

CITY OF HOMESTEAD



HST-FAC-001-0 FACILITY CONNECTION REQUIREMENTS

Revisions

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Facility Connection Requirements FAC-001-0

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1. Purpose & General Requirements

R1

The North American Electric Reliability Council (NERC) Reliability Standard FAC-001-0 requires to document, to maintain, and to publish Facility Connection Requirements (FCR) for generation, transmission and end-user facilities. The City of Homestead (COH) is registered as a Transmission Operator with NERC and is therefore responsible for complying with this reliability standard. The requirements are designed to ensure the safe operation, integrity and reliability of the City of Homestead electric system. They will be updated depending on changes to the subject standard by NERC and Florida Reliability Coordinating Council (FRCC) as well as evolutionary changes of COH electric system.

The City of Homestead transmission system consists of radial 138 kV transmission lines emanating from a single interconnection transmission substation (Lucy) with Florida Power & Light (FPL)'s Bulk Electric System (BES). COH's 138 kV transmission lines serve McMinn, Redland, and Renaissance distribution substations. The Ivy Power Plant which consists of approximately 41 MW of diesel fueled generation is connected at a distribution voltage level of 13.2 kV at Ivey distribution substation. Two 13.2 kV express underground cables connect the Ivey Power Plant to the McMinn distribution substation.

The information contained in this document is a guideline, not intended as a detailed specification, and provides an overview of the objectives and requirements needed for proper facility connections to COH's electric system. Final design of any facility connection to the City of Homestead electric system will be subject to review and approval by COH.

The following is a list of items that are addressed in this document, as per NERC FAC-001-0:

- Procedures for coordinated joint studies of new facilities and their impacts on the interconnected transmission systems.
- Procedures for notification of new or modified facilities to others (those responsible for the reliability of the interconnected transmission systems) as soon as feasible.
- Voltage level and MW and MVAR capacity or demand at point of connection.
- Breaker duty and surge protection.
- System protection and coordination.
- Metering and telecommunications.
- Grounding and safety issues.
- Insulation and insulation coordination.

- Voltage, Reactive Power, and power factor control.
- Power quality impacts.
- Equipment Ratings.
- Synchronizing of facilities.
- Maintenance coordination.
- Operational issues (abnormal frequency and voltages).
- Inspection requirements for existing or new facilities.
- Communications and procedures during normal and emergency operating conditions.

Any entity (generation, transmission, or end-user) that plans to connect facilities to COH's electric system should become familiar with COH's Facility Connection Requirements. The facility owner must apply with COH as early as possible to provide sufficient timeframe to meet facility in-service date.

COH will conduct, or hire a consultant to conduct, a Facility Connection Requirements Study to determine if COH's power system can accommodate the Applicant's facility and/or determine any system modification that may be required to reliably integrate such facility. The Applicant will be expected to pay for the cost of the FCR study.

COH will evaluate the Applicant's proposal on a case-by-case basis to determine the Applicant's facility impact on COH's system. If the Applicant's project will also interconnect with another electrical system, a joint study between COH and the other electrical system must be performed to assure all NERC reliability standards are satisfied.

The Applicant will be responsible for the cost of design, construction, inspection, analysis, maintenance, operations, monitoring, and all facilities required to satisfy the technical requirements for the project.

COH will require the Applicant to provide the following information, depending on type of facility, but more may be required during the planning and design phases of connection:

1. Facility name and contact name
2. Address
3. Phone number, fax number, e-mail address of contact name
4. Effective date of new connection or modification
5. Proposed location of project
6. One-line diagram of project
7. Preferred supply voltage
8. Load demand under normal and emergency conditions

9. Power factor
10. Expansion plans (type and size of potential loads)
11. Transmission line voltage, conductor rating, impedance, length, insulation, grounding, etc.
12. Transformer ratings, connections, voltage taps, impedances, and grounding
13. Lightning protection designs for transmission lines and stations
14. Special requirements (e.g. sensitive equipment, dual feeds, etc.)
15. Preferred method of connection (series, automatic high side swap-over, etc.)
16. Relay schemes, relay settings, protection equipment
17. Maintenance schedules and procedures
18. One-line diagram of plant distribution system and loads
19. Power factor correction capacitors size, connection, and control scheme
20. In-plant switchgear and protective device information
21. Motor loads, size, type, starting frequency, locked rotor amps, and rated voltage
22. Method of motor starting
23. Size, location, and characteristics of single-phase loads
24. Size, location, and characteristics of large fluctuating loads (arc furnaces, welders, etc.)
25. Size, location, and characteristics of harmonic producing load (variable speed drives, induction furnaces, etc.)
26. Size, method of operation, and location of one-site generation
27. Size, location, and characteristics of power conditioning equipment

R2

2. Facility Connection Requirements

The City of Homestead will allow a facility connection applicant (generation, transmission or end-use facilities) to connect to its electric system provided that there will be no adverse impacts on:

- The safe and efficient operation of COH's electric system;
- Neighboring utility systems;
- Planned connections with an earlier application date;
- The tax-exempt status of any bonds issued by the COH to finance facilities needed to provide the requested connection; or
- The general public.

To ensure a reliable bulk electric system, COH (or its assigned consultant) shall perform a Facility Connection Requirement (FCR) Study for all requests of facility connection to the COH Bulk Electric System. The FCR Study will include (as applicable) but are not limited to the following:

- Power Flow,
- Stability,
- Fault Duty, and
- Transfer Capability.

2.1.1. Procedures for coordinated joint studies of new facilities and their impacts on the interconnected transmission systems.

COH will utilize the FRCC Regional Transmission Planning Process in the instances that the FCR Study indicates any impact on the FRCC Bulk Electric System. All FCR studies that may impact Florida Power & Light's bulk electric system will be shared and coordinated with FPL to ensure reliability of the FRCC Bulk Electric System.

2.1.2. Procedures for notification of new or modified facilities to others (those responsible for the reliability of the interconnected transmission systems) as soon as feasible.

COH will, as required and necessary, advise other regional entities of any proposed and/or implemented new or modified facilities interconnected to the COH Bulk Electric System. COH will always notify neighboring Florida Power & Light Company at the earliest stage of feasible project.

2.1.3. Voltage level and MW and MVAR capacity or demand at point of connection.

At minimum, applicants must provide COH the following information:

- Load following capability
- AGC
- Reactive power output
- Minimum operating capability
- Remote control functions
- Coordination of generation control system settings
- Load shedding
- Black start capability
- Dynamic stability and the use of power system stabilizers
- Internal plant systems design (e.g., transformer rating/taps/impedance, cooling systems, generator/exciter rating) should be designed to support continuous reactive capability requirements at the point of transmission interconnection.
- Transmission interconnected equipment should have the tap ranges and self-regulation necessary to accommodate the transmission system's reactive power flow requirements.
- Load power factor
- Generator power factor
- Load equivalent sources of reactive power, if acceptable
- Generator equivalent sources of reactive power, if acceptable
- Transmission interconnections impact on adjacent areas' voltage and reactive power flow requirements
- Operational requirements that should be addressed include:
 - Operation at 60Hz nominal
 - Mode of frequency control
 - Operation of generators during frequency decline conditions
 - Coordination between generator controls and underfrequency load shedding programs
- Speed droop setting

- Responsibility for coordination with the appropriate operating entity
- Verification of reactive support capability per NERC Reliability Standards and corresponding FRCC documents
- Generator step-up transformer (GSU) tap changes as necessary to meet voltage schedule and reactive support requirements

2.1.4. Breaker duty and surge protection.

At minimum, applicants must provide COH the following information:

- Short circuit capabilities of current carrying elements
- Ratings of interrupting devices
- Existing and planned future fault current levels
- Responsibility for required changes in existing facilities due to increased fault currents (Generator and Transmission Projects only)
- Arrester applications

2.1.5. System protection and coordination.

At minimum, applicants must provide COH the following information:

- Safety of the general public
- Prevention/minimization of equipment damage
- Minimization of equipment outage time
- Minimization of system outage area
- Minimization of system voltage disturbances
- Maintenance of protective system coverage for abnormal conditions
- Performance of all appropriate studies: grounding, short circuit, stability, power quality, and coordination of protective devices
- Specification of RTU protocols and other communication channels
- Coordination of remote trip schemes, underfrequency load shedding schemes, undervoltage load shedding schemes and special protective systems
- Relay and device coordination with existing system protection
- Generation-specific facility requirements that should be addressed include:
 - Synchronizing with the transmission system
 - Parallel operation with the transmission system
 - Protection against islanding

2.1.6. Metering and telecommunications.

At minimum, applicants must provide COH the following typical metering data requirements:

- kW
- kWh
- kVAR, leading and lagging
- kVAR-hour
- kV²-hour
- voltage

System design requirements need to address:

- Loss compensation
- Bi-directionality

- Metering accuracy
- Ancillary equipment specifications (e.g., CT's, PT's)
- Provisions for maintenance and calibration
- Data protocol
- Mode of data transmission (e.g., fiber optic cable, phone line)
- Provisions for maintaining continuity and meeting reliability criteria

Supervisory Control and Data Acquisition (SCADA) data requirements need to include the following:

- Status of interrupting devices
- MW flow
- MVAR flow
- Voltage

SCADA design requirements need to address:

- Communication protocol
- Mode of data transmission (e.g. fiber optic cable, phone line)
- Control functionality (breakers, switches, etc.)
- Provisions for maintaining continuity and meeting reliability criteria (e.g., dual DC sources, dual port RTUs)

2.1.7. Grounding and safety issues.

At minimum, applicants must provide COH the following information:

- Grounding study
- Compatibility with COH's system
- Testing
- Periodic maintenance
- Personnel safety considerations
- Interconnection of grounding system to COH grounding system(s)
- Transmission line shielding provisions
- Cathodic protection

2.1.8. Insulation and insulation coordination.

Applicants must provide COH with studies that provide assurances that the interconnected facilities shall be protected against lightning, switching surges, and other voltage stresses associated with its expected operation. Basic Impulse Level ("BIL") ratings of interconnected facilities shall be equal to, or exceed, the BIL ratings of the COH's facilities.

2.1.9. Voltage, Reactive Power, and power factor control.

Applicant's facility shall be compliant with industry standards, be equal to or exceed the COH's own standards, and will be established in the interconnection agreement pending completion of the FCR Study.

2.1.10. Power quality impacts.

Applicant's facility must conform to IEEE recommended Practices and Requirements for Harmonic Control in Electric Power Systems ("IEEE Standard 519")

2.1.11. Equipment Ratings.

Applicant's facility shall meet or exceed COH's requirements for similar equipment. Connected facility ratings will be based on results of FCR Study including short circuit, power flow, stability analysis, and switching studies and in accordance with the current approved version of NERC Reliability Standards FAC-008 and FAC-009.

2.1.12. Synchronizing of facilities.

Applicant shall be responsible for the proper synchronization of their facility with COH power system in compliance with NERC, FRCC and COH standards. Applicants connecting synchronous generators and motors will be required to install equipment required to supervise the connection and prevent asynchronous breaker closing including but not limited to synchronizing check relays. The specific conditions and terms related to the control of facilities will be negotiated.

2.1.13. Maintenance coordination.

Applicant is responsible for all maintenance and calibration of connecting facility and must coordinate with COH as appropriate to ensure the reliability and continuity of service of the interconnected bulk electric system.

2.1.14. Operational issues (abnormal frequency and voltages).

Applicant must provide COH with a plan to deal with expected operational issues dealing with:

- Abnormal voltage conditions
- Abnormal frequency conditions
- Relay coordination to maintain stability
- Load shedding

2.1.15. Inspection requirements for existing or new facilities.

Applicant must allow pre-operational inspection and approval by COH as well as onsite visits to review operating and maintenance data and the associated documentation as required by NERC Reliability Standards.

Final inspection and approval by COH shall be required prior to commercial operation of the new facility. The facility owner/operator must grant COH or its designated representative the required right of access to the facility for the purpose of conducting inspections, observing tests, and auditing records as required by NERC Reliability Standards and established reporting procedures.

2.1.16. Communications and procedures during normal and emergency operating conditions.

Applicant must provide a point of contact with reliable communication so that COH and Applicant's personnel can monitor, coordinate, and cooperate to ensure the reliable operation of the electric system during normal and emergency conditions. Both COH and Applicant will agree on a set of procedures to deal with:

- Switching operations
- VAR support

- Adjustments in real or reactive generation net output
- Tripping of generating unit(s)
- Starting of generating unit(s) including black start units
- Implementation of emergency communication procedures
- Transmission facility restoration efforts

R3

3. Documentation requirements:

The City of Homestead (COH) shall maintain and update the Facility Connection Requirements reflected in this document as necessary to maintain compliance with current NERC, FRCC and COH standards.

Copies of this document will be provided within 5 business days upon request by contacting COH as per contact shown on section 4 of this document. In addition, this document is published on the FRCC Operating Entities Posting website at: <https://www.frcc.com/BATOPPosting/default.aspx>

NERC Reliability Standards require that Balancing Authorities (BA) and Transmission Operators (TOP) annually review and update each emergency plan as well as share various other documents with their Reliability Coordinator (RC) and neighboring entities. This posting area provides a method for BAs and TOPs to share their emergency plans and other coordination documents with the FRCC RC as well as neighboring FRCC BAs and TOPs.

4. City of Homestead Contact Information

To obtain a copy of the Facility Connection Requirements, please send your written request to:

R3

Mr. O. J. Garcia
Electric System Compliance Engineer
City of Homestead
675 N. Flagler Ave.
Homestead, FL 33030

5. DEFINITIONS:

For industry standard definitions of electric industry terminology, please refer to The New IEEE Standard Dictionary of Electrical and Electronic Terms, IEEE Standard 100-1992, or latest edition.

For the purposes of this document the following definitions apply:

Applicant – A company that owns and/or develops a new load delivery, transmission interconnection, or generation facility and plans to connect to COH’s electric system.

Applicant’s Operator – The Company that operates a load delivery, transmission interconnection, or generation facility, which plans to connect to COH’s electric system.

COH- City of Homestead Electric Utilities Department

Connection Point - The physical location on the power system where there is a change of ownership between COH and the facility that wants to connect.

Facility – The load delivery (end-user), transmission connection, or generation facility and all equipment associated with the Facility up to the Connection Point with COH. COH owns none of the facilities that make up the Facility.

FCR – Facility Connection Requirements

FCR Study – Technical study to determine how a new facility (generation, transmission, end-user) can connect to COH’s electric system and ensure reliable and safe operation of Bulk Electric System

FRCC – Florida Reliability Coordinating Council

Interconnection – Transmission system tie point between two control areas.

NERC - North American Electric Reliability Corporation

SCADA (Supervisory Control and Data Acquisition) - A system of remote control and telemetry used to monitor and control the transmission system.

Voltage Regulation - The difference between expected maximum and minimum voltage at any particular delivery point. The voltage regulation limits are expressed as a percent of the nominal voltage and are defined for both normal and contingency conditions. Voltage regulation for delivery point voltages should not exceed the guidelines.