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Canada's ZEV sales targets

Canada, and many of its Provinces have set ambitious transportation GHG reductions targets to address the urgency of climate change. For Canada, the target is to increase zero emission vehicle sales (ZEV) sales to 10/30/100% by 2025/2030/2040 respectively.

The Current Electric Vehicle Charging landscape

- Persons living in single family homes, duplexes and row housing generally have the ability to add home electric vehicle charging. They usually have access to their own electrical supply and approved meter and are outside the scope of this issue.
- Most of the persons living in multiple unit residential buildings (MURBs), do not have access to electric vehicle (EV) charging infrastructure nor is their parking space accessible to the electrical panel for their individual suite.
- EV infrastructure in MURBs is a pre-condition to expanded EV sales. Potential EV sales are reduced by as much as 40% without access to home charging (2015 SFU Study¹)
- Persons in MURBs that have purchased EVs in spite of the lack of home charging access, are overloading public and private commercial EV infrastructure with charging sessions.
- A requirement to accommodating large numbers of EVs in MURBs is the deployment of "shared" charging circuits which require a per kWh fee structure in order to bill fair fees based on energy consumption and avoid overbilling for electricity.
- Time-based fee structures are perceived by the public as inequitable, opaque and unfair as they result, in the majority of cases, in overbilling the consumer for electricity for their EVs.

¹ <https://sustainabletransport.ca/the-canadian-plug-in-electric-vehicle-study-cpevs/> Page 160

- Additional employment opportunities are being deferred because of the lack of certainty in MURB EV billing fee structures because estimated billing fees has a direct bearing on construction decisions.
- Without the expeditious resolution of per kWh fees, the deployment of cost-effective MURB EV infrastructure is essentially stalled. Instead, temporary installations or “work arounds” to time-based billing or smaller scale implementations are being deployed that result in few EV spaces per building. These “workarounds” and limited deployments will result in future rebuilds and retrofits.
- Providers of fast charging infrastructure lack viable business models as they have no certainty in fee structures.

Why Federal legislation and regulations represent an obstruction to ZEV sales

- The sale of electricity by the kWh and the measurement devices used for such sales are regulated under the Electricity and Gas Inspection Act and Regulations. The required accuracy for electricity meters is included in the Regulations under the Weights and Measures Act.
- The requirements of the Act (intended to regulate large public utilities) include; a very high meter accuracy (99.95%)², formal registration with the government, extensive record keeping for each individual meter, inspection, reinspection and other related requirements.
- The Act never envisioned the advent of electric vehicles nor that electric vehicle charging devices (EVSEs) that would be capable of inexpensively measuring and recording the electricity dispensed to individual vehicles for the purpose of billing fees to individual EV owners.
- The Act never envisioned that the consumer (or small Strata Corporation) would be the owner of the meter and hence could subject to the (onerous) requirements (government registration, record keeping and so forth) of the Act that are intended for large Utilities with millions of meters.
- Federal regulators would understandably prefer to have standards for such devices that are harmonized with international standards but the implementation of these standards is years away, especially considering the additional delays after standard-setting that would be occasioned by OEM testing, certification, and product production ramp up.
- The market, and availability of future regulated devices is uncertain, as other countries and jurisdictions are proceeding without waiting for an international consensus on standards.
- Given Canada’s small market share for these devices, such devices are likely to be late to market and likely command a premium price if and when they would be available.
- The climate change emergency and the need to urgently reduce GHGs warrants expeditious actions being taken to provide immediate and reasonable solutions to this issue.

Using the current regulations is of no benefit to the consumer

Under current regulations, sellers of electricity are required to register as *Contractors*³ with Measurement Canada which entails all the obligations of a large hydro utility. These regulations, as measurement Canada has confirmed⁴ would be extended to anyone who resells electricity and is a meter owner (under the Act). This

² Higher than Norway and the EU which require 96.5% accuracy for domestic meters

³ As defined in the Electricity and Gas Inspection Act

⁴ Documentation on request

includes individual EV owners and Strata Corporations who would own their own EVSE devices. It is expected that relatively few AC devices will be owned by other third parties⁵.

The Act and regulations never anticipated this scenario. If applied to Strata Corporations or individual EV owners, the regulatory requirements become onerous. There is no known scenario where any possible financial benefits to the consumer outweigh the extra meter cost, or the inspection, record keeping and other regulatory costs. For this to be the case, the total cost impacts of regulation (equipment and compliance) would need to be less than \$6.50 per year⁶ for multi-unit residents in Canada.

The Unintended Consequences due to the inability to deploy per kW fees

- EV billing fees by time are considered to be unfair by the consumer as lacking transparency and resulting in the overbilling for electricity in most cases.
- Electric Vehicle owners in MURBs without home charging are flooding the public and private charging networks to obtain access to charging infrastructure thereby making it less available to EV owners that need a charge when out of range from home or while travelling or those without home parking spaces.
- Working class income earners are being discouraged from purchasing EVs because of the higher fee structure for their purchase of less expensive EVs with smaller battery sizes (and slower charging speeds).
- The uncertainty about being able to install state-of-the-art shared systems (that are best deployed with per kWh fees), means that these systems are being deferred or not being installed.
- The foregoing of employment that would otherwise be building EV infrastructure
- MURBs are implementing “work-arounds” to accommodate time-based fees. These workarounds are ultimately more expensive than deregulations and many will require extensive rewiring of the buildings in the future for shared-power technology.
- Buildings that already have various degrees of readiness, are not proceeding with EV infrastructure for several reasons including the inability to due billings on a fair and transparent basis with (per kWh) fees.

EV Charging Infrastructure access at fair pricing

For many (40%) of prospective EV owners, the deciding factor for buying an EV is whether or not they will be able to access charging infrastructure and be charged reasonable and fair billing fees for access.

With over 70% of Canadian EV charging occurring at home⁷, having access to charging at home is critical to EV uptake and countless studies ([e.g. Electrifying Vehicles: SFU’s Canadian PEV Study and A Review of Consumer Preferences of and Interactions with Electric Vehicle Charging Infrastructure](#)) demonstrate this linkage. Without home charging access EV demand is reduced by 40%⁸.

⁵ To avoid long term monthly costs, EV owners are expected to prefer to own their own charger units, In the case of third parties, the business model is weak as Stratas are very reluctant to enter into long term contracts.

⁶ \$6.50 per year for Canada – 15,400 km/year X 0.2 kWh/km X 70% (home charging) X 0.02(accuracy gain) X 15 cents/kWh; 15,400 km per 2009 Stats Canada Canadian Travel Survey

⁷ Charge the North Study, FleetCarma 2019

⁸ Simon Fraser University - The Canadian Plug-in Electric Vehicle Study (CPEVS) 2015

The Urgency for per kWh fees in Multiple Unit Buildings

The ability to accommodate charging infrastructure in MURBs was previously seriously constrained because of the dedicated power requirements to accommodate more than just a few vehicles. Innovative technology (developed in Canada) combined with changes to the Electrical Codes have now provided the ability to share power between EVs in real time but per kWh fees goes hand-in-hand with this technology, otherwise EV owners are charged as much as 5 times or more too much under time-based fee structures. The reason is that the amount of energy being dispensed to the vehicle through power-sharing depends not on how long the vehicle is charging (time) but on the variable number of vehicles connected in real time (kW).

Without access to per kWh billing fees, these power-sharing systems, that are of key importance to providing large-scale access to EV home charging in MURBs, will not be installed due to the excessive fees associated with time-based billing. Time-based fees can lead to extra fees in the order 75 cents or higher per equivalent kWh or \$1,300 per year⁹ too much.

The importance of per kWh fees for intercity travel (Fast Chargers)

Using time-based fees for intercity travel using (DC) fast chargers, results in slower charging, older, or less expensive EV owners paying twice as much or more for electricity than newer or faster charging EVs. Billing fees by time (minute) also results in excessive fees under other conditions such as ambient temperature and the state-of-charge of each individual vehicle battery. These higher charges are socially inequitable for persons who cannot afford a more expensive EV. Further, with higher time-based fees being required for even higher speed charging devices (above 50 kW), the excessive time-based fees become ever larger. There is no known time-based fee structure or workaround that can address this problem.

In the public fast charging market, consumers continue to be unintentionally overcharged as the direct result of the unfairness caused by time-based fast billing fees that routinely result in “effective electricity fees” approaching a \$1 per kWh. Adjusting time-based fees downward in any to attempt to mitigate overbilling would result in the lower cost EV owners subsidizing the faster charging EVs. There is no equitable option other than “paying for what is dispensed” in kWh. The prospect of being overbilled for electricity discourages additional EV adoption rates (sales).

Without access to a per kWh fee structures for multi-residential units and intercity charging at fair (per kWh) pricing, Canada’s ZEV sales targets of 10/30/100% by 2025/2030/2040 respectively, will not be achieved.

The Central per kWh Issue

Less expensive, but reasonably accurate submeters already present in EV charging devices to measure electricity dispensed by the kWh cannot be used as the basis for fees because they do not meet the current (99.95%) accuracy requirements of Measurement Canada. Further, current fast charging meters have no metrology standards and are disqualified from using kWh measurements for billing purposes.

With the resolution of international standards and the lengthy road to market availability still years away, without at least interim deregulation, EV sales cycles are being repeatedly lost and Canada’s (as well as Provincial) EV sales targets are not achievable.

⁹ \$15,400 km X 0.2 kWh.km X 70% (home) X (\$0.75 (time-based fee) less \$0.15 (kWh cost) = \$1,294 per year extra
Average km per year from 2009 Stats Canada Travel Survey Report

What does Norway do?

Norway has expeditiously resolved this metrology and billing issue by permitting per kWh measurement for electric vehicle charging equipment while work (years of elapsed time) continues on future metrology standards for such devices.¹⁰

Norway does not currently regulate EV chargers and has removed the previous licensing requirement to deploy them for billing (fee) purposes. Norway permits the reselling of electricity by the kWh or by time. Norway's metrology standard for home meters, in any case is 3.5%¹¹, which is within the accuracy tolerances of most OEM EV charging devices available or already in use in Canada.

The Solution

Deregulate or place a moratorium on the regulation of electric vehicle charging devices until such time as the lengthy international metrology standards process, consultation, and production ramp up for EV charging devices is completed.

Compiled by:

The Victoria Electric Vehicle Association

Victoria BC

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¹⁰ <https://www.nve.no/reguleringsmyndigheten/nytt-fra-rme/nyheter-reguleringsmyndigheten-for-energi/nve-unntar-ladetjenester-omsetningskonsesjonsplikt/>

¹¹ Available on request