
DER Hosting Capacity Determination Methodology

1. Purpose

This document outlines all methodologies used by Festival Hydro to calculate Distributed Energy Resource (DER) hosting capacity across its distribution system.

Hosting capacity is defined as:

The maximum amount of DER that can be connected to a feeder or station without adversely impacting system safety, reliability, power quality, or requiring system upgrades.

This document is published in accordance with the requirements of the Ontario Energy Board (OEB) Distribution System Code (DSC) and reflects alignment with DER Connection Procedures (DERCP v3).

2. Scope

This methodology applies to:

- All distribution feeders and stations operated by Festival Hydro
- All DER technologies (e.g., solar PV, battery energy storage systems, CHP)
- All connection types:
 - Exporting
 - Export-limited
 - Non-exporting

This document describes:

- The methodologies used to determine total hosting capacity
 - The methodologies used to determine remaining hosting capacity
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3. Methodological Framework

Festival Hydro employs a two-tiered approach:

3.1 Screening-Level Methodology (Planning / PCIR Stage)

A simplified, conservative methodology used to:

- Provide preliminary hosting capacity estimates
- Support Preliminary Consultation Information Requests (PCIRs)

3.2 Detailed Engineering Methodology (CIA Stage)

A comprehensive, study-based methodology used to:

- Determine site-specific hosting capacity
 - Identify system constraints and required upgrades
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4. Factors Considered in Hosting Capacity Calculations

4.1 Existing and Allocated DER Capacity

When calculating remaining hosting capacity, Festival Hydro accounts for DERs that have been allocated capacity on the feeder or station, including:

a) Exporting DER

- Full nameplate export capacity is included
- Assumed to contribute to thermal loading, voltage rise, and fault current

b) Export-Limited DER

- Only the approved export limit is included
- Consideration is given to control scheme reliability

c) Non-Exporting DER

- Not included in export-based hosting capacity limits
 - Is still considered for fault contribution and operational impacts
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4.2 Station-Level Constraints

- Transformer MVA ratings (normal and emergency)
- Reverse power flow capability (where applicable)
- Voltage limits

- Protection and fault level limits
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4.3 Feeder Thermal Capacity

- Conductor ampacity
 - Equipment ratings (reclosers, switches, regulators)
 - Backfeed conditions under minimum load
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4.4 Short Circuit (Fault Level) Constraints

- Available fault current at station bus and along feeder
 - DER contribution assessed to ensure equipment ratings are not exceeded
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4.5 Voltage Constraints

- Voltage rise due to DER injection
 - Voltage drop under varying load conditions
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4.6 Protection and Coordination

- Relay coordination
 - Fuse-saving schemes
 - Anti-islanding requirements
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4.7 Power Quality

- Harmonics
 - Flicker
 - Voltage fluctuations
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4.8 Minimum Load Conditions

- Hosting capacity is typically constrained by minimum feeder load conditions
 - Historical minimum load and seasonal variation are considered
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5. Hosting Capacity Calculation Methodologies

5.1 Screening-Level Hosting Capacity Calculation

At the screening level, hosting capacity is estimated using:

- Feeder peak and minimum load
- Existing and allocated DER capacity
- Conservative assumptions

Approach:

Remaining Hosting Capacity = Total Capacity Limit – Allocated DER Capacity

Where allocated DER includes:

- Exporting DER (100% of export capacity)
- Export-limited DER (approved export limit)
- Non-exporting DER excluded from export calculations

This methodology is indicative only.

5.2 Detailed Hosting Capacity Calculation (CIA Methodology)

a) Load Flow Analysis

- Evaluates voltage profiles and thermal loading
- Includes peak and minimum load scenarios

b) Short Circuit Analysis

- Calculates DER fault contribution
- Confirms compliance with equipment ratings

c) Thermal Analysis

- Confirms conductor and equipment limits
- Evaluates reverse power flow

d) Protection Review

- Assesses coordination impacts
 - Identifies required mitigations
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5.3 Determination of Limiting Factor

Hosting capacity is determined by the most restrictive constraint, including:

- Thermal limits
 - Voltage limits
 - Fault level limits
 - Protection constraints
 - Operational constraints
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6. Determination of Remaining Hosting Capacity

Remaining hosting capacity is calculated as:

Remaining Hosting Capacity = Total Hosting Capacity – Allocated DER Capacity

Allocated DER capacity includes:

- All DERs with executed connection agreements
 - All DERs with approved capacity allocations
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7. Supporting Assumptions

- DER operates at maximum output during minimum load
 - DER output is assumed coincident
 - Export limits are assumed to be enforceable
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8. Limitations

- Hosting capacity is dynamic and subject to change
 - Results are non-binding and subject to detailed engineering review
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