Q. **Reference: Schedule 2, Executive Summary, page i**

It is stated

> Under the proposed project, Hydro will expand its charging network to include nine additional sites on the Great Northern Peninsula and Labrador. Each site will include both a Level 3 Direct Current Fast Charger ("DCFC") with a minimum output of 62.5 kW and a Level 2 (7 kW) charger. Final locations will be selected based on a public request for proposals.

a) Provide a history of charger technology development.

b) When does Hydro predict that the Level 3 DCFC technology will be superseded by a more advanced technology, potentially resulting in stranded assets?

c) Are Hydro and Newfoundland Power willing to take on this risk on behalf of their customers? Please provide the reference in the Application that discusses the risks of charger station obsolescence, how the risk will be managed and how customers will be held harmless. Further, provide all documentation showing that customers have expressed a willingness to take on this risk.

A. Newfoundland and Labrador Hydro ("Hydro") does not have a complete history of electric vehicle ("EV") charger technology nor was the analysis of historical technology considered in the development of its charging network. However, Hydro did complete a robust assessment of current and future EV charging technology in order to ensure its equipment specifications struck the appropriate balance between cost, functionality, accessibility, and upgradeability.

Plug Types

Unlike gasoline powered vehicles which can use any gas pump, plug standards for direct current fast chargers ("DCFC") are not universal among EV manufacturers. There are three dominant standards for DCFC plugs in North America: (i) CHAdeMO, (ii) SAE Combined Charging System ("CCS"), and (iii) Tesla.

CHAdeMO plugs are used by Mitsubishi and Nissan only,[1] whereas CCS plugs are used by most other EV manufactures including General Motors, Ford, Dodge, BMW, Volkswagen, Kia, and Hyundai, among others. The Tesla plug type is proprietary and is only able to charge Tesla vehicles; however, Tesla vehicle owners are able to purchase an adapter and make use of CHAdeMO plug types.[2] The DCFCs purchased by Hydro will have both CHAdeMO and CCS plug types. This ensures that owners of all EV brands can avail of the proposed network. Hydro expects CCS will become the dominate DCFC plug standard in North America and its current charger specification minimizes risk of obsolescence in this regard.

All Level 2 chargers (excluding Tesla, for which adapters are included with vehicles) use a common plug standard – J1772. Hydro's Level 2 chargers also use this standard again, eliminating any risk of plug-related obsolescence.

DCFC Charging Speeds

Historically, the majority of DCFCs in Canada were rated at 50 kW which reflected the maximum charging speed of many EVs.[3] However many new EV models are capable of charging at speeds well beyond this limit, with some new EVs capable of maximum charging rates in excess of 250 kW.[4] As a result, higher power chargers are becoming more prevalent across Canada, with Hydro-Québec recently announcing that it will begin to install 100 kW DCFCs.[5]

The selection of a DCFC specification requires a careful balance between cost and functionality. Higher power chargers are currently much more expensive relative to lower power models and require corresponding upgrades to supporting infrastructure also at an increased cost.[6] Hydro has specified 62.5kW as its minimum charging speed for new purchases of DCFCs. This speed is 25% faster than the 50 kW units currently installed by other utilities in Atlantic Canada; however

[1] Nissan's most recently announced EV, the Ariya, will use the CCS standard.
[2] A CHAdeMO to Tesla adapter must be purchased separately to utilize non-Tesla DCFCs. J1772 (Level 2) to Tesla adapters are included with the purchase of a Tesla vehicle.
[3] Excluding Tesla.
[4] For example, the Porshce Taycan is capable of charging at a rate of up to 270 kW.
[5] "Rollout of 100-kW Fast-Charge Stations: The Electric Circuit Selects Québec Company AddEnergie ," Hydro-Québec, June 11, 2020 <http://news.hydroquebec.com/en/press-releases/1621/rollout-of-100-kw-fast-charge-stations-the-electric-circuit-selects-quebec-company-addenergie>.
[6] Charging cabinets and transformers specifically.

these units, are not as expensive as the 100 kW units recently announced in Québec. Based on Hydro's experience to date with the first phase of its charging network, there are few EVs currently in the province capable of maximum charge rates in excess of this specification.[7]

DCFC Upgradeability

While Hydro's DCFCs are currently well positioned to serve all EVs in the province, this will change over time as the prevalence of higher power charging increases among EV manufacturers. The DCFC chargers currently specified by Hydro are capable of being upgraded to 125 kW,[8] thereby minimizing the risk of obsolescence over the chargers ten-year expected useful life.[9] After the ten-year expected useful life of the charger, Hydro would have the ability to install higher capacity units likely at a lower cost as the technology matures.

In summary, Hydro has selected a robust charger specification which will mitigate the risk of obsolescence over the ten-year expected life of the assets.

[7] All Tesla's are capable of fast charging beyond 62.5 kW, but, only at native Tesla Supercharging stations. When using the Tesla to CHAdeMO adapter, these vehicles are limited to a maximum charging rate of 50 kW.
[8] Hydro currently specifies ChargePoint CPE250 DCFCs which can either be configured in pairs to direct power from both stations to a single EV (62.5 kW x 2 = 125 kW) or additional power modules connected to increase the capacity of each station.
[9] In the first phase of Hydro's charging network, sites were selected with at least 350 kW available capacity from the electricity system to allow for future upgrades.