De-Carbonization / DER Report for NYSRC Executive Committee Meeting 11/14/2025

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The November 2025 edition of the De-Carbonization / Distributed Energy Resources (DER) Report includes these articles:

- New York Times: How Long Will It Take to Build a Nuclear Power 'Renaissance' in the U.S.?
- Orsted Brochure Highlights South Fork Wind Performance
- MV (Martha's Vineyard) Times: Vineyard Wind Reaches the Half-way Mark
- Canary Media: Solar is Crushing Gas Power in California This Year
  Inside the Colorado Factory Where AtmosZero is Electrifying Steam
- A closer look at large loads in the NYISO Interconnection Queue
- Snapshots of the NYISO Interconnection Queue and Cluster Queue: Storage / Solar / Wind / Co-located

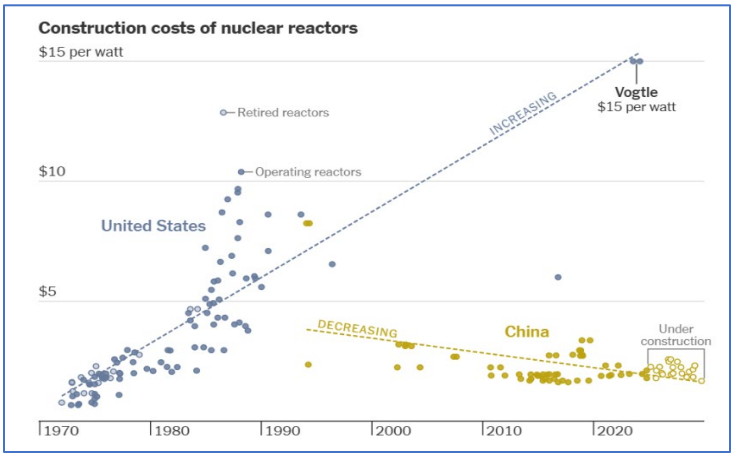
New York Times: How Long Will It Take to Build a Nuclear Power 'Renaissance' in the U.S.?

This Article describes how the present administration's goal to dramatically expand U.S. nuclear power faces significant structural, financial, and logistical hurdles that could take years to overcome. While nuclear energy enjoys renewed bipartisan and public support — with 60% of Americans now favoring more plants — the U.S. lags far behind China in new reactor development and construction speed, trailing by an estimated 10 to 15 years in nuclear technology development.

Key Findings

- Global Context:
  China has become the world's leader in nuclear power, building 13 reactors since 2013 and working on 33 more. In China, it now takes five to six years, thanks to streamlined design, predictable safety approvals and local manufacturing prowess. The U.S., by contrast, has built only two in that period.
- Domestic Challenges:
  U.S. reactor construction is slow, costly, and burdened by outdated infrastructure and manufacturing limitations. Late last year, Microsoft and Constellation Energy announced a plan to restart a reactor at Three Mile Island, the Pennsylvania facility made infamous by a partial meltdown in 1979. Even with much of the plant's equipment already in place, the facility is not expected to generate power until 2028.
- Financial and Industrial Bottlenecks:
  Building a single nuclear reactor can cost around $10 billion, and the U.S. lacks both the industrial capacity and specialized expertise once common in the mid-20th century. Regulatory reform alone is insufficient to solve these systemic issues. The U.S. also does not have the constellation of factories and manufacturers necessary to build nuclear reactor and plant components quickly and efficiently.
- Policy and Market Shifts:
  The administration has sought to shorten permit timelines to 18 months and extend nuclear tax incentives. Meanwhile, corporate demand — particularly from tech companies like Microsoft, seeking clean, reliable energy for data centers — is helping to attract new investment. This will be necessary to support its agreement to buy nuclear energy from Constellation, as Microsoft could pay double the wholesale rate for electricity.

Other tech companies, looking for ways to power their rapidly-growing data center operations, have set their sights on building more modest facilities known as small modular reactors, or S.M.R.s, which produce less energy but theoretically have lower upfront costs and are easier to get through the permit process, build and replicate. Previous efforts to build S.M.R.s in the United States have stalled, in part because of out-of-control costs.



An Energy Department pilot program aims to have at least three advanced nuclear reactors located outside the national labs reach the milestone of criticality by July of 2026.

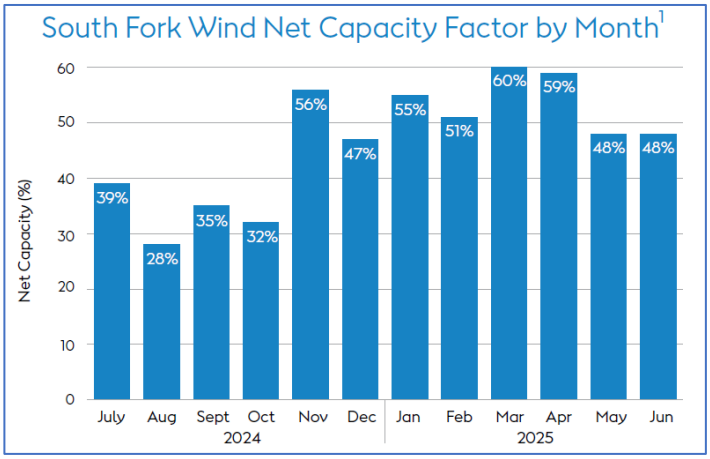
Orsted Brochure Highlights South Fork Wind Performance

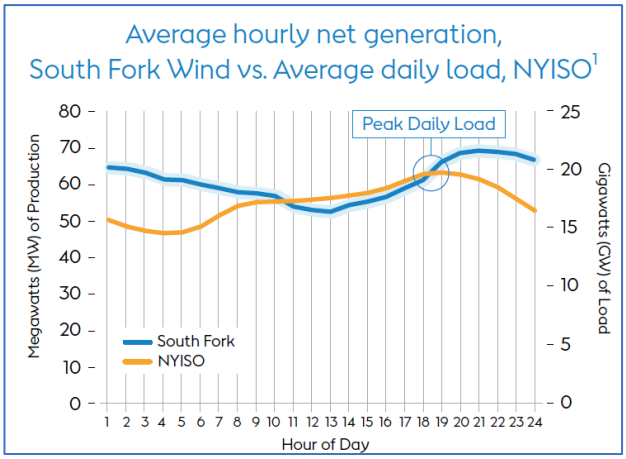
This Brochure (access may be subject to local Restrictions) provides a summary from Orsted and LIPA for the first year of operations of the South Fork Offshore Wind facility. South Fork began commercial operations in July 2024 and achieved a strong 46.4% net capacity factor over its first full year. Performance rose to 53% for the first half of 2025, which can be considered on par with New York's most efficient natural gas plants (53.7%).

Even as wind speeds vary naturally, the project produced electricity more than 92% of the time during the first half of 2025, supported by reliable operational uptime of the wind turbines themselves. The cost is estimated to be about $1.58 per month for the typical residential customer. South Fork has been adding needed capacity to a grid-constrained area, helping to keep down electric bills while ensuring consistent power.

During a heat wave in June 2025, record-breaking temperatures pushed New York's electricity demand to critical levels, requiring grid operators to call upon every available resource and triggering a Major Emergency declaration by the New York Independent System Operator (NYISO) on June 24th. South Fork responded by delivering an 87.4% capacity factor during a key window from 6:00 to 9:00 p.m., bolstering the power supply when the grid needed it most.

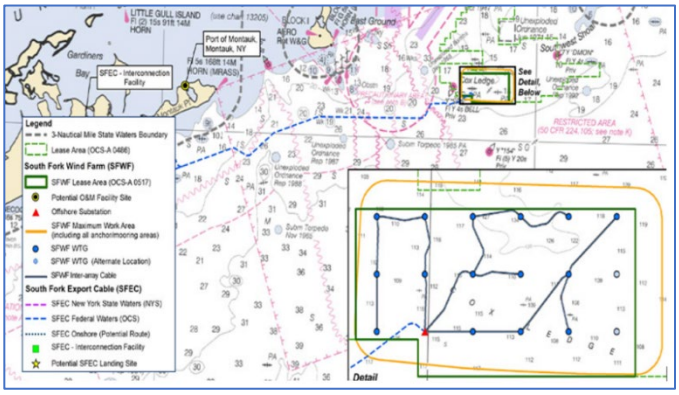
The project's generation also enhances grid reliability by naturally complementing other energy sources. While South Fork averaged solid energy production throughout each month in its first year, offshore wind output tends to peak during winter months, when natural gas demand for heating is highest. The project also generates more electricity in the afternoon and evening, complementing solar energy's daytime and summer production well. This generation pattern bolsters year-round grid stability and helps to meet daily peak load during the late afternoon.





Left Source: U.S. Energy Information Administration monthly net generation data, based on 132 MW of nameplate capacity
Right Source: NYISO Load Data - Excel Tabulation

South Fork's operational success also extends to its integration with the surrounding marine ecosystem. INSPIRE Environmental's independent, multi-year seafloor monitoring survey shows that the project is coexisting harmoniously with the marine environment. Marine life is responding to the project's infrastructure, with the twelve turbine foundations now functioning as artificial reefs and creating new habitat for commercially valuable species, including black sea bass, lobster, flounder, and Atlantic. The project's 1-by-1 nautical mile turbine spacing allows commercial fishing operations to continue between turbines, with local fishing vessels regularly operating within the site area.



Additional information can be found at: LIPA's South Fork Wind Farm Fact Sheet and
Orsted's Welcome to South Fork Wind Website (access subject to local restrictions)

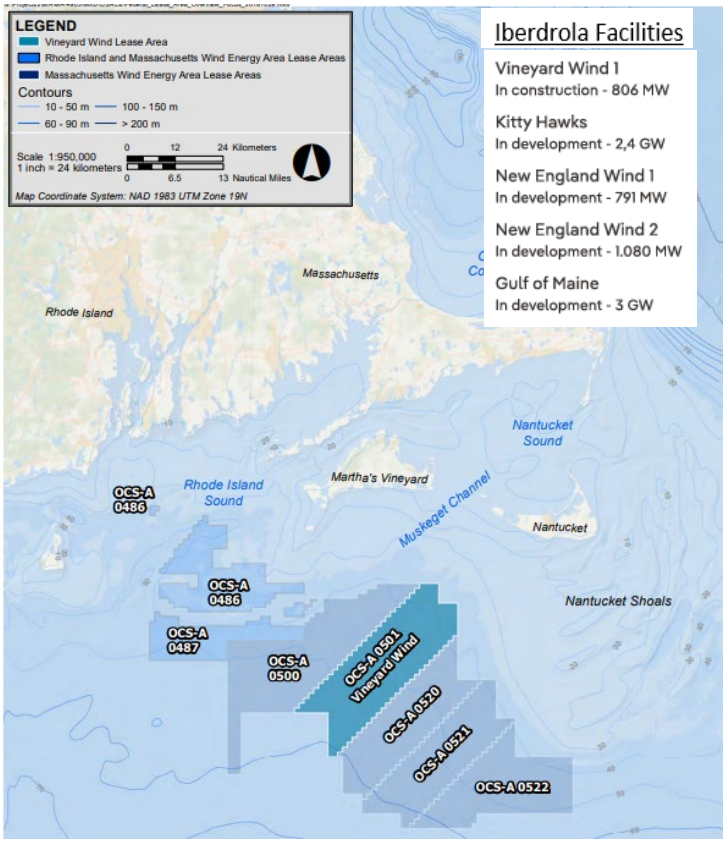
MV (Martha's Vineyard) Times: Vineyard Wind Reaches Half-way Mark

This Article (October 16) describes the current status of the Vineyard Wind offshore Windfarm located about 15 miles south of Martha's Vineyard, Massachusetts and 35 miles off the coast of the Massachusetts mainland. Officials of Iberdrola, the parent company of the project's part-owner Avangrid, recently announced the wind farm is 50 percent operational. The planned project is expected to have 62 turbines, and Iberdrola officials previously said in mid-July that 17 of those turbines were up and running. This newest report means that at least 31 turbines are operational and can send up to around 400 megawatts at full capacity to the grid.

The project is advertised as an 806-megawatt project that will be able to provide power for up to 400,000 homes across the Commonwealth when completed. But 806-megawatts is the nameplate production potential, which can be produced under optimal conditions (all turbines spin constantly at optimal wind speeds). A 2020 construction and operations plan for the project said the wind turbine generators have an annual capacity factor that exceeds 45 percent, as reported by The New Bedford Light. This is the ratio of the project's annual power production to the nameplate production potential.

Following a structural failure of some turbine blades in July 2024 Vineyard Wind was able to make a deal with the Biden administration to resume construction, provided that the project removed blades manufactured at the Canadian factory and replace them with blades made at the GE Vernova facility in France. Since then, the project has advanced enough to begin producing power.

In related news: On September 3rd, the administration announced plans to revoke a key permit for the New England Wind 1 Project. In the document, the federal government said it is "intending to remand and, separately, to vacate" the Bureau of Ocean Energy Management's approval of the construction and operations plan. On November 5th, Federal Judge Tanya Chutkan of the U.S. District Court for the District of Columbia ruled that the Interior department's Bureau of Ocean Energy Management can reopen a Biden-era decision approving construction and operations plans for the another offshore wind farm known as the SouthCoast Wind project. The decision stated that the SouthCoast Wind (formerly Mayflower Wind) developers will not "suffer immediate and significant hardship" if the government reconsiders its permits.



Solar is Crushing Gas Power in California This Year

This Article describes how California's combination of solar and battery plants has pushed clean generation of electricity to new heights, offering a reprieve from high gas prices. In California, batteries are shifting ever more solar into evening and nighttime hours. Consequently, solar generation hit new highs in the first half of the year, and fossil-gas generation has fallen rapidly in turn.

From January to July, solar generation delivered 39% of the state's generation, a record level, while fossil fuels provided just 26%, a new low for gas power. In April, a temperate shoulder month, gas generated less than 20%. For context, across all of last year, solar provided 32% of California's power, the highest rate of any U.S. state, nearly unseating gas as the largest source of power.

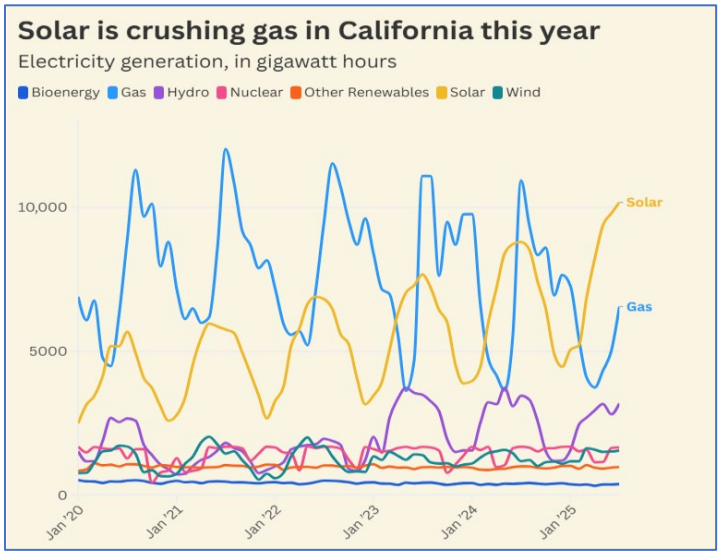


Image Source: Ember-energy.org

These trends have resulted in numerous clean energy records this summer. In the California Independent System Operator's grid, which serves most of the state, solar delivered a record 21.7 gigawatts just past noon on July 30. Two days later, at 7:30 pm, the battery fleet set its own record, nearing 11 gigawatts of instantaneous discharge for the very first time (it has since beaten that record).

California's electricity supply increasingly diverges from the nation's. Gas has predominated since 2016, and now accounts for more than 40% of U.S. generation; coal, meanwhile, has fallen to around 16%. The carbon-free cohort includes nuclear and renewables at around 20% each. Solar, including rooftop systems, provided about 7% of U.S. electricity last year, according to Ember.

Initially, California's billions of dollars in solar subsidies and suite of supporting policies couldn't overcome the state's gas dependency. The solar systems cranked out excess power through the sunny hours, much of which got curtailed for lack of simultaneous demand, then California turned to fossil fuels at night. That addiction at times overpowered the state's environmental ethos: California opted in 2020 to waive enforcement of a regulation protecting marine life because it would have shuttered some coastal gas plants that the grid wasn't ready to lose, despite having a decade to prepare for the rule.

While the state hasn't been building new gas generation, it has connected gigawatts of new solar and batteries each year. The price of gas has been going up, amid greater demand both at home (data center expansion), and abroad (with liquefied exports going to the highest bidder). Now California's gas plants have more competition in the peak hours from cheaper, cleaner resources; they're getting squeezed toward fewer hours of intense demand.

These patterns are playing out nationally: Very little new gas capacity is getting built, quite a lot of solar and batteries are, and gas prices are going up. Some regions allow developers to respond nimbly to these trends, namely Texas, which indeed has leapt ahead of California in its pace of solar and storage installations. Other regions such as PJM are having trouble with their wholesale markets, where skyrocketing capacity auctions are pushing costs to crisis levels.

Canary Media: Inside the Colorado Factory Where AtmosZero is Electrifying Steam

This Article describes how AtmosZero, a startup based in Loveland, Colorado, is pioneering the commercialization of all-electric, steam-producing heat pumps designed to replace traditional gas-burning boilers in factories. Their flagship product, Boiler 2.0, is a modular unit that can be installed quickly and aims to significantly reduce carbon emissions associated with industrial steam production.

Startup AtmosZero installed its first steam heat pump, the brightly colored container shown above, as part of a pilot project at the New Belgium brewery in Fort Collins, Colorado, in June.

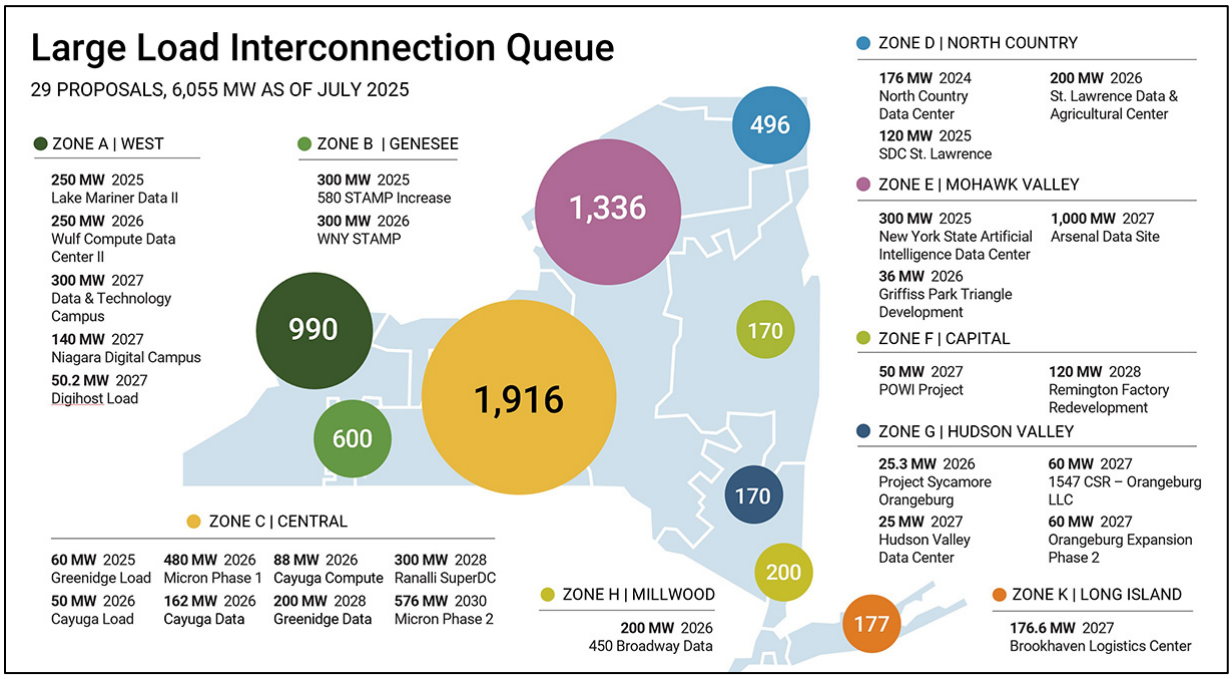
Key Points

- Industry Impact: Industrial boilers account for about 40% of fossil fuel consumption in U.S. factories, contributing to roughly 13% of U.S. energy-related carbon emissions. AtmosZero's technology targets this major source of pollution by electrifying steam generation.
- Technology: Unlike conventional boilers, which can reach 100% efficiency, AtmosZero's heat pumps use electricity and refrigerants to move and concentrate heat, achieving efficiencies of 300–400% or higher. Their two-stage compression cycle enables steam production at temperatures up to 165°C (329°F), covering over half of typical industrial heat needs.
- Commercialization & Adoption: The company has raised nearly $30 million from investors and $3.2 million from the Department of Energy. A 650-kilowatt pilot unit was installed at New Belgium brewery in Fort Collins, Colorado, providing 30–40% of the brewery's steam needs. AtmosZero is preparing for broader commercial deployment by 2026.
- Market Challenges: Adoption is hindered by higher upfront costs compared to gas boilers and historically low fossil gas prices. However, states like California, Colorado, Illinois, New York, and Pennsylvania are introducing incentives, regulations, and financing to accelerate decarbonization.
- Modular Approach: AtmosZero's Boiler 2.0 is designed for rapid installation and minimal disruption, with ambitions to scale production to 120–240 units per year by 2030. The company's approach is less efficient than waste-heat systems but offers lower installation costs and faster payback.
- Future Outlook: AtmosZero is expanding beyond factories, with plans to install heat pumps in large buildings such as hotels. The company recently received a $500,000 award from New York's state energy authority for a project at the Midtown Hilton hotel in Manhattan.

Strategic Significance

AtmosZero's innovation represents a scalable pathway for industrial decarbonization, leveraging modular design and high-efficiency heat pumps to address regulatory and market pressures for cleaner operations. The company's progress and partnerships position it as a leader in the transition to low-carbon industrial heat.

A Closer Look at Large Loads in the NYISO Interconnection Queue (Link to NYISO Blog with Map Image)



Large Loads from the NYISO Queue as of October 20th, 2025

	Zone	County	Queue Pos.	Project Name	Points of Interconnection	Utility	SP (MW)	Date of IR	In Svc Date
1	A	Erie	1726	Data & Technology Campus	National Grid 230kV line 78	NM-NG	300	1/31/2025	01-2027
2	A	Niagara	1670	Lake Mariner Data II	Kintigh 345kV Substation	NYSEG	250	1/23/2024	TBD
3	A	Niagara	1732	Wulf Compute Data Center II	Kintigh sub-station	NYSEG	250	3/29/2025	06-2026
4	A	Niagara	1741	North East Data LLC Data Center	Local transmission lines of 183, 184 or Packard	NM-NG	150	8/29/2025	01-2027
5	A	Niagara	1681	Niagara Digital Campus	Adams to Packard 115kV lines 187 and 188	NM-NG	140	4/9/2024	12-2027
6	A	Niagara	1465	Digihost load	Walck Rd. 115kV	NM-NG	50.2	11/14/2022	08-2027
7	B	Genesee	0580	WNY STAMP	Kintigh/Niagara - New Rochester 345kV	NYPA	300	9/27/2016	05-2026
8	B	Genesee	1484	580 STAMP load increase	115 kv STAMP substation	NM-NG	300	12/2/2022	12-2025
9	C	Onondaga	1627	Micron Fab 2	National Grid Clay 345 kV Substation	NM-NG	576	10/31/2023	09-2030
10	C	Onondaga	1536	White Pine Phase 1	Clay 345 kV Substation	NM-NG	480	3/11/2023	06-2026
11	C	Onondaga	1736	Ranalli SuperDC	Feeds from Clay Substation	NM-NG	300	5/7/2025	05-2028
12	C	Yates	1725	Greenidge 200 MW Data Center Project	New York State Electric & Gas (NYSEG) - Greenidge 115 kV Substation	NYSEG	200	12/20/2024	10-2029
13	C	Tompkins	1733	Cayuga Data	Milliken Substation	NYSEG	162	3/29/2025	08-2026
14	C	Tompkins	1683	Cayuga Compute	Milliken substation 115kV	NYSEG	88	4/24/2024	10-2026
15	C	Yates	0776	Greenidge Load	Greenidge 115kV	NYSEG	60	10/22/2018	06-2025
16	C	Cayuga	0850	Cayuga Load	Milliken 115kV	NYSEG	50	5/21/2019	12-2026
17	D	St. Lawrence	1743	St. Lawrence Infrastructure 2	NYPA's 230kV Moses Massena 1 and 230kV Moses Massena 2	NYPA	1935	9/2/2025	07-2030
18	D	St. Lawrence	1213	St Lawrence Data and Agricultural Center	Dennison 115kV substation	NM-NG	200	6/28/2021	01-2026
19	D	St. Lawrence	0979	North Country Data Center	Reynolds 115kV	NYPA	176	1/22/2020	12-2024
20	D	St. Lawrence	1315	SDC St. Lawrence	Moses-Reynolds MRG-1 and Moses-Reynolds MRG-2 at 115kV	NYPA	120	12/20/2021	TBD
21	E	St Lawrence	1730	Arsenal Data Site 1000	Denniston Substation	NYPA	1000	3/7/2025	03-2027
22	E	St Lawrence	1742	St. Lawrence Infrastructure 1	NYPA HA-2, 345kV Transmission Line	NYPA	860	9/2/2025	12-2029
23	E	St Lawrence	1729	Arsenal Data Site 500	Denniston Substation	NYPA	500	3/7/2025	03-2027
24	E	Herkimer	1740	Incremental Load Req Remington Factory Redevelopment	Line 1: 345KV EDIC to Fraser. Line 2: 345 KV Marcy to Coopers Corners	NYPA	500	8/29/2025	08-2028
25	E	St. Lawrence	1731	New York State Artificial Intelligence Data Center	Haverstock-Adirondack 345kV transmission line.	NYPA	300	3/14/2025	10-2026
26	E	St Lawrence	1728	Arsenal Data Site 250	Denniston Substation	NYPA	250	3/7/2025	03-2027
27	E	Oneida	1737	Griffiss Park Triangle Development	115kV Ellsworth Road Substation	NM-NG	36	6/3/2025	12-2027
28	F	Herkimer	1735	Remington Factory Redevelopment	Murphy Station City of Ilion, Bus Number 147905, 115kV	Ilion	120	5/2/2025	07-2028
29	F	Albany	1646	POWI Project	New Scotland to Knickerbocker 345kV line	NM-NG	50	11/30/2023	01-2027
30	G	Rockland	1715	1547 CSR - Orangeburg LLC	138kV Line 703 between Corporate Drive and Harings Corner	O&R	60	7/2/2024	01-2027
31	G	Orange	1716	Orangeburg Expansion Phase 2	Oak St 38kV substation	O&R	60	8/5/2024	12-2027
32	G	Rockland	1713	Project Sycamore Orangeburg	Oak Street 138kV	O&R	25.3	6/19/2024	01-2026
33	G	Rockland	1714	Hudson Valley Data Center	Line 60 138KV - Ramp to Tallman	O&R	25	7/2/2024	02-2027
34	H	Westchester	1717	Proposed Datacenters at 450 Broadway, Buchanan, NY	Buchanan 138kV Substation	ConEd	200	8/7/2024	09-2026
35	K	Suffolk	1721	Brookhaven Logistics Center	138-872 Holbrook to Sills Rd or 138-873 West Bus to Sills Rd.	LIPA	176.6	10/28/2024	01-2027
36	K	Suffolk	1739	Brookhaven National Lab Electron Ion Collider Project	LIPA existing 69 kV / 13.8 kV substation (PSEG Fifth Ave substation)	LIPA	120	7/30/2025	06-2030
						Total	10370.1		

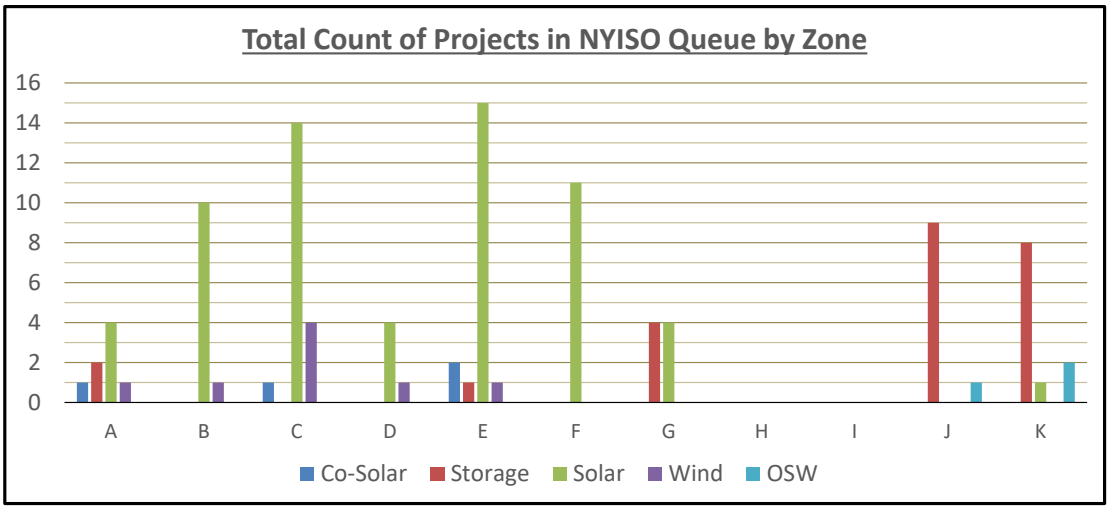
Interconnection Queue: Monthly Snapshot – Storage / Solar / Wind / CSRs (Co-located Storage)

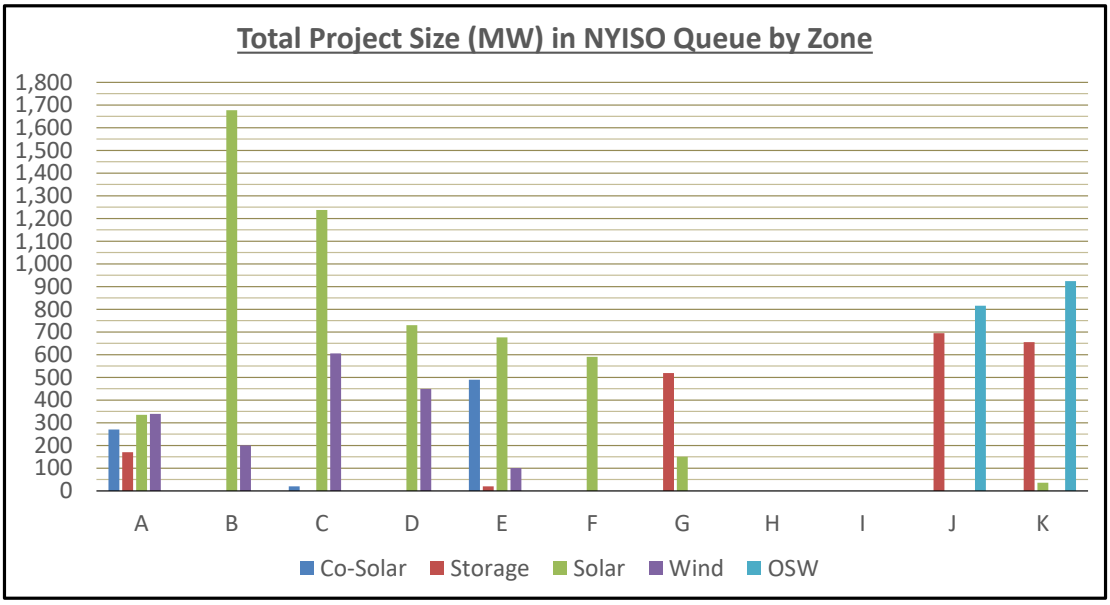
The intent is to track the growth of Co-Located Solar / Storage, Energy Storage, Solar, Wind, and Offshore Wind (OSW) projects in the NYISO Interconnection Queue, looking to identify trends and patterns by zone and in total for the state. The information was obtained from the NYISO Interconnection Website, based on information published on October 20th, and representing the Interconnection Queue as of September 30th. Note that three projects were added, and ten projects were withdrawn during the month of September.

Total Count of Projects in NYISO Queue by Zone					
Zone	Co-Solar	Storage	Solar	Wind	OSW
A	1	2	4	1	
B			10	1	
C	1		14	4	
D			4	1	
E	2	1	15	1	
F			11		
G		4	4		
H					
I					
J		9			1
K		8	1		2
State	4	24	63	8	3

Total Project Size (MW) in NYISO Queue by Zone					
Zone	Co-Solar	Storage	Solar	Wind	OSW
A	270	170	335	339	
B			1,678	200	
C	20		1,238	606	
D			730	449	
E	490	20	676	101	
F			591		
G		519	150		
H					
I					
J		695			816
K		655	36		924
State	780	2,059	5,433	1,695	1,740

Average Size (MW) of Projects in NYISO Queue by Zone					
Zone	Co-Solar	Storage	Solar	Wind	OSW
A	270	85	84	339	
B			168	200	
C	20		88	151	
D			183	449	
E	245	20	45	101	
F			54		
G		130	38		
H					
I					
J		77			816
K		82	36		462
State	195	86	86	212	580


Total Count of Projects in NYISO Queue by Zone
16
14
12
10
8
6
4
2
0
A
B
C
D
E
F
G
H
I
J
K
Co-Solar
Storage
Solar
Wind
OSW


Total Project Size (MW) in NYISO Queue by Zone
1,800
1,700
1,600
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
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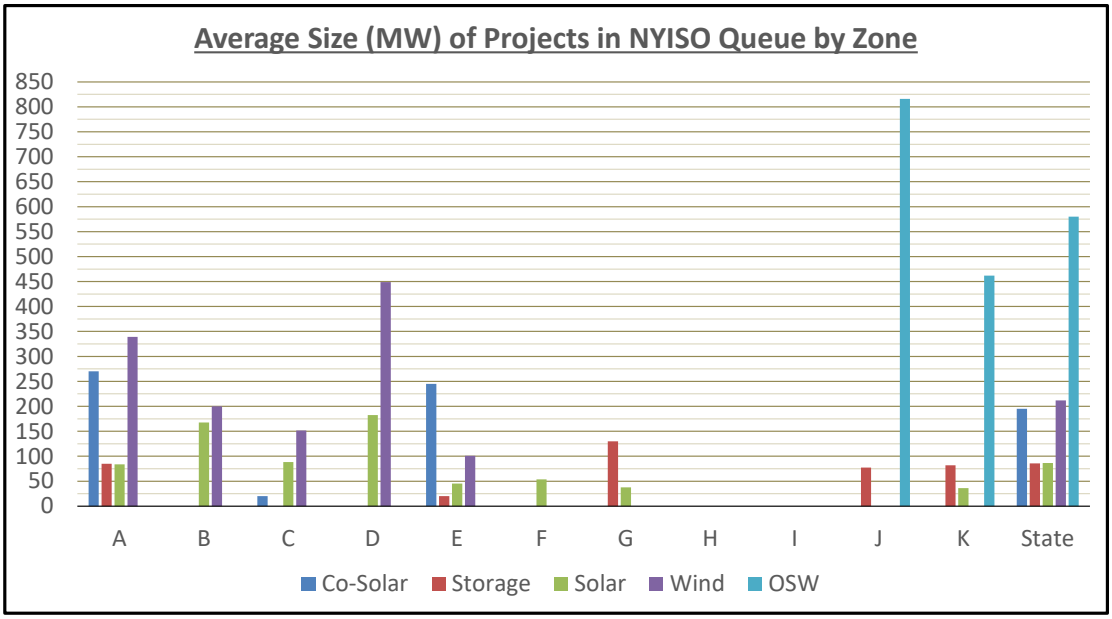
H
I
J
K
Co-Solar
Storage
Solar
Wind
OSW


Average Size (MW) of Projects in NYISO Queue by Zone
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
A
B
C
D
E
F
G
H
I
J
K
State
Co-Solar
Storage
Solar
Wind
OSW

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

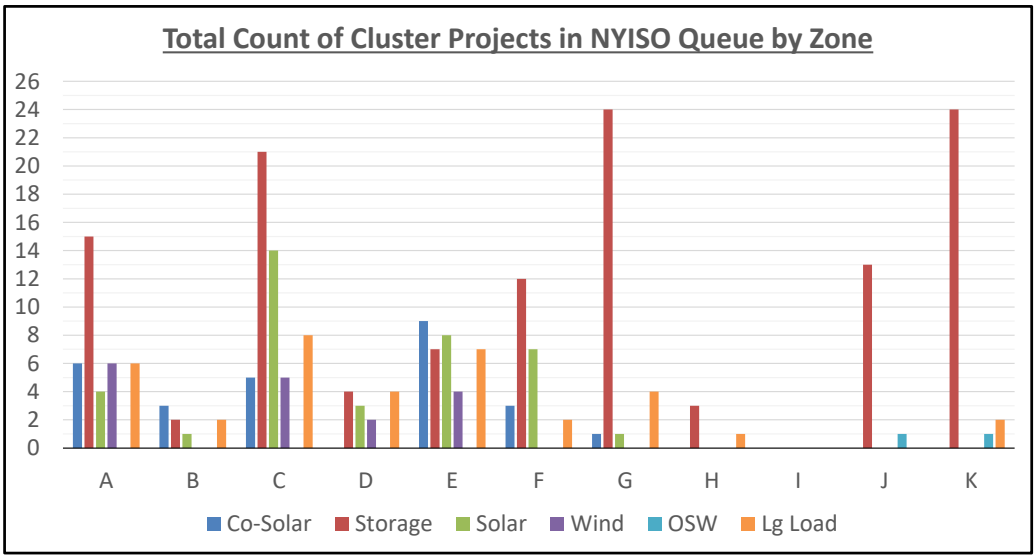
The intent is to track the growth of the Cluster-based projects, including Co-Located Solar and Wind / Storage, Energy Storage, Solar, Wind, and Offshore Wind (OSW) projects in the NYISO Interconnection Queue, looking to identify trends and patterns by zone and in total for the state. The information is based on the Cluster Interconnection Queue as of September 30th, and published on October 20th.

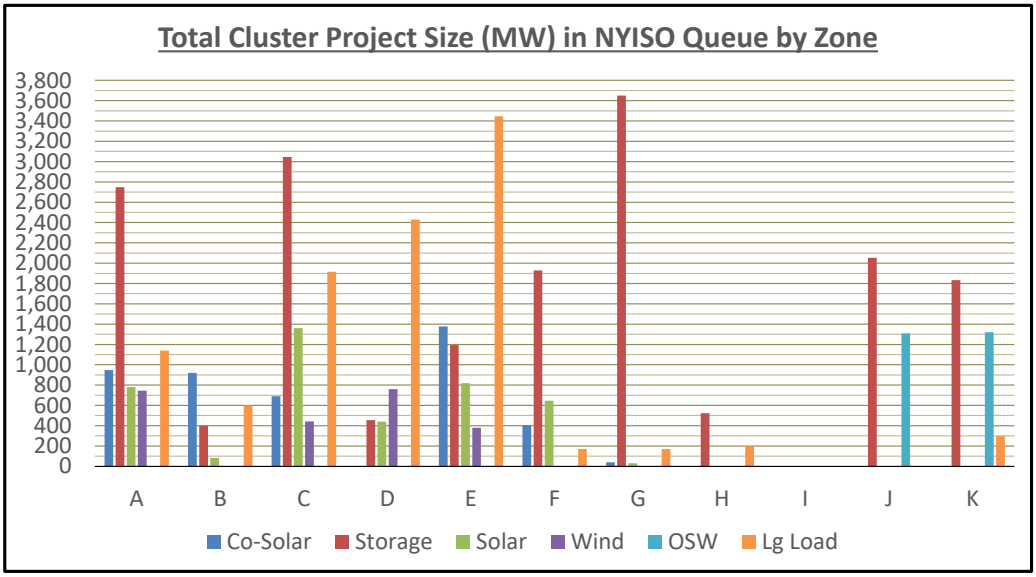
Note that within the Cluster Queue, there are currently 212 projects totaling 31,328 MW. This represents a drop of 10 projects totaling 1,145 MW from the previous month. A total of 164 projects representing 44,156 MW are listed as having been withdrawn to date.

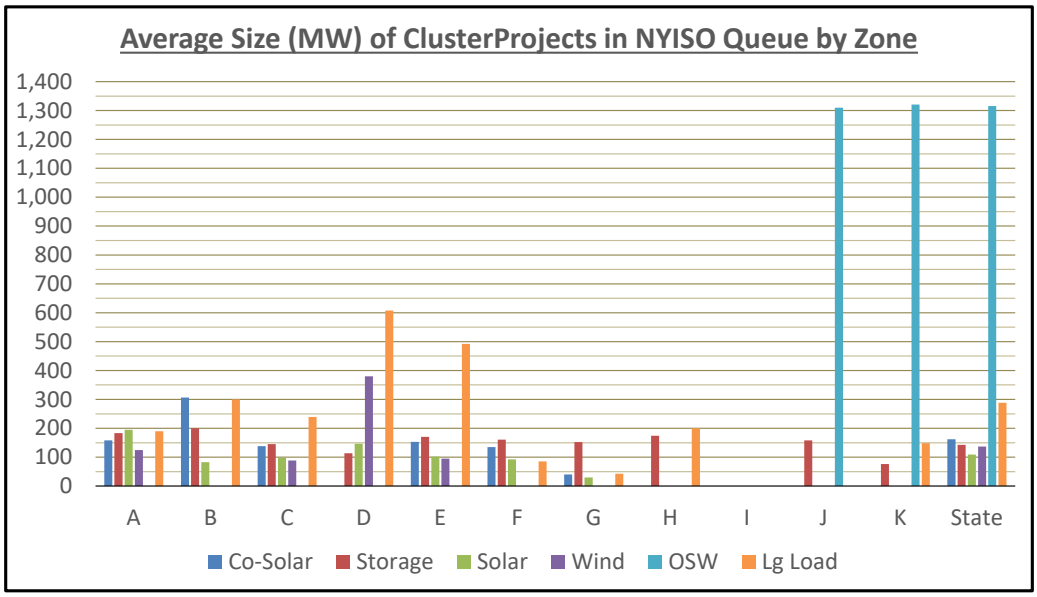
Total Count of Cluster Projects in NYISO Queue by Zone						
Zone	Co-Solar	Storage	Solar	Wind	OSW	Lg Load
A	6	15	4	6		6
B	3	2	1			2
C	5	21	14	5		8
D		4	3	2		4
E	9	7	8	4		7
F	3	12	7			2
G	1	24	1			4
H		3				1
I						
J		13			1	
K		24			1	2
State	27	125	38	17	2	36

Total Cluster Project Size (MW) in NYISO Queue by Zone						
Zone	Co-Solar	Storage	Solar	Wind	OSW	Lg Load
A	947	2,748	780	746		1,140
B	920	400	83			600
C	690	3,045	1,361	442		1,916
D		455	440	760		2,431
E	1,378	1,194	818	380		3,446
F	405	1,929	647			170
G	40	3,651	30			170
H		524				200
I						
J		2,054			1,310	
K		1,833			1,321	297
State	4,379	17,832	4,158	2,328	2,631	10,370

Average Size (MW) Cluster Projects in NYISO Queue by Zone						
Zone	Co-Solar	Storage	Solar	Wind	OSW	Lg Load
A	158	183	195	124		190
B	307	200	83			300
C	138	145	97	88		240
D		114	147	380		608
E	153	171	102	95		492
F	135	161	92			85
G	40	152	30			43
H		175				200
I						
J		158			1,310	
K		76			1,321	148
State	162	143	109	137	1,316	288


Total Count of Cluster Projects in NYISO Queue by Zone
26
24
22
20
18
16
14
12
10
8
6
4
2
0
A
B
C
D
E
F
G
H
I
J
K
Co-Solar
Storage
Solar
Wind
OSW
Lg Load


Total Cluster Project Size (MW) in NYISO Queue by Zone
3,800
3,600
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
A
B
C
D
E
F
G
H
I
J
K
Co-Solar
Storage
Solar
Wind
OSW
Lg Load


Average Size (MW) of ClusterProjects in NYISO Queue by Zone
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
Storage
Solar
Wind
OSW
Lg Load