Bloomenergy

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NYSERDA
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Re: New York Climate Action Council Draft Scoping Plan

Bloom Energy would like to thank the New York Climate Action Council ("Council") for the opportunity to submit the following comments on the Draft Scoping Plan released on December 30, 2021 ("Plan").

I. Background

Bloom Energy is a manufacturer of solid oxide fuel cells and hydrogen electrolyzers. Bloom Energy's highly efficient solid oxide fuel cell platform generates electricity by reforming hydrogen from natural gas and/or biogas or by using hydrogen directly as its native fuel. Bloom Energy's electrolyzer – essentially the solid oxide fuel cell configured in reverse order – is capable of converting renewable electricity into renewable "green" hydrogen more efficiently than any other commercially available system. With over 300 issued technology patents and 700 installations worldwide, BE is a leader in dependable, clean energy generation and resiliency. When utilizing renewable hydrogen and/or biogas as a fuel, Bloom Energy's solid oxide fuel cells are a Climate Leadership and Community Protection Act-eligible "renewable energy system."

II. Introduction

We applaud the New York Climate Action Council for developing a comprehensive Scoping Plan that will guide the implementation of the historic Climate Leadership and Community Protection Act ("CLCPA"). New York faces the enormous task of meeting ambitious greenhouse gas reduction targets and environmental justice objectives across all sectors, while taking on the growing challenge of climate change and preserving the State's economic dynamism. As laid out in the Plan, New York can pursue multiple energy transition pathways to meet its CLCPA mandates, with varying costs and benefits; jobs, climate justice, public health, and infrastructural impacts; and policy and regulatory implications.

Regardless of the decarbonization pathway that New York ultimately pursues, we believe that non-combustion fuel cell and electrolyzer systems that offer unmatched operational characteristics and environmental benefits will play critical roles in enabling this transition. BE's solid oxide fuel cells are fuel-flexible and, when running on biogas and green hydrogen, are CLCPA-compliant resources that can provide firm, zero-emission capacity that will become increasingly important as New York's grid transforms over the next few decades. As a distributed energy resource with microgrid capabilities, BE fuel cells enhance the power sector's operational resilience, a key consideration as extreme weather events become more frequent and electrification accelerates across end uses. BE's hydrogen fuel cell and electrolyzer offerings can enable New York's green hydrogen ecosystem, diversify the State's energy portfolio, and help integrate and utilize intermittent wind and solar resources.

As the Council finalizes the Scoping Plan, we offer our comments and recommendations around three thematic areas:

1. Air Quality Impacts of the Energy Sector and Environmental Justice
2. Power Sector Strategies
3. Advanced Fuels

While we do not advocate for a specific emissions reduction scenario, we provide insight into the ways in which fuel cell and electrolyzer systems can help accelerate deep decarbonization in any pathway. As the Plan is finalized, we urge the Council to consider the baseline policy, programmatic, and regulatory actions needed to ensure these technologies have a place in New York's broader energy transition.

III. Air Quality Impacts of the Energy Sector and Environmental Justice

The air pollution-energy nexus remains a principal challenge as New York transitions away from fossil fuel resources, a process that will likely take decades. We commend the Scoping Plan for emphasizing the interdependence of local air quality and the energy system and articulating improvements in air quality as a top priority in the State's efforts to decarbonize. The

disproportionate burden of air pollution on vulnerable and frontline communities – including Black, Indigenous, and People of Color (BIPOC), low-income communities, and immigrant households – is well established.[1] Recent research also indicates that the health impact of air pollution may be underestimated and affects the human body both acutely and chronically.[2] We note as well that the Scoping Plan identifies exacerbating respiratory conditions, greater risk of cardiovascular disease, and deteriorating outdoor air quality from rising temperatures among the climate-related health impacts anticipated in New York.[3]

Although the Scoping Plan emphasizes the environmental and public health harms from combustion-based energy generation throughout, a critical missing piece is serious discussion of backup emergency generators, which are typically powered by combusting diesel fuel. Findings from other states suggest that these small, stationary sources have expanded rapidly in recent years. In southern California, for example, the number of registered backup diesel generators increased by over twenty percent *in just one year*.[4] The Plan rightly notes that maintaining electricity sector reliability is critical to preserving public health in our energy-dependent society. This statement is especially true for critical facilities throughout New York, including hospitals, telecommunication centers, transportation depots, utility facilities, and other community infrastructure, as well as for Disadvantaged Communities that face disproportionate risks from grid outages and climate impacts. As a matter of public safety and environmental justice, it is concerning that the Scoping Plan has not fully evaluated the impact of greater deployment of backup generators nor has any policy or regulatory proposal been offered to

[1] See for example: Miranda, Marie Lynn, Sharon E. Edwards, Martha H. Keating, and Christopher J. Paul. 2011. "Making the Environmental Justice Grade: The Relative Burden of Air Pollution Exposure in the United States." International Journal of Environmental Research and Public Health 8 (6): 1755–71. https://doi.org/10.3390/ijerph8061755.
Tessum, Christopher W., Joshua S. Apte, Andrew L. Goodkind, Nicholas Z. Muller, Kimberley A. Mullins, David A. Paolella, Stephen Polasky, et al. 2019. "Inequity in Consumption of Goods and Services Adds to Racial–Ethnic Disparities in Air Pollution Exposure." Proceedings of the National Academy of Sciences 116 (13): 6001–6. https://doi.org/10.1073/pnas.1818859116.
[2] Schraufnagel, Dean E., John R. Balmes, Clayton T. Cowl, Sara De Matteis, Soon-Hee Jung, Kevin Mortimer, Rogelio Perez-Padilla, et al. 2019. "Air Pollution and Noncommunicable Diseases: A Review by the Forum of International Respiratory Societies' Environmental Committee, Part 1: The Damaging Effects of Air Pollution." CHEST 155 (2): 409–16. https://doi.org/10.1016/j.chest.2018.10.042.
[3] New York Climate Action Council, *Draft Scoping Plan*. 2021. p. 53-56
[4] Moss, Steven and Andrew Bilich. M.Cubed, *Hidden Grid: More Than Eight Gigawatts of Fossil Fueled Back-Up Generators Located in Just Five California Districts*. 2020.

address this risk. In fact, the Scoping Plan barely mentions 'backup power' or 'emergency power' and fails to consider the air quality and equity considerations of backup diesel generators.

In New York City, the Applied Economics Clinic found, using conservative estimates, that registered backup diesel generators emit between 104,300 and 127,500 metric tons of CO_2e per year and represent a considerable source of local air pollutants.[5] Their combined capacity is equivalent to one and a half times the size of the 2,050 MW Ravenswood Generating Station and nine out of ten backup diesel generators are located within 0.5 mile of an environmental justice community. Alarmingly, building code requirements suggest the true number of backup diesel generators may be up to four times greater than the figure registered with local authorities.[6]

Recommendations

- We strongly encourage the Council to advocate for non-combustion uses of hydrogen wherever possible to eliminate the risk of NOx and other criteria pollutants. Fuel cell systems that run on green hydrogen are compliant technologies under the Climate Act and are among the most efficient uses of hydrogen fuels. Deployment of hydrogen fuel cells should be prioritized in Disadvantaged Communities, where their emission benefits are greatest.
- With respect to biogas, we support the Climate Justice Working Group's (CJWG) recommendations to maximize onsite use of biogas and co-location in appropriate facilities. We also support the Council's recommendation under strategy *W9 Biogas Use* to prioritize fuel cell deployment for power generation. Wastewater recovery facilities and landfills present opportunities for biogas-powered fuel cell projects that can contribute to community resilience, avoid significant methane emissions, reduce fossil fuel use, displace diesel generators, and avoid sewage discharge to waterways during power outages. The Plan should recognize that biogas fuel cell deployments in critical community infrastructure such as wastewater recovery facilities are both a mitigation and

[5] Applied Economics Clinic, *Assessment of Backup Diesel Generators in New York City*. 2021.
[6] Applied Economics Clinic, *Assessment of Backup Diesel Generators in New York City*. 2021.

resilience strategy, allowing these facilities to generate consistent and reliable power while reducing the air pollution burdens in surrounding communities.

- The Plan should, at a minimum, discuss the environmental and public health implications of backup generation, particularly those that run on diesel, as an important component of decarbonizing the power sector. We emphasize that greater demand on the grid from electrification and higher frequencies of climate-related events will drive demand for more backup power. The Plan should develop a strategy to identify alternatives, including non-combustion technologies, to displace backup diesel generators and marginal power generators.
- The Plan should advocate for greater understanding of the State's existing backup generator fleet. This includes improving data availability and access, reporting, and tracking of small stationary sources, as well as including backup generators in air pollution permitting and greenhouse gas inventories. Annual reporting requirements should include hours for readiness testing and operation, air pollutant and greenhouse gas emissions, fuel consumption, and energy output.
- Regulators should develop stricter standards for siting and permitting locally polluting energy sources in Disadvantaged Communities, which already face disproportionate harm from local air pollution.

IV. Power Sector Strategies

Meeting the Climate Act's emissions reduction mandates will transform New York's energy system. Across modeled pathways, more end uses will become electrified and the grid will rely increasingly on intermittent solar and wind resources, resulting in unique infrastructural and energy market opportunities and challenges. We highlight three power sector strategies that will be necessary across transition pathways to achieve GHG and co-pollutant reduction targets while maintaining grid reliability and meeting social equity objectives:

1. Scale distributed energy resources: DERs provide flexible and resilient power that can help reduce peak demand and lower net electricity load. As noted by the strategy *E3 Facilitate Distributed Generation / Distributed Energy Resources* in the electricity sector chapter, clean DERs generate electricity closer to end users, increasing electricity sector

efficiency and avoiding the need for costly transmission investments. The Scoping Plan also notes that deploying DERs is a primary way to meet the social equity requirements of the Climate Act.

2. Significantly expand dispatchable, zero-carbon resources: Even with the proposed expansion of renewable resources such as wind and solar, the integration analysis has identified a significant need for new, firm, zero-carbon capacity across all scenarios: between 21-27 GW to maintain system reliability.[7] This will be a tremendous undertaking: for comparison, the State's entire current fossil fuel fleet provides about 26 GW of installed capacity.[8] We emphasize two crucial findings in the integration analysis: (1) that New York is expected to become a winter peaking system by the mid-2030s, during which seasonal conditions result in low renewable output[9] and (2) even with aggressively managed loads, electric consumption doubles and peak loads nearly double by 2050 throughout the State.
3. Diversify renewable energy and energy storage development: New York must secure a diversified resource mix in its generation and storage capabilities. Intermittent resources, even when they provide the bulk of New York's energy needs, must be supplemented by firm resources in all scenarios considered. The Scoping Plan notes, "at high penetration of renewables and storage, the incremental value of new resources is limited because the most challenging periods for system reliability becomes times in which renewable output is low and storage is quickly exhausted."[10] In storage, New York should not limit its strategy to batteries alone. For example, the Plan indicates that hydrogen effectively provides a form of storage to the system on the order of hundreds of hours and that a higher amount of 100-hour battery capacity is needed to meet the equivalent reliability.[11]

[7] New York Climate Action Council, *Draft Scoping Plan* Integration Analysis Technical Supplement. 2021. Section I – p. 46.
[8] NYISO, *Power Trends 2022: The Path to a Reliable, Greener Grid for New York*. 2022. p. 24
[9] New York Climate Action Council, *Draft Scoping Plan* Integration Analysis Technical Supplement. 2021. Section I – p. 48.
[10] New York Climate Action Council, *Draft Scoping Plan* Integration Analysis Technical Supplement. 2021. Section I – p. 46.
[11] New York Climate Action Council, *Draft Scoping Plan* Integration Analysis Technical Supplement. 2021. Section I – p. 49-50.

Fuel cell systems that run on renewable fuels and electrolyzers that utilize renewable power to produce hydrogen provide the reliability and environmental attributes that would support each of the power sector strategies mentioned above and enable faster decarbonization. For example, a recent NYISO study found that transmission constraints in certain renewable energy pockets will likely result in the curtailment of 11% of the total potential renewable energy production across New York, with curtailment levels in some individual pockets as high as 63%.[12] Curtailed output from renewable resources can be utilized via electrolyzers to produce green hydrogen, which can then be stored and used through noncombustion fuel cells during periods of low renewable generation. These modular technologies can also be deployed strategically and incrementally, in close coordination with renewable energy development. In addition to complementing variable resources, fuel cell and electrolyzer systems enhance the power sector's resilience and resource mix, important benefits as New York's electricity consumption is forecast to rise at the same time as climate-induced extreme weather accelerates over the next decades.

Recommendations

- We strongly support the adoption of the requisite administrative, regulatory, and legislative action to initiate the planning for the significant buildout of firm, zero-carbon resources that are needed to balance higher penetration of intermittent resources and maintain grid reliability. The capacity needs that have been identified by the Plan's integration analysis across scenarios is a serious policy issue that requires broader public debate and stakeholder input. While New York has made great strides in enabling wind, solar, and storage resources, to date there has been little attention given to CLCPA-eligible resources that would fill the capacity shortfall. The State must act decisively to develop a coherent strategy to ensure enough firm zero-carbon resources are in the development pipeline as the State's power sector continues to integrate renewable resources and CLCPA compliance milestones near. We believe that it is important to recognize that a non-combustion fuel cell that sources its hydrogen fuel from the natural gas system today is the same basic platform that is capable of utilizing renewable green hydrogen in the future. As a result, policies that do not discern between traditional

[12] NYISO, *Power Trends 2022: The Path to a Reliable, Greener Grid for New York*. 2022. p. 40

combustion uses of gas and non-combustion fuel cells can have the inadvertent effect of discouraging what essentially amounts to a "down payment" on future deployments of CLCPA-eligible clean firm power.

- In support of the Plan's recommendation to improve the DER stack to reflect the value of these technologies more accurately, we call for immediate reforms to the Value of Distributed Energy Resources ("VDER") program. At present, the VDER program rewards projects that export to the grid but entirely excludes behind the meter projects – including non-combustion microgrids – from participation even though these projects create the same, or superior, system benefits including locational value, energy value, demand reduction value, and capacity value. Moreover, while the VDER value stack provides an environmental benefit related to avoided GHG emissions, it provides no value at all for avoided criteria air pollutants – an approach that is inconsistent with heightened concerns about local air quality.
- We recommend that the strategy *E2 Accelerate Growth of Large-Scale Renewable Energy Generation* need not be limited to solar and wind. The strategy should be expanded to consider the enormous potential of green hydrogen and fuel cell systems that run on renewable fuels to be components of New York's energy transition.
- Alongside larger renewable generation, the Council should also develop a commensurate strategy to accelerate the deployment of smaller-scale, CLCPA-eligible renewable systems, which can be sited closer to customers and could avoid the permitting challenges of larger renewable infrastructure.
- Under strategy *E4 Support Clean Energy Siting and Community Acceptance*, we agree that the State should incentivize 'climate resilience hubs', although they should not be limited to only solar-plus-storage technologies. The State should develop a microgrid deployment strategy in coordination with statewide climate change vulnerability and risk assessments, with priority to Disadvantaged Communities and geographies with concentration of critical infrastructure and facilities.
- We support the CJWG's recommendations to develop behind-the-meter microgrids in Disadvantaged Communities, where microgrids serve as a focal point of resilience hubs.
- We agree with components of strategy *E6 Deploy Existing Storage Technologies* to update New York's Energy Storage Roadmap and to increase funding for energy storage

deployment. However, we strongly advocate for a technology-neutral approach in the State's energy storage development that considers green hydrogen as a viable long-duration storage option. Electrolyzers, which are deployed to convert otherwise curtailed renewables, can help diversify and improve the capabilities of the State's storage assets. Hydrogen electrolyzers and hydrogen energy storage should be considered an eligible technology in all energy storage policies.

V. Advanced Fuels

The Plan details multiple transition pathways in which hydrogen and other zero-carbon and low-carbon fuels could help meet New York's deep decarbonization goals, particularly in hard-to-abate sectors. Notably, hydrogen provides an important fuel source across all modeled scenarios, with consumption projections between 100 and 225 TBtu in 2050.[13] In addition to industrial applications, road and non-road transportation, and district heating, the Plan notes that hydrogen can play a key role in the electricity sector by providing an important dispatchable, zero-carbon resource. The Plan also recognizes the importance of developing hydrogen production capacity and capabilities in-state: the integration analysis assumes that New York produces fifty percent of its hydrogen needs in-state via electrolysis. Electrolysis loads can be highly flexible to take advantage of excess renewables on a seasonal timescale, and the integration analysis projects between 27 to 42 TWh of additional electricity demand from electrolysis in 2050.[14]

Recent efforts at the state and federal levels indicate growing interest and policy support for hydrogen. At the federal level, the 2021 Infrastructure Investment and Jobs Act committed over $9.0 billion to hydrogen development, including funding for regional hydrogen hubs, research and development for clean hydrogen production, and securing a domestic hydrogen supply chain. At the state level, Governor Kathy Hochul's 2022 State-of-the-State outlined a vision for making New York a hydrogen hub and included the development of a regulatory framework, a program for locally-owned green hydrogen microgrids, a NYSERDA Hydrogen Innovation Fund, and a Green Hydrogen Prize. Across the country, states are forming multi-state collaborations and

[13] New York Climate Action Council, *Draft Scoping Plan* Integration Analysis Technical Supplement. 2021. Section I – p. 51.
[14] New York Climate Action Council, *Draft Scoping Plan* Integration Analysis Technical Supplement. 2021. Section I – p. 52.

public-private partnerships and developing regulatory strategies to attract federal investments and catalyze an emerging energy sector.[15]

New York has the opportunity to become a leader in the hydrogen economy, an industry that is expected to grow fivefold by 2050.[16] We assert firmly that hydrogen is neither a 'false solution' to the energy transition nor a silver bullet for decarbonization. We instead call for a balanced, informed, and nuanced approach in assessing the role of hydrogen and other advanced fuels in New York. The Council should recognize that fuel cells use hydrogen in a fundamentally different way than combustion applications and these systems are CLCPA-eligible technologies when powered by renewable fuels.

There are ample opportunities for fuel cell and electrolyzer systems to enable New York's clean energy transition. Hydrogen electrolyzers can be deployed to work synergistically with wind and solar to allow for higher penetrations of intermittent renewables, storing electricity that would otherwise be curtailed. In wastewater treatment facilities, biogas fuel cells can make use of harmful methane that is currently vented or flared to provide consistent, clean power to critical community infrastructure. Renewable "green" hydrogen-powered community microgrids can be deployed in communities that are most vulnerable to climate impacts or in areas with a density of critical facilities and infrastructure.

New York's existing energy infrastructure will help unlock the enormous potential of green hydrogen, biogas, and other advanced fuels. Rather than blanket decommissioning, we emphasize that a coordinated, strategic, and carefully planned transition of the state's gas system assets will deliver the maximum social, environmental, and economic benefits. The Council should consider that decarbonizing the gas system is a strategy that is being explored and evaluated by governments around the country and around the world, and the enormous potential

[15] See for example: https://www.utilitydive.com/news/texas-hydrogen-proto-hub-leads-the-us-in-technical-potential-for-doe-fund/622565/; https://www.ghcoalition.org/hydeal-la; https://www.catf.us/2022/02/four-western-states-announce-coordinated-hydrogen-hub-collaboration/

[16] McKinsey, "Global Energy Perspectives 2022". 2022. https://www.mckinsey.com/industries/oil-and-gas/our-insights/global-energy-perspective-2022.

for utilizing existing assets for low and zero-carbon fuels, without prolonging New York's reliance on fossil fuels nor compromising its environmental justice commitments.

Recommendations

- The Scoping Plan should be updated to include recent federal and state efforts to spur hydrogen as an enabling policy context which will determine the future of hydrogen solutions in New York. Federal and state support for hydrogen demonstration projects, regional hubs, supply chains and production, and research and development will help drive down the cost of hydrogen and associated technologies, create new economic opportunities throughout New York and the Northeast, and scale innovative decarbonization solutions.
- New York State should develop a comprehensive hydrogen strategy that prioritizes opportunities for hydrogen development in the state; identifies regulatory, market, and policy barriers to hydrogen commercialization; analyzes hydrogen technology availability, costs, and readiness; develops an infrastructure program to enable hydrogen use; and establishes meaningful private-public partnerships. New York's hydrogen strategy development should include the relevant administrative and regulatory agencies, utilities, hydrogen technology firms, infrastructure developers, labor unions, and community and environmental justice organizations. NYSERDA's hydrogen strategy study with NREL provides a critical first step towards this endeavor. New York's hydrogen strategy should catalogue and evaluate best practices from jurisdictions that are committing to hydrogen, including Germany, Canada, the Netherlands, Japan, and South Korea.
- Non-combustion applications of hydrogen via fuel cells, the modeled use of hydrogen in Scenario 3 of the integration analysis, should be prioritized to maximize the GHG reduction and air quality improvements of green hydrogen, especially in Disadvantaged Communities.
- The Plan should call for more detailed evaluation and analysis of the cost-benefit between combustion and non-combustion uses of hydrogen. The integration analysis modeling finds that shifting from hydrogen fuel cells to hydrogen combustion would

reduce costs by $7 billion, with costs and operating characteristics of hydrogen fuel cells derived from the U.S. Department of Energy Fuel Cell Office technical targets which appear to have been last updated in 2017. Further, it is unclear what cost assumptions are being used for hydrogen combustion uses. These cost parameters appear to be both outdated and inconsistent with current market conditions. It is important that the cost assumptions for hydrogen fuel cells and associated technologies be revisited with industry stakeholders before the Plan is finalized. They should be adjusted to reflect the latest technology improvements, cost reductions, and projections in the hydrogen fuel cell industry.

- To encourage in-state green hydrogen production and as part of New York's hydrogen strategy, we advocate for policy and regulatory support and market mechanisms to scale electrolyzer deployment. This can include specific electrolyzer capacity targets, which many European governments have implemented.[17] Spatial integration of electrolysis with existing grid and gas infrastructure, large-scale renewable energy development, and industrial clusters will also be helpful.
- The Public Service Commission's (PSC) "Order Adopting Modifications to the Clean Energy Standard" is, at best, unclear with respect to the use of the gas distribution system for the purpose of transporting CLCPA-eligible renewable fuels.[18] This approach should be expected to have the effect of severely limiting the utilization of eligible renewable energy systems even as the Council itself has determined that more solution sets will be required to meet CLCPA goals. Importantly, other leading jurisdictions are taking precisely the opposite track. For instance, California recently enacted legislation which requires gas distribution utilities to blend renewable gas into their distribution systems.[19] Oregon is developing rules for renewable natural gas distribution programs for small and large utilities. The Council should accordingly recommend that the PSC clarify and/or revise its CES Order to allow the utilization of the gas distribution system to transport

[17] S&P Global Commodity Insights, "Hydrogen fever in EU puts 2024 target of 6-GW electrolyzer capacity in reach". 2021. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/070721-hydrogen-fever-in-eu-puts-2024-target-of-6-gw-electrolyzer-capacity-in-reach.
[18] New York Public Service Commission, "Order Adopting Modifications to the Clean Energy Standard". 2020. p. 15-17; 21.

renewable fuels where that fuel is being used in a CLCPA-eligible "renewable energy system."

- We support strategy *W7 Reduce Fugitive Emissions from Water Resource Recovery Facilities* that recommends DEC, EFC, and NYSERDA should work with local utilities and municipalities to repair WRRF equipment and explore captured biogas potential.
- We support the CJWG's emphasis on cost-effectiveness and equity to ensure the gas system transition is just for both customers and union workers and that failure to pursue detailed planning will make the transition more challenging, expensive, and longer to implement.
- Coordinate gas system transition with New York's hydrogen hub and other green hydrogen efforts and initiatives at the state and federal level.
- Closely analyze customer cost impacts, especially for households in Disadvantaged Communities and for customer classes that cannot easily or quickly transition away from gas use.
- Ensure gas system decommissioning occurs in tandem with NYISO's Reliability Needs Assessment and that sufficient dispatchable, zero-emission grid capacity is available prior to mass electrification.
- Evaluate the labor and economic development impacts of the gas system transition, including opportunities for transitioning New York's affected workforce to emerging energy sectors such as hydrogen. Develop a workforce transition plan for pipefitters, gas utility workers, and other impacted labor segments.

VI. Conclusion

Thank you for this opportunity to comment. Bloom Energy looks forward to providing valuable and meaningful input as the Scoping Plan is finalized.

Respectfully submitted,

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