New Hampshire Department of Energy
Investigative Proceeding Relative to Customer-Generator Interconnection

Written Comments Submitted February 1, 2023 by
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1. **How to create transparent, consistent, and reasonable engineering standards for interconnection, with special consideration given to established best practices used by other states as set forth in the Interstate Renewable Energy Council's (IREC) 2019 Model Interconnection Procedures.**

    a. **Please identify the applicable existing, and pending, interconnection codes, statutes, standards, and procedures that apply to the interconnection kW thresholds for various Distributed Energy Resource (DER) technologies (Battery, Wind, Solar, etc.). Include Federal, State, and Local requirements.**

New Hampshire currently lacks meaningful state interconnection codes, statutes, standards and procedures for customer-generator DERs, in contrast with every neighboring state and many other states nationwide. State interconnection guidance appears in Puc 900 rules, specifically Puc 904 through Puc 908, and is only applicable to small net metering customer-generators up to 100 kW (AC). For large customer-generators over 100 kW (AC), Puc 901.02 (d) states, "Interconnection of large net-metering customer-generators shall be governed by each utility's interconnection practices as set forth in its tariff filed with the commission."

The NH interconnection requirements for small customer-generators that appear in Puc 904 through Puc 908 were substantially developed prior to the deployment of most customer-generator DERs in New Hampshire. They contain useful information concerning the interconnection application process for small customer generators, as well as technical and procedural requirements, but are not in step with contemporary best practices for interconnection procedures now that the pace of DER deployment has increased substantially.

Interconnection procedures for large customer-generators over 100 kW (AC) are developed independently by each utility company, without meaningful public input, and differ substantially by utility. Utilities may partially base their NH interconnection procedures on independent guidelines or the requirements of other states in which they operate, but such applications are piecemeal and inconsistent.

From the perspective of private-sector DER developers and customer-generators in NH, the absence of meaningful state interconnection codes,

statutes, standards and procedures enables utilities to implement uneven and sometimes unfair practices, which often result in longer timelines and higher interconnection costs in NH than in other states for similar projects. As New Hampshire's largest solar company, which also operates in Maine, Massachusetts, and Vermont, ReVision Energy has seen these state differences play out over the course of 20 years installing over 10,000 residential and commercial solar and battery systems throughout the region.

New Hampshire municipalities typically do not have interconnection-specific codes or procedures although they do require standard electrical and building permits for construction projects. Federal requirements (e.g. FAA glare analysis, FWS and Army Corps of Engineers permitting) typically do not affect interconnection of DERs at the scale at which they are currently being developed in NH.

Outside of New Hampshire, state interconnection rules are largely aligned with various versions of the Federal Energy Regulatory Commission (FERC) *Small Generator Interconnection Procedures* and IREC *Model Interconnection Procedures*. These model small generator interconnection procedures (SGIPs) apply to facilities as large as 20 MW (AC) and serve to delineate requirements for various sizes of facilities in an effort "to streamline the process for safe and reliable interconnection for all [distributed energy resources] customers, while also helping states and utilities save time and resources as they address interconnection issues."[1]

The general alignment of the FERC and IREC SGIPs is due to IREC's participation in FERC deliberations and is informed by IREC's intervention in state rulemakings related to interconnection.

In addition to the model SGIPs from FERC and IREC, there are two other key guidance documents that can help to inform New Hampshire's efforts to consider updating the state's interconnection rules (attached):

- *Priority Considerations for Interconnection Standards: A Quick Reference Guide for Utility Regulators* by IREC is a valuable resource for understanding the considerations that have shaped IREC's *Model Interconnection Procedures* and was written specifically for audiences such as those parties considering how to strengthen New Hampshire's existing SGIPs.

- *Toolkit and Guidance for the Interconnection of Energy Storage and Solar-Plus-Storage* by Building a Technically Reliable Interconnection Evolution for Storage (BATRIES) is the result of a multi-stakeholder effort to establish model interconnection

[1] IREC *Model Interconnection Procedures 2019*, p. 1

standards specific to energy storage systems. With the expected expansion of grid-interconnected batteries to serve the NH distribution grid – consistent with recent NH Value of Distributed Energy Resources (VDER) study showing co-located storage increases the value of DERs on the grid – this document represents the national best practices for establishing a strong regulatory environment that provides predictability to utilities, regulators, and developers.

b. Please provide feedback on the IREC 2019 Model Interconnection Procedures. Include responses to the following questions:

i. Have any entities adopted this model?

The Interstate Renewable Energy Council (IREC) is an independent nonprofit organization based in Albany, NY that develops consensus-based technical solutions to renewable energy issues. Since 1977, IREC has worked with more than 35 states, including nearly every state in the northeast region, to improve interconnection procedures. IREC's technical assistance programs, developed in collaboration with the City/County Management Association and funded by the U.S. Department of Energy, have been applied by US jurisdictions with a combined population of more than 100 million people and have facilitated the orderly and efficient development of DERs in those jurisdictions. New Hampshire is the only state in the ISO-NE network that has not aligned its small generator interconnection procedures (SGIPs) with model standards from IREC and FERC. All of New Hampshire's neighboring states have aligned their SGIPs with current or past model interconnection procedures including Massachusetts, where two of New Hampshire's main distribution utilities operate.

ii. Is there interest in adopting this model in the future?

Puc 901.01 defines the purpose of New Hampshire's customer-generator statute as follows:

> *The purpose of Puc 900, pursuant to the mandate of RSA 362-A:9, is to establish reasonable interconnection requirements for safety, reliability, and power quality for net energy metering as the public interest requires, and consistent with the legislative declaration of purpose set forth in RSA 362-A:1, in which the legislature found: (a) "It to be in the public interest to provide for small scale and diversified sources of supplemental electrical power to lessen the state's dependence upon other sources which may, from time to time, be uncertain;"*

(b) "It to be in the public interest to encourage and support diversified electrical production that uses indigenous and renewable fuels and has beneficial impacts on the environment and public health;" and
(c) "That net energy metering for eligible customer-generators may be one way to provide a reasonable opportunity for small customers to choose interconnected self-generation, encourage private investment in renewable energy resources, stimulate in-state commercialization of innovative and beneficial new technology, enhance the future diversification of the state's energy resource mix, and reduce interconnection and administrative costs."

In light of this statement of purpose, we believe the State, utilities, customer-generators, and the public at large have a compelling interest in adopting standardized, comprehensive, evenhanded, and up-to-date interconnection procedures that have a demonstrated track record of facilitating orderly deployment of DERs in other states. The IREC *Model Interconnection Procedures 2019*, which have been developed and updated since 2005, and the aligned FERC *Small Generator Interconnection Procedures* contain current best practices for interconnecting the latest DER technologies, including energy storage, to the electric grid while maintaining grid safety and reliability. They have been effective at increasing the efficiency and cost-effectiveness of DER interconnection, which benefits customer-generators, utilities, and developers alike.

iii. If there is interest, are there any procedures that need to be addressed to respond to directives or goals of SB 262?

SB 262 (III) instructs the NH Department of Energy to report its findings and recommendations from this investigative proceeding to the standing committees of the house of representatives and senate with jurisdiction over energy and utility matters within a year and "identify ways any recommended statutory changes can reduce barriers to cost-effective, predictable, and timely interconnection of distributed energy resources to the state's electric distribution system." In light of these directives and goals, and the demonstrated shortcomings of New Hampshire's current interconnection procedures outlined in this and other submissions, the Department of Energy should incorporate the IREC *Model Interconnection Procedures 2019* in full or substantial part in its recommendations.

iv. Are there other preferred model interconnection procedures and, if so, what are they?

As mentioned above, the Federal Energy Regulatory Commission (FERC) also publishes its pro forma *Small Generator Interconnection Procedures*. FERC's SGIPs are closely aligned with IREC's *Model Interconnection Procedures 2019*. This alignment and the widespread adoption of state-level SGIPs based on these model procedures are indicative of widespread consensus on their efficacy. Based on our experiences in New Hampshire and neighboring states, ReVision Energy concurs with the effectiveness of the model SGIPs published by FERC and IREC and recommends New Hampshire align Puc 900 rules with the model SGIPs.

Additionally, the recommendations contained in the aforementioned BATRIES report (attached) related to the interconnection of energy storage systems are highly relevant to this proceeding.

2. How to ensure timely, consistent, and reasonably-priced interconnection studies.

a. Please identify issues, concerns, and impediments to completing timely interconnection evaluations/studies.

New Hampshire's Puc 900 rules currently lack meaningful and enforceable timelines for interconnection applications acknowledgement/review and final approval by utilities in the case of small customer-generators of inverter-based DERs up to 100 kW (AC), and no state timelines exist for large customer-generators over 100 kW[2]. Puc 904.04 (b) states "The distribution utility shall evaluate the application for completeness and notify the customer generator in writing within 10 business days of the application's receipt whether the application is or is not complete and, if the application is not complete, inform the customer-generator in writing of any information required to be provided to complete the application." Although an initial turnaround time of 10 business days is reasonable, it has not been met in the case of most customer generator interconnection applications submitted to utilities in 2022 and no enforcement mechanism exists to compel utilities to comply with the timeline or incur consequences for failure to comply.

With regard to timelines for interconnection of approved small customer-generator facilities after installation is complete, Puc 904.05 (h) states, "(h) If the distribution utility elects to conduct a witness test, the distribution utility shall attempt to conduct it within 10 business days of the receipt of the certificate(s) of completion." This timeframe was also

[2] The only other interconnection timelines in Puc 900 pertain to interconnection for non inverter-based customer-generator facilities, which are extremely rare.

not met for many small customer-generators in 2022 and no enforcement mechanism exists to compel utilities to comply with the timeline or incur consequences for failure to comply. The delays in final approval of installed systems, which amounted to more than a month for many ReVision Energy projects in 2022, came at a substantial cost to NH customer-generators who were compelled to continue purchasing grid electricity at unprecedented rates long after their solar arrays had been fully installed.

New Hampshire utilities have cited a marked increase in the number of interconnection applications submitted in the second half of 2022 as the primary reason for the extended delays in both acknowledging receipt of submitted interconnection applications and completing witness tests and issuing final approval once installations were complete. Although the utilities are correct that the number of applications soared beginning in August 2022, the increase was highly predictable following the publication in June 2022 of new utility default supply rates to take effect in August at double the current rates for most NH customers, which resulted in substantial publicity and a new state initiative to extend electric assistance. The lag time of approximately two months between expressions of customer interest in residential solar projects and submission of interconnection applications after contract signing for the first wave of highly-motivated customers could have enabled the two major utilities which doubled rates to increase staffing and implement efficiency measures. The absence of meaningful and enforceable state timelines for interconnection application processing and witness testing, combined with the lack of any official consequences for chronic failure to meet the stated timelines in Puc 904, may have contributed to the severe backlog in interconnections processing, which began in August and has yet to fully subside.

The delays and resulting costs are even more acute in the case of larger commercial DER interconnections for New Hampshire towns, schools, businesses, and nonprofits installing large customer-generator facilities over 100 kW (AC), for which detailed System Impact Studies (SIS) are now required by utilities as a matter of course. For these customer-generators and the contractors who serve them, there is a substantial cost resulting from the absence of any state timelines for acknowledgement and processing of interconnection pre-applications; acknowledgment and review of standard interconnection applications; issuance of SIS agreements following review of interconnection applications; completion and issuance of SIS reports; completion and issuance of utility upgrade cost estimates, which are increasingly (if inconsistently) tied to mandatory subsequent “Facility Studies”; issuance of Interconnection Service Agreements (ISA) after completion of SIS and Facility Studies; processing

of utility upgrade payments under the ISA; and completion of utility-mandated grid upgrades by the utility.

In the absence of state timelines, large customer-generators and their contractors are required to accept utility-provided timeframes, which often exceed those of the same and different utilities in neighboring states, and which often go unmet – not just in 2022 but over multiple years and continuing in 2023. Since no enforcement mechanisms exist to ensure long utility-provided timeframes are met, and no consequences exist if they are chronically unmet, contractors often resort to extending project timelines by multiple months, which slows DER deployment and delays the benefits of reduced-cost electricity for NH customer-generators. Utilities also have little or no apparent incentive to increase their interconnection staffing, a further impediment to completing timely interconnection evaluations and studies, especially at a time of extremely high default electric rates when demand for DERs continues to climb.

b. To the extent possible, please identify the issues and kW thresholds that impact the level of effort, and therefore the schedule and cost of completing interconnection evaluations/studies.

As noted above, New Hampshire's utilities and Puc 900 rules differentiate between smaller customer-generators up to 100 kW (AC) and large customer-generators over 100 kW (AC) and generally not exceeding 1 MW (AC). The former are partially governed by Puc 904 through Puc 908, with certain utilities applying varying levels of scrutiny to projects of different sizes within the small customer-generator designation. The latter are entirely at the discretion of utilities, which are increasingly requiring a level of study that is substantially greater, at a cost cost that is multiple times greater, than that of every neighboring state, including states in which certain NH utilities currently operate. Specifically, most large customer-generator projects now require detailed System Impact Studies (SIS), which routinely last four months or longer and are generally priced between $5,000 and $30,000, with considerable variation in scope, timeline, and cost across NH utilities.

In addition to the schedule delays cited above, customer-generators have seen these costs more than double for comparably-sized NH projects in recent years. In 2022, one utility abruptly discontinued its longstanding practice (common among other utilities) of providing utility upgrade cost estimates with SIS report and instead began requiring additional "Facility Studies" at a cost of $10,000 with a duration of one month or more in order to generate planning-level estimates. When customer-generators strongly objected, the utility partially amended its practice, although there remains a high degree of uncertainty as to what its practice is today.

As a result of these and other challenges in the unregulated domain of large customer-generator interconnections, larger New Hampshire DER customers frequently downsize their projects by 50% or more in order to not exceed the small customer-generator 100 kW (AC) threshold, even though it results in substantially less clean energy generation and long-term savings.

Although we agree with the importance of establishing kW thresholds for the level of scrutiny (including time and cost) that is applied to DER interconnection requests, current utility practices in NH are substantially out of step with those of neighboring states and established industry best practices. One of the critical features of the model SGIPs is the delineation of facilities based on the level of impact they are likely to have on the electrical grid. IREC's *Model Interconnection Procedures 2019* delineate "Fast Track" projects (Level 1 and Level 2 facilities) from projects that require more significant study prior to interconnection (Level 4). A thorough discussion of the value to utilities, regulators, and developers is included on pages 5-7 of *Priority Considerations for Interconnection Standards.*

In the IREC model SGIPs, Level 1 facilities have a maximum export capacity of 25 kW (AC) while Level 2 facilities may be as large as 1-5 MW (AC) depending upon the voltage of the distribution circuit at the proposed Point of Interconnection (POI) and its proximity to the substation. These two classes of ICGFs have prescribed technical screens that assess whether they are able to be considered as "Fast Track" projects or need more detailed study by the electrical utility. In contrast with New Hampshire's inefficient and costly process of subjecting all DER interconnections over 100 kW (AC) to months-long System Impact Studies, which can cost $30,000 or more, the model SGIPs utilized by all neighboring states base the level of study on actual known conditions on the grid. The net effect is a far more rapid, efficient, and cost-effective review for most projects up to 5 MW (AC) while a small subset of projects on crowded substations with limited grid capacity are appropriately subjected to more extensive and costly review.

As we hope to discuss in future stakeholder sessions of this Interconnection Investigation, adoption of effective "Fast Track" screening criteria – such as those detailed in the IREC *Model Interconnection Procedures 2019* – would not simply benefit NH customer-generators and DER contractors but also significantly reduce the administrative burden on utilities and regulators. The prescribed timelines within these model SGIPs also promote fair treatment of utility customers by ensuring process predictability and provide the PUC with a metric by which to measure the utility's customer service. Most importantly, the

model procedures ensure the highest level of safety and reliability of the distribution system is maintained.

3. **How to ensure just and reasonable pricing of grid modernization upgrades mandated by the distribution utility for interconnection of distributed energy resources, including transparency and consistency in pricing guidelines and appropriate cost-sharing among parties benefitting from such upgrades.**

    a. **Please identify issues and concerns, if any, regarding the transparency of interconnection cost estimates and schedules.**

New Hampshire's Puc 900 rules currently lack any cost guidelines for interconnection applications, studies, and resulting grid modernization upgrades for either small or large customer-generators. The utilities also do not publish any cost guidelines for the same, and project-specific cost estimates can vary substantially for similar projects within the same utility and across NH utilities. Quoted costs, which must be paid upfront in full before any interconnection review or study activity is undertaken, may be raised without advance notice for a given project. Tracking of spending is unclear and no refunds for unspent study fees are typically made unless requested by customer-generators and the utilities determine (based on unpublished cost accounting/time tracking) that unspent funds remain.

There is a similar lack of cost tracking for utility upgrades that are mandated by utilities, which frequently exceed $250,000 and sometimes exceed $1 million for larger customer-generators over 500 kW (AC) following completion of System Impact Studies. Utilities routinely take a year or more after payment is received to complete their mandated upgrades and return any unspent funds. In certain cases, utilities have charged substantially more than the original estimate even after customers moved forward and completed the installation of their DER project. A recent case in point for a 1 MW (AC) project included six-figure increases in the utility upgrade cost during the study process and a final five-figure cost increase months after the project was complete and operational; when the customer-generator objected, the utility issued a "correction" and returned unspent funds in the mid five-figures.

Substantial differences in the scope and cost of utility-mandated grid upgrades for similar projects in different NH utility territories and in neighboring states, including states in which New Hampshire utilities operate, are a particular source of concern to customer generators and contractors. It is not uncommon to see projects of similar scale interconnecting to utility circuits of comparable voltage on substations with ample capacity incur multiple times more utility upgrade charges in one NH utility territory compared to another and compared to other states. According to the limited available documentation on scopes of work

provided in System Impact Study reports and Interconnection Service Agreements, these differences are due to both the widely varying extent of grid upgrades required and the widely varying cost of equivalent upgrades across territories. For example, one NH utility now routinely requires multiple sets of fusing on a given distribution circuit be replaced with programmable reclosers upstream of the DER Point of Interconnection (sometimes several miles upstream) as a condition for interconnecting the DER while other utilities in NH and neighboring states, and the same utility in neighboring states, do not impose such requirements. The cost of such reclosers has climbed from approximately $100,000 each around 2020 to $150,000-$250,000 each in 2022 in this utility territory, while other NH utilities generally charge $100,000-$150,000. When ReVision Energy installs the same equipment as part of our standard scope of work on larger DERs in neighboring states (where model interconnection procedures permit contractors to own that scope), the cost is substantially lower at 50 percent or less.

These factors make project planning and budgeting very difficult and result in final costs that are often prohibitive, which in turn discourages NH towns, schools, businesses, and nonprofits that are considering DER projects from moving to contract. Following the model interconnection procedures referenced above, utilities should observe established best practices in defining the extent of upgrades mandated and should operate within reasonable bounds in pricing such upgrades at a point that is relatively consistent with the market. Wherever possible, customer-generators should be permitted to own interconnection equipment at the POI and utilities should also be free to bid work to any experienced DER subcontractor, not just the three subcontractors they lock in every three years (an anti-competitive practice that can result in higher costs getting passed thru to all ratepayers). Finally, a meaningful degree of transparency should be required in setting and tracking costs across all utilities and utilities should be given a reasonable tolerance (e.g. +/- 20%) to limit the degree of variance between utility upgrade estimates and final costs.

b. Please identify options for appropriate cost-sharing as well as issues and concerns.

A discussion of cost-sharing between local New Hampshire customer-generators and utilities is necessary because of the unusual practice of certain NH utilities requiring system upgrades that far exceed the scope and cost of upgrades for similar DERs in other NH utility territories and in other states that follow model interconnection procedures. Particular attention should be paid to expensive upgrades, such as reclosers, that are increasingly being required far upstream of the DER Point of Interconnection, as those devices are already being installed by all NH

utilities as part of their standard system reliability investments. According to recent feedback from one NH utility, more than 900 reclosers have been installed in recent years, which are delivering meaningful grid safety and reliability benefits to all local utility customers and are appropriately being rate-based as a result.

The preferred option from the perspective of customer-generators and contractors would simply be for state regulations to prohibit utilities from mandating system upgrades in connection with DER interconnections (particularly beyond the POI) if they are not essential to the safety and reliability of the grid, in accordance with established model interconnection procedures. For expensive upgrades that may be necessary and therefore required, we would recommend utilities provide not just hosting capacity maps (which were recently released by one utility, in accordance with the requirements of SB 262, but are still pending from other utilities) but also basic information regarding planned upgrades so contractors/developers can intelligently site projects in proximity to such upgrades so as to avoid potentially prohibitive additional upgrade costs. Where upgrades are required beyond the POI deliver a demonstrable benefit to the general ratepaying public, the cost of those upgrades should be shared in proportion with the distribution of benefits. Above all, a higher degree of transparency is required so as to identify which upgrades are necessary and which are purely discretionary, along with guidelines from the model interconnection procedures for how such determinations are made and how the costs of discretionary upgrades can be fairly distributed across the benefiting parties.

For some added context, our neighbors in Maine, who have experienced significant growth in the interconnection of DERs since 2019, have been considering the cost-sharing question in depth. In 2021, the state enacted *An Act To Support the Continued Access to Solar Energy and Battery Storage by Maine Homes and Businesses* (attached), which amended state law to ensure its PUC adopt interconnection rules that are aligned with nationally recognized best practices, give utility customers timely resolution to disputes arising from deficiencies in the state's interconnection rules, and promotes coordination of utility infrastructure upgrades related to interconnection with those required for load. In essence, it seeks to encourage optimal siting of DERs so as to deliver maximum benefit to utilities and ratepayers and avoid prohibitively expensive upgrade costs.

This legislation has resulted in the Maine PUC modernizing its SGIPs through rulemaking and provides a clear legislative directive that promotes the fair treatment of existing utility customers seeking to interconnect DERs. The Maine PUC has yet to enact rules to further detail cost sharing in light of these changes in statute and is currently involved in

comprehensive grid planning efforts based on other state legislation. Although general cost sharing rules are still in process in ME, larger DERs that undergo transmission-level cluster studies and require expensive substation upgrades in ME benefit from an orderly cost-sharing process based on the scale of each DER facility.

4. **How to ensure distribution system upgrades paid for by customer-generators are not claimed as part of the utility rate-base.**

    a. **Identify methods for ensuring transparency of how system upgrade costs are applied.**

        This question has been considered in several jurisdictions, including in a recent evaluation by IREC on behalf of the Maine Public Utilities Commission as part of proceedings to modernize Maine's SGIPs in response to the significant increase in the construction and interconnection of DERs. One approach being considered in Maine that could be valuable here in New Hampshire is the adoption of a "flat fee" for small customer-generators that can be used to pay for distribution upgrades and exempt individual customers from these costs. IREC's *Interconnection Standards, Practices, and Procedures to Support Access to Solar Energy and Battery Storage for Maine Homes and Businesses* provides an overview of similar efforts that have been implemented in Massachusetts, New York, and California. These examples provide relevant case studies by which New Hampshire can consider how to appropriately allocate the costs required to upgrade the distribution network in a manner that is fair to ratepayers and recognizes the benefits these upgrades have to customers who do not own the distributed energy resource triggering the upgrade.

5. **Whether it is appropriate to establish an "Interconnection Working Group" convened at the Department to regularly assess if interconnection standards need modification.**

    a. **Identify potential benefits, issues, and concerns on the concept of an "Interconnection Working Group" convened at the Department to regularly assess if interconnection standards need modification.**

        ReVision Energy believes there would be substantial benefits to the Department of Energy convening a dedicated Interconnection Working Group that meets on a monthly timeline for the now 11-month duration of the Interconnection Investigation, and on a monthly or quarterly basis once the Investigation is complete. The working group should consiste of utility representatives, interested customer-generators, DER contractors/developers, Clean Energy NH, and Department staff. It should

not only assess if interconnection standards need modifications, but also ensure all participants are following the established standards put forth in the Puc 900 rules. We recommend as part of these standards to have a clear enforcement mechanism at the PUC to ensure compliance with the interconnection rules.

Responses to the Set 1 Request for Comments be filed with the Department by February 1, 2023, by emailing them to Proceedings@energy.nh.gov