

**STATE OF NEW YORK PUBLIC SERVICE COMMISSION**

Petition of Niagara Mohawk Power Corporation d/b/a National Grid )  
Seeking a Declaratory Ruling and the Authorization of Certain Limited )  
Relief in Relation to the New York State Standardized Interconnection ) Case 23-E-0730  
Requirements and Application Process For New Distributed Generators )  
and/or Energy Storage Systems 5 MW or Less Connected in Parallel )  
With Utility Distribution Systems )

**CLEAN ENERGY PARTIES COMMENTS IN RESPONSE TO NATIONAL GRID’S PETITION FOR A DECLARATORY RULING SEEKING EXPLICIT AUTHORIZATION TO IMPOSE UNCAPPED RETROACTIVE SCOPE AND BUDGET MODIFICATIONS ON INTERCONNECTION CUSTOMERS WITH DISTRIBUTED GENERATORS AND/OR ENERGY STORAGE SYSTEMS 5 MW OR LESS**

**I. Introduction**

A transparent and fair interconnection process is foundational to New York’s competitive power market, and is necessary to achieve the statutory requirements of the Climate Leadership and Community Protection Act (CLCPA). On December 22, 2023, National Grid submitted a petition to the Commission requesting a declaratory ruling that would fundamentally alter and undermine the integrity of New York’s interconnection process for distributed energy resources (DER). National Grid’s petition seeks a ruling from the Commission to affirm that New York utility companies can impose additional interconnection requirements upon an interconnection customer at any stage of the process “without limitations relative to the magnitude of the design scope change and corresponding cost impact whereby the interconnection applicant is responsible for the additional costs.”<sup>1</sup> The petition also requests that the Commission grant a Limited Waiver from certain provisions of the New York State Standardized Interconnection Requirements (SIR) to 45 distributed generators that were negatively impacted by National Grid’s erroneous grid impact studies, subsequent re-studies, delays, and retroactive modifications to the scope, timeline, and cost of required Distribution Upgrades.

The catalyst for National Grid’s petition was the utility’s inaccurate interconnection studies. In 2023, National Grid disclosed that it had been conducting erroneous grid impact studies for years. National Grid indicated that there were potential grid reliability issues that were not accounted for in their prior studies. While an exact number was never disclosed, National Grid indicated that approximately 60 distributed solar projects under development needed to be re-

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<sup>1</sup> Case 23-E-0730, Petition of Niagara Mohawk Power Corporation d/b/a National Grid for a Declaratory Ruling Concerning Certain Limited Relief Regarding Standardized Interconnection Requirements and Application Process for New Distributed Generators and/or Energy Storage Systems 5 MW or Less Connected in Parallel with Utility Distribution Systems. Filed December 22, 2023.

studied, and that additional Distribution Upgrades might be required. National Grid's failure to conduct accurate interconnection studies continues to cause significant financial harm to the solar companies that raised and invested private capital into solar projects based upon the Distribution Upgrade scopes of work and cost estimates provided by the utility prior to executing interconnection agreements. Rather than seeking to address the harm caused by its erroneous studies, National Grid's petition seeks Commission approval to impose 100% of the cost of the additional upgrades on the impacted interconnection customers. National Grid further seeks a declaratory ruling that would impose a similar uncapped liability for non-disclosed upgrades on future distributed generation customers statewide.

Reliable and accurate interconnection studies are the foundation of New York's distributed solar and storage market. Financiers only invest private capital into DERs after interconnection studies are complete, once costs and timelines for Distribution Upgrades are understood. If National Grid's requested ruling is granted, it will impose an unacceptable risk on interconnection customers and clean energy investors, who will not agree to assume an uncapped obligation to pay for utility change orders and cost overruns. Such a ruling would imperil progress toward New York's ambitious clean energy goals by jeopardizing future investment.

National Grid's petition is not in the public interest, and should be rejected unequivocally. Further, National Grid's inaccurate studies and the severe financial impacts on interconnection customers highlight the need for New York to strengthen the SIR to protect interconnection customers and ensure that utilities bear responsibility for conducting accurate interconnection studies. The Clean Energy Parties (CEP) urge the Public Service Commission to reject National Grid's petition, fairly allocate the cost of any required additional upgrades for the impacted projects, and commence an expedited proceeding to modify New York's SIR to establish a cost envelope that fairly allocates the risk of utility engineering errors, omissions and cost overruns in a manner that protects interconnection customers and encourages utilities to conduct accurate studies and manage their costs as they design and construct Distribution Upgrades. A decision that affirms New York's commitment to a fair interconnection process for DERs will strengthen New York's ability to leverage private capital, supporting cost-effective progress toward the state's legislatively mandated clean energy goals, and protect customers from the adverse effects of utility errors, omissions and negligence.

## **II. Background**

The catalyst for National Grid's petition was erroneous interconnection studies performed by the utility over many years that failed to detect potential grid reliability issues. In 2023, upon adopting new software and methods for conducting interconnection studies, National Grid determined that approximately 60 previously studied and approved solar projects in the utility's Western Division posed a potential reliability risk. In May and June 2023, National Grid disclosed these findings,

and indicated that further studies and potentially additional Distribution Upgrades would be needed to safely interconnect the projects. The affected solar projects, with an estimated combined capacity of approximately 300 MW, includes many projects in advanced stages of development and some that are fully constructed.

According to National Grid, the newly identified grid reliability issue relates to fault detection; the utility's sensors for fault detection rely upon the negative sequence current produced by synchronous generators. National Grid indicated that these sensors are less effective as more inverter-based generators and energy storage facilities are connected to the grid. This is an issue that the utility did not identify or disclose during the Coordinated Electric System Interconnection Reviews (CESIR) completed for the affected projects. Following the completion of the CESIRs, interconnection customers proceeded with typical development activities, such as signing interconnection agreements with the utility, making significant payments to the utility to complete Distribution Upgrades identified in the CESIRs, design & engineering, permitting, procuring equipment, and constructing the solar projects.

Throughout 2023, National Grid re-studied the affected projects using more sophisticated modeling software, a process that caused significant delays, financial damages, and uncertainty for approximately 60 distributed solar projects in advanced stages of development. In the summer of 2023, National Grid informed the affected interconnection customers and other stakeholders that their re-studies would evaluate both traditional Distribution Upgrades and alternatives, including the use of smart-inverter settings to address the newly identified grid reliability issue. Many modern inverters are capable of producing negative sequence current to emulate legacy synchronous generators. Impacted customers strongly preferred the use of smart-inverter settings versus traditional Distribution Upgrades because smart-inverter settings could be implemented immediately and at minimal cost.

In November 2023, National Grid issued abbreviated "Additional Upgrade Disclosures" to 45 of the impacted customers, each with substantial additional Distribution Upgrades. In violation to Section C Step 6 of New York's SIR, National Grid did not provide an updated CESIR, "detailed description of reasoning and justification for any system upgrades", or other supporting analysis with the Additional Upgrade Disclosures. National Grid's cost estimates for the additional Distribution Upgrades vary, but reach nearly half a million dollars per project in some cases. In all 45 cases, National Grid indicated that the upgrades would take 12-18 months to complete once they were initiated. The delays, uncertainty and increased costs resulting from National Grid's erroneous studies, re-studies, and retroactive scope modifications have caused (and continue to cause) material financial damages to the impacted interconnection customers. These interconnection customers relied upon the results of the utility CESIRs, their signed interconnection agreements with the utility, and the timelines in the SIR for planning and investment purposes.

On December 22, 2023, National Grid filed a petition seeking a declaratory ruling. Rather than seeking relief for the subset of projects harmed by the utility’s inaccurate interconnection studies, National Grid’s petition seeks a ruling that would enable New York utilities to impose additional interconnection requirements on customers at any stage of the process “without limitations relative to the magnitude of the design scope change and corresponding cost impact whereby the interconnection applicant is responsible for the additional costs.”<sup>2</sup> Such a ruling would enable National Grid to burden the 45 impacted interconnection customers with the additional Distribution Upgrade costs identified by their restudies. It would also impose 100% of the risk associated with utility errors, omissions, and cost overruns on interconnection customers; an intolerable risk that will impact New York’s ability to leverage private capital to support DER deployment. On January 11, 2024, one day before the comment deadline associated with the abbreviated Declaratory Ruling process, the Department of Public Service issued a notice extending the comment deadline to March 25, 2024 to allow stakeholders the opportunity to consider and respond to National Grid’s petition.

### **III. Summary of CEP Position**

Utilities are responsible for conducting interconnection studies that accurately identify required Distribution Upgrades and for providing reliable cost estimates. Without accurate CESIR results, signed interconnection agreements are contracts of limited value, and do not provide investors with the certainty they require to invest private capital into DERs. New York must be able to attract and efficiently leverage private capital for a competitive energy market and to drive rapid and cost-effective progress toward the state’s ambitious clean energy obligations. Distribution Upgrade costs and timelines must be understood early in the process in order to attract investment.

The CEP acknowledge that CESIR results provide cost *estimates*, and are subject to modification. However, there is a broad understanding that cost adjustments will be modest and attributable to factors outside of the utility’s control. This is why the SIR allows utilities to include a contingency in the CESIR cost estimate and also why it caps it at 15%. However, retroactive modifications to the scope of Distribution Upgrades after interconnection agreements are signed violates the intent of the SIR and reduces the bankability of signed interconnection agreements. National Grid’s requested ruling also inappropriately allocates risk from utility errors, omissions, and cost overruns onto interconnection customers, creating financing challenges for DER developers and perverse incentives for utilities. While interconnection customers knowingly assume some risk, the issue transpiring in National Grid’s Western District highlights the need

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<sup>2</sup> Case 23-E-0730, Petition of Niagara Mohawk Power Corporation d/b/a National Grid for a Declaratory Ruling Concerning Certain Limited Relief Regarding Standardized Interconnection Requirements and Application Process for New Distributed Generators and/or Energy Storage Systems 5 MW or Less Connected in Parallel with Utility Distribution Systems. Filed December 22, 2023.

to protect interconnection customers from unreasonable risk and to ensure that utilities have a clear incentive to conduct accurate CESIRs and manage the cost of Distribution Upgrades.

For these reasons, and others outlined in the comments below, the CEP strongly oppose National Grid's request for a Declaratory Ruling (Section III). Instead, the CEP urge the Commission to issue an order that addresses both the impacted interconnection customers that were re-studies and received Additional Upgrade Disclosures as well as the broader policy issue of ensuring reasonable cost and timeline certainty for Distribution Upgrades.

For the impacted interconnection customers, the CEP encourage the Commission to issue an order that: 1) directs National Grid to release full re-study results to impacted interconnection customers and DPS staff within five (5) business days; 2) directs National Grid to complete the construction of all additional Distribution Upgrades required to safely interconnect the impacted projects within twelve (12) months, and within six (6) months for solar projects that are partially or fully constructed; and 3) caps the costs for the 45 interconnection customers that received Additional Upgrade Disclosures at 115% of the cost estimate included in National Grid's original CESIR results provided prior to the execution of Interconnection Agreements, with any balance paid for by National Grid. National Grid's contributions toward these additional Distribution Upgrades should not count toward the utility's annual cost-sharing cap<sup>3</sup>, and National Grid's ability to recover these costs from ratepayers should depend upon the Commission's determination of whether the additional upgrades could have reasonably been detected and disclosed by National Grid at the time the CESIRs were completed. Finally, 4) the CEP encourage the Commission to direct National Grid to create a list of encumbered substations that are affected by this issue or that cannot economically accommodate additional DER capacity, thereby providing greater transparency to DER developers.

With regard to the broader policy question of how to provide reasonable cost certainty and prevent retroactive scope and budget modifications for interconnection upgrades, the unfolding issue in National Grid's Western District highlights the need for New York to modify its SIR to more fairly allocate risk among interconnection customers and utilities. The CEP recommend that New York create a cost envelope, whereby utility upgrade costs borne by interconnection customers never exceed the 15% contingency utilities can include on the cost estimate provided to interconnection customers following the completion of a CESIR. Such a cap is appropriate for utility monopolies who otherwise lack any incentive to complete accurate CESIRs or to avoid cost overruns with Distribution Upgrades. It is also necessary to ensure that New York can continue to efficiently leverage private capital to deploy DERs and make cost-effective progress toward New York's clean energy goals. There are examples of cost envelopes in other mature DER markets, such as Massachusetts and California, which could serve as models to inform

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<sup>3</sup> New York Standardized Interconnection Requirements. Appendix E, Section (2)(c)(4). <https://dps.ny.gov/system/files/documents/2024/02/sir-effective-february-1-2024.pdf>. Accessed March 17, 2024.

New York's interconnection cost envelope. Therefore, the CEP encourage the Commission to issue an order that: 1) affirms New York's intent to create a cost envelope for DER interconnection; and 2) directs DPS staff to confer with stakeholders and file a proposal for SIR modifications to create an interconnection cost envelope within 120 days.

#### **IV. Importance of Distributed Energy Resources**

To date, the solar industry has installed approximately 5.3 gigawatts-DC of distributed solar generating capacity in New York. The industry is on track to install 6 GW by this year, achieving the first goal in the CLCPA one year ahead of schedule. The industry is already making significant progress toward New York's expanded goal of 10 GW of distributed solar by 2030. According to New York State Energy Research and Development Authority (NYSERDA), 10 GW of distributed solar will leverage approximately \$10B in private investment and provide immense benefits to New Yorkers, including more than \$1 billion in annual utility bill savings for participating ratepayers (a growing percentage of whom are low- to moderate-income) while eliminating millions of metric tons of carbon emissions and supporting more than 13,000 jobs in the solar industry.<sup>45</sup> New York's distributed solar and storage industry is also significantly contributing to New York's grid modernization, contributing hundreds of millions of dollars into utility infrastructure upgrades over the last decade. New York is poised to benefit from similar investments in energy storage assets, critical infrastructure that will allow New York to reduce its reliance on fossil fuels and mitigate the need for costly transmission and distribution upgrades. This distributed solar and storage capacity will also provide: significant cost savings to non-participating ratepayers in the form of wholesale price suppression; recurring revenue to rural landowners and municipalities hosting clean energy projects through lease payments, property taxes and PILOTs; and reduced localized air pollution from fossil fuel combustion, mitigating adverse health impacts borne by New Yorkers in environmental justice communities across the state.

#### **V. Financial Harm Caused by National Grid's Erroneous Interconnection Studies**

The delays incurred to date have already caused significant financial harm to the impacted solar companies. If the costs of the additional Distribution Upgrades identified in the re-studies are imposed on the interconnection customers, it will cause further harm. The financial harm caused by delays and uncertainty varies, but is generally most severe for the subset of projects that are fully or partially constructed. DER developers often use relatively expensive construction financing to pay for equipment and labor during project development and construction. Failure

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<sup>4</sup> <https://www.governor.ny.gov/news/governor-hochul-announces-new-framework-achieve-least-10-gigawatts-distributed-solar-2030>. April 2022.

<sup>5</sup> New York Department of Public Service and NYSERDA. CASE 21-E-0629. New York's 10 GW Distributed Solar Roadmap: Policy Options for Continued Growth in Distributed Solar. December 2022.

to reach certain construction milestones by deadlines can put a project in default, which remedies typically include at their worst, foreclosure.

System commissioning is also typically the milestone when a developer is paid for the years of work that went into developing the project. Upon commissioning, the system begins generating recurring revenue through the Value of Distributed Energy Resources (VDER) tariff and customer subscription payments. Commissioning is also the date that projects become eligible to receive the 30% federal Investment Tax Credit and any reserved NYSERDA NY-Sun incentives. If a fully constructed project cannot be commissioned, the developer is often paying or accruing monthly interest charges on their construction financing, making lease and tax/PILOT payments, and incurring other operating expenses without generating any revenue and without being able to access the federal and state incentives reserved for the project.

In addition to causing financial harm to individual impacted projects, the ongoing delays are causing harm across portfolios of unimpacted DERs. DERs are relatively small, and it is common for a DER developer to aggregate several DERs together in a special purpose entity to achieve the scale necessary to secure cost-effective financing. Some of the impacted projects are in portfolios with tax-equity and debt providers that have already negotiated and executed all the relevant legal documents, and for which 2023 commissioning dates were expected. Removing a project from a special purpose entity or changing the anticipated commissioning date for a project can be complicated and costly. Another way that the ongoing delays are causing harm to developers with projects in advanced stages is by tying up their capital and straining their cash flow. Developers that reasonably anticipated to commission one or more projects in 2023 may have anticipated an infusion of cash to repay their construction debt and support future project development activities. Moving these dates into the future while imposing cost uncertainty have a major impact on developers, especially smaller developers or developers with multiple impacted projects.

If the full cost of National Grid's recently issued additional Distribution Upgrades must be borne by the impacted customers, this will make a bad situation worse. Interconnection customers understand that CESIR cost estimates are subject to change. However, most interconnection customers reasonably anticipate that cost variation will be modest, within the 15% contingency allowed per the SIR, and tied to factors outside of the utility's control, such as inflation. Material scope modifications or new Distribution Upgrades identified *after* interconnection customers have signed interconnection agreements, paid for the Distribution Upgrades identified in the CESIRs, and in some cases fully constructed their projects, is well outside the bounds of what interconnection customers could reasonably anticipate, and clearly violates the intent of the SIR.

If these costs are imposed on the customers, some will pay for the additional Distribution Upgrades because they are so far into a project that paying for the additional upgrade is the

least financially damaging option. Others will determine that the additional unbudgeted expense is too much, and their project is no longer economically viable. Those customers may cancel their projects and write off the significant losses they incurred developing the projects; a harmful outcome for the individual solar companies as well as the many other stakeholders who stand to benefit from the projects. Exercising either of these options could derail the sale of a portfolio of projects and result in significant financial losses from which an impacted solar developer may not be able to financially recover. Rather than creating 45 cautionary tales about the risks of developing DERs in New York, the CEP encourage the Commission to take action affirming New York's commitment to a fair and transparent interconnection process.

## **VI. CEP Response to Request for Declaratory Ruling**

The CEP unequivocally oppose National Grid's requested relief. National Grid is requesting that the Commission affirm that New York utility companies may impose additional obligations upon an interconnection customer after interconnection agreements are signed, and at any stage of the process through commissioning and reconciliation. National Grid is requesting that the Commission grant monopoly utilities unfettered permission to retroactively impose additional obligations on interconnection customers, including obligations not disclosed or contemplated prior to the execution of the interconnection agreement, "without limitations relative to the magnitude of the design scope change and corresponding cost impact whereby the interconnection applicant is responsible for the additional costs."<sup>6</sup> Such a decision would undermine New York's interconnection process and have a chilling effect on New York's distributed solar and storage industry, reducing New York's access to private capital and increasing the cost of New York's energy supply and CLCPA compliance. The following pages describe the nature of the CEP's opposition to National Grid's request for a Declaratory Ruling, and also include an alternative proposal that the CEP believe is fairer and more appropriate, aligns with the intent of the SIR, and which better serves the public interest.

### **A. National Grid's Requested Declaratory Ruling is Not in the Public Interest**

The impact of the requested Declaratory Ruling is far more significant than National Grid's petition suggests, and threatens to limit competition, impede clean energy deployment statewide, harm New York's workforce, and increase CLCPA compliance costs for ratepayers. A ruling from the Commission affirming National Grid's assertion that interconnection customers must assume uncapped liability for interconnection upgrade modifications, even in cases of utility errors, omissions and negligence, would have a chilling effect on New York's distributed energy resources market. Investors will no longer be able to rely upon utility cost estimates from CESIR studies and signed interconnection agreements will be contracts of little value. Independent power producers and investors will perceive New York as a high-risk market, driving up the cost

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<sup>6</sup> Case 23-E-0730, National Grid Petition for Declaratory Ruling, December 22, 2023.



of capital, slowing clean energy deployment, and driving up the cost of CLCPA compliance for ratepayers. Such a ruling would drive hundreds of millions of dollars out of New York and limit competition; an outcome that is contrary to the objectives of Competitive Opportunities Regarding Electric Service and more recently Reforming the Energy Vision. National Grid's petition would limit competition and drive up the costs for New York to comply with the CLCPA.

## **B. National Grid's Errors and Omissions are the Root Cause**

Utilities have a responsibility to manage their electrical distribution system, which includes conducting accurate grid impact studies in order to safely interconnect distributed generators. National Grid failed to conduct accurate CESIRs, and the utility is abdicating that responsibility in their petition by seeking to impose 100% of the additional costs on their interconnection customers. National Grid is claiming that the interconnection customers should bear full responsibility for the additional upgrades that were not disclosed due to the utilities' engineering errors and omissions, with no regard to who is at fault for these errors, or the fact that they arose after Interconnection Agreements had already been signed.

National Grid's approach is to essentially state that the utilities have zero responsibility to complete thorough and accurate studies and to produce cost estimates in a timely manner. While interconnection customers are responsible for the cost of interconnection upgrades that are triggered by their project, the Commission must require utilities to identify those costs in a commercially reasonable manner and hold them responsible when they do not. While it is reasonable to apply the cost causer rule when costs are identified in the manner intended by the SIR, it is not reasonable to place no limit on when those costs can be identified. The interconnection customers in question have had no meaningful opportunity to make a reasonable decision about whether to bear the costs in question because they have been imposed after substantial investments have already been made based upon the information provided at the time the Interconnection Agreements were signed. Thus, as the Commission considers National Grid's petition, the CEP encourage the Commission to require utilities to assume meaningful financial responsibility when their actions fall well outside of the expectations of the SIR.

The CEP appreciate that, as New York achieves higher rates of DER penetration, new grid reliability issues and challenges may come to light. However, it is the utilities' responsibility to utilize whatever tools are most appropriate to accurately study new DERs. In the case of the projects that underwent re-studies last year, National Grid could have identified technical flaws in their modeling far sooner than they did. In September 2015, more than eight years ago, the New York Department of Public Service (DPS) issued a report titled *Interconnection of Distributed Generation in New York State: A Utility Readiness Assessment*. This report highlights the diversity of tools used by utilities to conduct CESIR studies, and also highlights that some

utilities (see Central Hudson in table below) were already using distinct tools to model synchronous and inverter-based generators back in 2015.<sup>7</sup>

**Table 8. Tools used by utilities during interconnection application process**

Source: Self-assessment summaries provided by utilities

Application Process Step	Central Hudson	ConEd	Iberdrola	National Grid	Orange & Rockland	PSEG LI
Application received	Web Portal	Project Center	Email	Email	Project Center	Email
Application reviewed for completeness	Mainframe, Access, Excel	Pega	Email	Email	NUCON	Email
External application tracking (sharing detailed information with customer about application status)	Web Portal	Project Center	Email, phone	Email, phone	Project Center	Email, phone
Add DG system to utility mapping	ESRI	GIS (in development), Vision Maps	GIS (in development)	SmallWorld	NRG	GIS
Screening or technical review	OMS, Excel (DEW for > 50 kW)	PVL	CYME, GIS	SmallWorld, FeedPro, MATLAB	NRG	Excel
Full CESIR	Inverter Based – WindMil  Non-Inverter Based – Aspen	PVL	Aspen, Cyme	Cyme, Aspen, SmallWorld, Excel, ABB EMS	DEW	Excel, Cyme, Aspen

In October of 2017, DPS and NYSERDA commissioned and published another technical interconnection report which notes that “CESIR studies...involve the full suite of tools available at the engineer’s disposal to develop the analysis, including power flow and short-circuit studies (*the individual software package utilized is likely inconsequential so long as they include these basic elements*). CESIRs are intended to be the final word on an interconnection request under the current system structure.”<sup>8</sup>

It is solely the utility’s responsibility to conduct accurate interconnection studies based upon the materials provided by the interconnection customer. Pursuant to the SIR, customers must

<sup>7</sup> Electric Power Research Institute. Interconnection of Distributed Generation in New York State: A Utility Readiness Assessment. Prepared for NY Department of Public Service and NYSERDA. <https://dps.ny.gov/system/files/documents/2022/11/epri-rpt-interconnection-of-dg-in-ny-state-complete-sept-2015.pdf>. September 2015.

<sup>8</sup> Electric Power Research Institute. Recommendations for Harmonizing Distributed Generation Interconnection Practices: Technical Review Processes in NY State. Prepared for DPS and NYSERDA. <https://dps.ny.gov/system/files/documents/2022/11/recommendations-for-harmonizing-distributed-generation-interconnection-practices-final-oct.pdf>. October 2017.

provide electric line diagrams that clearly denote the presence of inverters and any protection equipment, along with UL certifications, equipment spec sheets, and more. Interconnection customers furnished these materials to National Grid, and these materials are more than sufficient for National Grid to accurately model the impacts of inverter-based generators on its system. National Grid's failure to do so, whether that failure is due to their own errors and omissions or emergent technical issues that could not have been reasonably identified by the utility, should not create an uncapped financial liability for the interconnection customers *after the signing of Interconnection Agreements*.

### **C. National Grid has not Provided Adequate Data to Justify their Scope and Budget Modifications**

In November 2023, following National Grid's re-studies of impacted projects, no restudy results were provided to the affected interconnection customers; the utility only provided Additional Upgrade Disclosures with limited information regarding the cost and scope of additional upgrades required as a result of the re-studies. The disclosures do not comply with the SIR requirement that utilities provide "detailed description of reasoning and justification for any system upgrades and associated equipment deemed necessary for interconnection of the project."<sup>9</sup> It is critical for National Grid to provide this information to interconnection customers, as it is otherwise impossible for them to evaluate the veracity of National Grid's assertion that additional upgrades are needed, and that they've identified are in-fact the most appropriate and affordable option.

One reason that the CEP and impacted developers request additional transparency is because National Grid's re-study results and their stakeholder communication since the completion of their re-studies omit any information regarding evaluation of smart-inverter settings in lieu of the recommended Distribution Upgrades. In multiple meeting with DPS and industry, National Grid indicated it was evaluating the use of this low or no cost solution, but has said nothing about why it is not recommending its use since then. On June 5, 2023, National Grid disseminated a memorandum to solar industry stakeholders titled "Summary of DG Inverter Upgrade Needs: Results from Engineering Modeling Updates" (Attachment B). This document notes that the primary technical issue that needed to be solved relates to fault detection. National Grid notes that their electric distribution system is equipped with sensors that detect faults using negative sequence current, a byproduct of synchronous generators. Standard inverter-based generators do not produce this "noise on the grid", which reduces the effectiveness of the utilities' existing fault detection scheme as inverter-based generators become the dominant source of power generation.

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<sup>9</sup> New York State Public Service Commission. New York State Standardized Interconnection Requirements and Application Process. Effective May 1, 2023. Section I, Step 6.

National Grid's June memorandum states that "National Grid is also exploring the possibility of adding functionality to inverter-based generation to replicate synchronous generator characteristics. Specifically, National Grid is reviewing the potential for inverter-based generation to produce negative sequence current, similar to a synchronous generator". NYSEIA connected National Grid with inverter manufacturers, who provided National Grid with the requested data and models for their analysis. Many of these manufacturers confirmed that it is possible to modify their inverters' settings to generate negative sequence current, as proposed by National Grid. This software-based solution was strongly preferred by impacted developers versus the Distribution Upgrades that were included in the final Additional Upgrade Disclosures because smart-inverter settings do not impose additional costs or delays on the impacted solar projects. Despite significant discussion of this option throughout the re-study period, National Grid has not provided any evidence that they evaluated this option. The CEP do not believe National Grid prescribed this no-cost solution for any of the impacted projects, nor did it provide any explanation for why this option is not acceptable. The CEP respectfully request that National Grid disclose the full findings of this analysis, which are relevant to this cohort of projects and could also provide valuable insights as New York plans for our future grid, which will be powered by a growing proportion of inverter-based generation.

## **VII. Interconnection Upgrade Costs and Timelines Must be Transparent and Adhered to by the Utility**

Interconnection upgrade requirements, and the associated timelines and costs, are highly variable and can be prohibitive for many proposed DERs. As such, evaluating interconnection options is the first major step of project development. The CESIR contains critical information that enables DER developers to make a go/no-go decision based on economic feasibility. Once a developer determines economic feasibility based on CESIR results, they will incur significant additional project development expenses in order to advance permitting, interconnection upgrades, financing and eventually construction. As noted in the DPS/NYSERDA 2017 report *Recommendations for Harmonizing Distributed Generation Interconnection Practices: Technical Review Processes in NY State*, the cost estimate resulting from the CESIR study is intended to be the "final word" on an interconnection request.

The reason it is so important for these costs to be understood by the time the project signs an interconnection agreement is that this is a critical stage for obtaining financing. To obtain financing, the investors will need to have a clear understanding of the project costs and risks to justify deploying private capital for subsequent development activities. National Grid is requesting that the Commission issue a Declaratory Ruling stating that interconnection upgrade scopes and costs can be materially changed by the utilities without limitation all the way through the reconciliation process, or until approximately three months *after* final system commissioning. Modest variation between original cost estimates and final costs is anticipated within the 15%

contingency allowable per the SIR, however, customers with completed CESIRs and signed interconnection agreements do not expect utilities to identify entirely new upgrades. National Grid's request seeks to greatly expand what modifications are allowable, and is fundamentally misaligned with the development process, as it would impose an unreasonable uncapped liability on developers and render the CESIR results and interconnection agreement meaningless. Interconnection upgrade costs and timelines must be understood early in the development process to continue attracting private capital to New York so it can be leveraged to underwrite New York's clean energy transition at a lower cost to ratepayers. Failure to do so is likely to significantly increase the cost of capital and result in fewer viable projects.

In National Grid's petition for declaratory ruling, the utility mischaracterizes industry's lack of vocal objection to the Joint Utilities' (JU) December 2022 proposed SIR modifications<sup>10</sup> that directed utilities to provide updated estimates between the CESIR and the reconciliation process as support for the utility's current petition seeking to impose uncapped liability on interconnection customers. Pursuant to the JU 2022 SIR modification proposal, Section I-D of the SIR now states as follows:

Within (10) Business Days of completion of design work, the utility will provide an updated upgrade cost estimate if the scope of work changed from the CESIR estimate.<sup>11</sup>

This proposal and language were initiated and drafted by the JU, and included in a petition on an unrelated matter from the Interconnection Policy Working Group and Interconnection Technical Working Group. The JU's stated intent of the revision was that, in rare cases, minor scope and budget changes may be identified when the utility completes its final design. The DER industry's understanding was that these changes would not materially deviate from the original scope of work that was used to produce the cost estimate. Industry stakeholders agreed with the JU that receiving this information as soon as possible would be beneficial from a planning perspective. The CEP maintain that it is critical for interconnection customers to receive accurate information regarding the cost, timeline and scope of Distribution Upgrades as soon as possible. Unfortunately, National Grid is now mischaracterizing industry's support for transparency as consent to uncapped retroactive scope and budget modifications, which industry vehemently opposes.

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<sup>10</sup> Case 22-E-0713. Petition of the IPWG/ITWG Members Seeking Certain Minor Amendments to the New York State Standardized Requirements (SIR) for New Distributed Generators and/or Energy Storage Systems 5 MW or Less Connected in Parallel with Utility Distribution Systems. December 22, 2022.

<sup>11</sup> New York State Standardized Interconnection Requirements and Application Process. Effective May 1, 2023.

## **VIII. CEP Recommendations**

For the reasons outlined above, the CEP recommend that the Commission reject National Grid's petition, and issue an order that 1) definitively establishes a fair, near-term resolution for the 45 impacted projects that received Additional Upgrade Disclosures; and 2) initiates a process to provide greater cost-certainty to future interconnection customers.

### **A. National Grid Should Disclose Re-Study Results, Expedite Additional Upgrades, and Bear Costs in Excess of the 15% Contingency for the 45 Impacted Projects**

The CEP urge the Commission to compel National Grid to provide an adequate, just and reasonable resolution for the 45 interconnection customers in National Grid's Western District that are in limbo due to the ongoing delays and Additional Upgrade Disclosures. While these project developers have incurred, and continue to incur, material financial damages, the CEP's primary focus is on mitigating further harm. The CEP encourage the Commission to issue an order that: 1) directs National Grid to release full re-study results to impacted interconnection customers and DPS staff within five (5) business days; 2) directs National Grid to complete the construction of all additional Distribution Upgrades required to safely interconnect the impacted projects within twelve (12) months, and within six (6) months for solar projects that are partially or fully constructed; and 3) caps the costs for the 45 interconnection customers that received Additional Upgrade Disclosures at 115% of the cost estimate included in National Grid's CESIR provided prior to the execution of Interconnection Agreements, with any excess paid for by National Grid. National Grid's contributions toward these additional Distribution Upgrades should not count toward the utility's annual cost-sharing cap in Appendix E of the SIR. Finally, the CEP encourage the Commission to suspend interconnection payment deadlines for interconnection customers with queue positions behind the 45 impacted projects on the same substations, as the economic feasibility of these projects depend on the outcome for the 45 impacted projects.

#### **1. Re-Study Results Must be Released**

Throughout 2023, National Grid conducted re-studies for approximately 60 previously studied DERs. In November 2023, National Grid issued Additional Upgrade Disclosures to 45 interconnection customers following the completion of these studies. However, these disclosures included limited information, and do not comply with the SIR requirement that utilities provide "detailed description of reasoning and justification for any system upgrades and associated equipment deemed necessary for interconnection of the project." The full results should be provided to all interconnection customers that were restudied, and to DPS staff so they can more fully understand the technical issue identified by National Grid and which of the proposed solutions were evaluated. The CEP believe five business days is a sufficient amount of time for National Grid to release these study results, as the studies are already complete.

## **2. All Additional Distribution Upgrades Should be Completed Within 12 Months, and Within 6 Months for Constructed Projects**

The primary scope of work included in National Grid's Additional Upgrade Disclosures is replacing antiquated relays at substations. National Grid's November 2023 disclosures include an estimated 12- to 18-month timeline to complete these upgrades. Considering the significant financial damages to interconnection customers caused by ongoing delays, The CEP encourage the Commission to direct National Grid to complete all the required upgrades in no more than 12 months, and within no more than 6 months for solar projects that are already partially or fully constructed.

## **3. Interconnection Costs Should be Capped at 115% of the CESIR Cost Estimate**

For the 45 interconnection customers that received Additional Upgrade Disclosures, the CEP recommend that the Commission cap the interconnection customers' total financial contribution at 115% of the cost estimate included in the CESIR, with the balance paid for by National Grid. This cost allocation is reasonable, as the interconnection customers should have reasonably expected cost increases of up to 15% based on the SIR allowance for a 15% contingency. The balance should be borne by National Grid, as the utility is responsible for conducting accurate interconnection studies and their failure to detect grid reliability issues has already imposed significant unanticipated costs on the impacted interconnection customers. National Grid's ability to recover their portion of the upgrade costs from their rate base should be dependent upon the Commission's determination of whether the additional upgrades could have reasonably been detected and disclosed by National Grid at the time the CESIR studies were completed. These 45 generators are impacted by extraordinary circumstance, so if the Commission determines that National Grid should be able to recover these costs, the CEP recommend that any rate base cost recovery associated with this discrete subset of projects not count toward the 2% annual cost-sharing cap defined Appendix E of the SIR. This will ensure that a fair resolution for this subset of interconnection customers doesn't impede progress for other 2024 DERs that would benefit from participating in cost-sharing 2.0.

For the sake of clarity, an example of the CEP's proposal is included below:

*Example Project CESIR Cost Estimate: \$500,000*

*Example Project Additional Upgrade Disclosure: \$100,000*

*In this example, under the CEP proposal, the owner of this project would be responsible for no more than 115% of the CESIR cost estimate, or \$575,000 (\$500,000 X 115%). Therefore, National Grid would be able to charge the interconnection customer an additional \$75,000 to complete the additional upgrade, and National Grid's contribution toward the additional upgrade would be \$25,000.*

#### **4. National Grid Should Create a Public List of Encumbered Substations**

The CEP recommend that National Grid create a list of encumbered substations that are affected by the newly identified sub-transmission reliability issue and cannot economically accommodate additional DER capacity, thereby providing greater transparency to DER developers. NYSEG currently maintains such a list for its service territory<sup>12</sup>, and this transparency supports efficient DER development.

#### **B. The Commission Should Modify the SIR to Include a Clear Cost Envelope for All Future DERs**

The CEP recommend that the Commission affirm its intent to create an interconnection cost envelope and direct DPS to confer stakeholders and file proposed SIR modification to create an interconnection cost envelope within 120 days of an order.

As stated above, DER developers must have a clear understanding of interconnection costs early in the project development process in order to raise capital and deploy clean energy resources. A cost envelope would create cost certainty for DER developers, allowing New York to enjoy and leverage private capital to enable progress toward New York's clean energy goals. A cost envelope is also necessary to ensure that utilities are responsible for producing accurate CESIR studies and managing the cost of Distribution Upgrades. If utilities have no financial liability for the accuracy of their estimates, or even the manner in which they manage the construction process, then there is no incentive to ensure that they get it right and manage the process efficiently. This is a classic case of where regulation of the monopoly is essential. In a normal competitive market if a contractor fails to adequately estimate or price work, customers will choose to go elsewhere. Regulated monopolies have no such pressure, and, for this reason, the PSC should establish regulations to align utilities' incentives with the public interest. The CEP appreciate the Commission's concerns regarding ratepayer impacts, and a cost envelope could be designed to mitigate risk for ratepayers.

The CEP recommend that this cost envelope cap Distribution Upgrade costs borne by interconnection customers at the 15% contingency that can already be included in the cost estimate provided by the utility following the completion of a CESIR, pursuant to Section I Step 6 of the SIR. The SIR states that "utility cost estimates provided in the CESIR shall be detailed and broken down by specific equipment requirements, material needs, labor, overhead, and any other categories or efforts incorporated in the estimate. Contingencies associated with the cost estimates shall not exceed 15%." Interconnection customers are accustomed to assuming risk for up to 15% cost increases and the CEP believe this is an appropriate cap. The CEP recommend that any utility cost overruns beyond the 15% contingency be borne by the utility company itself. The CEP only support recovery of utility cost overruns from ratepayers in

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<sup>12</sup> <https://www.nyseg.com/smartenergy/innovation/distributedgeneration>. Accessed March 25, 2024.



circumstances where the utility has demonstrated to the Commission that the costs were reasonable, unavoidable, and could not have been foreseen by the utility at the time the CESIR was completed.

Establishing a cost envelope will ensure that New York can continue to efficiently leverage private capital to deploy DERs and make cost-effective progress toward New York's clean energy goals. There are compelling examples of cost envelopes in other mature DER markets, including Massachusetts (where National Grid operates) and California. New York should examine these policies and consider how to provide enhanced cost certainty in New York. Therefore, the CEP encourage the Commission to issue an order that: 1) affirms New York's intent to create a cost envelope for DER interconnection; and 2) directs DPS staff to confer with stakeholders and file a proposal for SIR modifications to create an interconnection cost envelope within 120 days.

## **IX. Conclusion**

Maintaining a competitive energy market and achieving New York State's ambitious clean energy goals requires a fair, transparent and reliable interconnection process that adequately protects interconnecting customers from risk caused by utility errors and omissions. National Grid's inaccurate interconnection studies have caused material financial harm to interconnection customers, and National Grid's requested ruling would undermine New York's interconnection process. The CEP strongly oppose National Grid's request for a Declaratory Ruling. The CEP urge the Commission to reject the petition, and to issue an Order that: a) definitively establishes a fair, near-term resolution for the 45 impacted projects that received Additional Upgrade Disclosures by: 1) directing National Grid to release full re-study results to impacted interconnection customers and DPS staff within five (5) business days; 2) directing National Grid to complete the construction of all additional Distribution Upgrades required to safely interconnect the impacted projects within twelve (12) months, and within six (6) months for solar projects that are partially or fully constructed; and 3) capping the costs for the 45 interconnection customers that received Additional Upgrade Disclosures at 115% of the cost estimate included in National Grid's original CESIR results provided prior to the execution of Interconnection Agreements, with any balance paid for by National Grid. National Grid's contributions toward these additional Distribution Upgrades should not count toward the utility's annual cost-sharing cap<sup>13</sup>, and National Grid's ability to recover these costs from ratepayers should depend upon the Commission's determination of whether the additional upgrades could have reasonably been detected and disclosed by National Grid at the time the CESIRs were completed; and 4) direct National Grid to create a list of encumbered substations that are affected by this issue or that cannot economically accommodate additional DER capacity, thereby providing greater

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<sup>13</sup> New York Standardized Interconnection Requirements. Appendix E, Section (2)(c)(4). <https://dps.ny.gov/system/files/documents/2024/02/sir-effective-february-1-2024.pdf>. Accessed March 17, 2024.

transparency to DER developers; and b) directs DPS staff to confer with stakeholders and file an interconnection cost envelope proposal within 120 days. Such an order would demonstrate New York's commitment to a fair and transparent interconnection process, affirm the value of signed Interconnection Agreements to financiers, and support continued progress toward New York's ambitious clean energy goals.

The CEP thank the Commission and DPS Staff for its attention to this important matter, and for the opportunity to provide input.

## **X. Attachments**

***ATTACHMENT A - NYSEIA Letter to the Commission (September 6, 2023)***

***ATTACHMENT B - National Grid Summary of DG Inverter Upgrade Needs: Results from Engineering Modeling Updates (June 5, 2023)***



September 6, 2023

SENT VIA ELECTRONIC COMMUNICATION

Hon. Michelle Phillips  
Secretary to the Commission  
New York State Public Service Commission  
Empire State Plaza, Agency Building 3  
Albany, NY 12223-1350  
CC: Doreen Harris, NYSERDA; David Sandbank, NYSERDA; John O’Leary, New York State Executive Chamber

**National Grid DER Re-Studies in Western New York: Financial and Clean Energy Deployment Implications**

Dear Chair Christian and New York Public Service Commission,

I’m writing on behalf of the New York Solar Energy Industries Association (NYSEIA) to bring an ongoing utility interconnection issue to your attention. Earlier this year, National Grid identified potential grid reliability issues in Western New York that threaten the feasibility of at least 60 distributed scale solar projects, with a combined capacity in excess of 300 MW-AC (~450 MW-DC). National Grid is re-studying the projects now using the PSCAD modeling software. NYSEIA respectfully requests that the Department of Public Service encourage National Grid to provide preliminary study results (PSCAD), initially expected in August, as soon as possible and move towards resolution of the potential grid reliability issue through no- or low-cost solutions that can be quickly implemented to limit damages incurred by companies that have millions of dollars invested into these solar projects.

The new issues that National Grid identified are impacting projects that were previously studied and approved. The 60+ solar projects underwent utility grid impact studies, and were granted interconnection approval under New York Standardized Interconnection Requirements. Based upon signed interconnection agreements with the utility, solar companies proceeded with municipal permitting, financing, contracting, grid upgrade payments, and (in many cases)

construction. In May and June 2023, these solar companies were notified by National Grid that the previously completed grid impact studies were potentially invalid, and the projects needed to be re-studied using different software; a time-consuming process that National Grid indicated could result in additional costly grid upgrades.

This interconnection issue came to light following the adoption of new software (ASPEN V14 → ASPEN V15) by National Grid in the fall of 2022 for evaluating the system impacts of integrating distributed energy resources (DER). National Grid's protection engineering and distribution planning teams identified potential concerns related to the protection of sub-transmission lines (69KV) spanning across Western New York. The updated software provided a more precise analysis of inverter fault response to sequence currents and voltages than the previous version.

Recognizing the paramount importance of maintaining reliability, NYSEIA and its affected members wholeheartedly support National Grid's endeavor to conduct supplementary studies beyond the standard interconnection process, with the goal of identifying timely and cost-effective solutions to enable these clean energy projects to proceed while maintaining the region's overall power reliability. Nonetheless, NYSEIA writes this letter to inform you of the significant risk and potential damages this approach is inflicting upon the 60+ impacted projects. These DER projects require complex financing and permitting procedures, all of which have been substantially disrupted by these additional studies.

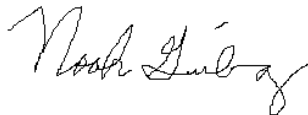
Regrettably, NYSEIA and the affected developers were only made aware of this issue in late May 2023. This sudden revelation resulted in the suspension of DER interconnection requests in Zone A (and in some cases Zone B) and further caused the postponement of final verification and commissioning of several solar projects that are fully constructed. In early July 2023, National Grid communicated its intention to conclude the supplementary studies by August 2023. However, in a subsequent August webinar, National Grid extended the anticipated study period to late October or even November.

The DER industry acknowledges and values National Grid's commitment to addressing this issue, yet we are concerned that the initial timeline communicated by the utility is not being followed. We want to be certain that the Public Service Commission, NYSERDA and the Governor's Office are aware of the severe financial ramifications of these prolonged delays, and potential project cancellations or postponements based upon pending study results, which could include significant costs that were not included in the original study results. This issue not only jeopardizes the economic viability of DER projects, but imperils the financial stability of the clean energy companies involved. Furthermore, these DER projects are bound by the timelines stipulated by their permitting municipalities and financiers. Any failure to adhere to these timelines could potentially lead to project cancellations or liquidated damages.

In light of these circumstances, we respectfully request that New York State urge National Grid to quickly complete re-studies and to identify and implement low- and no-cost solutions that enable these projects to proceed. We also request that the Commission acknowledge, and take into account, the individual and collective financial impacts that this issue is having on DER developers if and when this issue comes before the Commission in a formal petition. These projects are facing escalating financial pressure as they are forced to navigate prolonged uncertainties and delays. Urgent action is needed to prevent harm to New York's DER industry, as well as the state's broader clean energy ambitions.

Thank you for your attention to this matter. We welcome the opportunity to speak with you regarding this issue. We remain hopeful that National Grid will expedite their re-studies and identify solutions that allow these projects to proceed safely, expeditiously and cost-effectively, thereby limiting harm to solar developers, protecting ratepayers, and maintaining progress toward New York's ambitious clean energy goals.

Sincerely,

A handwritten signature in cursive script that reads "Noah Ginsburg".

Noah Ginsburg  
Executive Director  
New York Solar Energy Industries Association

CC: Doreen Harris, NYSERDA  
David Sandbank, NYSERDA  
John O'Leary, New York State Executive Chamber

## Summary of DG Inverter Upgrade Needs: Results from Engineering Modeling Updates

### Overview

National Grid is committed to providing safe, reliable, and affordable service to our customers. These basic principles guide our decisions when analyzing projects that seek to interconnect to our electric grid, including distributed generation (DG) inverters used for solar and battery energy storage projects. A number of DG projects are currently in National Grid's queue and others have applied to interconnect to our sub-transmission network. These projects are typically up to 5 MW in generation capacity, align with National Grid's clean energy vision, and are essential to achieving New York's CLCPA goals.

Our interconnection process includes conducting a thorough engineering review in adherence with New York's Standardized Interconnection Requirements (SIR) and New York Independent System Operator (NYISO) rules. This helps ensure each DG project is technically feasible and poses no adverse effects to either the safety and reliability of National Grid's electricity system or the developer's project. As part of a comprehensive engineering review, the NYISO requires the use of ASPEN OneLiner™ (Aspen) software to model protection schemes in order to assess the effectiveness of equipment to protect the electric system from faults for DG projects interconnecting to the transmission and sub-transmission systems.

In 2021, ASPEN released the new Version 15 (v15) with the recommendation to use a new generic model for inverter-based generation which provides more accurate results for fault response. The NYISO adopted the Aspen v15 in fall of 2022 and directed its use by all New York transmission operators. National Grid began using the Aspen recommended inverter-based generation model for interconnection studies following this directive.

As a result, our revised engineering analyses have identified the need for additional network upgrades to National Grid's system before a number of DG projects can be connected to our sub-transmission network. This includes connecting DG inverters used for solar and battery energy storage projects which have been previously studied resulting in issued Coordinated Electric System Interconnection Reviews (CESIRs) from National Grid where partial or full payments have been made by these applicants in accordance with the SIR as well as projects in much earlier stages of the SIR process.

The upgrades needed to safely accommodate these projects range from relays to new substations. Allowing this group of projects to connect to the electric network prior to the additional system upgrades could adversely impact reliability and public safety, and result in equipment damage within National Grid's network. More specifically, this could cause:

- A power line to incorrectly remain energized which, in turn, could lead to utility workers or a member of the public coming in contact with live electricity, equipment burning to failure, wildfires, and other safety hazards.

- Or, conversely, a power line could be incorrectly de-energized, resulting in a blackout to customers in a portion of our service area.

National Grid is actively working to identify the full range of solutions to this issue, including:

- Reviewing pending projects on a case-by-case basis to determine any additional requirements needed to enable safe interconnection. These studies are being prioritized based on planned interconnection dates.

Conducting further studies to determine if there are viable alternative interconnection solutions that could ensure safety and reliability while reducing cost and/or time delays.

Coordinating with project developers and seeking guidance from Department of Public Service Staff to address these requirements so that the projects can be safely brought online as soon as it is practical.

## Technical Discussion

National Grid models DG inverter characteristics and their effect on transmission/sub-transmission electric system using ASPEN software as adopted by the NYISO. Aspen v15 allows for a more accurate representation of DG inverters and the impact to transmission/sub-transmission electric system protection needs, specifically how they respond to a faulted condition. Older revisions of the software modeled inverters similar to synchronous generators. The new software version, with inputs from the DG inverter original equipment manufacturers, provide a more accurate fault response of the inverters with respect to sequence currents and voltages than previous Aspen software versions.

Aspen v15 and the resulting engineering analyses have identified additional system upgrades for both new projects and projects currently in our DG interconnection queue that were studied under earlier versions of the Aspen model. Allowing this group of DG projects to interconnect within the National Grid network could result in catastrophic results as described earlier on page 1.

National Grid's Protection Engineering and Distribution Planning teams have identified potential impacts to our sub-transmission system (<69kV) in Western NY related to the interconnection of DG inverters used for solar and battery energy storage projects up to 5 MW in size revealed by the use of the Aspen v15 software. The use of a more technically correct modeling tool provides a more accurate impact of inverter-based DG interconnections on the protection system that can range from relay upgrades to new substations.

National Grid is reviewing projects on a case-by-case basis to determine the additional requirements to enable safe interconnection. However, projects may experience significant delays before the electric power system is able to accommodate impacted projects, which include in-flight projects with fully executed interconnection agreements and partial or full payments already made to National Grid based on original upgrade scope and cost. Preliminarily, it appears possible that some projects requiring major substation upgrades could have their interconnection dates pushed out five or more years. National Grid is diligently pursuing further studies to determine if there are alternative viable solutions that could reduce cost and/or schedule impacts.

### *Summary of technical issue:*

Inverter-based generation does not respond to a system short circuit the same way as synchronous generation (i.e., large rotating machine) sources.

Conventional protection was designed based on synchronous generation fault response.

Saturation of inverter-based generation in a region can create operability concerns with conventional protection schemes.

Sub-transmission, specifically in National Grid's Western Region, is a hotbed for these issues. The lines are long and 34.5kV (primarily synchronous) sources are not located near many of the substations. The sub-transmission system has also been saturated with inverter-based generation.

Interconnecting further inverter-based DG without completing the upgrades could adversely impact reliability and public safety, and result in substantial equipment damage within National Grid's network.

## National Grid Next Steps

1. Obtain existing inverter model information from interconnection applicants to allow for National Grid to more accurately model inverter performance in its PSCAD simulation software. Begin evaluation on use of IEEE 2800-2022 inverter model and specifications for National Grid to model in PSCAD.
2. Begin more detailed PSCAD studies, which may take months, to model the impacted area of our electric power system and review all the possible solutions. Studies are being prioritized based on planned interconnection dates.
  - The ASPEN software allows for a high-level review of whether there is a protection issue or not. PSCAD simulation software must be used to study the problem more thoroughly and can be utilized to identify more cost-effective solutions. Not all inverter-based generators respond the same as differences in software and controls make it difficult to standardize how inverters respond to faulted conditions.
  - There is limited expertise in the industry of personnel who can perform protection studies in PSCAD.
    - National Grid's Massachusetts' affiliate has loaned the National Grid NY team their subject matter expert in PSCAD and system protections.
    - Quanta Technology and ENTRUST Solutions Group are experienced consultants that have PSCAD and system protection capabilities within their respective organizations and are being contracted to assist with this effort.
    - National Grid will develop more in-house expertise within its engineering organization in parallel with the above efforts to be able to perform protection analysis in PSCAD.
  - One of the solutions that National Grid is investigating to reduce the potential upgrades required to facilitate interconnection is the use of IEEE 2800-2022 compliant inverters. IEEE 2800-2022 provides a more standardized approach for fault current response of inverter-based resources. While the IEEE standard is recently published, National Grid is investigating the potential for specific inverters to update their software to reduce the impact on conventional protection schemes. However, to achieve conclusive findings, this would require an extensive modeling effort to be undertaken by Quanta Technology and Entrust Solutions Group.
  - National Grid is also exploring the possibility of adding functionality to inverter-based generation to replicate synchronous generator characteristics. Specifically, National Grid is reviewing the potential for inverter-based generation to produce negative sequence current, similar to a synchronous generator.
3. Collaborate with industry partners to determine impacts and solutions as the impact of inverter-based generation on conventional line protection is a hot topic in the utility industry. National Grid is participating in a New York State Energy Research and Development Authority (NYSERDA) study on this topic with Quanta Technology, a contracted engineering services firm that specializes in advanced studies and solutions for the electric power industry. The anticipated study release is in the summer 2023.
4. Prepare and file a petition with the New York Public Service Commission seeking the ability to utilize the Cost-Sharing 2.0 payment mechanism for upgrades and to revise CESIR estimates to reflect the incremental upgrade cost and time. The anticipated filing for this petition is summer 2023.

For questions, contact National Grid's New York DG Ombudsperson:

Marie Schnitzer, [Marie.Schnitzer@nationalgrid.com](mailto:Marie.Schnitzer@nationalgrid.com)