DRAFT Memo of the EV Small Group

Revised and Reissued to DER Connections Review Working Group on August 22, 2022

Background

In tranche 3, the distributed energy connections working group approved a list of issues to be considered in tranche 4 relating to bi-directional electric vehicle chargers. These issues were driven by the bi-directional discussion but would apply more broadly to other smaller DER connections.

For tranche 4, OEB staff would also like a list of issues relating to electric vehicles as loads (i.e. the uni-directional case), which would be considered in tranche 5 to the extent that they are in scope. In addition, the bi-directional issues can be expanded on and progressed to recommendations in tranche 4, time permitting.

This document provides:

- Suggested issues relating to electric vehicles as loads; and
- An update on potential recommendations relating to bi-directional charging.

Electric Vehicles as Loads (i.e. One-Directional Charging)

We recommend that the following issues be considered in tranche 5 relating to electric vehicles as loads:

- **EV Connection Costs:** Should panel upgrades to, say, 200 amps be considered part of the basic residential service paid for in rates (including the cost of any transformer upgrades that might be triggered)?
    - Rationale for issue to be considered:
        - Higher panel ratings should be considered standard and basic services (not a "plus" or "premium") now that we have EVs, electric heat pumps, etc.
        - There will be overall savings of time and transaction costs if these upgrades are a standard system access expense.
        - It is potentially unfair that an upgrade is free if you happen to be the first person to request it (while transformer capacity is available), but cost money if you happen to make a request at the threshold when a new transformer is needed.
    - Note: any change would need to be phased in to be consistent with a utilities regulatory cycle.

- **EV Data:** What steps can be taken to provide additional data on electric vehicle penetration to utilities?
    - Rationale for issue to be considered:
        - Utilities would benefit from additional data on which of their customers own electric vehicles.
        - Utilities are not notified when a customer installs an electric vehicle charger unless a panel upgrade is necessary,
    - Some options for consideration:
        - The OEB requesting that Electrical Standards Authority ("ESA") provide Ontario distributors access to the ESA's database(s)
            - The ESA has data on electric vehicles that can be valuable for distribution planning.[1]
            - Distributors can access ESA data, but it is cumbersome to do so because (a) the requests typically occur periodically, (b) the data is hard to import because it is not in a spreadsheet, and (c) there is no ability to conduct advanced queries.
            - Direct access to the ESA databases to run queries as needed could save time, reduce processing costs, and improve distribution planning.
        - Utilities using meter data to determine electric vehicle ownership, including via smart meters that will use artificial intelligence to do so;
        - The OEB requesting that the Ministry of Transportation consider providing access to vehicle registration data.
- **Smart switches/splitters:** Should customers be encouraged to use smart switches/splitters to allow, for example, a circuit to be shared by and EV and a dryer, to avoid panel upgrades and associated increase in demand on infrastructure?

We also identified a number of electric vehicle issues that are primarily distribution planning issues and therefore out of scope. These are important issues, and in many cases considerably more important than that the narrow set of connections-related uni-directional charging issues.

[1] The data is collected because customers require an ESA inspection if certain EV chargers are installed. In most of these cases, the ESA will be notified of the installation but the distributor will not be notified because a connection request is not necessary. The ESA data will not include (a) data on electric vehicles that do not involve a charger for which an ESA inspection is needed (e.g. if the owner simply plugs into a standard 120 v socket), (b) data on equipment installations that required ESA inspection in instances where the electrical contractor did not actually cause the inspection to take place.

These issues also relate to electrification more broadly, not just electric vehicles. We recommend flagging these issues for consideration in other processes:

- **Load forecasting:** How should utilities forecast the distribution needs relating to electrification? How locational should this forecasting be?
- **Capital planning:** How should utilities plan for forecast needs? For instance, how should new equipment and equipment replacements be sized to address forecast electrification needs (e.g. transformers in new developments)?
- **Cost minimization:** What should utilities do to minimize the distribution capacity costs related to electrification (e.g. smart charging incentives, bi-directional charging incentives, thermal storage, etc.)?
- **Rate reductions and beneficial electrification:** How can electrification be harnessed to flatten the overall demand profile (i.e. reduce "peakiness") and thus lower distribution costs per kWh?
- **Regulatory approaches:** Should the above issues be determined (a) case-by-case (e.g. in rebasing applications); (b) based on OEB guidance developed in a (i) generic hearing, (ii) standard OEB policy development consultation process, or (iii) in a stakeholder process like this one.

Electric Vehicles and Bi-Directional Charging

Approved issues from tranche 3

In tranche 3, the working group approved the following issues for consideration in tranche 4. The underlined portions represent proposed additions.

1. **Micro Threshold:** Should the micro threshold be increased above 10 kW (including the option of separate limits for exporting and non-exporting portions of the DER)?

   Potential threshold under consideration:

Grid Connection Type	Micro Threshold (e.g. Form C)	Nominal Current (at low-voltage)
Single Phase	20 kW	~83.3A @ 240 VAC 1p
Three Phase	30 kW	~83.3A @ 208 VAC 3p

   The general rationale is that the current 10 KW threshold has historic origins that may no longer be appropriate (e.g. for microFIT, where most rooftop solar would have been in that range regardless). There are now many use cases in the 10 to 30 KW range (e.g. homes with two electric vehicles with bi- directional chargers, solar and EV, solar and

battery, etc), some of which may not require exporting. A higher threshold, considering the non-exporting aspect is consistent with the Interstate Renewable Energy Council's (IREC) recommendations and jurisdictional review.

2. **Export Control:** Can an export control reduce the evaluated size for a connection application, to either eliminate or simplify CIA study requirements and costs?[2] What technical commitments are required to allow this?

3. **Simplified CIA for Systems up to ~50 kW:** Can a simpler CIA process be established for systems up to, for example, 50 kW?[3] What technical commitments are required to allow this?

   The general rational is that CIA and Connection Costs associated with small scale systems (e.g. in the 30 kW to 50 kW range) can be cost prohibitive for a project. Where dispatchable DER technologies are deployed (e.g. solar + EV / storage etc.)

We propose that issue 1 be progressed to a recommendation in tranche 4 and that issues 2 and 3 be considered more fully in tranche 5.

Update on Potential Micro-Embedded Generation Threshold Recommendation

More time is required to make a recommendation. However, the small group is currently considering a recommendation whereby the micro-embedded generation threshold will be based on 10 kW "export capacity" (i.e. the power export threshold set by a gateway) with the total name-plate capacity (i.e. the sum total of maximum rated power output of all the customer's generating facilities) having a higher limit (perhaps 20 kW).

Connection procedures for distributed energy resources currently differ depending on the name-plate rated capacity of the generation facility.[4] The simplest procedures apply to micro-embedded generation facilities, which are defined in the Distribution System Code as "an embedded generation facility with a name-plate rated capacity of 10 kW or less."[5] The proposal is to amend this definition.

The rationale for the revised threshold is as follows:

- The 10 kW threshold has historic origins that are no longer relevant to current circumstances. The 10 kW threshold made sense when the main small-scale distributed energy resources were microFIT rooftop solar installations. In most cases those installations would be 10 kW or lower in any event due to rooftop space restrictions.

- There are now many residential and small commercial use cases in the 10 to 30 kW range (e.g. homes with two electric vehicles with bi- directional chargers, solar and EV, solar and battery, etc). The connection processes for facilities over 10 kW are more complex,

[2] Not all electrical parameters would necessarily be impacted by an export control – for example, export control may not impact the potential short circuit contribution of a facility.
[3] There was discussion that some LDCs may already have streamlined processes for such applications.
[4] Distribution System Code; Distributed Energy Resources Connection Procedures.
[5] Distribution System Code, s. 1.2 *s.v.* "micro-embedded generation facility"

time consuming, and expensive, particularly for residential and small commercial customers. Therefore, the 10 kW threshold is increasingly a barrier for customers wanting to install distributed energy resources.

- The Interstate Renewable Energy Council ("IREC") recommends a threshold of 25 kW for simplified connections processes for distributed energy resources.[6]

- There is a trend in jurisdictions increasing the threshold for simplified connections processes. For example, California uses 30 kVA; Maryland, Minnesota, and North Carolina use 20 kVA; and New York uses 50 kVA.[7]

- Some utilities already have been allowing residential customers connect a total of 20 kW without requiring a full connection impact assessment.

- Increasing the threshold could increase the degree to which distributed energy resources can be harnessed, however the possibility of system upgrade costs as a result of increased penetration would need to be accounted for.

- LDCs can still conduct a "quick check" without a full CIA, as is currently done for projects under 10 kW, and can still reject applications. In other words, the simplified process does not guarantee a "yes".

This topic was canvassed over a number of meetings of the EV sub-group and the technical working group. Both groups included a range of utility representatives. Pros and cons were discussed and the general tenure of the discussions was positive.

Some other relevant considerations include the following:

- **Fairness in capacity allocation:** Allowing a 20 kW nameplate connection throttled to 10 kW may reduce the ability of a neighbouring customer to connect. In some cases, more 20 kW connections may mean fewer overall 10 kW connections. This could be viewed as an unfair. However, we do not think this should rule out increasing the threshold because:

    - This would be consistent with the current approach to capacity allocation of first come first served.

    - Reserving capacity for future capacity requests is speculative – they may not arise, in which case you restrict what the first customer can do for no reason.

    - The primary goal is reducing interconnection and system costs by facilitating DERs, which is best achieved by removing barriers and increasing the threshold.

    - Distributors should try to avoid preventing savvy customers from installing 20 kW projects, such as solar/battery projects.

[6] IREC, *Model Interconnection Procedures 2019*, (link) p. 7; *Toolkit and Guidance for the Interconnection of Energy Storage and Solar-Plus-Storage*, (link) p. 61.
[7] *Ibid*.

- In some cases a 20 kW project could be more cost-effective than two 10 kW projects.
- As DERs advance, barriers could cause customers to go off-grid, and thus reduce distributor revenue and increase rates.
- A customer could connect 20 kW in any event if capacity is available, but would be required to follow a more complex and expensive process.
- In some cases a 20 kW connection will not be an issue for other customers (e.g. where capacity is high and/or DER uptake is low).

- **Capacity and distribution planning:** Increasing the threshold will simplify distributor approval of connection requests. Where capacity is not available, they can still decline the request.