



DISTRIBUTED GENERATION TECHNICAL INTERCONNECTION REQUIREMENTS: AMENDMENTS

PART 1

Agenda



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- Amendment Proposals
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 - Time Delay for Automatic Reconnection of DGIT: Section 2.4.7, Page 118
 - Metering Requirements: Section 2.7, Page 132
 - SCADA Requirements for Embedded DG's (LDC's): Section 1.0, 1.1, Pages 7,8
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 - SCADA Requirements DGs' < 250kW: Section 2.5.4, Page 125
 - NEW: Telecommunications Requirements: Section 2.6
- Feedback Process
- Questions

Introduction

- Distributed Generation Technical Interconnection Requirements (TIR)
- First published November 2009
- Revision 1 published February 2010
- Further amendments will be presented today based on Industry standards, experiences and interaction with generation proponents

- Background
 - Based on recent experiences and reliability concerns
 - Higher reliability risk with larger collector systems or more connected equipment.
 - Fault in collector system should not cause operation of Hydro One protection equipment.
 - Proposed revision further aids in maintaining tolerable reliability

Amendments Proposal

- Existing Requirement
 - A large collector system is $\geq 200\text{m}$ in length
- Proposed Requirement
 - A large collector system is $\geq 200\text{m}$ in length or has multiple interface transformers.
- Multiple interface transformers normally require collector lines totalling 200m or more in length.
- Generally not a new requirement
- Existing requirement has been publically stakeholdered

2.1.6 NEW LINE

i) An automatic isolation device for a new line owned by the DG Owner that is ≥ 0.2 km shall be required at the PCC to disconnect the DG Owner's line from HONI's Distribution System for faults in the DG Owner's line. The DG Owner shall be responsible for the installation, operation, and ownership of this device.

ii) All DG facilities with more than one interface transformer are required to install an automatic isolating device at their PCC to disconnect the DG facility for faults on the DG owner's side of the PCC.

iii) Any additional requirements shall be determined in the CIA.

Time Delay for Automatic Reconnection of DGIT: Section 2.4.7, Page 118

- Background
 - Based on recent experiences with Distributed Generator voltage dip following feeder tripping
 - Magnitude of voltage dip severity increases with Interface Transformation Capacity
 - Voltage dip may be objectionable to load customers/generators

Amendment Proposal



- This amendment is proposed to avoid load customer complaints about the voltage dip associated with DG Interconnection Transformer energization.
- Voltage dip which occurs within a short time of feeder restoration are more likely associated with the feeder disturbance.
- Load customers restored first without the additional inrush current associated with Transformer energization.

Changes in the TIR

- Section 2.4.7:
Automatic Reconnection of Generation and HV
Ground Sources
 - Step 1: Automatic DGIT Reconnection (HVI reclosing)
 - (iii) The DGIT may be automatically re-energized using a HVI automatic reclosing scheme providing:
 - (d) The Distribution System voltages are stable within normal limits for continuous period of 15 seconds;
 - (e) Once Items iii a) to d) are satisfied, reconnection must occur within 15 seconds.

Metering Requirements

TIR: Section 2.7, Page 132

- Amendments Proposal
 - NOP41 is a separate document and it has its own needs of thorough stakeholdering
 - Presently NOP41 is embedded in TIR
 - Changes to NOP41 require TIR updates as well
 - Proposed that NOP41 be separated from TIR, by providing a hyperlink to NOP41 rather than an embedded document

Changes to be made in TIR Document

2.7 METERING REQUIREMENTS

Metering requirements vary with the type and intent of the generation facility. Please consult the IESO Market Rules and the Distribution System Code Section 5 for details. Hydro One Networks Inc. has published a Metering policy for DG Facilities and it is located [at the following link:](#)

<http://www.hydroone.com/Generators/Pages/Feed-inTariff.aspx>

~~on the following pages. It is in a different format as it is a standalone document. It has been included here as it does contain metering requirements.~~

~~Please note that some terminology is different in this section such as Distributed Generation is referred to as Embedded Generation. Please consult Section 11 of this section for definitions specific to this metering document.~~

SCADA Requirements for Embedded DG's (LDC's): Section 1.0, 1.1, Pages 7,8

- Background

- For embedded DG's, there has been some challenges in identifying the requirements for the Local Distribution Company (LDC) to provide Supervisory Control and Data Acquisition (SCADA) data to HONI
- Section 1 states that the TIR only applies to DG's connected to HONI Distribution system
- Section 1.1 and 2.5.1 imply that requirements such as Transfer Trip, Telemetry apply

Amendments Proposal



- Add clarity to the requirements for DG project telemetry and control in another LDC's service territory
- The requirement for telemetry and control was previously publically stakeholdered
- Ensuring consistency within the document

1 INTRODUCTION

This document, “Distributed Generation Technical Interconnection Requirements: Interconnections at Voltages 50kV and Below” outlines the technical requirements for the installation or modification of Distributed Generation (DG) projects connecting to Hydro One Networks Inc. (“HONI”) Distribution System feeders (feeders at $\leq 50\text{kV}$).

Certain requirements, including, but not limited to, transfer trip and control and monitoring, may also apply to DG Facilities, connecting to the Distribution System of an LDC other than Hydro One.

1.1 SCOPE

This document applies to the following DG Facilities interconnecting to HONI's Distribution System (50kV and below):

1. Single-phase installations with an aggregate capacity > 10 kW; and
2. Three-phase installations with an aggregate capacity > 30 kW

The document is intended to be applied to electric power generators using all types of energy sources, energy storage and energy conversion technologies – directly connected synchronous and asynchronous rotating machines, and those connecting via inverters or static power converters which are above the thresholds mentioned above. This document does not apply to generators paralleling with HONI for less than 100ms (Momentary Closed Transition Switching) except as noted in Section 2.1.23.

~~Certain requirements (such as Transfer Trip and Telemetry) may also apply to DG Facilities interconnecting to other LDC's.~~

Control and Telecommunications Requirements TIR: Section 2.5, Pages 122-124

- Background
 - Existing TIR: Telecommunications Requirements are specified only for Control purposes under section 2.5 Control and Telecommunications Requirement
 - Relationship between Telecommunication and control is not clearly defined in the existing Technical Interconnection Requirements
 - Requirements for monitoring of the interface protection failure and device statuses require clarity

Amendments Proposal



- Move telecommunications requirements from section 2.5 to a new section 2.6
- Add clarity to the interface protection and alarm monitoring requirements for Class 2 generators
- References to Telecommunications will be updated to reference the new section 2.6
- Remaining subsections of 2.5 will require renumbering

Changes to be Made in the TIR Document



- Change 1: 2.5 Control and Monitoring Requirements
- Change 2: 2.5.1 General
 - (i) Control and monitoring facilities shall be required at DG Facilities connected to the Hydro One Networks Inc. Transmission and Distribution system for provision of real time operating data
- Change 3: 2.5.4 become 2.5.3 Operating Data, Telemetry and Monitoring

Changes to be Made in the TIR Document – Cont'd



- Change 4: 2.5.4.2 becomes 2.5.3.2 Class 2 Generators
 - (b) Device Statuses:
 - (1) Consolidated Connection Status at the PCC (HVI/LVI)
 - (2) Status of individual DG units
 - (3) All generation rejection selections
- Change 5:
 - (c) Alarms:
 - (1) Where facilities exist to provide independent monitoring of the interface protection fail as stated in Section 2.3.18 provision shall be made for an alarm signal to be generated and transmitted to HONI

SCADA Requirements

DGs' < 250 kW:

Section 2.5.4, Page 125

- Amendments Proposal
 - Class 1 DG: SCADA link and modem not required as of today
 - May be requested by Hydro One at a later date
 - In order to support potential monitoring at a later date, a SCADA link and modem would be required at that time
 - To be implemented within 90 days

2.5.4.1 CLASS 1 GENERATORS

- i) DG Facilities with a capacity of less than 250 KW shall have the provision for monitoring the disconnecting device at the PCC.
- ii) Provisions for other quantities may be required and shall be determined by HONI.
- iii) The actual implementation to install the SCADA link and modem is not required, but may be requested by Hydro One at a later date to be implemented at DGs cost within 90 days.

Telecommunications Requirements: hydro one

NEW Section 2.6

- Background
 - Why add a new section on “Telecommunications Requirements”?
 - Telecommunication facilities are critical for protection, control and real-time monitoring required for DG Connections
 - In the current TIR document, telecommunications requirements are only included in section 2.5 as part of the Control Requirements
 - A new section on Telecommunications Requirements, defines the critical role of telecommunications facilities to safely connect the DGs and ensure that the reliability of the distribution system is met

Amendments Proposal

- New Section:

2.6 Telecommunications Requirements

2.6.1 General

- i. Telecommunication infrastructure is required by Distributed Generators connected to HONI's Distribution system for provision of protection and real time operating data.
- ii. Telecommunication infrastructure shall be fast, secure, reliable, and shall meet the technical requirements for protection, control and monitoring as described in section 2.3 and 2.5 of this document.

Amendments Proposal



- New Section:

2.6 Telecommunications Requirements

2.6.1 General – Cont'd

- iii. HONI will indicate the viable alternative technologies that may be used for Telecommunications, which may include licensed/unlicensed microwave radio, optical fiber or Carrier-based leased circuits.
- iv. Cellular based Telecommunication infrastructure shall only be considered for real-time control and monitoring.

Amendments Proposal

- New Section:

2.6 Telecommunications Requirements

2.6.1 General – Cont'd

- v. DG owner's shall provide the GPS coordinates of the DG Facility to assist in the evaluation of wireless communication alternatives.

Amendments Proposal

- New Sub-Section:

2.6.2 Telecommunications Facilities for Teleprotection

- i. A robust Telecommunication infrastructure will support the stringent reliability and latency requirements for Teleprotection.
- ii. The purpose of Teleprotection is to transmit critical information about the power system conditions from one end of the protected line to the other.

Amendments Proposal

- New Sub-Section:

2.6.2 Telecommunications Facilities for Teleprotection

- iii. The proposed Telecommunication infrastructure for Teleprotection shall meet the requirements for Transfer Trip (TT) and DGEO as per section 2.3.
- iv. Telecommunication infrastructure for Teleprotection will be reviewed by HONI to ensure the requirements for teleprotection are met.

Amendments Proposal



- New Sub-Section:

2.5.3 becomes 2.6.3 Telecommunications Facilities for Real-Time Control and Monitoring

- i. The DG owner shall provide real time operating information to HONI as specified in section 2.5 either directly from the station(s), as described in item (ii), or from the DG Facilities' SCADA master, as described in Item (iii).

For DGs connecting to the Distribution System of an LDC other than HONI, the LDC shall provide real time operating information to HONI from the LDC's SCADA Master.

For DGs connecting to the Distribution System of an LDC other than HONI that are not monitored by the LDC, the DG Owner will provide monitoring to HONI as described in Item (ii).

- 2.6.3 Telecommunications Facilities for Real-Time Control and Monitoring – Cont'd
 - ii. Real time operating information provided to HONI may be from an Intelligent Electronic Device (IED) at the DG Facility's station to HONI's control centre using Distributed Network Protocol (DNP 3.0 protocol)
 - (a) to HONI's wireless cellular data hub site and through the gateway to one of HONI's control centers, with the demarcation point being the wireless access point to the Service Provider's cellular network; or

Amendments Proposal



- 2.6.3 Telecommunications Facilities for Real-Time Control and Monitoring – Cont'd

- (b) where Item (ii) (a) above is not feasible, through a common carrier connection to one of HONI's Control Centers, with the demarcation point being the Central Office nearest to DG facility's station; or
- (c) where items (ii) (a) and (b) above are not feasible, HONI will suggest communication options available to a particular site.

- 2.6.3 Telecommunications Facilities for Real-Time Control and Monitoring – Cont'd
 - iii. Real time operating information provided to HONI may be from a SCADA master through HONI's SCADA master using Inter-Control Center Communications Protocol (ICCP).
 - iv. Where modems will be used in any of the above communication methods, HONI will determine the modem type and requirements considering communication media, site location, reliability, and amount of data transfer. The DG owner will provide all the required hardware and software and make arrangements, as needed, with a commercial provider of communication services to deliver the operating data to the demarcation point.

Amendments Proposal

- 2.6.4 Reliability Requirements:
2.5.3.1 becomes 2.6.4.1 Teleprotection

The Telecommunication infrastructure shall comply with the following:

- a) Provide at least an annual average availability of 99.65%.
- b) Meet the Teleprotection dependability requirement defined as the probability of a missed command be less than 10^{-4} for DG application. As defined in IEC 60834-1
- c) Meet the Teleprotection security requirement defined as an unwanted command shall be less than 10^{-10} for DG application.
As defined in IEC 60834-1

Amendments Proposal



- 2.6.4.2 Real-Time Control and Monitoring

- i. The delivery of the real time data at the communication demarcation point shall have a:
 - a. MTBF (Mean Time between Failure) of four (4) years; and
 - b. MTTR (Mean Time to Repair) of seven (7) days.
- ii. The DG owner may be required to disconnect the DG Facility until problems are corrected if the failure rates or repair time performance in Item i) above fails to achieve their targets by the following significant amounts:
 - a. less than 2 years MTBF; or
 - b. MTTR greater than 7 days.

Amendments Proposal



2.6.4.2 Real-Time Control and Monitoring – Cont'd

- iii. If the DG Facility is involved in a Special Protection System (SPS) or automated dispatch, the Telecommunication Mean Time to Repair (MTTR) requirement shall be 24 hours.
- iv. Upon loss of Telecommunications, the DG owner is required to immediately report the failure cause and estimated repair time to the Controlling Authority.
- v. Mean Time to Repair time shall start from the time when the communications was lost and not from when it was discovered.
- vi. The DG owner shall coordinate any planned interruption to the delivery of real time data with Hydro One Networks Inc.

Amendments Summary



TIR: Section 2.1.6, Page 30
New Line Amendments Proposal

Add clarity to the 200 meters length threshold, by adding an additional statement that a Distributed Generator with more than 1 interface transformer shall ALSO require an Automatic Isolation Device

TIR: Section 2.4.7, Page 118
Time Delay for Automatic Reconnection DGIT Amendments Proposal

1. Revision to is to change the time period in part d) to read 15 seconds
2. Further require that the automatic DG Interconnection Transformers reconnection must occur within 15 seconds of part d) being satisfied

Amendments Summary – Cont'd



TIR: Section 2.7, Page 132

Metering Requirements Amendments Proposal

1. The proposed amendment is to publish the NOP 41 Metering policy on a separate, publically available web address, and to include a URL within the TIR for this policy.

TIR :Section 1.0, 1.1, Pages 7,8

SCADA Requirements for Embedded DG's (LDC's) Amendments Proposal

1. Ensuring consistency within the document
2. Add clarity to the requirements for DG project telemetry and control in another LDC's service territory

Amendments Summary – Cont'd



TIR: Section 2.5, Pages 122-124

Control and Telecommunications Requirements Amendments Proposal

1. Move telecommunications requirements from section 2.5 to a new section 2.6
2. Add clarity to the interface protection and alarm monitoring requirements for Class 2 generators

Amendments Summary – Cont'd



TIR: Section 2.5.4, Page 125

SCADA Requirements DGs' < 250kW Amendments Proposal

1. Class 1 DG: SCADA link and modem not required as of today May be requested by Hydro One at a later date
2. In order to support potential monitoring at a later date, a SCADA link and modem would be required at that time
3. To be implemented within 90 days

TIR: Section 2.6, New Section

Telecommunications Requirements Amendments Proposal

1. In the current TIR document, telecommunications requirements are only included in section 2.5 as part of the Control Requirements
2. A new section on Telecommunications Requirements, defines the critical role of telecommunications facilities to safely connect the DGs and ensure that the reliability of the distribution system is met.

Feedback Process



- Additional questions and/or feedback regarding the TIR Amendments will be accepted for a period of one week
- Please use the following e-mail address to communicate your comments

DGConnectionReq@HydroOne.com

Next Webinar on Amendments



- Hydro One will hold one more webinar on the TIR amendments
- Topics for next webinar will include six more Protection amendment items

Questions?



We will answer questions only on today's Webinar -
TIR Amendments

For questions outside of the scope of the Webinar,
please contact your local Hydro One Account
Executive or email your question(s) to
DGConnectionReq@HydroOne.com