COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC INVESTIGATION OF INTERCONNECTION AND NET METERING GUIDELINES	)))	CASE NO. 2020-00302

KENTUCKY SOLAR INDUSTRIES ASSOCIATION, INC.
SUPPLEMENTAL BRIEF

Comes now the Kentucky Solar Industries Association, Inc. ("KYSEIA"), by and through counsel, and, pursuant to the March 12, 2026 Order in the instant case, tenders this Supplemental Brief concerning net metering and interconnection guidelines.

I. Introduction

KYSEIA members were active in the negotiation and approval of the 2009 Interconnection Guidelines adopted by the Public Service Commission ("Commission") and continue to be involved, daily, with the interconnection process in Kentucky pursuant to those Guidelines. As part of the instant proceeding, KYSEIA filed a Written Brief into the record on April 19, 2021. Through this pleading, KYSEIA supplements and updates its prior Written Brief.[1]

KYSEIA continues to have a special and distinct interest in these interconnection procedures and net metering guidelines, as it not only represents customer generators and potential customer generators who are subject to those procedures and guidelines, it also represents the solar companies that will ultimately be assisting customers and potential customers in complying with interconnection procedures and net metering applications and has ample experience upon which to make recommendations.

Interconnection standards provide express guidance and allow projects to smoothly connect to the grid. The quality of interconnection rules can facilitate easy flow of electricity and prevent unnecessary complications and congestion. With regard to distributed energy resources, KYSEIA continues to assert that interconnection standards should outline "with clarity the timelines, fees, technical requirements and steps in the

[1] In lieu of a wholesale restatement of its advocacy in its prior Written Brief, KYSEIA primarily offers a discussion of developments since its Written Brief and the reasons why these developments warrant consideration and inclusion into the decisions reached by the Commission for this investigation. KYSEIA also highlights certain areas that continue to present problems in the interconnection process. The prior Written Brief is, to the extent necessary, incorporated by reference and augmented and revised through this pleading.

review process for connecting distributed energy resources…to the electricity grid."[2] The interconnection process should not be a source of frustration and contention for any party involved.[3] Clear, forward-thinking rules are "essential to maintain the safety and reliability of the grid, while also enabling the adoption of distributed energy resources and achieving broader clean energy and resiliency goals."[4]

Since the Commission's approval of the initial (current) Interconnection Guidelines in 2009,[5] best practices for safe, reliable, and fair interconnections of distributed energy resources continue to evolve. Kentucky's Guidelines have yet to be amended to reflect the evolution. KYSEIA continues to advocate on behalf of updated guidelines that include the latest processes, practices, and technologies that can facilitate higher Distributed Energy Resources (DER) penetration on the grid, while maintaining grid safety and reliability and a fair, just, and reasonable interconnection process for all parties.

In addition, KYSEIA notes that its members routinely experience inconsistent and disparate treatment with regards to interconnection among the jurisdictional utilities. The Interconnection Guidelines require updating to address many gaps and some deficiencies that continue to surface in light of new technologies, updated practices, and processing

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[2] KYSEIA Exhibit 2 to Its Written Brief (filed Apr. 19, 2021), IREC, *Priority Considerations for Interconnection Standards: A Quick Reference Guide for Utility Regulators* (Aug. 2017), at Introduction.

[3] *Id.*

[4] *Id*.

[5] *Development of Guidelines for Interconnection and Net Metering for Certain Generators with Capacity Up to Thirty Kilowatts* (hereinafter "Case No. 2008-00169") (Ky. P.S.C. Jan. 9, 2009), Appendix A.

inconsistencies. Therefore, KYSEIA supplements its initial Written Brief with the following revisions and recommendations.

II. IREC Model Interconnection Rules (2023)

KYSEIA continues to recommend adoption of the most recent iteration (2023) of the Interstate Renewable Energy Council ("IREC") model interconnection procedures with some modifications.[6] The IREC model procedures reflect the national best practices for the interconnection of DERs. They provide robust step-by-step set of procedures to guide both interconnection applicants and utilities through the process of reviewing and approving interconnections for all types of state-jurisdictional projects. The model procedures include many provisions missing from the current rules, including a process for evaluating energy storage systems, requirements for publishing a public queue and reporting, a much-needed dispute resolution process, clarification of material modification provisions, and accommodation of ongoing technological standard updates.

Subsequent to KYSEIA's initial brief, the IREC published a revised edition of its model interconnection procedures in 2023 (hereinafter "Model Interconnection Procedures, 2023 Edition"). In its initial brief, a KYSEIA recommendation was for the Commission to adopt the then-most recent iteration of the IREC model interconnection protocols, the 2019 edition. Through this pleading, KYSEIA notes that its recommendation on this point has been revised from adoption of the 2019 edition to adoption of the 2023 edition. Among other things, the 2023 edition is informed by numerous developments concerning distributed energy resources in recent years, particularly regarding the

[6] *See* Appendix A to this Supplemental Brief.

interconnection of energy storage systems (also battery energy storage systems) and export limitation.

The interconnection guidelines established in 2009 do not, among other things, adequately address energy storage systems and the appropriate screening for DER proposals with energy storage systems. There is a need for clear guidance and principles concerning the screening process, system impact studies, acceptable means of export limitation,[7] and the application requirements for determining how such systems with energy storage will be operated.

In terms of tailoring the guidance of the Model Interconnection Procedures, 2023 Edition to Kentucky law, the definition of an "energy storage device" in the model procedures[8] necessarily must be supplanted on one point. Pursuant to Kentucky law, an energy storage system may not be considered as a DER or generator for purposes of KRS Chapter 278 because battery storage systems do not fall within the plain language definition of an "eligible electric generating facility" pursuant to KRS 278.465(2)(b).[9] To

[7] KYSEIA confirms a point in its initial brief. KYSEIA seeks design policies to prevent energy export. If controls are in place, the system nameplate generating capacity for purposes of interconnection should not be affected by the addition of energy storage. The result is wholly consistent and in furtherance of KRS 278.465(2)(b).

[8] IREC Model Interconnection Procedures, 2023 Edition, Section I(B)(15) at page 3.

[9] *See, for example,* Case No. 2025-00113, *Electronic Application of Kentucky Utilities Company for An Adjustment of Its Electric Rates and Approval of Certain Regulatory and Accounting Treatments,* (Ky. P.S.C. Feb. 16, 2026), at page 241 ("Following the statutory definition, KU Rider NMS-2 also does not address or compensate energy storage. … The Commission also agrees with KU that the NMS-2 statute does not contemplate energy storage."). Note: While the Commission has granted reconsideration to certain aspects of this Order, the findings and conclusions on this point are not within the scope of rehearing.

this extent, the general guidance in the model procedures requires modification to adjust to a Kentucky specific legal requirement.

III. AC Rating of Grid-Interactive Inverters

For purposes of interconnection, utilities should be limited to using the AC rating of grid-interactive inverters designed to export power to the utility. While many utilities in Kentucky comply with this approach, a few utilities use the AC capacity of ***any*** inverter associated with the customer's account, including inverters that are not intended for export. This problem is particularly acute for accounts that seek to add energy storage to an existing solar interconnection in that some utilities seek to add the AC rating of the energy storage inverter to the AC rating of existing solar inverters in determining capacity.

First, KRS 278.465(2)(b) and Commission precedent reject this approach (the former through excluding energy storage systems from the definition of eligible electric generating facilities the latter through confirmation of this construction through Commission Order).[10] Second, energy storage systems that are configured as non-exporting inverters and use listed control measures do not add storage inverter capacity to solar inverter capacity. Adding storage inverter capacity to solar inverter capacity is an unlawful and unreasonable utility practice. For the instant investigation, KYSEIA urges the Commission to find and conclude that interconnection capacity is the AC sum of grid-interactive inverters intended for simultaneous system export and, further, that energy storage systems do not count toward the total of interconnection capacity unless the

[10] *See* Footnote 9, Case No. 2025-00113, (Ky. P.S.C. Feb. 16, 2026) at page 241.

energy storage system is explicitly designed to simultaneously export with other on-site inverters.

IV. IEEE Standard 1547-2018

Through Administrative Case No. 2008-00169, the Commission established, among other things, the Institute of Electrical and Electronics Engineers ("IEEE") as an applicable safety and power quality standard.[11] Subsequent to the Commission's establishment of this standard, *IEEE Standard 1547-2018 – IEEE Standard for Interconnection and Interoperatbility of Distributed Energy Resources with Associated Electric Power Systems Interfaces* (hereinafter "IEEE Standard 1547-2018") was adopted and is now the nationally-applicable standard (replacing the prior standard, IEEE Standard 1547-2003).

As urged by KYSEIA in its initial brief, the Commission should move to the more recent standard, IEEE Standard 1547-2018, as an applicable safety and power quality standard. Currently, numerous tariffs simply reference "IEEE Standard 1547"; therefore, to extinguish any ambiguity, the Commission should find and conclude that IEEE Standard 1547-2018 is the applicable standard for use in interconnection procedures.

Nonetheless, as stated in its prior Written Brief, KYSEIA respectfully urges that the Commission order a separate robust and transparent stakeholder process prior to the adoption of IEEE Standard 1547-2018. A stakeholder process will enable a more efficient and uniform implementation of the standard. Moreover, to the extent that the Commission deems it advisable and necessary, KYSEIA notes that it will participate in any subsequent

[11] Case No. 2008-00169 (Ky. P.S.C. Jan. 8, 2009), Appendix A, page 1.

stakeholder process the Commission determines necessary for the implementation of new standard (beyond the instant proceeding).

V. Unvalidated Infrastructure Capacities

KYSEIA submits that there are jurisdictional utilities that use unvalidated infrastructure capacities to limit distributed energy resource interconnection. KYSEIA seeks an express rule through which a utility with less than twenty (20) percent of its peak energy production provided by distributed generation provide written documentation of all reasons why the utility is denying interconnection upon the claim of capacity limitations. The documentation should include distribution circuit loads, the calculations used in support of the interconnection denial, and equipment ratings and types on the line segment and upstream upon which the denial is supported. A utility representative's oral blanket statement that "we don't have capacity" is not sufficient.

Further, the documentation should be in writing and verified by the professional engineer making the determination. This is a much-needed anti-gaming provision through which utilities should be disincentivized from denying a request for interconnection and thereafter persist in the denial while in search of a supporting rationale. It also is reasonable to make details of an interconnection denial for a substation and GIS-mapped distribution circuit available to the public (redacting customer information) to allow public visibility of interconnection limitations and constraints on distributed generation siting.

VI. Utilities Should Use Procedurally and Substantive Reasonable Dispute Resolution Policies and Practices.

Utilities should have policies in place and engage in practices through which customers seeking an interconnection can, among other things, readily determine the status of their application and also through which the utility communicates in clear and

written terms any and all reasons for the failure to process or the denial of an application. Further, there are instances in which a utility seeking to deny a pending application under a specific set of facts has applied to the Commission for a declaration of rights in the absence of the customer. The practice is fundamentally unfair because when the utility is seeking a declaration to a specific set of facts, it is asking the Commission for something quite akin to an *ex parte* ruling in the absence of a party whose rights are directly impacted by the decision. Customers whose rights are being declared by the Commission for a specific set of facts (unique to that customer's attempt to interconnect with a system at a particular interconnection point) should be allowed the opportunity to know and contest the evidence relied upon by the utility, present evidence and argument upon the issues in controversy, and have an opportunity to brief the matter.

As a matter of administrative economy as well as fairness to the customer, utilities should be incentivized to work with customers and exhaust avenues for resolving a dispute (including the development of a written record documenting the dispute and the contention of the parties) before any resort by the utility to the Commission. Utilities should be disincentivized from deciding a policy for denying applications and thereafter developing a legal and factual position to support their decisions. For customers, it is appropriate for applicants to have a better avenue for resolving disputes than filing a complaint with the Commission.

VII. Meter Collars

KYSEIA submits that interconnecting a distributed generation system to a home continues to be one of the most expensive components of residential installation. Throughout much of the United States, distributed generation installers have adopted

meter collars (a device sitting between the meter base and the utility meter) as a straight-forward way of adding generation which reduces installation costs by thousands of dollars per system. KYSEIA recommends that (1) utilities allow the installation of meter collars or (2) that an investigation into the rationale for the rejection of meter collars be conducted.

VIII. FERC ORDER 2222 - DER Aggregation

KYSEIA continues to urge policies that facilitate the market participation of aggregators in wholesale markets, identify aggregation opportunities, and remove barriers that frustrate compliance with FERC Order 2222. The only financially viable pathway through which any entity is likely to provide this service is on in which the aggregator becomes the generation service provider to participating DERs. Each utility in Kentucky should file a report concerning their facilitation of participation of DERs in wholesale markets. Further, for a utility that is a member of an ISO/RTO, should provide a status report of their efforts to coordinate with the ISO/RTO regarding DER integration.

IX. Conclusion

KYSEIA respectfully submits its recommendations into the record in the instant case with the goal of assisting the Commission in the adoption and implementation of a streamlined review of interconnection requests, both requests for initial interconnection as well as requests for facility modifications. Timelines for review and other processes should have clearer and consistent milestones. KYSEIA respectfully submits that improvements in data sharing and reporting will greatly facilitate interconnections. Finally, the Commission should emphasize that utilities should have policies and practices in place to minimize and resolve disputes without resort to the Commission.

WHEREFORE, KYSEIA submits this Supplemental Brief.

Respectfully submitted,

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On Behalf of KYSEIA

NOTICE AND CERTIFICATION FOR FILING

Undersigned counsel provides notice that the electronic version of the paper has been submitted to the Commission by uploading it using the Commission's E-Filing System on this 6th of April 2026. Pursuant to the Commission's July 22, 2021 Order in Case 2020-00085, *Electronic Emergency Docket Related to the Novel Coronavirus Covid-19*, the paper, in paper medium, is not required to be filed.

/s/ David E. Spenard
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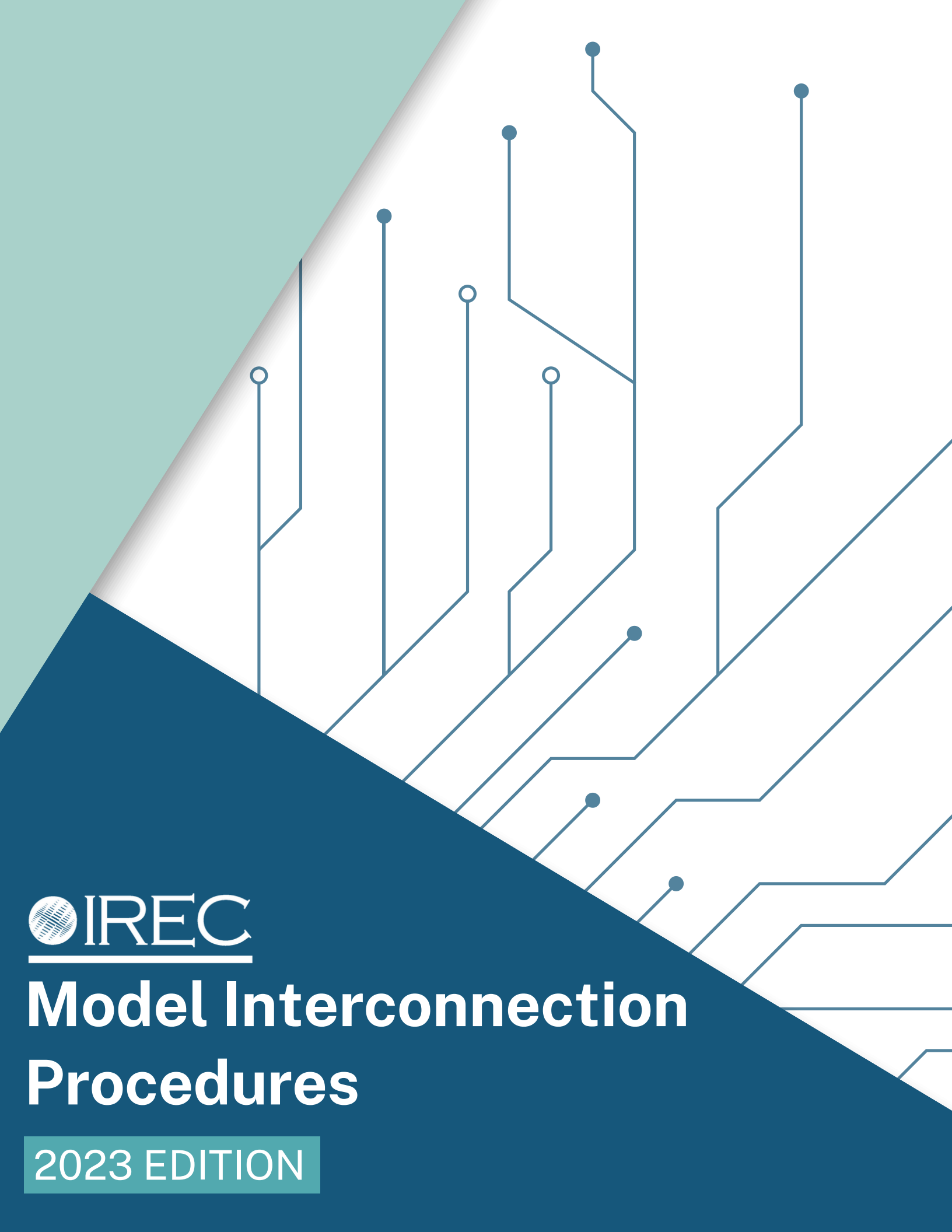
NOTICE REGARDING SERVICE

The Commission has not yet excused any party from electronic filing procedures for this case.

/s/ David E. Spenard
David E. Spenard

Appendix A



IREC

Model Interconnection Procedures

2023 EDITION

Model Interconnection Procedures
2023 Edition

Interstate Renewable Energy Council
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About IREC

The Interstate Renewable Energy Council (IREC) builds the foundation for rapid adoption of clean energy and energy efficiency to benefit people, the economy, and our planet. Its vision is a 100% clean energy future that is reliable, resilient, and equitable. IREC develops and advances the regulatory reforms, technical standards, and workforce solutions needed to enable the streamlined integration of clean, distributed energy resources. IREC is an independent 50l(c)(3) nonprofit, trusted for its clean energy expertise for over 40 years, since its founding in 1982. For more information, visit irecusa.org or follow IREC on Twitter, LinkedIn, Facebook, or Instagram.

INTRODUCTION

The Interstate Renewable Energy Council's (IREC) *Model Interconnection Procedures, 2023 Edition (2023 Model Procedures)* synthesize and reflect the evolving best practices for safe and reliable interconnections of distributed energy resources (DERs).[1] For over 18 years, this publicly available, complimentary resource has helped guide and inform state utility regulators, energy industry professionals, utilities, policymakers, and other DER stakeholders as they develop and refine the rules for grid access. The goal of these *Model Procedures* is to streamline the process for safe and reliable interconnection for all DER customers, while also helping states and utilities save time and resources as they address interconnection issues.

Initially developed in 2005 and updated in 2009, 2013, and 2019, the *Model Procedures* are informed by IREC's active engagement in dozens of state interconnection rulemakings over the years and participation in the Federal Energy Regulatory Commission (FERC) process to develop and update the Small Generator Interconnection Procedures (SGIP). In addition, IREC's consultation and coordination with DER developers, trade associations, utilities, manufacturers, national laboratories, consumer advocates, regulators, and other energy stakeholders informs our evolving understanding of interconnection issues and emerging best practices.

Since IREC first published the *Model Procedures*, demand for clean distributed energy has rapidly accelerated. In many states, interconnection has become the single most challenging aspect of clean energy development for both distribution- and transmission-interconnected projects. Demand has increased to the point that utilities now face an extremely high volume of applications for DER projects seeking to interconnect to an already saturated grid. In states with high DER application volume, regulators and stakeholders are grappling with new challenges, such as delays in studies, increased distribution upgrade costs to accommodate DER projects, and an increasing number of transmission system impacts from distribution-connected projects. Sometimes, these issues are further compounded by complexities introduced as utilities attempt to respond to increasing electrification.

The *2023 Model Procedures* reflect the latest best practices for DER interconnection. The components of the *Procedures* are intended to ensure a more efficient and cost-effective project development process, which saves money and time for consumers, developers, and utilities alike. Because the *Model Procedures* are based upon existing best practices nationwide, they will not always reflect innovations that could address some of the issues raised by increased DER interconnection demand, but that have not yet been sufficiently deployed and tested, a few of which we discuss below.

The *2023 Model Procedures* include the following important updates, among other changes:

- ***Interconnection of Energy Storage Systems:*** The 2019 edition of the *Model Procedures* introduced an initial framework for review of energy storage systems seeking to connect to the distribution grid. Since then, the market for energy storage

[1] The term Distributed Energy Resources, or DERs, refers to resources located on the distribution system (in front of or behind the customer meter) and includes both generation and storage devices.

has evolved considerably, and in response, many states' interconnection procedures have been updated to ensure efficient interconnection of energy storage. The *2023 Model Procedures* have been updated to reflect emerging best practices, including:

- Adding a screen to Fast Track (Level 2) to evaluate whether levels of inadvertent export require additional review;
- Requiring System Impact Studies to account for a project's export (versus nameplate) capacity, as appropriate;
- Refining the list of acceptable means of export limitation; and
- Updating application forms to ensure they collect sufficient information to screen and study limited- and non-export projects as they will actually be operated.

These revisions were developed as part of the *Toolkit and Guidance for the Interconnection of Energy Storage and Solar-Plus-Storage* (March 2022), a Department of Energy funded joint project led by IREC in partnership with the Electric Power Research Institute (EPRI); Shute, Mihaly & Weinberger LLP; the New Hampshire Electric Co-op; the Solar Energy Industries Association (SEIA); the California Solar & Storage Association (CALSSA); and PacifiCorp. The resulting "BATRIES Toolkit" is available at https://energystorageinterconnection.org/resources/batries-toolkit/. Since the Toolkit's publication, many of its recommendations and solutions have been adopted in several states, and are under consideration in a number of others.

- ***Use of 100% of Minimum Load in Fast Track Screen:*** Over the years, utilities have become more experienced with DER interconnections and have installed equipment that makes minimum load data more accessible. These advancements have led multiple states to start using minimum load, instead of peak load, in the Fast Track screens. The use of minimum load is more accurate and enables the use of a less conservative metric. As a result, the *Model Procedures* now use 100% of minimum load in place of 15% of peak load in both Fast Track and Supplemental Review.

- ***Elimination of Level 3 and Renaming of Study Tracks:*** In prior editions of the *Model Procedures*, Level 3 provided a review process for non-exporting DERs. With the growing prevalence of limited- and non-exporting DERs, it is advisable to incorporate provisions regarding the study of such projects into the other review tracks, as opposed to studying them through a separate process.

  Removing Level 3 left three review tracks: Levels 1, 2, and 4. As it is confusing to have a missing level (jumping from Level 2 to Level 4), instead of numbering the review tracks, the *Model Procedures* now adopt commonly used titles for each review track that better reflect how they function: "Simplified Process" for the smallest projects least likely to have grid impacts, "Fast Track" for mid-range projects that may be able to interconnect safely without requiring more extensive study, and "Detailed Study" for larger projects that cannot be interconnected using screens due to their potential to result in grid impacts.

- ***Supplemental Review Screens:*** The Supplemental Review screens have been revised to better incorporate best practices on how to evaluate projects that have limited export capabilities. In addition, a new screen has been added to streamline the evaluation of whether projects are effectively grounded.

- ***General Usability Updates:*** The *Model Procedures* include a number of improvements to make the *Procedures* more "user friendly," including moving the glossary from an attachment into the front of the main body of the *Procedures*, providing names for screens for easier referencing, and adding titles to some subsections to guide readers.

IREC's *2023 Model Procedures* provide guidance and best practices on the following important issues and related questions impacting the interconnection of DERs to the grid. Ideally, the questions within each category should be clearly addressed in statewide interconnection procedures to clarify the process for all involved stakeholders:

Applicability and Eligibility

1. Does the state have interconnection standards that apply uniformly to all utilities within the state's jurisdiction?

2. Are the interconnection standards applicable to all projects or are there size or design limitations that may prevent state jurisdictional projects from having a clear path to interconnection?

3. Is energy storage explicitly addressed, defined, and given a clear path to proceed through the interconnection review process?

System Size and Review Process

4. What are the size limits for the different levels of review?

5. Is there a Simplified review process for small, inverter-based systems unlikely to trigger adverse system impacts (e.g., 50 kW or less of nameplate capacity and 25 kW or less of export capacity)?

6. Is there an option for a Fast Track review process for larger DERs (e.g., up to 5 MW) that utilizes a set of technical screens to determine whether projects are unlikely to require system upgrades and/or negatively impact the safety and reliability of the grid?

7. What technical screens are applied for the Fast Track review process and do they reflect current best practices on screening? Do the screens accurately identify projects that require further study, while also minimizing the number of time-consuming studies that can clog the interconnection queue?

8. Is there a transparent Supplemental Review process for interconnection applications that fail the Fast Track screens?

9. Are proposed projects that limit export studied based on their actual anticipated impact to the grid (as opposed to assuming the projects will export their full nameplate capacity)?

Timelines

10. Are both the utility and the interconnection customer meeting established timelines?

11. What methods, approaches, and tools are in place to improve the timeliness of the interconnection process (e.g., electronic application submittal, tracking and signatures, and streamlined review)?

12. Is there an explicit process to clear projects from the interconnection queue if they do not progress?

13. Are there clear timelines for construction of upgrades or meter installs?

Dispute Resolution

14. Is there a clear, efficient, and fair dispute resolution process? Is there an interconnection ombudsperson in place to help facilitate resolution of disputes?

Information Sharing and Transparency

15. Is there a Pre-Application Report that allows DER customers to obtain (for a reasonable fee) basic information about their proposed point of interconnection *prior* to submitting a full interconnection application?

16. Is there a transparent reporting process and publication of the interconnection queue to allow customers and regulators to see how projects in the queue are progressing?

Beyond the issues addressed in IREC's *Model Procedures*, there are a number of interconnection-related questions that states and utilities will need to address as a result of the adoption of *IEEE Standard 1547™-2018 IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces* ("IEEE Std 1547-2018," or the "Standard"). This nationally-applicable standard by the Institute of Electrical and Electronics Engineers will transform how DERs interact with and function on the Electric Delivery System. More specifically, the Standard requires DERs to be capable of providing specific grid-supportive functionalities relating to voltage, frequency, communications, and controls. Once widely utilized, these functions will enable higher penetration of DERs on the grid, while maintaining grid safety and reliability and providing new grid and consumer benefits.

Any current state rules and utility interconnection procedures that are based on IEEE Std 1547-2003 will need to be updated to reflect these recent revisions. The new standard offers a menu of options from which required capabilities and activated functions can be chosen. Clearly defining related requirements and settings in statewide interconnection rules will help increase efficiency, minimize confusion, and reduce costs. Section IV.A in the *2023 Model Procedures* presents a path to include a minimum set of requirements for adopting the Standard, while

maintaining Commission oversight of technical details which may not desirable to include in interconnection rules.[2] Attachment 9 includes a template for use in adopting IEEE Std 1547-2018. Additional changes have been made throughout the *Model Procedures* to reflect IEEE Std 1547-2018 adoption. Some Simplified Process and Fast Track screens could potentially be updated further to reflect the use of grid-supportive functionalities, though additional research may be necessary to inform any updates.

States or utilities which have not yet adopted interconnection rules could begin the process today with IEEE Std 1547-2018 in mind, to avoid having to amend their rules again later (which could be inefficient and resource intensive for all involved stakeholders). IREC's *Making the Grid Smarter: Primer on Adopting the New IEEE Std 1547-2018 for Distributed Energy Resources* provides a helpful summary of these issues and the corresponding policy considerations for states, utilities, and other stakeholders. Further, IREC's *Decision Options Matrix for IEEE 1547™-2018 Adoption* helps streamline the adoption process of the Standard. The primer and matrix are available along with other related IREC resources at www.irecusa.org.

To facilitate optimal siting of proposed projects, some states now require utilities to publish maps of their systems with information on grid conditions that can help a customer determine whether there is capacity for a new project to interconnect. These hosting capacity analysis maps are typically required via separate commission orders, but can significantly improve the interconnection process. States are starting to use the results of hosting capacity analyses to help screen interconnection applications. The *Model Procedures* do not yet fully incorporate the use of hosting capacity analyses in the screening processes, although IREC strongly recommends states begin adopting robust hosting capacity analyses. IREC anticipates that future versions of the *Model Procedures* will be able to significantly improve the efficiency and accuracy of screening processes by using hosting capacity analyses results to better evaluate project impacts.

Finally, while these *Model Procedures* reflect established best practices, they do not yet reflect many of the fast-evolving issues faced in many jurisdictions with high DER penetration, like inequitable distribution of upgrade costs, delays in processing applications, and the increasing need for transmission system impact studies. Thus, as DER interconnection grows, regulators will likely want to consider further revisions to rules regarding these issues. For example, some states have developed group study processes to increase study efficiency and more fairly allocate upgrade costs. While there is not yet an established best practice for group studies, IREC will provide an overview of existing distribution group study processes and analyze common practices and potential challenges in its forthcoming paper on this topic, which is

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[2] States take varying approaches to establish technical requirements. Some include technical requirements within the interconnection rules themselves (e.g., California's Rule 21) and many others establish them separately or allow Utilities to manage them independently. The decision to include these technical details or not may be dependent on the regulatory burden or capacity of the Commission to modify the interconnection rules as the need to update technical requirements arises over time. The approach taken in the *2023 Model Procedures* Section IV.A provides a balanced approach by providing performance category assignments (which should not vary by Utility) but leaving technical details to be provided in a Commission-approved document called the Technical Interconnection and Interoperability Requirements.

expected to be published in fall of 2023. IREC encourages states to recognize the growing pressures on the interconnection process and to look for additional innovations to help stay on track toward their clean energy goals.

TABLE OF CONTENTS

I. GENERAL

A. Scope

These Interconnection Procedures are applicable to all state-jurisdictional interconnections of Distributed Energy Resources (DERs).[1]

B. Definitions

1. "Anti-Islanding" means a control scheme installed as part of the DER or Interconnection Facility that senses and prevents the formation of an Unintended Island.

2. "Applicant" means a person or entity that has filed an Application to interconnect a DER to an Electric Delivery System. For a DER that will offset part or all of the load of a Utility customer, the Applicant is that customer, regardless of whether the customer owns the DER or a third party owns the DER.[2] For a DER selling electric power to a Utility, the owner of the DER is the Applicant.

3. "Applicant Options Meeting" has the meaning provided in Section III.D of these Procedures.

4. "Application" means the Applicant's request, in accordance with these Interconnection Procedures, to interconnect a new DER, or to make a Material Modification to the operating characteristics of an existing DER that is interconnected with the Utility's Electric Delivery System.

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[1] Depending on state law, individual utility procedures may govern interconnections, particularly for municipal and cooperative utilities and public utility districts. These model Interconnection Procedures may be modified to apply to a particular utility. State or utility procedures do not apply when the Federal Energy Regulatory Commission (FERC) has jurisdiction over the interconnection, as is the case for many transmission interconnections and for some distribution interconnections.

[2] For a variety of reasons, a DER may be owned by a third party that contracts to sell energy or furnish the DER to the Utility's customer. In those cases, the Utility's customer is still the Applicant under this Agreement, though the Applicant may choose to designate the owner as the Applicant's representative. Customers may also designate on the Application form installers or others to act on their behalf in the process.

5. "Area Network" means a section of an Electric Delivery System served by multiple transformers interconnected in an electrical network circuit generally used in large, densely populated metropolitan areas in order to provide high reliability of service and having the same definition as the term "secondary grid network" as defined in IEEE Std 1547™.

6. "Auxiliary Load" means electrical power consumed by any auxiliary equipment necessary to operate the DER.

7. "Business Day" means Monday through Friday, excluding federal and state holidays.

8. "Certified" means a piece of equipment has been tested in accordance with the applicable requirements of IEEE Std 1547™ and IEEE Std 1547.1™ by any Nationally Recognized Testing Laboratory (NRTL) recognized by the United States Occupational Safety and Health Administration to test and certify equipment pursuant to the applicable standard and the equipment has been labeled and is publicly listed by such NRTL at the time of the Interconnection Application. Compliance with UL 1741 Supplement SB ensures compliance with IEEE Std 1547-2018 and IEEE Std 1547.1-2020. There may be additional or separate certifications available for specific pieces of equipment.

9. "Commission" means the *[insert name of the state utility commission or equivalent]*.

10. "Customer" means the person or entity that receives or is entitled to receive Distribution Service through the Utility's Electric Delivery System or is a retail customer of the Utility.

11. "Detailed Study" has the meaning provided in Section III.E and Attachment 3 and Attachment 4 of these Procedures.

12. "Distributed Energy Resource" or "DER" means the equipment used by an Interconnection Customer to generate, store, manage, interconnect, and monitor electricity. DER includes an Interconnection Equipment Package.

13. "Distribution Service" means the service of delivering energy over the Electric Delivery System pursuant to the approved tariffs of the Utility other than services directly related to the interconnection of a DER under these Interconnection Procedures.

14. "Electric Delivery System" means the equipment operated and maintained by a Utility to deliver electric service to end-users, including without limitation transmission and distribution lines, substations, transformers, Spot Networks, and Area Networks.

15. "Energy Storage Device" means a device that captures energy produced at one time, stores that energy for a period of time, and delivers that energy as electricity for use at a future time. For the purposes of these Procedures, an Energy Storage Device can be considered a DER or generator.

16. "Export Capacity" means the maximum Nameplate Rating of a DER in alternating current (AC); except where such capacity is limited by any of the methods of limiting electrical export in Section IV.B.3, the Export Capacity shall be the net capacity as limited through the use of such methods (not including Inadvertent Export).

17. "Facilities Study" has the meaning provided in Section III.E.5 and

18. Attachment 6B of these Procedures.

19. "Fast Track" has the meaning provided in Section III.B and Attachment 3 and Attachment 4 of these Procedures.

20. "Fault Current" means electrical current that flows through a circuit and is produced by an electrical fault, such as phase to ground, double-phase to ground, three-phase to ground, phase-to-phase, and three-phase. A Fault Current is often several times larger in magnitude than the current that normally flows through a circuit.

21. "Host Load" means the electrical power, less the Auxiliary Load consumed by the Customer, to which the DER is connected.

22. "IEEE" means the Institute of Electrical and Electronic Engineers.

23. "IEEE Standards" means the standards published by the IEEE, available at www.ieee.org.

24. "Inadvertent Export" means the unscheduled export of active power from a DER, exceeding a specified magnitude and for a limited duration, generally due to fluctuations in load-following behavior.

25. "Interconnection Agreement" means a standard form agreement between an Interconnection Customer and a Utility governing the interconnection of a DER to a Utility's Electric Delivery System, as well as the ongoing operation of the DER after it is interconnected. For the Simplified Process, the standard form Interconnection Agreement is incorporated with the Simplified Process Application, provided in Attachment 2 to these Interconnection Procedures. For Fast Track or Detailed Study, the standard form Interconnection Agreement is provided in Attachment 3 to these Interconnection Procedures.

26. "Interconnection Customer" means an Applicant that has entered into an Interconnection Agreement with a Utility to interconnect a DER and has interconnected that DER.

27. "Interconnection Equipment Package" means a group of components connecting an electric generator with an Electric Delivery System, and includes all interface equipment including switchgear, protective devices, inverters, or other interface devices. An Interconnection Equipment Package may include an integrated generator or electric source.[3]

28. "Interconnection Facilities" means the electrical wires, switches, and related equipment that are required, in addition to the facilities required to provide electric Distribution Service to a Customer, to allow interconnection. Interconnection Facilities may be located on either side of the Point of Common Coupling as appropriate to their purpose and design. Interconnection Facilities may be integral to a DER or provided separately. Interconnection Facilities may be owned by either the Interconnection Customer or the Utility.

29. "Interconnection Procedures" means these Procedures including attachments.

30. "Island" or "Islanding" means a condition on the Utility's Electric Delivery System in which one or more DERs deliver power to Customers using a portion of the Utility's Electric Delivery System that is electrically isolated from the remainder of the Utility's Electric Delivery System.

[3] The most common Interconnection Equipment Package is an inverter.

31. "Limited Export" means the exporting capability of a DER whose Export Capacity is limited by the use of any configuration or operating mode described in Section IV.B.

32. "Line Section" means that portion of the Utility's Electric Delivery System connected to a Customer bounded by automatic sectionalizing devices or the end of the distribution line.

33. "Material Modification" means a modification that has a material impact on the cost or timing of processing an Application with a later queue priority date or a change in the Point of Interconnection. A Material Modification does not include, for example, (a) a change of ownership of a DER, (b) a change or replacement of generating equipment that is a like-kind substitution in size, ratings, impedances, efficiencies, or capabilities of the equipment specified in the original Application, (c) replacement of existing inverters with inverters that conform to more recent standards after the state has adopted their use, as long as the Export Capacity does not change; or (d) a reduction in the Nameplate Rating and/or Export Capacity of the DER of ten percent (10%) or less.[4]

34. "Minor System Modifications" means modifications to a Utility's Electric Delivery System that involve little work or low costs (e.g., less than eight hours of work or $8,000 in materials). Minor System Modifications include, but are not limited to, activities like changing the fuse in a fuse holder cut-out or changing the settings on a circuit recloser.[5]

35. "Nameplate Rating" means the sum total capacity of all of a DER's constituent generating or storage units, regardless of whether it is limited by any of the methods in Section IV.B.

36. "Net Rating" means the Nameplate Rating of the DER minus the consumption of electrical power of the Auxiliary Load.

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[4] Different jurisdictions have taken varying approaches to defining what is a "Material Modification." Some states, like North Carolina, New York, California, and Minnesota, provide extensive examples of what is, and is not, a Material Modification, to set expectations and guide decision-making. Other states provide more limited guidance, leaving the determination more to utility discretion.

[5] Some utilities allow for more substantial modifications to be made without the need for study, including the replacement of service transformers. States should establish time and cost thresholds appropriate for their state, or consider expanding the list of upgrades that can be considered Minor System Modifications.

37. "Non-Export" or "Non-Exporting" means a DER that is sized and designed using any of the methods in Section IV.B, such that the DER's output is used for Host Load only and no electrical energy (except for any Inadvertent Export) is transferred from the DER to the Electric Delivery System.

38. "Parties" means the Applicant and the Utility in a particular Interconnection Agreement. "Either Party" refers to either the Applicant or the Utility.

39. "Point of Common Coupling" or "PCC" means the point of connection between the Utility's Electric Delivery System and the Customer's electrical facilities.

40. "Point of DER Connection" or "PoC" means the point where a DER unit is electrically connected in a Utility's Electric Delivery System and meets the requirements of IEEE Std 1547™-2018 exclusive of any load present in the respective part of the Customer's facility.

41. "Point of Interconnection" or "POI" means the point where the Interconnection Facilities connect with the Utility's Electric Delivery System. This may or may not be coincident with the Point of Common Coupling.

42. "Power Control System" means systems or devices which electronically limit or control steady state currents to a programmable limit.

43. "Power Rating Configuration Setting" means the as-configured value of the active or apparent power ratings which is used as the rating within the DER. This alternative rating is associated with the nameplate information required by IEEE Std 1547-2018 subclause 10.3, as allowed by subclause 10.4.

44. "Pre-Application Report" has the meaning provided in Section II.B of these Procedures.

45. "Pre-Application Report Request" has the meaning provided in Section I.A of these Procedures.

46. "Protective Function" means the equipment, hardware, and/or software in a DER (whether discrete or integrated with other functions) whose purpose is to protect against conditions that, if left uncorrected, could result in harm to personnel, damage to equipment, loss of safety or reliability, or operation outside pre-established parameters required by the Interconnection Agreement.

47. "Reference Point of Applicability" or "RPA" means a location proximate to the DER where the interconnection and interoperability performance requirements, as specified by IEEE Std 1547-2018, apply.

48. "Relevant Minimum Load" means the lowest measured circuit or substation load coincident with the DER's production. For solar photovoltaic DERs with no battery storage, use daytime minimum load (i.e., 10 a.m. to 4 p.m. for fixed panel systems and 8 a.m. to 6 p.m. for systems utilizing tracking).

49. "Simplified Process" has the meaning provided in Section III.A and Attachment 2 of these Procedures.

50. "Spot Network" means a section of an Electric Delivery System that uses two or more inter-tied transformers to supply an electrical network circuit. A Spot Network is generally used to supply power to a single Utility customer or to a small group of Utility customers, and has the same meaning as the term is used in IEEE Std 1547.

51. "Supplemental Review" has the meaning provided in Section III.C of these Procedures.

52. "System Impact Study" has the meaning provided in Section III.E.4 and Attachment 6A of these Procedures.

53. "Technical Interconnection and Interoperability Requirements" or "TIIR" means Commission-approved public documents, often utility-specific, which include requirements for interconnection, interoperability, DER capabilities and their utilization (settings), and grid integration (e.g., protection coordination, telemetry).[6]

54. "UL" means the company by that name which has established standards that relate to components of DERs.

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[6] The documents may be specific to the IEEE Std 1547-2018-related technical requirements, or may include additional information relevant to interconnected DERs. These documents may be variously referred to as interconnection handbooks, "blue books," or technical service manuals, etc. Commissions may want to approve the entirety of a TIIR, inclusive of items typically included in handbooks, but at a minimum, the Commission should approve the portions related to the IEEE Std 1547-2018 technical requirements.

55. "Unintended Island" means the creation of an Island without the approval of the Utility, usually following a loss of a portion of the Utility's Electric Delivery System.

56. "Utility" means an operator of an Electric Delivery System.[7]

C. Order of Review

1. Optional Pre-Application Report: Potential applicants may request this optional report to acquire information about system conditions at their proposed Point of Interconnection without submitting a full Interconnection Application.

2. Interconnection Review: There are three interconnection review paths: Simplified Process, Fast Track, and Detailed Study,[8] with options to undertake Supplemental Review and/or an Applicant Options Meeting prior to entering Detailed Study. At any time, any Applicant may elect to apply directly under Detailed Study or to move into Detailed Study. The Utility will process the Applications in the order of their queue position as established by Section I.D.3 unless the Application is part of a group study pursuant to Section I.D.6.

   The four interconnection review paths are:

   a. Simplified Process: For Certified inverter-based DERs that have a Nameplate Rating of 50 kilowatts (kW)[9] or less and an Export Capacity of 25 kW or less.

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[7] Some interconnection procedures reference the operator of the Electric Delivery System as the "Company" or the "Electric Delivery Company (EDC)." Here, the term "Utility" is meant to include all investor-owned and public utilities, including cooperatives, municipal utilities, and public utility districts that are subject to these rules. In deregulated states, the "wires" company is the Utility, while the energy provider is not.

[8] As explained in the introduction to this edition, the *Model Procedures* now utilize the terms Simplified Process, Fast Track, and Detailed Study in place of the former approach of referring to these processes as Levels 1 through 4. In addition, the process formerly known as Level 3 (the review process for non-exporting DERs) has been integrated into Fast Track and no longer exists as a separate process track.

[9] Throughout these *Interconnection Procedures*, all rated capacity figures are measured in alternating current (AC).

b. Fast Track: For DERs that have a Nameplate Rating of up to 5 megawatts (MW), depending on line capacity and distance from substation, as detailed in the table in Section III.B.1.

c. Detailed Study: For all DERs that do not qualify for, or pass through, the Simplified Process or Fast Track.

D. Application Submission and Processing

1. Submission: The Applicant shall submit the Application (in either Attachment 2 or Attachment 3) to the Utility along with the applicable processing fee or deposit. No additional fees for processing of the Application shall be required unless specified in these Interconnection Procedures.

2. Completeness Review: The Utility shall record the date and time of the Application's receipt. The Utility shall notify the Applicant within three (3) Business Days that the Application has been received. Within ten (10) Business Days of receipt, the Utility shall notify the Applicant whether the Application is complete. If the Application is incomplete, the Utility shall provide the Applicant with a list of all information that the Applicant must provide to complete the Application. The Applicant must provide the requested information within ten (10) Business Days, or the Application will be deemed withdrawn.

3. The Queue: The Utility shall assign the Application a queue position based on when it is deemed complete under Section I.D.2. The Utility shall maintain a single queue, which may be sortable by geographic region (e.g., feeder or substation).[10] The queue shall contain all of the information listed in Attachment 7. The queue shall be publicly available on the Utility's website and shall be updated at least monthly.

[10] Alternately, some states allow the maintenance of a separate queue for small projects proceeding under expedited review procedures such as the Simplified Process. These projects are typically able to move ahead rapidly without the need for upgrades that impact other projects and thus it is feasible to create a separate queue for these projects. In any case, the queue should be published in a manner that protects customer confidentiality. Also, if there is a delay in reviewing the completeness of applications, they shall be reviewed in the order received so that queue position is not undermined.

4. Modifications to an Application or to an Existing DER:

   a. At any time after an Application is deemed complete, including after the receipt of Fast Track, Supplemental Review, System Impact Study, and/or Facilities Study results, the Applicant or the Utility may identify modifications to the planned DER that may improve the costs and benefits (including reliability) of the DER, and/or the ability of the Utility to accommodate the interconnection. An existing DER may also propose such modifications. The Applicant shall submit to the Utility, in writing, all proposed modifications to any information provided in the Application or Interconnection Agreement for existing DERs. The Utility may not unilaterally modify the Application.

   b. Within ten (10) Business Days of receipt of a proposed modification, the Utility shall notify the Applicant whether a proposed modification to either an Application or an existing DER constitutes a Material Modification.

      i. If the proposed modification is determined to be a Material Modification, then the Utility shall notify the Applicant in writing that the Applicant may: 1) withdraw the proposed modification; or 2) proceed with a new Application for such modification. The Applicant shall provide the Utility with its decision in writing within ten (10) Business Days after being provided the Material Modification determination results. If the Applicant does not provide its decision, the proposed modification shall be deemed withdrawn.

      ii. If the proposed modification is determined not to be a Material Modification, then the Utility shall notify the Applicant in writing that the modification has been accepted and that the Applicant shall retain its eligibility for interconnection, including its place in the interconnection queue. Existing DERs may make the modification without requiring a new Application.

   c. Any dispute as to the Utility's determination that a modification constitutes a Material Modification shall proceed in accordance with the dispute resolution provisions in Section IV.E of these Procedures.

d. Any modification to machine data, equipment configuration, or to the interconnection site of the DER not agreed to in writing by the Utility and the Applicant may be deemed a withdrawal of the Application and may require submission of a new Application, unless proper notification of each Party by the other as described in Sections I.D.4.a and I.D.4.b is provided. The terms of the Interconnection Agreement apply for existing DERs.

5. Site Control: Documentation of site control must be submitted with the Application. Site control may be demonstrated by:

   a. Ownership of, or a leasehold interest in, or a right to develop a site for the purpose of constructing a DER;

   b. A fully executed option to purchase or acquire a leasehold site for such purpose; or

   c. A fully executed agreement demonstrating exclusivity or other business relationship between the Applicant and the entity having the authority to grant the Applicant the right to possess or occupy a site for such purpose.

6. Group Study: In some instances, typically where multiple DERs are electrically interrelated, studying them jointly in a group study process may provide cost and time efficiencies. If the Utility and the Applicant mutually agree, the Application may be studied in a group with other applications.[11]

7. Continued Review: If an Application is denied approval for interconnection under one review path, but the Applicant decides to continue with review under another review path within ten (10) Business Days of receipt of that denial, the Applicant shall retain its original queue position.

[11] In markets with substantial interconnection activity, it can be difficult for utilities to complete studies in a timely manner where there are many projects in the queue. Further, individual studies and the common "cost-causer pays" approach may result in inequitable allocation of costs for upgrades to the Utility's Electric Delivery System. To address these issues, some states have created group or cluster study processes to try to increase the efficiency of the study process, reduce study costs, and more fairly allocate upgrade costs. IREC provides an overview of existing distribution group study processes

E. Applicable Standards

Unless waived by the Utility, a DER must comply with the standards identified in Attachment 1, as applicable.

II. PRE-APPLICATION REPORT[12]

A. Pre-Application Report Request

1. A Pre-Application Report Request shall include:

   a. Contact information (name, address, phone number, and email address).

   b. A proposed Point of Interconnection. The proposed Point of Interconnection shall be defined by latitude and longitude, site map, street address, utility equipment number (e.g., pole number), meter number, account number, or some combination of the above sufficient to clearly identify the location of the Point of Interconnection.

   c. DER type (e.g., solar, wind, combined heat and power, storage, solar-plus-storage, etc.).

   d. Nameplate Rating and Export Capacity (if different).

   e. Single- or three-phase configuration.

   f. Whether the DER is stand-alone or will service onsite load.

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and analyzes emerging best practices and potential challenges in its forthcoming paper on group studies, which is expected to be published in fall of 2023.

[12] In addition to Pre-Application Reports, some states require utilities to publish publicly available maps of their systems, which provide basic system information such as line voltage, load profiles, and the amount of queued and interconnected DERs at specific points on the system. Some require utilities to calculate the available hosting capacity for each node on their system and publish the results in a public map. Mapping tools enable customers to get system information without requiring utility staff time to prepare reports and can reduce the number of requests for Pre-Application Reports. California's Rule 21 also provides for an Enhanced Pre-Application Report. For an additional fee, an applicant can request additional packages of information from the utility, including information about minimum load, existing upstream protection devices, available fault current at the proposed Point of Interconnection, transformer data, and primary and secondary services characteristics. These can help applicants design projects more correctly from the start with fewer surprises later in the process.

g. Whether new service is requested.

h. $300 non-refundable processing fee.

2. In requesting a Pre-Application Report, a potential Applicant understands that:

a. The existence of "available capacity" in no way implies that an interconnection up to this level may be completed without impacts because there are many variables studied as part of the interconnection review process.

b. The Electric Delivery System is dynamic and subject to change.

c. Data provided in the Pre-Application Report may become outdated and not useful at the time of submission of the complete Application.

B. Pre-Application Report

1. Within ten (10) Business Days of receipt of a completed Pre-Application Report Request, the Utility shall provide a Pre-Application Report to the Applicant. The Pre-Application Report shall include the following information, if available:

a. Total capacity (MW) of substation/area bus or bank and circuit likely to serve proposed site, based on the thermal ratings of the Utility's Electric Delivery System.

b. Aggregate existing Export Capacity (MW) interconnected to the substation/area bus or bank and circuit likely to serve proposed site.

c. Aggregate queued Export Capacity (MW) proposing to interconnect to the substation/area bus or bank and circuit likely to serve proposed site.

d. Available capacity (MW) of substation/area bus or bank and circuit likely to serve proposed site, based on the thermal ratings of the Utility's Electric Delivery System. Available capacity is the total capacity less the sum of existing and queued Export Capacity, accounting for all load served by existing and queued DERs. Note: DERs may remove available capacity in excess of their Export Capacity if they serve on-site load and utilize export controls which limit their

Export Capacity to less than their Nameplate Rating.

e. Whether the proposed DER is located on an area, spot, or radial network.

f. Substation nominal distribution voltage or transmission nominal voltage if applicable.

g. Nominal distribution circuit voltage at the proposed site.

h. Approximate circuit distance between the proposed site and the substation.

i. Relevant Line Section(s) and substation actual or estimated peak load and minimum load data.

j. Number and rating of protective devices and number and type of voltage regulating devices between the proposed site and the substation/area bus.

k. Whether or not three-phase power is available at the site and/or distance from three-phase service.

l. Limiting conductor rating from proposed Point of Interconnection to distribution substation.

m. Based on proposed Point of Interconnection, existing or known constraints such as, but not limited to, electrical dependencies at that location, short circuit interrupting capacity issues, power quality or stability issues on the circuit, capacity constraints, or secondary networks.

n. Any other information the Utility deems relevant to the Applicant.

2. The Pre-Application Report need only include pre-existing data. A Pre-Application Report request does not obligate the Utility to conduct a study or other analysis of the proposed project in the event that data is not available. If the Utility cannot complete all or some of a Pre-Application Report due to lack of available data, the Utility will provide the potential Applicant with a Pre-Application Report that includes the information that is available and identify the information that is unavailable.

3. Notwithstanding any of the provisions of this Section, the Utility shall, in good faith, provide Pre-Application Report data that

represents the best available information at the time of reporting.

III. INTERCONNECTION REVIEW

A. Simplified Process: Screening Criteria and Process for Certified Inverter-Based DERs with a Nameplate Rating of 50 kW or Less and an Export Capacity of 25 kW or Less

1. Eligibility: Simplified Process review is available to any Certified inverter-based DER that has a Nameplate Rating that does not exceed 50 kW and an Export Capacity that does not exceed 25 kW.

2. Application: An Applicant must submit a Simplified Process Application, pursuant to Section I.D.1, using the standard form provided in Attachment 2 to these Interconnection Procedures, which may be sent electronically to a recipient designated by the Utility. An Applicant executes the standard Interconnection Agreement for the Simplified Process by submitting a Simplified Process Application. A Utility may elect to charge a standard Application fee of up to $100 for Simplified Process review.[13]

3. Applicable Screens: The Utility shall evaluate the Application using the following screens:

   a. *Certified Equipment Screen.* The DER must utilize an inverter Certified to UL 1741 Supplement SB.

   b. *Minimum Load Screen.* For interconnection of a DER to a radial distribution circuit, the DER's Export Capacity, aggregated with the Export Capacity of all other DERs on a Line Section, will not exceed 100 percent of the Line Section's[14] Relevant Minimum Load as most recently

[13] Most states apply a Simplified Process Application fee in the $100 to $200 range, though a number of states have chosen to waive the fee for net-metered facilities. In general, the appropriate fee should ensure that the Utility is compensated, on average, for conducting a reasonably efficient process. This can be achieved by requiring a utility to provide data regarding its actual costs for processing Simplified Process applications and how many Simplified Process applications it processes. This same approach should be used for setting any fee in these Interconnection Procedures.

[14] Clarification of the relevant Line Section is sometimes necessary. If the Point of Common Coupling is downstream of a line recloser, include those medium voltage (MV) Line Sections from the recloser to the end of the feeder. If the 100 percent criterion is passed for aggregate distributed generation and

measured at the substation or calculated for the Line Section.[15]

c. *Shared Secondary Transformer Screen.* If the DER is to be interconnected on a single-phase shared secondary, then the aggregate generation capacity on the shared secondary, including the DER's Export Capacity, will not exceed 65 percent of the transformer nameplate power rating.

d. *Service Imbalance Screen.* If the DER is single-phase and is to be interconnected on a transformer center tap neutral of a 240-volt service, its addition will not create an imbalance between the two sides of the 240-volt service of more than 20 percent of the nameplate rating of the service transformer.

e. *Network Screen.* For interconnection of a DER within a Spot Network or Area Network, the aggregate Nameplate Rating including the DER's Nameplate Rating may not exceed 50 percent of the Spot Network or Area Network's Relevant Minimum Load. Alternately, if the Utility does not have minimum load data for the Spot or Area Network, the Utility may select any of the following methods to determine anticipated minimum load:

   i. Five percent of the Spot Network or Area Network's maximum load in the previous year;

   ii. The Applicant's good faith estimate, if provided; or

Relevant Minimum Load at first upstream recloser, then the screen is passed. If the Point of Common Coupling is upstream of all line reclosers (or none exist), include aggregate distributed generation relative to Relevant Minimum Load of the feeder measured at the substation. If the 100 percent criterion is passed for the aggregate distributed generation and Relevant Minimum Load for the whole feeder, then the screen is passed. A fuse must be manually replaced and is therefore not considered an automatic sectionalizing device.

[15] If utilities do not have minimum load data available for all circuits, Commissions can consider allowing screening based on 15% of peak load where minimum load data are not available for a period of time. However, the Commission should establish a reasonable certain date within the rules by which utilities must rely solely on minimum load data. This allows utilities time to acquire those data. Minimum load is an increasingly critical piece of Electric Delivery System data and utilities can use a variety of different methods to gather the data.

iii. The Utility's good faith estimate, if provided in writing to the Applicant along with the reasons why the Utility considered the other methods to estimate minimum load inadequate.

4. Time to Process Screens: Within seven (7) Business Days after the Utility notifies the Applicant that the Application is complete, the Utility shall notify the Applicant whether the DER meets all of the applicable Simplified Process screens.

5. Screens Failure: Despite the failure of one or more screens, the Utility, at its sole option, may approve the interconnection provided such approval is consistent with safety and reliability. If the Utility cannot determine that the DER may nevertheless be interconnected consistent with safety, reliability, and power quality standards, the Utility shall provide the Applicant with the screen results. If one or more screens are not passed, the Utility shall provide, in writing, the specific screens that the Application failed, including the technical reason for failure. The Utility shall provide information and detail about the specific system threshold or limitation causing the Application to fail the screen. In addition, the Utility shall allow the Applicant to select one of the following, at the Applicant's option:

   a. Undergo Supplemental Review, in accordance with Section III.C; or

   b. Continue evaluating the Application under Detailed Study, in accordance with Section III.E.

   The Applicant must notify the Utility of its selection within ten (10) Business Days or the Application will be deemed withdrawn.

6. Approval: If the proposed interconnection passes the screens, the Application shall be approved, and the Utility will provide the Applicant an executable Interconnection Agreement within the following timeframes:

   a. If the proposed interconnection requires no construction of facilities by the Utility on its own system,[16] the Utility shall provide the Applicant with a copy of the Simplified Process

[16] This sub-provision (a) permits the installation of any metering or other commercial devices.

Application form, signed by the Utility, forming the Simplified Process Interconnection Agreement, at the same time that the screen results are provided. If the Utility does not notify an Applicant whether an Application is approved or denied in writing within twenty (20) Business Days after notification of the Simplified Process review results, the Interconnection Agreement signed by the Applicant as part of the Simplified Process Application shall be deemed effective.

b. If the proposed interconnection requires construction of Interconnection Facilities or any Electric Delivery System modifications, the Application shall be processed under Fast Track starting at Section III.B.6 and shall use the Interconnection Agreement in Attachment 4 associated with the Fast Track process. The Applicant shall be notified of this upon receiving notification of the screen results.

7. Reference Point of Applicability Review: This process shall occur concurrently with the Simplified Process screening pursuant to Section III.A.4:

a. Within five (5) Business Days after the Utility notifies the Applicant that the Application is complete, the Utility shall review the RPA denoted in the application and determine if it is appropriate.

b. If it is determined that the RPA is appropriate, the Utility will notify the Applicant when it provides the screen results and proceed according to Section III.A.4.

c. If the Utility determines that the RPA is inappropriate, the Utility will notify the Applicant in writing, including an explanation as to why it requires correction. The Applicant shall provide the Utility with a corrected Application with the proper RPA within five (5) Business Days of notification. During this time, the Utility will proceed with applying the Simplified Process screens. The Utility shall review the revised Application within five (5) Business Days of receipt to determine if the revised RPA has been appropriately denoted. If correct, the Utility will proceed according to Section III.A.4 but be provided with a total of twelve (12) Business Days to provide the Simplified Process screen results. If the Applicant does not provide the appropriate location or request an extension of time within the deadline, the Application will be deemed withdrawn.

8. Time for Commencing Operation: Unless extended by mutual agreement of the Parties, within six (6) months of formation of an Interconnection Agreement or six (6) months from the completion of any upgrades, whichever is later, the Applicant shall commence operation of the DER. The Applicant must provide the Utility with at least ten (10) Business Days' notice of the anticipated start date of the DER.

9. Inspection: Within ten (10) Business Days of receiving the notice of the anticipated start date of the DER, the Utility may conduct an inspection of the DER at a time mutually agreeable to the Parties. If the DER passes the inspection, the Utility shall provide written notice of the passage within three (3) Business Days. If a DER initially fails a Utility inspection, the Utility shall offer to redo the inspection at the Applicant's expense at a time mutually agreeable to the Parties. If the Utility determines that the DER fails the inspection, the Utility must provide the Applicant with a written explanation detailing the reasons for the failure and any standards violated. If the Utility determines no inspection is necessary, it shall notify the Applicant within three (3) Business Days of receiving the notice of the anticipated start date.

10. Operation: An Applicant may begin interconnected operation of a DER provided that there is an Interconnection Agreement in effect, the Utility has received proof of the electric code official's approval, and the DER has received written notice that it passed any inspection required by the Utility or received notice that none is required.[17] Evidence of approval by an electric code official includes a signed Certificate of Completion in the form of Attachment 5 or other inspector-provided documentation.

[17] Upon interconnected operation, the Applicant becomes an Interconnection Customer.

B. Fast Track: Screening Criteria and Process for DERs Meeting Specified Size Criteria Up to 5 MW, Depending on Line Capacity and Distance from Substation

1. Eligibility: Fast Track review is available to any DER that has an Export Capacity that does not exceed the limits identified in the table below, which vary according to the voltage of the line at the proposed Point of Interconnection. DERs located within 2.5 miles of a substation and on a main distribution line with minimum 600-amp capacity are eligible for Fast Track interconnection under higher thresholds.

LINE VOLTAGE	FAST TRACK ELIGIBILITY	
	Regardless of location	**On ≥ 600-amp line and ≤ 2.5 miles from substation**
≤ 5 kV	< 1 MW	< 2 MW
5 kV – ≤ 15 kV	< 2 MW	< 3 MW
15 kV – ≤ 30 kV	< 3 MW	< 4 MW
30 kV – 69 kV	≤ 4 MW	≤ 5 MW

2. Application: An Applicant must submit a Fast Track Application, pursuant to Section I.D, using the standard form provided in Attachment 3 to these Interconnection Procedures, which may be sent electronically to a recipient designated by the Utility. A Utility may elect to charge a standard Application fee of up to $100 plus $10 per kW of Nameplate Rating up to a maximum of $2,000 for Fast Track review.

3. Applicable screens:

   a. *Minimum Load Screen.* For interconnection of a DER to a radial distribution circuit, the DER's Export Capacity, aggregated with all other generation capable of exporting energy on a Line Section, will not exceed 100 percent of the Line Section's[18] Relevant Minimum Load as most recently

[18] Clarification of the relevant Line Section is sometimes necessary. If the Point of Common Coupling is downstream of a line recloser, include those medium voltage (MV) Line Sections from the recloser to the end of the feeder. If the 100% criterion is passed for aggregate distributed generation and Relevant Minimum Load at first upstream recloser, then the screen is passed. If the Point of Common Coupling is upstream of all line reclosers (or none exist), include aggregate distributed generation relative to Relevant Minimum Load of the feeder measured at the substation. If the 100% criterion is passed for the aggregate distributed generation and Relevant Minimum Load for the whole feeder, then the screen is passed. A fuse must be manually replaced and is therefore not considered an automatic sectionalizing device.

measured at the substation or calculated for the Line Section.[19]

b. *Inadvertent Export Screen.* For interconnection of a proposed DER that can introduce Inadvertent Export, where the Nameplate Rating of the DER minus the Export Capacity is greater than 250 kW, the following threshold must be met. With a power change equal to the Nameplate Rating minus the Export Capacity, the change in voltage at the point on the medium voltage (primary) level nearest the Point of Interconnection does not exceed three percent (3%). Voltage change will be estimated applying the following formula:

Formula	$\frac{(R_{SOURCE} \times \Delta \boldsymbol{P}) - (X_{SOURCE} \times \Delta \boldsymbol{Q})}{V^2}$
Where: $\Delta \boldsymbol{P}$ = (DER apparent power Nameplate Rating – Export Capacity) × PF, $\Delta \boldsymbol{Q}$ = (DER apparent power Nameplate Rating – Export Capacity) × $\sqrt{(\mathbf{1} - \boldsymbol{PF^2})}$, R_{SOURCE} is the grid resistance, X_{SOURCE} is the grid reactance, V is the grid voltage, PF is the power factor	

c. *Fault Current Contribution Screen.* The DER, aggregated with other generation on the distribution circuit, will not contribute more than ten percent (10%) to the distribution circuit's maximum Fault Current at the point on the primary

[19] If utilities are concerned that they do not have minimum load data available for all circuits, one option is to allow screening based on 15% of peak load where minimum load data are not available for a period of time, and set a reasonable date certain within the rules by which utilities must rely solely on minimum load data. This allows utilities time to acquire those data. Minimum load is an increasingly critical piece of Electric Delivery System data and utilities can use a variety of different methods to gather the data.

nearest the proposed Point of Interconnection.

d. *Short Circuit Interrupting Capability Screen.* The DER, aggregated with other generation on the distribution circuit, will not cause any distribution protective devices and equipment (including but not limited to substation breakers, fuse cutouts, and line reclosers), or Utility customer equipment on the system, to exceed ninety percent (90%) of the short circuit interrupting capability; nor is the interconnection proposed for a circuit that already exceeds ninety percent (90%) of the short circuit interrupting capability.[20]

e. *Line Configuration Screen.* The DER complies with the applicable type of interconnection, based on the table below. This screen includes a review of the type of electrical service provided to the Interconnecting Customer, including line configuration and the transformer connection to limit the potential for creating over-voltages on the Utility's Electric Delivery System due to a loss of ground during the operating time of any Anti-Islanding function.[21]

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[20] This threshold could be higher than 90% based on utility practices. Some utility practices may allow fault current in excess of 90% of the short circuit interrupting capability. If the utility practices allow for higher thresholds, then there would be no reason to fail this screen because no further assessment or upgrades would be undertaken. Commissions could consider raising the threshold based on actual utility practice in the state.

[21] This screen allows utilities to continue to maintain safety, reliability, and power quality by identifying generators that pose overvoltage concerns and mitigating them through a technical solution. At the same time, it avoids a full study when one is not needed, i.e., for DERs below 11 kVA. In some states this screen appears in a table format, while in other states it may appear in sentences/paragraph format. Several iterations of the screen exist around the country and attempts have been made to refine it considering the differences in over-voltage behavior between inverters and rotating machines. The different editions of the *Model Interconnection Procedures* reflect the evolution in the practices, and the screen is likely to evolve further. This screen is based off the Illinois part 466.100 version which omits considerations of effective grounding for rotating machines. Commissions adopting the screen in this format should consider whether and how "effective grounding" should be specified for rotating machines, since the primary interconnection type is not the only determining factor for whether a rotating machine is effectively grounded. The important fact to note is that the term "effective grounding" as historically used to apply to rotating machines can be misinterpreted when applied to inverters. For further information on the differences between grounding needs of inverters and rotating machines see IEEE C62.92.6-2017 IEEE Guide for Application of Neutral Grounding in Electrical Utility Systems, Part VI—Systems Supplied by Current-Regulated Sources.

Primary Distribution Line Configuration	Type of Interconnection to Primary Distribution Line	Results/Criteria
Three-phase, three-wire	Three-phase or single-phase, phase-to-phase	Pass Screen
Three-phase, four-wire	Three-phase or single-phase, line-to-neutral	Pass Screen

f. *Shared Secondary Transformer Screen.* If the DER is to be interconnected on a single-phase shared secondary, then the aggregate Export Capacity on the shared secondary, including the DER's Export Capacity, will not exceed sixty-five percent (65%) of the transformer nameplate power rating.

g. *Service Imbalance Screen.* If the DER is single-phase and is to be interconnected on a transformer center tap neutral of a 240-volt service, its addition will not create an imbalance between the two sides of the 240-volt service of more than twenty percent (20%) of nameplate rating of the service transformer.

h. *Transient Stability Screen.* The DER's Nameplate Rating, in aggregate with other generation interconnected to the distribution low-voltage side of the substation transformer feeding the distribution circuit where the DER proposes to interconnect, will not exceed 10 MW in an area where there are known or posted transient stability limitations to generating units located in the general electrical vicinity (e.g., three or four transmission voltage level busses from the Point of Interconnection), or the proposed DER shall not have interdependencies, known to the Utility, with earlier-queued Interconnection Requests, that would necessitate further study.

i. *Transmission Screen.* The DER's Point of Common Coupling will not be on a transmission line.

j. *Network Screen.* For interconnection of a DER within a Spot

Network or Area Network, the aggregate Nameplate Rating including the DER's Nameplate Rating may not exceed 50 percent of the Spot Network or Area Network's Relevant Minimum Load. Alternately, if the Utility does not have minimum load data for the Spot or Area Network, the Utility may select any of the following methods to determine anticipated minimum load:

i. Five percent of the Spot Network or Area Network's maximum load in the previous year;

ii. The Applicant's good faith estimate, if provided; or

iii. The Utility's good faith estimate if provided in writing to the Applicant along with the reasons why the Utility considered the other methods to estimate minimum load inadequate.

4. Time to Process Under Screens: Within fifteen (15) Business Days after the Utility notifies the Applicant that the Application is complete, the Utility shall notify the Applicant whether the DER meets all of the applicable Fast Track screens.

5. Screens Failure: Despite the failure of one or more screens, the Utility, at its sole option, may approve the interconnection provided it concludes such approval is consistent with safety and reliability. If the Utility cannot determine that the DER may nevertheless be interconnected consistent with safety, reliability, and power quality standards, the Utility shall provide the Applicant with the screen results. If one or more screens are not passed, the Utility shall provide, in writing, the specific screens that the Application failed, including the technical reason for failure. The Utility shall provide information and details about the specific system threshold or limitation causing the Application to fail the screen. In addition, the Utility shall allow the Applicant to select one of the following, at the Applicant's option:

   a. Undergo Supplemental Review in accordance with Section III.C; or

   b. Continue evaluating the Application under Detailed Study.

   Upon receipt, the Applicant must notify the Utility of its selection within ten (10) Business Days or the Application will be deemed withdrawn.

6. Approval: If the proposed interconnection passes the screens, fails the screens but passes Supplemental Review, or the Utility determines that the project can proceed consistent with safety and reliability despite failure of one or more screens, the Application shall be approved, and the Utility will provide the Applicant with an executable Interconnection Agreement within the following timeframes:

    a. If the proposed interconnection requires no construction of facilities by the Utility,[22] the Utility shall provide the Interconnection Agreement to the Applicant at the same time that the Utility provides notification of Fast Track or Supplemental Review results.

    b. If the proposed interconnection requires only Interconnection Facilities or Minor System Modifications, the Utility shall provide the Interconnection Agreement, along with an itemized, non-binding good faith cost estimate and construction schedule for such upgrades, to the Applicant within fifteen (15) Business Days after the notification of the Fast Track or Supplemental Review results.

    c. If the proposed interconnection requires more than Interconnection Facilities and Minor System Modifications, the Utility may elect to either provide an Interconnection Agreement along with an itemized non-binding good faith cost estimate and construction schedule for such upgrades within twenty (20) Business Days after notification of Fast Track or Supplemental Review results, or the Utility may notify the Applicant within five (5) Business Days of notification of Fast Track or Supplemental Review results that the Utility will need to complete a Facilities Study under Section III.E.5 to determine the necessary upgrades.

7. Reference Point of Applicability Review: This process shall occur concurrently with Fast Track screening pursuant to Section III.B.4:

[22] As under the Simplified Process, this sub-provision (a) permits the installation of any metering or other commercial devices. If such devices are required, the three-day timeline for provision of the Interconnection Agreement still applies.

a. Within five (5) Business Days after the Utility notifies the Applicant that the Application is complete, the Utility shall review the RPA denoted by the Applicant and determine if it is appropriate.

b. If it is determined that the RPA is appropriate, the Utility will notify the Applicant when it provides the screen results and proceed according to Section III.B.4.

c. If the Utility determines that the RPA is inappropriate, the Utility will notify the Applicant in writing, including an explanation as to why it requires correction. The Applicant shall provide the Utility with a corrected Application with the proper RPA within five (5) Business Days of notification. During this time, the Utility will proceed with applying Fast Track screens. The Utility shall review the revised Application within five (5) Business Days of receipt to determine if the revised RPA has been appropriately denoted. If correct, the Utility will proceed according to Section III.B.4. If the Applicant does not provide the appropriate location or request an extension of time within the deadline, the Application will be deemed withdrawn.

8. Interconnection Agreement Execution: An Applicant that receives an Interconnection Agreement executed by the Utility shall have ten (10) Business Days to execute the agreement and return it to the Utility. Following execution of the agreement, an Applicant shall communicate with the Utility no less frequently than every six (6) months regarding the status of a proposed DER to which an Interconnection Agreement refers. Within twenty-four (24) months from an Applicant's execution of an Interconnection Agreement or six (6) months of completion of any upgrades, whichever is later, the Applicant shall commence operation of the DER. However, the Parties may mutually agree to an extension of this time if warranted, which shall not be unreasonably withheld. The Applicant must provide the Utility with at least ten (10) Business Days' notice of the anticipated start date of the DER.

9. Inspection: Within ten (10) Business Days of receiving notice of the anticipated start date of the DER, the Utility may conduct an inspection at a time mutually agreeable to the Parties. If the DER passes the inspection, the Utility shall provide written notice of the passage within three (3) Business Days. If a DER initially fails the Utility inspection, the Utility shall offer to redo the inspection at the Applicant's expense at a time mutually agreeable to the Parties. If

the Utility determines that the DER fails the inspection, the Utility must provide the Applicant with a written explanation detailing the reasons and any standards violated. If the Utility determines no inspection is necessary, it shall notify the Applicant within three (3) Business Days of receiving the notice of the anticipated start date.

10. Operation: Upon the Utility's receipt of proof of the electric code official's approval, an Applicant may begin interconnected operation of a DER, provided that there is an Interconnection Agreement in effect and that the DER has passed any inspection required by the Utility or received notice that none is required.[23] Evidence of approval by an electric code official includes a signed Certificate of Completion in the form of Attachment 5 or other inspector-provided documentation.

C. Supplemental Review

1. If the Applicant agrees to undergo Supplemental Review, it shall notify the Utility and submit a $2,500 fee for the review in accordance with the timeline specified in Section III.A.5 or III.B.5.

2. Within twenty (20) Business Days of an Applicant's election to undergo Supplemental Review and payment of the fee, the Utility shall perform Supplemental Review using the screens set forth below, notify the Applicant of the results, and include with the notification a written report of the analysis and data underlying the Utility's determinations under the screens, including information about the specific system threshold or limitation causing the result.

3. Applicable Screens:

   a. *Minimum Load Screen.* Where twelve (12) months of Line Section minimum load data (including onsite load but not station service load served by the proposed DER) are available, can be calculated, estimated from existing data, or determined from a power flow model, the DER's Export Capacity aggregated with all other generation capable of exporting energy on the Line Section[24] is less than one

[23] Upon interconnected operation, the Applicant becomes an Interconnection Customer.

[24] See Footnote 14.

hundred percent (100%) of the Relevant Minimum Load for all Line Sections bounded by automatic sectionalizing devices upstream of the proposed DER. If the minimum load data are not available, or cannot be calculated or estimated, the DER's Export Capacity aggregated with all other generation capable of exporting energy on the Line Section is less than 30 percent of the peak load for all Line Sections bounded by automatic sectionalizing devices upstream of the proposed DER.

i. Load that is co-located with load-following, non-exporting or export-limited generation should be appropriately accounted for.

ii. The Utility will not consider as part of the aggregate Export Capacity for purposes of this screen DER Export Capacity, including combined heat and power (CHP) facility capacity, known to be already reflected in the minimum load data.

b. *Voltage and Power Quality Screen.* If the DER limits export pursuant to Section IV.B, the Export Capacity instead of Nameplate Rating must be utilized in any analysis done for this screen, including power flow simulations. In aggregate with existing generation on the Line Section:

i. The voltage regulation on the Line Section can be maintained in compliance with relevant requirements under all system conditions;

ii. The voltage fluctuation is within acceptable limits as defined by IEEE Std 1547; and

iii. The harmonic levels meet IEEE Std 1547 limits at the Reference Point of Applicability.

c. *Supplemental Grounding Screen.* If the DER failed the Line Configuration Screen (Section III.B.3.e):

i. For DERs with a rotating machine, effective grounding must be maintained.

ii. For DERs with a three-phase inverter, the Utility shall apply one of the following screens to evaluate whether the DER is effectively grounded:

(a) The line-to-neutral connected load on the feeder or Line Section is greater than thirty-three percent (33%) of peak load on the feeder or Line Section.

(b) If using a supplemental grounding software tool:

(1) The tool determines that supplemental grounding is not required to maintain effective grounding.

(2) If the tool determines that supplemental grounding is required, the Applicant must agree to modify the DER to include supplemental grounding.

(c) If using a detailed hosting capacity analysis that incorporates evaluation of temporary overvoltage risk for inverters, the Nameplate Rating of the DER is below the available hosting capacity at the Point of Interconnection.

d. *Safety and Reliability Screen.* The location of the proposed DER and the aggregate Export Capacity on the Line Section do not create impacts to safety or reliability that cannot be adequately addressed without Detailed Study review. If the DER limits export pursuant to Section IV.B, the Export Capacity must be included in any analysis including power flow simulations, except when assessing Fault Current contribution. To assess Fault Current contribution, use the rated Fault Current; for example, the Applicant may provide manufacturer test data (pursuant to the Fault Current test described in IEEE Std 1547.1™-2020 clause 5.18) showing that the Fault Current is independent of the Nameplate Rating. The Utility shall give due consideration to the following factors and others in determining potential impacts to safety and reliability in applying this screen:

i. Whether the Line Section has significant minimum loading levels dominated by a small number of customers (i.e., several large commercial customers).

ii. Whether there is an even or uneven distribution of

loading along the feeder.

iii. Whether the proposed DER is located in close proximity to the substation (i.e., ≤ 2.5 electrical circuit miles), and whether the distribution line from the substation to the Point of Interconnection is composed of large conductor/feeder section (i.e., 600A class cable).

iv. Whether the proposed DER incorporates a time delay function to prevent reconnection of the DER to the system until system voltage and frequency are within normal limits for a prescribed time.

v. Whether operational flexibility is reduced by the proposed DER, such that transfer of the Line Section(s) of the DER to a neighboring distribution circuit/substation may trigger overloads or voltage issues.

vi. Whether the proposed DER utilizes Certified Anti-Islanding functions and equipment.

4. If the proposed interconnection passes the supplemental screens, the Utility shall approve the Application and provide the Applicant an executable Interconnection Agreement pursuant to the procedure set forth in Section III.B.5.

5. After receiving an Interconnection Agreement executed by the Utility, the Applicant shall proceed under the terms of the applicable level of review under which the Application was initially studied.

D. Applicant Options Meeting

1. If the Utility determines the Application cannot be approved without evaluation under Detailed Study, at the time the Utility notifies the Applicant of either the Simplified Process or Fast Track review or Supplemental Review results, the Utility shall provide the Applicant the option of proceeding to Detailed Study review or of participating in an Applicant Options Meeting with the Utility to review possible DER modifications or the screen analysis and related results, to determine what further steps are needed to permit the DER to be connected safely and reliably.

2. The Applicant shall notify the Utility in writing that it requests an Applicant Options Meeting or that it would like to proceed to Detailed Study within fifteen (15) Business Days of the Utility's notification of screen results, or the Application shall be deemed withdrawn. If the Applicant requests an Applicant Options Meeting, the Utility shall offer to convene a meeting at a mutually agreeable time within fifteen (15) Business Days of the Applicant's request.

3. After the Applicant Options Meeting, the Applicant may choose to either amend the Application or proceed with study under Detailed Study, following the procedures set forth here:

    a. If the Applicant chooses to amend the Application to address the specific failed screens, the Applicant must submit an updated Application demonstrating the redesign within ten (10) Business Days after the Applicant Options Meeting. The redesign shall include only changes to address the screen failures or identified upgrades (which could include, for example, the addition of DC- or AC-coupled energy storage). Increases in Export Capacity or changes to the Point of Interconnection are not permitted and shall require the Application to be withdrawn and resubmitted. The Utility will evaluate whether the redesign addresses the screen failure and notify the Applicant of the results of this evaluation within ten (10) Business Days of receiving the updated Application. This redesign option to mitigate impacts shall only be available one time during the process.

b. If the Applicant does not amend or withdraw its Interconnection Application within ten (10) Business Days of receiving results, it shall continue to be evaluated under Detailed Study.

E. Detailed Study: Review Process for All Other DERs

1. Application: An Applicant must submit a Detailed Study Application using the standard form provided in Attachment 3 to these Interconnection Procedures, which may be sent electronically to a recipient designated by the Utility. An Applicant whose Simplified Process or Fast Track Application was denied may request that the Utility treat that existing Application already in the Utility's possession as a new Detailed Study Application. Within three (3) Business Days of receipt of the Application or the Applicant's request to use the existing Application, the Utility shall acknowledge receipt of the Application or transfer of an existing Application to the Detailed Study and notify the Applicant whether or not the Application is complete. If the Application is incomplete, the Utility shall provide a written list detailing all information that the Applicant must provide to complete the Application. The Applicant will have twenty (20) Business Days after receipt of the list to submit the listed information. Otherwise, the Application will be deemed withdrawn. The Utility shall notify the Applicant within three (3) Business Days of receipt of the revised Application whether the revised Application is complete or incomplete. The Utility may deem the Application withdrawn if it remains incomplete.

2. Fees: An Application fee shall not exceed $100 plus $10 per kW of Nameplate Rating up to a maximum of $2,000, as well as charges for actual time spent on any interconnection study. Costs for Utility facilities necessary to accommodate the Applicant's DER interconnection shall be the responsibility of the Applicant as set forth in the Interconnection Agreement.

3. Scoping Meeting: The Utility will conduct an initial review that includes a scoping meeting with the Applicant within ten (10) Business Days of determining that an Application is complete. The scoping meeting shall take place in person, by telephone, or electronically by a means mutually agreeable to the Parties. The purpose of the scoping meeting is to discuss the Application, the Reference Point of Applicability, and review existing studies relevant to the Application. At the scoping meeting, the Utility shall

provide pertinent information such as: the available Fault Current at the proposed location, the existing peak loading on the lines in the general vicinity of the proposed DER, and the configuration of the distribution line at the proposed Point of Interconnection. The Utility and the Applicant will bring to the meeting personnel, including system engineers, and other resources as may be reasonably required to accomplish the purpose of the meeting. By mutual agreement of the Parties, the scoping meeting, System Impact Study, or Facilities Study may be waived.

4. System Impact Study:

   a. If the Parties do not waive the System Impact Study, within five (5) Business Days of the completion of the scoping meeting (or five (5) Business Days after completion of the Application or the final step in the Simplified Process or Fast Track if scoping meeting is waived), the Utility shall provide the Applicant with an Interconnection System Impact Study Agreement in Attachment 6A, including a good faith estimate of the cost and time to undertake the System Impact Study. The Applicant must return the signed System Impact Study Agreement within twenty (20) Business Days, or the Application shall be deemed withdrawn.

   b. A System Impact Study for a DER shall include a review of the DER's adherence to IEEE Std 1547. For DER components that are Certified, the Utility may not charge the Applicant for review of those components in isolation.

   c. Each Utility shall include in its compliance tariff a description of the various elements of a System Impact Study it would typically undertake pursuant to this Section, including:

      i. Load-Flow Study;

      ii. Short-Circuit Study;

      iii. Circuit Protection and Coordination Study;

      iv. Impact on System Operation;

      v. Stability Study (and the conditions that would justify including this element in the System Impact Study);

      vi. Voltage-Collapse Study (and the conditions that would justify including this element in the System Impact

Study).

d. The System Impact Study shall take into account the proposed DER's design and operating characteristics and study the DER according to how the DER is proposed to be operated. If the DER limits export pursuant to Section IV.B, the System Impact Study shall use Export Capacity instead of Nameplate Rating, except when assessing Fault Current contribution. To assess Fault Current contribution, the System Impact Study shall use the rated Fault Current; for example, the Applicant may provide manufacturer test data (pursuant to the Fault Current test described in IEEE Std 1547.1-2020 clause 5.18) showing that the Fault Current is independent of the Nameplate Rating.

e. Once an Applicant delivers to the Utility an executed System Impact Study Agreement and payment in accordance with that agreement, the Utility shall conduct the System Impact Study. The System Impact Study shall be completed within forty (40) Business Days of the Applicant's delivery of the executed System Impact Study Agreement.[25] The System Impact Study provided to the Applicant shall include a description of the Utility's analysis, conclusions, and the reasoning supporting those conclusions.

5. Facilities Study:

a. If the Utility determines that Electric Delivery System modifications required to accommodate the proposed interconnection are not substantial, the System Impact Study will identify the scope and cost of the modifications defined in the System Impact Study results, and no Facilities Study shall be required.

b. If the Utility determines that necessary modifications to the Utility's Electric Delivery System are substantial, the results of the System Impact Study will include an estimate of the cost of the Facilities Study and an estimate of the modification costs. The detailed costs of any Electric Delivery

[25] If a proposed Application is found to require evaluation by an ISO/RTO or other external transmission provider, there may need to be an adjustment to the timelines to allow said entity to evaluate the project. At all times Applicants should be kept informed of any delays on a regular basis.

System modifications necessary to interconnect the Applicant's proposed DER will be identified in a Facilities Study to be completed by the Utility.

c. If the Parties do not waive the Facilities Study, within five (5) Business Days of the completion of the System Impact Study, the Utility shall provide an Interconnection Facilities Study Agreement provided in Attachment 6B, including a good faith estimate of the cost and time to undertake the Facilities Study.

d. Once the Applicant executes the Facilities Study Agreement and pays the Utility pursuant to the terms of that agreement, the Utility shall conduct the Facilities Study. The Facilities Study shall include a detailed list of necessary Electric Delivery System upgrades and an itemized cost estimate, breaking out equipment, labor, operation and maintenance, and other costs, including overheads, for completing such upgrades. The Applicant is not responsible for costs which exceed the estimate by more than twenty-five percent (25%) if actual upgrades are completed.[26] The Facilities Study shall also indicate the milestones for completion of the Applicant's installation of its DER and the Utility's completion of any Electric Delivery System modifications, and the milestones from the Facilities Study (if any) shall be incorporated into the Interconnection Agreement. The Facilities Study shall be completed within forty-five (45) Business Days of the Applicant's delivery of the executed Facilities Study Agreement.

6. Interconnection Agreement:

a. Within five (5) Business Days of completion of the last study, the Utility shall execute and send the Applicant an Interconnection Agreement using the standard form

[26] In order for Applicants to have confidence that they understand the costs of any necessary upgrades, it is important that Utilities be required to provide cost estimates within a reasonable margin of error. States such as California and Massachusetts have implemented binding cost envelopes, which cap the cost to the customer at the accepted margin of error (i.e., the total customer responsibility cannot exceed 25% above the original estimated amount), while other states such as Minnesota are requiring careful tracking of costs that exceed a specified margin. Commissions may want to specify that utility shareholders are responsible for any costs that exceed the margin of error.

agreement provided in Attachment 4 of these Interconnection Procedures, which shall incorporate the milestones (if any) from the Facilities Study. The Interconnection Agreement shall include an itemized quote, including overheads, for any required Electric Delivery System modifications, subject to the cost limit set by the Facilities Study cost estimate.

b. Within forty (40) Business Days of the receipt of an Interconnection Agreement, the Applicant shall execute and return the Interconnection Agreement and notify the Utility of the anticipated start date of the DER. Unless the Utility agrees to a later date or requires more time for necessary modifications to its Electric Delivery System, the Applicant shall identify an anticipated start date that is within twenty-four (24) months of the Applicant's execution of the Interconnection Agreement. However, the Parties may mutually agree to an extension of this time if needed, which shall not be unreasonably withheld. The Applicant shall notify the Utility if there is any change in the anticipated start date of interconnected operations of the DER.

7. Inspection:

a. The Utility shall inspect the completed DER installation for compliance with requirements and shall attend any required commissioning tests pursuant to IEEE Std 1547-2018. The Utility shall conduct the inspection within ten (10) Business Days of receiving the notice of the anticipated start date at a time mutually agreeable to the Parties. If the DER passes the inspection, the Utility shall provide written notice of the passage within three (3) Business Days. If a DER initially fails a Utility inspection, the Utility shall offer to redo the inspection at the Applicant's expense at a time mutually agreeable to the Parties. If the Utility determines that the DER fails the inspection, it must provide a written explanation detailing the reasons and any standards violated. Provided that any required commissioning tests are satisfactory, the Utility shall notify the Applicant in writing within five (5) Business Days of completion of the inspection that operation of the DER is approved.

8. Operation:

a. Upon the Utility's receipt of proof of the electric code

official's approval, an Applicant may begin interconnected operation of a DER, provided that there is an Interconnection Agreement in effect and that the DER has passed any inspection required by the Utility. Evidence of approval by an electric code official includes a signed Certificate of Completion in the form of Attachment 5 or other inspector-provided documentation.

IV. GENERAL PROVISIONS AND REQUIREMENTS

A. IEEE Std 1547-2018 Adoption

1. Beginning on *[insert effective date]* DERs shall be required to comply with IEEE Std 1547-2018, and shall conform with the following minimum requirements:

    a. Abnormal operating performance category: Inverter-based DERs shall meet Category III capabilities and rotating DERs shall meet Category I capabilities.

    b. Normal operating performance category: Inverter-based DERs shall meet Category B capabilities and rotating DERs shall meet Category A capabilities.

    Inverter-based interconnection equipment may be Certified to UL 1741 Third Edition, Supplement SB in order to demonstrate compliance with IEEE Std 1541-2018. Equipment that is not Certified to Supplement SB may require additional evaluation and commissioning testing to confirm compliance with IEEE Std 1547-2018.

2. The above assignment of categories is expected to cover the vast majority of interconnections. Any instances that do not fall within the above assignment shall be:

    a. Reviewed on a case-by-case basis, with the Utility making the determination for requiring the specific category; or

    b. Specified in the Utility's TIIR.

    The Utility should consider Annex B of IEEE Std 1547-2018 when making these determinations on a case-by-case basis or in a TIIR.

3. Each Utility shall post its preferred settings in its TIIR. As applicable the following shall be identified in the TIIR:[27]

    a. Voltage and frequency trip settings;

[27] Attachment 9 includes a template designed to demonstrate how the IEEE Std 1547-2018 settings could

b. Frequency droop settings;

c. Activated reactive power control function and settings;

d. Voltage-active power mode activation and settings;

e. Enter service settings; and

f. Communication protocols and ports requirements.

4. TIIRs shall be created through a technical advisory group process and submitted to the Commission for approval with opportunity for public comment. Subsequent changes to TIIRs shall also be submitted to the Commission for approval with opportunity for public comment.

B. Limited-Export and Non-Exporting DERs

1. If a DER uses any configuration or operating mode in Section IV.B.3 to limit the export of electrical power across the Point of Common Coupling, then the Export Capacity shall be only the amount capable of being exported (not including any Inadvertent Export). To prevent impacts on system safety and reliability, any Inadvertent Export from a DER must comply with the limits identified in this Section. The Export Capacity specified by the Interconnection Customer in the Application will subsequently be included as a limitation in the Interconnection Agreement.

2. An Application proposing to use a configuration or operating mode to limit the export of electrical power across the Point of Common Coupling shall include proposed control and/or protection settings.

3. Acceptable methods of export limitation include:

a. *Export Limitation Methods for Non-Exporting DERs:*

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be defined in a TIIR. The template provides a minimum set of expectations on what to include in a TIIR. The selected default setpoints within the template align with IEEE Std 1547-2018. It is acceptable for states/utilities to deviate from default settings shown in the template, as long as the selected settings are within ranges allowed in the standard. Commissions may use the IREC Decision Option Matrix for IEEE Std 1547-2018 Adoption to identify key decision points in the selection of each of the identified default settings. The matrix also includes a list of other items not included in the template that Commissions may want to consider including.

i. Reverse Power Protection (Device 32R): To limit export of power across the Point of Common Coupling, a reverse power Protective Function is implemented using a utility-grade protective relay. The default setting for this Protective Function shall be 0.1% (export) of the service transformer's nominal base Nameplate Rating, with a maximum 2.0 second time delay to limit Inadvertent Export.

ii. Minimum Power Protection (Device 32F): To limit export of power across the Point of Common Coupling, a minimum import Protective Function is implemented using a utility-grade protective relay. The default setting for this Protective Function shall be 5% (import) of the DER's total Nameplate Rating, with a maximum 2.0 second time delay to limit Inadvertent Export.

iii. Relative Distributed Energy Resource Rating: This option requires the DER's Nameplate Rating to be so small in comparison to its host facility's minimum load that the use of additional Protective Functions is not required to ensure that power will not be exported to the Electric Delivery System. This option requires the DER's Nameplate Rating to be no greater than 50% of the Interconnection Customer's verifiable minimum Host Load over the past 12 months. This option is not available for interconnections to Area Networks or Spot Networks.

b. *Export Limitation Methods for Limited-Export DERs:*

i. Directional Power Protection (Device 32): To limit export of power across the Point of Common Coupling, a directional power Protective Function is implemented using a utility-grade protective relay. The default setting for this Protective Function shall be the Export Capacity value, with a maximum 2.0 second time delay to limit Inadvertent Export.

ii. Configured Power Rating: A reduced output rating utilizing the Power Rating Configuration Setting may be used to ensure the DER does not generate power beyond a certain value lower than the Nameplate Rating. The configuration setting corresponds to the active or apparent power ratings in Table 28 of IEEE Std 1547-2018, as described in subclause 10.4. A local DER communication interface is not required to utilize the configuration setting as long as it can be set by other Certified means. The reduced power rating may be indicated by means of a Nameplate Rating replacement, or a supplemental adhesive de-rating tag to indicate the reduced power rating. This method must be Certified to IEEE Std 1547.1-2020. Use of a configured power rating not applied to individual generator(s) shall require evaluation under mutually agreed upon means.

c. *Export Limitation Methods for Non-Exporting DERs or Limited-Export DERs:*

i. Certified Power Control Systems: A DER may use Certified Power Control Systems to limit export. A DER utilizing this option must use a Power Control System and an inverter Certified per UL 1741 by a Nationally Recognized Testing Laboratory (NRTL) with a maximum open loop response time of no more than 30 seconds to limit Inadvertent Export.[28] This option is not available for interconnections to Area Networks or Spot Networks.

[28] NRTL testing to the UL Power Control System Certification Requirement Decision shall be accepted until similar test procedures for power control systems are incorporated into the standard.

ii. Agreed-Upon Means: A DER may be designed with other control systems and/or Protective Functions to limit export and Inadvertent Export if mutual agreement is reached with the Utility. The limits may be based on technical limitations of the Interconnection Customer's equipment or the Electric Delivery System equipment. To ensure Inadvertent Export remains within mutually agreed-upon limits, the Interconnection Customer may use an uncertified Power Control System, an internal transfer relay, energy management system, or other customer facility hardware or software if approved by the Utility.

C. Timelines and Extensions

1. The Utility shall make reasonable efforts to meet all timelines set by these Interconnection Procedures.[29] If the Utility cannot meet a timeline, the Utility shall notify the Applicant in writing within one (1) Business Day after the missed deadline. The notification shall explain the reason for the Utility's failure to meet the deadline and provide an estimate of when the step will be completed. The Utility shall keep the Applicant updated of any changes in the expected completion date.

2. The Applicant may request in writing the extension of one timeline set by these Interconnection Procedures. The requested extension may be for up to one-half of the time originally allotted (e.g., a ten (10) Business Day extension for a twenty (20) Business Day timeframe). The Utility shall not unreasonably refuse this request. If further timeline extensions are necessary, the Applicant may request an extension in writing to the Interconnection Ombudsperson,[30] who shall grant or deny the request, if it is

[29] Providing utilities some level of flexibility in meeting timelines in order to manage staffing in times of fluctuating application submittal rates and the need to manage system emergencies is typical in most states. However, since the timelines are binding on applicants and utility delays can have real cost implications for projects, it is important to ensure utilities understand there is some expectation of maintaining compliance with the timelines set forth within. Some states have begun to implement financial rewards and penalties for steady rates of compliance, while others are considering rigorous tracking to ensure Commissions are at least aware of where delays may be occurring.

[30] An Interconnection Ombudsperson can be designated by the Commission (typically the ombudsperson is a Commission staff member) to help track and facilitate the efficient and fair resolution of disputes. Some states have begun to look at processes which engage a technical master to help resolve disputes related to engineering questions that may arise in the interconnection process.

reasonable, within three (3) Business Days.

D. Online Applications and Electronic Signatures

1. Each Utility shall allow Interconnection Applications to be submitted via email or through the Utility's website.

2. Each Utility shall dedicate an easy to locate page on their website to interconnection procedures. The relevant website page shall include:

    a. These Interconnection Procedures and attachments in an electronically searchable format.

    b. The Utility's Interconnection Application forms in a format that allows for electronic entry of data.

    c. The Utility's Interconnection Agreements.

    d. The Utility's point of contact for submission of Interconnection Applications including email address and phone number.

3. Each Utility shall allow electronic signatures to be used for Interconnection Applications and Agreements.

E. Dispute Resolution

1. The Parties agree to attempt to resolve all disputes arising out of the interconnection process and associated study and Agreements according to the provisions of this Section.

2. In the event of a dispute, the disputing Party shall provide the other Party a written Notice of Dispute containing the relevant known facts pertaining to the dispute, the specific dispute and the relief sought, and express notice by the disputing Party that it is invoking the Procedures under this Section. The notice shall be sent to the non-disputing Party's email address and physical address set forth in the Interconnection Agreement, or in the Application if there is no Interconnection Agreement. A copy of the notice shall also be sent to the Interconnection Ombudsperson.

    The non-disputing Party shall acknowledge the notice within three (3) Business Days of its receipt and identify a representative with the authority to make decisions for the non-disputing Party with respect to the dispute.

3. If the dispute is principally related to one or both Parties' compliance with timelines specified in these Interconnection Procedures or associated agreements, the Parties shall seek assistance from the Interconnection Ombudsperson if the Parties cannot mutually resolve the dispute within eight (8) Business Days.[31]

4. If the dispute is not principally related to one or both Parties' compliance with a timeline, then the non-disputing Party shall provide the disputing Party with all relevant regulatory and/or technical details and analysis regarding any Utility interconnection requirements under dispute within ten (10) Business Days of the date of the notice of dispute. Within twenty (20) Business Days of the date of the notice of dispute, the Parties' authorized representatives shall meet and confer to try to resolve the dispute. Parties shall operate in good faith and use best efforts to resolve the dispute.

5. If a resolution is not reached in thirty (30) Business Days from the date of the notice of dispute, either (1) a Party may request to continue negotiations for an additional twenty (20) Business Days, or (2) the Parties may by mutual agreement make a written request for mediation to the Interconnection Ombudsperson. Alternatively, both Parties by mutual agreement may request mediation from an outside third-party mediator with costs to be shared equally between the Parties.

6. If the results of the mediation are not accepted by one or more Parties and there is still disagreement, the dispute shall proceed to the formal complaint process provided by the Commission.[32]

7. At any time, either Party may file a complaint before the Commission pursuant to its rules.

8. If neither Party elects to seek assistance from the Commission, or if the attempted dispute resolution fails, then either Party may

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[31] The duration of the typical dispute resolution process is generally considered to be too long to be effective in assisting parties with timeline disputes. Thus, it is helpful to engage an ombudsperson earlier on to facilitate disputes related to timelines where possible. Some states are adopting expedited processes to specifically assist with timeline disputes.

[32] This section must be modified if the relevant Commission does not have a formal complaint process.

exercise whatever rights and remedies it may have in equity or law consistent with the terms of these Procedures.

F. Utility Reporting Requirement

Each Utility shall submit to the Commission two times per year and make available to the public on its website an interconnection report. The report shall contain information in the form required by Attachment 8, including relevant totals for both the year and the most recent reporting period.

G. Interconnection Forum

The Commission shall host a quarterly interconnection forum open to the public wherein interested stakeholders and Utilities can discuss interconnection challenges and potential solutions.[33]

H. Miscellaneous Requirements

1. The Applicant is responsible for construction of the DER and obtaining any necessary local code official approvals (electrical, zoning, etc.).

2. The Applicant shall conduct the commissioning test pursuant to the IEEE Std 1547-2018 and comply with all manufacturer requirements.

3. To assist Applicants in the interconnection process, the Utility shall designate an employee or office from which basic information on interconnections can be obtained. Upon request, the Utility shall provide interested Applicants with all relevant forms, documents, and technical requirements for filing a complete Application. Upon an Applicant's request, the Utility shall meet with an Applicant at the Utility's offices, by telephone, or via video meeting prior to submission for up to one hour for Simplified Process Applicants and two hours for other Applicants.

4. The authorized hourly rate for engineering review under

[33] Multiple states have begun to utilize regular interconnection forums, often facilitated by Commission staff, to help parties work together to resolved interconnection issues that arise outside of language in the procedures and/or to discuss areas where the interconnection procedures or technical requirements may need to be modified. The forum may be created by a Commission order or referenced in the procedures.

Supplemental Review or Detailed Study shall be $100 per hour.[34]

5. A Utility shall not require an Applicant to install additional controls (other than a utility-accessible disconnect switch for non-inverter-based DERs[35]), or to perform or pay for additional tests not identified herein to obtain approval to interconnect.

6. A Utility may only require an Applicant to purchase insurance covering Utility damages, and then only in the following amounts:[36]

   a. For non-inverter-based DERs:

Nameplate Rating > 5 MW	$3,000,000
2 MW < Nameplate Rating $\leq$ 5 MW	$2,000,000
500 kW < Nameplate Rating $\leq$ 2 MW	$1,000,000
50 kW < Nameplate Rating $\leq$ 500 kW	$500,000
Nameplate Rating $\leq$ 50 kW	Typical Homeowners[37]

   b. For inverter-based DERs:

Nameplate Rating > 5 MW	$2,000,000
1 MW < Nameplate Rating $\leq$ 5 MW	$1,000,000
Nameplate Rating $\leq$ 1 MW	no insurance

7. Additional protection equipment not included with the Interconnection Equipment Package may be required at the Utility's discretion as long as the performance of an Applicant's DER is not negatively impacted and the Applicant is not charged for any

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[34] The fixed hourly fee for engineering review may be adjusted to reflect standard rates in each state, but the hourly charge should be fixed so there are no disparities among Utilities or between different Applications to ensure fair treatment.

[35] A number of states have allowed Utilities to require external disconnect switches but have specified that the Utility must reimburse Applicants for the cost of the switch. Several states have specified that an external disconnect switch may not be required for smaller inverter-based DERs. Recognizing that non-inverter-based DERs might present a hazard, Utilities may require a switch for these DERs.

[36] Insurance requirements are not typically separated by inverter- and non-inverter-based DERs. However, concerns seem to center on the potential for non-inverter-based systems to cause damage to utility property. To IREC's knowledge, there has never been a claim for damages to a utility's property caused by an inverter-based system, and it seems that there is little theoretical potential for damage to a utility's property caused by an inverter-based system of less than a megawatt.

[37] The amount required by a typical homeowners insurance policy is generally adequate here, this amount may vary by state.

equipment that provides protection that is already provided by Certified interconnection equipment.

8. Metering and Monitoring shall be as set forth in the Utility's tariff for sale or exchange of energy, capacity, or other ancillary services.[38]

9. Telemetry may be required by the Utility for DERs with a Nameplate Rating of 1 MVA or higher. See the Utility's interconnection handbook for details on equipment requirements.

10. Once an interconnection has been approved under these procedures, a Utility shall not require an Interconnection Customer to test its DER except that the Utility may require any manufacturer-recommended testing and:

    a. For Fast Track, the Utility may require periodic testing to verify adherence to the interconnection requirements. The frequency of periodic testing will be specified in the Utility's interconnection handbook or other appropriate documentation.

    b. For Detailed Study, all interconnection-related Protective Functions and associated batteries shall be periodically tested at intervals specified by the manufacturer, system integrator, or authority having jurisdiction over the interconnection. Periodic test reports or a log for inspection shall be maintained.

    c. For functional software or firmware changes, hardware changes, protection settings, or function changes, or changes to operating modes, the Utility may require retesting to ensure the DER still meets the requirements of IEEE Std 1547-2018. When required, the updated DER configuration and testing results shall be documented and submitted to the Utility.

11. A Utility shall have the right to inspect an Interconnection Customer's DER before and after interconnection approval is

[38] Metering or other revenue-based technical requirements that are necessary to qualify for rates or procurement programs such as Net Energy Metering ("NEM") should be addressed in the tariffs, regulations, or rules related to those programs rather than in the interconnection procedures which are drafted to be agnostic with respect to the rates and procurement programs projects may utilize.

granted, at reasonable hours and with reasonable prior notice provided to the Interconnection Customer. If the Utility discovers an Interconnection Customer's DER is not in compliance with the operating requirements of the Interconnection Agreement or applicable standards, and the non-compliance adversely affects the safety or reliability of the electric system, the Utility may require disconnection of the Interconnection Customer's DER until the DER complies with the operating requirements of the Interconnection Agreement or applicable standards.

12. The Interconnection Customer may disconnect the DER at any time without notice to the Utility and may terminate the Interconnection Agreement at any time with one (1) day's notice to the Utility.

13. On the Application form, an Applicant may designate a representative to process an Application on Applicant's behalf, and an Interconnection Customer may designate a representative to meet some or all of the Interconnection Customer's responsibilities under the Interconnection Agreement.[39]

14. For a DER offsetting part or all of the load of a Utility customer at a given site, that customer is the Interconnection Customer and that customer may assign its Interconnection Agreement to a subsequent occupant of the site.[40] For a DER providing all of its energy directly to a Utility, the Interconnection Customer is the owner of the DER and may assign its Interconnection Agreement to a subsequent owner of the DER. Assignment is only effective after the assignee provides written notice of the assignment to the Utility and agrees to accept the Interconnection Customer's responsibilities under the Interconnection Agreement.

15. If the Applicant is seeking approval for an Energy Storage Device, a separate application for the interconnection of new or modified load will not be required as a result of a customer's application for interconnection under these Interconnection Procedures and instead the review shall occur under these Interconnection

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[39] In the most common case, a residential customer may designate an installer as the representative. For larger DERs, a third-party owner might be the designated representative.

[40] In the most common case, an Interconnection Customer is a homeowner, and this clause allows the homeowner to sell the home and assign the Agreement to the new owner. In many commercial situations, the Interconnection Customer is a lessee and this clause allows that lessee to move out at the end of a lease and assign the Agreement to a new lessee.

Procedures.[41]

[41] In most states, there are separate procedures for customers seeking to modify or connect new load. Rather than requiring two different application forms, timelines, etc. this review can be completed all through these Interconnection Procedures for energy storage customers that may charge from the grid. Note that further clarification may be required if new or expanded load customers are typically given a credit for any utility work or if cost allocation rules otherwise diverge between the procedures for interconnecting new load versus new generation.

Attachment 1
Codes and Standards[1]

1. IEEE Std 1547™-2018, IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces[2]

2. IEEE Std 1547.1™-2020, IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces

3. ANSI C84.1-2020, Electric Power Systems and Equipment—Voltage Ratings (60 Hertz)

4. IEEE Std 1547.2™-2008, Application Guide for IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems[3]

5. IEEE Std 1547.3™-2007, Guide for Monitoring Information Exchange and Control of Distributed Resource Interconnected with Electric Power Systems[4]

6. IEEE Std 1547.4™-2011, IEEE Guide for Design, Operation, and Integration of Distributed Resource Island System with Electric Power Systems[5]

7. IEEE Std 1547.6™-2011, IEEE Recommended Practice for Interconnecting Distributed

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[1] The standard documents have intentionally been listed with the respective publication year. Practice across states and utilities varies in this regard, and an intentional choice should be made whether to include the version or year of publication. If the publication date is included in the list of standards, then the interconnection procedures may need updating on a more regular basis as new versions become available and need to be referenced. However, technical requirements of different standard versions can vary significantly. Thus, while these Model Interconnection Procedures do not contain specific technical requirements based on standards, those documents that do contain specific technical requirements (such as those based on IEEE Std 1547) should be reviewed when a new version of a standard becomes available to ensure that applicable elements of the new version are properly incorporated. Updates to the procedures should account for timelines for adopting new or revised standards established by regulatory proceedings. Listing the revision year is the best practice because it informs stakeholders when the new version of the standard applies. Any dated standards should be updated to the most recent revision year and title.

[2] IEEE Std 1547-2018 provides: "For DER interconnections that include individual synchronous generator units rated 10 MVA and greater, and where the requirements of this standard conflict with the requirements of IEEE Std C50.12 or IEEE Std C50.13, the requirements of IEEE Std C50.12 or IEEE Std C50.13, as relevant to the type of synchronous generator used, shall prevail."

[3] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed. However, a new version is likely to be published soon after publication of these Model Interconnection Procedures.

[4] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed. However, a new version is likely to be published soon after publication of these Model Interconnection Procedures.

[5] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed. However, a new version is likely to be published sometime after publication of these Model Interconnection Procedures.

Resources with Electric Power Systems Distribution Secondary Networks[6]

8. IEEE Std 1547.7™-2013, IEEE Guide for Conducting Distribution Impact Studies for Distributed Resource Interconnection

9. IEEE Std 519™-2022, IEEE Standard for Harmonic Control in Electric Power Systems

10. IEEE Std 1453™-2022, IEEE Standard for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems

11. IEEE Std C37.90™-2005, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus[7]

12. IEEE Std C37.90.1™-2012, IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems Associated with Electric Power Apparatus[8]

13. IEEE Std C37.90.2™-2004, IEEE Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers[9]

14. IEEE C37.95™-2014, IEEE Guide for Protective Relaying of Utility-Consumer Interconnections

15. IEEE Std C50.12™-2005, IEEE Standard for Salient-Pole 50 Hz and 60 Hz Synchronous Generators and Generator/Motors for Hydraulic Turbine Applications Rated 5 MVA and Above[10]

16. IEEE Std C50.13™-2014, IEEE Standard for Cylindrical-Rotor 50 Hz and 60 Hz Synchronous Generators Rated 10 MVA and Above

17. IEEE Std C62.41.2™-2002, IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits[11]

18. IEEE Std C62.45™-2002, IEEE Recommended Practice on Surge Testing for Equipment

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[6] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

[7] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

[8] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

[9] The standard's status is "inactive——reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

[10] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

[11] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

Connected to Low-Voltage (1000 V and Less) AC Power Circuits[12]

19. IEEE Std C62.92.1™-2016, IEEE Guide for the Application of Neutral Grounding in Electric Utility Systems—Part I: Introduction

20. IEEE Std C62.92.2™-2017, IEEE Guide for the Application of Neutral Grounding in Electric Utility Systems, Part II—Synchronous Generator Systems

21. IEEE Std C62.92.6™-2017, IEEE Guide for Application of Neutral Grounding in Electrical Utility Systems, Part VI—Systems Supplied by Current-Regulated Sources

22. UL 1741, Edition 3, September 28, 2021, Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources[13]

23. UL 1741 Certification Requirement Decision for Power Control Systems, March 8, 2019, Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources

[12] The standard's status is "inactive—reserved" according to IEEE. Inclusion of this standard in interconnection rules should be reviewed.

[13] UL 1741 compliance must be recognized or Certified by a Nationally Recognized Testing Laboratory as designated by the U.S. Occupational Safety and Health Administration. Inverter certification to UL 1741 is routinely required. Some states have established lists of Certified inverters with UL 1741 certification as the primary criterion.

Attachment 2
Simplified Process Application and Interconnection Agreement

This Application is complete when it provides all applicable and correct information required below and includes a one-line diagram, if required by the Utility, and a standard Processing Fee of up to $100, if required by the Utility. This form should be made available in an electronically fillable format and it shall be permissible to submit the form with electronic signatures.

Written Applications should be submitted by mail or e-mail to:

Utility: _____

Address: _____

Email Address: _____

Utility Contact Name: _____

Utility Contact Title: _____

1. Applicant Information:

Legal Name of Applicant (if an individual, individual's full name):

Name:

_____

Address:

_____

City: State, Zip:

_____

Telephone (Day): _____

(Evening): _____

Email Address: _____

Utility Customer Number (if applicable): _____

Electricity Provider (if different from Utility):_____

Representative (if different from Applicant):

Name:

_____

Address:

_____

City, State, Zip:

_____

Telephone (Day): _____

(Evening): _____

Email Address: _____

2. DER Specifications:

All power ratings should be listed in AC throughout.

Location (if different from above): _____

Facility Owner (include percent ownership by any electric utility): _____

_____

Applicant Load: _____(kW) (if none, so state)

Typical Reactive Load (if known): _____

Total Number and Type of Generators to be Interconnected Pursuant to This Application:

Total Number of Inverters to be Interconnected Pursuant to This Application: _____

Total Aggregate Nameplate Output Rating for All Generators: _____(kW) _____(kVA)

Export Capacity[1]: _____ (kW) _____(kVA)

a. Energy Storage Information (if any):

Total Aggregate Nameplate Charge Rating: _____ (kW) _____ (kVA)

Does the storage share an inverter with another generator? ☐ Yes ☐ No

Does the applicant intend to have the storage charged by the utility? ☐ Yes ☐ No

b. Limited-Export / Non-Export / Limited-Import Data:

If multiple export or import control systems are used, provide for each control system and use additional sheets if needed.

Is export controlled to less than the Total Aggregate Nameplate Output Rating?

☐ Yes ☐ No

If the applicant intends to have the storage charged by the utility, is import controlled to less than the total aggregate nameplate charge rating? ☐ Yes ☐ No

If storage is import-limited, describe the method of import limitation:_____

_____

Method of export limitation: _____Reverse Power Protection (Device 32R)

_____

[1] As limited by any export controls.

_____Minimum Power Protection (Device 32F)
_____Relative DER Rating
_____Directional Power Protection (Device 32)
_____Configured Power Rating
_____Power Control System (PCS)
_____Export Control using mutually agreed-upon

Control Power Limit Setting: _____ (kW) _____ (kVA)

Control Time Delay (if any): _____

If Power Control System is used, Open-Loop Response Time: Maximum_____ Average_____

When grid-connected, will the PCS employ any of the following? [Select all that apply]

- ☐ Unrestricted mode
- ☐ Export-only mode
- ☐ Import-only mode
- ☐ No exchange mode
- ☐ Export-limiting from all sources
- ☐ Export-limiting from ESS
- ☐ Import-limiting to ESS

Export controls are applied to how many generators?

☐ One ☐ Multiple (indicate number): _____

Describe which generators the export control system controls:

_____
_____
_____

c. IEEE Std 1547™-2018-related information:

If the desired RPA location is NOT at the Point of DER Connection (PoC), describe the desired RPA location:

_____
_____

In addition to grid-connected mode, will the DER operate as an intentional local Electric Power System island (also known as "microgrid" or "standby mode")?

d. Individual Generator Data:

Provide for each generator, use additional sheets if needed.

Generator Technology: Photovoltaic / Turbine / Fuel Cell / Energy Storage / Other (describe):
_____
_____

Generator[2] Manufacturer, Model Name & Number:
_____

Version Number:
_____

Energy Source: Solar / Wind / Hydro / Other (describe): _____

If Energy Storage, usable capacity at maximum discharge rate: _____ (kWh)

e. Individual Inverter (or Energy Storage System) Data (if any):

Provide for each inverter, use additional sheets if needed.

Inverter (or Energy Storage System) Manufacturer: _____

Model Name & Number: _____

Version Number: _____

Nameplate Rating: _____ (kW) _____ (kVA)

AC Voltage Nominal Rating: _____ (Volts)

Rated Power Factor: (Underexcited) _____ (Overexcited) _____

Minimum Power Factor: (Underexcited) _____ (Overexcited) _____

☐ Single-phase ☐ Three-phase (check one)

List of adjustable set points for the protective equipment or software:

_____

Do export controls apply to this inverter? ☐ Yes ☐ No

Do import controls apply to this inverter or energy storage system? ☐ Yes ☐ No

Max design fault contribution current: (Instantaneous) _____ (RMS) _____

Is the inverter certified to UL 1741? ☐ Yes ☐ No

If yes, attach evidence of UL 1741 certification.

If required by the Utility, attach a one-line diagram of the DER.

[2] E.g., the solar PV module manufacturer, battery manufacturer, etc.

3. Signatures (may be electronic):

a. Applicant Signature (may be electronic)

I designate the individual or company listed as my Representative to serve as my agent for the purpose of coordinating with the Utility on my behalf through the interconnection process (*see* Procedures Section IV.H.13). INITIAL: _____

I hereby certify that, to the best of my knowledge, the information provided in this Application is true. I agree to abide by the terms and conditions for a Simplified Process Interconnection Agreement, provided on the following pages.

Signed: _____

Title: _____

Date: _____

Operation is contingent on Utility approval to interconnect the DER.

b. Utility Signature (may be electronic)

Interconnection of the DER is approved contingent upon the terms and conditions for a Simplified Process Interconnection Agreement, provided on the following pages ("Agreement").

Utility Signature: _____

Title: _____ Application ID number: _____

Date: _____

Utility waives inspection? Yes _____ No _____

Terms and Conditions for a Simplified Process Interconnection Agreement

1.0 Construction of the DER

After the Utility executes the Interconnection Agreement by signing the Applicant's Simplified Process Application, the Applicant may construct the DER, including interconnected operational testing not to exceed two hours.

2.0 Interconnection and Operation

The Applicant may operate the DER and interconnect with the Utility's Electric Delivery System once all of the following have occurred:

The DER has been inspected and approved by the appropriate local electrical wiring inspector with jurisdiction, and the Applicant has sent documentation of the approval to the Utility; and

The Utility has either:

Inspected the DER and has not found that the DER fails to comply with a Simplified Process technical screen or a UL or IEEE standard; or

Waived its right to inspect the DER by not scheduling an inspection in the allotted time; or

Explicitly waived the right to inspect the DER.

3.0 Safe Operations and Maintenance

The Interconnection Customer shall be fully responsible for operating, maintaining, and repairing the DER as required to ensure that it complies at all times with IEEE Std 1547™-2018.

4.0 Access

The Utility shall have access to the metering equipment of the DER at all times. The Utility shall provide reasonable notice to the Interconnection Customer when possible prior to using its right of access.

5.0 Disconnection

The Utility may temporarily disconnect the DER upon the following conditions:

For scheduled outages upon reasonable notice.

For unscheduled outages or emergency conditions.

If the DER does not operate in the manner consistent with these terms and conditions of the Agreement.

The Utility shall inform the Interconnection Customer in advance of any scheduled disconnection, or as soon as possible after an unscheduled disconnection.

6.0 Indemnification

Each Party shall at all times indemnify, defend, and hold the other Party harmless from any and all damages, losses, claims, including claims and actions relating to injury to or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney's fees, and all other obligations by or to third parties, arising out of or resulting from the indemnified Party's action or inactions of its obligations under this Agreement on behalf of the indemnifying Party, except in cases of gross negligence or intentional wrongdoing by the indemnified Party.

7.0 Insurance

The Interconnection Customer is not required to provide general liability insurance coverage as part of this Agreement, or through any other Utility requirement**.**

8.0 Limitation of Liability

Each Party's liability to the other Party for any loss, cost, claim, injury, liability, or expense, including reasonable attorney's fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage actually incurred. In no event shall either Party be liable to the other Party for any indirect, incidental, special, consequential, or punitive damages of any kind whatsoever, except as allowed under paragraph 6.0 (Indemnification).

9.0 Termination

This Agreement may be terminated under the following conditions:

By the Interconnection Customer: By providing written notice to the Utility.

By the Utility: If the DER fails to operate for any consecutive 12-month period or the Interconnection Customer fails to remedy a violation of these terms and conditions of the Agreement.

Permanent Disconnection: In the event the Agreement is terminated, the Utility shall have the right to disconnect its facilities or direct the Interconnection Customer to disconnect its DER.

Survival Rights: This Agreement shall continue in effect after termination to the extent necessary to allow or require either Party to fulfill rights or obligations that arose under the Agreement.

10.0 Assignment

For a DER offsetting part or all of the load of a Utility customer at a given site, that customer is the Interconnection Customer and that customer may assign its Interconnection Agreement to a subsequent occupant of the site. For a DER providing energy directly to a Utility, the Interconnection Customer is the owner of the DER and may assign its Interconnection Agreement to a subsequent owner of the DER. Assignment is only effective after the assignee provides written notice of the assignment to the Utility and agrees to accept the Interconnection Customer's responsibilities under the Interconnection Agreement.

Attachment 3
Fast Track and Detailed Study Interconnection Application

An Application is complete when it provides all applicable information required below and any required Application fee. A one-line diagram and a load flow data sheet must be supplied with this Application. Additional information to evaluate a request for interconnection may be required after an Application is deemed complete; however, the Utility shall endeavor to identify data needs upfront rather than repeatedly asking for additional information. This form should be made available in an electronically fillable format and it shall be permissible to submit the form with electronic signatures.

Applicant requests review under (select one):

_____ Fast Track _____ Detailed Study

Written Applications should be submitted by mail or email to:

Utility: _____

Address: _____

Email Address: _____

Utility Contact Name: _____

Utility Contact Title: _____

1. Applicant Information:

Legal Name of Applicant (if an individual, individual's full name):

Name: _____

Address: _____

City, State, Zip: _____

Telephone (Day): _____ (Evening): _____

Email Address: _____

Representative (if different from Applicant):

Name: _____

Address: _____

City, State, Zip: _____

Telephone (Day): _____ (Evening): _____

Email Address: _____

Type of interconnection (choose one): _____ Net Metering

_____ Load Response (no export)

_____ Wholesale Provider

Utility Account Number (for DERs at Utility customer locations): _____[1]

2. DER Specifications:

All power ratings should be listed in AC throughout.

Location (if different from above): _____

Facility Owner (include percent ownership by any electric utility): _____

_____

Applicant Load: _____ (kW) (if none, so state)

Typical Reactive Load (if known): _____

Total number and type of generators to be interconnected pursuant to this Application:

_____

Total number of inverters to be interconnected pursuant to this Application: _____

_____

Total Aggregate Nameplate Output Rating for all Generators:

_____ (kW) _____ (kVA)

Export Capacity[2]: _____ (kW) _____ (kVA)

a. Energy Storage Information (if any):

Total Aggregate Nameplate Charge Rating _____ (kW) _____(kVA)

Does the storage share an inverter with another generator? ☐ Yes ☐ No

Does the applicant intend to have the storage charged by the utility? ☐ Yes ☐ No

b. Limited-Export / Non-Export / Limited-Import Data:

If multiple export or import control systems are used, provide for each control system and use additional sheets if needed.

_____

[1] If the Utility requires the customer's name on the application to match the customer on the bill, this should be specified on the application.

[2] As limited by any export controls.

Is export controlled to less than the Total Aggregate Nameplate Output Rating?

☐ Yes ☐ No

If the applicant intends to have the storage charged by the utility, is import controlled to less than the total aggregate nameplate charge rating? ☐ Yes ☐ No

If storage is import-limited, describe the method of import limitation:_____

_____

Method of export limitation:

_____Reverse Power Protection (Device 32R)
_____Minimum Power Protection (Device 32F)
_____Relative DER Rating
_____Directional Power Protection (Device 32)
_____Configured Power Rating
_____Power Control System (PCS)
_____Export Control using mutually agreed-upon

Control Power Limit Setting: _____ (kW) _____(kVA)

Control Time Delay (if any): _____

If Power Control System is used, Open-Loop Response Time: Maximum_____ Average_____

When grid-connected, will the PCS employ any of the following? [Select all that apply]

- ☐ Unrestricted mode
- ☐ Export-only mode
- ☐ Import-only mode
- ☐ No exchange mode
- ☐ Export-limiting from all sources
- ☐ Export-limiting from ESS
- ☐ Import-limiting to ESS

Export controls are applied to how many generators?

☐ One ☐ Multiple (indicate number) _____

Describe which generators the export control system controls: _____

_____

c. IEEE Std 1547™-2018 Related Information:

Where is the desired RPA location? [Check one]

- ☐ Point of DER connection (PoC)
- ☐ Point of Common Coupling (PCC)
- ☐ Another point between PoC and PCC (must be denoted in the one-line diagram)
- ☐ Different RPAs for different generators (must be denoted in the one-line diagram)

Is the RPA location the same as above for detection of abnormal voltage, faults, and open-phase conditions?

- ☐ Yes
- ☐ No (detection location must be denoted in the one-line diagram)

Why does this DER fit the chosen RPA? [Check all that apply]

- ☐ Zero-sequence continuity between PCC and PoC is maintained
- ☐ The DER aggregate Nameplate Rating is less than 500 kVA
- ☐ Annual average load demand is greater than 10% of the aggregate DER Nameplate Rating, and it is not capable of, or is prevented from, exporting more than 500 kVA for longer than 30 seconds.

Does the DER utilize export limiting for the Limit Maximum Active Power function?

☐ Yes ☐ No

Which equipment(s) achieves this functionality? _____

_____

Is the equipment certified for export limiting (PCS, or "plant controller" via IEEE Std 1547.1 test 5.13)? ☐ Yes ☐ No

In addition to grid-connected mode, will the DER operate as an intentional local EPS island (also known as "microgrid" or "standby mode")? ☐ Yes ☐ No

When grid-connected, does the DER employ active or reactive power functions not specified in IEEE Std 1547 (such as the Set Active Power function)? ☐ Yes ☐ No

If so, describe the functions: _____

_____

Is the DER, or part of the DER, designated as emergency, legally required, or critical facility backup power? ☐ Yes ☐ No

(If yes, denote the emergency generators and applicable portions of the DER in the submitted one-line diagram)

How is the voltage-active power function (volt-watt) implemented? [Check one]

- ☐ N/A (voltage-active power function will not be implemented per Utility)
- ☐ All generators follow the same functional settings (same per-unit curve regardless of individual unit Nameplate Rating)
- ☐ Different generators follow different functional settings (different per-unit curves for individual unit Nameplate Ratings)
  - Denote in one-line diagram the voltage-active power settings of each generator
- ☐ A plant controller or other supplemental DER device manages output of the entire system (one per-unit curve based on total system Nameplate Rating)
  - If selected, is the managing device certified for the voltage-active power function? ☐ Yes ☐ No
- ☐ Export limit is utilized (power control system manages export based on total system Nameplate Rating)
  - If selected, is the managing device certified for the voltage-active power function? ☐ Yes ☐ No

d. Individual Generator Data:

Provide for each generator, use additional sheets if needed.

Generator Technology: Photovoltaic / Turbine/ Fuel Cell / Energy Storage/ Other (describe):

_____

Generator[3] Manufacturer, Model Name & Number:

_____

Version Number:

_____

Generator Nameplate Rating:

_____

Energy Source: Solar / Wind / Hydro / Other (describe): _____

If energy storage, usable capacity at maximum discharge rate: _____(kWh)

If energy storage, what is the discharge ramp rate? _____(kW/s)

If energy storage, what is the charge ramp rate? _____(kW/s)

[3] E.g., the solar PV module manufacturer, battery manufacturer, etc. The inverter information is provided below.

e. Individual Inverter (or Energy Storage System) Data (if any):

Provide for each inverter, use additional sheets if needed.

Inverter (or Energy Storage System) Manufacturer: _____

Model Name & Number: _____

Version Number:

_____

Nameplate Output Rating: _____ (kW) _____ (kVA)

Nameplate Charge Rating: _____ (kW) _____ (kVA)

AC Voltage Nominal Rating: _____ (Volts)

Rated Power Factor: (Underexcited) _____ (Overexcited) _____

Minimum Power Factor: (Underexcited) _____ (Overexcited) _____

Do export controls apply to this inverter or energy storage system? ☐ Yes ☐ No

Do import controls apply to this inverter or energy storage system? ☐ Yes ☐ No

☐ Single-phase ☐ Three-phase (check one)

List of adjustable set points for the protective equipment or software: _____

_____

Max design fault contribution current: (Instantaneous) _____ (RMS) _____

Is the inverter certified to UL 1741? ☐ Yes ☐ No

If yes, attach evidence of UL 1741 certification.

f. Rotating Machines (of any type):

Manufacturer, Model Name & Number:_____

Version Number: _____

Nameplate Output Power Rating:(kW) _____(kVA) _____

Rated Power Factor: (Underexcited) _____ (Overexcited) _____

Minimum Power Factor: (Underexcited) _____ (Overexcited) _____

☐ Single-phase ☐ Three-phase (check one)

List of adjustable set points for the protective equipment or software:_____

_____

Do export controls apply to this machine? ☐ Yes ☐ No

RPM Frequency: _____

Neutral Grounding Resistor (if applicable): _____

List components of the Interconnection Equipment Package that are certified to UL or IEEE standards:

	Equipment Type	Certifying Entity
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____

Is the prime mover compatible with the Interconnection Equipment Package?

☐ Yes ☐ No

g. Synchronous Generators:

Direct Axis Synchronous Reactance, Xd: _____ (pu)

Direct Axis Transient Reactance, X' d: _____ (pu)

Direct Axis Subtransient Reactance, X" d: _____ (pu)

Negative Sequence Reactance, X2: _____ (pu)

Zero Sequence Reactance, X0: _____ (pu)

kVA Base: _____

Field Volts: _____

Field Amperes: _____

For synchronous generators, provide appropriate IEEE model block diagram of excitation system, governor system, and power system stabilizer (PSS) in accordance with the regional reliability council criteria. A PSS may be determined to be required by applicable studies. A copy of the manufacturer's block diagram may not be substituted.

h. Induction Generators:

Motoring Power (kW): _____

I^2t or K (Heating Time Constant): _____

Rotor Resistance, Rr: _____ Rotor Reactance, Xr: _____

Stator Resistance, Rs: _____ Stator Reactance, Xs: _____

Magnetizing Reactance, Xm: _____

Short Circuit Reactance, Xd: _____

Exciting Current: _____

Temperature Rise: _____

Frame Size: _____

Design Letter: _____

Reactive Power Required in Vars (No Load): _____

Reactive Power Required in Vars (Full Load): _____

Total Rotating Inertia, H: _____ pu on kVA Base

3. Transformer and Protective Relay Specifications:

Will a transformer be used between the generator and the Point of Common Coupling?

☐ Yes ☐ No

Will the transformer be provided by the Interconnection Customer?

☐ Yes ☐ No

a. Transformer Data (if applicable, for Interconnection Customer-Owned Transformer):

Is the transformer: ☐ Single-phase ☐ Three-phase (check one)

Size: _____kVA

Transformer Impedance: _____ percent on _____ kVA Base

If three-phase:

Transformer Primary: _____ Volts ☐ Delta ☐ Wye ☐ Wye Grounded

Transformer Secondary: _ Volts ☐ Delta ☐ Wye ☐ Wye Grounded

Transformer Tertiary: _____ Volts ☐ Delta ☐ Wye ☐ Wye Grounded

b. Transformer Fuse Data (if applicable, for Interconnection Customer-Owned Fuse):

(Enclose/Attach copy of fuse manufacturer's Minimum Melt and Total Clearing Time-Current Curves)

Manufacturer: _____ Type: _____

Size: _____ Speed: _____

c. Interconnecting Circuit Breaker (if applicable):

Manufacturer: _____ Type: _____

Load Rating (Amps): _____ Interrupting Rating (Amps): _____

Trip Speed (Cycles): _____

d. Interconnection Protective Relays (if applicable):

If Microprocessor-Controlled:

List of Functions and Adjustable Setpoints for the protective equipment or software:

	Setpoint Function	Minimum	Maximum
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

e. Discrete Components (if applicable):

(Enclose/Attach Copy of any Proposed Time-Overcurrent Coordination Curves)

Manufacturer: _____ Type: _____ Style/Catalog No.: _____

Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____

Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____

Proposed Setting: _____

f. Current Transformer Data (if applicable):

(Enclose/Attach Copy of Manufacturer's Excitation and Ratio Correction Curves)

Manufacturer: _____

Type: _____ Accuracy Class: _____ Proposed Ratio Connection: _____

g. Potential Transformer Data (if applicable):

Manufacturer: _____

Type: _____ Accuracy Class: _____ Proposed Ratio Connection: _____

4. General Information

Enclose/attach copy of site electrical one-line diagram showing the configuration of all DER equipment, current and potential circuits, and protection and control schemes.[4] This one-line diagram must be signed and stamped by a licensed Professional Engineer if the DER is larger than 200 kW.

Is one-line diagram enclosed? ☐ Yes ☐ No

Enclose/attach copy of any site documentation that indicates the precise physical location of the proposed DER and all protective equipment (e.g., USGS topographic map or other diagram or documentation).

Is site documentation enclosed? ☐ Yes ☐ No

Enclose/attach copy of any site documentation that describes and details the operation of the protection and control schemes.

Is available documentation enclosed? ☐ Yes ☐ No

Enclose/attach copies of schematic drawings for all protection and control circuits, relay current circuits, relay potential circuits, and alarm/monitoring circuits (if applicable).

Are schematic drawings enclosed? ☐ Yes ☐ No

4. Applicant Signature (may be electronic):

I designate the individual or company listed as my Representative to serve as my agent for the purpose of coordinating with the Utility on my behalf through the interconnection process (*see* Interconnection Procedures Section IV.H.13). INITIAL: _____

I hereby certify that, to the best of my knowledge, all the information provided in this Interconnection Application is true and correct. I also agree to install a warning label provided by (utility) on or near my service meter location. DERs must be compliant with IEEE, NEC, ANSI, and UL standards, where applicable. By signing below, the Applicant also certifies that the installed generating equipment meets the appropriate preceding requirement(s) and can supply documentation that confirms compliance.

Signature of Applicant: _____

Date: _____

[4] Some states require or encourage utilities to publish sample one-line diagrams that illustrate the expectations for format and detail. Such supporting materials can help the customer and the utility by reducing the number of applications that are deemed incomplete on the first try.

5. Information Required Prior to Physical Interconnection:

A Certificate of Completion in the form of Attachment 5 of the Interconnection Procedures must be provided to the Utility prior to interconnected operation. The Certificate of Completion must either be signed by an electrical inspector with the authority to approve the interconnection or be accompanied by the electrical inspector's own form authorizing interconnection of the DER.

Attachment 4
Fast Track and Detailed Study Interconnection Agreement
(Standard Agreement for Interconnection of DERs)

This agreement ("Agreement") is made and entered into this ____ day of _____, _____ ("Effective Date") by and between _____, a _____ organized and existing under the laws of the State of _____, ("Interconnection Customer") and _____, a _____, existing under the laws of the State of _____, ("Utility"). Interconnection Customer and Utility each may be referred to as a "Party," or collectively as the "Parties."

Recitals:

Whereas, Interconnection Customer, as an Applicant, is proposing to develop a Distributed Energy Resource ("DER"), or Export Capacity addition to an existing DER, consistent with the Application completed by Interconnection Customer on _____; and

Whereas, Interconnection Customer desires to interconnect the DER with the Utility's Electric Delivery System;

Now, therefore, in consideration of and subject to the mutual covenants contained herein, the Parties agree as follows:

Article 1. Scope and Limitations of Agreement

1.1 This Agreement shall be used for all approved Fast Track and Detailed Study Interconnection Applications according to the procedures set forth in the Interconnection Procedures. Capitalized terms in this Agreement if not defined in the Agreement have the meanings set forth in the Interconnection Procedures.

1.2 This Agreement governs the terms and conditions under which the DER will interconnect to, and operate in parallel with, the Utility's Electric Delivery System.

1.3 This Agreement does not constitute an agreement to purchase or deliver the Interconnection Customer's power.

1.4 Nothing in this Agreement is intended to affect any other agreement between Utility and Interconnection Customer. However, in the event that the provisions of this Agreement are in conflict with the provisions of a Utility tariff, the Utility tariff shall control.

1.5 Responsibilities of the Parties

1.5.1 The Parties shall perform all obligations of this Agreement in accordance with all applicable laws and regulations, and operating requirements.

1.5.2 The Interconnection Customer shall construct and operate the DER in the manner specified in the Application. If design or operational changes are made, and agreed upon by the Utility, during the interconnection review process those shall be specified in an Exhibit to this Agreement.

1.5.3 The Interconnection Customer shall arrange for the construction, interconnection, operation, and maintenance of the DER in accordance with the applicable manufacturer's recommended maintenance schedule, in accordance with this Agreement.

1.5.4 The Utility shall construct, own, operate, and maintain its Electric Delivery System and its facilities for interconnection ("Interconnection Facilities") in accordance with this Agreement.

1.5.5 The Interconnection Customer agrees to arrange for the construction of the DER or systems in accordance with applicable specifications that meet or exceed the National Electrical Code, the American National Standards Institute, IEEE, UL, and any operating requirements.

1.5.6 Each Party shall operate, maintain, repair, and inspect, and shall be fully responsible for the facilities that it now or subsequently may own unless otherwise specified in the Exhibits to this Agreement and shall do so in a manner so as to reasonably minimize the likelihood of a disturbance adversely affecting or impairing the other Party.

1.5.7 Each Party shall be responsible for the safe installation, maintenance, repair, and condition of their respective lines and appurtenances on their respective sides of the Point of Common Coupling.

Article 2. Inspection, Testing, Authorization, and Right of Access

2.1 Equipment Testing and Inspection

The Interconnection Customer shall arrange for the testing and inspection of the DER prior to interconnection in accordance with IEEE Std 1547™-2018 and the Interconnection Procedures.

2.2 Certificate of Completion

Prior to commencing parallel operation, the Interconnection Customer shall provide the Utility with a Certificate of Completion substantially in the form of Attachment 5 of the Interconnection Procedures. The Certificate of Completion must either be signed by an electrical inspector with the authority to approve the interconnection or be accompanied by the electrical inspector's own form

authorizing interconnection of the DER.

2.3 Authorization

The Interconnection Customer is authorized to commence parallel operation of the DER when there are no contingencies noted in this Agreement remaining.

2.4 Parallel Operation Obligations

The Interconnection Customer shall abide by all permissible written rules and procedures developed by the Utility which pertain to the parallel operation of the DER. In the event of conflicting provisions, the Interconnection Procedures shall take precedence over a Utility's rule or procedure, unless such Utility rule or procedure is contained in an approved tariff, in which case the provisions of the tariff shall apply. Copies of the Utility's rules and procedures for parallel operation are either provided as an exhibit to this Agreement or in an exhibit that provides reference to a website with such material.

2.5 Reactive Power

The Interconnection Customer shall design its DER to maintain a composite power delivery at continuous rated power output at the Point of Common Coupling with reactive power within the range specified by IEEE Std 1547™-2018 for Category __.[1]

2.6 Right of Access

At reasonable hours, and upon reasonable notice, or at any time without notice in the event of an emergency or hazardous condition, the Utility shall have reasonable access to the Interconnection Customer's premises for any reasonable purpose in connection with the performance of the obligations imposed on the Utility under this Agreement, or as is necessary to meet a legal obligation to provide service to customers.

Article 3. Effective Date, Term, Termination, and Disconnection

3.1 Effective Date

This Agreement shall become effective upon execution by both of the Parties.

3.2 Term of Agreement

This Agreement shall remain in effect unless terminated earlier in accordance with Article 3.3 of this Agreement.

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[1] DER may operate at lower power factors than those previously specified in interconnection rules. The Utility should specify the appropriate Category required of the DER.

3.3 Termination

No termination shall become effective until the Parties have complied with all applicable laws and regulations applicable to such termination.

3.3.1 The Interconnection Customer may terminate this Agreement at any time by giving the Utility twenty (20) Business Days' written notice.

3.3.2 Either Party may terminate this Agreement pursuant to Article 6.6.

3.3.3 Upon termination of this Agreement, the DER will be disconnected from the Electric Delivery System. The termination of this Agreement shall not relieve either Party of its liabilities and obligations, owed or continuing at the time of the termination.

3.3.4 The provisions of this Article shall survive termination or expiration of this Agreement.

3.4 Temporary Disconnection

The Utility may temporarily disconnect the DER from the Electric Delivery System for so long as reasonably necessary in the event one or more of the following conditions or events:

3.4.1 Emergency Conditions: "Emergency Condition" shall mean a condition or situation:

(1) that in the judgment of the Party making the claim is imminently likely to endanger life or property; or

(2) that, in the case of Utility, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of the Utility's Interconnection Facilities or damage to the Electric Delivery System; or

(3) that, in the case of the Interconnection Customer, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to, the DER.

Under emergency conditions, the Utility or the Interconnection Customer may immediately suspend interconnection service and temporarily disconnect the DER. The Utility shall notify the Interconnection Customer promptly when it becomes aware of an Emergency Condition that may reasonably be expected to affect the Interconnection Customer's operation of the DER. The Interconnection Customer shall notify the Utility promptly when it becomes aware of an Emergency Condition that may reasonably be expected to affect the Utility's Electric Delivery System. To the extent information is known, the notification shall

describe the Emergency Condition, the extent of the damage or deficiency, the expected effect on the operation of both Parties' facilities and operations, its anticipated duration, and any necessary corrective action.

3.4.2 Routine Maintenance, Construction, and Repair: The Utility may interrupt interconnection service or curtail the output of the DER and temporarily disconnect the DER from the Electric Delivery System when necessary for routine maintenance, construction, and repairs on the Electric Delivery System. The Utility shall provide the Interconnection Customer with five (5) Business Days' notice prior to such interruption. The Utility shall use reasonable efforts to coordinate such repair or temporary disconnection with the Interconnection Customer.

3.4.3 Forced Outages: During any forced outage, the Utility may suspend interconnection service to effect immediate repairs on the Electric Delivery System. The Utility shall make reasonable efforts to provide the Interconnection Customer with prior notice. If prior notice is not given, the Utility shall, upon request, provide the Interconnection Customer written documentation after the fact explaining the circumstances of the disconnection.

3.4.4 Adverse Operating Effects: The Utility shall provide the Interconnection Customer with a written notice of its intention to disconnect the DER if, based on good utility practice, the Utility determines that operation of the DER will likely cause unreasonable disruption or deterioration of service to other Utility customers served from the same electric system, or if operating the DER could cause damage to the Electric Delivery System. Supporting documentation used to reach the decision to disconnect shall be provided to the Interconnection Customer upon request. The Utility may disconnect the DER if, after receipt of the notice, the Interconnection Customer fails to remedy the adverse operating effect within a reasonable time which shall be at least five (5) Business Days from the date the Interconnection Customer receives the Utility's written notice supporting the decision to disconnect, unless emergency conditions exist in which case the provisions of Article 3.4.1 apply.

3.4.5 Modification of the DER: The Interconnection Customer must receive written authorization from Utility before making any change to the DER that may have a material impact on the safety or reliability of the Electric Delivery System. Such authorization shall not be unreasonably withheld. Modifications shall be completed in accordance with good utility practice. Requests for modification and approval of such requests shall be made in accordance with Section I.D.4 of the Interconnection Procedures. If the Interconnection Customer makes such modification without the Utility's prior written authorization, the latter shall have the right to temporarily disconnect the DER.

3.4.6 Reconnection: The Parties shall cooperate with each other to restore the DER, Interconnection Facilities, and the Electric Delivery System to their normal operating state as soon as reasonably practicable following a temporary disconnection.

Article 4. Cost Responsibility for Interconnection Facilities and Distribution Upgrades

4.1 Interconnection Facilities

4.1.1 The Interconnection Customer shall pay for the cost of the Interconnection Facilities itemized in the Exhibits to this Agreement ("Interconnection Facilities"). If a Facilities Study was performed, the Utility shall identify its Interconnection Facilities necessary to safely interconnect the DER with the Electric Delivery System, the cost of those facilities, and the time required to build and install those facilities.

4.1.2 The Interconnection Customer shall be responsible for its share of all reasonable expenses, including overheads, associated with (1) owning, operating, maintaining, repairing, and replacing its Interconnection Equipment Package, and (2) operating, maintaining, repairing, and replacing the Utility's Interconnection Facilities as set forth in any exhibits to this Agreement.

4.2 Distribution Upgrades

The Utility shall design, procure, construct, install, and own any Electric Delivery System upgrades ("Utility Upgrades"). The actual cost of the Utility Upgrades, including overheads, shall be directly assigned to the Interconnection Customer.

Article 5. Billing, Payment, Milestones, and Financial Security

5.1 Billing and Payment Procedures and Final Accounting

5.1.1 The Utility shall bill the Interconnection Customer for the design, engineering, construction, and procurement costs of the Utility-provided Interconnection Facilities and Utility Upgrades contemplated by this Agreement as set forth in the exhibits to this Agreement, on a monthly basis, or as otherwise agreed by the Parties. The Interconnection Customer shall pay each bill within thirty (30) calendar days of receipt, or as otherwise agreed by the Parties.

5.1.2 Within sixty (60) calendar days of completing the construction and installation of the Utility's Interconnection Facilities and Utility Upgrades described in the exhibits to this Agreement, the Utility shall provide the Interconnection Customer with a final accounting report of any difference between (1) the actual cost incurred to complete the construction and installation and the budget estimate provided to the Interconnection Customer and (2) the Interconnection Customer's previous deposit and aggregate payments to the Utility for such Interconnection Facilities and Utility Upgrades. The Utility shall provide a written explanation for any actual cost exceeding a budget estimate by twenty-five percent (25%) or more. If the Interconnection Customer's cost responsibility exceeds its previous deposit and aggregate payments, the Utility shall invoice the Interconnection Customer for the amount due and the Interconnection Customer shall make payment to the Utility within thirty (30) calendar days. If the Interconnection Customer's previous deposit and aggregate payments exceed its cost responsibility under this Agreement, the Utility shall refund to the Interconnection Customer an amount equal to the difference within thirty (30) Business Days of the final accounting report.

5.2 Interconnection Customer Deposit

At least twenty (20) Business Days prior to the commencement of the design, procurement, installation, or construction of a discrete portion of the Utility's Interconnection Facilities and Utility Upgrades, the Interconnection Customer shall provide the Utility with a deposit equal to fifty percent (50%) of the cost estimated for its Interconnection Facilities prior to its beginning design of such facilities.

Article 6. Assignment, Liability, Indemnity, Force Majeure, Consequential Damages, and Default

6.1 Assignment

This Agreement may be assigned by either Party as provided below upon fifteen (15) Business Days' prior written notice to the other Party.

6.1.1 Either Party may assign this Agreement without the consent of the other Party to any affiliate of the assigning Party and with the legal authority and operational ability to satisfy the obligations of the assigning Party under this Agreement.

6.1.2 The Interconnection Customer shall have the right to assign this Agreement, without the consent of the Utility, for collateral security purposes to aid in providing financing for the DER.

6.1.3 For a DER offsetting part or all of the load of a Utility customer at a given site, that customer is the Interconnection Customer and that customer may assign its Interconnection Agreement to a subsequent occupant of the site. For a DER providing energy directly to a Utility, the Interconnection Customer is the owner of the DER and may assign its Interconnection Agreement to a subsequent owner of the DER. Assignment is only effective after the assignee provides written notice of the assignment to the Utility and agrees to accept the Interconnection Customer's responsibilities under this Interconnection Agreement.

6.1.4 All other assignments shall require the prior written consent of the non-assigning Party, such consent not to be unreasonably withheld.

6.1.5 Any attempted assignment that violates this Article is void and ineffective. Assignment shall not relieve a Party of its obligations, nor shall a Party's obligations be enlarged, in whole or in part, by reason thereof. An assignee is responsible for meeting the same obligations as the Interconnection Customer.

6.2 Limitation of Liability

Each Party's liability to the other Party for any loss, cost, claim, injury, liability, or expense, including reasonable attorney's fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage actually incurred. In no event shall either Party be liable to the other Party for any indirect, special, consequential, or punitive damages, except as specifically authorized by this Agreement.

6.3 Indemnity

6.3.1 This provision protects each Party from liability incurred to third parties as a result of carrying out the provisions of this Agreement. Liability under this provision is exempt from the general limitations on liability found in Article 6.2.

6.3.2 Each Party shall at all times indemnify, defend, and hold the other Party harmless from any and all damages, losses, claims, including claims and actions relating to injury to or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs,

attorney's fees, and all other obligations by or to third parties, arising out of or resulting from the indemnified Party's action or failure to meet its obligations under this Agreement on behalf of the indemnifying Party, except in cases of gross negligence or intentional wrongdoing by the indemnified Party.

6.3.3 If an indemnified Party is entitled to indemnification under this Article as a result of a claim by a third party, the indemnifying Party shall, after reasonable notice from the indemnified Party, assume the defense of such claim. If the indemnifying Party fails, after notice and reasonable opportunity to proceed under this Article, to assume the defense of such claim, the indemnified Party may at the expense of the indemnifying Party contest, settle, or consent to the entry of any judgment with respect to, or pay in full, such claim.

6.3.4 If the indemnifying Party is obligated to indemnify and hold the indemnified Party harmless under this Article, the amount owing to the indemnified Party shall be the amount of such indemnified Party's actual loss, net of any insurance or other recovery.

6.3.5 Promptly after receipt of any claim or notice of the commencement of any action or administrative or legal proceeding or investigation as to which the indemnity provided for in this Article may apply, the indemnified Party shall notify the indemnifying Party of such fact. Any failure of or delay in such notification shall not affect a Party's indemnification obligation unless such failure or delay is materially prejudicial to the indemnifying Party.

6.4 Consequential Damages

Neither Party shall be liable under any provision of this Agreement for any losses, damages, costs, or expenses for any special, indirect, incidental, consequential, or punitive damages, including but not limited to loss of profit or revenue, loss of the use of equipment, cost of capital, cost of temporary equipment, or services, whether based in whole or in part in contract, in tort, including negligence, strict liability, or any other theory of liability; provided, however, that damages for which a Party may be liable to the other Party under another agreement will not be considered to be special, indirect, incidental, or consequential damages hereunder.

6.5 Force Majeure

6.5.1 As used in this Article, a Force Majeure Event shall mean any act of God, labor disturbance, act of the public enemy, war, acts of terrorism, insurrection, riot, fire, storm or flood, explosion, breakage, or accident to machinery or equipment, any order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. A Force Majeure Event does not include an act of negligence or intentional wrongdoing.

6.5.2 If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, the Party affected by the Force Majeure Event ("Affected Party") shall promptly notify the other Party of the existence of the Force Majeure Event. The notification must specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the Affected Party is taking to mitigate the effects of the event on its performance, and if the initial notification was verbal, it should be promptly followed up with a written notification. The Affected Party shall keep the other Party informed on a continuing basis of developments relating to the Force Majeure Event until the event ends. The Affected Party will be entitled to suspend or modify its performance of obligations under this Agreement (other than the obligation to make payments) only to the extent that the effect of the Force Majeure Event cannot be reasonably mitigated by the Affected Party. The Affected Party shall use reasonable efforts to resume its performance as soon as possible.

6.6 Default

6.6.1 Default exists where a Party has materially breached any provision of this Agreement, except that no default shall exist where a failure to discharge an obligation (other than the payment of money) is the result of a Force Majeure Event as defined in this Agreement, or the result of an act or omission of the other Party.

6.6.2 Upon a default, the non-defaulting Party shall give written notice of such default to the defaulting Party. Except as provided in Article 6.6.3, the defaulting Party shall have sixty (60) calendar days from receipt of the default notice within which to cure such default; provided however, if such default is not capable of cure within sixty (60) calendar days, the defaulting Party shall commence efforts to cure within twenty (20) calendar days after notice and continuously and diligently pursue such cure within six months from receipt of the default notice; and, if cured within such time, the default specified in such notice shall cease to exist.

6.6.3 If a default is not cured as provided in this Article, or if a default is not capable of being cured within the period provided for herein, the non-defaulting Party shall have the right to terminate this Agreement by written notice at any time until cure occurs, and be relieved of any further obligation hereunder and, whether or not that Party terminates this Agreement, to recover from the defaulting Party all amounts due hereunder, plus all other damages and remedies to which it is entitled at law or in equity. The provisions of this Article will survive termination of this Agreement.

Article 7. Insurance

The Interconnection Customer is not required to provide insurance coverage for utility damages beyond the amounts listed in Section IV.H.6 of the Interconnection Procedures as part of this

Agreement, nor is the Interconnection Customer required to carry general liability insurance as part of this Agreement or any other Utility requirement. It is, however, recommended that the Interconnection Customer protect itself with liability insurance.

Article 8. Dispute Resolution

Any dispute arising from or under the terms of this Agreement shall be subject to the dispute resolution procedures contained in the Interconnection Procedures.

Article 9. Miscellaneous

9.1 Governing Law, Regulatory Authority, and Rules

The validity, interpretation and enforcement of this Agreement and each of its provisions shall be governed by the laws of the State of _____, without regard to its conflicts of law principles (*if left blank, such state shall be the state in which the DER is located*). This Agreement is subject to all applicable laws and regulations. Each Party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, or regulations of a governmental authority.

9.2 Amendment

The Parties may only amend this Agreement by a written instrument duly executed by both Parties.

9.3 No Third-Party Beneficiaries

This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest, and, where permitted, their assigns.

9.4 Waiver

9.4.1 The failure of a Party to this Agreement to insist, on any occasion, upon strict performance of any provision of this Agreement will not be considered a waiver of any obligation, right, or duty of, or imposed upon, such Party.

9.4.2 Any waiver at any time by either Party of its rights with respect to this Agreement shall not be deemed a continuing waiver or a waiver with respect to any failure to comply with any other obligation, right, or duty of this Agreement. Termination or default of this Agreement for any reason by the Interconnection Customer shall not constitute a waiver of the Interconnection Customer's legal rights to obtain an interconnection from the Utility. Any waiver of this Agreement shall, if requested, be provided in writing.

9.5 Entire Agreement

This Agreement, including all exhibits, constitutes the entire Agreement between the Parties with reference to the subject matter hereof, and supersedes all prior and contemporaneous understandings or agreements, oral or written, between the Parties with respect to the subject matter of this Agreement. There are no other agreements, representations, warranties, or covenants which constitute any part of the consideration for, or any condition to, either Party's compliance with its obligations under this Agreement.

9.6 Multiple Counterparts

This Agreement may be executed in two or more counterparts, each of which is deemed an original but all of which constitute one and the same Agreement.

9.7 No Partnership

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties nor to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power, or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

9.8 Severability

If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other Governmental Authority, (1) such portion or provision shall be deemed separate and independent, (2) the Parties shall negotiate in good faith to restore, insofar as practicable, the benefits to each Party that were affected by such ruling, and (3) the remainder of this Agreement shall remain in full force and effect.

9.9 Environmental Releases

Each Party shall notify the other Party, first orally and then in writing, of the release any hazardous substances, any asbestos or lead abatement activities, or any type of remediation activities related to the DER or the Interconnection Facilities, each of which may reasonably be expected to affect the other Party. The notifying Party shall (1) provide the notice as soon as practicable, provided such Party makes a good faith effort to provide the notice no later than twenty-four (24) hours after such Party becomes aware of the occurrence, and (2) promptly furnish to the other Party copies of any publicly available reports filed with any governmental authorities addressing such events.

9.10 Subcontractors

Nothing in this Agreement shall prevent a Party from utilizing the services of any subcontractor as it deems appropriate to perform its obligations under this Agreement; provided, however, that each Party shall require its subcontractors to comply with all applicable terms and conditions of this Agreement in providing such services and each Party shall remain liable for the performance of such subcontractor.

9.10.1 The creation of any subcontract relationship shall not relieve the hiring Party of any of its obligations under this Agreement. The hiring Party shall be fully responsible to the other Party for the acts or omissions of any subcontractor the hiring Party hires as if no subcontract had been made; provided, however, that in no event shall Utility be liable for the actions or inactions of the Interconnection Customer or its subcontractors with respect to obligations of the Interconnection Customer under this Agreement. Any applicable obligation imposed by this Agreement upon the hiring Party shall be equally binding upon, and shall be construed as having Application to, any subcontractor of such Party.

9.10.2 The obligations under this Article will not be limited in any way by any limitation of subcontractor's insurance.

Article 10. Notices

10.1 General

Unless otherwise provided in this Agreement, any written notice, demand, or request required or authorized in connection with this Agreement ("Notice") shall be deemed properly given if delivered in person, delivered by recognized national currier service, or sent by first class mail, postage prepaid, to the person specified below:

Interconnection Customer:

_____

Attention: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Email: _____

Utility:

Attention: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Email: _____

10.2 Billing and Payment

Billings and payments to Interconnection Customer shall be sent to the address provided in Section 10.1 unless an alternative address is provided here:

Interconnection Customer:

_____

Attention: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Email: _____

10.3 Designated Operating Representative

The Parties may also designate operating representatives to conduct the communications which may be necessary or convenient for the administration of this Agreement (*see* Interconnection Procedures Section IV.H.13). This person

will also serve as the point of contact with respect to operations and maintenance of the Party's facilities.

Interconnection Customer's operating representative:

_____

Attention: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Email: _____

Utility's operating representative:

Attention: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Email: _____

Article 11. Signatures

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective duly authorized representatives.

For the Utility:

Signature: _____ Date: _____

Printed Name: _____

Title: _____

For the Interconnection Customer:

Signature: _____ Date: _____

Printed Name: _____

Title: _____

Exhibits incorporated in this Agreement: *May include:*

a) one-line diagram and site maps;

b) Interconnection Facilities to be constructed by the Utility. The interconnection facilities exhibit shall include any milestones for both the Interconnection Customer and the Utility as well as cost responsibility and apportionments if there is more than one DER interconnecting and sharing in the Distribution Upgrade costs;

c) operational requirements or reference to Utility website with these requirements—this exhibit shall require the Interconnection Customer to operate within the bounds of IEEE Std 1547™-2018 *and associated standards;*

d) reimbursement of costs (Utility may, in its sole discretion, reimburse Interconnection Customer for Utility Upgrades that benefit future DERs);

e) operating restrictions (no operating restrictions generally apply to the Simplified Process or Fast Track interconnections but may apply, in the discretion of the Utility, to DERs approved under Detailed Study. Design or operating changes or limitations that are different from the application should be identified);

f) copies of Impact and Facilities Study Agreements.

Attachment 5
Certification of Completion

Installation Information: Check if owner-installed ☐

Applicant: _____ Contact Person:_____
Mailing Address: _____
_____
Location of DER (if different from above): _____
City: _____State: _____ Zip Code: _____
Telephone (Daytime): _____ (Evening): _____
Email Address: _____

Electrician:

Installing Electrician:_____ Firm:_____

License No.: _____
Mailing Address: _____
_____
City: _____ State: _____ Zip Code: _____

Telephone (Daytime): _____ (Evening): _____
Email Address: _____

Installation Date:_____ Interconnection Date: _____

Electrical Inspection:

The system has been installed and inspected in compliance with the local Building/Electrical Code of _____ (appropriate governmental authority).

Local Electrical Wiring Inspector (*or attach signed electrical inspector's form*):

Signature:_____
Name (printed): _____ Date: _____

The electrical inspector's form may be used in place of this form, so long as it contains substantively the same information and approval.

Attachment 6
System Impact and Facilities Study Agreements

As noted in the Interconnection Procedures, a Utility may require that a proposed DER that falls under Detailed Study be subject to System Impact and Facilities Studies. At the Utility's discretion, any of these studies may be combined or foregone. Also, at the Utility's discretion, for any study, the Applicant may be required to provide information beyond the contents of the Application; but, the Utility shall endeavor to request all information upfront to the greatest extent possible. Sample study agreements are provided on the following pages.

Attachment 6A
System Impact Study Agreement

This agreement ("Agreement") is made and entered into this _____ day of _____ by and between _____, a_____ organized and existing under the laws of the State of_____, ("Applicant,") and _____, a _____ existing under the laws of the State of _____, ("Utility"). The Applicant and the Utility each may be referred to as a "Party," or collectively as the "Parties."

Recitals:

Whereas, Applicant is proposing to develop a DER or Export Capacity addition to an existing DER consistent with the Application completed by Applicant on _____;
Whereas, Applicant desires to interconnect the DER with the Utility's Electric Delivery System;
Whereas, Applicant has requested the Utility perform a System Impact Study to assess the impact of interconnecting the DER to the Utility's Electric Delivery System;
Now, therefore, in consideration of and subject to the mutual covenants contained herein, the Parties agree as follows:

1. When used in this Agreement, Capitalized terms shall have the meanings indicated. Capitalized terms not defined in this Agreement shall have the meanings specified in the Interconnection Procedures.
2. Applicant elects and the Utility shall cause to be performed a System Impact Study consistent with Section III.E.4 of the Interconnection Procedures.
3. The scope of the System Impact Study shall be based on information supplied in the Application, any prior study of the DER completed by the Utility, and any other information or assumptions set forth in any attachment to this Agreement.
4. The Utility reserves the right to request additional technical information from Applicant as may reasonably become necessary consistent with good utility practice during the course of the System Impact Study. If after signing this Agreement, Applicant modifies its Application or any of the information or assumptions in any attachment to this Agreement, the time to complete the System Impact Study may be extended.
5. The System Impact Study shall provide the following information:
    - 5.1. Identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection,
    - 5.2. Identification of any thermal overload or voltage limit violations resulting from the interconnection,
    - 5.3. Identification of any instability or inadequately damped response to system disturbances resulting from the interconnection, and
    - 5.4. Description and non-binding, good faith estimated cost of facilities required to interconnect the DER to the Electric Delivery System and to address the identified short circuit, instability, and power flow issues.

6. The Utility may require a study deposit of the lesser of fifty percent (50%) of estimated non-binding good faith study costs or $3,000. If required, this shall be provided by the Applicant at the time it returns this Agreement.
7. The System Impact Study shall be completed and the results transmitted to Applicant

within forty (40) Business Days after this Agreement is signed by the Parties, unless the proposed DER will impact other proposed DERs.

8. Study fees shall be based on actual costs and will be invoiced to Applicant after the study is transmitted to Applicant. The invoice shall include an itemized listing of employee time and costs expended on the study.
9. Applicant shall pay any actual study costs that exceed the deposit without interest within thirty (30) calendar days on receipt of the invoice. The Utility shall refund any excess amount without interest within thirty (30) calendar days of the invoice.

In witness thereof, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

For the Utility:

Signature: _____ Date: _____

Printed Name: _____

Title: _____

Date: _____

For the Applicant:

Signature: _____ Date: _____

Printed Name: _____

Title: _____

Are attachments included to supplement or modify information contained in the Application?

_____ Yes _____ No

Attachment 6B
Interconnection Facilities Study Agreement

This agreement ("Agreement") is made and entered into this _____ day of _____ by and between _____, a _____ organized and existing under the laws of the State of _____, ("Applicant,") and _____, a _____existing under the laws of the State of _____, ("Utility"). The Applicant and the Utility each may be referred to as a "Party," or collectively as the "Parties."

Recitals:
Whereas, Applicant is proposing to develop a DER or Export Capacity addition to an existing DER consistent with the Application completed by Applicant; and
Whereas, Applicant desires to interconnect the DER with the Utility's Electric Delivery System;
Whereas, the Utility has completed or waived a System Impact Study and provided the results of said studies to Applicant; and
Whereas, Applicant has requested that Utility perform a Facilities Study to specify and estimate the cost of the engineering, procurement and construction work needed to physically and electrically connect the DER to the Electric Delivery System in accordance with good utility practice.

Now, therefore, in consideration of and subject to the mutual covenants contained herein the Parties agree as follows:

1. When used in this agreement, capitalized terms shall have the meanings indicated. Capitalized terms not defined in this agreement shall have the meanings specified in the Interconnection Procedures.
2. Applicant elects and the Utility shall cause to be performed a Facilities Study consistent with Section III.E.5 of the Interconnection Procedures.
3. The scope of the Facilities Study shall be subject to information supplied in the Application, and any feasibility study or System Impact Study performed by the Utility for the DER and any other information or assumptions set forth in any attachment to this agreement.
4. The Utility reserves the right to request additional technical information from Applicant as may reasonably become necessary consistent with good utility practice during the course of the Facilities Study.
5. A Facilities Study report (1) shall provide a detailed and itemized description of all required facilities to interconnect the DER to the Electric Delivery System, the estimated costs of those facilities, and schedule for their construction and (2) shall address the short circuit, instability, and power flow issues identified in the System Impact Study.
6. The Utility may require a study deposit of the lesser of fifty percent (50%) of estimated non-binding good faith study costs or $5,000. If required, this shall be provided by the Applicant at the time it returns this Agreement.
7. The Facilities Study shall be completed and the results shall be transmitted to Applicant within sixty (60) Business Days after this agreement is signed by the Parties.
8. Study fees shall be based on actual costs and will be invoiced to Applicant after the

study is transmitted to Applicant. The invoice shall include an itemized listing of employee time and costs expended on the study.

9. Applicant shall pay any actual study costs that exceed the deposit without interest within thirty (30) calendar days on receipt of the invoice. The Utility shall refund any excess amount without interest within thirty (30) calendar days of the invoice.

In witness whereof, the Parties have caused this agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

For the Utility:

Signature: _____ Date: _____

Printed Name: _____

Title: _____

Date: _____

For the Applicant:

Signature: _____ Date: _____

Printed Name: _____

Title: _____

Are attachments included to supplement or modify information contained in the Application and the System Impact Study (if performed)? ☐ Yes ☐ No

Attachment 7
Public Queue Requirements

Each utility shall maintain a public interconnection queue, pursuant to Interconnection Procedures Section I.D.3, available in a sortable spreadsheet format on its website, which it shall update on at least a monthly basis. The date of the most recent update shall be clearly indicated.

The public queue should include, at a minimum, the following information about each interconnection application:

1. Queue number
2. Nameplate Rating (kW)
3. Export Capacity (kW)
4. Primary fuel type (e.g., solar, wind, bio-gas, etc.)
5. Secondary fuel type (if applicable)
6. Exporting or Non-Exporting
7. City
8. Zip code
9. Substation
10. Feeder
11. Status (active, withdrawn, interconnected, etc.)
12. Date application deemed complete
13. Date of notification of Fast Track screen results, for projects undergoing review under the Simplified Process or Fast Track (if applicable)
14. Fast Track screen results, for projects undergoing review under the Simplified Process or Fast Track (pass or fail, and if fail, identify the screens failed)
15. Date of notification of Supplemental Review results (if applicable)
16. Supplemental Review results (pass or fail, and if fail, identify the screens failed)
17. Date of notification of System Impact Study results (if applicable)
18. Date of notification of Facilities Study results and/or construction estimates (if applicable)

19. Date final Interconnection Agreement is provided to Customer
20. Date Interconnection Agreement is signed by both parties
21. Date of grant of permission to operate
22. Final interconnection upgrade cost paid to utility

Attachment 8
Reporting Requirements

Each Utility shall submit to the Commission and make available to the public on its website an interconnection report with the following information, as required by Section IV.F. The report shall contain information in the following areas, including relevant totals for both the year and the most recent reporting period.

1. Pre-Application Reports
    a. Total number of reports requested
    b. Total number of reports in process
    c. Total number of reports issued
    d. Total number of requests withdrawn
    e. Maximum, mean, and median processing times from receipt of request to issuance of report
    f. Number of reports processed in more than the ten (10) Business Days allowed in Section II.B.1

2. Interconnection Applications:

    a. Total number received, broken down by:
        i. Primary fuel type (e.g., solar, wind, bio-gas, etc.)
        ii. Nameplate Rating (e.g., <20 kW, <1 MW, <5 MW, >5 MW)

    b. Simplified Process Review
        i. Total number of applications processed
        ii. Maximum, mean, and median processing times from receipt of complete Application to provision of counter-signed Interconnection Agreement

    c. Fast Track Review
        i. Total number of applications that passed the screens in Section III.B.3
        ii. Total number of applications that failed the screens in Section III.B.3[1]
        iii. Maximum, mean, and median processing times from receipt of complete Application to issuance of Interconnection Agreement

[1] If the specific screens failed are not tracked in the public queue, or a queue is not published for smaller projects, then the utilities should be required to report on the number of projects that are failing each screen and in what size categories. Failure of specific screens is an important indication of whether penetrations are reaching high levels or whether other issues exist that may require a broader policy or technical solution.

d. Supplemental Review
   i. Total number of applications that passed the screens in Section III.C.3
   ii. Total number of applications that failed the screens in Section III.C.3
   iii. Maximum, mean, and median processing times from receipt of complete Application to issuance of Interconnection Agreement

e. Detailed Study Review
   i. System Impact Studies
      (a) Total number of System Impact Studies completed under Section III.E.4

      (b) Maximum, mean, and median processing times from receipt of signed Interconnection System Impact Study Agreement to provision of study results

      (c) Maximum, mean, and median System Impact Study costs

   ii. Facilities Studies

      (a) Total number of Facilities Studies completed under Section III.E.5

      (b) Maximum, mean, and median processing times from receipt of signed Interconnection Facilities Study Agreement to provision of study results

      (c) Maximum, mean, and median processing times for projects undergoing the study process from receipt of complete Application to issuance of Interconnection Agreement

      (d) Maximum, mean and median Facility Study costs

f. Construction: Number of projects where final construction milestone was not reached by time specified in the Interconnection Agreement

g. Number of Projects that achieved Commercial Operation, by:
   i. Primary fuel type (e.g., solar, wind, bio-gas, etc.)
   ii. Nameplate Rating (e.g., <20 kW, <1 MW, <5 MW, >5 MW)

h. Upgrade Costs: Maximum, mean, and median final upgrade costs for projects by:

   i. Primary fuel type (e.g., solar, wind, bio-gas, etc.)
   ii. Nameplate Rating (e.g., <20 kW, <1 MW, <5 MW, >5 MW)

i. Deviation Between Estimates and Final Upgrade Costs

   i. Number of projects where the final upgrade costs exceeded the cost estimate provided in the Facilities Study.

   ii. Number of projects where the final upgrade costs were below the cost estimate provided in the Facilities Study.

   iii. Maximum, mean and median amount of deviation where upgrade costs were above the cost estimate.

   iv. Maximum, mean and median amount of deviation where upgrade costs were below the cost estimate.

Attachment 9
Technical Interconnection and Interoperability Requirements (TIIR) Template

Minimum Performance Requirements Based on DER Technology:

DERs shall conform with the following minimum performance requirements of IEEE Std 1547™-2018.

Normal and abnormal operating performance requirements based on technology type:

Technology	Normal Operating Performance Category	Abnormal Operating Performance Category
Inverter-Based DER	Category B	Category III
Rotating DER	Category A	Category I

Voltage and Frequency Trip Settings:

The DER shall comply with voltage and frequency tripping requirements of IEEE Std 1547-2018 for the applicable Abnormal Operating Performance Category. Unless otherwise specified by the Utility, the following specified settings shall be implemented.

Inverter DER response (shall trip) to abnormal voltages:

Shall Trip Function	Specified Setting	
	Clearing Time (s)	Voltage (p.u. of nominal)
OV2	0.16	1.20
OV1	13	1.10
UV1	21	0.88
UV2	2	0.50

Rotating DER response (shall trip) to abnormal voltages:

Shall Trip Function	Specified Setting	
	Clearing Time (s)	Voltage (p.u. of nominal)
OV2	0.16	1.20
OV1	2	1.10
UV1	2	0.70
UV2	0.16	0.45

DER response (shall trip) to abnormal frequencies:

Shall Trip Function	Specified Setting	
	Clearing Time (s)	Frequency (Hz)
OF2	0.16	62.0
OF1	300	61.2
UF1	300	58.5
UF2	0.16	56.5

Frequency Droop Settings:

The DER shall comply with the frequency droop requirements of IEEE Std 1547-2018 for the applicable Abnormal Operating Performance Category. Unless otherwise specified by the Utility, the following specified settings shall be implemented.

Frequency droop operating parameters:

Parameter	Specified Setting
db_{OF}, db_{UF} (Hz)	0.036
k_{OF}, k_{UF}	0.05
$T_{response\ (small\ signal)}$ (s)	5

Voltage Regulation by Reactive and Active Power Control Functions:

The DER shall comply with voltage regulation requirements of IEEE Std 1547-2018 for the applicable Abnormal Operating Performance Category. Unless otherwise specified by the Utility, the following specified settings shall be implemented.

Voltage regulation mode activation:

		Function Activation
Reactive Power Control Modes[a]	Constant Power Factor	Disabled
	Voltage-Reactive Power (Volt-Var)	Enabled for Categories A and B
	Active-Reactive Power	Disabled
	Constant Reactive Power	Disabled
Active Power Control Mode	Voltage-Active Power (Volt-Watt)	Enabled for Category B

[a]Voltage regulation functions/modes by reactive power are mutually exclusive – only one can be activated/enabled at a time.

Reference voltage:

DER shall utilize a fixed reference voltage (VRef) for volt-var.

Volt-var operating parameters:

Volt-Var Parameters	Specified Setting	
	Rotating DER	Inverter-Based DER
V_{Ref}	V_N[a]	V_N[a]
V_1	0.9 V_N	V_{Ref} – 0.08 V_N
V_2	V_N	V_{Ref} – 0.02 V_N
V_3	V_N	V_{Ref} + 0.02 V_N
V_4	1.1 V_N	V_{Ref} + 0.08 V_N
Q_1[b]	25% injection	44% injection
Q_2	0	0
Q_3	0	0
Q_4	25% absorption	44% absorption
Open Loop Response Time	10 s	5 s

[a]V_N is assumed to be set at DER nominal operating voltage.

[b]The DER reactive power capability may be reduced at a lower voltage.

Volt-watt operating parameters (for Category B):

Volt-Watt Parameters	Specified Setting
V_1	1.06 V_N
P_1	P_{rated}
V_2	1.1 V_N
P_2[b]	The lesser of 0.2 P_{rated} or P_{min}[a]
P'_2[c]	0
Open Loop Response Time	10 s

[a]P_{min} is the minimum active power output in p.u. of the DER rating.

[b] P_2 is applicable to DER that can only generate active power.

[c]P'_2 is applicable to DER that can generate and absorb active power.

Enter Service Parameters and Synchronization:

The DER shall comply with enter service and synchronization requirements of IEEE Std 1547-2018. Unless otherwise specified by the Utility, the following specified settings shall be implemented.

DER enter service criteria:

Enter Service Criteria		Specified Setting
Voltage Within Range	Minimum Value	≥0.917 p.u.
	Maximum Value	≤1.05 p.u.
Frequency Within Range	Minimum Value	≥59.5 Hz
	Maximum Value	≤60.1 Hz
Intentional Minimum Delay		300 s
Enter Service Period (Ramp Duration)		300 s
Randomized Time Delay Maximum Interval[a]		300 s

[a]For DER with a Nameplate Rating of less than 500 kVA, individual generators may use the randomized time delay as an alternative to the enter service period (ramp duration).

Additional Requirements:

Utilities may choose to specify additional requirements that are included in IEEE Std 1547-2018, including specifications for communication protocols. It is acceptable to add these into the TIIRs. Commission, utilities, and other stakeholders should refer to IREC's *Decision Option Matrix for IEEE 1547 Adoption* to identify the list of items that may be included in the TIIR.