October 15, 2024

To: Andrew Pietrewicz, Ontario Energy Board

From: Power Advisory

Re: EV Low Load Factor Delivery Rates: Impact of Venue Type

Background

On June 13, 2024, the Ontario Energy Board (OEB) held a stakeholder meeting to discuss an OEB Staff Discussion Paper entitled "Adjusted Retail Transmission Service Rate for Low Load Factor Electric Vehicle Charging" released on May 30, 2024[1] ("the OEB's Draft Proposal"). The Draft Proposal was supported by a Power Advisory report entitled "EV Delivery Rates Addendum 1: Analysis and Rate Design" delivered to the OEB March 25, 2024[2] ("the Addendum 1 report").

Power Advisory's report demonstrated that the proposed EV charging rate was grounded in cost causality using analysis of historical hourly consumption profiles for Direct Current Fast Chargers (DCFCs) in the United States and General Service Greater than 50 kW customers in Ontario. The analysis suggested that proposed low load factor rate would more closely reflect the expected contribution of low load factor customers to coincident demand than existing rates.

The OEB's Draft Proposal specified that the "EVC Rate would only be available to EV charging stations that are publicly available" and could include retail establishments, employee parking lots, and multi-residential buildings (see "Eligibility Requirement 2: Public Accessibility"). One stakeholder concern with the proposed rate was the risk that material differences in consumption patterns for EV charging stations at different types of venues (e.g. multi-unit residential building, employee parking lot, retail) would limit the applicability of the cost causation analysis to all DCFCs, potentially leading to undue cross subsidization.

Methodology and Results

Power Advisory used the same data source as the Addendum 1 report to explore potential differences in consumption profile by venue.[3] The full EV charging session dataset used for the Addendum 1 report analysis did not include data on each charger's venue type. As a result, it was not possible to segment the

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[1] OEB Staff Discussion Paper. Adjusted Retail Transmission Service Rate for Low Load Factor Electric Vehicle Charging. May 30, 2024. https://www.rds.oeb.ca/CMWebDrawer/Record/854544/File/document

[2] Power Advisory Memo to OEB. EV Delivery Rates Addendum 1: Analysis and Rate Design. March 25, 2024. https://www.rds.oeb.ca/CMWebDrawer/Record/854316/File/document

[3] EV Watts Public Database: https://www.osti.gov/biblio/1970735

full analysis by venue type. However, the interactive dashboard[4] published for the same dataset included hourly average charger utilization data by venue type.

The dataset covered a period from October 2019 to December 2023, but data were very sparse in 2023. Power Advisory considered quarterly average consumption profiles for DCFCs over a two-year period (2020 to 2021) for this analysis. Table 1 provides descriptive statistics on the dataset. There was no data available for multi-unit dwellings in the period considered, but limited utilization data was available for 2022. For all other venue types, DCFC ports were added throughout the study period.

To focus on differences in the timing of consumption, Power Advisory also normalized hourly average consumption, on a quarterly basis, for each venue type relative to the venue type's average consumption. The minimum, average, and maximum normalized utilization for the period from hour ending 15 to 19 (i.e. the peak demand period identified in the Addendum 1 report) are also presented in Table 1. Visualizations of the hourly normalized utilization profiles are presented in Appendix 1.

Table 1: Descriptive Statistics and Results for DCFC Data

Venue Type	Number of Ports: Jan 2020	Number of Ports: Dec 2021	Average Utilization	Minimum Normalized Utilization: HE15-19	Average Normalized Utilization: HE15-19	Maximum Normalized Utilization: HE15-19
Fleet	80	319	17.7%	0.83	0.90	0.96
Hotel	38	42	3.4%	1.42	1.50	1.63
Leisure Destination	28	63	3.6%	1.39	1.54	1.63
Medical or Educational Campus	26	44	5.7%	1.37	1.59	1.75
Mobility Hub	0	12	7.7%	1.25	1.39	1.58
Multi-Unit Dwelling[5]	0	0	n/a	1.43	1.54	1.63
Municipal Building	37	154	6.0%	1.40	1.57	1.66
Business Office	270	501	5.5%	1.24	1.40	1.57
Multi-use Parking Garage/Lot	57	118	4.3%	1.14	1.56	1.71
Retail	654	1029	5.2%	1.29	1.45	1.54

[4] EV Watts: Electric Vehicle Widescale Analysis for Tomorrow's Transportation Solutions. https://app.powerbi.com/view?r=eyJrIjoiYmI4NTU3NTItZmYzYi00MTc1LTkwMWMtZGY4YzgwMzk1Y2Y5IiwidCI6ImM1MDVhNzQ1LTUwYzYtNDc3Zi1hMTEwLTdiZTg5YjUxM2FjYyIsImMiOjN9

[5] Data for multi-unit dwellings is unavailable for 2020 and 2021 and very sparse in the entire dataset. Normalized utilization is shown for 14 ports available for some months in 2022.

Fleet DCFCs have materially different consumption profiles, average utilization, and utilization during peak demand periods compared to other venue types. For all other venue types in the dataset, the range of normalized utilization generally falls between 1.25 and 1.75 and the average falls between 1.39 and 1.59. There is a low sample size for some venue types such as multi-unit dwellings, mobility hubs, and medical or educational buildings.

Discussion

The available data suggests that DCFCs for fleets have materially different consumption patterns compared to public EV chargers, but public EV chargers at different venue types have similar consumption patterns during peak times. Another analysis of the EV Watts database found that for Level 2 and DCFC stations, public charging in general has an "n" shaped curve (lower usage overnight) while private charging at fleet and residential buildings typically follows a "u" shaped curve (higher usage overnight).[6]

From a ratemaking perspective, there is no indication that publicly accessible DCFCs at different types of buildings have materially different hourly consumption patterns. DCFCs are intended to be used for relatively short sessions (i.e. under and hour) and the timing of consumption appears to be a function of overall vehicle traffic rather than characteristics of the host facility. Data was not available for DCFCs with restricted access (e.g. private parking at a condominium or private employee parking).

The existing customer classes defined in Ontario include a broad range of customers with different consumption patterns and expected contribution to coincident peak demand. Based on analysis for this memo and previous reports to the OEB, load factor is substantially more predictive of demand during coincident peak periods than normalized average hourly consumption. Differences in consumption patterns among publicly accessible DCFCs with low load factors are small compared to the difference between low load factor DCFCs and General Service Greater than 50 kW customers with high load factors.

[6] "Evaluating Electric Vehicle Public Charging Utilization in the United States using the EV WATTS Dataset" (2023) https://www.nrel.gov/docs/fy24osti/85902.pdf

Appendix 1: Hourly Consumption Patterns

Figure 1: Normalized DCFC Hourly Consumption, 2020

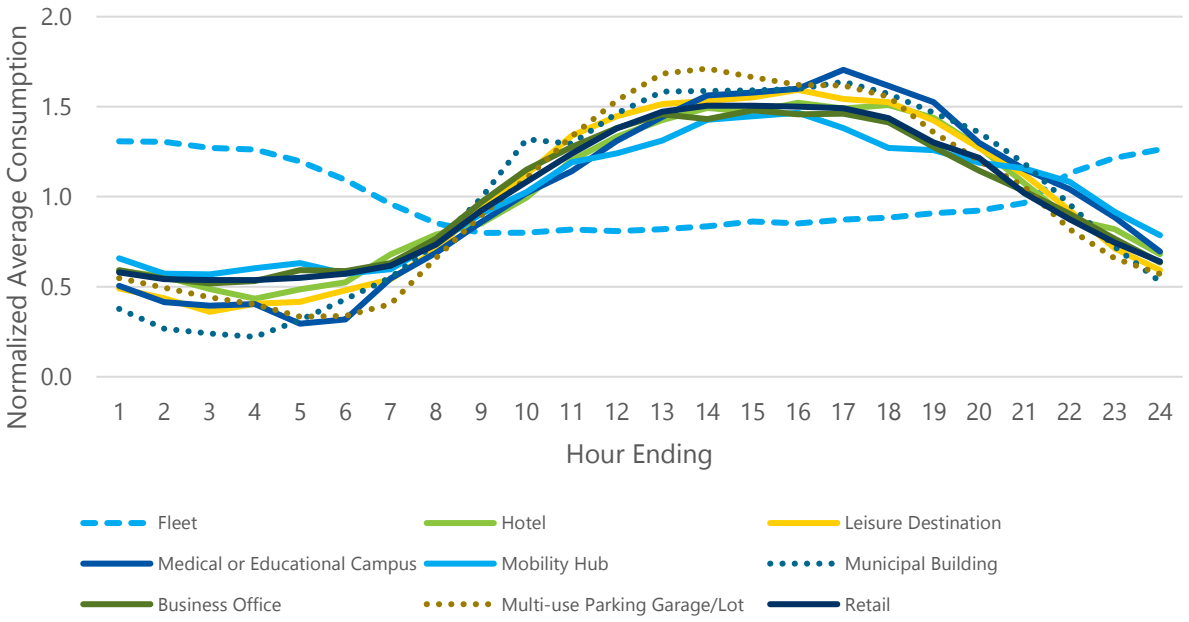

Figure 2: Normalized DCFC Hourly Consumption, 2021