BULLETIN 86-01

REQUIREMENTS
FOR
INDEPENDENT POWER PRODUCERS
OF
ELECTRICITY

Revision Date: March 31, 2005

1 INTRODUCTION

1.1 PURPOSE

The purpose of this Bulletin is to document the Utility's application and review process, and technical requirements for Developers with generating sources operating in parallel with the Utility system. These requirements have been developed based on (i) regulatory requirements as set forth by the NYSDPS and/or FERC, (ii) the NYISO guidelines, and (iii) typical Utility industry design, operating procedures and safety practices in order to ensure the safety of Utility personnel and equipment, Utility customers and the general public.

1.2 UTILITY CONTACT

All correspondence regarding IPP projects shall be directed to the following:

Ms. Carol L. Muessigbrodt
Manager, NUG Interconnections
NYSEG and RGE
New York State Electric & Gas Corporation
James A. Carrigg Center

Kirkwood Industrial Park - Corporate Drive
P.O. Box 5224
Binghamton, NY 13902-5224

Telephone: (607) 762-7697
Facsimile: (607) 762-8666
Internet: clmuessigbrodt@nyseg.com

2 DEFINITIONS

Whenever used in this Bulletin with initial capitalization, the following terms shall have the meanings specified in this Section 2. Terms used in this Bulletin with initial capitalization that are not defined in this Section 2 shall have meanings specified in Attachment S of the NYISO OATT.

2.1 Acceptance for Interconnection

Written acceptance by the Utility; contingent upon the Utility's satisfaction with the inspection of the Developer's facilities, testing of the Developer's protection equipment, and the fulfillment of all contractual obligations required prior to the interconnection of the Developer's generating facility.

2.2 Affected System

An electric system other than the transmission system owned, controlled or operated by the NYISO or the Transmission Owner that may be affected by the proposed interconnection.

2.3 Affected System Operator

The entity that operates the Affected System.

2.4 Applicable Laws and Regulations

All duly promulgated applicable federal, state and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority, including but not limited to Environmental Law.

2.5 Applicable Reliability Councils

The NERC, the NPCC and the NYSRC.

2.6 Applicable Reliability Standards

The requirements and guidelines of the Applicable Reliability Councils, and the Transmission District, to which the Developer's Large Facility is directly interconnected, as those requirements and guidelines are amended and modified and in effect from time to time; provided that no Party shall waive its right to challenge the applicability or validity of any requirement or guideline as applied to it in the context of the large Facility Interconnection Procedures.

2.7 Attachment Facilities

The Transmission Owner's Attachment Facilities and the Developer's Attachment Facilities. Collectively, Attachment Facilities include all facilities and equipment between the Large Generating Facility or Merchant Transmission Facility and the Point of Interconnection, including any modification, additions or upgrades that

are necessary to physically and electrically interconnect the Large Facility to the New York State Transmission System. Attachment Facilities are sole use facilities and shall not include Stand Alone System Upgrade Facilities or System Upgrade Facilities.

2.8 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.

2.9 Base Case

The base case power flow, short circuit, and stability data bases used for the Interconnection Studies by the NYISO, Transmission Owner or Developer; described in Section 2.3 of the Large Facility Interconnection Procedures.

2.10 Breach

The failure of a Party to perform or observe any material term or condition of the Standard Large Generator Interconnection Agreement.

2.11 Breaching Party

A Party that is in Breach of the Standard Large Generator Interconnection Agreement.

2.12 Bulletin

Bulletin 86-01, "Requirements for Independent Power Producers of Electricity".

2.13 Business Day

Monday through Friday, excluding federal holidays.

2.14 Calendar Day

Any day including Saturday, Sunday or a federal holiday.

2.15 Cease to Energize

Cessation of energy flow capability.

2.16 Clustering

The process whereby a group of Interconnection Requests is studied together, instead of serially, for the purpose of conducting the Interconnection System Reliability Impact Study.

2.17 Commercial Operation

The status of a Large Facility that has commenced generating or transmitting electricity for sale, excluding electricity generated or transmitted during Trial Operation.

2.18 Commercial Operation Date

The date on which the Large Facility commences Commercial Operation as agreed to by the Parties pursuant to Appendix E to the Standard Large Generator Interconnection Agreement.

2.19 Confidential Information

Any information that is defined as confidential by Section 13.1 of the Large Facility Interconnection Procedures.

2.20 Coordinated Electric System Interconnection Review ("CESIR")

Any studies performed by utilities to ensure the safety and reliability of the electric grid with respect to the interconnection of distributed generation as discussed in this Bulletin.

2.21 Dedicated Service Transformer or Dedicated Transformer

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

2.22 Default

The failure of a Party in Breach of the Standard Large Generator Interconnection Agreement to cure such Breach in accordance with Article 17 of the Standard Large Generator Interconnection Agreement.

2.23 Design Test

A test performed on protective equipment to ensure that devices and systems used in a proposed application meet the necessary technical and functional requirements.

2.24 Developer

An individual, company, corporation, limited partnership, etc., developing an IPP project to be interconnected to the Utility's system.

2.25 Developer's Attachment Facilities

All facilities and equipment, as identified in Appendix A of the Standard Large Generator Interconnection Agreement, that are located between the Large Generating Facility or Merchant Transmission Facility and the Point of Change of Ownership, including any modification, addition, or upgrades to such facilities and equipment necessary to physically and electrically interconnect the Large Generating Facility or Merchant Transmission Facility to the New York State Transmission System. Developer's Attachment Facilities are sole use facilities.

2.26 Direct Transfer Trip ("DTT")

Remote operation of a circuit breaker by means of a communication channel.

2.27 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.

2.28 Disconnect Switch

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

2.29 Dispute Resolution

The procedures described in Section 13.5 of the large Facility Interconnection Procedures for resolution of a dispute between Parties.

2.30 Draw-out Type Circuit Breaker

Circuit breakers that are disconnected by physically separating, or racking, the breaker assembly away from the switchgear bus.

2.31 Effective Date

The date on which the Standard Large Generator Interconnection Agreement becomes effective upon execution by the Parties, subject to acceptance by the Commission, or filed unexecuted, upon the date specified by the Commission.

2.32 Energy Control Center

A Utility control center whose purpose is to monitor and operate the electric transmission and distribution center.

2.33 Engineering & Procurement (E&P) Agreement

An agreement that authorizes Transmission Owner to begin engineering and procurement of long lead-time items necessary for the establishment of the interconnection in order to advance the implementation of the Interconnection Request.

2.34 Engineering Review

Preliminary Technical Review and/or Final Technical Review.

2.35 Environmental Law

Applicable Laws or Regulations relating to pollution or protection of the environment or natural resources.

2.36 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.

2.37 FERC

Federal Energy Regulatory Commission.

2.38 Final Technical Review

A detailed review of the Customer-Generator's internal AC and DC elementary and control design, protection system and proposed device settings to determine if the proposed system will respond appropriately to Utility system abnormalities, such as Utility short circuits.

2.39 Force Majeure

Any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment, in any order, regulation or restriction imposed by government, military or lawfully established civilian authorities, or any other cause beyond the Party's control. A Force Majeure event does not include acts of negligence or intentional wrongdoing by the Party claiming Force Majeure.

2.40 Formal Acceptance

Written acceptance by the Utility; contingent upon the Utility's review of and satisfaction with the complete information package to be provided by the Developer as specified in this Bulletin.

2.41 Generating Facility

The Developer's device for the production of electricity identified in the Interconnection Request, but shall not include the Developer's Attachment Facilities.

2.42 Generating Facility Capacity

The net seasonal capacity of the Generating Facility and the aggregate net seasonal capacity of the Generating Facility where it includes multiple energy production devices.

2.43 Generator-Owner

An applicant who is proposing to install and operate on-site power generation equipment in parallel with the Utility grid per the requirements of this Bulletin.

2.44 Governmental Authority

Any federal, state, local or other governmental regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, or other governmental authority having jurisdiction over any of the Parties, their respective facilities, or the respective services they provide, and exercising or entitled to exercise any administrative, executive, police, or taxing authority or power; provided, however, that such term

does not include Developer, NYISO Transmission Owner, or any Affiliate thereof.

2.45 Hazardous Substances

Any chemicals, materials, or substances defined as or included in the definition of "hazardous substances", "hazardous waste", "hazardous materials", "hazardous constituents", "restricted hazardous materials", extremely hazardous substances", "toxic substances", radioactive substances", "contaminants", "pollutants", "toxic pollutants" or words of similar meaning and regulatory effect under any applicable Environmental Law, or any other chemical, material or substance, exposure to which is prohibited, limited or regulated by any applicable Environmental Law.

2.46 Initial Synchronization Date

The date upon which the Large Generating Facility or Merchant Transmission Facility is initially synchronized and upon which Trial Operation begins.

2.47 In-Service Date

The date upon which the Developer reasonably expects it will be ready to begin use of the Transmission Owner's Attachment Facilities to obtain back feed power.

2.48 Interconnection Facilities Study

A study conducted by the NYISO or a third party consultant for the Developer to determine a list of facilities (including Transmission Owner's Attachment Facilities and System Upgrade Facilities as identified in the Interconnection System Reliability Impact Study), the cost of those facilities, and the time required to interconnect the Large Generating Facility or Merchant Transmission Facility with the New York State Transmission System. The scope of the study is defined I Section 8 of the Standard Large Facility Interconnection Procedures.

2.49 Interconnection Facilities Study Agreement

The form of agreement contained in Appendix 4 of the Standard Large Facility Interconnection Procedures for conducting the Interconnection Facilities Study.

2.50 Interconnection Feasibility Study

A preliminary evaluation of the system impact and cost of interconnecting the Large Generating Facility or Merchant Transmission Facility to the New York State Transmission System, the scope of which is described in Section 6 of the Standard Large Facility Interconnection Procedures.

2.51 Interconnection Feasibility Study Agreement

The form of agreement contained in Appendix 2 of the Standard Large Facility Interconnection Procedures for conducting the Interconnection Feasibility Study.

2.52 Interconnection Request

Developer's request, in the form of Appendix 1 to the Standard Large Facility Interconnection Procedures, in accordance with the Tariff, to interconnect a new Large Generating Facility or Merchant Transmission Facility to the New York State Transmission System, or to increase capacity of, or make a material modification to the operating characteristics of, an existing Large Generating Facility or Merchant Transmission Facility that is interconnected with the New York State Transmission System.

2.53 Interconnection Study

Any of the following studies: the Interconnection Feasibility Study, the Interconnection System Reliability Impact Study, and the Interconnection Facilities Study described in the Standard Large Facility Interconnection Procedures.

2.54 Interconnection System Reliability Impact Study ("SRIS")

An engineering study that evaluates the impact of the proposed Large Generation Facility or Merchant Transmission Facility on the safety and reliability of the New York State Transmission System and, if applicable, an Affected System, to determine what Attachment Facilities and System Upgrade Facilities are needed for the proposed Large Generation Facility or Merchant Transmission Facility of the Developer to connect reliably to the New York State Transmission System in a manner that meets the NYISO Minimum Interconnection Standard. The scope of the SRIS is defined in Section 7.3 of the Large Generation Interconnection Procedures.

2.55 Interconnection System Reliability Impact Study Agreement

The form of agreement contained in Appendix 3 of the Standard Large Facility Interconnection Procedures for conducting the System Reliability Impact Study.

2.56 IPP

Independent Power Producer.

2.57 IRS

Internal Revenue Service.

2.58 Islanding

A condition in which a portion of the Utility system that contains both load and distribution generation is isolated from the remainder of the Utility system. [Adopted from IEEE Std. 929]

2.59 Large Facility

Large Generating Facility or Merchant Transmission Facility.

2.60 Large Generating Facility

A Generating Facility having a Generating Facility Capacity of more than 20 MW.

2.61 Loss

Any and all losses relating to injury to or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney fees, and all other obligations by or to third parties, arising out of or resulting from the Indemnified Party's performance or non-performance of its obligations under the Large Generator Interconnection Agreement on behalf of the indemnifying Party, except in cases of gross negligence or intentional wrongdoing by the Indemnified Party.

2.62 Material Modification

Those modifications that have a material impact on the cost or timing of any Interconnection Request with a later queue priority date.

2.63 Merchant Generator

A generator that sells its energy and/or capacity into the market or to an entity other than the Utility.

2.64 Merchant Transmission Facility

Developer's device for the transmission of electricity identified in the Interconnection Request, but shall not include Developer's Attachment Facilities. Merchant Transmission Facilities shall be those for which the Developer intends to receive approval from the FERC to charge market-based rates. Merchant Transmission Facilities shall not include upgrades or additions to the New York State Transmission System for which the owner does not have market-based rate authority.

2.65 Metering Equipment

All metering equipment installed or to be installed at the Large Generating or Merchant Transmission Facility pursuant to the Standard Large Generator Interconnection Agreement at the metering points, including but not limited to instrument transformers, MWh-meters, data acquisition equipment, transducers, remote terminal unit, communications equipment, phone lines, and fiber optics.

2.66 Minimum Interconnection Standard

The reliability standard that must be met by any Large Generating Facility, or Merchant Transmission Facility, proposing to interconnection to the New York State Transmission System. The Standard is designed to ensure reliable access by

the proposed project to the New York State Transmission System. The Standard does not impose any deliverability requirement on the proposed interconnection.

2.67 Network Access Interconnection Service

The service provided by the NYISO to interconnect the Developer's Large Generating Facility or Merchant Transmission Facility to the New York State Transmission System in accordance with the NYISO Minimum Interconnection Standard, to enable the New York State Transmission System to receive electric energy and capacity from the Large Generating Facility or Merchant Transmission Facility at the Point of Interconnection, pursuant to the terms of the NYISO OATT.

2.68 Notice of Dispute

A written notice of dispute or claim that arises out of or in connection with the Standard Large Facility Interconnection Procedures, or the Standard Large Generator Interconnection Agreement or its performance.

2.69 NPCC

Northeast Power Coordinating Council or its successor.

2.70 NYISO

New York Independent System Operator, Inc.

2.71 NYSDPS

New York State Department of Public Service, also known as the Public Service Commission.

2.72 NYSEG

New York State Electric & Gas Corporation.

2.73 OATT

Open Access Transmission Tariff.

2.74 OC

NYISO Operating Committee.

2.75 Optional Interconnection Study

A sensitivity analysis based on assumptions specified by the Developer in the Optional Interconnection Study Agreement.

2.76 Optional Interconnection Study Agreement

The form of agreement contained in Appendix 5 of the Standard Large Facility Interconnection Procedures for conducting the Optional Interconnection Study.

2.77 Parallel Operation

All electric power generation that is connected to a Utility substation, transmission and/or distribution facility that is part of the Utility electric system.

2.78 Party or Parties

NYISO, Transmission Owner, or Developer or any combination thereof.

2.79 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.

2.80 Point of Change of Ownership

The point, as set forth in Appendix A to the Standard Large Generator Interconnection Agreement, where the Developer's Attachment Facilities connect to the Transmission Owner's Attachment Facilities.

2.81 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.

2.82 Point of Interconnection

The point, as set forth in Appendix A to the Standard Large Generator Interconnection Agreement, where the Attachment Facilities connect to the New York State Transmission System.

2.83 Preliminary Technical Review

A review of the generator-owner's proposed system capacity, impact of the proposed generation on the Utility system, system characteristics and general system regulation to determine if the interconnection is viable.

2.84 Protection System Impact Study

A study of the impact on the Utility protection system, short circuits on the Utility electric system and ferroresonant overvoltage studies that are performed on the Utility electrical system during the SRIS.

2.85 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.

2.86 Queue Position

The order of a valid Interconnection Request, relative to all other pending valid Interconnection Requests, that is established based upon the date and time of receipt of the valid Interconnection request by the NYISO.

2.87 Reasonable Efforts

With respect to an action required to be attempted or taken by a Party under the Standard Large Facility Interconnection Procedures or Standard Large Generator Interconnection Agreement, efforts that are timely and consistent with Good Utility Practice and are otherwise substantially equivalent to those a Party would use to protect its own interests.

2.88 Remote Terminal Unit ("RTU")

A device located in a substation or generating station used to monitor various electrical quantities and/or status of electrical equipment that is telecommunicated to an operator at a Utility Energy Control Center, and/or to provide control functions of remote equipment to the operator.

2.89 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.

2.90 RGE

Rochester Gas & Electric Corporation.

2.91 SCADA ("Supervisory Control And Data Acquisition")

The system used to telemeter analog and status points of data collected by RTUs to the Utility Energy Control Center.

2.92 Scoping Meeting

The meeting between representatives of the Developer, NYISO and Transmission Owner conducted for the purpose of discussing alternative interconnection options, to exchange information including any transmission data and earlier study evaluations that would be reasonably expected to impact such interconnection options, to analyze such information, and to determine potential feasible Points of Interconnection.

2.93 Services Tariff

The NYISO Market Administration and Control Area Tariff, as filed with the Commission, and as amended or supplemented from time to time, or any successor tariff thereto.

2.94 SIR

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

2.95 Site Control

Documentation reasonably demonstrating: (1) ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing the Large Generating Facility or Merchant Transmission Facility; (2) an option to purchase or acquire a leasehold site for such purpose; or (3) an exclusivity or other business relationship between Developer and the entity having the right to sell, lease or grant Developer the right to possess or occupy a site for such purpose.

2.96 Stand Alone System Upgrade Facilities

System Upgrade Facilities that a Developer may construct without affecting day-to-day operations of the New York State Transmission System during their construction. NYISO, the Transmission Owner and the Developer must agree as to what constitutes Stand Alone System Upgrade Facilities and identify them in Appendix A to the Standard Large Generator Interconnection Agreement.

2.97 Standard Large Facility Interconnection Procedures ("LFIP")

The interconnection procedures applicable to an Interconnection Request pertaining to a Large Generating Facility or Merchant Transmission Facility that are included in Attachment X of the NYISO OATT.

2.98 Standard Large Generator Interconnection Agreement ("LGIA")

The form of interconnection agreement applicable to a Interconnection Request pertaining to a Large Generating Facility, that is included in Attachment X to the NYISO OATT.

2.99 System Protection Facilities

The equipment, including necessary protection signal communications equipment, required to (1) protect the New York State Transmission System from faults or other electrical disturbances occurring at the Large Generating Facility or Merchant Transmission Facility or (2) protect the Large Generating Facility or Merchant Transmission Facility from faults or other electrical system disturbances occurring on the New York State Transmission System or on other delivery systems or other generating systems to which the New York State Transmission System is directly connected.

2.100 Tariff

The NYISO Open Access Transmission Tariff ("OATT") , as filed with the Commission, and as amended or supplemented from time to time, or any successor tariff.

2.101 TPAS

NYISO Transmission Planning Advisory Subcommittee.

2.102 Transmission Owner

The public utility or authority (or its designated agent) that (i) owns facilities used for the transmission of Energy in interstate commerce and provides Transmission Service under the Tariff, (ii) owns leases or otherwise possesses an interest in the portion of the New York State Transmission System at the Point of Interconnection and (iii) is a Party to the Standard Large Generator Interconnection Agreement.

2.103 Transmission Owner's Attachment Facilities

All facilities and equipment owned, controlled or operated by the Transmission Owner form the Point of Change of Ownership to the Point of Interconnection as identified in Appendix A to the Standard Large Generator Interconnection Agreement, including any modifications, additions or upgrades to such facilities and equipment. Transmission Owner's Attachment Facilities are sole use facilities and shall not include Stand Alone Upgrade Facilities or System Upgrade Facilities.

2.104 Trial Operation

The period during which Developer is engaged in on-site test operations and commissioning of the Large Generating Facility or Merchant Transmission Facility prior to Commercial Operation.

2.105 Utility Grade Relay

A relay that is constructed to comply with, as a minimum, the most current version of 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)

2.106 Verification Test

A test performed upon initial installation and repeated periodically to determine if there is continued acceptable performance.

3 APPLICATION AND REVIEW PROCESS

3.1 General

Before a Developer is allowed to install and operate a generating facility in parallel with the Utility system, the Developer shall submit design and operating information for the proposed facility to the Utility for its review and Formal Acceptance in accordance with the applicable application and review process described in this Bulletin.

The Utility's review and acceptance of the Developer's proposed generation and protection design and operating information for the proposed generating facility shall not be construed as confirming or endorsing the design, or as any warranty of safety, desirability, or reliability of any of the Developer's facilities.

The Developer will be responsible for all Utility costs incurred during the Application and Review Process as set forth in this Bulletin.

3.2 Distributed Generation Rated 2 MW or Less Connected in Parallel with Utility Distribution Systems

3.2.1 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 6.1.8 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.

3.2.2 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:

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

  general high voltage bus configuration and relay functions; and

  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, 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.

3.2.3 Application Forms

New York State Standardized Application for Single Phase Attachment of Parallel Generation Equipment 15 kW or Smaller. (Reference ATTACHMENT 3)

New York Sate Standardized Application for Attachment of Parallel Generation Equipment 2 MW or Smaller. (Reference ATTACHMENT 4)

3.3 Independent Power Producer Generation Rated Greater Than 2 MW and Less Than or Equal to 20 MW

3.3.1 Introduction

The section provides the framework for processing applications for the interconnection of IPP generation, rated greater than 2 MW but less than or equal to 20 MW, to the Utility system.

3.3.2 Engineering Review Process

Upon receipt of a request from a Developer for interconnection requirements associated with the installation and operation of a generating facility in parallel with the Utility's system, the Developer will be sent a copy of this Bulletin and a copy of the applicable Utility standard agreement. If the Developer wishes to proceed with a project, it shall furnish the Utility with ALL of the information asterisked (*) in ATTACHMENT1, and described in Section 4. Within ten (10) business days of receipt of the initial application and design package, the Utility shall review the information for completeness and, if necessary, provide the Developer, in writing, with a list of missing information and a cost estimate to complete the Preliminary Technical Review.

PRELIMINARY TECHNICAL REVIEW PROCESS

Upon receipt of a complete application and design package and advanced payment, if applicable, the Utility shall commence the Preliminary Technical Review, which shall be completed in four (4) months following receipt of a complete application and design package, and advanced payment, if applicable, unless otherwise agreed upon by the Parties. The duration of the Preliminary Technical Review is dependent upon the size, location and interconnect scheme of the proposed generating facility. The Preliminary Technical Review shall consist of a review of the Developer's proposed system capacity, impact of the proposed generation on the Utility system, system characteristics and general system regulation to determine if the interconnection is viable.

Once the Preliminary Technical Review is completed, the Utility will provide the Developer, in writing, the results of the review. Such results shall include (i) any problems or deficiencies in the proposed design or information provided, (ii) identification of required system modifications, and (iii) a preliminary cost estimate for the required system modifications and completion of the Technical Review. **The Developer will be responsible for all costs pursuant to Section 5 of this Bulletin.**

Following receipt of the Preliminary Technical Review results, if the Developer elects to proceed with the project, it must provide to the Utility a proposed project schedule noting dates for obtaining major permits for the project, purchasing and receiving major equipment, starting and completing construction of the Developer's facilities, synchronizing with the Utility system and commencing Commercial Operation. This project schedule may be subject to modifications since it must also reflect the schedule for any modifications/additions to the Utility's system.

FINAL TECHNICAL REVIEW PROCESS

In order for the Utility to begin the Final Technical Review, the Developer must submit to the Utility all of the information listed in ATTACHMENT 1 and described in Section 4, and provide advanced payment for the cost of the review. The Final Technical Review will be completed in no more than six (6) months following receipt of ALL information required and advanced payment, unless otherwise agreed upon by the Parties. The duration of the review is dependent upon on the size, location and interconnection scheme of the proposed generating facility. If any portion of the submitted design or data is not acceptable, the Utility will comment on those areas and notify the Developer to make the appropriate revisions. The Developer must submit the revisions to the Utility before the Final Technical Review will continue. Any delay in the Developer's response to the Utility's comments will directly delay completion of the Final Technical Review and Final Acceptance of the proposed generation and protection design.

Upon completion of the Final Technical Review, the Utility will provide the Developer, in writing, the results of the review. If the review determines the Utility's acceptance of the Developer's proposed generation and protection design (in accordance with this

Bulletin), then the written notification will include a Formal Acceptance. Formal Acceptance of the Developer's proposed generation and protection design is the first stage in the process leading to the Utility's acceptance of the Developer's generating facility for interconnection to the Utility system (see Section 8).

3.4 Greater Than 20 MW Interconnecting to the New York State Transmission System

If the proposed generating facility is rated greater than 20 MW and interconnecting to the New York State Transmission System, then the Developer must follow the procedures set forth in Attachment X to the NYISO OATT.

4 INFORMATION REQUIREMENTS

In order for the Utility to review and formally accept the Developer's proposed generation and protection design, the Developer shall furnish the Utility will ALL of the information listed in ATTACHMENT 1. This Section 4 provides a brief description of the items listed in ATTACHMENT 1 to assist the Developer in preparing the application and design package. Items with an asterisk (*) are required for the Preliminary Technical Review or Protection System Impact Study.

*4.1 Utility Form NB 232**

To permit the Utility to begin the Engineering Review Process for the Developer's proposed generation project, the Developer must complete the Independent Power Producer Generator Notice (Form NB-232)(See ATTACHMENT 2)

If, at any time during the Engineering Process, modifications are made to the Developer's design that affect the original information furnished on Form NB-232, then the Developer shall provide a revised Form NB-232 to the Utility.

Form NB-232 contains information that is supplied by both the Utility and the Developer. A description of the information to be furnished by the Developer is provided below.

4.1.1 Developer Information

a)	Developer Name:	Name of Developer proposing the IPP project.
b)	Developer Address:	Developer's address.
c)	Telephone No. Primary:	Developer's primary telephone number.
d)	Telephone No. Alternate:	Developer's alternate telephone number.
e)	Proposed Generating Facility Location:	Location of the proposed generating facility, including street, city/town/village, county, state and zip code.

4.1.2 Generator Information

a)	Manufacturer:	Generator manufacturer's name and model number.
b)	Type:	Type of generator (i.e., induction, synchronous, dc with synchronous inverter, ac with synchronous inverter, etc.)
c)	Rated Output (kVA):	Maximum rated output of the generating unit in kVA. For multiple generating units, the Developer shall note the quantity and rating of the units. The Developer shall complete the Generator Information

		Sheet (ATTACHMENT 5) for the Utility's Preliminary Technical Review Process.
d)	Nameplate Voltage:	Rated output voltage of the generating unit(s).
e)	Power Factor:	Power factor of the generating unit(s).
f)	Phase:	Indication of whether the generating unit is single or three phase.
g)	Disconnect Device:	Indication of the manufacturer, type and continuous and interrupting ratings of the disconnecting device proposed to isolate the generating facility from the Utility system.
h)	Prime Mover:	Source of power to the generating unit (i.e., wind, hydro, wood, solar, natural gas, etc.).

4.1.3 General Information

a)	Consultant:	Name and telephone number of Developer's consulting engineer, if any.
b)	Electrical Contractor:	Name and telephone number of Developer's electrical contractor, if any. If Developer is providing its own personnel for electrical work, it must indicate so.
c)	Equipment Supplier:	Name and telephone number of the manufacturer or firm supplying generation equipment for the project.
d)	Interconnection Date:	Estimated date that the Developer's generating facility will be ready for interconnection to the Utility system.

4.1.4 Remarks

This section shall be used to provide any additional information necessary to complement the information provided above. Any unusual conditions or potential problems should be noted. If the Prime Mover is something other than wind or solar, the Developer should provide the turbine or engine size.

*4.2 Application Form**

This form is the standard application form found in the New York State Standardized Interconnection Requirements and Application Process for New Distributed Generators 2 MW or Less and Connected in Parallel with Utility Distributions Systems, and included in ATTACHMENTS 3&4.

4.3 Project Schedule

A schedule (bar chart, CPM, etc.), noting dates for obtaining major permits and financing for the project, purchasing and receiving major equipment, starting and completing

construction of the Developer's facilities, synchronizing with the Utility system, and commencing Commercial Operation.

*4.4 Site Plan**

A detailed site plan showing the Developer's generation facilities, including any interconnection facilities (substations, etc.), in relation to the Utility's existing facilities. This site plan must be of sufficient detail to accurately locate the Developer's facilities on a U.S. Geological Survey ("USGS") topographic map.

*4.5 Description of Operation**

A brief description of the intended operation and control of the Developer's facilities, including the method of starting and the number of starts per day. Any unusual switching procedures or unique operating condition that may be planned shall also be explained.

*4.6 One Line Electrical Diagram of Complete Facility**

The one line diagram must accurately represent the Developer's electrical equipment up to the point of interconnection with the Utility system. The one line diagram must include, at a minimum, the following: Disconnect Switch(es), step-up transformer(s), circuit breaker(s) and contactors, switches, generator(s), current and voltage transformers, capacitors, surge arresters, and station service transformer.

*4.7 One Line Relay Diagram**

The one-line relay diagram must accurately represent the Developer's electrical equipment up to the point of interconnection with the Utility system. The one-line diagram shall include, at a minimum, the following: Disconnect Switch(es), step-up transformer(s), circuit breaker(s) and contactors, switches, generator(s), current and voltage transformers, station service transformer and proposed protective relay device function numbers.

*4.8 Three Line Relay or AC Elementary Diagram(s)**

This diagram must detail the interconnection wiring for the equipment detailed on the one-line diagrams. In particular, this diagram must illustrate how the protective relays and instrument transformers are connected. (This may not be necessary if the instrument transformer winding connections are shown on the Generator One Line Relay Diagram).

4.9 Elementary Control or DC Elementary Control Diagram(s)

Sometimes referred to as a schematic diagram, the elementary control diagram depicts the electrical arrangement of the relays and contacts associated with the protective relay scheme, the generator control scheme and the circuit breaker trip and close schemes.

4.10 Generator, Exciter and Governor Information Sheets*

The Developer shall complete the Generator (ATTACHMENT 5), Exciter (ATTACHMENT 6), and Governor (ATTACHMENT 7) Information sheets. Incomplete information sheets will result in delays since the Developer will be requested to provide the missing information.

4.11 Equipment Nameplate Data and Electrical Ratings

The Developer shall provide the following information, as a minimum for each piece of equipment:

a. Prime Mover - type, manufacturer, power rating, rated speed.
b. Interface/Step-up Transformer(s)* (from proposed generation to point of common coupling) - manufacturer, rated kVA, high and low voltage ratings, winding connections, winding impedance, neutral impedance.
c. Interrupting Devices* - manufacturer, type, rated voltage, rated current, interrupting capacity, operating time.
d. Current Transformers (CTs)* - manufacturer, type, accuracy class, ratio of all devices utilized for protection, control and data telemetering (if required).
e. Voltage Transformers (VTs)* - manufacturer, type, primary and secondary voltage, winding connections, VA rating of all devices utilized for protection, control and data telemetering (if required).
f. Line/Disconnect Switch(es)* - manufacturer, type, rated voltage and current, rated interrupting capacity and location of switch.
g. Capacitor Bank - manufacturer, rated kVAR and connection.
h. Battery and Charger or Source of Power Supply to Protective Relays and Interrupting Devices (such as a UPS) - manufacturer, rating, dc voltage range and output capacity and duration upon loss of ac supply.
i. Surge Arresters - manufacturer, catalog number, MCOV rating.
j. Other – additional information will be requested by the Utility, as required, to complete the review of the Developer’s design.

4.12 Proposed Relay Types and Settings for Fault Isolation Protection Schemes

The Developer shall provide a list of relays proposed for the purpose of providing isolation protection, detection of short circuits and other system abnormalities on the Utility system, and for detection of short circuits within the generating facilities to disconnect the generating facilities from the Utility system. Each relay's function, manufacturer, model, and range shall be indicated. The proposed settings for the relays provided for detection of short circuits and other system abnormalities on the Utility system shall also be provided. The settings for the isolation protection relays are specified in Sections 6.1.1.1.1 and 6.1.1.1.2 or Section 6.2.2.1.6 of this Bulletin, depending on the size and type of the proposed generator.

4.13 Telemetering Information (when applicable)

When data telemetering is required, the Developer shall provide the Utility with the following telemetering information:

a. AC Elementary Diagram(s) - showing current, potential and external power inputs to the transducers, test switches, etc.
b. Connection diagram(s)
c. Types and ratings of integrated electronic devices ("IEDs"), IED connection(s) and associated scaling.
d. Copies of certificates of test for the metering current and voltage transformers. When certificates are not available, a typical curve for the type of transducer shall be furnished.

4.14 Protective Relay Communications and Monitoring Systems Information (when applicable)

When protective relay communications and/or monitoring equipment are required, the Developer shall provide the Utility with the following information (refer to Section 6.3):

a. Equipment vendor bid proposals, correspondence, equipment drawings, certified test reports and instruction books for the protective relay communications and/or monitoring equipment.
b. Copy of the Communications Service Request Form, Ground Potential Rise calculations and earth resistance measurement data for leased telephone channels for protective relaying.

4.15 Method of Excitation

The means for providing the generator excitation (rotating dc generator, static var source, etc.) must be described.

4.16 Minimum Site Load Without Generation On Line*

The Developer's minimum site load (kVA, power factor), is required to determine the overall load/generation ratio, to determine the impact of the Developer's generation on the Utility system and to ensure that an adequate design is employed.

4.17 Generation Saturation Curve

Per unit armature voltage versus field current for open and short circuit conditions that identify and specify the saturation factor values at 1.0 and 1.2 per unit armature voltage values.

4.18 Exciter Saturation Curves

Per unit exciter field voltage versus exciter field current during load and no-load conditions that identify and specify the exciter field current values at 75% and 100% of maximum exciter field voltage values.

4.19 Block Diagrams

System block diagram, complete with corresponding constants for each type of governor and exciter proposed.

4.20 Regulatory Filings, Impact Statements, License Applications and Other Permit Applications

The Developer shall notify the Utility (provide copies) of all regulatory filings, impact statements, license applications and all other permit applications required by federal, state and local agencies for the Developer's generating facilities. When the Utility's interconnection facilities are included in the Developer's regulatory filings, impact statements, license applications and other permit applications for the generating facilities, the Developer shall provide this information to the Utility for review and acceptance, prior to filing with the agency. Copies of all regulatory approvals and permits obtained by the Developer shall be provided to the Utility upon the Utility's request, including all conditions applied to the approvals.

4.21 Additional Information

The Utility shall request from the Developer, and the Developer shall provide, any additional information required that the Utility deems necessary for completion of the technical reviews.

5 UTILITY SYSTEM MODIFICATIONS

5.1 General

This Section 5 provides information associated with Utility system modifications. If the proposed project is subject to the NYISO OATT, to the extent that this Section 5 conflicts with Attachment X and/or Attachment S, Attachment X and Attachment S shall apply.

5.2 Preliminary Cost Estimate

If Utility system modifications are required, the Utility will provide the Developer with a preliminary cost estimate and estimated completion date for the system modifications at the completion of the Utility's review process as described in the applicable sections of Section 3. A firm schedule for the completion of the Utility's system modifications will be provided after the design has been finalized and Utility internal authorization has been obtained.

5.3 Final Cost Estimate

Upon completing the final design and obtaining Utility internal authorization for any Utility system modifications required due to the Developer's proposed generation, the Utility will provide the Developer with a final engineering quality estimate for the required Utility system modifications. **The Developer will be responsible for all Utility actual incurred costs associated with the required Utility system modifications.** The Utility will provide an advance payment schedule to the Developer, which will be the basis for invoices to be issued monthly by the Utility, to cover the estimated cost of all Utility system modifications. Invoices will be issued to the Developer so that payments are received from the Developer prior to completion of the work. Any differences between the estimated and actual incurred Utility costs will be resolved at the completion of the required system modifications through reimbursements to the Developer (for overpayments), or an invoice issued to the Developer (for additional incurred costs).

5.4 Engineering, Design and Construction

Unless otherwise negotiated with the Developer, the Utility will engineer, design, procure equipment for and construct any modifications required on the Utility system due to the installation of the Developer's generation. If Agreements state that interconnection facilities (electric transmission, distribution, and/or substation facilities) are to be provided by the Developer and transferred to the Utility upon completion and acceptance

by the Utility, the Developer shall engineer, design, procure equipment for, construct and test all facilities in accordance with the Utility's latest design guidelines and equipment and construction specifications. The Utility will provide these documents to the Developer as required.

The Developer shall submit to the Utility for review and acceptance all design drawings, engineering documentation and equipment specifications for all interconnection facilities to be transferred to the Utility upon completion and acceptance by the Utility. The Utility will require at least thirty (30) days to review all submitted documentation and either accept or provide comments to the Developer. Depending on what interconnection facilities are required, the Utility will furnish a list of design packages and documentation to be submitted by the Developer for the Utility's review and acceptance.

5.5 Regulatory Approvals and Permits

The Developer shall obtain all regulatory approvals and permits required for all interconnection facilities to be constructed by the Developer and transferred to the Utility. The Developer shall provide copies of all regulatory filings, impact statements, license applications and all other permit applications involving interconnection facilities to be transferred to the Utility. The Developer shall provide this information to the Utility for review and acceptance, prior to filing with the agency. Copies of all regulatory approvals and permits obtained by the Developer shall be provided to the Utility, including all conditions applied to the approvals.

5.6 Installation and Testing

During the installation and testing of the interconnection facilities to be transferred to the Utility, the Utility will have the right to be present to verify that the facilities are in complete accordance with the Utility's design guidelines and equipment and construction specifications and standards. The Developer will be required to correct all work not completed in accordance with the Utility's standards. Upon the Utility's acceptance of the interconnection facilities and energization of the Developer's generating facility, the Developer shall transfer ownership of the interconnection facilities to the Utility.

5.7 Affected Systems

Where other public utilities are involved in the Developer's generation project, the Developer shall coordinate all project activities. The Developer shall be responsible for negotiating and/or obtaining any additional agreements or contract requirements with the other public utilities.

6 ELECTRICAL INTERCONNECTION REQUIREMENTS

This Section 6 specifies the Utility's technical interconnection requirements for Independent Power Producer generation connected in parallel with the Utility's system. Generation that does not operate in parallel with the Utility's system is not subject to these requirements. The requirements in this section have been developed based on typical Utility industry design, operating procedures, and safety practices in order to ensure the safety of Utility personnel and equipment, Utility customers, and the general public.

The Developer's proposed generation interconnection shall have 60 Hz alternating current characteristics compatible with the Utility system at the point of interconnection.

6.1 New York State Standardized Interconnection Requirements for New Distributed Generation 2 MW or Less Connected in Parallel with Utility Distribution Systems

6.1.1 Design Requirements

6.1.1.1 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 Section 6.1 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 Section 6.1 shall be followed.

6.1.1.1.1 *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.

6.1.1.1.2 *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.

6.1.1.2 Synchronous Generators

Synchronous generation shall require synchronizing facilities. These shall include automatic 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.

6.1.1.3 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.

6.1.1.4 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.

6.1.1.5 Minimum Protective Function Requirements

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.

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.

6.1.1.6 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 irresolvable 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.

6.1.2 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 6.1.4, 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.

6.1.3 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.

6.1.4 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 6.1.2, 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.

6.1.5 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.

6.1.6 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.

6.1.7 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.

6.1.8 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 6.1.1.5 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-Voltage 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 judgment 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.

6.1.9 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.

6.2 Electrical Interconnection Requirements for Independent Power Producer Generation Rated Greater than 2 MW

6.2.1 General

This Section 6.2 specifies the Utility's interconnection technical requirements for Developers of generating sources rated greater than 2 MW and operating in parallel with the Utility system.

6.2.1.1 Protection Requirements

The protection requirements described in this Section 6.2 are those necessary to protect the Utility system from the Developer's generator and to minimize any adverse consequences to the Utility system. Illustrated in ATTACHMENTS 8, 9, 10 and 11 are typical protection, control and grounding schemes that could be employed by the Developer to meet those requirements. It should be noted, however, that the specific design of the protection, control and grounding schemes will depend on the size and characteristics of the Developer's generator as well as the characteristics of the particular portion of the Utility system to which the Developer is connecting the generation. The Developer's relay calculations and settings associated with the interconnection protection must be submitted to the Utility for review and acceptance, and should be done early enough in the project such that any changes identified during the Utility review do not adversely affect schedules.

Generators connected to the Utility transmission and subtransmission system shall be capable of coordinating their underfrequency protective relaying with the NPCC Underfrequency Load Shedding Curve (see ATTACHMENT 14). The Developer's machines shall be capable of remaining connected (not trip or be damaged) through major system disturbances until both stages of the Utility underfrequency load shedding scheme have had a chance to operate and reduce system load. The Developer shall take whatever steps are necessary during the design of their turbine/generator to ensure that the machines can withstand sustained underfrequency operation. During system conditions where local area load exceeds generation, NPCC Emergency Operation Criteria requires a program of phased automatic underfrequency load shedding of up to 25% of area load to assist in arresting frequency decay and to minimize the possibility of a widespread system collapse. In conformance with the Emergency Operating Criteria, the generation shall be required to remain connected to the system during the frequency decline to allow the objectives of the NPCC automatic load shedding program to be achieved.

The Developer's system design must conform to all applicable National Electrical Code ("NEC"), National Electrical Safety Code ("NESC"), American National Standards Institute ("ANSI") and Institute of Electrical and Electronic Engineers ("IEEE") standards and applicable government regulations.

It is not the Utility's intention to ensure that the Developer's generator or facilities other than the interconnection are adequately protected. If a safety concern is identified during the course of reviewing the Developer's design or witnessing start-up testing, the Utility will bring it to the Developer's and/or their agent's attention for corrective action. Ultimately, the responsibility to identify compliance with applicable safety codes and government regulations and to resolve any opposing views regarding safety code interpretation lies with the authorized inspection organization.

The Utility may require the Developer to provide two independent, redundant relaying systems in accordance with NPCC criteria for the protection of the bulk power system if the interconnection is to the bulk power system, or if it is determined that delayed clearing of faults within the generating facility adversely affects the bulk power system.

6.2.2 IPP Generation System Design Requirements

6.2.2.1 Protection & Control

The protection requirements described in this document are those necessary to protect the Utility system from the Developer's generation and minimize its impact on the system. Other devices necessary solely for the protection of the Developer's equipment and to ensure its safe operation shall be the Developer's responsibility. It is not the Utility's intent to assess such protection in the Utility Engineering Review Process.

6.2.2.1.1 *PE Engineer*

The Developer is required to obtain the services of a qualified, New York State licensed Professional Engineer ("P.E.") to design the protection system to meet the Utility's requirements, as well as the Developer's own requirements. The responsible P.E.'s seal shall be affixed on all of the Developer's design documentation that is required to be submitted to the Utility for review and acceptance.

6.2.2.1.2 *Consultant(s)*

To help minimize the potential for delays in the Utility Engineering Review Process, it is highly recommended that the Developer's consultant(s) have extensive background in power system protection and relay calibration and testing. It is the sole responsibility of the Developer to ensure the qualification of the Developer's consultant(s).

6.2.2.1.3 *Protection Schemes*

The Utility requires that Developers with a generating source(s) operating in parallel with the Utility system design, purchase, and install protection schemes at their location that are designed to detect the following:

- System abnormalities and disturbances on the Utility system to which the Developer's generation is interconnected (Utility fault protection scheme).
- Faults within the Developer's plant, to separate the plant from the Utility system, avoiding outages to other Utility customers supplied on the same circuit to which the generation is interconnected (plant fault protection scheme).
- Backfeeding, by the Developer's generation, to the Utility system when the Utility supply is separated from the Utility system to which the Developer's generation is interconnected (isolation protection scheme).

6.2.2.1.4 *Line Protection for Interconnections to Utility Subtransmission or Transmission Circuits*

For generation proposed for interconnection to Utility subtransmission or transmission circuits, the infeed that is introduced into the circuit from the proposed generation has an adverse impact on the Utility protective relays at the line terminals. The infeed causes the Utility protective relays to be less sensitive for short circuits that occur on the protected line beyond the proposed interconnection point of the generation. In addition, settings for the Utility line terminal protective relays may not be able to be calculated to protect the line for all IPP operating conditions (e.g. all generators on line, no generators on line, etc.).

Because of this impact on the Utility line protection schemes, an IPP shall not be allowed to interconnect to a Utility subtransmission or transmission line as a third line terminal. The developer will be required to install facilities at the proposed point of interconnection to split the line into two separate lines. The Developer shall install line protection equipment at each new line terminal that can interface with the protective relays at each of the Utility line terminals.

6.2.2.1.5 *Protective Relays*

The protective relays used by the Developer to meet the Utility's fault and isolation protection requirements must be Utility-approved Utility Grade Relays (see Section 2 - Definitions). The following suppliers are currently approved by the Utility for the fault and isolation protection relays shown in Figures 1, 2, and 3 (ATTACHMENTS 8, 9, and 10):

- ABB (former Westinghouse, ASEA, and BBC types only),
- Basler (BE1 class relays only),
- Beckwith,
- General Electric and GE/Multilin,
- Schweitzer Engineering Laboratories (SEL).

6.2.2.1.6 *Fault Protection Schemes*

The Developer's fault protection scheme must isolate the Developer's generation from the Utility system for, but not necessarily limited to, the following abnormalities and disturbances:

- Faults within the Developer's equipment;
- Multiphase and ground faults on the Utility system between the Developer's generation and a Utility-designated "system location"; and
- Single phasing of a three-phase generator (open conductor).
- Loss of power supply to the protective relays within the plant
- Protective relay failure (relay trouble alarm)

6.2.2.1.7 *Isolation Protection Scheme*

The Developer's isolation protection scheme must automatically isolate the Developer's generation from the Utility system for loss of the Utility supply. The Developer's generation must not supply other Utility customers in the event of a loss of the Utility source. The isolation protective equipment would typically be designed to sense a "step change" in the generator's output voltage, current, or frequency upon loss of the Utility source. NOTE: The "step change" resulting from the loss of the Utility supply may or may not be locally detectable at the Developer's location. If not, additional remote communications protection may be required.

Figures 1, 2 and 3 (ATTACHMENTS 8, 9, and 10) illustrate examples of the minimum protection requirements available to the Developer for various typical generator systems. The specific design of the protection schemes will depend on the generator type and kVA size, the Developer's own site load, the type of Utility supply feeder and its associated loads, as well as the method of grounding selected. The circuit breaker used to disconnect the generation from the Utility system shall be tripped either directly from the protective relay or through one interposing relay.

For isolation protection relays, the Utility requires the following minimum settings:

Underfrequency (81U)

For generators interconnected to Utility distribution circuits, pick-up at no less than 59.3 Hz and operate in no greater than 0.5 seconds.

For generators connected to Utility subtransmission or transmission circuits, coordinate with the NPCC Underfrequency Load Shedding Curve shown in ATTACHMENT 14 (i.e., the setting must be on or below the curve shown).

Overfrequency (81O)

Pick-up at no more than 60.5 Hz and operate in no greater than 0.5 seconds.

Undervoltage (27)

Pick-up at no less than 90% of nominal supply voltage and operate in no greater than 1.0 seconds.

Overvoltage (59)

For generators interconnected to Utility circuits that are ungrounded, or not effectively grounded, pick-up at no more than 110% of nominal supply voltage and operate instantaneously.

For generators interconnected to Utility circuits that are effectively grounded, pick-up at no more than 110% of nominal supply voltage and operate in no greater than 1.0 seconds.

6.2.2.1.8 *Fault Protection Relays*

For fault protection relays, it is the Developer's responsibility to perform the necessary calculations and determine the proper settings. The Utility will provide the Developer with pertinent Utility system data and the appropriate fault protection criteria. Once the Developer has completed the calculations and finalized these settings, the calculations and settings must be provided to the Utility for review and acceptance.

6.2.2.1.9 *Current Transformers (CTs) Used for Fault Protection Relays*

Relay accuracy CTs (CTs whose accuracy class begin with a “C” or a “T” followed by a voltage class (e.g. C400, T200, etc.) must be used for all protective relays installed within the plant that are used for fault protection. Metering accuracy CTs can saturate when exposed to fault currents, and are thus unacceptable.

6.2.2.1.10 *High Speed Protection vs. Time-Delayed Protection*

The developer may be required to use high speed protection if time-delayed protection would result in degradation in the existing sensitivity or speed of the protection system on Utility lines.

6.2.2.1.11 *Local Breaker Failure Protection*

The Developer may be required to provide local breaker failure protection, which may include Direct Transfer Tripping to the Utility line terminal(s), in order to detect and clear faults within the generating source that cannot be detected by Utility backup protection or that could result in undesirable interruption to utility customers.

6.2.2.1.12 *Relay Test Switches*

Relay test switches (ABB FT-19R or equivalent) shall be installed for each microprocessor-based relay that provides isolation protection and/or detection of short circuits or other abnormalities on the Utility system. At least one test switch is required for each relay. This requirement is primarily to assure that any relay output is not

rewired incorrectly following the required initial and periodic relay testing. Installation of relay test switches also aids to facilitate and expedite relay testing.

6.2.2.2 Grounding

The Utility transmission, subtransmission and distribution facilities are all designed and built to maintain a specific level or type of grounding. The interconnection of the Developer's generation to Utility facilities may adversely affect that grounding. In order to maintain the existing level or type of grounding on the circuit, the interconnecting IPP generation must comply with the following criteria:

Developer's generation interconnecting to wye-grounded distribution circuits must provide a ground source to maintain effective grounding on the circuit. The ground source must ensure that under all conditions where the Developer's generation becomes isolated with the Utility's distribution load, the distribution circuit remains effectively grounded. (A ground source provides effective grounding if, during a phase-to-ground fault, the voltages on the unfaulted phases with respect to ground do not exceed 1.35 per unit.)

a. During a phase-to-ground fault on the Utility's distribution circuit, the Developer's generation may be isolated with the phase-to-ground fault if the Utility source opens before the Developer's protection detects the fault condition and isolates the generation from the Utility system. If the Developer's facility does not provide effective grounding during the period that the generation is isolated with the phase-to-ground fault, the system neutral can shift, creating an overvoltage on the two remaining unfaulted phases. All phase-to-ground connected loads isolated with the generation will be subjected to this overvoltage, which can reach 173% of nominal voltage. This high voltage could quickly damage Utility equipment and/or other customer's equipment.

b. The qualified New York State licensed P.E. responsible for the design of the Developer's system shall be aware that the ground source at the Developer's location will provide a path for a portion of the zero-sequence fault current for <u>all</u> phase-to-ground faults on the circuit. Should this additional fault current path adversely affect the operation of existing Utility ground relaying and/or fusing on the circuit, additional zero-sequence impedance may have to be added to the Developer's ground source (while still maintaining effective grounding), or the ground source may have to be tripped-off simultaneously when the generator is tripped for faults.

c. The following are examples of methods that the Developer may use to provide the required ground source at his location. Figures 4.1, 4.2 and 4.3 (ATTACHMENT 11) illustrate each of these methods, respectively:
   - A wye-grounded/wye-grounded step-up transformer with a wye-grounded generator.

- A grounding transformer at the point of interconnection. A wye-grounded/delta or zig-zag transformer may be used.
- A wye-grounded/delta step-up transformer.

NOTE: The preferred method is to use a wye-grounded/wye-grounded step-up transformer with a wye-grounded generator.

The Developer's generation interconnecting to delta-connected distribution circuits typically will not be required, nor allowed, to provide a ground source for the Utility system.

The Developer's generation interconnecting to transmission or subtransmission facilities, either delta- or wye-connected, will be reviewed individually to determine if there is a need for the Developer to provide a ground source for the Utility system.

6.2.2.3 Synchronizing and Reclosing

Installations with synchronous generators or self-commutated inverters are required to use Utility Grade synchronizing equipment to parallel their generation with the energized Utility system. In general, installations with induction generators or line-commutated inverters are not required to have synchronizing equipment.
The connection of any type of IPP generation to a de-energized portion of the Utility system is prohibited.

When the Developer's fault interrupting device is tripped via fault or isolation protective relay equipment, reclosing of that device must be delayed until the Utility system has been restored for a minimum of five (5) minutes.

NOTE: The IPP should be aware that Utility autoreclosing may cause transient shaft torque on the Developer's machine(s) if it (they) is (are) still connected to the Utility system when reclosing occurs.

For fault initiated operations on transmission, subtransmission and distribution circuits, the Utility substation and line fault interrupting devices (excluding fuses) typically reclose automatically without hot-line supervision or synchronizing. Dead time on the Utility circuit before the first reclosing occurs typically ranges from 2 to 10 seconds. As noted previously, if the Developer's generation remains on-line when reclosing occurs, the Developer's equipment may be damaged by a possible out-of-sync reclose. It is not the Utility's practice to add hot-line supervision or synchronizing to existing fault interrupting devices on transmission, subtransmission, and distribution circuits when IPP generators are connected to them.

6.2.2.4 Disconnect Switch

6.2.2.4.1 *General*

Generating equipment shall be capable of being isolated from the Utility system by means of an external, manual, visible, gang-operated, load break Disconnect 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.

a. The Disconnect Switch shall be clearly marked, "Generator Disconnect Switch," with permanent 3/8 inch letters or larger.
b. The Disconnect Switch shall be located within 10 feet of the Utilities' external electric service meter or the location and nature of the dispersed generator Disconnect Switches shall be indicated in the immediate proximity of the electric service entrance.
c. The Disconnect Switch shall be readily accessible for operation and locking by Utility personnel at all times. Operation of this switch by the Utility is at the discretion of the Utility without prior notice to the power producer.
d. The Disconnect Switch must be lockable in the open position with a standard Utility padlock.

6.2.2.4.2 *Standards and Ratings*

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.

6.2.2.4.3 *Utility Access*

The Disconnect Switch may be opened by the Utility 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

The Disconnect Switch may be opened by the Utility for the following reasons, after notice to the power producer has been delivered and a reasonable time to correct (consistent with the conditions) has elapsed:

a. Power producer has failed to properly maintain the protective devices.
b. Power producer's system interferes with Utility equipment or equipment belonging to other Utility customers.

c. Power producer's system is found to affect quality of service of adjoining customers.
d. Failure to make Verification Test records available to the Utility upon request.

6.2.2.4.4 *Notification of Disconnection*

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

6.2.2.5 Power Factor Correction

If the Developer installs an induction machine, power factor correction equipment may be required. If the Utility determines in its sole judgment that the use of power factor correction equipment is necessary for VAR support, the Developer shall:

- Install such power factor correction equipment on its systems, as specified and accepted by the Utility; and/or
- Be responsible for all Utility-incurred costs associated with the addition of such power factor correction equipment installed by the Utility on the Utility system.

6.2.2.6 Harmonics

The following is the Utility's policy, based on the most current IEEE standards, regarding harmonic distortion limits that apply to all customers, including IPPs:

> "Harmonic distortion due to a Developer's generation additions shall be limited such that the harmonic voltage distortion as measured at any point on the Utility system will not exceed 3% for any single frequency or 5% total harmonic distortion ("THD"), or otherwise be determined by the Utility to cause problems with the Utility or other customers. THD is defined as the square root of the sum of the squares of the harmonic voltages divided by the magnitude of the fundamental (60 hertz) voltage."

If the percent THD is above the limit, the Developer may need to install a filter to meet the requirement.

If a harmonic-related problem with other Utility customers can be traced to a Developer's generating facility, the Developer must cease operation of the generating facility and remedy the problem.

6.2.2.7 Flicker

The Developer's generator shall not create unacceptable voltage fluctuation or flicker conditions on the Utility system, as determined by the Utility. Refer to GRAPH 1 (ATTACHMENT 13) for flicker limitations, based on the most current IEEE standards. The Developer shall limit voltage fluctuations in accordance with the 3% curve for transmission or Subtransmission system interconnections, or the 4% curve for distribution system interconnections.

6.2.2.8 Ferroresonance

6.2.2.8.1 *Description*

Studies have shown that ferroresonant overvoltages can occur on Utility T&D systems. These are produced by the discharging and charging of the system capacitance through the highly non-linear magnetizing reactance of the system transformers as they pass into and out of a saturated condition. The result is high overvoltage and distorted waveforms, which not only contain the ferroresonance but also all the natural resonant frequencies of the distribution circuits excited by the ferroresonant pulses.

6.2.2.8.2 *Conditions*

Four conditions must be present for ferroresonant overvoltages to occur:

- The generator must be separated from the Utility source (Islanding condition).
- The kilowatt load in the Island must be less than three times the generator rating.
- The system capacitance must be greater than 25% of the generator rating.
- There must be at least one transformer connected to the island.

6.2.2.8.3 *Impact On Customer Equipment*

Ferroresonant overvoltages can result in customer equipment and wiring being subjected to up to three times rated voltage. This can result in damage to both customer-owned appliances and equipment as well as Utility-owned equipment, and may even result in a fire.

6.2.2.8.4 *Equipment Requirements*

If, during the Preliminary Technical Review, it is determined that a ferroresonant overvoltage condition is possible, the Utility protection engineer will investigate if it is feasible to remove capacitor banks from the branch or circuit to which the generator(s) will be connected. If this is determined not to be feasible, then unidirectional Direct Transfer Trip (DTT) equipment will be required to be installed at the Utility substation or

line recloser and the generation facility. Through this equipment, the Utility's relays or recloser, upon detection of a short circuit on the feeder or branch, will key a DTT signal to the generation facility via telephone channel to Disconnect the generation from the faulted circuit prior to opening of the Utility breaker or recloser.

6.2.3 Metering

The metering scheme(s) required to measure the generation delivered to the Utility, or any service power required by the Developer and supplied by the Utility (i.e., temporary, back-up, maintenance, or permanent service), will be dictated by the Agreement terms negotiated between the Utility and the Developer. The metering scheme(s) will be designed by the Utility.

6.2.3.1.1 *Metering Point at Source of Generation*

When the metering point is located at the source of generation, the Developer shall provide space and mounting structures for the metering equipment in the Developer's interconnection facilities. A suitable Disconnect Switch(es) (group-operated, with a visible open) operable and lockable by the Utility, shall be provided by the Developer to isolate the metering instrument transformers (VTs and CTs), for maintenance and testing. The metering CTs shall be located on the Utility side of the metering VTs. The Developer shall also provide the conduit(s) required between the instrument transformer secondary junction box(es) and the metering enclosure(s).

a. The Utility will normally purchase, install, test and maintain the metering instrument transformers (VTs and CTs), meters, enclosure(s), and ancillary equipment required for metering of the Developer's generating facility. The Utility will provide instrument transformer outline drawings and meter enclosure physical information to the Developer to incorporate into the design of the Developer's interconnection facilities. The Developer shall coordinate the location of the metering equipment with the Utility. The Developer shall provide drawings showing the location and mounting structure details for the metering instrument transformers and meter enclosure, for the Utility's review and acceptance.
b. The Utility will install all connections between the instrument transformer secondaries and the meter test switches, along with meter interconnections and connections to ancillary equipment.
c. When required, the Developer shall supply additional source(s) of 120 volt ac, single phase station power to the meter ancillary equipment. The supply circuit(s) shall be dedicated for the Utility's use only. The Utility will make all connections to the ancillary equipment from a specified demarcation point. The Utility will provide the Developer with power requirements. This supply circuit shall not be interrupted during routine switching and maintenance outages.

d. In some instances, to facilitate construction and installation, the Utility may authorize the Developer to include the purchase and/or installation of metering instrument transformers in the Developer's interconnection facilities. The Utility will provide equipment specifications and accuracy requirements for any instrument transformers to be purchased by the Developer. The Developer shall provide equipment drawings and certified test data for the Utility's review and acceptance.

e. The Developer shall furnish a dedicated standard "voice-grade POTS" (plain old telephone system) telephone channel and jack to a designated demarcation point for remote meter interrogation.

f. The Utility shall have access to all metering equipment located within the Developer's interconnection facilities to perform initial and routine in-service maintenance and testing. The Utility will notify the Developer prior to entering the Developer's facilities.

6.2.3.1.2 *Meter Point at Location Other than the Generation Source*

When the metering point is located at a location other than the source of generation, the Utility will purchase, install, test, and maintain the metering instrument transformers (VTs and CTs), meters, enclosure(s), ancillary equipment, and mounting structures required for metering of the Developer's generating facility.

6.2.3.1.3 *Dedicated Phone Line*

The Developer will be responsible for providing 2-wire, dial-up, dedicated telephone line(s) at the demarcation point adjacent to the Utility's metering location(s). The telephone line(s) shall provide the Utility with remote metering reading capability. The Developer shall be responsible for all costs related to obtaining, installing, testing, commissioning and maintaining the telephone line(s) as those costs may be charged by the telephone company.

6.2.3.1.4 *Instrument Transformers*

Instrument transformers utilized for metering the Developer's generation delivered to the Utility, or any service power required by the Developer and supplied by the Utility will not be used for other functions (i.e., protective relaying, telemetering, etc.).

6.2.3.1.5 *Cost Responsibility*

The Developer will be responsible for all costs associated with the installation, testing and maintenance of the metering equipment. The Utility will retain ownership of all metering equipment.

6.2.4 Data Telemetering

For Developer's generating facilities with an installed capacity of greater than 2 MW, or for Merchant Generators, plant net Kilowatt, Kilovar, Kilowatt-hour output, and bus voltage shall be required to be continuously (every two seconds) sent to the Utility's Energy Control Center. At the Utility's option, circuit breaker status, control and critical alarms may also be required. For Developer's generating facilities 2 MW or less, data telemetering may be required at the Utility's option, depending on the interconnection system requirements.

6.2.4.1.1 *Data Transmittal*

This data may be transmitted, at the Utility's option, to a local Utility facility that has a Remote Terminal Unit ("RTU") on the Utility's Supervisory Control and Data Acquisition ("SCADA") system for retransmission to the Utility's Energy Control Center. Alternatively, a Utility SCADA RTU may be installed directly at the Developer's facility.

6.2.4.1.2 *Dedicated Leased Phone Channel*

If the Utility requires the Developer to install an RTU at their generating facility, the Developer must provide RTU communications to the Utility's Energy Control Center via a dedicated leased telephone channel. The Developer shall obtain a leased telephone channel to a Utility connection point (located at an AT&T POP facility for all inter-LATA circuits). For intra-LATA circuits, the Developer shall connect to the Utility's Energy Control Center via a dedicated channel. The Developer will be invoiced by the Utility for the connection between the AT&T POP facility and the Utility's Energy Control Center. The Developer shall be responsible for ordering and paying for the telephone channel from the Developer's generating facilities to the dedicated connection point.

6.2.4.1.3 *Telemetry Information Requirements*

A 485 communications interface will be connected to the billing meter to carry the analog measurements, via DNP3.0 protocol, to the RTU communications port. Any IED’s for the analog measurement of volts, watts, and reactive volt-amperes shall conform to ANSI standards C39.1, C39.5, and C37.90A. Instrument transformers shall conform to ANSI standard C57.13.

The Utility will inform the Developer of full scale values for volts, watts and vars. This information will determine the calibration range of the transducer and define scaling resistor requirements.

The Developer shall provide pertinent telemetering information, as noted in Section 4.13, for the Utility's review and acceptance.

The Developer will be required to bring the analog value communications from the billing meter, the digital alarms and the breaker position, and the breaker control wiring to a demarcation block for the RTU. The Developer will also prepare a point list diagram that describes the order of the signals brought to the terminal block. The Utility technicians will deliver the RTU, mount it next to the terminal block, wire from the terminal block into the RTU, and program the RTU.

6.2.4.1.4 *Equipment and Cost Responsibility*

The Developer shall be responsible for all telemetering equipment and be required to pay for all the costs associated with its purchase, installation, operation, test and maintenance of this equipment.

6.2.4.1.5 *Testing*

After initial testing and acceptance, the Developer is required to provide the Utility with certified transducer test results once every two years to coincide with the required protection system periodic test schedule.

6.3 Protective Relay Communications and Monitoring Systems

This Section 6.3 specifies the Utility's requirements for the purchase and installation of protective relay communications systems and monitoring equipment. Communication facilities for protective relaying applications (i.e., pilot and/or direct transfer trip), and/or monitoring equipment which are required (as defined in the system modifications) for the Utility's and the Developer's facilities for the purpose of accepting IPP generation for interconnection, shall be designed, purchased, and installed in accordance with the following requirements:

6.3.1 Terminal Equipment

6.3.1.1.1 *Ownership*

The metering point will generally establish the demarcation. All equipment on the Developer's side of the metering point will be owned, operated, and maintained by the Developer. All equipment on the Utility side of the metering point will be owned, operated, and maintained by the Utility. At the Utility's option, the Developer may purchase equipment to be installed on the Utility side of the metering point. However, upon Utility acceptance of the equipment for interconnection and energization of the Developer's facilities, the Utility will own, operate and maintain the equipment.

6.3.1.1.2 *Cost Estimates*

Upon identification of the need for a communications and/or monitoring system(s), the Utility will provide the Developer with a cost estimate, which will identify billable costs and functional requirements.

6.3.1.1.3 *Specification and Ordering Responsibilities*

After the Utility furnishes the Developer with communication system requirements and associated costs and responsibilities, the Developer shall be responsible for the procurement of all equipment and associated hardware for the Developer's end of the interconnection. The Utility will provide the Developer with equipment specifications and any unique design requirements. Additionally, the Utility will supply the Developer with an Utility-approved vendors list for the equipment. The Developer shall be the lead contact with the equipment vendor(s).

The Developer shall provide copies of all vendor bid proposals and any subsequent correspondence between the Developer and the equipment supplier(s) dealing with any proposed technical modifications to the Utility specified equipment as well as the equipment delivery schedules. Any vendor exceptions to the Utility supplied specification(s) will require the Utility's review and acceptance. The Utility's review of vendor bid proposals must be completed before purchase orders are placed for the equipment.

6.3.1.1.4 *Documentation*

The Developer shall submit to the Utility a complete set of vendor's equipment drawings throughout various phases of the project. The Utility will review this documentation and provide the Developer with comments regarding equipment modifications. Specific documentation requirements and review procedures are outlined in the Utility-supplied equipment specifications.

6.3.1.1.5 *Installation and Delivery*

Each party will be responsible for equipment installation at their respective ends. The Utility will not install equipment at the Developer's facility.

The Utility-end equipment will be delivered directly to a specified Utility Division Service Center. Upon receipt of the equipment, each party will be responsible for acceptance testing of equipment for their respective ends. The Developer shall test all equipment in accordance with Appendix 1, “IPP Protective Relay Communications and Monitoring Equipment Test Requirements.”

6.3.1.2 Remote Alarming, Control and Metering

Where protective relay communications systems are required, the Developer shall provide remote alarming of the systems’ "off-normal" conditions to a designated Utility location. This can be accomplished through a Utility RTU, if one will be located at the

Developer's facility. If an RTU is not required at the Developer's facility, protective relay communication systems alarm information must be provided by alternate means.

In facilities where an RTU is required, the following status points at the facility are required to be monitored by the RTU ("breaker" corresponds to all interrupting devices in the facility that interconnect generation to the Utility system):

- Status of interconnecting breaker(s) and individual generator breakers ("a" switch indication)
- Breaker trouble (interconnecting breaker(s) only)
- Loss of relay DC
- Loss of relay AC potential
- Protective Relay cutoff switches (if any)
- Relay trouble
- Supervisory cutoff of devices controlled through the RTU (Local-Remote)

In addition, where an RTU is required, the Utility requires (through the RTU) control of all breakers in the facility that interconnect generation to the Utility system.

Depending on the MVA capacity of the facility, the Utility requires that various analog data points be monitored by the RTU. These points may include, but are not limited to, the following (also referenced in Section 6.2.3.3):

- Watts, vars, MWH, amperes of each unit within the facility
- Watts, vars, MWH, amperes of the total facility
- Bus voltage at which the plant is interconnected to the Utility

6.3.1.3 Spare Parts

The Utility **strongly recommends** that the Developer stock a complete set of spare parts. Loss of a protective relay communications system will compromise the reliability of the protective system, and the Developer will be forced to disconnect the generation from the Utility system until such time that the communications system is back in service.

6.3.2 Communications Media

6.3.2.1 Leased Communications Media

Leased telephone channels for protective relaying shall conform to the Bell Systems Technical Reference - PUB 41011-C6, Transmission Specifications For Voice Grade Private Line Audio Tone Protective Relay Channels.

Leased telephone channels for data shall conform to the Bell Systems Technical Reference - PUB 41004, Data Communications Using Voiceband Private Line Channels; and, PUB 41009, Transmission Parameters Affecting Voiceband Data Transmission - Measuring Techniques.

6.3.2.1.1 *Standards*

The Developer is responsible to ensure compliance with the most current version of the following standards.

(IEEE Std. 487) - IEEE Guide for Protection of Wire-Line Communications Facilities Serving Electric Power Stations (IEEE Std. 367) -IEEE Guide for Determining the Maximum Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault.

6.3.2.1.2 *Liaison and Ordering Responsibilities*

Telephone channel ordering and interface responsibilities with the telephone company(ies) will be the sole responsibility of the Developer.

6.3.2.1.3 *Cost Estimates*

For protective relaying applications, the Developer is solely responsible to obtain communication channel installation and monthly rental charges from the appropriate telephone company(ies).

6.3.2.1.4 *Ground Potential Rise Considerations*

If high voltage special protection ("HVSP") equipment is required, as identified by Ground Potential Rise ("GPR") studies, the Developer will incur all expenses for such equipment. If the telephone company(ies) do not allow customer ownership of HVSP equipment, then it will be the responsibility of the Developer to procure HVSP equipment for both ends of the interconnection.

Where the local communications carrier's tariff(s) allow customer ownership of HVSP equipment, the Utility will negotiate directly with the telephone company(ies), at the Developer's expense, for ownership and maintenance arrangements for the Utility-end only. If HVSP equipment already exists at the Utility location, the Developer will be informed of this requirement at the outset of the project. The Utility will not estimate the cost of HVSP equipment.

The Utility will calculate the GPR for the Utility terminal(s) and supply the necessary information for the Developer to determine the GPR at the Developer's location. The Developer's GPR calculations and associated results (including earth resistance measurement data) shall be submitted to the Utility for review of the Developer-end HVSP requirements.

6.3.2.1.5 *Notification Requirements*

The Utility shall be notified of the circuit type requisitioned via copy of the circuit order issued by the Developer to the telephone company(ies). The Developer shall notify the Utility a minimum of two weeks in advance of the telephone channel installation so that proper arrangements can be made to have a Utility representative present during telephone company installation of the leased circuit(s) at the Utility-end.

6.3.2.2 Privately Owned Communications Media

If it is technically and economically feasible to install privately owned fiber optic, hardwire, or power line carrier protective relay, and/or data communications systems, the Developer and the Utility shall mutually agree on the types of systems to be used and the engineering specification, procurement, and installation responsibilities and requirements.

Any communications system designed or proposed by the Developer shall conform to all applicable ANSI, IEEE, NEC, NESC, and Utility standards.

The Utility will have the right to review and accept all systems designed, specified, procured, and installed by the Developer or the Developer's agent.

6.3.3 Other Utilities

Where other foreign electric utilities are involved in the Developer's generation project, the Developer shall be responsible to coordinate the engineering, procurement and installation of protective relay communications and monitoring systems. The Developer shall be responsible for negotiating and/or obtaining any additional agreements or contract requirements.

7 INSPECTION, CERTIFICATION, TESTING, AND MAINTENANCE REQUIREMENTS

7.1 Inspection and Certification Requirements

The Developer's electrical equipment and interconnection wiring shall be in accordance with applicable portions of the NEC, NESC, and all other applicable codes, as required. The Developer shall obtain a written statement from the qualified New York State Licensed P.E. utilized to design the Developer's protection system, certifying that the Developer's facility, as designed and constructed, is in complete accordance with all applicable codes. This statement shall have the P.E.'s seal affixed on it. A copy of the statement shall be furnished to the Utility.

The Utility also requires the Developer to obtain certification that the Developer's electrical equipment and interconnection wiring is in accordance with all applicable codes, from an authorized electrical inspection organization acceptable to the Utility. Names of such organizations will be provided upon request. Once the Developer has selected one of the Utility-approved inspection organizations and the inspection process has been initiated, the selected inspection organization must be retained by the Developer throughout the inspection process until certification is granted. The Utility must be presented with written evidence showing that all electrical equipment and interconnection wiring at the Developer's facility has been inspected and certified by a qualified inspection organization **prior** to the beginning of initial inspection and testing.

7.2 Test Requirements

The Developer shall arrange for qualified personnel to perform calibration and functional tests on the fault and isolation protection systems, along with tests on CTs and VTs utilized in the protection systems, in accordance with typical Utility industry practices. The tests that shall be performed during the initial and periodic tests are detailed in Section 7.2.3. The Developer shall provide the name and qualifications of the individual(s) who will be performing the tests, for the Utility's acceptance.

7.2.1 Initial Inspection and Tests

Prior to the initial parallel operation of the Developer's equipment with the Utility system, or after modifications are made to plant already interconnected with the Utility system, Utility personnel must be present for the protective relay and associated equipment calibration and functional tests, as well as the inspection of the Developer's equipment. The Developer will be invoiced for the costs for Utility personnel to inspect and witness these tests. The Utility requires a minimum of **two (2) weeks** notice prior to witnessing the Developer's protection system calibration and testing.

It is **not** the Utility's policy to lease test equipment or provide assistance during testing.

The Developer shall provide the Utility a copy of all certified test reports for the initial inspection and tests of the Developer's equipment. Certified test reports must be submitted to the Utility prior to synchronization of the Developer's generation with the Utility's system.

7.2.2 Periodic Tests

Periodic calibration and functional tests of the Developer's isolation protection and protection for detecting faults on the Utility system and within the plant are required on a four-year basis for microprocessor-based relays that include self-test algorithms, or on a biennial (once every two years) basis for all other relays. Copies of certified test reports for microprocessor-based relays that include self-test algorithms shall be submitted to the Utility every six years. Copies of certified test reports for all other relays shall be submitted to the Utility on a biennial basis. Also, a battery maintenance log (if applicable) shall be submitted to the Utility on a biennial basis.

For relays installed in accordance with the "NPCC Criteria for the Protection of the Bulk Power System", maintenance intervals shall be in accordance with the "NPCC Maintenance Criteria for Bulk Power System Protection".

In order for the Developer's testing and inspection to be considered certified and accepted by the Utility, it must be performed under the direction of a qualified New York State licensed Professional Engineer ("P.E."). Additionally, test results and Developer's equipment data must be stamped by the qualified P.E. witnessing or performing the checkout and testing. The Developer is responsible to ensure that the P.E. witnessing or performing equipment calibration and start-up testing on the Developer's behalf has an extensive background in this field.

Periodic tests may be witnessed by the Utility at the Utility's option in lieu of P.E. certified tests. The Utility also reserves the right to inspect any of the Developer's equipment upon prior notice.

7.2.3 Tests to be Performed

The following tests shall be performed for the initial and periodic tests:

7.2.3.1 Current Transformer Test (initial tests only)

Field verify that the CT ratio and polarity are correct (Most easily accomplished during assembly). Verify the integrity of the CT insulation and secondary circuit using a 500 volt megger, and check for proper secondary ground connection.

7.2.3.2 Voltage Transformer Test (initial tests only)

Field-verify that the VT ratio is correct. Verify that correct voltages are present at the switchboard locations. Verify the integrity of the VT insulation and secondary circuit using a 500 volt megger and check for proper ground connection.

7.2.3.3 Calibration Test

The purpose of relay testing is to verify that a relay will respond to the appropriate inputs in the required manner as determined by the setting. The actual input quantities must be applied to the relay in accordance with the manufacturer's instruction book. The input quantities shall be determined by the relay settings. The settings must be consistent with those submitted by the Developer and accepted by the Utility. When testing electromechanical relays with time dials, sufficient test points must be taken to define the relay curve. The calibration data shall be documented in a legible format and contain all pertinent relay data. (Utility test forms may be used and are available upon request.)

7.2.3.4 Functional Test

A protective relay cannot function by itself. It is reliant upon other equipment such as instrument transformers, auxiliary relays, circuit breakers, interconnecting cables and control power to perform its protective function. The purpose of functional testing is to verify that the overall operation of the relay and its associated equipment is in accordance with its intended design. Therefore, it is beneficial for the Developer to develop specific test procedures with well-defined parameters for use during testing.

The functional tests must, at a minimum:

a. Verify that end devices from each protective scheme operate from every possible source of trip potential (including, if applicable, confirmation that the communications system operates the transfer trip end devices).
b. Verify that the end device contacts complete the trip circuit to the breaker, actually trip the breaker, and operate all associated auxiliary relays in the close and trip circuit.
c. Check for correct operation of synchronism check relay, block of close, and block of reclose.
d. AC Control Circuit - Verify circuit breaker trips upon loss of ac control power.
e. DC Control Circuit - Verify correct operation of dc control devices in the absence of ac supply. Battery systems shall be checked for proper recovery time after a circuit breaker has been operated.

7.2.3.5 Battery Maintenance

Battery systems must be serviced and maintained on a regular basis by the Developer. Each battery should be visually inspected for corrosion, damage and level of electrolyte. Voltage and specific gravity readings shall be taken for each cell in accordance with manufacturer's instructions and properly documented in a battery maintenance log.

8 ACCEPTANCE FOR INTERCONNECTION

8.1 Requirements for Interconnection

The Utility will notify the Developer in writing that the Developer's generating facility is accepted for interconnection to the Utility's system only after **ALL** of the following items have been completed:

8.1.1 Protection Design

Formal Acceptance of the Developer's proposed generation and protection design by the Utility.

8.1.2 PE Certification

Developer has obtained a written statement from a qualified New York State licensed P.E. certifying that the facility, as constructed, is in complete accordance with all applicable codes, with a copy of the certification provided to the Utility.

8.1.3 Certificate of Inspection

Developer's facility has been inspected and certified by a Utility-approved inspection organization, with a copy of the certification provided to the Utility.

8.1.4 Utility Inspection

The Utility has inspected and accepted the Developer's protection and interconnection equipment.

8.1.5 Testing Completion

Developer has satisfactorily completed all calibration and functional tests on the protection system(s), witnessed by the Utility.

8.1.6 Safety and Operating Procedures

The Developer is familiar with the Utility's safety and operating procedures, switching and tagging procedures, etc. Copies of these procedures will be provided by the Utility, and the Developer will be required to attend a scheduled training seminar conducted by the Utility.

8.1.7 Other

All other terms of the Agreement are satisfied (i.e., insurance, etc.)

8.2 Interconnection/Synchronization of Developer's Facility

Upon receipt of the Utility's written acceptance of the Developer's facility for interconnection to the Utility system, the Developer shall provide a minimum of **two (2) weeks** prior written notice of the date that the facility will synchronize to the Utility system.

Just prior to interconnection with the Utility's system, the Developer shall verify that the rotational phase sequence of the Developer's voltage matches that of the Utility system.

Immediately after interconnection, a load test shall be performed to verify:

- The correct polarity and phasing of inputs to the directional relays under load conditions.
- The correct current and voltage magnitudes in the CT and VT secondary circuits, under load conditions.

8.3 Maintenance Requirements

The Developer's Generator Disconnect Switch, protection and control equipment, interrupting device and synchronizing and phasing equipment shall be maintained on a regular basis by qualified personnel in accordance with industry and/or manufacturer's practices. The Utility reserves the right to inspect such equipment after interconnection of the Developer's system. A maintenance schedule and log shall be maintained and made available for inspection by the Utility upon request.

8.4 Developer's System Modifications

Subsequent to the Utility's Formal Acceptance and Acceptance for Interconnection for parallel operation of the Developer's generation, the Developer shall not make any modifications or additions to its system without review and Formal Acceptance by the Utility. The Developer shall furnish the Utility with all documentation clearly indicating the modifications or additions being proposed. The Utility must review and Formally Accept these proposed modifications or additions prior to their implementation.

The Developer shall implement any fault and/or isolation protection system modifications identified by vendor defect reports, which would upgrade the interconnection protection to published vendor specifications. Upgrades involving devices that are installed solely for the protection of the Developer's equipment may be implemented at the discretion of the Developer.

9 ATTACHMENTS

The following attachments are included in the Bulletin for the Developer's use and reference:

Attachment 1	List of Information Required from Developer
Attachment 2	Independent Power Producer Generator Notice (Form NB-232)
Attachment 3	New York State Standardized Application for Single Phase Attachment of Parallel Generation Equipment 15 kW or Smaller
Attachment 4	New York State Standardized Application for Attachment of Parallel Generation Equipment 2 MW or Smaller
Attachment 5	Generator Information Sheet
Attachment 6	Exciter Information Sheet
Attachment 7	Governor Information Sheet
Attachment 8	Figure 1: Single Phase Induction Generator One Line Diagram
Attachment 9	Figure 2: Three Phase Induction Generator One Line Diagram
Attachment 10	Figure 3: Synchronous Generator One Line Diagram
Attachment 11	Figures 4.1,4.2 & 4.3: Methods of Grounding
Attachment 12	Shielded Cable Grounding Procedures for RTU/Tone Telemetry Systems
Attachment 13	Graph 1: Flicker Limitations, Distribution Standard A80
Attachment 14	NPCC Emergency Operating Criteria Underfrequency Load Shedding Curve
Attachment 15	Checkout Forms for Generation Protection by Type Tested and Approved Equipment
Attachment 16	Checkout Forms for Independent Power Producer Generation
Attachment 17	Utility Service Territory Maps

ATTACHMENT 1

INFORMATION REQUIRED FROM THE DEVELOPER

The Developer shall furnish **ALL** of the following information required to complete the Utility's Engineering Review Process:

*1. Utility Form NB-232
2. Project Schedule
*3. Site Plan
*4. Description of Operation
*5. One-Line Electrical Diagram of Complete Facility
*6. Generator One-Line Relay Diagram
*7. Generator Three-Line Relay Diagram or AC Elementary Diagram
8. Generator Elementary Control Diagram
*9. Generator, Exciter & Governor Information Sheets
10. Equipment Nameplate Data and Electrical Ratings for:
    a. Prime Mover(s)
    *b. Interface/Step-up Transformer(s)
    *c. Interrupting Devices (Breakers, Contactors, etc.)
    *d. Current Transformers
    *e. Voltage Transformers
    *f. Line/Disconnect Switches
    g. Capacitor Bank(s)
    h. Battery and Charger or Source of Power Supply to Protective Relays and Interrupting Devices
    i. Surge Arresters
    j. Other (as specifically requested)
11. Proposed Relay Types and Settings for Fault and Isolation Protection Schemes
12. Telemetering Information (When Applicable)
13. Protective Relay Communications and Monitoring Systems Information
14. Method of Excitation
*15. Minimum Site Load Without Generator On-Line
16. Generator Saturation Curve
17. Exciter Saturation Curve
18. Block Diagrams
19. Temporary Construction, Start-up & Station Service Power Information
20. Application for Non-Residential Electric and/or Gas Service NYSEG Form CD942)
21. Developer's Site Environmental Information
22. Regulatory Permits and Approvals
23. Additional Information as Required by the Utility for Completion of the Technical Reviews

NOTE:

1) Items listed above with asterisks (*) are required by NYSEG to complete the Preliminary Technical Review.

2) Additional information will be requested from the Developer when facilities are to be constructed by the Developer and transferred to the Utility upon completion.