STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on November 10, 2004

COMMISSIONERS PRESENT:

William M. Flynn, Chairman
Thomas J. Dunleavy
Leonard A. Weiss
Neal N. Galvin

CASE 02-E-1282 – In the Matter of the New York State Standardized Interconnection Requirements and Application Process for New Distributed Generators 300 kVA or Less Connected in Parallel with Radial Distribution Lines, filed in C 93-M-0229.

ORDER MODIFYING STANDARDIZED INTERCONNECTION REQUIREMENTS

(Issued and Effective November 17, 2004)

BY THE COMMISSION:

BACKGROUND

The Commission adopted Standardized Interconnection Requirements (SIR) for distributed generation units of 300 kVA or less operating in parallel with the radial distribution systems of the electric utilities in 1999.[1] As part of an ongoing review of the requirements, substantive revisions were

[1] Case 94-E-0952, Competitive Opportunities Regarding Electric Service, Opinion No. 99-13 (issued December 31, 1999).

proposed and adopted in 2000[2] and 2002.[3] A continuation of this periodic review process yielded new Staff proposals in 2003, consisting primarily of an increase in the upper capacity threshold from 300 kW to 2 MW, the adoption of an Underwriter's Laboratories (UL) standard for equipment certification, and the extension of the applicability of the SIR beyond the current application to only radial distribution systems to also now include network distribution systems. In addition, miscellaneous technical and editorial enhancements were suggested as part of the revision proposals.

A notice pursuant to the State Administrative Procedure Act (SAPA) regarding the proposals was published in the State Register on December 24, 2003. A technical conference was held on January 14, 2004 to allow all parties an opportunity to discuss the changes with Staff prior to submission of their comments. The minimum SAPA comment period expired on February 7, 2004. A two-month extension of the comment period was granted, and reply comments were accepted until May 14. The comments submitted are described and analyzed below. This Order adopts the recommended revisions to the SIR with some additional modifications that were indicated as a result of the comments received and directs the utilities to submit revised tariffs.

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[2] Case 94-E-0952, Competitive Opportunities Regarding Electric Service, Order Denying Petitions for Rehearing, Providing Clarification, Modifying Standard Interconnection Requirements, and Directing Filing of Revised Tariffs (issued November 15, 2000).

[3] Case 02-E-1282, Standardized Interconnection Requirements, Order Modifying Standard Interconnection Requirements (issued November 6, 2002).

Three parties filed extensive comments. These included a coalition of the New York utilities[4] (Joint Utilities), Plug Power, Inc. (Plug), and a coalition of organizations interested in the promotion of distributed generation[5] (Joint Supporters). The comments are categorized below by their relation to the proposals.

Increase in Capacity Threshold from 300 kW to 2 MW

In light of ongoing efforts at the Federal Energy Regulatory Commission (FERC) and other state commissions to establish interconnection standards for systems larger than the current 300 kW maximum, Staff proposed that an increase in New York's threshold be authorized and recommends an increase in the upper threshold limit of the SIR to 2 MW. Staff also proposes the inclusion of additional generation sources, encompassing more rotational generation as well as inverter-based sources. To accomplish this end, Staff has recommended augmentation to existing sections of the SIR addressing synchronous and induction generators to provide necessary technical provisions and a new section detailing minimum protective function requirements.

[4] Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation.

[5] The E-Cubed Company, LLC, Hess Microgen, Allied Utility Network, LLC, Energy Concepts Engineering, PC, Capstone, CSA Engineering Services, DSM Engineering Associates, PC, Gas Technology Institute, KeySpan Energy, Siemens Building Technology, District One, Coast Intelligen, Monroe NewPower, National Fuel Gas, Pace Energy Law Project, RealEnergy, Inc., Red Hook Stores, Turbostream, and 1st Rochdale Cooperative.

1. Application Process

Joint Utilities provides extensive comments on the Application Process, providing what it believes is necessary enhancement to the process steps. These include extended time frames for large-scale projects and additional data request requirements. Its comments are presented in detail below, categorized for each step:

a. Step 4, Utility Conducts a Preliminary Review and Develops a Cost Estimate for the Coordinated System Interconnection Review (CESIR)

Joint Utilities proposes that a 15 business day review interval for projects above 300 kW up to 2 MW be allowed.

Discussion

Given their greater size and complexity, systems of this magnitude will require a longer review period to allow for a thorough and complete review. During this phase of the process, the utilities must identify any essential studies that may be required to allow for the completion of the CESIR, and it is vital that enough time is afforded to complete this task. It is in the best interest of all parties that an accurate assessment of the viability of the project and any costs associated with the completion of a CESIR be identified in this step. Accordingly, we will adopt the Joint Utilities' proposal.

b. Step 5, Applicant Commits to the Completion of the CESIR

Joint Utilities provides extensive comments and recommendations that would significantly increase the submittals that are required of applicants for systems rated greater than 300 kW up to 2 MW and for interconnection to network systems. Its proposals consist primarily of technical information, as detailed and addressed below, that it contends is the minimum necessary to complete the CESIR.

Discussion

We will not adopt the proposal to require the exact physical location of the facility to be identified on a USGS map. The need for a reference location based on USGS maps is unclear. Parties presenting applications per the SIR provide detailed information on the address of the residence/facility, and this should be sufficient for the utility to locate the site within its service territory.

We will also not adopt an additional requirement that the overall operational output (in MW) of the facility be provided. This information is already required in the standard application and a redundant submission is not necessary.

Although we are in general agreement that information regarding the system wiring diagram is necessary to complete the CESIR, it should be clarified that only information pertaining to the generation system and any associated equipment is the subject of the request. A comprehensive diagram of the entire facility housing the generation equipment is not essential for the completion of the review. As such, we will adopt a revised version of this item to clarify the intent of the proposal.

The request that general operational constraints be provided, such as the ability to run various combinations of units, is reasonable, and the requirement will be adopted. However, it is unclear what the need is for a daily demand profile for at least one week of the premises' operation minimum and maximum kW load, for spot network systems, and that requirement will not be adopted. It would seem that, if needed, the utility itself has this information readily available from the customer billing records, or, in the case of a new customer, an estimate may be derived.

With respect to the request that certain items be provided (i.e., proposed generator step-up transformer ratings, impedances, tap settings, and winding voltage ratings), it is

clear that specifications for this equipment would be required for the CESIR. For the sake of clarity and efficiency, we will incorporate these items where not redundant. As to the proposed machine electrical parameters noted on the Appendix C data sheets, we can think of no compelling rationale for an applicant to resubmit information that has already been provided in the standard application. Consequently, this change will not be adopted.

We will adopt the suggestion that the proposed location and arrangement of utility metering equipment furnished by the utility be included on the applicant's drawings when submitted for acceptance as the additional information is beneficial for the purpose of system design and coordination.

If the utility has requested the studies as part of the Preliminary Review in Step 4, the proposal to require electrical studies to demonstrate that the design is within acceptable limits (including, without limitation, the following studies: system fault, relay coordination, relay settings, voltage flicker, voltage drop, and harmonics) is reasonable. However, we believe that a defined and limited list of studies should be provided as part of the SIR to discourage unnecessary or superfluous studies being required of the applicants. As a result, we will incorporate the Joint Utilities' list of studies.

The proposal for a written verification test procedure for utility review and approval is covered by an earlier reference in this section and is, therefore, redundant. It will not be incorporated.

c. Step 6, Utility Completes the CESIR

Joint Utilities proposes that the CESIR review interval be increased to 80 business days for projects greater than 300 kW up to 2 MW.

Discussion

The enlarged scope of the proposed revisions warrants an associated increase in the review time to allow for a suitable analysis, but the proposal to extend the period from the current 40 business days to 80 business days constitutes too great an increment. As a modification, we will adopt a 60-day period for systems greater than 300 kW and a 30-day period for systems rated less than 300 kW. This will accomplish the goal of providing the requisite time for a review without prolonging the process beyond a reasonable level.

d. Minimum Protective Functions

Joint Utilities proposes simplifying the table of minimum protective functions, eliminating references to any functions other than those related to over and under voltage and frequency protection and a requirement for anti-islanding protection for inverters.

Joint Utilities also proposes a revision that would require the generator-owner to calculate, and propose for utility review, settings for all required protective functions. Joint Supporters takes issue with this proposal, stating that it violates the spirit of IEEE Standard 1547, which allows for field-adjustable settings for both voltage and frequency functions.

Discussion

With respect to the first proposal regarding the table of minimum protective functions, we are in agreement with Joint Utilities' suggestion and its rationale in support of its argument. In reality, any commercially available utility grade relay package used in conjunction with a synchronous or induction generator will come equipped with any function that may be required, which simply has to be enabled during installation. This, in effect, renders the specification of all but the most basic functions unnecessary, and the simplified

table presented by Joint Utilities is adequate to address this need.

As currently written, the SIR stipulates that, "the utility specify and provide settings for those functions that the utility designates as being required to satisfy protection practices." This meshes with the requirement that the utility determine additional protective functions on a case-specific basis. If the utility is given discretion to require supplemental functions, it should be responsible for providing the appropriate settings. Further, as the operator of the grid system, the utility is responsible for ensuring that it is not adversely affected by any generation that may be introduced. It is obviously more familiar and better equipped to address the unique characteristics that are present at any point in the system. As a result, we will not adopt the Joint Utilities' proposal on this matter.

Joint Supporters is correct in stating that IEEE Standard 1547 allows for field-adjustable settings, but this is not necessarily germane to this issue. Field-adjustable settings allow for changes to be made during verification testing or subsequent to commissioning of the system. However, the initial settings must be calculated based on system conditions, and clearly the utilities are better suited for this task.

e. Automatic Reconnection to the Utility

In a new section, Joint Utilities proposes language that would prohibit automatic reclose capability at the interconnection breaker, unless otherwise approved by the utility, and require permission to reconnect as system conditions warrant. Plug and Joint Supporters respond to this proposal, stating that the manual disconnect switch is sufficient to provide this function, and that residential customers using their equipment should not have to contact the

utility in the event of any excursion that may result in the operation of any protective devices.

Discussion

Given the increase in the capacity threshold proposed for the SIR, this topic should be addressed. Clearly, for small inverter-based generation (such as residential fuel cells), reconnecting after the required five-minute interval is not a significant issue with respect to utility system operation. However, for larger rotational generation, automatic reclosing to the utility system without proper coordination, and verification of system conditions can result in serious localized problems if appropriate synchronization between the grid and the generating equipment is not achieved. The manual disconnect switch provides assurance, in the event of a prolonged service outage, that the generation will be disconnected to allow for restoration work in the area and provide for the safety of utility workers. But Plug's point regarding receiving permission to reconnect is well taken. A momentary transient on a distribution feeder that results in the generation equipment disconnecting at that level should not be cause for a customer to contact the utility for permission to re-energize the customer's system. In the case of small inverter-based systems implemented on the residential level, this is especially true because of the reasons cited above. The vast majority of systems of this scale are rated below 15 kW, as evidenced by data we have received from the utilities. As a result, we will include language similar to that proposed by the Joint Utilities, but exclude systems using inverter-based technology rated less than 15 kW.

f. Disconnect Switch

Joint Supporters raises the issue of whether it is possible for larger capacity (greater than 600 kW) systems interconnected at low voltage (typically 480 V) to comply with the requirements of this section. It contends that it may be prohibitively expensive or impossible to obtain the equipment necessary to meet the intent of the requirement and further states that a draw-out circuit breaker should be considered as an alternate. It proposes that a facility with a full-load output greater than 960 A, which corresponds with the largest commercially available disconnect switch that complies with the SIR, be allowed to substitute a draw-out circuit breaker to comply with this requirement.

Discussion

Joint Supporters' points regarding this requirement for larger systems are well taken. Providing a typical disconnect switch for systems of this magnitude can involve a considerable expense. In addition, the physical size of the enclosures can have a bearing on any space constraints that may be an issue with a given location. The intent of this section of the SIR is to provide a means to disconnect the generation and ensure utility worker safety in the event of a service outage. For relatively small-scale systems (such as those currently encompassed by the SIR), this requirement can be reasonably achieved by means of a standard load break disconnect switch. However, to account for the larger systems proposed to be included in the SIR, without imposing overly burdensome provisions, we will incorporate the Joint Supporters' proposal to the existing language in the SIR that allows a draw-out circuit breaker for installations rated above 600 V.

Extension to Network Systems

The December posting also included a proposal to eliminate the exclusion of network distribution systems from the standard. Staff determined that, given the experience utilities (in particular Con Edison) have gained with interconnecting distributed generation on network distribution systems, it is now appropriate to include these systems in the SIR. After careful consideration of the issues and possible ramifications surrounding this proposal, Staff is convinced that, given the stipulations in the SIR, this exclusion can be eliminated.

In their formal comments, Joint Utilities objected to this proposal, citing several technical issues of concern that it claims are sufficient to warrant the deletion of this proposal.

Plug comments on the Staff proposal to require reverse power relaying capability on all installations interconnected with network distribution systems. It contends that this requirement is unnecessary in many circumstances and will add significant cost to small-scale projects. It proposes some additional language that it believes will properly address the needs of the utilities as well as applicants pursuing small-scale projects.

Discussion

We have assessed the general comments on network systems from Joint Utilities and while all present a genuine concern in relation to interconnection to network systems, none present an insurmountable obstacle. As with interconnection to radial systems, all situations are unique and require site-specific measures to ensure the integrity of the local distribution grid. The SIR (in its current and draft form) does not prohibit utilities from imposing any necessary measures to achieve this end. In fact, Con Edison has, for many years, allowed interconnection to its secondary networks as dictated by

its own internal technical standards. The arguments presented by Joint Utilities are not adequate to continue with a blanket prohibition of interconnection to network systems.

Plug's arguments with respect to reverse power relaying capability are persuasive. In the context of a small inverter-based application, it seems unlikely that backfeed from a 5 kW fuel cell at the residential level, for example, could impact the operation of network protection devices. In a situation where the generation will continue to operate even in the event of a loss of a network feed, which could possibly result in the cycling of network protectors, anti-islanding functions employed with the inverters will serve to interrupt the equipment within several cycles. A blanket requirement for this function is not in keeping with the goal of crafting a standard to apply to all types of generation in any given circumstance. However, if it can be demonstrated by the utility that this function is essential to ensure the integrity of the system, given site-specific conditions, they should be accorded the discretion to do so. As a result, we will incorporate language in this section that is intended to satisfy the interests of both parties.

Equipment Certification

Staff's proposal included a major revision to the equipment certification procedure, eliminating the current type-testing process and replacing it with a reference to Underwriter's Laboratories (UL) Standard 1741. In Staff's estimation, the UL protocols have advanced to the point where they provide an equivalent level of assessment and will afford a more uniform practice that will benefit all parties to the interconnection process.

Joint Utilities proposes revising the proposed language adopting UL Standard 1741 as the acceptable testing protocol. It points out that there is no reference in this

section to the table of minimum protective functions and that UL 1741 does not require that equipment be supplied with those minimum functions. Joint Utilities also proposes clarification for the citation of IEEE Standard C37.90.1 detailing appropriate surge-testing requirements.

Discussion

Joint Utilities' proposals with respect to UL Standard 1741 provide improvements to Staff's proposal and will be adopted. Joint Utilities argues that only relays and control devices are tested per the requirements of IEEE Standard C37.90.1 and not equipment such as inverters, fuel cells, or microturbines. The proposals provide technical enhancements and clarification to the Staff proposals. It should be noted that all equipment currently approved under the existing type testing process will not be affected by this revision.

Miscellaneous Revisions

1. Section II.B. Operating Requirements

Joint Utilities proposes revised language to this section that will provide that any changes to voltage, frequency, and protection trip set points be reviewed and approved by the utility before they are completed. This is a reasonable requirement that is necessary to ensure that system protection constraints are not compromised, especially with the larger generating units now covered by the SIR, and we will adopt the proposal.

2. Section II.I. Verification Testing

Plug suggests a clarification to the language in this section that delineates the test procedure for single-phase inverters rated at 15 kW and below. It proposes replacing the terms "shut down" and "restart" with "disconnect" and "reconnect." It argues that the use of this terminology is more precise and less open to interpretation than the current version. Plug's contention that the term "shut down" could

infer that the generating unit must completely shut down and stop producing power on the generator side of the interface is valid. The true intent of the verification test is to determine whether the utility's interactive functions operate as intended and disconnect the system from the grid and reconnect after the five-minute interval. Compelling the generating unit to shut down would prohibit it from providing power to any on-site loads independent of the grid, which is not the objective of the verification test. As a result, we will adopt Plug's proposal.

3. Section III. Glossary of Terms

Plug comments on the proposed change to the definition of "Required Operating Range" that eliminates a reference to the type-testing procedure and instead refers to the voltage and frequency limits contained in the document. Plug contends that it is more appropriate to link this definition to the proposed adoption of the UL 1741 protocol, as it is linked to the type-testing process in the current version of the SIR. The proposal, as submitted by Plug, makes clear that the Required Operating Range is not an operating requirement *per se*, but a set of threshold limits for which the unit must respond as delineated in the testing protocols. As discussed above, it is not the intent of the SIR to mandate that equipment remain in operation, and it can be reasonably interpreted from Staff's proposal that the intent is to require this as part of the SIR. To eliminate this possibility, we will adopt Plug's proposal.

Contractual Provisions

1. Liability

The November 15, 2000 SIR revision addressed many of the contractual issues now being raised by the Joint Utilities. However, according to the Joint Utilities, there are increased risks associated with larger sized units and units interconnected to network distribution systems. Joint Utilities seeks a "comprehensive, reciprocal indemnification provision," a limited liability provision to exclude utilities from liability for certain direct and all consequential damages, and an insurance requirement. While the magnitude of risk is perhaps larger, the general degree of risk remains the same. The potential effect of such provisions to act as a barrier to interconnection continues to be of concern. We will not impose such requirements and will keep with our current approach of leaving these issues to be resolved by private market forces for the reasons stated in the November 15, 2000 Order.[6] As we stated then, utilities remain free to pursue their remedies at law against customers to recover any actual damages.

2. Operation and Maintenance (O&M) Costs

When the original SIR was adopted, we applied a general policy of not imposing an O&M charge for installed units until such time as we have better cost information.[7] The general claims of the utilities that larger units will cause higher O&M costs, not backed up by any specifics, do not provide enough "better cost information" to make us change course at this juncture.

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[6] Case 94-E-0952, supra, Order Denying Petitions for Rehearing, Providing Clarification, Modifying Standard Interconnection Requirements, and Directing Filing of Revised Tariffs, pp. 8-9.

[7] Case 94-E-0952, supra, Opinion No. 99-13, mimeo p. 25.

3. Assignment

The Joint Utilities' comments on assignment do not demonstrate any greater need for additional language regarding assignment than that already in place for the smaller units.

4. Entire Agreement

The Joint Utilities' proposal to revise the language regarding the "entire agreement" will not be adopted as it may open the door for unintended exceptions or additions to the SIR.

5. Subcontractors

The Joint Utilities proposal regarding language on "subcontractors" appears to be unnecessary verbiage. Using subcontractors does not relieve a customer of any responsibilities.

6. Curtailment

The Joint Utilities' proposal to add language on curtailment is not backed by a sufficient demonstration as to why these customers should be treated any differently than other customers, be they large or small users of electricity. The proposed additions are not adopted.

7. Mediation

The Joint Utilities' proposal regarding the mediation provisions might exacerbate the difficulty of resolving any potential disputes by allowing the parties to extend their substantive dispute into a dispute regarding who should mediate. The proposal is ill-considered and will not be adopted.

The Commission orders:

1. The Staff proposals to revise the Standardized Interconnection Requirements (SIR) are adopted with modifications to the extent noted in the body of this Order.

2. Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation,

Orange and Rockland Joint Utilities, Inc., and Rochester Gas and Electric Corporation, are directed to make tariff filings to incorporate verbatim into their electric tariffs the revised Standardized Interconnection Requirements (including the standard applications and contracts) set forth in the appendix to this Order. The tariff amendments shall become effective on a temporary basis on not less than one day's notice, to take effect on or before December 31, 2004. These amendments shall not become effective on a permanent basis until approved by the Commission. The requirement of Section 66(12) of the Public Service Law as to newspaper publication of these amendments is waived.

3. This proceeding is continued.

By the Commission,

(SIGNED) JACLYN A. BRILLING
Secretary

New York State
Standardized Interconnection Requirements and Application Process for New Distributed Generators 2 MW or Less Connected in Parallel with Utility Distribution Systems

New York State
Public Service Commission

November 2004

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Section I. Application Process

New York State
Standardized Interconnection Requirements and Application Process for New Distributed Generators 2 MW or Less Connected in Parallel to Utility Distribution Systems

A. Introduction

This section provides a framework for processing applications to:

- interconnect new distributed generation facilities with a nameplate rating of 2 MW or less [aggregated on the customer side of the point of common coupling (PCC)], and

- review any modifications affecting the interface at the PCC to existing distributed generation facilities with a nameplate rating of 2 MW or less (aggregated on the customer side of the PCC) that have been interconnected to the utility distribution system and where an existing contract between the applicant and the utility is in place.

Generation neither designed to operate, nor operating, in parallel with the utility's electrical system is not subject to these requirements. This section will ensure that applicants are aware of the technical interconnection requirements and utility interconnection policies and practices. This section will also provide applicants with an understanding of the process and information required to allow utilities to review and accept the applicants' equipment for interconnection in a reasonable and expeditious manner.

The time required to complete the process will reflect the complexity of the proposed project. Projects using previously submitted designs certified per the requirements of Section II.H will move through the process more quickly, and several steps may be satisfied with an initial application depending on the detail and completeness of the application and supporting documentation submitted by the applicant. Applicants submitting systems utilizing certified equipment however, are not exempt from providing utilities with complete design packages necessary for the utilities to verify the electrical characteristics of the generator systems, the interconnecting facilities, and the impacts of the applicants' equipment on the utilities' systems.

The application process and the attendant services must be offered on a non-discriminatory basis. The utilities must clearly identify their costs related to the applicants' interconnections, specifically those costs the utilities would not have incurred but for the applicants'

interconnections. The utilities will keep a log of all applications, milestones met, and justifications for application-specific requirements. The applicants are to be responsible for payment of the utilities' costs, as provided for herein.

Staff of the Department of Public Service (Staff) will monitor the application process to ensure that applications are addressed in a timely manner. To perform this monitoring function, Staff will meet periodically with utility and applicant representatives.

B. Application Process Steps

STEP 1: Initial Communication from the Potential Applicant.

Communication could range from a general inquiry to a completed application.

STEP 2: The Inquiry is Reviewed by the Utility to Determine the Nature of the Project.

Technical staff from the utility discusses the scope of the project with the potential applicant (either by phone or in person) to determine what specific information and documents (such as an application, contract, technical requirements, specifications, listing of qualified type-tested equipment/systems, application fee information, applicable rate schedules, and metering requirements) will be provided to the potential applicant. The preliminary technical feasibility of the project at the proposed location may also be discussed at this time. All such information and a copy of the standardized interconnection requirements must be sent to the applicant within three (3) business days following the initial communication from the potential applicant, unless the potential applicant indicates otherwise. A utility representative will be designated to serve as the single point of contact for the applicant (unless the utility informs the applicant otherwise) in coordinating the potential applicant's project with the utility.

STEP 3: Potential Applicant Files an Application.

The potential applicant submits an application to the utility. The submittal must include the completed standard application form and, for systems with a contractual total aggregate nameplate rating exceeding 15 kW, and a non-refundable $350 application fee, except that the fee shall be refunded to net metering customer-generators unless applied toward the cost of installing a dedicated transformer. If the applicant proceeds with the project to completion, the application fee will be applied as a payment to the utility's total cost for interconnection, including the cost of processing the application. Within five (5) business days of receiving the application, the utility will notify the applicant of receipt and whether the application has been completed adequately. It is in the best interest of the applicant to provide the utility with all pertinent technical information as early as possible in the process. If the required documentation is presented in this step, it will allow the utility to perform the required reviews and allow the process to proceed as expeditiously as possible.

STEP 4: Utility Conducts a Preliminary Review and Develops a Cost Estimate for the Coordinated Electric System Interconnection Review (CESIR).

The utility conducts a preliminary review of the proposed system interconnection. Upon completion of the preliminary review, the utility will inform the applicant as to whether the proposed interconnection is viable or not, and provide the applicant with an estimate of costs associated with the completion of the CESIR. The preliminary review shall be completed and a written response detailing the outcome of the preliminary review shall be sent to the applicant within five (5) business days of the completion of Step 3. For aggregate systems above 300 kW and up to 2 MW, and interconnections to network systems, the Preliminary Review shall be completed and a written response detailing the outcome of the Preliminary Review shall be sent to the applicant within fifteen (15) business days of the completion of Step 3. The utility's response to applicants proposing to interconnect aggregate systems above 300 kW and up to 2 MW, or proposing to interconnect to network systems, will include preliminary comments on requirements for protective relaying, metering and telemetry**.**

For systems of 15 kW or less, no costs may be charged by the utility to the applicant for completion of the Preliminary Review or the CESIR.

STEP 5: Applicant Commits to the Completion of the CESIR

Prior to commencement of the CESIR, the applicant shall provide the following information to the utility:

- a complete detailed interconnection design package,
- the name and phone number of the individual(s) responsible for addressing technical and contractual questions regarding the proposed system, and
- if applicable, advanced payment of the costs associated with the completion of the CESIR

The complete detailed interconnection design package shall include:

(1) Electrical schematic drawing(s) reflecting the complete proposed system design which are easily interpreted and of a quality necessary for a full interconnection. The drawings shall show all electrical components proposed for the installation, and their connections to the existing on-site electrical system from that point to the PCC.

(2) A complete listing of all interconnection devices proposed for use at the PCC. A set of specifications for this equipment shall be provided by the applicant upon request from the utility.

(3) The written verification test procedure provided by the equipment manufacturer, if such procedure is required by this document.

For aggregate DG systems above 300 kW and up to 2 MW, and interconnections to network systems, the complete detailed interconnection design package shall include, where applicable, three (3) copies of the following information

Proposed single line diagram of the generation system showing the interconnection of major electrical components within the system. This single line indicating proposed equipment ratings clearly needs to indicate:

1) number, individual ratings, and type of units comprising the above rating;

2) general high voltage bus configuration and relay functions.

3) proposed generator step-up transformer MVA ratings, impedances, tap settings and winding voltage ratings

General operational constraints such as the ability to run various combinations of units

The proposed location and arrangement of utility metering equipment will be furnished by the utility and shall be included on the applicant's drawings when submitted for acceptance.

Electrical studies as requested by the utility to demonstrate that the design is within acceptable limits, inclusive and limited to the following: system fault, relay coordination, flicker, voltage drop, and harmonics

STEP 6: **Utility Completes the CESIR**

The CESIR will consist of two parts:

(1) a review of the impacts to the utility system associated with the interconnection of the proposed system, and

(2) a review of the proposed system’s compliance with the applicable criteria set forth below.

A CESIR will be performed by the utility to determine if the proposed generation on the circuit results in any relay coordination, fault current, and/or voltage regulation problems. A full CESIR may not be needed if the aggregate generation is less than: 50 kW on a single-phase branch of a radial distribution circuit; or 150 kW on a single distribution feeder.

The CESIR shall be completed within 6 weeks (30 business days) of receipt of the information set forth in Step 5 for systems of 300 kW or less and within 12 weeks (60 business days) for systems larger than 300 kW. For systems utilizing type-tested equipment, the time required to complete the CESIR may be reduced.

Upon completion of the CESIR, the utility will provide the applicant, in writing, the following:

(1) utility system impacts, if any;

(2) notification of whether the proposed system meets the applicable criteria considered in the CESIR process;

(3) if applicable, a description of where the proposed system is not in compliance with these requirements;

(4) Except for net metering applicants, a good faith, detailed estimate of the total cost of completion of the interconnection of the proposed system. Such estimate will include, but not be limited to, the costs associated with any required modifications to the utility system, administration, metering, and on-site verification testing. For net metering applicants, the estimate shall be limited to the cost of installing a dedicated transformer.

Photovoltaic, net meter, residential applicants are only responsible for the costs of a dedicated transformer, if applicable, up to a maximum expense of $350. Farm Waste, net meter, farm applicants are only responsible for the costs of a dedicated transformer,[5] if applicable, up to a maximum expense of $3,000.

STEP 7: Applicant Commits to Utility Construction of Utility's System Modifications.

The applicant will:

- execute a standardized contract for interconnection; and
- provide the utility with an advance payment for the utility's estimated costs as identified in STEP 6, except for net metering applicants (estimated costs will be reconciled with actual costs in STEP 11).

STEP 8: Project Construction.

The applicant will build the facility in accordance with the utility-accepted design. The utility will commence construction/installation of system modifications and metering requirements as identified in STEP 6. Utility system modifications will vary in construction time depending on the extent of work and equipment required. The schedule for this work is to be discussed with the applicant in STEP 6.

STEP 9: The Applicant's Facility is Tested in Accordance With the Standardized Interconnection Requirements.

The verification testing will be performed in accordance with the written test procedure provided in STEP 5 and any site-specific requirements identified by the utility in STEP 6. The final testing will be conducted at a mutually agreeable time, and the utility shall be given the opportunity to witness the tests. Single-phase inverter-based systems rated 15 kW or less will be allowed to interconnect to the utility system prior to the verification test for a period not to exceed two hours, for the sole purpose of assuring proper operation of the installed equipment.

STEP 10: Interconnection.

The applicant's facility will be allowed to commence parallel operation upon satisfactory completion of the tests in STEP 9. In addition, the applicant must have complied with and must continue to comply with the contractual and technical requirements.

STEP 11: Final Acceptance and Utility Cost Reconciliation.

Within 60 days after interconnection, the utility will review the results of its on-site verification and issue to the applicant a formal letter of acceptance for interconnection. At this time, the utility will also reconcile its actual costs related to the applicant's project against the application fee and advance payments made by the applicant. The applicant will receive either a bill for any balance due or a reimbursement for overpayment as determined by the utility's reconciliation, except that a net metering applicant may not be charged in excess of the cost of installing the dedicated transformer described above. The applicant may contest the reconciliation with the utility. If the applicant is not satisfied, a formal complaint may be filed with the Commission.

Section II. Interconnection Requirements

A. Design Requirements

1. Common

The generator-owner shall provide appropriate protection and control equipment, including a protective device that utilizes an automatic disconnect device that will disconnect the generation in the event that the portion of the utility system that serves the generator is de-energized for any reason or for a fault in the generator-owner's system. The generator-owner's protection and control equipment shall be capable of automatically disconnecting the generation upon detection of an islanding condition and upon detection of a utility system fault.

The generator-owner's protection and control scheme shall be designed to ensure that the generation remains in operation when the frequency and voltage of the utility system is within the limits specified by the required operating ranges. Upon request from the utility, the generator-owner shall provide documentation detailing compliance with the requirements set forth in this document.

The specific design of the protection, control and grounding schemes will depend on the size and characteristics of the generator-owner's generation, as well the generator-owner's load level, in addition to the characteristics of the particular portion of the utility's system where the generator-owner is interconnecting.

The generator-owner shall have, as a minimum, an automatic disconnect device(s) sized to meet all applicable local, state, and federal codes and operated by over and under voltage and over and under frequency protection. For three-phase installations, the over and under voltage function should be included for each phase and the over and under frequency protection on at least one phase. All phases of a generator or inverter interface shall disconnect for voltage or frequency trip conditions sensed by the protective devices. Voltage protection shall be wired phase to

ground for single phase installations and for applications using wye grounded-wye grounded service transformers.

The settings below are listed for single-phase and three-phase applications using wye grounded-wye grounded service transformers or wye grounded-wye grounded isolation transformers. For applications using other transformer connections, a site-specific review will be conducted by the utility and the revised settings identified in Step 6 of the Application Process.

The requirements set forth in this document are intended to be consistent with those contained in IEEE Std 1547, Standard for Interconnecting Distributed Resources with Electric Power Systems. The requirements in IEEE Std. 1547 above and beyond those contained in this document shall be followed.[1]

Voltage Response

The required operating range for the generators shall be from 88% to 110% of nominal voltage magnitude. For excursions outside these limits the protective device shall automatically initiate a disconnect sequence from the utility system as detailed in IEEE Std.1547. Clearing time is defined as the time the range is initially exceeded until the generator-owner's equipment ceases to energize the PCC and includes detection and intentional time delay.

Frequency Response

The required operating range for the generators shall be from 59.3 Hz to 60.5 Hz. For excursions outside these limits the protective device shall automatically initiate a disconnect sequence from the utility system as detailed in IEEE Std.1547. Clearing time is defined as the time the range is initially exceeded until the generator-owner's equipment ceases to energize the PCC and includes detection and intentional time delay.

If the generation facility is disconnected as a result of the operation of a protective device, the generator-owner's equipment shall remain disconnected until the utility's service voltage and frequency has recovered to acceptable voltage and frequency limits for a minimum of five (5) minutes. Systems greater than 15 kW that do not utilize inverter based interface equipment shall not have automatic recloser capability unless otherwise approved by the utility. If the utility determines that a facility must receive permission to reconnect, then any automatic reclosing functions must be disabled and verified to be disabled during verification testing.

2. Synchronous Generators

Synchronous generation shall require synchronizing facilities. These shall include automatic

[1] It is expected that IEEE Std.1547 will eventually supercede the need for explicit technical standards in New York State. However, until such time as all IEEE Std.1547 compliance standards (including testing protocols) are complete and approved, this standard will take precedence.

synchronizing equipment or manual synchronizing with relay supervision, voltage regulator, and power factor control.

For all synchronous generators sufficient reactive power capability shall be provided by the generator-owner to withstand normal voltage changes on the utility's system. The generator voltage VAR schedule, voltage regulator, and transformer ratio settings shall be jointly determined by the utility and the generator-owner to ensure proper coordination of voltages and regulator action. Generator-owners shall have synchronous generator reactive power capability to withstand voltage changes up to 5% of the base voltage levels.

A voltage regulator must be provided and be capable of maintaining the generator voltage under steady state conditions within plus or minus 1.5% of any set point and within an operating range of plus or minus 5% of the rated voltage of the generator.

Generator-owners shall adopt one of the following grounding methods for synchronous generators:

a) Solid grounding

b) High- or low-resistance grounding

c) High- or low-reactance grounding

d) Ground fault neutralizer grounding

Synchronous generators shall not be permitted to connect to secondary network systems without the approval of the utility.

3. Induction Generators

Induction generation may be connected and brought up to synchronous speed (as an induction motor) if it can be demonstrated that the initial voltage drop measured at the PCC is acceptable based on current inrush limits. The same requirements also apply to induction generation connected at or near synchronous speed because a voltage dip is present due to an inrush of magnetizing current. The generator-owner shall submit the expected number of starts per specific time period and maximum starting kVA draw data to the utility to verify that the voltage dip due to starting is within the visible flicker limits as defined by IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electric Power Systems.

Starting or rapid load fluctuations on induction generators can adversely impact the utility's system voltage. Corrective step-switched capacitors or other techniques may be necessary. These measures can, in turn, cause ferroresonance. If these measures (additional capacitors) are installed on the customer's side of the PCC, the utility will review these measures and may require the customer to install additional equipment.

4. Inverters

Direct current generation can only be installed in parallel with the utility's system using a synchronous inverter. The design shall be such as to disconnect this synchronous inverter upon a utility system interruption.

It is recommended that equipment be selected from the "Certified Equipment" list maintained by the PSC. Non-certified equipment must have dynamic anti-islanding protection as defined by IEEE 929, conform to the maximum harmonic limits delineated in IEEE 519, and be protected by utility grade relays (as defined in these requirements) using settings approved by the utility and verified in the field. The field verification test must demonstrate that the equipment meets the frequency requirements detailed in this section.

Synchronization or re-synchronization of an inverter to the utility system shall not result in a voltage deviation that exceeds the requirements contained in Section II.E, Power Quality. Only inverters designed to operate in parallel with the utility system shall be utilized for that purpose.

A line inverter can be used to isolate the customer from the utility system provided it can be demonstrated that the inverter isolates the customer from the utility system safely and reliably.

5. Minimum Protective Function Requirements

Protective system requirements for distributed generation facilities result from an assessment of many factors, including but not limited to:

- Type and size of the distributed generation facility
- Voltage level of the interconnection
- Location of the distributed generation facility on the circuit
- Distribution transformer
- Distribution system configuration
- Available fault current
- Load that can remain connected to the distributed generation facility under isolated conditions
- Amount of existing distributed generation on the local distribution system.

As a result, protection requirements can not be standardized according to any single criteria. Minimum protective function requirements shall be as detailed in the table below. ANSI C37.2, Electric Power System Device Function Numbers, are listed with each function.

Synchronous Generators	Induction Generators	Inverters
Over/Under Voltage (Function 27/59)	Over/Under Voltage (Function 27/59)	Over/Under Voltage (Function 27/59)
Over/Under Frequency (Function 81O/81U)	Over/Under Frequency (Function 81O/81U)	Over/Under Frequency (Function 81O/81U)
		Anti-Islanding Protection

The need for additional protective functions shall be determined by the utility on a case-by-case basis. If the utility determines a need for additional functions, it shall notify the generator-owner in writing of the requirements. The notice shall include a description of the specific aspects of the utility system that necessitate the addition, and an explicit justification for the necessity of the enhanced capability. The utility shall specify and provide settings for those functions that the utility designates as being required to satisfy protection practices. Any protective equipment or setting specified by the utility shall not be changed or modified at any time by the generator-owner without written consent from the utility.

The generator-owner shall be responsible for ongoing compliance with all applicable local, state, and federal codes and standardized interconnection requirements as they pertain to the interconnection of the generating equipment.

Protective devices shall utilize their own current transformers and potential transformers and not share electrical equipment associated with utility revenue metering.

A failure of the generator-owner's protective devices, including loss of control power, shall open the automatic disconnect device, thus disconnecting the generation from the utility system. A generator-owner's protection equipment shall utilize a non-volatile memory design such that a loss of internal or external control power, including batteries, will not cause a loss of interconnection protection functions or loss of protection set points.

All interface protection and control equipment shall operate as specified independent of the calendar date.

6. Metering

The need for additional revenue metering or modifications to existing metering will be reviewed on a case-by-case basis and shall be consistent with metering requirements adopted by the Public Service Commission.

Net metering customer-generators shall be afforded the option of selecting a single meter with bi-directional capability or two meters measuring consumption and generator output separately. For photovoltaic, net metering residential applicants, at least one meter in a two meter

arrangement shall be non-demand, non-time of use. Applicants are advised that the use of a standard meter, running in reverse, does not meet accuracy standards as documented under Public Service Law and accordingly, in any billing dispute dependent upon those meter accuracy standards, the applicant will be unable to rely upon net meter readings as a basis for claims against the utility. Applicants selecting the standard meter option, agree to waive in writing, any billing complaint that is unresolvable because of the inaccuracy inherent in running a meter in reverse. Applicants choosing the alternate option will have their billing disputes resolved on the usual standards for evaluating customer complaints. The generator-owner is responsible for the cost of installing any necessary meter box and socket.

The two-meter (or bi-directional meter) option is required for Time of Use (TOU) metering, unless a suitable single meter option is proven acceptable to the PSC. The generator-owner is responsible for the cost of the second TOU meter installed at the generator.

B. Operating Requirements

The generator-owner shall provide a 24-hour telephone contact. This contact will be used by the utility to arrange access for repairs, inspection or emergencies. The utility will make such arrangements (except for emergencies) during normal business hours.

Voltage and frequency trip set point adjustments shall be accessible to service personnel only. Any changes to these settings must be reviewed and approved by the utility.

The generator-owner shall not supply power to the utility during any outages of the system that serves the PCC. The generator-owner's generation may be operated during such outages only with an open tie to the utility. Islanding will not be permitted. The generator-owner shall not energize a de-energized utility circuit for any reason.

The disconnect switch specified in Section II.D, Disconnect Switch, may be opened by the utility at any time for any of the following reasons:

a. to eliminate conditions that constitute a potential hazard to utility personnel or the general public;

b. pre-emergency or emergency conditions on the utility system;

c. a hazardous condition is revealed by a utility inspection;

d. protective device tampering;

e. parallel operation prior to utility approval to interconnect

The disconnect switch may be opened by the utility for the following reasons, after notice to the responsible party has been delivered and a reasonable time to correct (consistent with the conditions) has elapsed:

a. A generator-owner has failed to make available records of verification tests and maintenance of its protective devices;

b. A generator-owner's system adversely impacts the operation of utility equipment or equipment belonging to other utility customers;

c. A generator-owner's system is found to adversely affect the quality of service to adjoining customers.

The utility will provide a name and telephone number so that the customer can obtain information about the utility lock-out.

The customer shall be allowed to disconnect from the utility without prior notice in order to self generate.

Under certain conditions a utility may require direct transfer trip (DTT). The utility shall provide detailed evidence as to the need for DTT.

If a generator-owner proposes any modification to the system that has an impact on the interface at the PCC after it has been installed and a contract between the utility and the customer has already been executed, then any such modifications must be reviewed and approved by the utility before the modifications are made.

C. Dedicated Transformer

The utility reserves the right to require a power-producing facility to connect to the utility system through a dedicated transformer. The transformer shall either be provided by the connecting utility at the generator-owner's expense, purchased from the utility, or conform to the connecting utility's specifications. The transformer may be necessary to ensure conformance with utility safe work practices, to enhance service restoration operations or to prevent detrimental effects to other utility customers. The transformer that is part of the normal electrical service connection of a generator-owner's facility may meet this requirement if there are no other customers supplied from it. A dedicated transformer is not required if the installation is designed and coordinated with the utility to protect the utility system and its customers adequately from potential detrimental net effects caused by the operation of the generator.

If the utility determines a need for a dedicated transformer, it shall notify the generator-owner in writing of the requirements. The notice shall include a description of the specific aspects of the utility system that necessitate the addition, the conditions under which the dedicated transformer is expected to enhance safety or prevent detrimental effects, and the expected response of a normal, shared transformer installation to such conditions.

D. Disconnect Switch

Generating equipment shall be capable of being isolated from the utility system by means of an external, manual, visible, gang-operated, load break disconnecting switch. The disconnect switch shall be installed, owned, and maintained by the owner of the power-producing facility, and located between the power-producing equipment and its interconnection point with the utility system.

The disconnect switch must be rated for the voltage and current requirements of the installation.

The basic insulation level (BIL) of the disconnect switch shall be such that it will coordinate with that of the utility's equipment. Disconnect devices shall meet applicable UL, ANSI, and IEEE standards, and shall be installed to meet all applicable local, state, and federal codes. (New York City Building Code may require additional certification.)

The disconnect switch shall be clearly marked, "Generator Disconnect Switch," with permanent 3/8 inch letters or larger.

The disconnect switch shall be located within 10 feet of the utility's external electric service meter. If such location is not possible, the customer-generator will propose, and the utility will approve, an alternate location. The location and nature of the disconnect shall be indicated in the immediate proximity of the electric service entrance. The disconnect switch shall be readily accessible for operation and locking by utility personnel in accordance with Section II.B, Operating Requirements.

The disconnect switch must be lockable in the open position with a standard utility padlock with a 3/8-inch shank.

For installations above 600V or with a full load output of greater than 960A**,** a draw-out type circuit breaker with the provision for padlocking at the draw-out position can be considered a disconnect switch for the purposes of this requirement.

E. Power Quality

The maximum harmonic limits for electrical equipment shall be in accordance with IEEE 519 to limit the maximum individual frequency voltage harmonic to 3% of the fundamental frequency and the voltage total harmonic distortion (THD) to 5% on the utility side of the PCC. In addition, any voltage fluctuation resulting from the connection of the customer's energy producing equipment to the utility system must not exceed the limits defined by the maximum permissible voltage fluctuations border line of visibility curve identified in IEEE 519. This requirement is necessary to minimize the adverse voltage effect upon other customers on the utility system.

F. Power Factor

If the average power factor, as measured at the PCC, is less than 0.9 (leading or lagging), the method of power factor correction necessitated by the installation of the generator will be negotiated with the utility as a commercial item.

Induction power generators may be provided VAR capacity from the utility system at the generator-owner's expense. The installation of VAR correction equipment by the generator-owner on the generator-owner's side of the PCC must be reviewed and approved by the utility prior to installation.

G. Islanding

Generation interconnection systems must be designed and operated so that islanding is not sustained on utility distribution circuits. The requirements listed in this document are designed and intended to prevent islanding.

H. Equipment Certification

In order for the equipment to be acceptable for interconnection to the utility system without additional protective devices, the interface equipment must be equipped with the minimum protective function requirements listed in the table in Section II.A.5 and be tested in compliance with Underwriter's Laboratories (UL) 1741, Inverters, Converters and Controllers for Use in Independent Power Systems.

Equipment rated less than 1000 V shall be tested in accordance with the Guide on Surge Testing for Equipment Connected to Low-Votage AC Power Circuits, ANSI/IEEE C62.45, to confirm that the surge withstand capability is met for the product's surge level rating as defined in Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits, ANSI/IEEE C62.41.2.

Equipment rated greater than 1000 V shall be tested in accordance with manufacturer or system integrator designated applicable standards. For equipment signal and control circuits use Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems, IEEE C37.90.1.

The acceptance criteria for both of these testing protocols shall be as detailed in IEEE C37.90.1. If, during the performance of any of the tests prescribed above, the equipment ceases to export power and in the judgement of the independent testing laboratory fails in a safe manner, this will be considered an acceptable result for the purposes of these requirements.

Utility grade relays need not be certified per the requirements of this section.

Documentation indicating compliance with the requirements of this section shall be submitted to the contacts listed on the Department web site (http://www.dps.state.ny.us/distgen.htm). A list of "Certified Equipment" shall be maintained for posting at this location.

I. Verification Testing

All interface equipment must include a verification test procedure (except for single phase inverters and inverter systems rated 15 kW and below) as part of the documentation presented to the utility. Except for the case of small single-phase inverters as discussed later, the verification test must establish that the protection settings meet the SIR requirements. The verification testing may be site-specific and is conducted periodically to assure continued acceptable performance.

Upon initial parallel operation of a generating system, or any time interface hardware or software is changed, the verification test must be performed. A qualified individual must perform verification testing in accordance with the manufacturer's published test procedure. Qualified individuals include professional engineers, factory-trained and certified technicians, and licensed electricians with experience in testing protective equipment. The utility reserves the right to witness verification testing or require written certification that the testing was successfully performed.

Verification testing shall be performed at least once every four years. All verification tests prescribed by the manufacturer shall be performed. If wires must be removed to perform certain tests, each wire and each terminal must be clearly and permanently marked. The generator-owner shall maintain verification test reports for inspection by the utility.

Single-phase inverters and inverter systems rated 15 kW and below shall be verified upon initial parallel operation and once per year as follows: the owner or his agent shall operate the load break disconnect switch and verify the power producing facility automatically disconnects and does not reconnect for five minutes after the switch is closed. The owner shall maintain a log of these operations for inspection by the connecting utility. Any system that depends upon a battery for trip power shall be checked and logged once per month for proper voltage. Once every four (4) years the battery must be either replaced or a discharge test performed.

Section III. Glossary of Terms

Automatic Disconnect Device: An electronic or mechanical switch used to isolate a circuit or piece of equipment from a source of power without the need for human intervention.

Cease to Energize: cessation of energy flow capability

Coordinated Electric System Interconnection Review: Any studies performed by utilities to ensure that the safety and reliability of the electric grid with respect to the interconnection of distributed generation as discussed in this document.

Dedicated Transformer: A transformer with a secondary winding that serves only one customer.

Direct Transfer Trip: Remote operation of a circuit breaker by means of a communication channel.

Disconnect (verb): To isolate a circuit or equipment from a source of power. If isolation is accomplished with a solid-state device, "Disconnect" shall mean to cease the transfer of power.

Disconnect Switch: A mechanical device used for isolating a circuit or equipment from a source of power.

Draw-out Type Circuit Breaker: Circuit breakers that are disconnected by physically separating, or racking, the breaker assembly away from the switchgear bus.

Farm Waste, Net Meter, Farm Applicant: A farm applicant who is proposing to install a farm waste anaerobic digester generating system, not to exceed 400 kW, at a farm, per the requirements of New York State Public Service Law §66-j.

Generator-Owner: An applicant to operate on-site power generation equipment in parallel with the utility grid per the requirements of this document.

Islanding: A condition in which a portion of the utility system that contains both load and distributed generation is isolated from the remainder of the utility system. (Adopted from IEEE 929.)

Photovoltaic, Net Meter, Residential Applicant: A residential applicant who is proposing to install a photovoltaic generating system, not to exceed 10 kW, in an owner occupied residence per the requirements of New York State Public Service Law §66-j.

Point of Common Coupling : The point at which the interconnection between the electric utility and the customer interface occurs. Typically, this is the customer side of the utility revenue meter.

Preliminary Review: A review of the generator-owner's proposed system capacity, location on the utility system, system characteristics, and general system regulation to determine if the interconnection is viable.

Protective Device: A device that continuously monitors a designated parameter related to the operation of the generation system that operates if preset limits are exceeded

Required Operating Range: The range of magnitudes of the utility system voltage or frequency where the generator-owner's equipment, if operating, is required to remain in operation for the purposes of compliance with UL 1741 Excursions outside these ranges must result in the automatic disconnection of the generation within the prescribed time limits

Utility Grade Relay: A relay that is constructed to comply with, as a minimum, the following standards for non-nuclear facilities:

Standard	Conditions Covered
ANSI/IEEE C37.90	Usual Service Condition Ratings - Current and Voltage Maximum design for all relay Ac and dc auxiliary relays Make and carry ratings for tripping contacts Tripping contacts duty cycle Dielectric tests by manufacturer Dielectric tests by user
ANSI/IEEE C37.90.1	Surge Withstand Capability (SWC) Fast Transient Test
IEEE C37.90.2	Radio Frequency Interference
IEEE C37.98	Seismic Testing (fragility) of Protective and Auxiliary Relays
ANSI C37.2	Electric Power System Device Function Numbers
IEC 255-21-1	Vibration
IEC 255-22-2	Electrostatic Discharge
IEC 255-5	Insulation (Impulse Voltage Withstand)

Verification Test: A test performed upon initial installation and repeated periodically to determine that there is continued acceptable performance.

APPENDIX A

NEW YORK STATE
STANDARDIZED CONTRACT
FOR INTERCONNECTION OF NEW DISTRIBUTED GENERATION UNITS WITH CAPACITY OF 2 MW OR LESS CONNECTED IN PARALLEL WITH UTILITY DISTRIBUTION SYSTEMS

Customer Information:	**Company Information:**
Name: _____	Name: _____
Address: _____	Address: _____
Telephone: _____	Telephone: _____

Unit Application No. _____

DEFINITIONS

Dedicated Facilities means the equipment and facilities on the Company's system necessary to permit operation of the Unit in parallel with the Company's system.

Delivery Service means the services the Company may provide to deliver capacity or energy generated by Customer to a buyer to a delivery point(s), including related ancillary services.

"SIR" means the New York State Standardized Interconnection Requirements for new distributed generation units with a nameplate capacity of 2 MW or less connected in parallel with the Company's distribution system

"Unit" means the distributed generation Unit with a nameplate capacity of 2 MW or less located on the Customer's premises at the time the company approves such Unit for operation in parallel with the Company's system. This Agreement relates only to such Unit, but a new agreement shall not be required if the customer makes physical alterations to the Unit that do not result in an increase in its nameplate generating capacity. The nameplate generating capacity of the unit shall not exceed 2 MW.

I. TERM AND TERMINATION

1.1 Term: This Agreement shall become effective when executed by both Parties and shall continue in effect until terminated.

1.2 Termination: This Agreement may be terminated as follows:

a. The Customer may terminate this Agreement at any time, by giving the Company sixty (60) days' written notice.

b. Failure by the Customer to seek final acceptance by the Company within twelve (12) months after completion of the utility construction process described in the SIR shall automatically terminate this Agreement.

c. Either Party may, by giving the other Party at least sixty (60) days' prior written notice, terminate this Agreement in the event that the other Party is in default of any of the material terms and conditions of this Agreement. The terminating Party shall specify in the notice the basis for the termination and shall provide a reasonable opportunity to cure the default.

d. The Company may, by giving the customer at least sixty (60) days' prior written notice, terminate this Agreement for cause. The Customer's non-compliance with an upgrade to the SIR, unless the Customer's installation is "grandfathered," shall constitute good cause.

1.3 Disconnection and Survival of Obligations: Upon termination of this Agreement the Unit will be disconnected from the Company's electric 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.

1.4 Suspension: This Agreement will be suspended during any period in which the Customer is not eligible for delivery service from the Company.

II. SCOPE OF AGREEMENT

2.1 Scope of Agreement: This Agreement relates solely to the conditions under which the Company and the Customer agree that the Unit may be interconnected to and operated in parallel with the Company's system.

2.2 Electricity Not Covered: The Company shall have no duty under this Agreement to account for, pay for, deliver, or return in kind any electricity produced by the Facility and delivered into the Company's System.

III. INSTALLATION, OPERATION AND MAINTENANCE OF UNIT

3.1 Compliance with SIR: Subject to the provisions of this Agreement, the Company shall be required to interconnect the Unit to the Company's system, for purposes of parallel operation, if the Company accepts the Unit as in compliance with the SIR. The Customer shall have a continuing obligation to maintain and operate the Unit in compliance with the SIR.

3.2 Observation of the Unit - Construction Phase: The Company may, in its discretion and upon reasonable notice, conduct reasonable on-site verifications during the construction of the Unit. Whenever the Company chooses to exercise its right to conduct observations herein it shall specify to the Customer its reasons for its decision to conduct the observation. For purposes of this paragraph and paragraphs 3.3 through 3.5, the term "on-site verification" shall not include testing of the Unit, and verification tests shall not be required except as provided in paragraphs 3.3 and 3.4.

3.3 Observation of the Unit - Fourteen-day Period: The Company may conduct on-site verifications of the Unit and observe the performance of verification testing within a reasonable period of time, not exceeding fourteen days, after receiving a written request from the Customer to begin producing energy in parallel with the Company's system. The Company may accept or reject the request, consistent with the SIR, based upon the verification test results.

3.4 Observation of the Unit - Post-Fourteen-day Period: If the Company does not perform an on-site verification of the Unit and observe the performance of verification testing within the fourteen-day period, the Customer may begin to produce energy after certifying to the Company that the Unit has been tested in accordance with the verification testing requirements of the SIR and has successfully completed such tests. After receiving the certification, the Company may conduct an on-site verification of the Unit and make reasonable inquiries of the Customer, but only for purposes of determining whether the verification tests were properly performed. The Customer shall not be required to perform the verification tests a second time, unless irregularities appear in the verification test report or there are other objective indications that the tests were not properly performed in the first instance.

3.5 Observation of the Unit - Operations: The Company may conduct on-site verification of the operations of the Unit after it commences operations if the Company has a reasonable basis for doing so based on its responsibility to provide continuous and reliable utility service or as authorized by the provisions of the Company's Retail Tariff relating to the verification of customer installations generally.

3.6 Costs of Dedicated Facilities: During the term of this Agreement, the Company shall design, construct and install the Dedicated Facilities. The Customer shall be responsible for paying the incremental capital cost of such Dedicated Facilities attributable to the Customer's Unit. All costs associated with the operation and maintenance of the Dedicated Facilities after the Unit first produces energy shall be the responsibility of the Company.

IV. DISCONNECTION OF THE UNIT

4.1 Emergency Disconnection: The Company may disconnect the Unit, without prior notice to the Customer (a) to eliminate conditions that constitute a potential hazard to Company personnel or the general public; (b) if pre-emergency or emergency conditions exist on the Company system; (c) if a hazardous condition relating to the Unit is observed by a utility inspection; or (d) if the Customer has tampered with any protective device. The Company shall notify the Customer of the emergency if circumstances permit.

4.2 Non-Emergency Disconnection: The Company may disconnect the Unit, after notice to the responsible party has been provided and a reasonable time to correct, consistent with the conditions, has elapsed, if (a) the Customer has failed to make available records of verification tests and maintenance of his protective devices; (b) the Unit system interferes with Company equipment or equipment belonging to other customers of the Company; (c) the Unit adversely affects the quality of service of adjoining customers.

4.3 Disconnection by Customer: The Customer may disconnect the Unit at any time.

4.4 Utility Obligation to Cure Adverse Effect: If, after the Customer meets all interconnection requirements, the operations of the Company are adversely affecting the performance of the Unit or the Customer's premises, the Company shall immediately take appropriate action to eliminate the adverse effect. If the Company determines that it needs to upgrade or reconfigure its system the Customer will not be responsible for the cost of new or additional equipment beyond the point of common coupling between the Customer and the Company.

V. ACCESS

5.1 Access to Premises: The Company shall have access to the disconnect switch of the Unit at all times. At reasonable hours and upon reasonable notice consistent with Section III of this Agreement, or at any time without notice in the event of an emergency (as defined in paragraph 4.1), the Company shall have access to the Premises.

5.2 Company and Customer Representatives: The Company shall designate, and shall provide to the Customer, the name and telephone number of a representative or representatives who can be reached at all times to allow the Customer to report an emergency and obtain the assistance of the Company. For the purpose of allowing access to the premises, the Customer shall provide the Company with the name and telephone number of a person who is responsible for providing access to the Premises.

5.3 Company Right to Access Company-Owned Facilities and Equipment: If necessary for the purposes of this Agreement, the Customer shall allow the Company access to the Company's equipment and facilities located on the Premises. To the extent that the Customer does not own all or any part of the property on which the Company is required to locate its equipment or facilities to serve the Customer under this Agreement, the Customer shall secure and provide in favor of the Company the necessary rights to obtain access to such equipment or facilities, including easements if the circumstances so require.

VI. DISPUTE RESOLUTION

6.1 Good Faith Resolution of Disputes: Each Party agrees to attempt to resolve all disputes arising hereunder promptly, equitably and in a good faith manner.

6.2 Mediation: If a dispute arises under this Agreement, and if it cannot be resolved by the Parties within ten (10) working days after written notice of the dispute, the parties agree to submit the dispute to mediation by a mutually acceptable mediator, in a mutually convenient location in New York State, in accordance with the then current CPR Institute for Dispute Resolution Mediation Procedure, or to mediation by a mediator provided by the New York Public Service Commission. The parties agree to participate in good faith in the mediation for a period of up to 90 days. If the parties are not successful in resolving their disputes through mediation, then the parties may refer the dispute for resolution to the New York Public Service Commission, which shall maintain continuing jurisdiction over this agreement.

6.3 Escrow: If there are amounts in dispute of more than two thousand dollars ($2,000), the Customer shall either place such disputed amounts into an independent escrow account pending final resolution of the dispute in question, or provide to the Company an appropriate irrevocable standby letter of credit in lieu thereof.

VII. INSURANCE

7.1 Disclosure: The Customer is not required to provide general liability insurance coverage as part of this Agreement, the SIR, or any other Company requirement. Due to the risk of incurring damages, the Public Service Commission recommends that every distributed generation customer protect itself with insurance, and requires insurance disclosure as a part of this Agreement. The Customer hereby discloses as follows:

(Note: Check off one of the boxes below.)

[ ] the Customer has obtained, or already has in effect under an existing policy, general liability insurance coverage for operation of the Unit and intends to maintain such coverage for the duration of this Agreement (attach Certificate of Insurance or copy of Policy); or

[ ] the Customer has not obtained general liability insurance coverage for operation of the Unit and/or is self-insured.

7.2 Effect: The inability of the Company to require the Customer to provide general liability insurance coverage for operation of the Unit is not a waiver of any rights the Company may have to pursue remedies at law against the Customer to recover damages.

VIII. MISCELLANEOUS PROVISIONS

8.1 Third Parties: This Agreement is intended solely for the benefit of the parties hereto. Nothing in this Agreement shall be construed to create any duty to, or standard of care with reference to, or any liability to, any person not a party to this Agreement.

8.2 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, such portion or provision shall be deemed separate and independent, and the remainder of this Agreement shall remain in full force and effect.

8.3 Entire Agreement: This Agreement constitutes the entire Agreement between the parties and supersedes all prior agreements or understandings, whether verbal or written.

8.4 Waiver: No delay or omission in the exercise of any right under this Agreement shall impair any such right or shall be taken, construed or considered as a waiver or relinquishment thereof, but any such right may be exercised from time to time and as often as may be deemed expedient. In the event that any agreement or covenant herein shall be breached and thereafter waived, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive any other breach hereunder.

8.5 Applicable Law: This Agreement shall be governed by and construed in accordance with the law of the State of New York.

8.6 Amendments: This Agreement shall not be amended unless the amendment is in writing and signed by the Company and the Customer.

8.7 Force Majeure: For purposes of this Agreement, "Force Majeure Event" means any event: (a) that is beyond the reasonable control of the affected Party; and (b) that the affected Party is unable to prevent or provide against by exercising reasonable diligence, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war, public disorder, insurrection, or rebellion; floods, hurricanes, earthquakes, lightning, storms, and other natural calamities; explosions or fires; strikes, work stoppages, or labor disputes; embargoes; and sabotage. If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, such Party will promptly notify the other Party in writing, and will keep the other Party informed on a continuing basis of the scope and duration of the Force Majeure Event. The affected Party will 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. The affected Party will be entitled to suspend or modify its performance of obligations under this Agreement, other than the obligation to make payments then due or becoming due under this Agreement, but only to the extent that the effect of the Force Majeure Event cannot be mitigated by the use of reasonable efforts. The affected Party will use reasonable efforts to resume its performance as soon as possible.

8.8 Assignment to Corporate Party: At any time during the term, the Customer may assign this Agreement to a corporation or other entity with limited liability, provided that the Customer obtains the consent of the Company. Such consent will not be withheld unless the Company can demonstrate that the corporate entity is not reasonably capable of performing the obligations of the assigning Customer under this Agreement.

8.9 Assignment to Individuals: At any time during the term, a Customer may assign this Agreement to another person, other than a corporation or other entity with limited liability, provided that the assignee is the owner, lessee, or is otherwise responsible for the Unit.

8.10 Permits and Approvals: Customer shall obtain all environmental and other permits lawfully required by governmental authorities prior to the construction and for the operation of the Unit during the term of this Agreement.

8.11 Limitation of Liability: Neither by inspection, if any, or non-rejection, nor in any other way, does the Company give any warranty, express or implied, as to the adequacy, safety, or other characteristics of any structures, equipment, wires, appliances or devices owned, installed or maintained by the Customer or leased by the Customer from third parties, including without limitation the Unit and any structures, equipment, wires, appliances or devices appurtenant thereto.

ACCEPTED AND AGREED:

Customer: _____

Date: _____

Company: _____

Date: _____

APPENDIX B

NEW YORK STATE STANDARIZED APPLICATION
FOR SINGLE PHASE ATTACHMENT OF PARALLEL
GENERATION EQUIPMENT 15 KW OR SMALLER
TO THE ELECTRIC SYSTEM OF
Utility:_____

Customer:
Name: _____ Phone: (___)_____

Address:_____ Municipality: _____

_____

Consulting Engineer or Contractor:
Name: _____ Phone: (___)_____

Address:_____

_____

Estimated In-Service Date: _____

Existing Electric Service:
Capacity: _____Amperes Voltage: _____Volts
Service Character: ( )Single Phase ( )Three Phase

Location of Protective Interface Equipment on Property:
(include address if different from customer address)

_____

Energy Producing Equipment/Inverter Information:
Manufacturer: _____
Model No. _____ Version No. _____
( )Synchronous ( )Induction ( )Inverter ( )Other_____
Rating: _____kW Rating: _____kVA
Generator Connection: ( )Delta ( )Wye ( )Wye Grounded
Interconnection Voltage: _____Volts
System Type Tested (Total System): ( )Yes ( )No; attach product literature
Equipment Type Tested (i.e. Inverter, Protection System):
( )Yes ( )No; attach product literature
One Line Diagram attached: ( )Yes
Installation Test Plan attached: ( )Yes

Signature:

_____	_____	_____
CUSTOMER SIGNATURE	TITLE	DATE

APPENDIX C

NEW YORK STATE STANDARIZED APPLICATION
FOR ATTACHMENT OF PARALLEL GENERATION
EQUIPMENT 2 MW OR SMALLER
TO THE ELECTRIC SYSTEM OF

Utility:_____

Customer:
Name: _____ Phone: (___)_____

Address:_____ Municipality: _____

_____

Consulting Engineer or Contractor:
Name: _____ Phone: (___)_____

Address:_____

_____

Estimated In-Service Date: _____

Existing Electric Service:
Capacity: _____Amperes Voltage: _____Volts
Service Character: ( )Single Phase ( )Three Phase
Secondary 3 Phase Transformer Connection ( )Wye ( )Delta

Location of Protective Interface Equipment on Property:
(include address if different from customer address)

_____

Energy Producing Equipment/Inverter Information:
Manufacturer: _____
Model No. _____ Version No. _____
( )Synchronous ( )Induction ( )Inverter ( )Other_____
Rating: _____kW Rating: _____kVA
Rated Output: ____VA Rated Voltage: ____Volts
Rate Frequency: ____Hertz Rated Speed: ____RPM
Efficiency: ____% Power Factor: ____%
Rated Current: ____Amps Locked Rotor Current: ____Amps
Synchronous Speed: ____RPM Winding Connection:
Min. Operating Freq./Time:
Generator Connection: ( )Delta ( )Wye ( )Wye Grounded
System Type Tested (Total System): ( )Yes ( )No; attach product literature
Equipment Type Tested (i.e. Inverter, Protection System):
( )Yes ( )No; attach product literature
One Line Diagram attached: ( )Yes
Installation Test Plan attached: ( )Yes

For Synchronous Machines:

Submit copies of the Saturation Curve and the Vee Curve
( )Salient ( )Non-Salient
Torque: _____lb-ft Rated RPM: _____
Field Amperes: _____ at rated generator voltage and current
and _____% PF over-excited
Type of Exciter: _____
Output Power of Exciter: _____
Type of Voltage Regulator: _____
Direct-axis Synchronous Reactance (X_d) _____ohms
Direct-axis Transient Reactance (X'_d) _____ohms
Direct-axis Sub-transient Reactance (X''_d) _____ohms

For Induction Machines:

Rotor Resistance (R_r)_____ohms Exciting Current ____Amps
Rotor Reactance (X_r)_____ohms Reactive Power Required:
Magnetizing Reactance (X_m)_____ohms ___VARs (No Load)
Stator Resistance (R_s)_____ohms ___VARs (Full Load)
Stator Reactance (X_s)_____ohms
Short Circuit Reactance (X''_d)_____ohms Phases:
Frame Size: _____ Design Letter: ____ ( )Single
Temp. Rise: _____^{O}C. ( )Three-Phase

For Inverters:

Manufacturer: _____ Model:
Type: ___ ( )Forced Commutated ( )Line Commutated
Rated Output: ____Amps ____Volts
Efficiency: _____%

Signature:

_____	_____	_____
CUSTOMER SIGNATURE	TITLE	DATE