



TO: New York State Climate Action Council
FROM: GE Gas Power
DATE: July 1, 2022
RE: New York Climate Action Council Draft Scoping Plan Comments

GE Gas Power believes addressing climate change must be an urgent priority, requiring consistent policy and regulatory frameworks at all levels of government. We also believe that the accelerated and strategic deployment of renewables and smart use of decarbonized gas power can change the trajectory for climate change and deliver a path to reductions of CO₂ emissions.

We look forward to working with New York to advance towards the ambitious goal of carbon-free electricity by 2040 as outlined in the 2019 *Climate Leadership and Communities Protect Act* (CLCPA).

However, the technological and economic pathways to achieve this requires a balanced approach when choosing technologies that will enable the State to achieve carbon reduction in a cost-effective manner. There are a variety of pathways to build out generation and transmission to support these goals, but affordability and reliability must be at the forefront.

In New York, GE gas turbines comprise 57% of the ~25 GW installed gas capacity. GE reactors make up 83% of the ~3 GW of installed nuclear capacity. GE wind turbines comprise 46% of the ~2 GW of installed wind capacity.

Natural gas-fired power generation will play a critical role in reducing emissions and providing reliable, sustainable, and affordable power to the grid across the country. Carbon capture and storage (CCS) technology, as well as hydrogen (H₂), can be used today and in the future to achieve low to zero carbon power generation while maintaining characteristics of the grid.

Since gas turbines have multiple technological options to decarbonize today, they are not stranded assets, but enable the opportunity to repurpose existing assets. Natural gas plants can be retrofitted today with post-combustion carbon capture or H₂ combustion. Retrofitting natural gas power plants can help address emissions in existing units, while providing flexibility to the grid to ensure the stable operation of its power systems.

The deployment of additional renewable resources onto the electric grid is necessary and inevitable, but resource planning must also take into consideration further demand for power as electrification of other sectors is required for New York to meet its economy wide GHG emissions reduction goal of 85% below 1990 levels by 2050. For electrification to be most effective at reducing CO₂ emissions, there needs to be a concurrent shift in the makeup of the fuel sources of the power sector with deployment of renewables and the pursuit of low or zero-carbon technologies.

According to the 2022 NYISO annual grid and markets report, in 2021, 47% of New York's electricity generation was produced by natural gas and dual fuel units, followed by 29% from renewables largely from 23% hydroelectric, and 24% nuclear.¹ However, it is important to consider these resources according to the two zones separating upstate load (Zones A-E) and the load closer to the population center of New York City and surrounding areas (Zones F-K). The upstate load is met primarily by

renewables, with ~41% coming from hydroelectric resources. The rest of the generation mix is made up of ~44% nuclear, with natural gas and dual fuel units at only ~6%. Whereas natural gas and dual fuel generation provides ~90% of the electricity downstate followed by ~5% nuclear and ~4% hydro.¹ There are important differences in the need to decarbonize fossil-based generation in the downstate area where reliability, grid inertia, and readily deployable power will be needed the most. The increase in electrification in downstate New York will only exacerbate the need for low-carbon electricity.

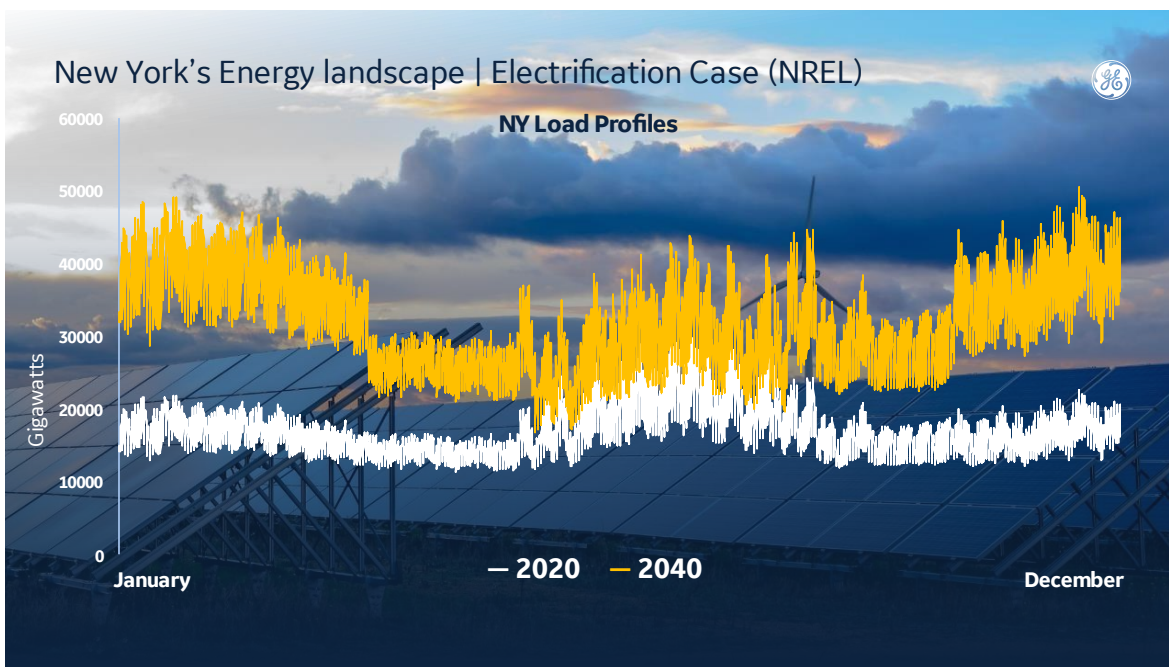


Figure 1: NYISO 2020 Actual Load vs. Projected 2040 load

As shown in Figure 1, in 2020 peak demand in NY currently occurs in the summer months, whereas in 2040, peak demand may occur in the winter months due to the effects of electrification.

In the future, New York's electricity demand may increase in winter months due to the electrification of residential and commercial heating, increased demand from an electrified transportation sector, and will be compounded by the seasonality issues in our region, which may affect solar resources and their ability to perform. During the winter season in New York, cold weather will increase the demand for heat. Fewer daylight hours will mean the lights in homes and businesses will need to stay on longer and cannot be powered by solar energy at that time. When renewables are unable to meet demand due to these elements, abated natural gas power generation can ramp up quickly and provide reliable and dispatchable power. Gas turbines are designed to provide fast and reliable starts, efficient at partial load operations, and can be turned down to low levels of output to accommodate renewables. Natural gas generation paired with H₂, or carbon capture can provide near zero-carbon firm capacity to ensure reliability throughout the year. If the State does not strategically decarbonize, outage frequency and durations can increase due to increased electrification and lack of dispatchable and reliable emissions compliant resources.

¹ New York ISO 2022, *The Path to a Reliable, Greener Grid for New York*, NYISO, accessed 1 July 2022, <<https://www.nyiso.com/documents/20142/2223020/2022-Power-Trends-Report.pdf/d1f9eca5-b278-c445-2f3f-edd959611903?t=1654689893527>>

The NYISO analyzed the CLCPA's goals of a zero-emission electricity sector by 2040 and found ~32 GWh of missing capacity, which is aligned with GE Gas Power's own analysis. According to GE Gas Power's modeling, there is between 17 TWh - 67 TWh of unmet load in all four referenced cases in the NYISO model. This means that ~30-33 GW of firm, flexible, and dispatchable power will be needed to prevent recurring blackouts, without considerations for reserve margins, which will be needed on top of this missing capacity.

According to GE Gas Power's modeling, the CLCPA's goal of 70% renewables by 2030 will increase the Levelized Cost of Electricity (LCOE) to \$65 per MWh, from \$26 today. With the added target of zero emissions by 2040, all unabated fossil fuel generation would need to be retired, resulting in an incremental system LCOE of \$48 per MWh. When added to the LCOE of \$65 to get to the 2030 target, this results in a system cost of over \$110 / MWh in a State which already has some of the highest costs of electricity.

GE strongly supports the rapid deployment of renewable power resources but encourages an alternative pathway to meet zero emissions in the power sector by 2040, which includes renewables, abated gas, and small modular nuclear reactors. When these technologies are more optimally mixed, the system LCOE may be able to achieve ~\$35 per MWh, while meeting all electricity demand at all 8,760 hours of the year. One of these pathway's includes New York's electric generation mix including 22% natural gas with CCS, 7% of NY's existing natural gas retrofitted for H₂ combustion, and 50% renewable generation. This alternative pathway is a lower-cost option while satisfying the State's carbon reduction targets.

To achieve a carbon-free electric grid by 2040, New York policies should consider the following actions:

- Create and prioritize policies that are technology agnostic and drive an even footing among sources of electric power
- Establish clear laws and regulations supporting the transportation of both CO₂ and H₂ via pipelines in a manner that provides business certainty needed to encourage private investment
- Adjust capacity markets to better reflect the value that dispatchable and emissions compliant resources provide for the grid
- Incorporate advanced fuels and nuclear
- Utilize the existing power generation fleet for both CCS and H₂
 - Ensure affordability and reliability
 - Minimize land density required for wind and solar
 - Installing pipeline infrastructure for CO₂ pipelines

GE in New York

GE employs nearly 5,000 people across the state of New York. One of GE's first ever campuses is the 628-acre site in Schenectady, NY. Schenectady is home to GE Renewable Energy's U.S. Headquarters, as well as many of GE Gas Power's leadership, and contains manufacturing and services facilities for steam turbines and generators. New York is also home to GE's Global Research Center in Niskayuna where research scientists and engineers work on cutting edge research and development across several industries. Also in Niskayuna, GE Renewable Energy trains new wind turbine technicians at the Renewable Energy Learning Center.

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