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Distributed Energy Resource Capacity Information Methodology

Purpose

Oshawa PUC Networks Inc. ("Oshawa Power") has developed this methodology to support the reporting of Distributed Energy Resource ("DER") capacity values as part of the Capacity Calculation and Information Map ("CCIM") initiative. The purpose of this methodology is to provide transparency into how Oshawa Power determines available DER capacity on its distribution system, including how feeder-level, station-level, and upstream constraints are considered when identifying the most limiting capacity value.

DER Capacity Tracking

As a first step, Oshawa Power developed a master tracking sheet of all existing DER connections within its distribution system.

For each existing DER connection, Oshawa Power identified and recorded the associated distribution and upstream supply information, including:

- The applicable **F-class 13.8 kV distribution feeder**;
- The associated **Oshawa Power-owned municipal station**;
- The applicable **M-class 44 kV upstream feeder**; and
- The associated **upstream Hydro One-owned transformer station**, where applicable.

This tracking allows Oshawa Power to account for existing DERs already connected to the system and to assess the remaining capacity available at various levels of the distribution supply path.

Capacity Assessment Methodology

Oshawa Power calculates available DER capacity by assessing multiple technical criteria across the relevant supply path. The available capacity is determined based on the most constraining applicable limit.

The following technical thresholds are considered:

1. **M-class 44 kV feeder thermal capacity limits**
2. **M-class 44 kV feeder short-circuit capacity limits**
3. **Oshawa Power-owned station bus thermal capacity limits**
4. **Oshawa Power-owned station bus short-circuit capacity limits**
5. **F-class 13.8 kV feeder thermal capacity limits**

6. **F-class 13.8 kV feeder short-circuit capacity limits**

For each DER category, the applicable thresholds are reviewed, and the lowest applicable remaining capacity value is used to determine the reported available capacity.

Threshold Calculation Descriptions

1. M-Class 44 kV Feeder Thermal Capacity Limit

The M-class 44 kV feeder thermal capacity limit is assessed by reviewing the remaining thermal capacity available on the upstream 44 kV feeder.

This assessment considers the thermal rating 44 kV feeder – 400A (aligned with Hydro One's TIR and applicable to Oshawa Power based on equipment rating thresholds) and the existing connected DER capacity already allocated to that feeder. The remaining capacity is calculated as the difference between the feeder thermal rating and the existing or allocated generation contribution.

2. M-Class 44 kV Feeder Short-Circuit Capacity Limit

The M-class 44 kV feeder short-circuit capacity limit is assessed by reviewing the available short-circuit margin on the upstream 44 kV feeder. The short circuit margins are the most limiting of either equipment rating or the short circuit current thresholds per voltage class as per the Transmission system code

This assessment considers the short-circuit contribution to the feeder from all upstream equipment connected to the same station bus, all existing connected DERs (both upstream and downstream) and the remaining available short-circuit capacity before applicable equipment or system limits are reached.

3. Oshawa Power-Owned Station Bus Thermal Capacity Limit

The station bus thermal capacity limit is assessed by reviewing the remaining thermal capacity available at the applicable Oshawa Power-owned municipal station bus. This is arrived at by using 60% of maximum MVA rating of the single transformer and the minimum station-Bus load.

The remaining capacity is arrived at by deducting existing or allocated DER capacity connected downstream of the station, from the station bus thermal capacity.

4. Oshawa Power-Owned Station Bus Short-Circuit Capacity Limit

The station bus short-circuit capacity limit is assessed by reviewing the available short-circuit margin at the applicable Oshawa Power-owned municipal station bus. The short circuit margins are the most limiting of either equipment rating or the short circuit current thresholds per voltage class as per the Transmission system code.

This assessment considers the short-circuit contribution to the bus from all upstream equipment , all existing connected DERs (both upstream and downstream) and the remaining available short-circuit capacity before applicable equipment or system limits are reached.

5. F-Class 13.8 kV Feeder Thermal Capacity Limit

The F-class 13.8 kV feeder thermal capacity limit is assessed by reviewing the remaining thermal capacity on the applicable distribution feeder.

This assessment considers the thermal rating 13.8 kV feeder – 400A (aligned with Hydro One's TIR and applicable to Oshawa Power based on equipment rating thresholds) and the existing connected DER capacity already allocated to that feeder. The remaining capacity is calculated as the difference between the feeder thermal rating and the existing or allocated generation contribution.

6. F-Class 13.8 kV Feeder Short-Circuit Capacity Limit

The F-class 13.8 kV feeder short-circuit capacity limit is assessed by reviewing the available short-circuit capacity on the applicable distribution feeder. The short circuit margins are the most limiting of either equipment rating or the short circuit current thresholds per voltage class as per the Transmission system code

This assessment considers the short-circuit contribution to the feeder from all upstream equipment connected to the same station bus, all existing connected DERs (both upstream and downstream) and the remaining available short-circuit capacity before applicable equipment or system limits are reached.

DER Categories

Oshawa Power further categorizes available DER capacity values based on the type of DER connection. Different technical constraints apply depending on whether the DER is inverter-based or non-inverter-based, and whether it is exporting or non-exporting.

The categories used are:

1. **Inverter-based exporting DER**
2. **Inverter-based non-exporting DER**
3. **Non-inverter-based exporting DER**
4. **Non-inverter-based non-exporting DER**
5. **Micro-embedded generation**

Application of Thresholds by DER Category

1. Inverter-Based Exporting DER

For inverter-based exporting DERs, Oshawa Power considers both thermal and short-circuit capacity limits at the feeder and station-bus levels.

For inverter-based systems, short-circuit capacity values are assessed using applicable full-load current to short-circuit current conversion factors. Where required, short-circuit values are converted back to equivalent full-load current or capacity values to allow comparison with thermal capacity thresholds.

2. Inverter-Based Non-Exporting DER

For inverter-based non-exporting DERs, Oshawa Power primarily considers short-circuit capacity limits.

For inverter-based systems, applicable conversion factors are used to estimate short-circuit contribution and convert the result to an equivalent capacity value, where required.

3. Non-Inverter-Based Exporting DER

For non-inverter-based exporting DERs, Oshawa Power considers both thermal and short-circuit capacity limits at the feeder and station-bus levels.

Non-inverter-based DERs may have different short-circuit contribution characteristics than inverter-based DERs. As such, Oshawa Power applies the applicable short-circuit contribution assumptions for the technology type when determining remaining capacity.

4. Non-Inverter-Based Non-Exporting DER

For non-inverter-based non-exporting DERs, Oshawa Power primarily considers short-circuit capacity limits.

Applicable short-circuit contribution assumptions are applied based on the DER technology type.

5. Micro-Embedded Generation

For micro-embedded generation, considers both thermal and short-circuit capacity limits at the feeder and station-bus levels, as well as an additional screening criterion related to feeder peak load.

Oshawa Power applies an additional threshold whereby micro-embedded generation capacity is assessed against **7% of the annual peak load of the applicable F-class feeder**.

Upstream Constraints

Oshawa Power's capacity values are calculated based on the limits of Oshawa Power-owned distribution assets and the upstream feeder information available to Oshawa Power.

Where upstream constraints exist at Hydro One-owned facilities, including at the upstream 44 kV station bus level, those constraints may further limit the ability to connect DERs.

Oshawa Power does not calculate available capacity at Hydro One-owned station buses. Where a DER connection may be limited by upstream Hydro One infrastructure, the most constraining value between Oshawa Power's calculated thresholds and any applicable upstream constraints will apply.

As a result, the capacity values published by Oshawa Power should be interpreted as preliminary distribution-level capacity values. Final connection capacity remains subject to detailed technical review, including any required upstream assessment by Hydro One or other affected parties.

General Notes

The capacity values produced through this methodology are intended for information and planning purposes only. They do not constitute approval to connect a DER facility to Oshawa Power's distribution system.

All DER connection requests remain subject to Oshawa Power's connection application process, technical review, protection review, applicable standards, and any required upstream distributor or transmitter review.

Available capacity values may change over time due to system configuration changes, new customer connections, load growth, DER connection applications, asset replacements, protection changes, feeder transfers, or upstream system constraints.

Oshawa Power may revise this methodology as required to reflect changes to OEB requirements, applicable standards, system planning practices, or DER connection procedures.

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DER Capacity Determination Methodology Flow Diagram