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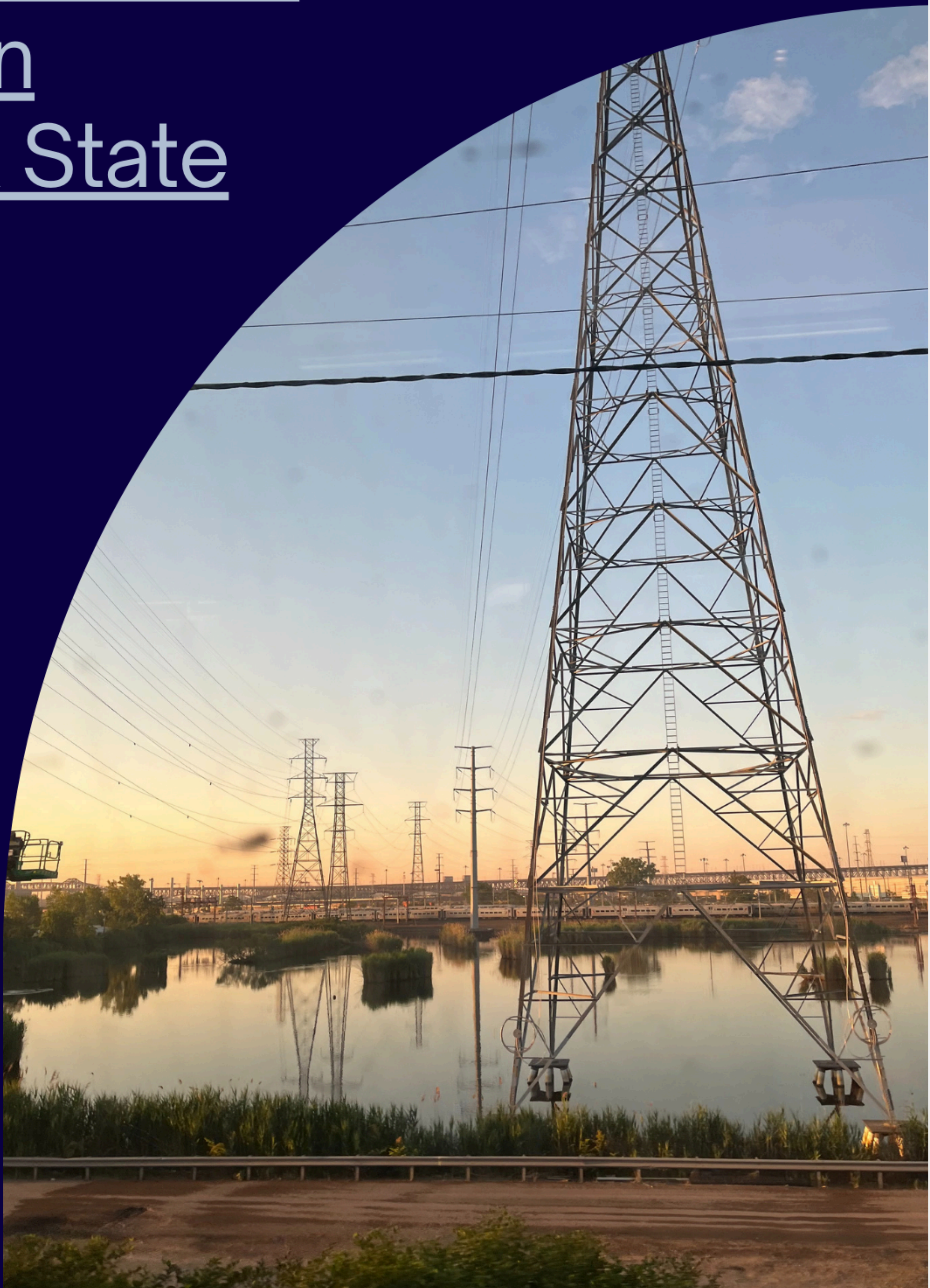
Energy Justice and Transmission Planning in New York State



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Executive Summary

"[E]nergy justice, above all, seeks just outcomes." *Energy Justice: US and International Perspectives*: Salter, R., Gonzalez, C., Warner, E. (2018, p. 2)

New York State is facing the necessity to upgrade and expand energy transmission lines to connect and transport clean energy from new, developing, and planned sites of generation to distribution lines and end users. In the transition into clean energy, energy justice and disadvantaged communities (DACs) must be prioritized to ensure grid expansion and transmission processes do not perpetuate cycles of inequity and inequality, but rather further equitable and just energy measures. New York State is in a planning process to expand its electric grid to comply with the Climate Leadership and Community Protection Act (CLCPA). To achieve this, the New York Public Service Commission (NYPSC) approved the Energy Policy Planning Advisory Council (EPPAC) to conduct a two year planning process examining grid expansion to identify needed investments in New York's grid. Multiple energy justice and community-centric organizations were brought on to the planning process. However, during modeling stages, utilities had an outsized influence, and energy justice has not been prioritized in the process.

Our capstone research team at the Columbia Climate School, led by Raya Salter of the Energy Justice Law and Policy Center, set out to examine the current landscape of metrics used to establish energy justice and equity regarding transmission and grid modeling processes. There are three main focuses of research. First, finding pathways to integrate energy justice and equity into processes modeling transmission and distribution lines. Second, evaluating current metrics that are able to be applied and integrated into a modeling process, or measured after the fact, in order to further energy justice and equity in New York State. Third, to look for approaches to reform or modify the NYPSC in order to integrate more procedural justice.

This led to the development of a guiding question: "What equity and justice metrics can we apply to grid planning and critiques can we offer the NYPSC process to ensure the distributive justice measures of the CLCPA are tangible, and measurable, and ensure equity and procedural justice are integrated in the grid planning process in a meaningful way?"

For six months, March-August 2024, the research team conducted a literature review, viewed recordings of EPPAC meetings and other public materials, and interviewed experts Raya Salter and Dr. Shelley Welton. This research was used to establish our recommendations.

EPPAC faces the following challenges in furthering a just and equitable grid planning process. First, there is a lack of integration of justice mandates included in the CLCPA, which require a minimum of 35% of benefits go towards DACs. Second, the grid modeling process is controlled by utilities, and the process itself is opaque and lacks transparency to stakeholders outside of utilities. Third, there is a need for energy justice metrics to identify where to direct investments in the grid according to the CLCPA's justice mandate. Fourth, there is a need for energy justice and equity metrics to measure the impact of grid infrastructure projects and ensure that DACs would benefit from projects.

The following recommendations have been created to be integrated into the EPPAC process to further energy justice and equity in New York State's grid planning process to support in bypassing the current EPPAC obstacles. The first recommendation is to treat justice measures as an input at the beginning of the modeling process, model scenarios for just outcomes, utilize equity and justice metrics to analyze grid modeling results, increase transparency throughout the grid modeling process, and to conduct a hosting capacity analysis of the electric grid in energy justice communities in New York State. Regarding metrics, the recommendation is to apply metrics to move forward just investments through the grid modeling process, as well as metrics to begin tracking now to further energy justice in the future. There is also recommendation for further research on metrics to advance justice and equity, the integration of justice metrics in different modeling processes, and additional research regarding justice surrounding transmission expansion. Finally, regarding NYPSC reform, the recommendation is the creation of a two year rolling working group focused on prioritizing DACs, as well as including justice and equity training for all incoming and current members of the NYPSC.

The short-term benefit of this research allows energy justice organizations such as the Energy Justice Law and Policy Center to advocate for justice and equity in many places throughout New York's modeling grid planning process. The long-term benefit is to examine and further advance progress in a relatively niche and emerging area of research. This research can be utilized by New York and other states, as a loose guide in a transition into just and equitable transmission, with inclusion of grid capacity, and updating of electrical grids.

Policy Landscape

Four laws make up the backdrop to this report. First, New York's 2019 Climate Leadership and Community Protection Act (CLCPA), the state's groundbreaking Climate Law, set greenhouse gas emission reduction goals for 2030 (40% reduction) and 2050 (at least 85% reduction) from 1990 baseline levels (New York State, n.d.-a). The CLCPA also includes justice mandates, including that disadvantaged communities (DACs) receive 40% (no less than 35%) of benefits from the state's clean energy transition (New York State, n.d.-e). The Accelerated Renewable Growth and Community Benefit Act followed the CLCPA in 2020, which established the Office of Renewable Energy Siting (ORES) and mandated a study on necessary grid upgrades to fulfill the CLCPA mandates (NYSERDA, 2020). Then, in 2023, the Build Public Renewables charged the New York Power Authority (NYPA) with developing renewable energy projects to meet the CLCPA goals and included in the law labor rights considerations as well as discounts on energy bills for low-income and moderate-income households (Hu, 2023). Finally, the 2024 Renewable Action through Project Interconnection and Deployment Act (RAPID Act) "will create a one-stop-shop for the environmental review and permitting of electric transmission and improve the interconnection process" (New York State, 2024b). Each of these laws plays a significant role in New York's transition to clean energy, including its grid planning process.

The Energy Policy Planning Advisory Council (EPPAC) was established by the New York Public Service Commission (NYPSC) in a 2023 order, in compliance with the required grid upgrade study included in the Accelerated Renewable Growth and Community Benefit Act (New York Public Service Commission, 2023). The order calls on the major New York utilities to conduct a grid planning process "to enable the Commission and utilities to identify transmission investments needed to meet the objectives of the Climate Leadership and Community Protection Act" (New York State, n.d.-c). As stated in the order, EPPAC is an advisory group of stakeholders, whose "primary function would be to advise the system planners on the development of up to three generation build-out scenarios projecting potential renewable generation resource development in the State" (New York Public Service Commission, 2023, p. 5-6). The members of EPPAC include energy justice organizations (such as the Energy Justice

Law and Policy Center), clean energy groups (such as New York Battery and Energy Storage Technology Consortium), state agencies (such as NYPA), the City of New York, New York Independent Systems Operator (NYISO), and the major New York utilities (such as Con Edison) (New York State, n.d.-c). The three scenarios studied by the EPPAC groups include a state scenario developed with NYISO, a high transmission impact scenario and a low transmission impact scenario (New York Independent System Operator, 2024). The EPPAC process includes six stages taking place over two years (2023-2025): “Data Collection and Determination of Scenarios;” “Network Model Development;” “Local Assessments;” “Review of Preferred Solutions;” “Least Cost Planning Assessment;” with finally the “Least Cost Plan Report” (New York Public Service Commission, 2023, p. 6-7). At the time of this report, EPPAC had reached the second stage and was moving into stage three (Fig. 1).

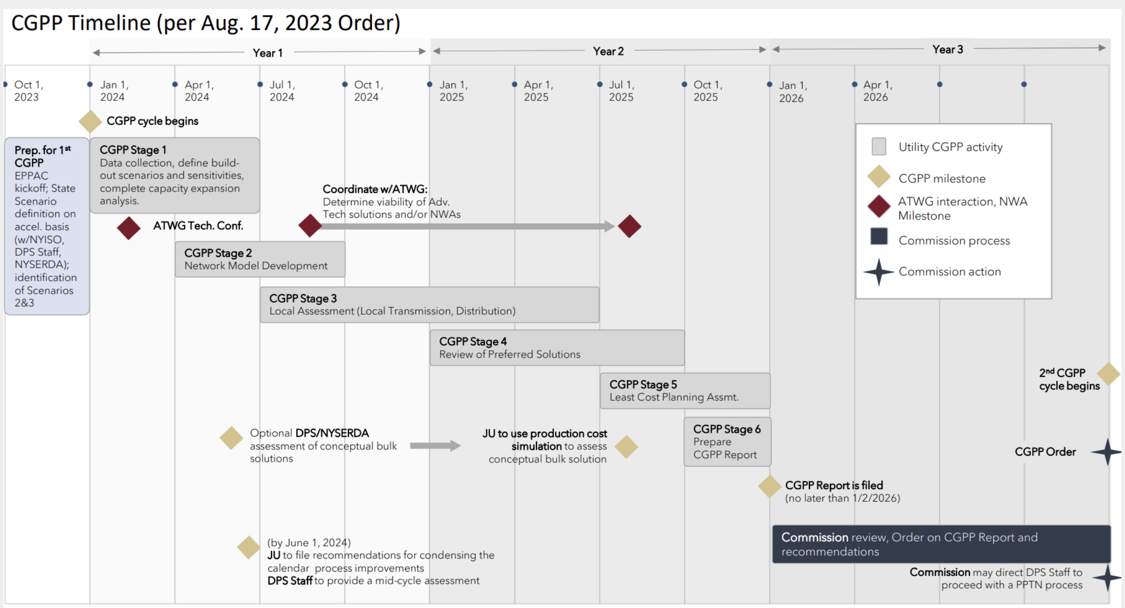

Fig. 1: EPPAC’s six stages mapped over a two year timeline (New York State, 2023a).

Recommendations: Grid Planning

Input Justice at the Beginning of the Grid Modeling Process

Much of the planning process in EPPAC, and larger transmission planning projects as a whole, involve modeling, and the importance of incorporating equity and justice into modeling processes is crucial. Attorney and clean energy law and policy expert Raya Salter has written at length on energy justice, and explains that "energy justice seeks just and equitable inputs and out-comes to energy systems, including the remediation of past harms" (Salter, 2023, p. 131). Echoing Salter, scholar Shelley Welton argues that applying justice as an input, instead of shoehorned in as an afterthought, is an important way of building equity into the grid model used in New York's grid planning process (Welton et al., 2024). In *Metrics for Decision Making for Energy Justice*, Baker et al. (2023) assert: "...evaluation tools (e.g., modeling tools) and evaluation systems are only as good as the metrics that serve as the inputs. Without metrics that account for equity, equality, and justice, the models that we use for planning will not account for or illuminate potential injustices" (p. 74). In this way, it seems that before a modeling process, whether it is large in scale or granular in how it analyzes data, incorporating justice and equity as a metric while the model is being built is the most effective way to realize justice in a planning process. **It is our recommendation that, whenever a new set of modeling is proposed, energy justice metrics are inserted where possible.**

To advocate for equity and justice being an input, there is a grounded pathway shown by using models to account for policy needs. Specifically, we recommend modeling the 35-40% benefits directed towards DACs outlined in the CLCPA. Capacity expansion models are able to address questions that regard distributional effects of policy designs, as outlined in a presentation by Erin Boyd of the U.S. Department of Energy (DOE) (Boyd, 2016) (see page 17). For example, in a 2023 modeling study by the not-for-profit advocacy organization, Union of Concerned Scientists, the authors used assumptions in the model that included programs directed toward environmental justice communities, suggesting that the justice mandates in the CLCPA could also be modeled (Clemmer et al., 2023b) (See page 21). Further, EPPAC could potentially model for other policies with justice implications, such as the Build Public Renewables Act, to ensure investments are directed toward publicly owned utilities.

A second way to include justice and equity upfront in the model is by ensuring that energy justice and equity are a core goal of the modeling process, which entails incorporating equity metrics into the model. A 2024 study on grid resiliency planning in Colorado demonstrated how grid resiliency, sustainability, and social equity can be modeled alongside one another in a capacity expansion model for transmission planning (Byles et al., 2024) (See page 23). While still focusing on the cost of building out the grid, the study includes justice as a priority in addition to resiliency and sustainability, and then models for just outcomes by using a social vulnerability index (Byles et al., 2024) (See page 23). EPPAC should include just and equitable outcomes as a goal in the modeling process. Further, EPPAC should include energy justice and equity metrics at the beginning of each stage of the grid modeling process.

Model Scenarios for Just Outcomes

Some scenarios modeled in a transmission planning process can lead to more just and equitable outcomes than other scenarios. For example, including grid modeling scenarios in which clean battery storage is prioritized over hydrogen could decrease the demand for hydrogen and avoid some of the potentially problematic issues associated with hydrogen production (See page 53). Thus, EPPAC could consider expanding the number of scenarios it runs in order to compare the justice implications of various outcomes. Even further, EPPAC should consider modeling for low-energy demand scenarios made possible by policies and programs that increase, for example public transport, and decrease individualized transport, as exemplified in a 2023 modeling study by Union of Concerned Scientists on achieving the Inflation Reduction Act (IRA) clean energy goals (Clemmer et al., 2023b) (See page 21). Modeling for such a future can help decision makers chart a path forward toward the most just and equitable outcome possible.

Utilize Energy Equity & Justice Metrics to Analyze Grid Modeling Results

A 2023 study by the Union of Concerned Scientists modeling for the IRA's clean energy goals used two models and then analyzed how the results would impact air pollution (Clemmer et al., 2023a) (See page 21). Next, the study used the U.S. Environmental Protection Agency (EPA)'s CO-Benefits Risk Assessment (COBRA) model to find the public health benefits associated with the various air pollution reduction estimates (Clemmer et al., 2023a) (See page 21). Thus, after concluding the grid modeling study, EPPAC should consider the environmental and energy justice outcomes of each modeled scenario by running through a similar process. First, the modelers could see how the use of certain technologies will impact air pollution. Then, the modelers could calculate estimates of public health benefits, illuminating the intersections of energy, climate, and environmental justice (Salter, 2023).

Increase Transparency Throughout the Grid Modeling Process

Literature on utilities and Public Service Commissions/Public Utilities Commissions illuminates how utilities' participation tends to overpower the inputs of other stakeholders in energy planning processes (Welton & Eisen, 2019; University of Michigan School for Environment and Sustainability [SEAS], 2022). This is also apparent in New York's grid planning process. The current flow of the EPPAC meetings is the major New York utilities run the grid model and report out their methods and findings to the EPPAC members. This inevitably creates an imbalance of power in which the utilities have most of the control over the process while the EPPAC members provide feedback (See page 19). Concerns over this dynamic are also reflected in comments provided by environmental and clean energy groups in the NYPSC's grid planning process order (New York Public Service Commission, 2023). Transparency and accountability are part of the core principles of energy justice (Salter et al., 2018; Salter, 2023). Thus, to make New York's grid planning process more democratic and just, the utilities should demonstrate how they are incorporating the EPPAC members' feedback into the model. Additionally, the utilities should provide their analysis of how the members' feedback has impacted the modeling results.

Conduct Analysis of Grid Hosting Capacity in Environmental Justice Communities

A 2021 study based in California demonstrated how grid limitations, including hosting capacity, are distributed inequitably, with less grid hosting capacity located in environmental justice communities, especially Black communities (Brockway et al., 2021) (See page 33). EPPAC is considering using hosting capacity as a way to analyze where distributed energy resource (DER) interconnection projects can take place. However, this study demonstrates the importance of analyzing the distribution of hosting capacity across the state. EPPAC should use the tools it already has available, including the New York Department of Public Service's list of utility hosting capacity maps and the New York State Department of Environmental Conservation's environmental justice community maps (New York State, n.d.-b; New York State, n.d.-f). Furthermore, to ensure environmental justice communities see the benefits of grid upgrades, the study suggests for grid planners to prioritize DERs in environmental justice communities in the interconnection queue and to promote the co-location of energy storage to decrease the impact of new DER projects on the grid (Brockway et al., 2021) (See page 33). Thus, EPPAC should conduct a hosting capacity and distributive justice study prior to moving forward with its grid modeling process to ensure that relying on hosting capacity for interconnection plans does not disproportionately burden environmental justice communities. In addition, to direct the benefits of the grid planning process to environmental justice communities, EPPAC should promote the co-location of energy storage and generation and ensure the interconnection queue prioritizes DERs in environmental justice communities (See page 33).

Recommendations: Metrics to Forward Just Investment

Based on our literature review, we have found an abundance of different metrics to measure for in order to forward energy justice and equity when regarding the EPPAC process. As there are many different aspects of justice and equity in play, and they overlap and play off each other, some metrics are able to affect more aspects of justice than others. For example, metrics that are able to contribute to the overlap between ownership of renewable energy, (See page 31) and community solar, microgrids, and DER (See page 32) will be more effective to start gathering data for than just a singular aspect of equity and justice. To this effect, we wanted to present metrics that affect the largest amounts of aspects of justice in the EPPAC process. NOTE: While public health metrics are very important to justice in transmission, many of these metrics are already tracked through New York's DAC tracker and tools like EJScreen (New York State, 2023b; U.S. Environmental Protection Agency, 2024). While these trackers could be more adequate, the inclusion of many factors in those tools makes it so metrics that span a lot of public health initiatives are not included in our recommendations, as they already have data presented through these tools. Overall, using the below metrics forwards promotion of investment for DACs in New York. Metrics that cover large amounts of energy justice and equity are:

Energy Burden. Seeing an overall decrease in energy burden, especially since energy burden is high for majority DACs, will be extremely influential in determining the equity and justice of the new transmission lines. To achieve this overall decrease, not only will high efficiency and cheaper renewable energy be necessary for households suffering from energy burden, but the cost of those upgrades will have to be distributed in a way that those households are not the only ones paying for the upgrades (See page 17). Calculating energy burden, as in the way that it is used for the DAC tracker, is typically done using income. However, this doesn't capture customer behavior that can point to indications of energy poverty. We recommend measuring energy burden at a more granular level than typically measured, in order to more fully account for experiences of energy burden. For example, we recommend using the "energy equity gap" developed by Carnegie Mellon University researchers or the "home energy affordability gap" developed by the consulting firm Fisher, Sheehan, and Colton (FSC) (Cong et. al. 2023, p. 3; McAdams, 2023; Fisher, Sheehan & Colton, 2023).

Frequency and Duration of Power Outages in DACs. The frequency and duration of power outages are higher in urban New York environmental justice communities and the duration of power outages are higher in rural New York environmental justice communities (Flores et al., 2024) (See page 35). Thus, it is imperative to consider energy justice and equity metrics measuring the duration and frequency of power outages in New York State in the grid planning process, in order to build both climate and grid resiliency in environmental justice communities. This knowledge will also allow for measurement of which infrastructure needs prioritization in certain areas, to ensure investment in weatherization for communities, and to note when a possible grid investment is not actually a positive fiscal investment for communities (See page 17).

Fuel Mix and Energy Ownership in DAC households. As renewable energy continues to get cheaper (IRENA, 2023, p. 17), being able to monitor the fuel mix of DAC households will be influential in determining equity and justice. Not only will trying to balance the fuel mix of DAC households and making sure it is not overall less than non-DAC households inadvertently start to balance out the disparity between households that have installed rooftop solar and are in neighborhoods with existing renewable infrastructure, but it will also further other goals. Additionally, this will affect the public health aspects of air quality and greenhouse gas (GHG) emissions (See page 21), but also potentially encourage the development of community solar initiatives for DACs, promoting more community ownership of energy resources (See page 31). As there are reports of utilities potentially blocking the future development of different forms of energy ownership (See page 31), a possible route towards justice would be to advocate that, as the grid is modeled to expand, a certain amount of capacity is built around areas with high concentrations of DACs to be set aside for the inclusion of community-owned energy resources.

Recommendations: Metrics to Track for Future Projects

While there are many proposed metrics for furthering justice and equity within electrical transmission, there is little data to get started implementing many of them. While the grid planning process through EPPAC continues, it will be important to start tracking certain aspects of communities in New York during and after the EPPAC process to develop the datasets necessary to further equity and justice in future processes. Major areas to track include:

Effect of Renewable Infrastructure on Communities. In an EPPAC meeting on July 15, 2024, it was stated that the planning organizations didn't have a solid idea whether or not renewable energy and transmission infrastructure could be harmful or not to DACs, as a reason to not immediately prioritize renewable energy production near DAC concentrated areas (New York State Department of Public Service, 2024). This provides a clear pathway to start tracking what renewable energy infrastructure does to communities in terms of positive and negative effects. As the EPPAC planning process is intended to deploy clean energy, it is important to start tracking certain metrics that will be fruitful in determining what positive and negative effects there are, and it means measuring metrics as soon as sites are decided to host infrastructure. These metrics can include air quality, community wealth, jobs created and maintained, and more.

Cost of Disaster Borne per Household. A main driver of the CLCPA is decarbonizing New York's energy mix in order to minimize the negative effects of climate change, and this also means minimizing the frequency and severity of natural disasters like hurricanes. These natural disasters can lead to repairs to transmission infrastructure that is usually on the ratepayer to pay for. Calculating the cost of disaster that each household bears will be an important set of data to maintain to see if there are disparities between households that have less means that have to pay more of their income than households with more means. This data will also be able to analyze the grid modernization and resilience tactics used, and see which tools, such as buried power lines, smart meters, and more, actually lead to investments that favor more community resilience in the face of disasters (Alvarez et. al., 2022, p. 2).

Customer Groups and Households with Access to Renewable Energy. Collecting data on customer groups that currently access energy generated through renewable means before and after the building process will be important data to use when determining the CLCPA's mandate that 40% of benefits go to DACs. This will not only determine that the investments in the grid upgrade process will be beneficial to DACs, but will also show possible disparities between community ownership of energy sources, (See page 31) and uptake of renewables (See page 32).

Energy Burden. Collecting data determining and identifying households with high rates of energy burden will be important to see if there are positive financial effects of these grid upgrades, and will also be able to determine if the costs of upgrading the grid are disproportionately burdening DACs. Once again, we call for granular energy burden measurements using the "energy equity gap" developed by Carnegie Mellon University researchers or the "home energy affordability gap" developed by the consulting firm, FSC (Cong et. al. 2023, p. 3; McAdams, 2023; Fisher, Sheehan & Colton, 2023) (See page 39).

Recommendations: New York Public Service Comission

It is recommended for the NYPSC to create a rolling two year DAC working group based off of the California Public Utilities Commission (PUC) model with focus areas on affordability, resiliency, Tribal and community engagement and participation, equity and justice workforce training and development. This process would have bi-annually reports based off an equity and justice framework, and public and written check-ins lead by the DAC working group with PSC as an advisory group. The DAC working group would convene to advise and review NYPSC clean energy programs and policies to ensure that disadvantaged communities, including Tribal, BIPOC, low-income, and rural communities, benefit from proposed clean energy and pollution reduction programs. Group members are either from or represent disadvantaged communities. This would also include an application process open to the public on the PSC's website, which emphasizes that diverse experiences are a strength. It is also recommended to include equity and justice training for all incoming and current members of the NYPSC utilizing the justice and equity framework, based off the California PUC model, which includes evaluating past, present and future equity implications of "agency and regulatory investments and programs, specifically on Health and Safety, Access and Education, Financial Benefits, Economic Development, and Consumer Protection" (California Public Utilities Commision, 2024). This process would include utilizing the current NYPSC DEI group and their mission to enhance the "importance of a diversified work force," and enhance their "[t]raining, recruitment and retention" to include equity and justice measures (Department of Public Service [NYDPS], 2022).

Literature Review: Grid Modeling

Incorporating equity and justice metrics into grid modeling processes poses a challenge due to the complexity of grid models. The grid model used in EPPAC is a capacity expansion model (New York State, n.d.-d). In the Union of Concerned Scientists' blog, *The Equation*, energy expert Mark Specht discusses the four types of grid models that are used as tools in the clean energy transition, including capacity expansion models (Specht, 2022).[1] Specht (2022) explains that capacity expansion models are often used "to make investment decisions" by utilities, operators, and regulators. This model aims "to minimize grid costs while meeting certain objectives (called "constraints" in the modeling), such as reducing global warming emissions, meeting renewable and clean electricity standards, and ensuring grid reliability" (Specht, 2022). Finally, Specht (2022) writes that the "complex optimization" of the capacity expansion model "selects the mix of new grid resources that satisfies all the constraints at the lowest cost." Thus, costs play a significant role in the capacity expansion model, along with the constraints that are placed on the model.

Specht (2022) cites a presentation by DOE on "Power Sector Modeling 101," presented by scholar Erin Boyd, for readers to access more information on grid modeling (Boyd, 2016). Boyd (2016) offers examples of questions that capacity expansion models can address, including: "Quantifying the impacts of environmental policies on generation and capacity," as well as "What are the cost implications of alternative pathways to a low greenhouse gas emissions future;" and "What are the efficiency and distributional effects of various policy designs" (p. 13). The inclusion of "distributional effects" in a question used to guide the grid modeling study opens the potential for incorporating justice considerations into the grid modeling process. Further, Boyd (2016) discusses "Key Considerations in Comparing Model Results or Designing Modeling Scenarios," which include "Input Assumptions," "Representation of Electricity

[1] The other types of grid modeling that Specht (2022) writes about include production cost modeling, which "is used to conduct *detailed* simulations of grid operations and costs" with "one static set of resources on the grid;" probabilistic modeling, which is similar to production cost modeling but "includes hundreds or even thousands of simulations;" and network reliability modeling, which "is typically conducted on a much shorter timescale (only seconds or minutes), and it can be used to examine grid reliability factors such as voltage stability and frequency stability that can't be analyzed with the previously mentioned modeling tools."

Demand," "Cost/Benefit Metrics," "Electricity Bills and Prices," "Retirements," and "Detailed Representation of Policies" (pp. 16-17). Justice concerns are indirectly raised in these considerations, with, for example, Boyd (2016) noting the "Distributional impacts - consumer/producer surplus, regional cost metrics" in the "Cost/Benefit Metrics," or the rate at which "Retirements" are prioritized (pp. 16-7). The "Detailed Representation of Policies" included in the model could also have justice implications, such as New York's mandate for at least 35% of benefits go to environmental justice communities (Boyd, 2016, p. 17).[2] The indirect consideration of justice and equity metrics in the grid modeling process again provides a starting point from which further justice and equity metrics could be explored in the key considerations that inform the design of the grid modeling scenarios in EPPAC.

Therefore, the constraints, considerations, and guiding questions for the grid model are important places to address equity and advance distributive justice within the grid planning space. Attorney and energy law and policy expert Raya Salter states that "[e]nergy justice provides a lens to design just energy systems and transitions" (Salter, 2023, p. 141).[3] Salter illuminates the importance of incorporating energy justice into the process of designing energy systems, including in New York's grid planning process. While a member in EPPAC, Salter developed the concept driving this energy justice research project: to identify and explore ways to incorporate energy justice and equity metrics into the grid model to be used in the planning process, ensuring the outcomes of the model comply with the CLCPA's justice mandates. Salter's scholarship discussing energy justice as an input into energy systems to advance just outcomes is reflected in conversations and literature across the field of energy policy. For example, in a 2024 interview with scholar Shelley Welton, Welton emphasized the importance of building equity into the model by applying justice as an input into the model instead of an afterthought (Welton et al., 2024). Similarly, Baker et al. (2023) write that "[p]rospectively, metrics can be used in models and what-if scenarios, as well as in forecasting. Of particular importance are energy equity metrics that can be used to evaluate net-zero pathways and the actions needed to get there," reiterating the significance of this research for New York's grid planning process (p. 742).

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[2] "Input Assumptions," discussed later in this section, as well as "Representation Electricity Demand," with "energy efficiency representation" included as a factor, and "Electricity Bills and Prices" also provide opportunities to engage with energy justice and equity metrics (Boyd, 2016, p.16).

[3] Contextualizing energy justice in the environmental justice and climate justice movements, Salter (2023) goes on to state that "[j]ust outcomes, however, require the application of solutions found in frameworks of environmental and climate justice" and further that "[e]nsuring energy justice takes hold in energy transitions requires true participation and ongoing advocacy from stakeholders, including grassroots advocates" (p. 141).

Applying energy justice and equity metrics at the beginning of the modeling process and continuing to analyze the results of the modeling through the lens of energy justice are crucial to ensuring that New York's clean energy transition centers environmental justice communities. Further, as Specht (2022) writes, "the results from these models are only as good as the assumptions that go into them." To increase equitable outcomes, the constraints (or objectives) and assumptions built into the model must also be transparent and open to critique. In the same interview, Welton explains that because grid modeling is opaque in regards to how the inputs impact the results, it is crucial for grid modelers to be transparent with the inputs used (Welton et al., 2024). As Salter (2023) notes, transparency and accountability are core principles of energy justice, and therefore must be considered alongside energy justice and equity metrics in the grid modeling process.[4]

Lack of transparency from the utilities and the PSC is impeding efforts to ensure justice and equity are centered in New York's grid planning process. The PSC has taken actions to make the meetings more accessible to the public, such as publishing meeting recordings and slides, supporting materials, and other EPPAC materials online. However, the structure of the EPPAC process enables the utilities and PSC to run the grid model scenarios behind the scenes and then present the results for feedback from the EPPAC members. Thus, the utilities have more control over the grid modeling than the EPPAC members. As the University of Michigan School for Environment and Sustainability (SEAS) (2022) report notes, "[t]he regulated industry has long operated similar to an ivory tower in which the public has been asked to trust that the decisions being made are in the public's best interest" (p. 69). It is unclear to what extent – or if at all – the comments of the EPPAC members are being incorporated as inputs into the grid model as well as reflected in the outcomes of the model. The EPPAC process could be a more democratic process if the utilities demonstrate how they are incorporating the EPPAC member's comments into the capacity expansion model and further attempt to trace how the inputs into the model impact the outcomes.

Comments included in the PSC's order for the grid planning process also draw attention to issues around transparency and lack of opportunities for EPPAC members to meaningfully participate in the grid planning process (New York Public Service Commission, 2023). For example, the coalition Clean Energy Parties argues for "a more participatory EPPAC framework"

[4] See also, Salter et al., 2018.

as well as for EPPAC members to take part in "identifying model inputs" and "providing input on model sensitivities" (New York Public Service Commission, 2023, p. 53). Environmental Defense Fund (EDF) also argues for more EPPAC member engagement in the grid modeling process, stating: "EPPAC, rather than the Utilities, should be responsible for developing the framework for the creation of generation build-out scenarios" and that there should be more scenarios modeled (New York Public Service Commission, 2023, p. 58). Additional concerns include little or no training for EPPAC members on the Utility process, raised by the City of New York, and that "each utility has representation that, collectively, could dominate the EPPAC decisions," a point raised by the New York Power Authority (New York Public Service Commission, 2023, p. 68). The latter point echoes an article by Scholars Shelley Welton and Joel Eisen that argues, "[u]tilities dominate energy proceedings with their expertise and resources, allowing them to wield outsized influence in many cases" (Welton & Eisen, 2019, p. 348). With much of the power consolidated with the utilities in the grid planning process, it is critical for transparency around how EPPAC members' advice, feedback, and recommendations are being incorporated into the grid model as well as the planning process. To this point, the not-for-profit Vote Solar states that "it is unclear from the CGPP proposal how feedback from EPPAC will be incorporated into system planning," while New York Independent System Operator (NYISO) recommends "greater specificity" around "the method to resolve issues related to EPPAC's input and feedback" (New York Public Service Commission, 2023, p. 72., pp. 69-70).

The utilities must also be transparent with the data they have collected on energy systems and structures, such as grid hosting capacity.[5] The SEAS (2022) states that "[t]he utility or business that is proposing the project or rate also control the data and information needed to understand and verify the need for their request, and may be reluctant not provide any information unless and until directed to do so by the regulator" (p. 69). This dynamic illuminates the imbalance of power within the EPPAC process in which the utilities are privy to critical information that could impact how DERs – including community or publicly owned energy resources – connect to the grid. The utilities must be forthcoming with the data and information they possess in order to apply justice and equity metrics to the grid modeling process. Thus,

[5] Clean Energy Partners in the PSC's order for the grid planning process also recommends that the utilities update the hosting capacity maps more frequently (New York Public Service Commission, 2023).

given the current dynamics, it is crucial that the PSC directs the utilities to be as transparent with information as possible.

Along with increasing transparency, the EPPAC process could benefit from a few studies on modeling for a clean energy transition that offer insight into strategies for incorporating equity and justice metrics into modeling processes. A 2023 modeling study by the Union of Concerned Scientists was conducted on a national scale, analyzing how the U.S. can transition to clean energy and meet the emission reduction goals in the Inflation Reduction Act (IRA) (Clemmer et al., 2023a). Two models were used in the study: an EnergyPATHWAYS model was used to analyze "energy use, technologies, and costs in the transportation, buildings, and industrial sectors," and a Regional Investment and Operations model was used to analyze energy demand and "supply-side options for producing, transporting, and storing electricity, fuels, and carbon dioxide" (Clemmer et al., 2023a, p. 5). The way policy mandates are modeled and as well as assumptions going into the model exemplify how equity and justice considerations can be added as an *input* into the modeling process. For example, to model IRA incentives, the study includes certain assumptions, such as "NREL projections for distributed solar PV that capture tax credits available for projects installed in the residential, commercial, and industrial sectors, along with bonus credits available for deploying up to 1.8 GW per year of solar in low-income communities through 2032" (Clemmer et al., 2023b, p. 8). The inclusion of this program illuminates opportunities for New York State to input the CLCPA justice mandates into the grid modeling process, including the 35%-40% of energy project benefits going to environmental justice communities. Furthermore, this example suggests that justice can be included at the outset of the grid modeling process.

In addition to considering justice and equity measures as an input in the modeling process, the Union of Concerned Scientists study offers a few opportunities to engage with equity and justice metrics throughout the study. After running the two models, the authors "used the resulting changes in the scale and method of energy production and use" as a way to "estimate reductions in major air pollutants (including sulfur dioxide, nitrogen oxides, and fine particulate matter)" (Clemmer et al., 2023a, p. 5). Adding a layer to the air pollution measurements, the authors then "ran those estimates through the CO–Benefits Risk Assessment (COBRA) model of the US Environmental Protection Agency (EPA) to calculate public health impacts" (Clemmer et al., 2023a, p. 5). Thus, instead of stopping at quantitative air quality measurements, the authors directly linked the reductions in pollution to public health benefits, offering a way to incorporate energy equity and justice metrics related to public health into the modeling process. This addition to the study opens up considerations of co-benefits as well as energy justice and equity metrics that could be used to analyze modeling results.[6]

Another way in which the modeling process can engage with questions around justice and equity is in the scenarios run by the modelers. In the Union of Concerned Scientist report, the authors model for seven scenarios, four of which are discussed in the main report: including a scenario without IRA or the Infrastructure Investment and Jobs Act (IIJA), a scenario with IRA and IIJA, a net-zero pathway to meet the U.S.'s decarbonization goals and a net-zero pathway with low energy demand scenario (Clemmer et al., 2023b). This fourth scenario imagines a future in which additional policies with justice implications - such as an increase in public transportation and a decrease in individualized transportation - are implemented (Clemmer et al., 2023b). The three additional scenarios included in the appendix but not in the main report explore further assumptions with justice implications, including a net-zero and ambitious demand reduction scenario that doubles the demand reduction in the fourth scenario, a reduced biomass scenario, and a low hydrogen scenario (Clemmer et al., 2023b). Therefore, the scenarios modeled in a given study also have the potential to create pathways that address energy justice issues and promote intersecting policies that advance social justice.

There are, however, limitations to grid modeling identified in the Union of Concerned Scientists report. The authors note that the frameworks they use produce modeling results at the national and sometimes regional level and, thus, this modeling process "is not set up to focus on attributes that might be of core interest to specific communities" (Clemmer et al., 2023a, p. 7).[7] Even further, although the authors included a public health analysis in their study, they "could not specifically model changes to promote distributional equity by prioritizing those kinds of benefits for specific communities that have been historically overburdened" (Clemmer et al., 2023a, p. 7). Given the distributive injustices taking place across New York State, as discussed

[6] Alliance for Clean Energy New York (ACENY) included a recommendation for "providing analysis to evaluate social equity impacts" in their comments in the PSC's order for the grid planning process (New York Public Service Commission, 2023, p. 49).

[7] As frameworks for the study, the authors "used an energy-modeling framework focused on the cost and performance of different energy technologies, resources, and related infrastructure that are needed to meet national and regional energy demand in different sectors of the economy. It also used a least- cost optimization framework to meet constraints such as emissions reduction targets and existing state and federal laws and regulatory requirements" (Clemmer et al., 2023a, p. 7).

later in this report, a state-wide model may overlook distributive justice concerns. However, the authors offer suggestions for future studies, including using "a different modeling framework or couple ours with one suited to exploring localized inputs and outputs drawing from the specific variables of interest for communities" (Clemmer et al., 2023a, p.7) Finally, the authors discuss tradeoffs when selecting scenarios in the clean energy transition, specifically addressing how tradeoffs are "not neutral within a socioeconomic and energy system built on inequities and environmental injustices, tilted toward pushing adverse outcomes onto communities and people who have long borne such burdens" (Clemmer et al., 2023a, p. 24). While the authors do not model for tradeoffs, they call for inclusive and transparent qualitative approaches to assessing tradeoffs with meaningful and lasting community participation (Clemmer et al., 2023a).

Yet another article, "Generation and Transmission Expansion Planning: Nexus of Resilience, Sustainability, and Equity," by scholars and experts Dahlia Byles et al. (2024), offers a grid modeling case study in Colorado focusing on grid capacity expansion planning as new renewable energy sources are connected to the grid. The authors analyze a grid modeling process that balances grid resiliency (concerning wildfires in Colorado), sustainability (using a life cycle analysis to measure the negative impacts of various "generation technologies and transmission expansion options"), and social equity (using a social vulnerability index) with even weight given to each component (Byles et al., 2024, p. 3).[8] Thus, as opposed to status quo capacity expansion modeling:

> "where the problem is often viewed merely from financial and technical perspectives, the three objectives of minimizing costs, minimizing energy not served (weighted based on social vulnerabilities of demand areas to long-duration power outages), and minimizing life cycle impacts of different generation and transmission technologies were considered and modeled using a Chebyshev goal programming approach to ensure that no objective dominate others" (Byles et al., 2024, p. 25).

The inclusion of the social vulnerability index upfront in the model as an objective suggests that there are opportunities to incorporate specific energy equity and justice metrics at the start of the modeling process. Further, the study illuminates how energy equity and justice metrics can be modeled alongside other considerations such as resiliency and sustainability. The "cost of

[8] The social vulnerability index in the Byles et al. (2024) article is drawn from a study by scholars Jesse Dugan et al. (2023) that identifies health, resources to prepare for a power outage, and ability to evacuate as the dimensions of social vulnerability.

operation and expansion" is also considered in the model, reflecting a conventional component in grid capacity expansion planning processes (Byles et al., 2024, p. 1). Thus, the focus on cost within the grid modeling process is not lost in the study, suggesting that justice and equity can be incorporated into current grid models.

The results of the author's modeling process allows for further clean energy and justice analyses. The authors found that first, "when costs are balanced against life cycle impacts, fossil fuel generation resources are still phased out at the benefit of renewable generation technologies," illustrating how the benefits of retiring fossil fuel-fired plants "far outweigh the financial costs associated with deploying new cleaner generation resources" (Byles et al., 2024, p. 23). Furthermore, using social vulnerability indices to prioritize environmental justice communities in wildfire scenarios, the authors found that environmental justice communities "remained largely unaffected by the wildfire contingency scenarios," suggesting that "with equity in mind, the same amount of power can more or less be supplied; however, routed towards those who need it the most" (Byles et al., 2024, p. 24). The report, therefore, not only demonstrates the importance of considering grid resiliency, clean energy development, and distributive justice in grid modeling processes but further the significance of prioritizing environmental justice communities in grid resiliency efforts as climate hazards intensify. Finally, the authors state that "[t]he proposed model is generalizable and can be utilized for other generation and transmission networks to assess where more growing networks should focus their efforts first to benefit their populations while being cost-effective and sustainable," signaling the study's potential to inform New York's current grid planning process (Byles et al., 2024, p. 25).

Literature Review: Energy Equity and Justice Metrics

Introduction to Energy Equity Metrics: General Themes

Across our team's analysis of energy equity metrics regarding transmission in the current landscape, we came across multiple themes that are widely repeated across the literature. These themes concern themselves largely around data used to establish, measure, and decide whether or not to implement energy and justice metrics in certain cases. Identified themes include scale of data used and collected, gaps in necessary data, data privacy, balancing qualitative and quantitative data, and capacity to handle data.

Scale of Data Collection When establishing, implementing, and evaluating efficacy of metrics, scale of data collection surfaces often in the literature, and typically calls for more granular data.[9] Performance metrics that are currently tracked are specific to cost-benefit analyses, and the information the performance metrics contain about operational costs do not inform equity decision-making enough to be significant (Parker et al. 2023, p. 235). The authors of *Observations of an Evolving Grid* note that, in the current landscape, "most sources emphasize the need for data at finer geography and time scales" (Parker et al. 2023, p. 238). Operating on large datasets on a national scale requires technical ability and time to diffuse down to the community level, and even then may not fully represent the community being accounted for (Tarekegne, et al. 2021-a, p. 10). Examining broad areas when it comes to equity metrics with energy is, increasingly, becoming seen as not enough, and while there is large enough bodies of data to be had for utility territories, cities, counties, and other larger jurisdictions, the level of individual neighborhoods, blocks, and households is important to consider when determining equitable energy distribution systems. Disparities in given areas can be easily looked over, so accounting for smaller scales is important in order to account for inequities (SEAS, 2022, p. 103). However, this call for granular, specific data does have the tradeoffs of not having enough data, having data be episodic or inaccurate, difficult to correlate within different systems, time consuming, and expensive to collect (Tarekegne, et al. 2021-a, p. iii). Baker et. al. (2023) notes

[9] EDF in the PSC's order for the coordinated grid planning process recommends "that the zonal granularity for DER forecasting should be amended to require greater spatial and temporal granularity" (New York Public Service Commission, 2023, p. 59).

that: “Although many of the metrics in this section are reproducible in theory, actually gathering and accessing the data is likely to be a challenge for all. Some metrics are highly localized or context specific and may require highly intensive data collection such as interviews, surveys, or focus groups” (p. 749). Ultimately, the scale of data used will be different depending on the metrics at work, and each project needs to integrate “identifying the appropriate levels for equity measurement [to] allow for a more equitable quantification and comparison of inequities across populations” (Tarekegne, et al. 2021-a, p. iii).

Data Gaps The current landscape of literature also notes that much of the data being discussed as metrics is not currently there. As Parker et al. (2023) notes: “Developing metrics will be based on new information, will measure grid attributes or customer impacts that were not previously measured, and may include socioeconomic elements outside the control of the utility” (p. 234). Parker et al. (2023) notes that, in the current body of literature, there are gaps concerning the disparate effects of past policies, fully capturing community needs, tracking successes and failures in community inclusion and community engagement approaches, assessing the quality of jobs, benefits of relieving energy burden not involved in cost, and abatement of health and safety issues (Parker et al. 2023, p.236). Participants of the State Energy Justice Roundtable also list data gaps needed to fully pursue energy justice through transmission, including: Unreliable data surrounding Indigenous and rural communities, lack of data regarding procedural justice approaches, limited access to utility data, lack of data surrounding grid reliability and resilience in collaboration with equity metrics, identifying critical assets and vulnerabilities, status of data infrastructure, and, overall, a lack of third-party validation to ensure quality control (McAdams, 2023, p. 10).

Stakeholder Privacy Notably, when discussing scale of data and type of data collected, a smaller theme that surfaced in the literature pointed at the issue of stakeholder privacy when it comes to data. As the most effective data when using metrics for energy justice requires different, varied, and in-depth kinds of data ranging from qualitative to quantitative, gathering that data will use multiple venues and sources (Baker, et al. 2023, p. 748). The more granular the data gets, especially if it is tracking “electricity system experiences at a more granular level, for example, at the feeder or even for households” (Parker et al. 2023, p.234), then the issue of privacy is inherent in who is collecting the data, how is it being used, or misused (McAdams, 2023, p. 11). This brings data privacy into play in two ways. First, the privacy of companies and organizations, and privacy of individuals. Concerns about access to data from utilities and state agencies was brought up in the State Energy Justice Roundtable Series as a concern and a call to action for PUCs/PSCs across the country (McAdams, 2023). The data held by utilities is not fully accessible to state agencies in order to develop stronger senses of grid reliability, resilience, and household level data. Likewise, data held amongst state agencies, such as emergency management and economic development agencies, is encouraged to be shared to increase effectiveness. The participants even go so far as to propose the creation of a "Data Bill of Rights" to protect consumers and promote ethical data collection (McAdams, 2023, p. 6). On the individual and household level, privacy concerns come up in reference to the call for more granular data. Finer time scales and geographies within data are cited often as needed improvements to apply energy justice metrics, and that call for data is joined with the suggestion of mechanisms to protect personal privacy when examining vulnerability and consumer data (Parker et al. 2023, p.238). However, as most metrics necessitating such granular data have often only been discussed in literature and have not been implemented (Baker, et al. 2023, p. 753), data privacy mechanisms and practices remain a theme that calls for more inquiry (McAdams, 2023, p. 11).

Integrating Quantitative and Qualitative Data Marrying the current sources of data concerning the grid and transmission, most of which involves cost-benefit analyses, load bearing information, and other technocratic and quantitative data points with other metrics concerning equity and justice, some of which concern qualitative data, is a large discussion. In the SEAS *Energy Equity Project Report* (2022), the authors argue that "the ability to define guiding principles and adopt a range of quantitative metrics and qualitative best practices is essential for tackling the numerous energy inequities that persist" (p. 9). Baker et. al. (2023) argues that individuals and households should be able to self-identify behavior, which should then be combined with metrics surrounding exposure, vulnerability, and sensitivity to estimate impacts of injustices (p. 748). However, not all vulnerability indicators are quantifiable, although they do propose using a numerical vulnerability measure. Baker et. al. (2023) states: "a vulnerability measure may be useful in siting decisions, to determine if impactful infrastructure is being sited in particularly vulnerable areas. Such measures are, thus, highly adaptable. The trade-off, however, is that the high degree of complexity may limit the manageability and replicability of the vulnerability scores and introduces subjectivity in the weighting of various elements within the vulnerability calculations" (p. 747). In order to establish metrics that track change in quality of life, health, and well-being, research methods such as interviews or surveys are necessary, which can be expensive, time-consuming, subjective, and hard to replicate (Baker, et al. 2023, p. 748). While most literature agrees that qualitative assessment combined with qualitative assessment will be most effective at identifying and targeting areas of inquiry that can be improved, combining that data is costly and requires large amounts of technical expertise (McAdams, 2023, p. 10). The problems surrounding gathering and combining qualitative and quantitative data can be solved with "sustained and consistent funding and others with a system that prioritizes relationship building and acknowledges the time required to do so" (Baker, et al. 2023, p. 754).

Organizational Capacity Discussion of difficulty finding, using, and applying data that is specific, local, and applicable leads us to the discussion of the capacity of organizations to effectively collect and use the data in a way that can inform equity metrics. The State Energy Justice Roundtable series emphasizes that there are concerns on data standardization, misuse of data, staff capacity and expertise, and bureaucratic inefficiencies when using data to determine metrics for equity (McAdams, 2023, p. 10). Specifically, it is also noted that the complication and lack of standardization of data added hurdles for coordination within agencies, strained resources, and took away routes for added technical expertise (McAdams, 2023, p. 10). In the discussion, it was suggested that, concerning organizational capacity problems, "resource limitations could be addressed through means such as having access to a national database or pool of technical experts and through increased funding for technical assistance" (McAdams, 2023, p.10). However, it was already noted above that data on a national scale needs high amounts of analysis and expertise to use effectively, which would counteract this solution (Tarekegne, et al. 2021-A, p. 10).

Identifying major themes of data collection to establish and use metrics to achieve energy justice, namely scale, data gaps, privacy, qualitative/quantitative, and capacity of organizations, are themes that apply to all metrics listed below.[10] Given the scope of EPPAC pertaining to New York State's grid, and existing tools that use data sources to identify disadvantaged communities in New York, some of these concerns and solutions are already underway in EPPAC process, as

[10] Using energy equity and justice metrics can also address Vote Solar's recommendation in the PSC's order for the coordinated grid planning process "that the Final CGPP Report clearly delineate how each benefit is defined and measured" (New York Public Service Commission, 2023, p. 72).

capacities of organizations involved in the process are identified, levels of scale have been implemented in identifying vulnerability, and there is much data already collected.

Energy Equity Metrics for Distributive Justice

Distribution of Energy Infrastructure One of the major themes measured by energy equity metrics is the distribution of energy infrastructure and the consequential burdens or benefits impacting environmental justice communities. An example of a stark distributive injustice burdening environmental justice communities across New York State is the siting of fossil fuel-fired power plants, including peaker plants. A 2021 report by the PEAK Coalition - a coalition of environmental and social justice groups addressing the burden of peaker plants on environmental justice communities in New York City - found that fossil-fuel fired power plants make up 69% of the power generated downstate New York compared to only 9% upstate (PEAK Coalition, 2021). Further, 78% of the 750,000 New York City residents living within a mile radius of a peaker plant are people of color or people with low-income (PEAK Coalition, 2021). Energy equity metrics can be used to identify distributive spatial inequities, such as the siting of dirty-energy infrastructure, in addition to measuring the outcomes of efforts to address systemic inequities.

Public Health and Pollution Levels Common energy equity metrics used to measure disproportionate environmental burdens are metrics concerning public health and pollution. "Justice in 100 Metrics," a report by the Initiative for Energy Justice, has a section on "Health and Environmental Impact," including equity indicators (Lanckton & DeVar, 2021).[11] The authors uplift two indicators related to the health impacts of energy infrastructure, including the "share of population and pollution burden by race/ethnicity, geography, and all customer groups" as well as the "air pollution exposure index, by race/ethnicity and all other customer groups" (Lanckton & DeVar, 2021, p. 26). Measurements of more specific health impacts are presented in a report by the Pacific Northwest National Laboratory (PNNL) titled "Review of Energy Equity Metrics," in which the authors suggest measuring "air particulate matter," "child asthma rate," and "cancer rate," as well as "number of health incidences abated" if actions to address inequities

[11] The authors of "Justice in 100 Metrics," energy experts Talia Lanckton and Subin DeVar, define "equity indicators" as measuring the state of equity across space and time (Lanckton & DeVar, 2021, p. 5).

are taken (Tarekegne et al., 2021-a, pp. A-1-A-2). To assess the impacts of actions addressing distributive injustice, the SEAS (2022) report includes a “household benefits index” with a recommendation to measure the “reduction in respiratory distress and disparities among frontline households,” due to unjust histories of siting fossil-fuel infrastructure in Black communities (p. 114). Further, energy storage experts Will McNamara et al. (2022), in the article “Seeking energy equity through energy storage,” suggest using a metric to measure “the monetary value associated with increased medical expenses and lost economic opportunity such as time away from work caused by poor environmental conditions” (p. 6). As energy generation, grid upgrades, and build-outs of energy infrastructure - including grid infrastructure - are being considered in the EPPAC modeling process, energy justice and equity metrics can be used to address the harmful health impacts of pollution from fossil-fuel fired power plants, specifically in environmental justice communities.

Disproportionalities in Rural and Urban Communities Yet another energy equity metric considered by the literature is the distribution of benefits or harms across rural vs. urban communities. “Justice in 100 Metrics” urges utilities to “[e]nsure there is not uneven attention given to urban and rural communities” (Lanckton & DeVar, 2021, p. 13). Given the current uneven distribution of fossil fuel-fired power plants between upstate and downstate New York, developing equity metrics to measure the distribution of burdens and benefits between rural and urban communities in the state could be an important step in advancing justice, particularly distributive justice. Further, the “Justice in 100 Metrics” report suggests that utilities take actions to “[r]educe reliance on bridge fuels such as gas plants” (Lanckton & DeVar, 2021, p. 25). Measuring the reduction of New York State’s reliance on fossil fuels used in power plants is an important step in fulfilling the clean energy requirements of the CLCPA. However, on its own, this metric may not be enough to address the stark inequity in the distribution of dirty energy infrastructure between upstate and downstate, as well as disproportionate levels of pollution from fossil fuels in communities of color and low-income communities. Thus, reducing reliance on bridge fuels should be a pointed effort to ensure that fossil-fuel infrastructure is replaced by renewable energy infrastructure with a specific focus on environmental justice communities across the state.

Disproportionalities of Renters and Homeowners The inequitable distribution of the benefits and burdens of energy infrastructure can also be measured at the household level. For example, the PNNL report recommends a metric to measure clean energy programs by "[p]ercent of participants by housing type," alluding to the disproportionate access to the benefits of clean energy between renters and homeowners (Tarekegne et al., 2021-a, pp. A-1). The SEAS (2022) report points out that renters face additional burdens because "[w]hile landlords or property managers are the ones with control over energy-saving upgrades being made in a building, renters typically are the ones responsible for their energy bills and therefore the ones experiencing the impacts of higher energy costs" (p. 89). The SEAS (2022) report goes on to explain that "BIPOC, frontline, and low-income communities typically have higher percentages of renter populations, making renter access to clean energy programs an important measure of procedural equity" (p. 89). To address inequities in renewable energy access, the "Justice in 100 Metrics" report suggests that utilities take action to ensure renters "receive economic benefits in local renewable energy" and suggests measuring the "[p]ercent with access to renewable energy (including breakdown for access to distributed renewable energy, access to microgrids), by customer groups" (Lanckton & DeVar, 2021, pp. 12-14). Through net metering and a Value of Distributed Energy Resources (VDER) program, New York State has created policy support for ratepayers who own renewable energy resources to receive credits on their utility bills for energy they provide to the grid (Sustainable CUNY, 2015). Thus, in addition to measuring the burdens of dirty energy infrastructure, it is important to also consider access to clean energy infrastructure.[12]

Renewable Energy Ownership In addition to access, ownership of renewable energy is an energy justice concern and equity metrics can be used to identify disparities in renewable energy ownership. Baker et al. (2023) offer the metric of "measuring the percentage of the ownership of resources by local community members," which could be used to analyze the distribution of energy resource ownership within and between communities (p. 749). Another way to measure the distribution of energy infrastructure ownership is offered by the "Justice in 100 Metrics" report, which suggests measuring "[v]alue ($) of energy assets owned by all customer groups," a metric that could be tailored to focus specifically on renewable energy assets (Lanckton & DeVar, 2021, p. 24). Further, a model that is able to be used to assess the cost of

[12] Yet another example illuminating the connections between homeowner and renter disparities and renewable energy ownership is discussed in a study by scholars Flores et al. (2024), which states: "Residents in multiple unit housing face more challenges in accessing backup power options than people living in single family homes, a housing typology more common in suburban and rural areas" (p. 14).

installing community owned energy resources, is the Least Cost Distributional Grid Expansion, or LODGE model, which models for projects like community solar in different impacts, such as heavy load, or premature grid upgrades (Heleno et. al. 2023, p. 15). The model needs utility data to function, but since utilities don't have a financial incentive to encourage developing different models of ownership, and have been reported to potentially be slowing and halting the process of building access to ownership models (Semuels, 2023), this model could potentially be difficult in a process that is ran by utilities, such as EPPAC.

Community Ownership of Renewable Energy Projects Ownership of clean energy resources is crucial to realizing energy democracy and advancing equity across energy systems, including between renters and homeowners. Thus, establishing energy equity metrics around both access to and ownership of DERs and storage are a step toward ensuring an equitable and just distribution of renewable energy benefits. According to a report by IRENA (2020) the addition of community owned renewable energy projects has been found to increase flexibility, reliability, and resiliency within the main power grid. Using models of leadership ranging from co-operatives, partnerships, non-profits, community trusts, and housing associations, there are five key energy resource projects that can be communally owned, including: electricity generation plants, district heating systems, energy storage systems, energy efficiency programs, and electricity retailers. Accounting for the ability to host, own, and develop further community ownership projects is a necessary ability for energy justice (IRENA, 2020, p. 6).

Amount of Community Solar, Microgrids, and DER Addressing access to and ownership of renewable energy resources can be achieved by expanding community solar projects, microgrids, and other DER projects. McNamara et al. (2022) suggest measuring "[a]doption rates for behind-the-meter technologies such as photovoltaic solar and battery storage, broken down by demography and geography" in addition to "developing community-sharing opportunities for both solar and energy storage" (pp.5-6). To equitably develop community solar projects, the "Justice in 100 Metrics" report suggests that utilities "[s]ize renewable energy projects to ensure siting in frontline, Black, and Indigenous communities and communities of color," and to "[a]dvance and incentivize community ownership and procurement among frontline, Black, and Indigenous communities and communities of color" (Lanckton & DeVar, 2021, p. 23).[13] The "Justice in 100 Metrics" report further mentions microgrids as an opportunity to promote energy democracy, urging utilities to "[i]nvest in research and development of microgrids in frontline, Black, and Indigenous communities and communities of color" (Lanckton & DeVar, 2021, p. 23). In this vein, scholars Benjamin K. Sovacool and Michael H. Dworkin in "Energy justice: Conceptual insights and practical applications" offer a "preliminary energy justice checklist," with one of the guiding questions drawing attention to energy planning processes: "Does an electrification plan include support for distributed generation and development of micro-grids?" (Sovacool & Dworkin, 2015, pp. 441-442). Connecting DER to grid infrastructure, the authors of "Justice in 100 Metrics" suggest developing:

> "a plan for establishing and managing a network of distributed energy generation, including how to connect distributed energy resources into the grid, maximize data flow throughout the grid between consumers and generators, and resolve technical barriers to increased distributed energy generation" (Lanckton & DeVar, 2021, p. 12).

Thus, while focused on energy generation, the process of interconnecting community solar, microgrids, and other DER projects - which can promote energy justice - also have consequences for the grid planning process.[14]

Transmission and Distribution Infrastructure Equity metrics directly related to transmission and distribution infrastructure are a relatively new field of research. One example is a recent study by scholars Anna M. Brockway et al. (2021) analyzing how DER adoption is impacted by grid limitations – such as hosting capacity – and the equity implications of these limitations. Focusing on California, the authors demonstrate how hosting capacity is filled by early adopters of DER, extending the "social disparities in the adoption of" DER to grid interconnection efforts (Brockway et al., 2021, p. 1). Consequently, as the authors explain,

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[13] For community solar projects owned by utilities, the authors of "Justice in 100 Metrics" recommend utilities "maximize the benefits of going solar, including increasing community control and expanding the opportunity to use community energy projects to accomplish social goals such as quality employment for disadvantaged populations" (Lanckton & DeVar, 2021, p. 23).

[14] A study on "Equitable Grid Principles," organized by the Union of Concerned Scientists discusses the relationship between generation and transmission, writing: "Decisions about electricity generation and electricity transmission are interrelated, each affecting the other. For instance, building new transmission infrastructure can enable new wind generation to come online in the Great Plains states and serve demand in the Great Lakes area. Likewise, the build-out of transmission along this corridor can affect future electricity generation decisions in the Great Lakes area, possibly disincentivizing local power generation. Also, where and how transmission is built can help close polluting power generation facilities sooner or extend their lifespans" (Byers et al., 2023, p. 4).

"efforts to improve equity in PV adoption may be caught in a race with continuing adoption among already well-represented demographic groups for the circuit hosting capacity that remains" (Brockway et al., 2021, p. 3). Thus, even though the costs of upgrading the grid to increase DER interconnection are evenly distributed across ratepayers, low-income ratepayers and communities of color who have historically faced barriers to DER adoption may not have the same opportunities to connect to the grid as those who adopted DER early (Brockway et al., 2021).

<u>Hosting Capacity Distribution</u> For their study, the authors use California's Integration Capacity Analysis maps to analyze the distribution of hosting capacity and distributed generation, the CalEnviroscreen to identify environmental justice communities, and Census Block Groups to look at social demographics (Brockway et al., 2021). New York State has similar tools it could draw on for its own grid hosting capacity and distributive justice study. Using these tools, the authors find that grid capacity for DERs is lower in environmental justice communities, especially in Black communities, raising significant distributive justice concerns (Brockway et al., 2021). While the study is focused on drawing attention to this disparity, the authors theorize two potential causes, the first being that upgrades to the grid were directed towards neighborhoods with early adoption of DERs, leading to an increase in hosting capacity in these areas (Brockway et al., 2021). Another theory is that grid upgrades were made in areas expecting new housing developments that, due to structures of oppression and discrimination, systematically excluded members of environmental justice communities (Brockway et al., 2021).

<u>Measuring Hosting Capacity with Justice Metrics</u> To address the disparity in hosting capacity, the authors recommend future studies on "policy requiring co-located storage or demand response," which would lower new DER interconnections' "impact on the grid" (Brockway et al., 2021, p. 9). The authors further suggest moving DER projects in environmental justice communities to "the front of the queue" for grid upgrade investments (Brockway et al., 2021, p. 9). This suggestion is similar to Vote Solar's recommendation "that the Utilities prioritize upgrading the electric grid in low-income communities and that projects serving disadvantaged communities receive preferential interconnection," a comment included in the PSC's order for the coordinated grid planning process (New York Public Service Commission, 2023 p. 72). Vote Solar goes further to state "that the Commission should only approve major grid investments that facilitate disadvantaged communities receiving their fair share of hosting capacity" (New York Public Service Commission, p. 72). New York could conduct a similar study to the California study, employing energy equity and justice metrics to measure hosting capacity in environmental justice communities using similar hosting capacity mapping tools already available through the Department of Public Service and state environmental justice maps available on the New York Department of Environmental Conservation's website to advance justice and equity in grid upgrades (New York State, n.d.-b; New York State, n.d.-f).

Grid Resiliency Grid resilience is yet another area in which environmental justice communities face disproportionate burdens (McNamara et al., 2022). In the article "Energy justice beyond the wire: Exploring the multidimensional inequities of the electrical power grid in the United States," scholars Benjamin K. Sovacool et al. (2024) include various ways to analyze inequity in grid resiliency, such as "[v]ariations in blackouts by minority status," "[c]oncentration of power outage impacts among vulnerable groups and those with medical conditions," and "[c]oncentration of blackout risks to peripheral areas" (p. 3). Furthermore, energy engineers and experts Kendall M. Parker et al. (2023) state that "uneven resilience conditions implicate the need for equity in metric expansion" (p. 235).[15] A study by scholars Flores et al. (2024) demonstrates how power outages disproportionately burden environmental justice communities in New York State due to both frequency and duration.[16] Researching the impacts of climate change on power outages in both rural and urban communities in New York, Flores et al. (2024) find that,

> "In NYC, severe weather-driven outages were more common and lasted longer in marginalized communities. In rural regions, outages were no more common in socially

[15] Focusing first on resilience metrics, Parker et al. (2023) note that high level grid resilience metrics often look at A) "Likelihood: probability that a disruption scenario may lead to decreased system performance or failure;" and B) "Consequence: the impact of system failure given a disruption scenario" (p. 236). Diving deeper into the first resiliency metric, the authors uplift two measurement strategies developed by the Grid Modernization Lab Consortium (GMLC), the first is a multi-criteria decision analysis (MCDA) that characterizes the grid's capabilities (adaptiveness, etc.) and evaluates with qualitative methods (surveys, etc.) (Parker et al., 2023). The second measurement, performance-based metrics, is applied to the MCDA and involves an analysis of observations or projections on grid effectiveness prior to, during, and in the aftermath of a hazard event (Parker et al., 2023). The GMLC's measurements incorporate both quantitative and qualitative metrics that could provide a more localized approach to identifying and addressing issues of grid resiliency in environmental justice communities.

[16] Power outages in environmental justice communities in New York is an ongoing issue, as Flores et al. (2024) note: "Outages in New York City resulting from Tropical Storm Isaias were longer in regions that were lower income and/or had higher percentages of non-white residents" (p. 2).

vulnerable communities but when they occurred, lasted longer for socially vulnerable communities" (p. 13).[17]

Even further, Flores et al. (2024) point out that "[d]uring outage events, many electric utilities prioritize power restoration in regions with community assets, such as mass transit, hospitals, police and fire stations, and sewage and water stations," which "can lead to inequitable outage distributions and durations for underfunded and under-resourced communities" (p. 14). Thus, the authors argue for "prioritizing power restoration in regions with higher concentrations of low-income and/or medically vulnerable individuals first" in rural communities and "to ensure that urban dwellers have safe backup power options" in urban communities through programs that mitigate the costs of renewable energy generators (Flores et al., 2024, p. 14).[18]

Household Impacts of Power Outages The household impacts of power outages also disproportionately impact environmental justice communities. For example, as McNamara et al. (2022) explain, "residents in affluent communities can easily replace refrigerated or frozen food that is ruined from prolonged outages, while residents in disadvantaged communities may lose their food supply with limited means to replace it" (p. 4).[19] Thus, resiliency and equity metrics are not only connected through the uneven distribution of grid resiliency, but also the inequitable distribution of resources to recover from a power outage. Parker et al. (2023) use two lists of resiliency metrics, differentiating metrics for utilities and for communities, with utility metrics focusing on monetary, temporal, or customer impacts, while the community impacts include number and duration of critical facilities without power, "loss of assets," and "business interruption costs" (p. 237). The side-by-side lists have the effect of underscoring the responsibility of utilities to take action to prevent and respond to disasters as well as the devastating impacts of disasters on communities. The "Justice in 100 Metrics" report also focuses on the impacts of a disaster event on communities, with the equity indicator of "[c]osts of disasters borne by customer, by customer group (such as injury, health impacts, death, lost/damaged buildings or property, lost jobs/wages, duration of power outages, etc.)" (Lanckton

[17] More specifically in terms of types of climate hazards, the authors write that: "In NYC, we identified that heat-, precipitation-, and wind-driven outages disproportionately impacted vulnerable communities. We also found that in NYC, on average, the duration of precipitation-driven outages was highest in localities with the highest social vulnerability. In rural NYS, on average, the duration of precipitation- and snow-driven outages were higher in localities with greater social vulnerability" (Flores et al., 2024, p. 14).

[18] Flores et. al (2024) highlight a pilot program in Vermont addressing generator ownership by supplying households with battery systems.

[19] In this vein, Flores et al. (2024) write that "preventing prolonged outages or providing backup power sources is critical for population health" (p. 2).

& DeVar, 2021, p. 14). Thus, the “Justice in 100 Metrics” report takes the resiliency metrics in the Parker et al. (2023) article one step further by offering an equity indicator that specifically addresses the disparities in the impacts of a disaster on different customer groups (Lanckton & DeVar, 2021).

Social Burden The social burden metric developed by Jeffers et al. and highlighted in McNamara et al.’s (2022) article is yet another way to measure the equity implications of an unreliable grid. The social burden metric “measures the effort expended by a population during a disruption to obtain critical lifeline services normalized by that population’s household income” (McNamara et al., 2022, p. 5). The article also suggests normalizing metrics measuring “the household costs of power interruptions . . by household income or other indicators of underserved communities” in addition to utilizing existing resilience measurement tools such as the Baseline Resilience Indicators for Communities (BRIC) (McNamara et al., 2022, p. 5). Adding an additional lens to resiliency and equity metrics, the report “Justice in 100 Metrics" suggests that utilities take actions to “[t]arget investments to help underserved communities prepare for and recover from disasters” (Lanckton & DeVar, 2021, p. 12). With this suggestion, the report offers two valuable inputs into energy equity and justice metrics development in relation to grid resiliency. First, the need for considerations of disaster preparedness (in addition to recovery), which is further exemplified in their recommendation for utilities to “[e]quitably link the grid to disaster preparedness” (Lanckton & DeVar, 2021, p. 12). Finally, the report also emphasizes the importance of measuring the effectiveness in utility responses to advancing equity in grid resiliency projects - thus using metrics to not only measure inequitable distributions of benefits and burdens but also the effectiveness of actions aiming to address systemic injustices.

Impacts of Climate Change Equitable resilience metrics become even more important as the impacts of climate change - which disproportionately burden low-income communities and communities of color - become more severe (U.S. Environmental Protection Agency, 2021). Sovacool et al. (2024) note the impacts of climate change on grid infrastructure, including “[h]igher temperatures and heat waves limiting the transfer capabilities of transmission lines, which causes line sagging and increases energy losses,” in addition to equipment damage from extreme rainfall and flooding, and “[h]igh winds during storms or hurricanes damaging overhead lines via debris or collapsing pylons and towers" (p. 6).[20] Due to the inequitable distribution of grid resiliency, the impacts of climate change on the grid have the potential to further exacerbate social inequities, including in New York State (Flores et al., 2024).[21] To this point, Flores et al. (2024) explain that:

> "Previous work posits that increased outage exposure in vulnerable communities may be the result of historical and current discriminatory practices. Practices such as redlining and zoning have had longstanding impacts, including (1) underinvestment in marginalized communities and (2) the placement of marginalized communities in disaster-prone regions–both of which may make these communities more likely to experience outages" (p.14).

Considering the importance of grid resiliency for climate and energy justice, Sovacool & Dworkin (2015) pose the guiding energy justice question: "Does a decision to build energy infrastructure account for the physical risks posed by climate change?" (p. 441). The SEAS (2022) report also acknowledges the relationship between climate resiliency and energy systems in its Community Benefits Index, with the metric: "[f]rontline community and climate resilience benefits, and reductions in disparities" (p. 119).[22] While this metric is general, it could serve as the basis for more specific equity metrics to ground grid resiliency planning.

Economic Costs and Benefits Financial costs and economic benefits of grid infrastructure upgrades are also linked to energy justice issues. Beginning with the distribution of costs, McNamara et al. (2022) explain that "[e]lectrification (e.g., batteries, electric vehicles, heating and cooling) benefits the more affluent, but the cost burdens of generation, storage, transmission, and distribution are borne by all ratepayers" (p. 2). Thus, while costs for grid upgrades are evenly distributed, they are not equitably distributed because environmental justice communities face barriers to accessing the benefits of electrification. Before implementing an energy project, Sovacool & Dworkin (2015) recommend asking: "Does a fossil fuel-centric project require a multibillion dollar investment that would take decades to repay?" (p. 443). The

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[20] Focusing on New York State, Flores et al. (2024) write: "From 2017–2020, we identified 40,646 electrical power outages, of which we linked 16,236 (39.9%) to severe weather" (p. 7).

[21] Asserting the importance of analyzing grid reliability and impacts of climate hazards, EDF states in the PSC's order for the grid planning process: "that the CGPP could study what system improvements may be needed in disadvantaged communities unduly impacted by system outages" (New York Public Service Commission, 2023, p. 60).

[22] The SEAS (2022) report further notes the difficulties in standardizing resiliency measures, given that these actions can take place at the neighborhood or household level, an issue also discussed by Parker et al. (2023).

authors' question could further be extended to other forms of energy infrastructure, such as hydrogen, to analyze the impacts on ratepayer bills, specifically low-income consumers, in the transition to clean energy.

Energy Burden Measurement One of the most prominent energy equity metrics concerning the distribution of costs and energy affordability is measuring energy burden. Parker et al. (2023), Baker et al. (2023), the PNNL report by scholars and energy experts Bethel Tarekegne et al. (2021-a), the SEAS (2022) report, a National Association of Regulatory Utility Commissioners (NARUC) report by scholar Jasmine McAdams (2023), and a VEIC report on "The State of Equity Measurement: A Review of Practices in the Clean Energy Industry" by scholars and energy efficiency experts Erin Levin et al. (2019) all engage with equity metrics around energy burden.[23] Energy burden, as defined by McAdams (2023), is "the proportion of energy expenditures relative to overall household income," and Baker et al. (2023) explain that 6% marks "[a] high energy burden," while over 10% marks "a severe energy burden" (p. 4; p. 747). Metrics concerning energy burden are evoked in a few ways across the literature, with, for example, the PNNL report asking: "Where are energy prices higher or more burdensome?" to analyze potential distributive injustices (Tarekegne et al., 2021-a, p. 6). The PNNL report goes on to recommend the use of an "energy burden index" to identify environmental justice communities and to measure the "energy burden change" to analyze the impact of various programs (Tarekegne et al., 2021-a, pp. 7-9). The SEAS (2022) report focuses on measuring "[a]verage energy burden among low-income households, BIPOC, and frontline households, and/or other disproportionately impacted groups (e.g. renters)," thus suggesting a metric that focuses on environmental justice communities and energy burden (p. 109). Due to the current system of ratepayers taking on the costs of grid upgrades, energy burden is an equity metric to take into account in grid planning processes.

Energy Insecurity and Energy Poverty Energy burden is not the only metric used to measure the distribution of energy costs. Although perhaps not discussed as frequently as energy burden, energy insecurity, which McAdams (2023) defines as "hardships households face when meeting basic household energy needs," often emerges in literature around energy equity and justice metrics (p.4). Another similar metric is energy poverty, which McAdams (2023) defines as "the lack of access to reliable and affordable energy" (p. 4). While there are multiple ways to

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[23] VEIC is a not-for-profit clean energy consulting organization.

define and measure for distributive injustice in energy costs, the VEIC report explains that "[e]nergy burden is a useful to tool for describing the challenges of addressing energy use in low-income households but may not fully capture the challenges of reaching and adequately addressing the needs of low-income customers" (Levin et al., 2019, p. 7). Thus, more granular metrics are needed to develop programs and actions leading to more equitable and just energy outcomes.

Granular Energy Burden Metrics The law and economic consulting firm Fisher, Sheehan, and Colton (FSC), with Principal Roger Colton, created "a model that calculated the dollar amount by which "actual" home energy bills exceeded "affordable" home energy bills on a county-by-county basis for the entire country" (Fisher, Sheehan & Colton, 2023). Referred to as a "home energy affordability gap," this model can be applied in "research, legislative analysis, program-planning and advocacy" (Fisher, Sheehan & Colton, 2023). FSC's model specifically draws attention to distributive injustices across the U.S. energy landscape. Another example of more granular energy burden measurement is illuminated by McAdams (2023), who cites work by Carnegie Mellon University researchers that recognizes how income metrics can fall short of measuring energy burdens because some households may reduce their use of energy to save for other expenses. Thus, in addition to energy burden, the researchers recommend an "energy equity gap" metric that compares the temperature outside when low-income households vs. high-income households turn on their cooling systems (McAdams, 2023, p. 9).[24] These examples of granular energy burden metrics illuminate the importance of implementing energy equity metrics not in a vacuum but rather developing metrics that reflect the sociopolitical and economic landscape in which they are applied. Analyzing a "home energy affordability gap" and an "energy equity gap" could ensure that households avoiding energy use do not fall through the cracks in clean energy programs aiming to benefit environmental justice communities.

Economic Development In addition to economic costs related to the grid, economic development benefits and opportunities also have justice implications. The VEIC report notes that in terms of equity, one of the issues clean energy businesses focus on is "[d]etermining disparate impacts of programs" (Levin et al., 2019, p. 6).[25] The VEIC report goes on to highlight

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[24] However, it would appear the "energy equity gap" measurement does not take into account households without cooling systems.
[25] The other concerns in the VEIC report include "[d]efining target populations" and "[i]ncluding representative voices in program design and delivery" (Levin et al., 2019, p. 6).

equity metrics such as "program investment," which could measure the extent to which programs are equitably distributed, as well as "program savings" and "energy cost savings," which could be used to understand the effectiveness and impact of programs, specifically in environmental justice communities (Levin et al., 2019, p. 23). McAdams (2023) discusses another equity metric related to clean energy programs, which was developed by DOE for guiding Justice40 implementation: "Dollars spent [$] and/or number of participants from DACs in job training programs, apprenticeship programs, STEM education, tuition, scholarships, and recruitment" (p. 8). Some reports focus more on investments – such as Baker et al. (2023) with the metric "investment-generated jobs" – while others focus on participation rates, such as the SEAS (2022) report's metric: "% of new jobs created by utility programs that go to BIPOC and low-income individuals or frontline communities" (p. 749; p. 118). Renewable energy development and installation - including projects involving the grid - have the potential to expand job opportunities - as explained in a World Resources Institute expert note by scholar Devashree Saha (2020), and it is crucial to ensure equitable access to these positions. Thus, to address the distribution of economic benefits, the literature points to metrics relating to investments in programs serving environmental justice communities and to measuring access to newly created clean energy jobs.

Literature Review: New York Public Service Commission Reform

NYPSC: Potential Leadership in Energy Justice

The New York Public Service Commission (NYPSC) is an integral part of the clean energy transition. Currently, the NYPSC has room to grow in procedural energy justice. As voiced by scholar Alison Gocke, “State public utility commissions are at the forefront of the clean-energy transition,” and the New York Public Service Commision has the potential to grow into not just a leader of a clean energy transition, but a *just* clean energy transition (Gocke, 2024). The NYPSC “has a broad mandate to ensure access to safe, reliable utility service at **just** and reasonable rates,” and has historically focused on rates (New York Department of Public Service, n.d.). The ability to ensure just rates by the NYPSC can potentially be accomplished through the NYPSC actively participating and engaging in procedural justice, acting on the New York Build Public Renewables Act, creating access to intervenor funding prioritizing Environmental Justice Communities (EJ) and DACs, and creating a branch of the NYPSC which focuses primarily on just and equitable outcomes for DACs and EJ communities.

Procedural Justice: The New York Public Service Commission (NYPSC)

Procedural justice has multiple definitions, and a common theme in the descriptions of procedural justice is that DAC community members are meant to be at the decision making table from the beginning of the decision making processes to the end. As described in “Metrics for Decision Making in Energy Justice” procedural justice is defined as “who is involved in and leading the decision-making processes” (Baker et al., 2023, p. 739). Initiative for Energy Justice defines procedural justice as “procedural justice concerns who is at the decision-making table, and whether, once at the table, everyone’s voice is heard” (Initiative for Energy Justice, n.d.). The NYPSC has the potential to advance procedural justice through engaging in efforts in the following areas as stated in “Procedural Equity at Public Utility Commissions” (Adler et al., 2024, p.iii):

1) Financial Support
2) Accessibility of Participation Opportunities

3) Meaningful Engagement
4) Informational Resources and Support
5) Transparency
6) Equity Prioritization for DACs

The NYPSC has, "jurisdiction over energy-generation resources, distribution systems, and retail energy sales, exercise significant control over the energy systems that are responsible for much of the United States' greenhouse-gas emissions" (Gocke, 2024). In other words, the NYPSC has power, and the ability to create change in collaboration with DACs, if the above issues are addressed.

NYPSC and Procedural Justice: Financial Support and Intervenor Funding

Intervenor funding is a method to enhance financial support and decision making of DACs in the NYPSC decision making process, and potentially increase equity for various community members, stakeholders, advocates, and organizations. "The particulars of these programs vary by state, including the types of proceedings covered, eligibility of applicants, compensation limits, deadlines for requests, and timing of reimbursements" (Adler et al., 2024, p. 9). A key aspect of intervenor funding in order to benefit DACs, is that compensation programs must be designed to support DAC and environmental justice communities.

New York State currently participates in intervenor funding ~ although not just intervenor funding. Currently, the New York State intervenor funding can be used for processes for the NY Siting Board, expert witnesses, consultants, administrative costs, and legal fees, and not for appeal of Siting Board decisions or "other matters before a court" (Department of Public Service, n.d.). There is no mention of prioritizing DACs in the Intervening Funder section of this law.

An example of just intervenor funding is seen in the Oregon Public Service Commission Justice Funding. The current Oregon framework states that the framework is "is designed to address issues associated with energy burden, and it permits utilities and the Commission to take action to relieve energy burden for certain classes of customers. The second component of the legislation provides for the Commission to administer intervenor funding agreements that public utilities may enter into with two distinct groups of advocates; those representing "environmental justice communities" and "low-income communities*"*(81st Oregon Legislative Assembly, 2021). This is written into HB2475, which includes the emphasis for eligibility of funding to also include organizations that represent DAC communities (81st Oregon Legislative Assembly, 2021). Intervenor funding can support in ensuring that a myriad of voices are included in the Commision decision making process, whether that be in grant funding or cost reimbursement (NARUC, 2021). Although requiring legislation sign off, the NYPSC has the potential to participate in similar actions to provide intervenor funding for DAC communities and energy justice communities as seen in Oregon, and other states as seen below.

Table 1. Features of Authorized State Intervenor Compensation Programs

State	Applicable Utilities	Plan Type	Applicants	Eligibility Criteria[10]	Costs	Limits	Payee	Used in Practice
Alaska[11]	Electric	Cost Reimbursement	Electric consumer of regulated electric utility,[12] either intervenor or public witness	I, F, M, J	Reasonable Costs	None	Utility	N
California	Electric, Gas, Water and Telephone	Cost Reimbursement	Customer or eligible local government entity; intervenors with conflicts of interest are ineligible	I, F, M, J, O	Reasonable Costs based on Market Rate Study	None	Utility[13]	Y
Colorado	Electric or Gas Utility	Cost Reimbursement	Intervenors other than office of consumer counsel; prohibits any intervenor in direct competition with public utility involved in proceeding	I, M, O	Reasonable Costs	None	Not Specified	N
Hawaii[14]	Integrated Resource Plans only	Cost Reimbursement	Excludes government agencies, for-profit entities, or an association of for-profit entities	F, M, O	Reasonable Costs	None	Utility[15]	N
Idaho[16]	In any case involving electric, gas, water, or telephone utilities with gross Idaho intrastate annual revenues exceeding $3,500,000	Cost Reimbursement	Excludes any intervenor who is in direct competition with a public utility involved in the proceeding	I, F, M, O	Reasonable Costs	$40,000 for all intervening parties combined in any proceeding	Utility	Y

10 I = Granted intervenor status in proceeding; F = Financial hardship; M = Participation materially contributed to decision of commission; R = Represents interest not otherwise adequately represented in proceeding; J = Intervenors with same or similar interests, may be joined as one party; O = Other.

11 Unless an alternative means of compensation is provided.

12 Subject to Title I of the Public Utility Regulatory Policies Act (PURPA) of 1978 (a public utility whose sales of electric energy, for purposes other than resale, during any calendar year after 1975 and before the immediately preceding calendar year, exceeded 500 million kilowatt-hours).

13 Or if it is a quasi-legislative rulemaking proceeding affecting an industry or multiple industries, awards are paid from the Intervenor Compensation Fund.

14 A process for intervenor funding was outlined in *A Framework for* Integrated Resource Planning, March 9, 1992, Revised March 14, 2011, Docket No. 2009-1018, p. 122–124. The process is limited to the specific context of integrated resource planning and implementation and has not been utilized in about ten years, according to the Hawaii Public Utilities Commission.

15 Paid by the utility, cost recovery subject to approval of utility integrated resource plan.

16 Referred to as Intervenor Funding.

(NARUC, 2021)

State	Applicable Utilities	Plan Type	Applicants	Eligibility Criteria[10]	Costs	Limits	Payee	Used in Practice
Illinois[17]	Electric or Gas	Cost Reimbursement	Customer Interest Representatives[18]	F, M, O	Market Rates	Compensation cannot exceed the comparable market rate for services paid by the utility as part of its rate case expense	Utility	N/A[19]
Kansas	Electric	Cost Reimbursement	Consumers of electric utilities subject to Title I of PURPA	I, F, M, R, J, O	Reasonable Costs	None	Utility	N
Maine	Public Utilities	Cost Reimbursement	Intervenor related to issue in a commission proceeding or judicial review related to a PURPA or non-PURPA issue	I, F, M, R, O	Reasonable Costs	None	Utility or the commission's regulatory fund[20]	N
Michigan	Energy utilities that apply to the commission for initiation of cost recovery proceedings	Grant[21]	Nonprofit organization or unit of local government; no individual interests[22]	O	Reasonable Costs	None	Utility[23]	Y
Minnesota	Public Utilities[24] in a general rate case	Cost Reimbursement	Nonprofit organization or individual granted formal intervenor status by commission	I, F, M, R, O	Reasonable Costs	$50,000 per single intervenor in a proceeding	Utility	Y

17 Illinois passed the Climate and Equitable Jobs Act (SB 2408), effective September 15, 2021, which includes a provision for an intervenor compensation fund. As of December 17, 2021, the program has not been initiated.

18 Defined as (a) a residential utility customer or group of residential utility customers represented by a not-for-profit group or organization registered with the Illinois Attorney General under the Solicitation of Charity Act; (b) representatives of not-for-profit groups or organizations whose membership is limited to residential utility customers; or (c) representatives of not-for-profit groups or organizations whose membership includes Illinois residents and that address the community, economic, environmental, or social welfare of Illinois residents, except government agencies or intervenors specifically authorized by Illinois law to participate in Commission proceedings on behalf of Illinois consumers.

19 New legislation.

20 From the utility if ordered by the commission in any proceeding in which PURPA standards are implemented under Title 16, Section 2601; from the commission's regulatory fund if ordered in proceedings in which the commission does not implement standards under PURPA Title 16, Section 2601.

21 From the Utility Consumer Representation Fund.

22 Only for advocating residential energy utility customers concerning energy costs or rates; not available for representation of merely individual interests.

23 Each energy utility that has applied to the commission for initiation of an energy cost recovery proceeding pays into the fund; excludes energy utilities organized as cooperative corporations.

24 Minnesota statute related to intervenor compensation falls under general Public Utilities. Specific administrative rules have been adopted only related to telecommunications. The features of the plan relate to the broad Public Utility statute.

(NARUC, 2021)

The New York State Build Public Renewables Act

The New York Public Renewables Act is an act of legislation that could support the NYPSC's work towards a just clean energy transition. The New York Public Renewables Act "requires the New York power authority to provide only renewable energy and power to customers; requires such authority to be the sole provider of energy to all state owned and municipal properties; requires certain New York power authority projects and programs pay a prevailing wage and utilize project labor agreements" (New York Senate, 2023). This could prove to be a valuable piece of legislation for the NYPSC in creating space for procedural justice in both involvement of projects and proceedings as a Renewable Energy Project "shall be defined as all infrastructure which generates, stores, distributes, or transmits renewable energy or thermal energy as defined [...]" (State of New York, 2023). This one sentence means the NYPSC can support in the mission towards renewable energy ~ and has significant responsibility in supporting a just transition.

The NYPSC and Inclusion of Voices

Current legislation alone does not guarantee the inclusion of Indigenous community voices, which is part of procedural justice's meaningful engagement. The NYPSC has historically and presently excluded Indigenous peoples voices in the implementation of decision making surrounding clean energy transmission and transition. This can be seen in the event of the Champlain Hudson Power Express, a hydro dam based in Canada. Although based in Canada, the hydrodam would bring renewable energy to New York City while "destroying rivers and damaging Indigenous communities, threatening their way of life" (Leah Rae, as cited in Riverkeeper, 2022). As of April 2024, The New York State Public Commission formally approved two segments of the Champaign Hudson Power Express Project and is expected to be fully operational by Spring 2026 (Public Service Commission, 2024). The NYPSC in a formal Approval had a focus on celebration of this movement towards clean energy, and how the Champaign Hudson Power Express Project is integral towards supporting the New York state goal of reaching 70% electricity run by renewable energy by 2030 (CHPE, n.d). There is recognition that New York City's DACs are currently most impacted by fossil fuels and the location of energy generation infrastructure through negative health impacts. Throughout the Approval there is no mention of Indigenous Rights or acknowledgement that for some Indigenous communities in regards to the Champaign Hudson Power Express Project, "The waters are most important to us as human beings. Human beings have rights. First Nations have rights. And water is so important to everyone, to all living creatures, because water is life. This is what we say, water is life. Me, I call this cultural genocide" (Lucien Wabanonik, as cited in Riverkeeper, 2022).

In this instance, Indigenous groups urged the NYPSC to put their efforts into other energy projects that did not negatively affect their communities or their territories. The New York Public Service Commission had the opportunity to participate in procedural justice with Indigenous communities, and did not.

An aspect of action that the PSC can take is actively utilizing the public voice that currently exists in New York, and it is clear that the public voice is ready to be heard. NY residents want to be heard.

There has been a call for a more accessible and informative relationship with energy, ratings, and the PSC overall, which has also been expressed. As voiced in the SEAS 'Energy

Equity Project Report,' "As customers and the public are captive to the rates and impacts of the impacts authorized by the regulatory bodies, it is important that regulatory processes have sufficient transparency that all members of the public, regardless of their level of sophistication with respect to energy issues, can understand the benefit, impacts, and rationale for the proposed project, and can participate meaningfully in the agency's decision making process" (p. 69). There is a current communication barrier in the NYPSC, where the public's voices as the NYPSC communicates with specific electric and energy jargon and field-specific language, and acronyms that can be difficult for any person to understand who is not part of the electric industry. This can prove to be a challenge to accessibility, as it can be difficult for the public to participate while also learning what the field specific language means, adding an extra layer of work and an extra layer of passive lack of transparency by the Public Service Commission. On one hand, the general public does not have sufficient translation of the technical language of the PSC. On the other hand, the PSC does not translate the general public's words into the technical language of the PSC (Welton et al., 2024). Without clear understanding and communication on the side of the PSC, there will not be just and equitable transmission rates.

The NYPSC: Shelley Welton Interview: Rates, Pay, and NYPSC

The question of who pays and how much has been a question within the NYPSC longer than just 2024. In fact, the NYPSC opened an investigation of "issues related to the future regulatory regime for the provision of electric service in light of competitive opportunities was instituted" (State of New York Public Service Commission [NYDPS], 1996). The overall objective was "to identify regulatory and ratemaking practices that will assist in the transition to a more competitive electric industry designed to increase efficiency in the provision of electricity while maintaining safety, environmental, affordability, and service quality goals" in 1994 (NYDPS, 1996). The New York State Department of Public Service, an overarching player of the NYPSC, now says on their website "The primary mission of the New York State Department of Public Service is to ensure affordable, safe, secure, and reliable access to electric, gas, steam, telecommunications, and water services for New York State's residential and business consumers, at just and reasonable rates, while protecting the natural environment," which includes the NYPSC (New York State Department of Public Service [NYDPS], n.d.). In other words, it is stated that the NYPSC's main mission is to ensure affordable, safe, secure, reliable access to electricity at just and reasonable rates.

In a recent interview with Shelley Welton in June 2024, Welton mentioned how it is difficult for the PSC to engage in deep meaningful ways with the public - especially since it is not a natural fit for PSC's, where the primary job as stated before is rate regulation (Welton et al., 2024). In the NYPSC there is opportunity for growth within the mission because of the state's statement and dedication towards "just and reasonable rates." In order to ensure "just" rates, justice and equity metrics must be included. Without inclusion of these metrics, DAC's will be vulnerable to harmful impacts, such as continuously being vulnerable to blackouts.

Welton also stated that the NYPSC is incredibly leadership driven ~ this means that the leadership in the PSC has a lot of power in decision making, and how just and inclusive measures are taken to ensure DAC's are being included in the procedural justice process (Welton et al., 2024). This is because there is no official mandate anywhere saying that the rates must be equitable and just, although it is in the mission statement, there is not a state legislation mandate stating this. This does not mean everything is a lost cause. As stated by Shelley Welton in the 2022 Sabin Center Public Public Power in New York video conference, "the public utility model of regulating electric utilities has a notion of equity that's very much each sector of the system should pay its fair share of the costs that it causes for the electric system" (Sabin Center for Climate Change Law, 2022). The notion is must be action and accountability.

The NYPSC: DACs and Decision Making

The NYPSC is in a beneficial position to be able to better include public participation as "the issues considered by state PUCs tend to be at least somewhat more accessible than the complex market rules negotiated in RTOs and approved by FERC" (Welton & Eisen, 2019, p. 350). In other words, the NYPSC is the community opportunity to get their word in. The challenge to this is that PSC is so full of technical jargon, time intensive, and also incredibly resource intensive based that it can be very hard for those who don't have that knowledge or money to have a voice that is heard through the PSC. As Welton et al. (2024) voiced, "PSCs still tend to implement new policies on a utility by utility basis," which is a long, arduous, jargon, and resource filled process. On the surface of the NYPSC, DACs, community groups, and advocates can access dockets, recordings of proceedings, and decisions. Unfortunately, not all of these utility proceedings are accessible to the public due to financial barriers, time, and communication gaps. The financial barrier can be to access to understanding proceedings can be seen, at times, through NARUC.

The National Association of Regulatory Utility Commissioners is a nonprofit that "represents the state public service commissions who regulate the utilities that provide essential services such as energy, telecommunications, power, water, and transportation and who have largely shaped the profile and substance of public utility regulation in America" (NARUC, 2024). NARUC holds an Annual Meeting and Education Conference, which is an opportunity for people to better understand energy and utilities. There is a financial barrier to this event which includes educational resources and opportunities, and chances for voice in the year 2024, costs $1,195 for all other people coming in onsite, and $950 for a consumer advocate coming on-site, non-member state or federal agency, or for a participant in academia (NARUC, 2024). For credentialed media, the cost to attend onsite is $0 (NARUC, 2024.) This non-profit utility convention could and would be a prime opportunity for DACs to access utility knowledge, and yet this knowledge is provided for those who can afford access.

In the fight for just and equitable clean energy transmission, there is the challenge that both energy legal frameworks and utility proceedings are incredibly technical (Welton et al., 2024). There is a history of utilities and financial institutions supporting each other in transactional relationships over clean energy justice, which includes procedural justice. In other words "Utilities dominate energy proceedings with their expertise and resources, allowing them to wield outsized influence in many cases (Welton & Eisen, 2019, p. 348).

This can prove to be especially challenging due to the fragmented utility by utility case process the NYPSC utilizes. In order for a group to have a voice in a typical PSC proceeding they must have the time, knowledge, and resources to have strong state impact.

The NYPSC: California PUC as Example

The California PUC combats the outsized influence utilities and financial institutions through the creation of a Disadvantaged Communities Advisory Board. Within the advisory board, an equity framework is utilized, prioritizing the following communities: "CalEnviroScreen, as defined by Cal EPA, Tribal Lands, Census tracts with area median household income/state median income, less than 80%, and Households with median household income less than 80% of Area Median Income" (CPUC, 2024).

The framework itself focuses on how energy policies must take into account the possible positive and negative impact on overall public health, as well as providing education for DAC communities and ways to build climate resiliency. There is also a focus on access and education, financial benefits, economic development, and consumer protection.

In New York, the creation of a DAC working group would be beneficial as part of the NYPSC DEI initiative created in 2022 which is currently working to prioritize "The importance of a diversified workforce,""Training, recruitment and retention," and "supplier diversity," (NYDPS, n.d). Through the implementation of a continuous DAC working group, including members who are New York DAC community members, this would assist in establishing frontline community partnerships and working relationships. The legislation of the CLCPA states that part of the importance of the CLCPA is to improve quality of life, ensure equity and inclusion, protect the environment, and grow economic opportunities (New York State, n.d.) and by having a specific long term DAC working group, this could support in ensuring that this goal is sincerely met.

Appendix

Siting of energy infrastructure, including generation, transmission, distribution, and storage, is an important energy justice concern. Scholars Alexandra B. Klass and Hannah Wiseman in their forthcoming paper, “Repurposed Energy,” discuss issues such as “not in my backyard” or “NIMBY” stances on renewable energy infrastructure as well as opposition to renewable energy projects in rural communities, mostly in the Midwest, U.S. (Klass & Wiseman, 2024). In New York and New Jersey, procedural justice and Indigenous rights issues have been raised with large scale wind projects, including calls from the Shinnecock Nation to pause offshore wind projects near the coast of Long Island until Indigenous sovereignty is protected (Sharp, 2023).[26] Acknowledging a range of concerns around renewable energy siting, Klass & Wiseman (2024) propose a concept they call “repurposed energy,” which they define as follows:

> “clean energy development on lands that have already been disturbed by energy extraction (e.g., coal mines and abandoned oil and gas wells) or energy generation (e.g., coal plants); lands where development is impaired by the presence or potential presence of hazardous substances or pollutants from any activity or source, and thus meets the federal definition of a “brownfields site”; marginal farmland— depleted or unproductive farmland, whether or not that land is enrolled in a federal conservation reserve program; and abandoned or closed industrial facilities” (p. 11).

The authors note how this approach would alleviate some opposition to the siting of renewables, given that the sites were already used for energy development or were closed off to the public (Klass & Wiseman, 2024). Furthermore, the authors argue that “[r]etiring coal plants and other

[26] Two news articles by Maria Lynders, a former news fellow at WSHU Public Radio, discuss the concerns raised by Indigenous Nations regarding offshore wind projects (Lynders, 2023a; Lynders, 2023b).

fossil generation sites are similarly attractive for clean energy projects for their access to existing electric grid interconnections" (Klass & Wiseman, 2024, p. 27-8). With a disproportionate number of fossil fuel-fired power plants sited in environmental justice communities in the U.S., retiring and repurposing these sites for renewable energy development could be a strategy to advance energy justice by reducing pollution, creating local jobs and - with supportive policies - reducing energy bills (Cushing et al., 2022; Klass & Wiseman, 2024).

New York state has a few laws that support the myriad benefits of repurposed energy. For example, through its Build-Ready Program, the state focuses on renewable energy development on sites that are not actively being used, including inactive energy generation infrastructure sites (Klass & Wiseman, 2024; New York State, 2024a). Further, in "New York, anywhere renewable energy will be built, the legislature requires the developer to pay benefits in the form of electricity bill credits" (Klass & Wiseman, 2024, p. 22).[27] As Klass & Wiseman (2024) write:

> "Repurposed energy is important because the communities slated to host the bulk of the infrastructure for the energy transition are those that could—with careful design—benefit most from the transition, with the redevelopment of underused and abandoned industrial and other lands" (p. 16).

The benefits of repurposed energy projects could be extended even further with New York's Build Public Renewables Act, which "requires the New York Power Authority to establish a program allowing low- and moderate-income electricity customers in disadvantaged communities to receive credits on their monthly utility bills for any renewable energy produced by the power authority" (Hu, 2023). Thus, if New York Power Authority (NYPA) spearheaded a repurposed energy project, energy justice communities would receive discounts on their utility bills, while the state would assume responsibility for cleaning up any potentially hazardous sites.[28] Further, Klass & Wiseman, write: "Retaining local control over repurposed energy empowers communities to become energy leaders guiding their own destiny" (Klass & Wiseman, 2024, p. 29). In this vein, polluting energy infrastructure sites could be repurposed to host

[27] Klass & Wiseman (2024) explain that this law (N.Y. EXEC. § 94-c 5(f)) on renewable energy siting and energy bill credits applies to "energy projects that are 25 megawatts or more" (p. 20).
[28] Klass & Wiseman discuss liability issues around cleaning up brownfields and how 2002 amendments to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) "provided liability protection for "innocent owners," "contiguous landowners," and "bona fide prospective purchasers" that conduct "all appropriate inquiry" for the property; and otherwise confirmed and expanded EPA's approach to brownfield property redevelopment in terms of providing technical assistance, funding, and a range of liability assurances for existing and prospective property owners" (p. 40).

community solar projects - with the support of NYPA to mitigate any associated liability risks - which would promote community ownership of renewable energy projects and create discounts on energy bills in New York's supportive legal landscape, which includes net metering and VDER programs (Sustainable CUNY, 2015).

Energy Storage

Another issue that has been discussed in the EPPAC meetings and has appeared in comments from clean energy and environmental groups in the PSC's order for the grid planning process is how energy storage has the potential to play a key role in helping New York meet the CLCPA clean energy mandates and, thus, in turn, the grid planning process (New York Public Service Commission, 2023).[29] The PEAK Coalition, Union of Concerned Scientists, and scholars and energy storage experts Bethel Tarekegne et al. in the article "Energy Storage as an Equity Asset" all argue for the implementation of energy storage in place of fossil-fueled fired power plants to promote cleaner air in communities living near dirty power plants (PEAK Coalition, 2021; Union of Concerned Scientists, 2019; Tarekegne et al., 2021-b). Green hydrogen production has been a key consideration in the EPPAC process as a dispatchable emission free resource (DEFR) (New York Independent System Operator, 2024). Yet, even *green* hydrogen production can have negative impacts, such as diverting current renewable energy from the grid (as explained in a blog post by environmental scientist Julie McNamara) as well as energy inefficiency and potentially high costs of production (discussed in an interview by Salter with scholar Bob Howarth), which, as explained by McNamara et al. (2022), will ultimately be passed to consumers who pay for energy infrastructure upgrades (McNamara, 2023; Salter & Howarth, 2022; McNamara, 2022). In this vein, Sovacool & Dworkin (2015) put forth the question: "Does a proposed technology lock out low-carbon solutions" (p. 443). This question could help guide conversations in the EPPAC meetings around the energy infrastructure replacing polluting power plants to ensure that options such as hydrogen production do not lock out renewable energy infrastructure with greater benefits to local environmental justice communities who have historically been over-burdened by harmful energy infrastructure.

[29] For example, Alliance for Clean Energy New York (ACENY), Clean Energy Partners, and Environmental Defense Fund Renewables (EDFR) all mention issues around storage in their comments included in the PSC's order for the grid planning process (New York Public Service Commission, 2023).

It is important to note, however, that implementing energy storage without specific provisions for environmental justice communities may fall short of addressing distributive justice issues. McNamara et al. (2022) offer two examples of state policies that have been implemented to benefit environmental justice communities. First, California's Self-Generated Incentive Program addressed the issues of an inequitable distribution of program benefits by allocating around $100 million "to support the development of about 100 MW of stalled BTM battery projects by shifting funds that had been reserved for large-scale storage projects to more geographic-specific project in disadvantaged communities" (McNamara et al., 2022, p. 4). By switching from large-scale battery storage to distributed storage, the program works to advance an equitable distribution of renewable energy benefits. The second example is a case study in Vermont, where a solar company received funds from DOE to connect battery storage to "transmission lines in the state" that serve low-income communities and would lead to a decrease in "instances of excess renewable energy that has been curtailed by the New England ISO" (McNamara et al, 2022, p. 6). By selecting transmission lines in low-income communities, this project specifically sought to promote an equitable distribution of resources using energy storage. These examples demonstrate how a distributive justice framework can shape grid interconnection projects.[30]

Previous New York Grid Studies

The most recent study on New York's transmission, "The New York Power Grid Study" (PGS) completed in 2021, was initiated by the PSC as directed by the Accelerated Renewable Energy Growth and Community Benefit Act to advance transmission and distribution upgrades needed to reliably and cost effectively integrate the work to achieve the goals set forth in the CLCPA. Three studies were initiated by the PSC through this pathway and published in the PGS.. This study is of high interest, as it is very thorough, and accounts for many different parts of the power grid in New York State. However, within the three studies within the PGS, justice, equity, and disadvantaged communities are not often mentioned.

[30] New York also provides an example of distributing energy storage equitably. McNamara et al. (2022) note that: "The New York Public Service Commission, directed to do so by the state's legislature, has an ongoing docket that is intended to ultimately specify that a minimum percentage of energy storage projects should deliver clean energy benefits into zones within the New York Independent System Operator (NY-ISO) that serve disadvantaged communities" (p. 6).

There are three instances that language relevant to energy justice was used in the full report of the PGS. The first mention confronts a needed description of justice in the grid construction, reading:

> "In considering both aspects of a project, the Utilities recognize that regional differences should be considered in order to assess the impact on proposals meant to facilitate the CLCPA's mandates of delivering renewable power to New York's customers, reducing the reliance on fossil generation, and reducing emissions in environmental justice communities." (DPS & NYSERDA, 2021, p. 208)

This is the most direct mention in the PGS that construction of proposed transmission projects affect communities disproportionately. The second mention appears in a discussion of fossil fuel retirements that will affect energy production in New York, reading:

> "The regulation, referred to as the 'Peaker Rule,' complements the CLCPA and supports its objectives by reducing nitrogen oxide (NOx) emissions from fossil generation during the summer Ozone Season, which is disproportionately located in neighborhoods already overburdened by pollution, such as the South Bronx, Sunset Park in Brooklyn, and other Environmental Justice Communities." (DPS & NYSERDA, 2021, p. 255)

The final mention is also related to peaker plants, as Consolidated Edison Company of New York (CECONY) is proposing three actionable items that the Commission should take, reading:

> "Specifically, while the projects are needed to meet local system reliability needs, the Commission should recognize that such needs arise as a result of State action, taken as an initial step towards the achievement of CLCPA's climate goals, to reduce polluting emissions from the older peaking units located in New York City, many of which are in or near disadvantaged communities." (DPS & NYSERDA, 2021, p. 264)

While these three mentions show that there was some consideration of justice in the PGS, energy justice was not measured or accounted for in the study itself. The comments made regarding justice only refer to legislation related to energy justice and New York's grid. Metrics related to energy justice were not explicitly present in the PGS. With the knowledge that the report is 744 pages long, and three sentences total regard energy justice, it is clear that, while there is acknowledgement that there are energy justice issues present in New York's grid, the conductors of the study did not fully incorporate justice as something that needed to have dedicated space. This suggests that the PSC needs Equity and Justice metrics in order to actively incorporate energy justice into future grid studies.

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