April 26, 2023

Estimate of DCFC requirements for Nova Scotia

1. Dunsky (April 2023) says 10kwh/day is the average energy figure used as an average in calculations for all locales and light vehicle types in Canada[1]. EVs use public chargers 5% of the time, so will charge .05 x 10 kWh/day = 0.5 kWh/day at public chargers.
2. All vehicles on the road eventually will be EVs, probably by around 2045. Nova Scotia has approximately 950,000 vehicles. With growing population, assume there will be 1,000,000 vehicles in Nova Scotia in 2045.
3. Each of these 1,000,000 vehicles will need .5 kWh of energy each day, on average. That totals 500,000 kWh/day.
4. Pearre and Swan[2] show that the available power from a DCFC is 10% of the nameplate power, averaged over 24 hours, if queueing is to be avoided. A 100 kW charging head can deliver 10 kW x 24 hours = 240 kwh per day.
5. The number of 100 kW charging connectors will therefore be 500,000 / 240 = 2,083. So, assume 2,000 connectors.
6. A typical charging station configuration is 2 heads/charger and 4 to 8 heads per charging station. Thus 250 to 500 charging stations, offering 2,000 DCFC charging heads, will be needed in the province by 2045.
7. Today there are fewer than 50 DCFC charging heads in Nova Scotia.
8. Extrapolating to all of Canada, with 24,000,000 vehicles on the road, a total of close to 48,000 charging heads, or 24,000 DCFCs in 3,000 to 6,000 charging stations will be required by 2045.

Converting the world to EVs is a 25-year experiment! There will be much to learn. Uncertainties and Questions are many:

1. Will drivers continue to use L2s when DCFCs are readily available?
2. Will EV technology improve efficiency to the point of making a significant difference in the range per kwh?
3. Will faster charging technology in batteries and in DCFCs significantly increase the available usage per charger from 10% to perhaps 20%.
4. Will full adoption of EV chargers in MURBs and workplaces significantly reduce the percentage of charging that will occur at public chargers?
5. Will the number of vehicles on the road (the fleet) change significantly as population grows, EV autonomy grows, and drivers change habits as they adopt EVs.
6. Will new technologies such as road installations to enable charge-while-you-drive reduce the demand for stationary charging?

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[1] Jeff Turner, Dunsky Consultants, April 2023, minute 40:00 of webinar. https://www.youtube.com/watch?v=7ojJ351bja8&list=PLgmymQuAYlURyz27qs3Nrum3krmv9zo0J

[2] Observational Evaluation of the Maximum Practical Utilization of Electric Vehicle DCFC Infrastructure, Nathaniel S Pierre and Lukas Swan, World Electric Vehicle Journal, **2022**, *13*(10), 190; **https://doi.org/10.3390/wevj13100190** - 16 Oct 2022

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