Q. (Reference Application) With respect to EV charger technology:

a) Provide a history of charger technology development.

b) When does Newfoundland Power predict that Level 3 DCFC technology will be superseded by a more advanced technology, potentially resulting in stranded assets?

c) 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. *This Request for Information relates to the Electrification, Conservation and Demand Management Plan: 2021-2025 (the "2021 Plan") developed in partnership by Newfoundland Power and Newfoundland and Labrador Hydro ("Hydro" or, collectively, the "Utilities"). Accordingly, the response reflects collaboration between the Utilities.*

a) Direct Current Fast Chargers ("DCFC") are currently using CHAdeMO and SAE CCS[1] connectors.

Table 1 provides a brief history of CHAdeMO development.

Table 1:
History of CHAdeMO Development

Year	Development
2005	Research and development on CHAdeMO begins.
2009	First CHAdeMO infrastructure commissioned.
2010	The CHAdeMO association was established.
2011	First charger in Europe deployed.
2013	100,000 CHAdeMO compatible EVs globally and third-party certification starts.
2014	CHAdeMO published as International Electrotechnical Commission ("IEC") and CHAdeMO V2X protocol published.
2015	10,000 CHAdeMO charge points globally.
2016	CHAdeMO published as Institute of Electrical and Electronics Engineers standard.
2018	CHAdeMO 2.0 (400kW) specs published and 20,000 CHAdeMO charge points and one million CHAdeMO compatible EVs globally.
2021	CHAdeMO bus specs to be published as IEC standard.

[1] For fast charging, the CHAdeMO (an abbreviation of "CHArge de MOve"), and SAE CCS ("Combined Charging System") are the most used connectors by EV manufacturers. These two connectors are not interchangeable, meaning a vehicle with a CHAdeMO port cannot charge using an SAE Combo plug and vice versa. https://chargehub.com/en/electric-car-charging-guide.html.

Table 2 provides a brief history of SAE CSS development.

Table 2:
History of SAE CSS Development

Year	Development
2011	Proposal for a "Combined Charging System" was published at the 15th International Verein Deutscher Ingenieure – Congress of the Association of German Engineers.
2012	Prototype implementations for up to 100 kW were shown at Electric Vehicle Symposium 26 in Los Angeles.
2013	Volkswagen built the first public CCS quick-charge station providing 50 kW DC in Wolfsburg, followed by BMW who opened its first CCS rapid charge station to support the upcoming BMW i3.
2015	The first common power output of CCS stations to be built was 50 kW since this is the maximum rate that most cars can charge.
2016	As part of the Volkswagen emission scandal settlement, Volkswagen is to spend $2 billion in the United States over the following 10 years on CCS and other charging infrastructure through subsidiary company Electrify America; Ford, Mercedes, Audi, Porsche and BMW announced building a 350 kW (up to 500 A and 920 V) CCS charge network.

b) Newfoundland Power cannot predict when Level 3 DCFC technology will be superseded by a more advanced technology. Current DCFC technology is compatible with EVs currently being sold.[2]

Newfoundland Power acknowledges that, as EV technology advances, vehicle acceptance rates (i.e. maximum power rates vehicles can accept) are expected to increase.

With respect to advanced technologies potentially resulting in stranded assets, there are options available in DCFC technology that will protect against the chargers becoming stranded assets. These include:

(i) Expandable models. This involves the addition of power modules that result in a higher power output at a single station.

(ii) Pairing ability. For example, if two DCFCs were co-located at a site with an output of 50 kW each, these can combine for a total output of 100 kW to a single vehicle, provided the acceptance rate of the vehicle is sufficient.

[2] The Company is aware of alternate technologies under development, including wireless charging. These technologies are in the early stages of development and a timeline cannot be placed on mass scale development.

c) Newfoundland Power is focused on ensuring that the selected chargers will have expansion and pairing capability as discussed in part (b). This will protect the charging stations from obsolescence as battery capacity and acceptance rate of EVs potentially increase.