***Maintaining Energy System Reliability During the Clean Energy Transformation***

***Report Date – June 23, 2022***

***By The Utility Consultation Group[1]***

**Key Insights**

- We commend the Climate Action Council for prioritizing energy system reliability. The Draft Scoping Plan affirms that it is crucial to maintain electric reliability and recognizes the valuable role that the New York Independent System Operator (NYISO), the State's gas and electric utilities, and the New York State Reliability Council (NYSRC) play in maintaining electric system reliability. All State agencies that either directly or indirectly make decisions with potential reliability impacts should be mindful of the need to maintain energy system reliability while helping achieve the CLCPA emissions goals. The UCG looks forward to participating and contributing to preserving high levels of reliability during the clean energy transformation.

- It is imperative that implementation of the clean energy transformation is accomplished in a thoughtful and well-timed way, providing adequate lead time for both transmission and distribution investments. Conventional generation resources should not be retired before adequate and reliable renewable replacements are available.

- Reliability can be enhanced by optimizing the decarbonization of both the electric and gas delivery systems. In the same way that the electric generation mix continues to transition to less carbon emissions, the gas delivery system can also be decarbonized with a transition to no- and low-carbon fuels that provide diversified, safe and secure sources for dispatchable generation units.

- Recent electric grid reliability disturbances in Texas and California reinforce the negative impacts on public health and safety if energy system reliability is not maintained and prioritized. In addition, reliability issues would be detrimental to achieving clean energy goals as the CLCPA statute itself provides for temporary suspension of those goals if implementation impedes provision of safe and adequate service.

- New York's energy systems have complex interactions and operations, and their reliability is a result of methodical planning that considers the long lead times needed for construction of new generation resources, dependent fuel sources, transmission and distribution facilities, as well as the critical nature of continuous access to energy. Traditional forecasting, planning, and investments continue to be critical to meeting infrastructure needs in advance of the demands resulting from clean energy transformation. However, in addition to the way utilities historically forecasted, planned and made investments, the State should consider

[1] The Utility Consultation Group (UCG) was formed in December of 2020 in connection with the Climate Action Council (CAC or Council) to provide expertise to the Council and act as a resource for its Advisory Panels as they develop recommendations for the Council. The participating utilities include: Consolidated Edison Company of New York, Inc.; Central Hudson Gas and Electric, Inc., The Municipal Electric Utilities Association of New York State; National Fuel Gas Distribution Corporation; National Grid; New York State Electric and Gas, Inc.; Orange and Rockland Utilities, Inc.; and Rochester Gas and Electric, Inc.

authorizing a 'build in advance' approach for infrastructure needed for electrification of transportation and certain buildings to allow for timely, cost-effective provision of electric service for electrifying customers. Building in advance is especially important for transportation electrification given the unique characteristics of requests for electric vehicle charging infrastructure, where the lead time typically afforded to utilities for standard new business requests is dramatically reduced, leaving little time to evaluate, plan, and construct infrastructure to meet an applicant's demand. This should include infrastructure for charging stations for public access and private access (e.g., behind-the-fence charging at commercial, industrial and government facilities), as well as procedures for upgrading service for private residential charging. Building in advance is also important for the decarbonization of heat, particularly in light of changing housing codes. Utilities stand ready to make the needed investments.

- Customers and other stakeholders have increasing expectations of reliability which are likely to grow with the 'work-from-home' transformation of the economy, and as more customers heat their homes or buildings with electricity or rely on electricity for transportation. Maintaining and increasing reliability will also become more challenging with the expected increasing frequency and severity of weather events.

- The transition from conventionally-fueled dispatchable resources to inherently intermittent renewables must be accomplished in a way that preserves reliability without compromising safety or fuel security. The State should continue to rely on NYISO's established expertise and well-functioning stakeholder process for planning and managing the State's bulk power system and on the NYSRC's guidance on electric reliability standards. Additionally, we must plan for and invest in local electric transmission and distribution system upgrades to maintain reliability at the local level and meet changing customer demands. The State has successfully gone through major transformations of its energy systems previously, for example moving away from using coal to generate electricity and can do so again by leveraging existing infrastructure, processes and expertise. The State's existing gas infrastructure can be optimized with its electric infrastructure to further the Climate Act's emissions reduction goals while helping to preserve energy reliability for residents, businesses and industries. See the UCG's May 23, 2022 report – *The Gas System Transformation: Achieving GHG Reductions While Keeping All Options in Play for the Benefit of New Yorkers* – for additional information.[2]

**The Electric Utilities Are Actively Engaged with the NYISO and NYSRC to Ensure a Reliable Transition to Clean Energy**

UCG members have a long track-record of working closely with regulators and other stakeholders to safeguard reliability for our customers, in partnership with the NYISO and the NYSRC. This coordinated, methodical planning approach has contributed to the generally high level of reliability experienced by New York customers. Under the NYISO's Comprehensive System Planning Process (CSPP), NYISO conducts quarterly Short-term Assessment of Reliability (STAR) studies, the biennial Resource Needs Assessment (RNA), and (in subsequent years) the biennial Comprehensive Reliability Plan (CRP). Together, these studies assess the reliability of the bulk-power system over the short- (0-5 years) and medium- (10 years) term planning horizons. To the extent reliability needs are identified, the NYISO procures

[2] https://jointutilitiesofny.org/ucg_clcpa

the necessary solutions, giving the market time to provide competitive solutions where feasible. The various NYISO planning reports also highlight future potential risks to the system. For example, the most recent CRP, issued in 2021, noted that tightening reliability margins, due in part to retirements of peaker plants to meet stricter air quality requirements, were a risk factor that merited close monitoring.

The State's utilities have worked with the NYISO over the past several years to develop an overarching plan titled the "Grid in Transition" to address the impact of the clean energy transformation on the electric system. The work continues this year, as NYISO embarks on a study that will identify the future grid's needs for flexibility, which will then inform potential market changes to procure the needed resources.

The New York utilities have continued to work with our regulators, the NYISO, and other reliability-focused organizations like the NYSRC to advance climate goals while maintaining system reliability and are making investments today to implement those goals. An example of such an effort resulted in the Public Service Commission's approval of three transmission feeders known as the Reliable Clean City projects that were needed to help facilitate the retirement of certain aging peaker plants in New York City, providing local air quality benefits as well as enabling the delivery of future clean energy to electric customers in the affected areas. Additionally, the NYSRC has an approved set of goals for 2022 to increase its engagement with NYISO and NYSDEC in maintaining reliability during this transition period. The UCG will continue to actively engage with these organizations to lend expertise to provide for a reliable transition.

**The Transition to Clean Energy at the Bulk-Power Level Must Be Comprehensive and Well-Planned**

The energy grid is complex and interdependent with multiple systems and requires sufficient lead time for construction activities and other actions to meet customers' future energy needs and CLCPA goals. To meet CLCPA requirements, new dispatchable resources with secure fuel sources will need to be developed and energy storage resources supplied with renewable energy and evolving emissions free resources will need to be incorporated, while serving what is likely to be increasing demand for electricity.

Reduction of emissions on the gas system must be coordinated with the build-out of our grid. While electricity is being decarbonized with more renewable power, the State should support a similar transformation of the gas system: gas transmission and distribution fuel sources can undergo a similar decarbonization, and existing gas infrastructure can deliver no- and low-carbon fuels reliably and safely.

Optimization of the inter-relationship of the electric and gas energy systems allows for a holistic system view that can maintain reliability for end-users while achieving CLCPA GHG emissions reduction targets. In this regard, it is critical not to underestimate the range of potential planning, operational, and market challenges that must be addressed during the clean energy transformation. The NYISO, NYSRC and appropriate transmission owners must be included on the front-end of planning to ensure the reliability impacts are properly analyzed and understood.

**The Supply Side Transformation Can Leverage Existing Processes to Ensure Reliability**

Generation retirement planning must support reliable service to our customers. Although generation retirement planning is already part of the NYISO process, it should be augmented to consider the impacts of rapid and high volumes of retirements in a short period of time. Additionally, reliability planners should examine whether the current process allows for enough time to plan, or if more lead time notification of retirements is required. While renewables and storage may be able to replace some of the existing generation portfolio's reliability role, we will need to gain experience with the operating characteristics of new resources like offshore wind as we maintain high levels of system reliability.

While integrating these clean resources, State policy makers and reliability planners should take into consideration the inherent characteristics of many renewable resources. Higher proportions of intermittent renewable resources will result in new challenges to address, including in-day load and supply gaps, multi-day lulls in production, seasonal variations, and the impact of severe weather. It is important that these factors are well understood and mitigated by sufficient backup resources, such as the emerging classes of longer-duration energy storage, low- and no-carbon fuels and clean dispatchable resources like pumped hydro.

Plant permitting policy should include an evaluation conducted by NYISO and the local Transmission Owner(s) to consider and address reliability impacts to the grid. Incorporating such an evaluation of reliability into the permitting process will allow the State to meet its clean energy goals while preserving the level of reliable service our customers rely on.

Similarly, the integration of emerging resources such as offshore wind should be proactively planned to optimize system reliability. The Offshore Wind Study[3] notes the current radial interconnection approach of offshore wind projects does not provide redundancy or reliability benefits offered by a meshed or backbone offshore transmission system. A proactive and comprehensive evaluation of different offshore wind transmission approaches, including prebuilding offshore wind transmission, should be considered to determine the most cost-effective and reliable solution.

Continuing the State's proactive transmission planning more broadly is imperative. Goals of transmission planning and transmission projects are evolving as the State moves to integrate renewable resources to meet CLCPA targets. To provide reliability while replacing aging transmission infrastructure, the utilities are working to ensure that new transmission is sufficiently resilient to withstand the impacts of climate change. Traditionally, many transmission projects were built near population centers to transport energy from in-land fossil-fueled resources to the load. However, this new generation of transmission projects need to be built to reliably transfer energy from renewable and clean dispatchable resources often sited far from population centers. For example, to integrate offshore wind resources to the onshore system, critical transmission assets need to be built in coastal areas and often in or near flood plains. The utilities are adhering to higher standards so that these new assets are designed with increased capability to endure extreme weather events, and availability of a decarbonized underground gas transportation system can assist in this regard as well. The utilities are also exploring innovative ways to address transmission needs such as understanding the role of

[3] https://www.nyserda.ny.gov/-/media/Files/Publications/NY-Power-Grid/Appendix-D.pdf pp. 58-59

storage as transmission assets in areas where building new transmission lines may be challenging.

The NYISO – working with the State's utilities and the NYSRC and other stakeholders - is well placed to develop a holistic view of the energy system of the future. The NYISO's current process includes coordination with TOs on each TOs' Local Transmission Planning Process, and collaboration with all stakeholders on Economic, Reliability, and Public Policy Planning Process. State and local governments should leverage the NYISO's robust and transparent stakeholder process and expertise. For example, at the direction of the Public Service Commission, the electric distribution companies are currently working with the NYISO to develop a statewide Coordinated Grid Planning Process to identify and approve local transmission projects needed to achieve CLCPA goals in alignment with NYISO statewide planning processes. Such coordination between the local and statewide planning activities, including consistency of assumptions and information related to study results, will be invaluable to planners, regulators, market participants and policy makers. In addition, the NYSRC is the authoritative voice on current electric reliability requirements, and is regularly evaluating new requirements as electric system and resource needs change. This evaluation must not only include New York State but also potential impacts from neighboring states implementing similar policies that will impact their respective electric grids in a similar manner.

It is imperative that emerging technologies and resources be technically proven before being relied on for desired outcomes. For example, wind, solar and battery storage technologies are inverter-based resources (IBR) that require comprehensive study to address potential system stability challenges. The consequences of the lack of proper planning regarding IBRs were experienced in Texas in May 2021 where a simple electrical fault resulted in the disconnection of many solar resources as far as 200 miles from the originating event.[4] To address these issues, reliability rules should incorporate electromagnetic transient modeling and analysis. IBRs are but one of many examples of emerging technologies that must be properly understood, analyzed and addressed.

Additional research and development is needed. Energy storage is a cornerstone resource of a clean and resilient energy future. New storage systems in the industry today are typically 4-hour duration or less, corresponding to bulk-power system peaking capacity and ancillary service needs. However, there is a potential need for longer duration energy storage (LDES) in the coming years as storage will be needed to replace higher capacity factor conventional generation, absorb longer periods of renewable overgeneration, and support resilience during severe weather events. LDES could potentially shift very large amounts of solar and wind energy, which would otherwise be curtailed, to other times, thereby reducing the need for peaker plant operation. Additionally, as winter heating requirements will increasingly be met with electric when solar output is seasonally low, LDES will be needed to shift renewable energy supply from seasonally high periods to seasonally low periods. LDES could also potentially support natural disaster resilience strategies, mitigate multi-day outages, and provide backup power in events like storm restoration in certain circumstances.

[4] See the North American Reliability Council report "Odessa Disturbance: Texas Events: May 9, 2021 and June 26, 2021, Joint NERC and Texas RE Staff Report," published September 2021. https://www.nerc.com/pa/rrm/ea/Documents/Odessa_Disturbance_Report.pdf, accessed on June 5, 2022.

Currently, LDES is still nascent, requiring R&D efforts to advance it to commercialization. Some UCG members are actively engaging the Electric Power Research Institute, Brookhaven National Laboratory, New York Battery and Energy Storage Technology, and others to understand the potential of the different LDES technologies (mechanical, thermal, electrochemical, and chemical) and develop use cases for R&D studies and demonstrations. In selecting which of the LDES technologies to pursue, it is important to consider the technology's attributes: safety, cost effectiveness, footprint density, charging/discharging cycle efficiency, scalability potential and technical maturity. Based on our current assessment, many UCG members plan to pursue further R&D in promising LDES technologies suitable for the environment in which they will be installed. For example, in an urban context these include metal-air batteries (such as iron air) to support a reliable, resilient and carbon-free grid, and thermal storage and/or power-to-gas storage to help decarbonize the fuel supply for district heating systems. UCG members plan to take advantage of funding opportunities from the U.S. Department of Energy (DOE) and NYSERDA to help fund R&D efforts to advance and develop the LDES technologies we need tomorrow to help decarbonize our electric, gas and steam systems in the most cost-effective manner while also ensuring their continued reliable and resilient operations.

Research and development is important to facilitate the use of alternative fuels and methods to utilize the gas system to facilitate the State's decarbonization efforts in a reliable manner. In particular, hydrogen, including its potential storage properties, and carbon capture and storage should be closely evaluated as efforts to optimize the State's electric and gas energy systems proceed.

**<u>The Demand Side Transformation is Occurring Already, but May Need New Approaches</u>**

UCG members are taking steps so that more clean energy resources can reliably interconnect to our distribution systems. Renewable Natural Gas (RNG) is already flowing on some utility systems and pilot projects are in-place to explore incorporating hydrogen in the future as well. Planning, coordination, and operations continue to evolve as small-scale distributed energy resources (DER) integration increases. The State's electric distribution companies are already incorporating distributed generation into their forecasting and system planning processes, utilizing resources as part of Demand Response programs or in Non-Wires Alternative programs to alleviate electric system constraints during peak load conditions. The utilities have also worked closely with the NYISO to create operating and coordination guidelines to integrate DERs into the future of the wholesale market.

In addition to proactively addressing changes on the supply side, the electric grid is also experiencing rapid changes on the demand side including increased loads and volatility due to heating electrification, the rapid adoption of electric vehicles, and other new demands.[5] The changing supply and resource mix will require State and Federal regulators to stay vigilant and engaged with electric utilities and stakeholders in developing standards to accommodate the changing needs of the New York distribution and bulk power systems.

While utilities have always relied on sophisticated forecasting techniques to provide for sufficient infrastructure to be ready 'just in time', the clean energy transformation may require a new approach to planning. The speed of the transformation being considered on the demand side

[5] https://www.nytimes.com/2021/12/05/nyregion/bitcoin-mining-upstate-new-york.html

for electric distribution companies is greater than that experienced in previous demand-side technological shifts. For example, the installation of residential air conditioning occurred over multiple decades, significantly increasing the electric system peak, but doing so at a pace that allowed electric utilities and system planners to install the needed generation, transmission and distribution assets such that reliability was maintained at a high level. In some cases, this includes techniques to mitigate the growth in electric peak, such as encouraging the selective adoption of steam- or gas-powered central air conditioning in dense urban environments. The air conditioning revolution, however, did not have a State policy push behind it, and so the adoption of summer cooling was limited by the cost of air conditioner units and the cost and time needed for premises upgrades required to accommodate cooling. With the State's current focus on converting almost the entirety of the transportation sector to electricity within the next 30 years, and a similarly robust effort to convert a portion of the State's building sector to electric heating, we may experience growth in electric peak at a pace that is greater than any previous technologically-driven shift.

Unlike with air conditioning, both the heating and transportation transformations are significantly aided by State financial support – for the purchase of electric vehicles, the installation of EV chargers, and the purchase and installation of electric-powered heating technologies. Electric utilities are already adapting their forecasting practices to incorporate this accelerated approach to electrifying these sectors that previously relied on fossil fuels. Electric vehicles in particular present a new paradigm to electric system planners, because planning and implementation of system changes and upgrades will be at a much faster pace. For example, EV charging stations could add as much new load as a modern skyscraper but this load can be installed in a fraction of the time required to plan for and build a skyscraper. Initiatives related to decarbonization of the gas system – such as RNG, hydrogen and geothermal projects – can also contribute significantly to the clean energy transformation. The State should consider authorizing utilities to proactively build out their infrastructure based on the policy requirements of CLCPA, as opposed to the previous practice of waiting for customer applications before investing in significant energy infrastructure projects. This 'build in advance' approach to energy infrastructure will facilitate achieving CLCPA goals but requires that regulators authorize infrastructure using cost recovery mechanisms and different planning criteria than the State has relied upon in the past.

**The State Has Transformed Its Energy Systems in Fundamental Ways Before, and Can Do So Again**

The rapid energy transformation envisioned by the CLCPA and described in the draft Scoping Plan is ambitious and presents new challenges and opportunities. The State's utilities are confident that the technological and operational changes needed to achieve the clean energy transformation envisioned by the CLCPA can be implemented. UCG members are committed to making the necessary investments in energy infrastructure and alternative technologies. UCG members have successfully made similarly complex transitions in the past, including building a statewide high voltage transmission grid, establishing the NYISO to oversee the dispatch of generation and the operation of the markets, and incorporating increasing volumes of customer-sited clean generation and others. Going further back, the State has successfully transitioned from dirtier fuels to cleaner fuels, setting aside coal, manufactured gas, and heavy fuel oils. These successful transitions have always been accomplished with firm support from our partners in government and our customers; if we have that support for this transition, there is no doubt that we will be successful again.

## **Conclusion**

State agencies should proactively consider and address energy reliability and coordinate with the utilities so we can transition to clean energy while maintaining reliable service at a reasonable cost. The utilities recognize that the speed of the transition and the composition of the State's energy systems at given target dates cannot be precisely forecasted. While the mix of solutions that will comprise the 2030, 2040 and 2050 energy system is not clear today, these challenges can be overcome with close collaboration between the State, utilities, and other stakeholders. We should explore, test, and scrutinize potential technologies like energy storage, hydrogen, RNG generation and grid enhancing technologies, so we can deploy them in decarbonization efforts while preserving high levels of reliability. The utilities stand ready to work with the NYISO, NYSRC, State and local regulators on long-term reliability planning, as well as with technology innovators on the R&D needed to decarbonize our systems.