

## **INDEPENDENT INTERVENOR EXHIBIT 5**

### **DISPATCHABLE EMISSIONS FREE RESOURCES MUST BE DEPLOYED TO ENSURE SAFE AND ADEQUATE SUPPLY**

One fundamental flaw in the Climate Leadership & Community Protection Act (CLCPA) is the mistaken belief by the authors of the law that existing wind, solar, and energy storage would be sufficient and that no new technology would be required. This attachment explains why this position is incorrect. It documents the need for new Dispatchable Emissions-Free Resources (DEFR), explains the requirements for this new resource, describes potential options, and notes the challenges associated with specifying how much capacity and energy will be needed to prevent a reliability crisis.

The Public Service Commission presumes that the PSL 66-P Establishment of a Renewable Energy Program can be implemented reliably. However, that presumption does not address the fact that a new category of Dispatchable Emissions-Free Resources (DEFR) must be identified, tested, and deployed to provide energy during extended periods of low wind and solar resource availability. There is a real chance that nothing will be feasible. Furthermore, because the DEFR technologies have not been identified it is impossible to determine if they are affordable or can be developed in the timeframe necessary to ensure reliability.

## DEFR Requirement

A PSC technical conference in December 2023<sup>1</sup>, the CLCPA Scoping Plan<sup>2</sup>, the New York Independent System Operator (NYISO) 2023-2042 “System & Resource Outlook”<sup>3</sup>, the New York Department of Public Service (DPS) Proceeding 15-E-0302,<sup>4</sup> and others<sup>5</sup> all have noted that DEFR is needed to provide adequate electricity support during periods of extended low wind and solar resource availability. The NYISO 2021-2040 System Resource Outlook<sup>6</sup> states:

DEFRs that provide sustained on-demand power and system stability will be essential to meeting policy objectives while maintaining a reliable electric grid. While essential to the grid of the future, such DEFR technologies are not commercially viable today. DEFRs will require committed public and private investment in research and development efforts to identify the most efficient and cost-effective technologies with a view

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<sup>1</sup> <https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={A0AE368C-0000-C039-83A3-3D617797E8F4}>

<sup>2</sup> <https://climate.ny.gov/Resources/-/media/project/climate/files/Appendix-G.pdf>

<sup>3</sup> <https://www.nyiso.com/documents/20142/46037414/2023-2042-System-Resource-Outlook.pdf/8fb9d37a-dfac-a1a8-8b3f-63fbf4ef6167>

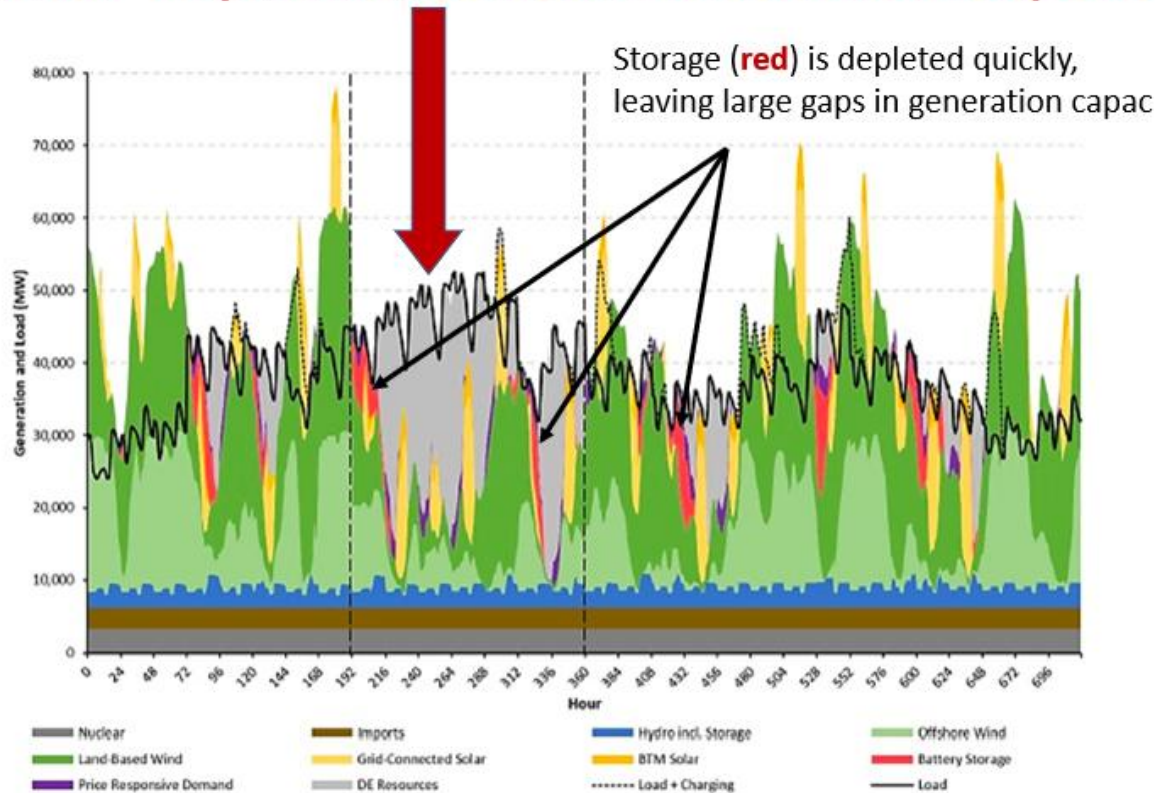
<sup>4</sup> <https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=15-E-0302>

<sup>5</sup> <https://reformingtheenergyvisioninconvenienttruths.com/dispatchable-emissions-free-resources-page/>

<sup>6</sup> <https://www.nyiso.com/documents/20142/33384099/2021-2040-Outlook-Report.pdf/a6ed272a-bc16-110b-c3f8-0e0910129ade?t=1663848437588>

towards the development and eventual adoption of commercially viable resources. The development and construction lead times necessary for these technologies may extend beyond policy target dates.

## **“FIRM” Dispatchable Emission-Free Resources (DEFR)**



The New York Independent System Operator 2023-2042 System & Resource

Outlook<sup>7</sup> includes Appendix F - Dispatchable Emission-Free Resources<sup>8</sup> that

<sup>7</sup> <https://www.nyiso.com/documents/20142/46037414/2023-2042-System-Resource-Outlook.pdf/8fb9d37a-dfac-a1a8-8b3f-63fbf4ef6167>

<sup>8</sup> <https://www.nyiso.com/documents/20142/46037616/Appendix-F-Dispatchable-Emission-Free-Resources.pdf/c18e686f-241e-f729-c0fa-ef3c43515bd3>

describes the reason DEFR is needed: “Numerous studies have shown that a system comprised of intermittent renewable energy resources and short-duration storage (i.e. 4 and 8-hour capacity duration) that cycle daily can economically meet demand in most hours across a year.” It goes on to note that “However, due to the seasonal mismatch in electricity demand and weather dependent production from wind and solar resources, there remains a significant amount of energy that must be shifted from the low net load intervals of the spring and fall seasons to the peak load times during the summer and winter months”. The Independent Intervenors note that the dark doldrum episodes described in Exhibit 4 are an additional energy challenge that need to be addressed with DEFR.

NYISO Vice-President Zachary Smith gave an overview summary presentation of the DEFR issue that is included in the conference slide deck<sup>9</sup>. His description<sup>10</sup> of the first slide (shown below) gave an overview of the generating resource outlook to make the point that a large amount of new generating resources needs to be developed. The estimates shown are from the 2021-2040 System & Resource Outlook<sup>11</sup> and represent two plausible load projections. He noted that there are “a lot of attributes that fossil fuel resources provide today that wind,

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<sup>9</sup> <https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={A0AE368C-0000-C039-83A3-3D617797E8F4}>

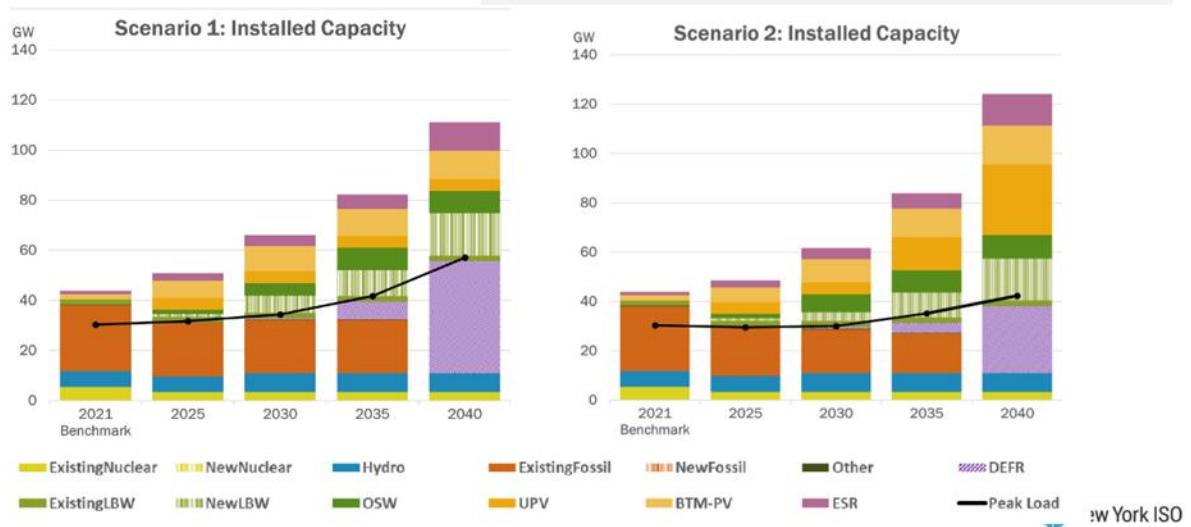
<sup>10</sup> <https://youtu.be/H8cDf0bRetQ?t=2194>

<sup>11</sup> <https://www.nyiso.com/documents/20142/33384099/2021-2040-Outlook-Report.pdf/a6ed272a-bc16-110b-c3f8-0e0910129ade?t=1663848437588>

solar, and energy storage simply cannot provide”. He also made the point that the DEFR replacements do not have to be a single technology but could be several technologies that in aggregate can replace the fossil generation.

## Resource Outlook:

✓ Significant new resource development will be required to achieve CLCPA energy targets.



Smith also listed the attributes<sup>12</sup> needed by DEFR in his presentation.

<sup>12</sup> <https://youtu.be/H8cDf0bRetQ?t=2501>

# Attributes for Reliability

1. **Dependable Fuel Sources** that are carbon free and allow these resources to be brought online when required
2. **Non-Energy Limited** and capable of providing energy for multiple hours and days regardless of weather, storage, or fuel constraints
3. **Dispatchable** to follow instructions to increase or decrease output on a minute-to-minute basis.
4. **Quick-Start** to come online within 15 minutes
5. **Flexibility** to be dispatched through a wide operating range with a low minimum output
6. **Fast Ramping** to inject or reduce the energy based on changes to net load which may be driven by changes to load or intermittent generation output
7. **Multiple starts** so resources can be brought online or switched off multiple times through the day as required based on changes to the generation profile and load
8. **Inertial Response and frequency control** to maintain power system stability and arrest frequency decline post-fault
9. **Dynamic Reactive Control** to support grid voltage
10. **High Short Circuit Current contribution** to ensure appropriate fault detection and clearance

 New York ISO

Smith's presentation described<sup>13</sup> the attributes of twelve sample technologies. This represents the NYISO opinion of the capability of different technologies to meet the attributes necessary to maintain a reliable system. In the future grid the insistence that all fossil-fuel fired units must be shut down means that numerous technologies that meet some or all of the necessary attributes will be required. The added complexity of these technologies does not increase resiliency because wind, solar, battery and demand response are all energy limited. Ancillary support services will be a major consideration because wind, solar and battery do not provide those services.

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<sup>13</sup> <https://youtu.be/H8cDf0bRetQ?t=2753>

## Attributes of Sample DEFR Technologies

		2023 NYCA Summer Capacity (MW)	Energy Attributes						Other Reliability Attributes			
			Carbon Free	Dependable Fuel Source	Non-Energy Limited	Dispatchable	Quick Start	Flexible	Multi Start	Inertial Response	Dynamic Reactive Control	High Short Circuit Current
Sample Technology	Fossil	25,667	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Hydro	4,265	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Pumped Storage	1,407	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Hydrogen Fuel Cell	0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
	Hydrogen Combustion	0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Nuclear	3,305	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
	Modular Nuclear	0	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes
	Battery	0	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
	Solar	154	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No
	Wind	2,051	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No
	Demand Response	1,234	Yes	Yes	No	No	No	Yes	No	No	No	No
	Synchronous Condenser	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes

## Potential DEFR Options

Appendix F<sup>14</sup> in the 2023-2042 System & Resource Outlook evaluates three DEFR options that the NYISO believe represent the most likely viable approach but concede that there still are concerns even with these:

While DEFRs represent a broad range of potential options for future supply resources, two technology pathways being discussed as potential options for commercialization are: 1) utilization of low- or zero-carbon intensity hydrogen (typically generated by electrolysis derived from renewable generation) in new or retrofit combustion turbine or fuel cell applications or

<sup>14</sup> <https://www.nyiso.com/documents/20142/46037616/Appendix-F-Dispatchable-Emission-Free-Resources.pdf/c18e686f-241e-f729-c0fa-ef3c43515bd3>

2) advanced small modular nuclear reactors, which are currently seeking approval from the relevant regulatory bodies to design and operate these resources. Currently, both technologies have shown limited commercial viability on the proof of concept. Even assuming that they are commercially viable, there remains significant work in the implementation and logistics that must be overcome to economically justify transitioning the dispatchable fleet to some combination of new technologies in the next 15 years. Long-duration energy storage could potentially serve in the role of the modeled DEFRs in the Outlook. In many respects, long-duration energy storage closely mimics various hydrogen production and conversion pathways. Long-duration energy storage adds to load in many hours, similar to electrolysis production of hydrogen. However, a notable difference is that electrolysis production of hydrogen has a lower round-trip efficiency when injecting energy into the system compared to other long duration energy storage technologies under development.

It cannot be over-emphasized enough that there has not been any feasibility analysis of these options. Consider that hydrogen – really energy storage – has just 50% round trip efficiency (returning 50% of energy input) and would require 400 miles of hydrogen-grade pipe and, in NYSERDA scenarios – also requires neighboring states to produce 50% of the hydrogen we would need. On top of that



we would need fuel cell plants. On the other hand consider SMRs. These have been used for decades in nuclear-powered vessels and some have 200MW capacity.

The Independent Intervenors believe that the most promising DEFR backup technology is nuclear generation because it is the only candidate resource that is technologically ready, can be expanded as needed and does not suffer from limitations of the Second Law of Thermodynamics<sup>15</sup>. If the only viable DEFR solution is nuclear, then renewables cannot be implemented without it. But nuclear operates best as a baseload resource and can replace renewables, eliminating the need for a massive DEFR backup resource. If there were affordability and reliability risk metrics in place, we believe a feasibility analysis would trigger a pause in renewable development projects needed for the PSL 66-P Establishment of a Renewable Energy Program. What if it is determined that there is no technology or group of technologies that can provide the necessary grid support? If the feasibility analysis finds that nuclear generation is the only viable path to zero emissions, then the renewable investments are redundant and unnecessary.

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<sup>15</sup> <https://seam.ly/0H75wo9x>

## Summary

The Independent Intervenors believe the requirement for DEFR is the major reliability risk of the PSL 66-P Establishment of a Renewable Energy Program zero-emissions electric grid by the 2040 zero-emission-grid target. DEFRs must be developed and deployed at scale well before 2040 to ensure reliability and meet climate mandates. They are not commercially viable today and the Department of Public Service (DPS) Proceeding 15-E-0302<sup>16</sup> has no schedule to address the mandates in the May 18, 2023 Order Initiating Process Regarding Zero Emissions Target<sup>17</sup>. That Order initiated a process<sup>18</sup> to “identify technologies that can close the gap between the capabilities of existing renewable energy technologies and future system reliability needs, and more broadly identify the actions needed to pursue attainment of the Zero Emission by 2040 Target.”

Deployment of existing technology takes time as shown by the delays in the wind and solar development programs. The uncertainty associated with deploying new technologies is much greater. One of the boundary conditions that must be established in the proposed proceeding is to determine the acceptable risk for long-term planning associated with DEFR development. Given that we don’t know

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<sup>16</sup> <https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=15-E-0302>

<sup>17</sup> <https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={00E12F88-0000-C914-BA3F-E14BF4BA3762}>

<sup>18</sup> Ibid

what will work, how much it will cost, and how long it will take to deploy, the Independent Intervenors suggest that implementation should be paused until this issue is resolved.

Note also that the Business Council in a letter<sup>19</sup> to Hochul voiced similar concerns:

While New York can and should take steps to reduce greenhouse gas emissions, its goal should be to present a model path forward, not a cautionary tale of unaffordable costs, harmful economic disruptions, and threats to future economic growth... New York's business community is facing additional uncertainties under the CLCPA, including its impact on the cost, availability and reliability of electric power delivered through a grid increasingly reliant on intermittent solar and wind generation... Unrealistic mandates erode public confidence... more important that New York leads by example by taking a workable approach to its energy and emission goals than failing to meet an arbitrary schedule.

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<sup>19</sup> [https://www.bcnys.org/sites/default/files/2025-04/ACT%20Delay%20Business%20Sign%20On%20Letter%20April%202025\\_0.pdf](https://www.bcnys.org/sites/default/files/2025-04/ACT%20Delay%20Business%20Sign%20On%20Letter%20April%202025_0.pdf)