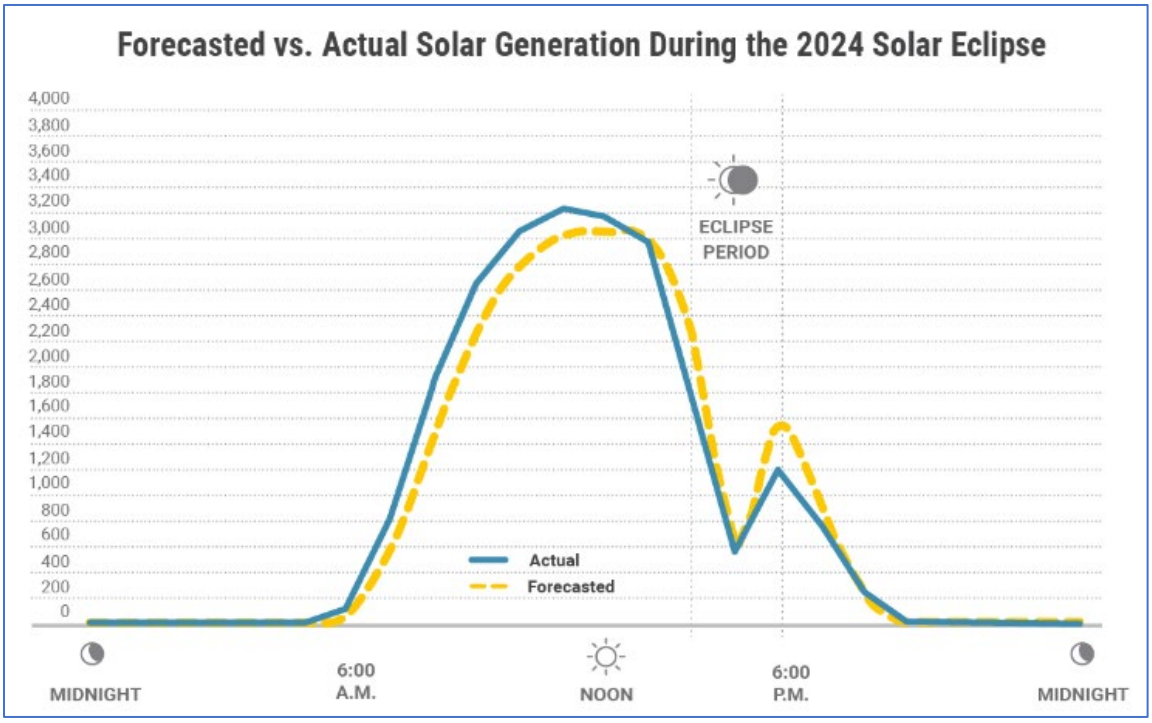
NYISO Blog: Eclipse 2024: What Happened to Solar Generation Across New York?

As we recently highlighted, there was a tremendous amount of interest about the impacts of the 2024 solar eclipse on solar generation and the bulk power system here in New York State. On April 8, 2024, the moon completely obscured the sun in portions of the state, turning day into night for up to 3.5 minutes, between 3:15 p.m. and 3:30 p.m.

Professionals from our forecasting and operations teams began examining the eclipse's potential effects on solar energy production months ago using solar forecasting tools, which anticipate how much solar energy production the system can expect throughout the day. This data helps our team determine what resources are needed to meet expected demand. If unexpected circumstances arise and solar resources aren't producing power as initially forecasted, the NYISO's operations team must dispatch energy from other resources to maintain reliability.

During the 2017 eclipse, the sun became roughly 75% obscured and subsequently cut solar generation in New York State by about 500 megawatts.

In the hours leading up to this eclipse, solar resources generated just over 3,000 MWs. As the eclipse crossed New York, solar generation declined to just under 600 MWs by 3:30 pm, an 80% reduction. By 4 p.m., solar generation ramped back up to just under 1,200 MWs before declining again during the early evening hours.



NYISO's operators maintained system reliability through a sharp decline in solar generation, with actual generation levels landing close to pre-eclipse forecasts. Flexible resources like electricity from hydro-pumped storage, conventional hydro facilities, and fossil-fuel resources were dispatched to make up for the reduced solar generation during the event.

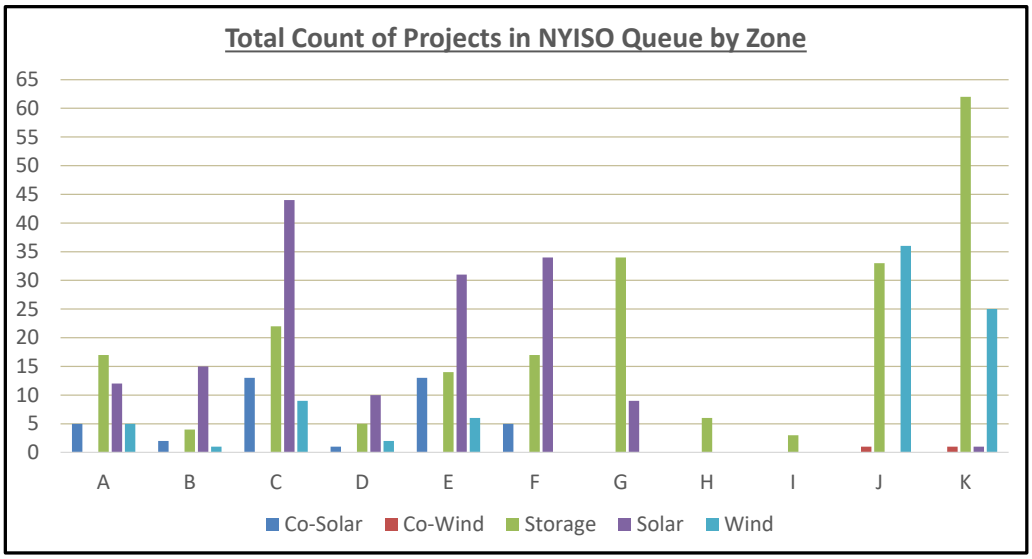
Interconnection Queue: Monthly Snapshot – Storage / Solar / Wind / CSRs (Co-located Storage)

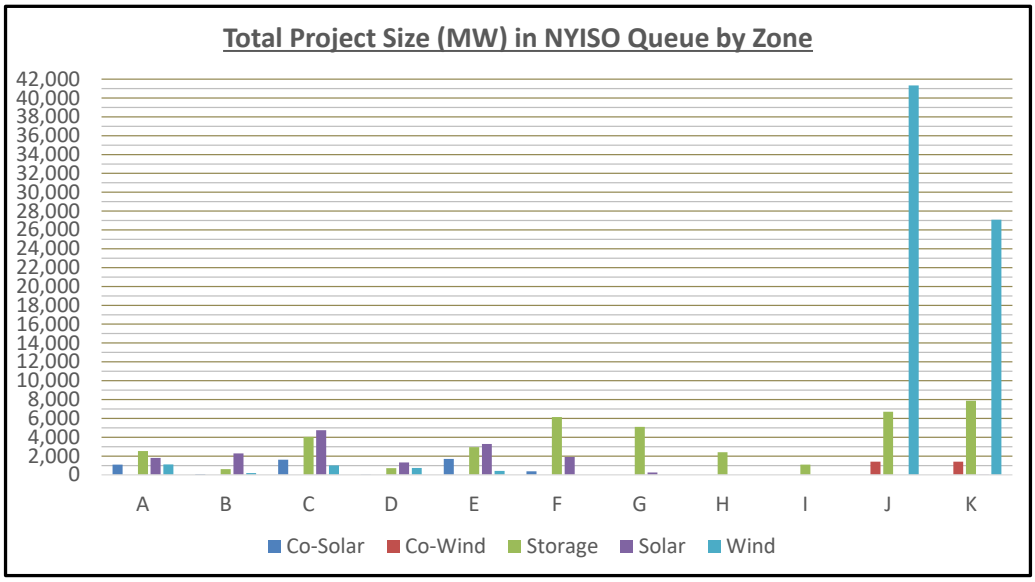
The intent is to track the growth of Energy Storage, Wind, Solar and Co-Located Storage (Solar and Wind) projects in the NYISO Interconnection Queue, looking to identify trends and patterns by zone and in total for the state. The information was obtained from the NYISO Interconnection Website, based on information published on April 22nd, and representing the Interconnection Queue as of March 31st. Note that 3 projects were added, and 9 were withdrawn during the month of March.

Total Count of Projects in NYISO Queue by Zone					
Zone	Co-Solar	Co-Wind	Storage	Solar	Wind
A	5		17	12	5
B	2		4	15	1
C	13		22	44	9
D	1		5	10	2
E	13		14	31	6
F	5		17	34	
G			34	9	
H			6		
I			3		
J		1	33		36
K		1	62	1	25
State	39	2	217	156	84

Total Project Size (MW) in NYISO Queue by Zone					
Zone	Co-Solar	Co-Wind	Storage	Solar	Wind
A	1,092		2,536	1,813	1,114
B	67		620	2,275	200
C	1,611		4,027	4,744	1,001
D	20		710	1,322	747
E	1,690		2,954	3,291	430
F	380		6,136	1,906	
G			5,104	250	
H			2,416		
I			1,100		
J		1,400	6,705		41,336
K		1,400	7,865	36	27,096
State	4,860	2,800	40,173	15,636	71,922

Average Size (MW) of Projects in NYISO Queue by Zone					
Zone	Co-Solar	Co-Wind	Storage	Solar	Wind
A	218		149	151	223
B	34		155	152	200
C	124		183	108	111
D	20		142	132	374
E	130		211	106	72
F	76		361	56	
G			150	28	
H			403		
I			367		
J		1,400	203		1,148
K		1,400	127	36	1,084
State	125	1,400	185	100	856


Total Count of Projects in NYISO Queue by Zone
65
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
42,000
40,000
38,000
36,000
34,000
32,000
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
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A
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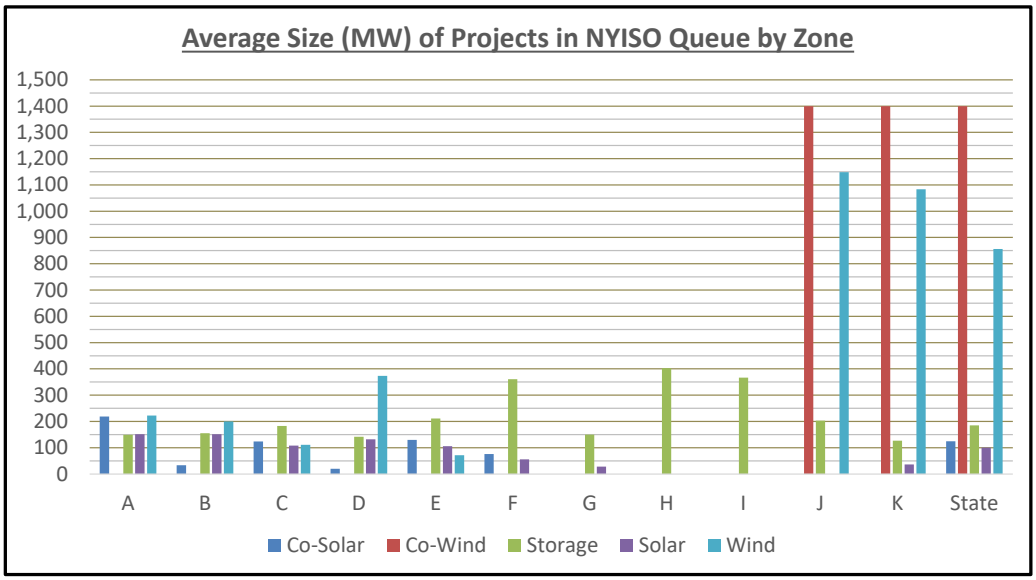
J
K
Co-Solar
Co-Wind
Storage
Solar
Wind


Average Size (MW) of Projects in NYISO Queue by Zone
1,500
1,400
1,300
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