

Net metering technical workshop

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November 15, 2021

Today's agenda



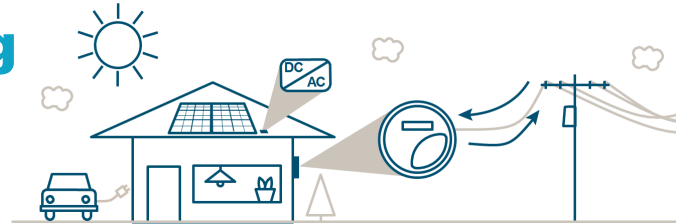
- Introductions
- Program overview
- Technical presentation
- Q&As

What is not going to be covered today

- Rates and future changes
- Virtual net metering
- Connection of projects larger than 100 kW

Quick overview of net metering program

BC Hydro Net metering



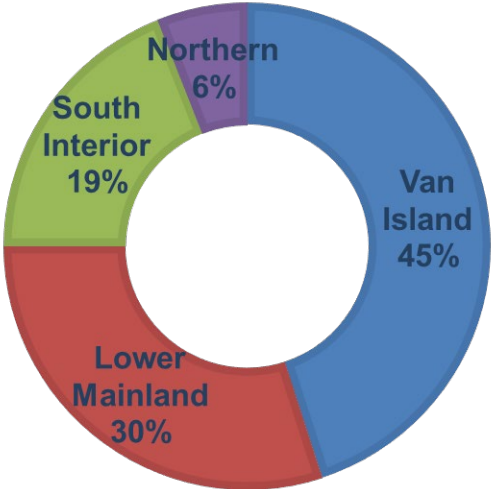
- Since 2004
- Eligibility: residential and general service customers installing clean and renewable energy sources up to 100 kW
- Generation credits offset customer's consumption
- Every March 1 excess generation paid at market price (for 2021 2.85 c/kWh)
- Electricity flow measured by a smart meter (no separate meter required)

All customers require BC Hydro's approval to connect generation to the grid even if they don't feed any electricity back

Net metering by the numbers

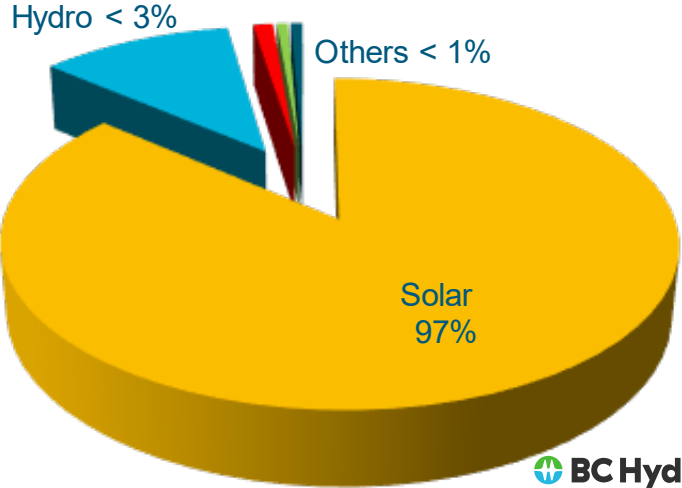
By number of customers

>4,170 customers



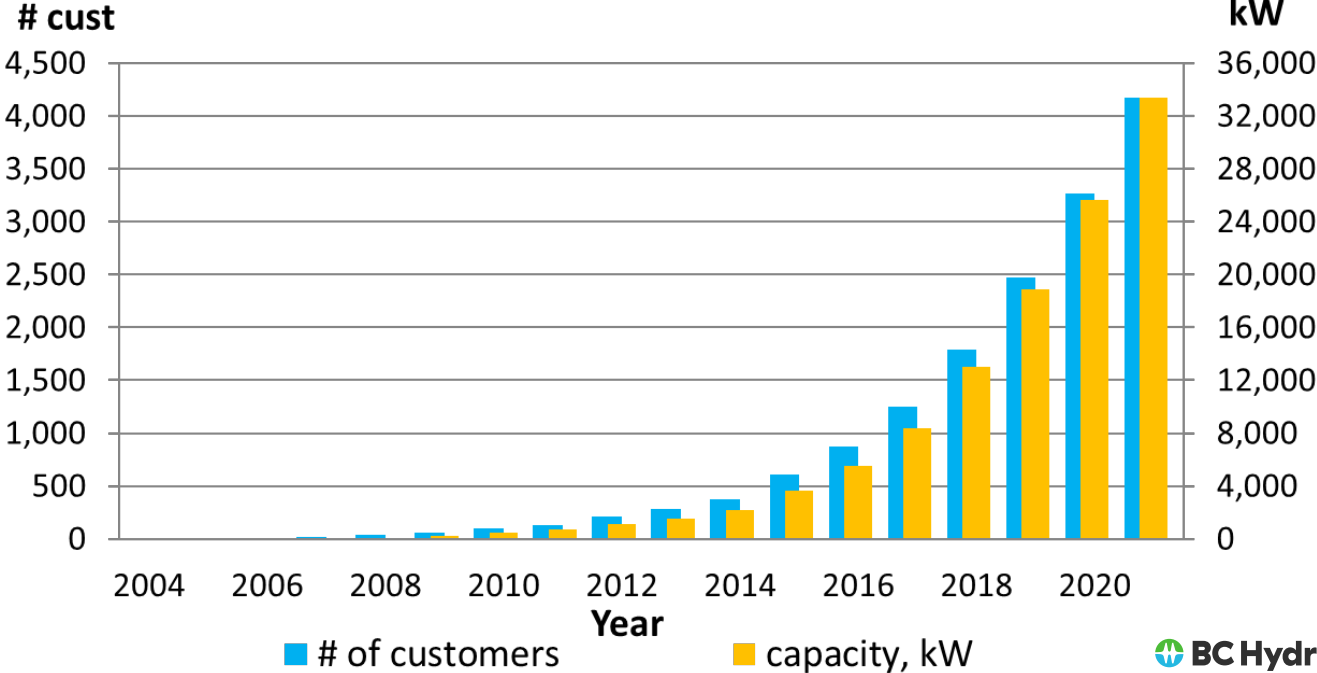
By installed capacity

Cumulative size ~33 MW



as of November 2021

Program growth



as of November 2021



Simple vs. Complex

Simple Net Metering

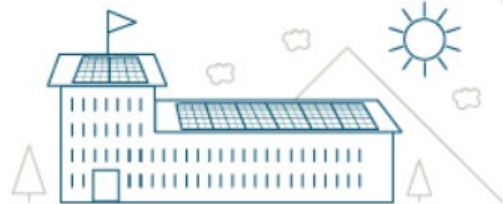


Simple Net Metering

For inverter-based projects up to 27 kW in size

- >90% of applications
- Homeowners
- Small businesses
- Mostly solar generators

Complex Net Metering



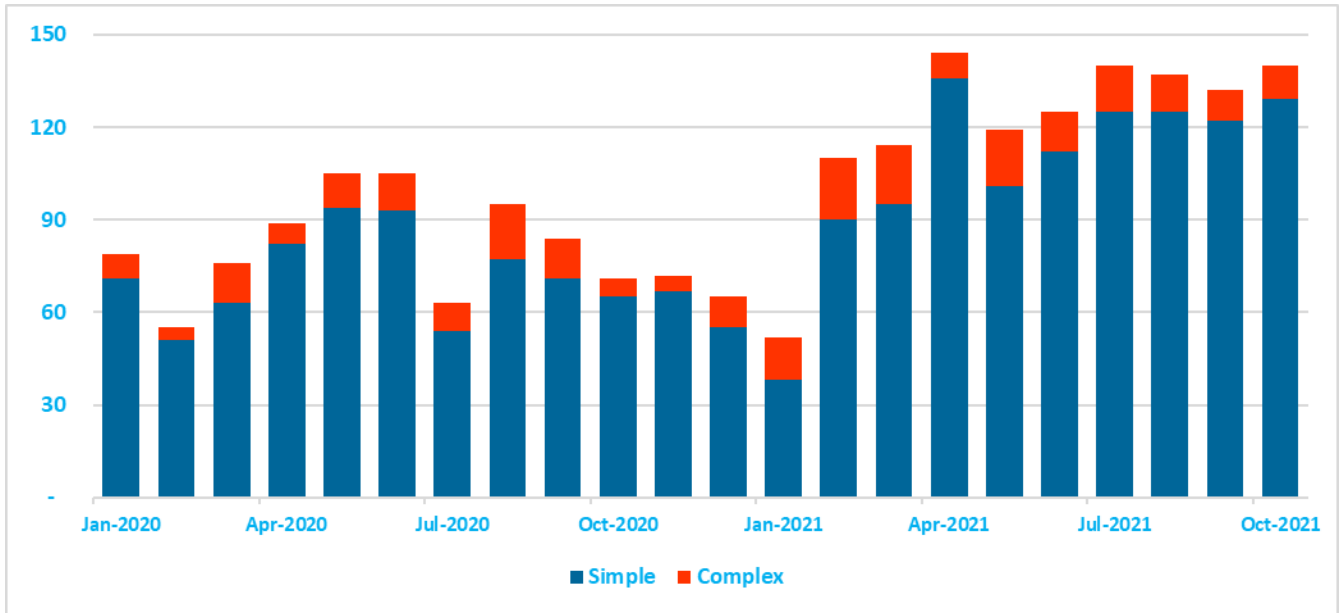
Complex Net Metering

All other projects up to 100 kW

- <10% of applications
- Schools
- Municipalities
- Some are hydroelectric

Simple vs Complex

Applications received monthly 2020 - 2021



Application process: Complex



1. SUBMIT AN APPLICATION

- Electric single-line diagram (see sample on website)
- Site plan (see sample on website)
- Additional documentation (As listed on the application form)

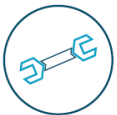
Depending on your application, it'll take us up to 2–6 weeks to review your application and assess your connection to the grid.



2. ACCEPTING YOUR APPLICATION

When we accept your application, we'll provide a few additional requirements which may include:

- Field verification testing (charges apply),
- Commissioning report
- Photos of the system—prior to authorizing your connection to the grid (see our Interconnection Requirements for more details).
- Incremental interconnection costs may apply.



3. INSTALL YOUR SYSTEM

Your contractor can move forward with installing your system.



4. TEST & COMMISSION YOUR SYSTEM

Notify us early before the initial energizing and start-up testing of your system, as we may need to coordinate a field verification test or a commissioning report.



5. INSPECT YOUR SYSTEM

- Submit your electrical contractor's Authorization & Declaration of Compliance or Certificate of Electrical Inspection from a BC Safety Authority Officer
- Submit any other documentation as requested at the time of acceptance



6. CONNECT TO THE GRID

We'll authorize your connection to the grid. *This is usually two weeks after receiving the electrical inspection.*

Technical Session: Net Metering

By: Shah Rahman, *Ph.D., P.Eng.*

Today's session...

□ Topics to be covered

- Technical Requirement from utility (BCH) perspective for Net Metering (less than 100kW) generation interconnection based on DGTIR100

□ Topics not covered

- Discussion on CSA standard or, Local Safety Authority Requirement - DGTIR100 does not replace any electrical code or other applicable standards.

Simple vs Complex

□ Simple NM: Must meet all the conditions below

- No CT for RM (200A service connection), and
- Less Than 30kVA, and
- Only CSA certified inverter based on type of generation (mostly PV)

□ Complex NM: In general, other than Simple NM including, but not limited to, any of the following conditions

- Uses CT for RM (Typically, more than 200A service or, 600V service) or,
- Multiple generation under same RM disconnects or,
- Generation source with black start capability (e.g., Synchronous, battery)
- Complicated technology uses power management controller or,
- Multi-mode of operation, etc.

Technical Assessment

□ Objectives

1. Ensure Safety ('safety' is the paramount)

- a. During BCH Primary outage
 - Line crew does not isolate physically any NM generation
 - Relies on CSA certified protection function and safe work method
- b. During CT maintenance work
 - RM tech is required to isolate all the sources from CT
 - Requires proper equipment labeling and guarantee of no energization

2. Impact on BCH Network: Impact assessment (and identify SI work) based on

- Ampacity
- Power quality (e.g., voltage rise, etc.)

Simple NM: Does not require any technical review

Complex NM: Two review stages; Application Review and FV Review

Complex NM: Application Review Stage

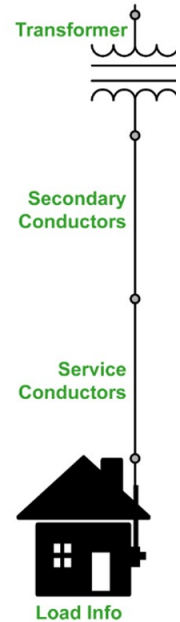
□ Application Review

➤ Identify SI work

- Service Conductor upgrade (100% cost goes to the customer)
- Secondary Conductor upgrade with associated work (If NM size > 50kW, cost paid by the customer)
- Transformer size upgrade (If NM size > 50kW, cost paid by the customer)

➤ Safety Evaluation

- Electrical single line diagram (SLD) showing all the generation on site and proper labeling
- Site plan showing the location of all the referred device on SLD
- Additional note/documentation when required including, but not limited to, sequence of operation, internal diagram of technology, mode of operation, etc.



Complex NM: Example

□ Sample SLD to address some key questions:

- Do we need specific size of padlock ? - *Yes*
- Do we need Lamacoid or equivalent Labeling? – *Recommended but required for outdoor installation*
- Do we need every disconnects to be lockable? – *No; only those which will be referenced as DG disconnect(s).*
- Do we need separate DG disconnects for every individual DGs? – *No, effort should be provided to minimize the number of disconnects to isolate all DGs.*
- Do we need simplified SLD? – *Highly recommended*
- How do we know if the RM is 'Hot Style' or, 'Cold Style'? – *If there is disconnect /breaker on Hydro side of RM to isolate BCH service. (Switching test can be done to identify.)*
- Is there any recommended labeling ? – *Yes, if they are unique.*
- Is there any recommended location for DG disconnect ? – *Must be readily accessible and safe to operate.*

Complex NM: FV Review Stage

Field Verification review is required to confirm the SI work and the NM installation are completed as intended to meet all the safety requirement.

□ Two types FV

A. Reduced FV (Only applicable to NM projects with straight forward technology)

- Free of cost.
- Installer to submit the photographs of installation demonstrating all the labels affixed on the equipment as per approved SLD.
- Installer to submit TSBC or, local authority inspection report; filled and signed FV form

B. Full FV (BCH Usual practice for all projects. NM projects with complicated technology)

- Customer/Installer to pay the cost of FV witness.
- The installer will demonstrate the test and BCH will witness the test. BCH witness will verify all the labels, collect photographs for review and complete FV form
- Installer to submit TSBC or, local authority inspection report;

Technical Review Challenge

The main challenge we are having is the end-to-end turnaround time of an application review due to the following reasons

- ❑ **Work Volume:** Higher than normal volume of Complex applications
- ❑ **Submittal and representation:**
 - Legibility and completeness of Electrical SLD as per the guideline, DGTIR100
 - Reference of equipment label mis-matching with the equipment label and location
 - Change in approved SLD during FV or during review process
 - Inconsistency between the approved SLD and FV photographs/equipment labeling
 - Difficulties in identifying key equipment on affixed SLD, etc.
- ❑ **Complicated Technology:** Complicated technology lacking the documentation in the required format

Technical Review Challenge

contd...

□ Steps to overcome the challenge

A. BCH side:

- BCH is working on improving the technical review process
- In order to facilitate our expectation, we have posted sample SLD on [NM website](#)
- Technical presentation

B. Installer side:

- Follow DGTIR100 guideline and sample SLD
- Submit complete and legible information
- Be consistent with all the submittals including equipment labeling on site
- Avoid to choose complicated technology unless it is necessary
- In case of complicated technology, provide the documentation in requested format

Questions