NEXTERA ENERGY RESOURCES
Facility Connection Requirements

September 29, 2011

Revisions

Rev. No.	Date	Description	Approver
1	5/24/2010	Original	Joe Arasim
2	8/16/2010	Revised Section 1 contact information, Section 2.1.1 to include FERC references, Section 2.1.5 and 2.1.14 to add clarity to voltage ride-through requirements, and Section 2.1.6 to include RTU and SCADA references.	Dean Busch
3	9/29/2011	Revised Section 1 contact information.	Dean Busch

1. NEXTERA ENERGY RESOURCES' (NextEra) FACILITY CONNECTION REQUIREMENTS

This document is published in compliance with North American Electric Reliability Corporation (NERC) Reliability Standard FAC-001-0 Facility Connection Requirements (as may be amended from time to time). This document addresses connection requirements for generation, transmission and end-user connection to a generation lead owned by NextEra Energy Resources (NextEra). For purposes of this documents, a generation lead is a NextEra line that connects a generator to a transmission substation, and includes any such lines that have been classified as transmission lines by NERC (or one of the NERC regions), and for which NextEra has been registered as a Transmission Owner. Given the unique nature of connecting to a generation lead, NextEra understands that entities proposing to connect may need to better understand the application of the requirements to their proposed connection. Thus, any entity proposing to connect to a NextEra generation lead (or any entity with any questions related to this document) should contact as soon as possible the following NextEra contact to discuss the requirements set forth in this document in the context of their proposed connection:

Jan Bagnall
NextEra Energy Resources
Executive Director Transmission Business Management
700 Universe Blvd FEJ/JB
Juno Beach, FL 33408
Jan.Bagnall@nexteraenergy.com
561-304-6159

Consistent with R3 of FAC-001-0, NextEra does maintain and update this facility connection requirement document, as required. NextEra also shall make documentation of these requirements available to the users of the transmission system, the Regional Reliability Organization, and NERC on request within five business day. Currently, this document is also posted on **http://www.nexteraenergyresources.com/content/what/transmission.shtml**

Consistent with FAC-001-0 R1 and R2 and their sub-requirements, the remainder of this document addresses the following:

1.1 Generation Facilities

Generation facility connection requirements described in this document are general overviews of functional requirements for connecting new generation to a NextEra generation lead. Detailed, project specific requirements will be developed as part of coordinated Joint Studies, Interconnection Agreements, other applicable NERC or Regional Reliability Standards, applicable Regional Reliability Organization, subregional, Power Pool planning criteria and facility connection requirements or the National Electrical Safety Code (NESC).

1.2 Transmission Facilities

Transmission facility connection requirements described in this document are general overviews of functional requirements for connecting new transmission facilities to a NextEra generation lead. Detailed, project specific requirements will be developed as part of

coordinated Joint Studies, Interconnection Agreements, other applicable NERC or Regional Reliability Standards, applicable Regional Reliability Organization, subregional, Power Pool planning criteria and facility connection requirements or the NESC.

1.3 Delivery Point (end-user) Facilities

In the unlikely event an end-user proposes to connect to a NextEra generation lead, the facility connection requirements described in this document are general overviews of functional requirements for connecting as a Delivery Point. Detailed, project specific requirements will be developed as part of coordinated Joint Studies, Interconnection Agreements, other applicable NERC or Regional Reliability Standards, applicable Regional Reliability Organization, subregional, Power Pool planning criteria and facility connection requirements or the NESC.

2. MORE DETAILED INFORMATION ON FAC-001-0 R1 AND R2

This document has been prepared to identify the technical requirements for connecting new facilities to a NextEra generation lead. It applies to new connections or substantial modifications of an existing generation lead. Rather than give detailed technical specifications, this document provides a general overview of the functional objectives and requirements to be met in the design of facility connections. These requirements are written to establish a basis for maintaining reliability, power quality, and a safe environment for the general public, power consumers, maintenance personnel and the equipment.

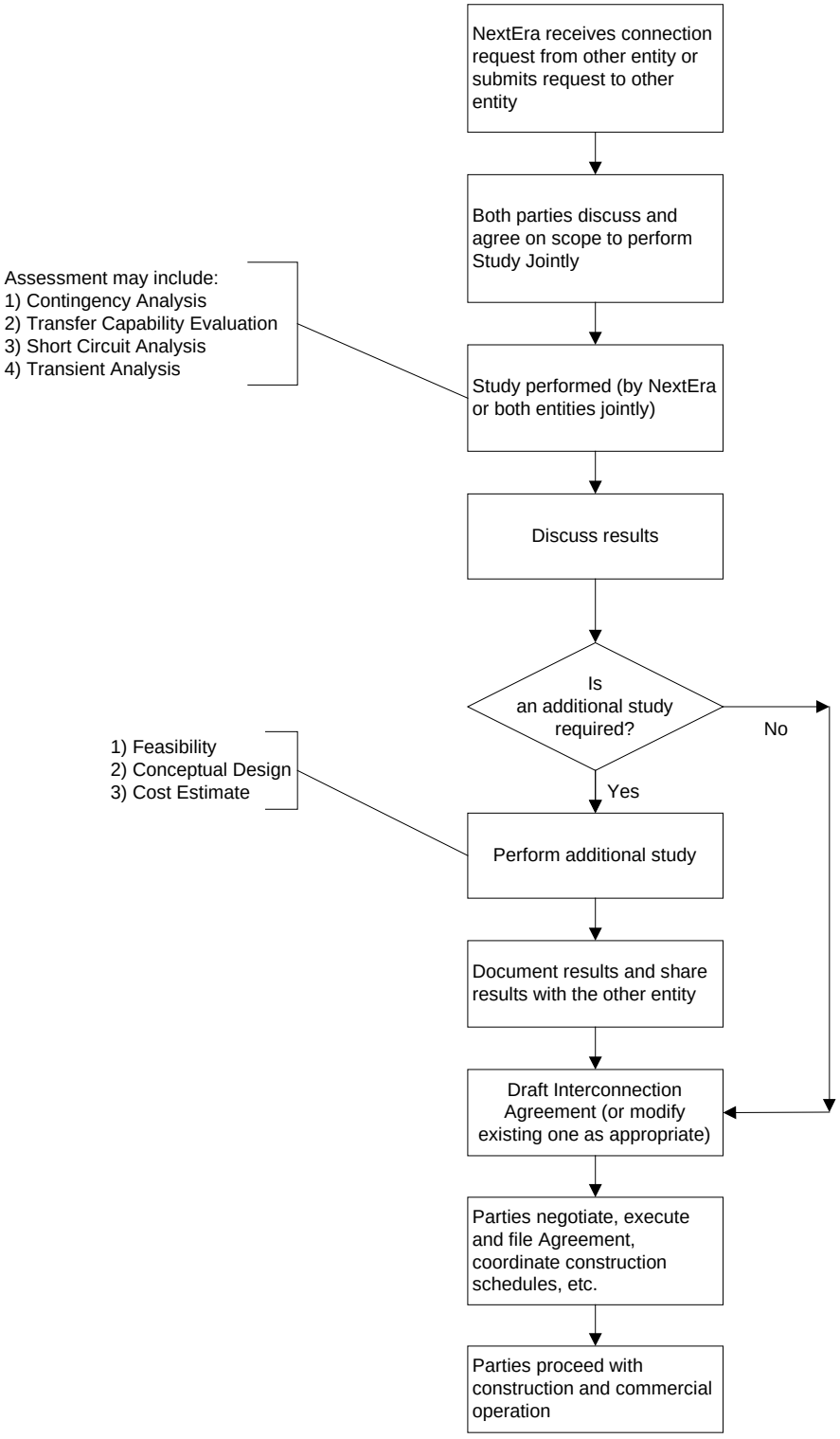
2.1 Summary of Plans to Achieve Required Performance (R2.1)

It is the intent of NextEra to achieve the required system performance and comply with the relevant NERC or Regional Reliability Standards as such relate to connections to the NextEra generation lead throughout the applicable planning horizon for the generation lead.

2.1.1 Procedure for Coordinated Joint Studies (R2.1.1)

The connection of generation, transmission, or Delivery Point (end-user) facilities to the NextEra generation lead generally should follow the Coordinated Facility Connection Joint Study Process outlined in Figure 1 below. Other procedures include the FERC Large Generator Interconnection Procedures and Small Generator Interconnection Procedures. When necessary, a study will be initiated to determine the cost of the connection and all NextEra facility improvements needed to accommodate the new connection.

Figure 1- Coordinated Facility Connection Joint Study Process[1]



[1] It is understood that each NERC region may require certain study procedures that will need to be followed by the parties for any Joint Study undertaken pursuant to this document.

2.1.2 Procedure for Notification of New or Modified Facilities to Others (R2.1.2)

Those entities seeking to connect shall notify the NextEra contact set forth in Section 1 as soon as feasible. Any changes that affect a generation lead must be reviewed well in advance of a proposed in-service date, so that consideration of modifications to the metering or protection scheme as well as the impacted equipment and any impact to the ratings of any related facility or equipment.

2.1.3 Voltage Level, MW, MVAR Capacity or Demand at Point of Connection (R2.1.3)

Given the unique nature of connecting to a generation lead, voltage level and megawatt (MW) and Megavar (MVAR) capacity or demand at point of connection shall be analyzed, as necessary and appropriate, during the study process. Notwithstanding, the following are voltage issues that need to be considered:

All synchronous generators connected to the NextEra generation lead are to be equipped with automatic voltage regulators (AVR). Generators with Mega Volt Ampere (MVA) ratings larger than 20.0 MVA connected to the NextEra generation lead shall operate with the generator's AVR on and in the automatic voltage control mode to the extent practicable unless otherwise approved by the applicable system operator consistent with NERC Reliability Standard VAR-002-1.1a as may be amended from time to time.

Entities connecting their transmission system with NextEra's generation lead shall endeavor to supply the reactive power required on their own system, except as otherwise mutually agreed with NextEra. NextEra shall not be obligated to supply or absorb reactive power for the other party when it interferes with NextEra's generation lead.

For end-users, the installation of power factor correction capacitor banks that compensate for the reactive power demands of customer loads may be required. The end-user should design and operate its load connections so that the load power factor measured at the point where the load connection exits is between 95% lagging and unity at all times. Delivery point(s) connections to the NextEra generation lead shall operate to meet the power factor requirements agreed to by the parties.

2.1.4 Breaker Duty and Surge Protection (R2.1.4)

Breaker duty and surge protection requirements are applicable to all generation facilities, transmission facilities and end-user facilities connected to the NextEra generation lead.

All circuit breakers and other fault interrupting devices shall be capable of safely interrupting fault currents for any fault they may be required to interrupt. AC high voltage circuit breakers are specified by operating voltage, continuous current, interrupting current, and operating time in accordance with ANSI/IEEE Standards C37 series, "Symmetrical Current Basis." These ratings are displayed on the individual Circuit Breaker nameplate. Breakers are scheduled for replacement when they exceed 100% of ANSI C37 Guidelines for breaker duty ratings. There may be cases where adding generation will increase the available fault current above the present interrupting ratings of the existing breakers at a substation or stations. When this occurs, breaker upgrades are to be considered as part of the interconnection project.

Application of circuit breaker duty rating shall be in accordance with ANSI/IEEE C37 standards.

Basic Surge Level (BSLs), surge arrester, conductor spacing and gap application, substation and transmission line insulation strength, protection, and shielding shall be documented and submitted for evaluation as part of the interconnection plan.

2.1.5 System Protection and Coordination (R2.1.5)

Utility grade, transmission level protective relays and fault clearing systems are to be provided on the interconnected power system. All protective relays should meet or exceed ANSI/IEEE Standard C37.90. Current transformers used for protection must be designed and installed in accordance with IEEE Standards. Adjoining power systems may share a common zone of protection between two parties. Compatible relaying equipment must be used on each side of the point of ownership within a given zone of protection. The design must provide coordination for speed and sensitivity in order to maintain power system security and reliability.

System Protection Requirements for Generation Facilities:

Generators connecting to the NextEra generation lead are responsible for protecting those facilities from electrical faults and other hazardous conditions. Generator interconnections must be equipped with circuit breakers or other appropriate interrupting devices to protect those facilities. The generator owner must provide and own the primary circuit breaker or other interrupting device that protects the facility and disconnects it from the NextEra generation lead. The primary purpose of this interrupting device is to protect the generating plant facility. The protection system design must provide coordination for speed and sensitivity in order to maintain power system security and reliability.

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System Protection Requirements for Transmission Facilities and End-User Facilities:

All primary protective relaying must operate within a time that meets the performance criteria established under the NERC TPL series of Reliability Standards.

Backup protective systems must provide additional coverage for breaker and relay failure. Backup systems should operate for failures on either side of an interconnection point to the extent possible. Time and sensitivity coordination must be maintained to prevent misoperations.

A power source for tripping and control must be provided at substations by a DC storage battery. The battery is to be sized with enough capacity to operate all tripping devices after eight hours without a charger and in accordance with IEEE Standards. An undervoltage alarm must be provided for remote monitoring by the facilities owners who shall take immediate action to restore power to the protective equipment.

A transfer trip is required for many installations. It is used for backup protection and islanding schemes. Fiber optics is the preferred means of communication. Power line carrier is also used. Audio tone over phone line is the least preferred method because it may not meet requirements for speed and reliability.

End-users are responsible for providing a reliable protective relaying scheme for their power transformer connected to the NextEra generation lead. All faults on the transformers, bushings and transformer high-side arresters must be isolated by tripping a transformer high side fault interrupting device. Faults on the transformer high-side windings, high-side bushings, and transformer high-side arresters must be cleared to coordinate with transmission protection systems. This is to assure that a permanent failure in this zone would not result in a permanent outage of a transmission line segment. Faults in this zone must be coordinated with any applicable NextEra remote relaying.

2.1.6 Metering and Telecommunications (R2.1.6)

Metering and Telemetry Requirements for Generation Facilities

All generating plants greater than 20MVA connected to the NextEra generation lead must provide real time telemetered data for individual generators to the applicable system control center. The required data includes generator MW, MVAR, terminal voltage and switchyard high side voltages. MW and MVAR data should be Net output values as measured at the point of interconnection.

Metering and Telemetry Requirements for Transmission Facilities and End–User Facilities

Metering equipment shall be installed as close to the change of ownership as possible. All inter-utility tie lines connected to the NextEra generation lead must provide real time telemetered data to the applicable system control center. The required data includes MW, MVAR, and switchyard voltages.

Each installation needs to be evaluated separately for metering requirements because of the many possible contractual agreements and connection configurations. All metering devices are to be pre-approved by NextEra prior to installation. Dual ported remote terminal units (RTU's) accessed by both parties may be used, provided the appropriate security levels are implemented. Equipment control of breakers switches and other devices via SCADA is to be provided to only one responsible party. Power for SCADA or metering communication equipment, if needed, is to be provided by station battery. Office type power systems are not acceptable.

Instrument transformers are to have an accuracy class of 0.3% or better with 0.15% being preferred. Metering accuracy CTs and PTs are to be installed as close to the delivery point as practical. Metering CT's are not to be connected in parallel. Auxiliary CT's are not to be used in metering circuits. When more than one point is to be monitored, individual metering is to be used. The impedance of the CT and PT cable leads is to be kept low and not impose burdens above that of the instrument transformer rating.

At 500 kV and above, metering accuracy CCVT's may be used. Whenever metering accuracy CCVT's are installed, a testing program must be provided to ensure the devices maintain accuracy over time.

When the metering location is different from the delivery point, compensation for losses is required for transformer losses and transmission line losses.

Revenue meters are to have an accuracy class of 0.3% or better. Transducers are to be accurate to +/- 0.2% of full scale. Three element meters are to be used on all effectively grounded power systems. Revenue meters are to remain sealed during operation and following maintenance or calibration testing. All parties are to be notified prior to removing seals. Calibration testing is to be performed on an interval consistent with accepted industry practice. Maintenance is to include all associated parties. Test equipment must be certified and traceable to the National Bureau of Standards.

2.1.7 Grounding and Safety Issues (R 2.1.7)

Safety is of utmost importance. Strict adherence to established switching, tagging and grounding procedures is required at all times for the safety of personnel. Any work carried out within a facility shall be performed in accordance with all applicable laws, rules, and regulations and in compliance with Occupational Safety and Health Administration, NESC and good utility practice. Automatic and manual disconnect devices are to be provided as a means of removing all sources of current to any particular element of the power system. Only trained operators are to perform switching functions within a facility under the direction of the responsible dispatcher or designated person as outlined in the NESC.

Grounding Requirements for Generation Facilities (Source Systems)

When various switching devices are opened on an energized circuit, its ground reference may be lost if all sources are not effectively grounded. This situation may cause overvoltages that can affect personnel safety and damage equipment. This is especially true when one phase becomes short circuited to ground. Therefore, the interconnected transmission power system is to be effectively grounded from all sources. This is defined as $X_0/X_1 \leq 3$ and $R_0/X_1 \leq 1$. Interconnected generators should provide for effective system grounding of the high side transmission equipment by means of a grounded high voltage transformer.

An alternative design only for sites is available in some limited cases but requires a special Electromagnetic Transients Program (EMTP) system study to determine applicability. Under this non-preferred option the system is not grounded at the source. However, the transmission system equipment insulation level in the area must be rated to withstand the amplitude and duration of all overvoltages caused by neutral displacement. Also the source must be removed rapidly when any overvoltage condition occurs. This includes isolation of the ungrounded source for system faults simultaneously with other relaying systems within the protected zone. Since the source provides no ground fault current, relay protection devices must operate for zero current. Some switching operations may cause the loss of all remote ground sources by islanding a part of the system even under non-fault conditions. The protection scheme must also be able to quickly remove the generation under this situation before any adverse effects occur. Some form of communication with remote transmission stations is usually required in order to accomplish this.

Grounding Requirements for Transmission Facilities and end-user Facilities:

Each interconnection substation must have a ground grid that solidly grounds all metallic structures and other non-energized metallic equipment. This grid and grounding system shall be designed to meet the requirements of ANSI/IEEE 80, IEEE Guide for Safety in AC

Substation Grounding and ANSI/IEEE C2, National Electrical Safety Code. The transmission line overhead ground wire (OHGW) shall be connected to the substation ground grid.

If the interconnection substation is close to another substation, the two grids may be isolated or connected. Connected grids are preferred, since they are easier to connect than to isolate. If the ground grids are to be isolated, there may be no metallic ground connections between the two substation ground grids. There must also be sufficient physical separation to limit soil conduction. If the ground grids are to be interconnected, the interconnecting cables must have sufficient capacity to handle the fault currents, duration, and duty. NextEra must approve any connection to a NextEra ground.

All transmission line structures must be adequately bonded and grounded to control step and touch potential in compliance with the NESC, and to provide adequate lightning performance. All transmission lines should have a continuous ground wire, not relying on earth as the primary conductor, to transfer fault current between structures and to substations and plant switchyards. Any exceptions to a continuous ground wire shall be verified with a system study. All ground wires and bond wires must be adequately sized to handle anticipated maximum fault currents and duty without damage.

Transmission interconnections may substantially increase fault current levels at nearby substations and transmission lines. Modifications to the ground grids of existing substations and OHGWs of existing lines may be necessary. The interconnection studies will determine if modifications are required and the scope and cost of the modifications.

2.1.8 Insulation and Insulation Coordination (R 2.1.8)
Insulation and Insulation Coordination requirements are applicable to all generation facilities, transmission facilities and end-user facilities connected to the NextEra generation lead.

Insulation coordination is the selection of insulation strength. Insulation coordination must be done properly to ensure electrical system reliability and personnel safety. Basic Surge Level (BSLs), surge arrester, conductor spacing and gap application, substation and transmission line insulation strength, protection, and shielding shall be documented and submitted for evaluation as part of the interconnection plan.

2.1.9 Voltage, Reactive Power, and Power Factor Control (R2.1.9)
Given the unique nature of connecting to a generation lead, voltage, reactive power and power factor control requirements will be considered on a case-by-case basis. Please refer to Section 2.1.5 for a discussion of generator and transmission requirements related to voltage, reactive power and power factor control. In addition, in order to assess power factor, the end-user delivery point real (kW) and reactive demands (kVar) shall be recorded as agreed to with NextEra.

2.1.10 Power Quality Impacts (R2.1.10)
Power quality requirements are applicable to all generation facilities, transmission facilities and end-user facilities connected to a NextEra generation lead. Generation of harmonics should be limited to values prescribed by IEEE Standard 519 when measured at the interconnection point of ownership. Additionally, a NextEra generation lead should not be

subjected to harmonic currents in excess of 5% of a transformer's rated current as stated in ANSI/IEEE Standard C57.12.00.

2.1.11 Equipment Ratings (R2.1.11)

Equipment rating requirements are applicable to all generation facilities, transmission facilities and end-user facilities connected to a NextEra generation lead. For facility and equipment ratings, reference the NextEra Facility Rating Methodology document, which may be obtained from the NextEra contact set forth in Section 1.

2.1.12 Synchronizing of Facilities (R2.1.12)

Generation Facilities: Prior to commercial operation, the owner of a synchronous generator with a rating larger than 20 MVA shall provide the NextEra's contact set forth in Section 1 with documentation that describes the functional operation and settings for the AVR's control functions. This documentation shall demonstrate the AVR's controls are coordinated with the generator protection and with the generator's short term capabilities. In cases where the AVR has been set to regulate a voltage other than the generator's terminal voltage or it has been set to regulate a compensated terminal voltage, sufficient data shall be provided to allow the AVR to be modeled accurately.

Provision of Generator Test Data – One of the standard generator commissioning tests is to introduce a step change in the AVR's reference voltage with the generator running at synchronous speed but not connected to the transmission system. This is referred to the open circuit, step in voltage test and is used to confirm the AVR is functioning properly. Prior to commercial operation, the owner of a synchronous generator with a rating larger than 20 MVA is encouraged to provide NextEra's contact set forth in Section 1 with open circuit, step in voltage test results. Recordings of the generator terminal voltage and generator field voltage magnitudes should be provided together with any calibration data necessary to equate the recordings with actual voltages. In situations where it is impractical to measure the generator field voltage (*e.g.*, brushless excitation systems) alternate quantities with equivalent response characteristics can be provided. An estimate of the generator's field winding temperature during this test should also be provided.

Each generating facility shall provide a point of contact to the NextEra. A point of contact shall be reachable and available through telephone or other agreed upon means of communication at all times when the generating facility is energized or in operation. Any synchronizing the generation facility to or disconnecting the facility from the NextEra generator lead must get pre-approval from NextEra contact set forth in Section 1. Disconnection without prior approval is permitted only when necessary to prevent injury to personnel or damage to equipment. Permission to synchronize to the interconnected system must be requested of NextEra following any overhaul, unit trip or islanding.

It is the responsibility of the generation facility owner to provide all devices necessary to protect the customer's equipment from damage by abnormal conditions and operations that might occur on the interconnected power system. The facility owner shall protect its generator and associated equipment from overvoltage, undervoltage, overload, short circuits (including ground fault conditions), open circuits, phase unbalance, phase reversal, surges from

switching and lightning, over and under frequency conditions, and other injurious electrical conditions that may arise on the interconnected system.

Transmission and end-user Facilities: It is the responsibility of the facility owner to provide for the orderly re-energization and synchronizing of their high voltage equipment to other parts of the electric system. Appropriate operating procedures and equipment designs are needed to guard against out-of-synch closure or uncontrolled energization. Each owner is responsible to know and follow all applicable regulations, industry guidelines, safety requirements, and accepted practice for the design, operation and maintenance of the facility.

2.1.13 Maintenance Coordination (R2.1.13)

The maintenance of facilities is the responsibility of the owner of those facilities. Adjoining facilities on the interconnected power system are to be maintained in accordance with accepted industry practices and procedures. Each party is to have a documented maintenance program ensuring the proper operation of equipment. NextEra will have the right to review maintenance reports and calibration records of equipment that could impact the NextEra generation lead if not properly maintained. NextEra is to be notified as soon as practicable about any out of service equipment that might effect the protection, monitoring, or operation of interconnected facilities.

2.1.14 Operational Issues (abnormal frequency and voltages) (R2.1.14)

Generators connected to the NextEra generation lead must be able to withstand certain temporary excursions in voltage, frequency, reactive and real power output without tripping. A waiver may be justified in certain special circumstances such as low adverse reliability consequences from generator tripping, if mutually agreed to by NextEra.

Generating facilities must be designed to remain online for normally cleared three-phase and delayed clearing single-line-to-ground faults within the close proximity to the plant switchyard (on the high-side of the generator step-up transformer). The ability of the generating unit to stay connected and synchronized with the transmission system during system disturbances is known as Low Voltage Ride-Through. Voltage may approach zero at the switchyard bus for four to nine cycles for some types of faults. Generating plants are required to remain in-service during three-phase faults with normal clearing (which is a time period of approximately 4 – 9 cycles) and single line to ground faults with delayed clearing, and subsequent post-fault voltage recovery to pre-fault voltage unless clearing the fault effectively disconnects the generator from the system except as allowed under the current NERC Standards and FERC Orders.

Most synchronous generator AVRs are equipped with limiting controls that help protect the generator while also allowing the generator to support the grid during temporary excursions in transmission voltage. The AVR's control and limiting functions must coordinate with the generator's short time capabilities and protective relay settings. These limiting controls must be properly coordinated with generator protection and with the generator’s short term voltage/reactive capabilities. Two common examples of these controls are the maximum excitation limiter (coordinates with overexcitation protection) and the minimum excitation limiter (coordinates with the loss of field relay). The generating equipment owner shall

provide NextEra contact set forth in Section 1 the AVR's control and limiter settings as well as the protection settings which coordinate with AVR control and limiting functions.

All new synchronous generators connected to the NextEra generation lead with a nameplate rating greater than 20 MVA shall be equipped with a speed/load governing control that has a speed droop characteristic in the 3 to 6% range. Notification of changes in the status of the speed/load governing controls must be provided to the NextEra contact set forth in Section 1.

All new synchronous generators connected to the NextEra generation lead with a nameplate rating greater than 100 MVA shall be equipped with a power system stabilizer. Technical evaluations of oscillatory stability will be conducted for the interconnection of new generating plants. New generators that cause a decrease in the damping of an existing mode of oscillation or cause a poorly damped mode of oscillation will be required to operate with the power system stabilizer in service. The determination of the power system stabilizer's control settings will be coordinated with NextEra. Typically this coordination would be to provide NextEra with preliminary power system stabilizer settings prior to the stabilizer's field commissioning tests with the final settings provided after the field commissioning tests

All operational issues shall be considered during the study phase. Also, please refer to Section 2.1.5. Prior approval from NextEra contact in Section 1 is require for any switching that energizes or de-energizes portions of the NextEra generator lead or that may adversely affect the NextEra generator lead. Industry and OSHA switching and safety procedures shall be strictly adhered to when maintenance is being performed. Also, each party shall maintain its system and facilities so as to avoid or minimize the likelihood of disturbances that might impair or interrupt service to the customers of the other party.

2.1.15 Inspection Requirements for Existing or New Facilities (R2.1.15)
Inspection requirements for existing or new facilities are applicable to all generation facilities, transmission facilities and end-user facilities connected to a NextEra generation lead. NextEra has the right to inspect without prior notice any of the connecting party's equipment directly related to the connection of the NextEra generator lead.

2.1.16 Communication and Procedures During Normal and Emergency Operating Conditions (R2.1.16)
Communication requirements during normal and emergency operating conditions are applicable to all generation facilities, transmission facilities and end-user facilities connected to the NextEra generation lead.

Operational procedures are established in accordance with NESC, OSHA, and NERC requirements. Each party shall designate operating representatives to address: lines of communications, maintenance coordination, actions to be taken after de-energization of interconnected facilities, and other required operating policies. All parties are to be provided with current station operating diagrams. Common, agreed upon nomenclature is to be used for naming stations, lines and switches.