EDA | POWER OF LOCAL HYDRO

CHARGING AHEAD:

ELECTRICITY DISTRIBUTORS ASSOCIATION POSITION PAPER ON ELECTRIFIED TRANSPORTATION

December 2020

1. Summary

The popularity of electrification, to displace greenhouse gas (GHG) emitting fuel sources, is gaining traction and the trend will increase over the next decade as Canada strives to meet its climate goals. This position paper, focusing on the transportation sector, is the first in a potential series of electrification papers**.** The next position papers developed by the EDA will focus on the electrification of buildings and the industrial sector. At 38%[1], the transportation sector is the largest contributor to Ontario's emissions, with cars and trucks being the largest components. With the increase of commuters and vehicle ownership, there is an opportunity to use our clean electricity to decarbonize other sectors through the electrification of transportation.

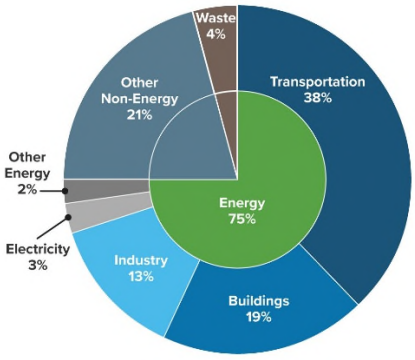


Figure 1: Ontario's Emissions

The rapid growth of electric vehicles (EVs) in Canada and around the world will have a major impact on many industries and will significantly impact those that literally fuel this transition: electric utilities. Building on their trusted relationships with customers and the upcoming increase in electricity demand, there is a need for LDCs to play a significant role in supporting the electrification of the transportation sector.

This paper outlines the EDA's perspective, advocacy positions and the role that LDCs can play in electrified transportation, one of the largest components of overall beneficial electrification expected to unfold in Ontario.

To summarize, the EDA believes LDCs should:

- ✓ be enabled and encouraged to support the electrified transportation through infrastructure developments;
- ✓ have the ability to rate-base strategic investments in electrification technologies, such as EV and transit-oriented charging stations, where the LDC business case balances customers' needs, government policy objectives, and supports our robust electricity systems; and
- ✓ review existing customer rate classes and establish, with OEB approval, a specific rate class for public fast charging.

One approach to supporting electrified transportation would be for the OEB to establish a generic hearing on using rates to support adoption of personal, fleet, and transit electric vehicle infrastructure.

2. Background

Electrification refers to the process of replacing technologies that use fossil fuels (coal, oil, and natural gas) with technologies that use electricity as a source of energy. Depending on the resources used to generate electricity, electrification can potentially reduce carbon dioxide (CO_2) emissions from the transportation, building, and industrial sectors which make up the bulk of all greenhouse gas emissions

[1] https://www.ontario.ca/page/made-in-ontario-environment-plan

in Canada. Addressing emissions from these sectors is critical to decarbonizing the economy, and ultimately, mitigating the impacts of climate change. The electrification of the transportation sector includes several aspects of the transportation industry including EVs, personal and fleet; other electrified transportation including medium-duty (e.g., delivery trucks) and heavy-duty vehicles; and rail systems like subways and the Metrolinx GO network. LDCs can play a major role in supporting all forms of electrified transportation by helping to meet the increased demand through supportive rate structures and building EV charging infrastructure.

Not taking an active and supportive role with electrification can add to existing climate change issues, can result in governments failing to meet decarbonization policy goals, and lose out on opportunities to shape the way that unmanaged electrification will impose costs on the grid. Moreover, electrification expansion without collaboration with electricity distributors could negatively impact the system and cause negative consequences, such as denial of connection, reliability, or power quality issues.

LDCs understand the system capacity needs of their service area and are best positioned to make decisions on where it would make the most sense to install charging infrastructure on a larger scale, something which is needed to see a much larger adoption of EVs. Connection issues, power quality issues and reliability concerns are all factors that must be considered when thinking about electricity infrastructure developments at a local level, and failing to engage with LDCs on critical decisions around expansion of electrification can result in these above mentioned issues and can unnecessarily increase costs.

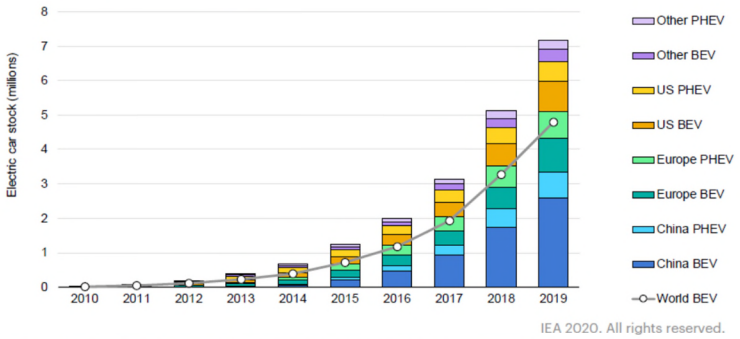
2.1 Electrification as a climate change solution

Canada's future is heading toward electrification as one of many strategies to combat climate change. Ontario has led climate change action with the decommissioning of coal-fired power plants which dramatically reduced the carbon footprint of its electricity system. Decarbonizing the transportation sector makes sense where it provides significant environmental, economic and grid benefit. The transportation sector is a significant source of GHGs, producing 24% of total national emissions. Use of EVs can curb overall GHG emissions from transportation, especially where the electricity used to charge them is generated from clean sources. Already, 67 percent of Canada's electricity comes from renewable sources like hydro, wind and solar; in Ontario, over 95% of its capacity is from non-fossil fuel sources.

2.2 Electrification and EVs

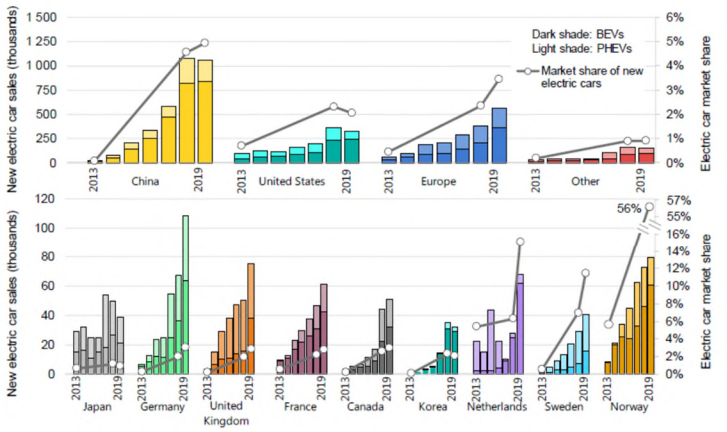
The popularity, usage, and market (both global and Canadian) for EVs is growing. According to the International Energy Agency's Global EV Outlook 2020 over 2.1 million electric vehicles were sold worldwide in 2019 – an increase of 40% over 2018's record year. The total number of EVs on the road, globally, reached 7.2 million in 2019. According to the IEA's outlook, *"Ambitious policy announcements have been critical in stimulating the electric-vehicle rollout in major vehicle markets in recent years. In 2019, indications of a continuing shift from direct subsidies to policy approaches that rely more on regulatory and other structural measures – including zero-emission vehicles mandates and fuel economy standards – have set clear, long-term signals to the auto industry and consumers that support the transition in an economically sustainable manner for governments".* Seventeen countries have plans to phase out some or all gas-powered vehicles between 2025 and 2050.

Global electric car stock, 2010-19



Sources: IEA analysis based on country submissions, complemented by other sources. For more details, see figure 1.1 in the main report.

Figure 1.2 Passenger electric car sales and market share in selected countries and regions, 2013-19

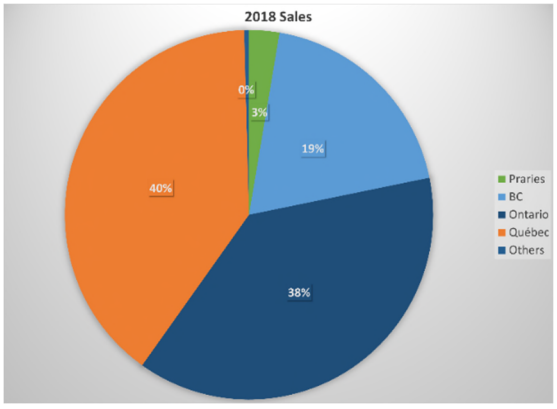


Note: Regions and countries in this figure represent the largest electric vehicle markets and are ordered by size of their conventional car market.

Sources: IEA analysis based on country submissions, complemented by ACEA (2020); EAFO (2020c); EV-Volumes (2020); Marklines (2020); OICA (2020); CAAM (2020).

The worldwide market share of electric cars reached a record high of 2.6% in 2019, expanding in all major markets except Japan, Korea and United States.

Canada has seen a significant expansion in the EV market, with Ontario, Quebec and British Columbia accounting for 97% of all plug-in vehicles sold in Canada between 2013 and 2018. The Ontario government cancelled its EV incentive program in September 2018; however, the federal government's program substantially replaced it in 2019. Car sales, including EVs, declined in early 2020 due to the pandemic; however, vehicle sales and EV market share are expected to regain strength once the pandemic subsides. The market share growth is further supported by the government's recent



announcements of funding for Ontario's EV automotive sector (e.g. Ford and GM announcements for Oakville and Oshawa).

In addition to funding EV purchases, the federal government has been and continues to fund charging infrastructure through its zero-emissions vehicle infrastructure programs (ZEVIP) and electric vehicle alternate fuel infrastructure deployment initiative (EVAFIDI). The third-party delivery agent RFP for ZEVIP3 is currently underway closing on December 10, 2020.

2.3 Electrification and Public Transit

Through Metrolinx, Ontario has been making significant investments in electrifying its GO train rail network. The Province has committed $13.5 billion to implement GO Regional Express Rail (RER) as part of a $21.3 billion transformation of the GO network from commuter transit to a regional rapid transit system. GO RER involves electrifying the transit train system in several communities and corridors across Ontario with the goal of improving service times and protecting the environment. The electrification process consists of transitioning away from presently diesel-powered GO trains towards the use of direct electrical supply as a new power source. Electrification of transit systems directly benefits the environment, and our health, through air quality improvement and lower emissions.

Several municipalities are also advancing fleet and public transit electrification in their plans to address climate emergencies. Some large corporations have also announced decarbonization plans in Canada. The federal government has established programs to encourage and fund mass transit, medium-, and heavy-duty fleet electrification, with an RFP expected to be released in December 2020.

RFP	EVAFIDI 2020	ZEVIP (third-party delivery agents)	ZEVIP (strategic projects including mass transit & medium/heavy-duty fleets)	ZEVIP (public places and on-street)	ZEVIP (multi-unit residential buildings, workplaces, light-duty vehicle fleets)	ZEVIP (third-party delivery agents)	ZEVIP (strategic projects including mass transit & medium/heavy-duty fleets)	ZEVIP (multi-unit residential buildings, workplaces, light-duty vehicle fleets)
Launch Date	26-Mar-20	11-Sep-20	Dec-20	Feb-21	May-21	Aug-21	Dec-21	Feb-22
Submission Deadline	23-Jul-20	10-Dec-20	Mar-21	May-21	Aug-21	Nov-21	Mar-22	May-22

2.4 Grid Impacts

As EV and other electrified transportation adoption grow, LDCs, transmitters, and generators will need to plan the power needed to charge those vehicles, and how to forecast when, where, and what intervals of time that electricity will be needed. Ultimately, there is a need for new infrastructure investments in both the distribution and transmission systems.

Other long-term challenges for utility operations is more about managing peak demand than total consumption. A National Grid UK study estimated a 30% increase in instantaneous peak demand in a fully EV environment. As a result, the industry will need to explore options for shifting and controlling charging habits. Options, from the LDC perspective, include credits, rebates, rate plans to encourage off-peak charging and smart charging solutions that automate the response to price signals. Those are extensions of traditional ways of managing electricity demand.

3. Position Statements

The following position statements will contextually serve in future messaging and advocacy. These include, in no particular order:

1. LDCs should be enabled and encouraged to support electrified transportation through infrastructure developments;
2. LDCs should have the ability to rate-base strategic investments in electrification technologies, such as EV and transit-oriented charging stations, where the LDC business case balances customers' needs, government policy objectives, and supports our robust electricity systems;
3. LDCs should review existing customer rate classes and establish a specific rate class, approved by the OEB, for public fast charging.

3.1. LDCs should be enabled and encouraged to support electrified transportation through infrastructure developments

LDCs are uniquely positioned and trusted to support, advise, and provide solutions to, their customers. While there are numerous opportunities for LDCs to serve their customers, there are many barriers to the productive interactions between LDCs and their customers.

When energy related questions surface for customers, families and businesses alike, they will turn to their LDC for answers. As the world is rapidly progressing with new energy sources, storage, self-generation, and electrification solutions, there will be a heightened level of activity and communication between customers and LDCs. It would be beneficial to enable LDCs to participate in customer discussions on electrification and provide appropriate solutions for their customers. Further, there will be an increase in third party solution providers, and like what the sector experienced with gas marketers, electricity retailers, microFIT installers, and hot water tank rental

agents, there will be bad actors amongst the good ones. LDCs needs to be part of the communication process and assess the impact on the local, regional and system grid. Customers will rely on their LDC for quality information and advice.

One of the major barriers being faced by EVs for widespread adoption, is mainly due to limited charging infrastructure, which LDCs can help alleviate. LDCs are being held back from playing a more active role in the electrification of transportation by not being able to rate base the much needed EV charging infrastructure that is required to see a much larger uptake in EV usage across the province. Currently, LDCs do not have the regulatory support or mandate from the OEB to engage in initiatives that support electrification and are, therefore, being left out of the conversation with both customers and stakeholders alike on the path forward for electrification.

Electrified transportation can provide a significant reduction in GHGs as transportation fuel is one of Canada's largest GHG contributors. Many electrification initiatives will be generated by cities and municipalities, who are likely to turn to their LDC for support, advice, and nimble response.

Our electricity grid is large and robust, and handling additional load can be achieved if well managed. Jointly coordinated electrification by LDCs and the IESO, will help Ontario and Canada meet their emission targets by ensuring electrification efforts are not being duplicated, and that more informed decisions are being made for future electrification developments. In addition, while Ontario benefits from the grid's nuclear and renewable energy supply, there have been challenges with surplus energy on occasions where demand falls below energy produced from our nuclear fleet. Increasing consumption through electrification will help make use of surplus energy and decrease the global adjustment (GA) rate, as GA is mostly fixed costs (i.e., fixed costs divided by higher consumption results in a lower rate).

Overall, LDCs are a key part of any strategy to deliver electrified transportation in Ontario's communities. Enabling and encouraging LDCs to engage and support electrified transportation will cost effectively, reliably, and expediently move the industry forward.

3.2. LDCs should rate-base strategic investments in electrification technologies, such as EV and transit-oriented charging stations, where the LDC business case balances customers' needs, government policy objectives, and supports our robust electricity systems

Electrification provides a valuable service to customers, the electricity system, and the environment, while contributing to provincial and federal climate objectives. Incorporating electrified transportation infrastructure (transit and fleet charging, EV control systems, etc.) should be viewed with the same lens as poles, wires and transformers. By including electrification infrastructure in the rate-base, the electricity system will be able to amortize higher upfront capital needed to

support the development and expansion of needed systems. Further, by having LDCs in control of the infrastructure enables the local grid to be more responsive and nimbler to the significant growth in electrification.

California is a great example of a public regulator using different cost recovery mechanisms which includes rate basing for utilities in developing electrification programs and charging infrastructure. To help increase EV market penetration, the Government of California passed key legislation in 2015 codifying the state's clean energy goals and requiring the California Public Utilities Commission, or CPUC, to promote widespread transportation electrification. The California government also set a goal of having five million EVs by 2030 and 250,000 EV charging stations by 2025. To meet the aggressive legislative mandates to expand the usage of EVs, California is spending over $2 billion in EV charging infrastructure, education and outreach programs and for monitoring and evaluating the various projects, with the bulk of the investment going towards developing charging infrastructure. This funding comes from a mixture of private sector investment, public tax dollars, and more than $1B authorized by CPUC (which will be generated through rates). No other state has been as active in expanding the market for EVs, which leads North America in both number of EVs on the road and EV charging infrastructure stations, largely attributable to their aggressive policies supporting electrification and the significant investments made to help support those policies.

Discussions with the OEB and the Province are required to create an enabling framework for LDCs to develop the solutions and business cases for rate-based electrification. There are several opportunities for incorporating electrification in rates, including this recommendation to simply incorporate the assets into the traditional asset mix or to include a new rate rider to support transition of EV charging infrastructure. In addition, a new rate class, as discussed next, could be developed that encourages electrified transportation, and allocates costs specifically to those who are using electric vehicles.

3.3. LDCs should review existing customer rate classes and establish a specific rate class, approved by the OEB, for public fast charging

EDA members support a rate class where demand (kW) charges are aligned with the orderly transition of fleet EVs. This could be through removal of peak charges at night or by developing a graduated demand rate that increases over the course of several years. Achieving these reforms would facilitate a customer-focused cycle, where increased availability of charging infrastructure would encourage greater adoption of EVs and longer-term investments in the electrification of local transportation fleets and transit systems. This would enable the permanent growth of Ontario's total load, and significantly ease fixed costs and GA charges for all customers.

One of the largest challenges associated with electrified transportation is timing of installing needed infrastructure. There may be a reluctance for customers to invest in the infrastructure and the associated electricity costs while they gradually and prudently build their electrified fleet. It would be

advantageous for them to build the charging infrastructure today to meet the future needs; however, they need electricity costs to be considerate of the growth. Today's general service electricity rates (50kW or greater) are mostly based on the peak energy (kW) they use in a 15-minute or 60-minute interval, while energy use (kWh) rates are lower for this rate class. So, when several vehicles charge simultaneously for a short period their peak demand for the month is high even though their consumption is low. Large fast charging systems, needed for EVs travelling long distances, fleets, and transit system, operate at over 50kW. To address the rate dilemma, customers are limiting their EV fast-charging systems to not exceed 50kW so that they can subscribe to the smaller general service rate (<50kW), thereby avoiding extreme peak (kW) charges. This limitation increases charge times to triple or longer, which completely undermines the purpose of fast charging. Rate classes need to be re-evaluated to ensure equitable costs are charged to those electrifying their fleets.

BC Hydro successfully created a business case built from the California EV rate models. BC Hydro now offers two rate classes for fleet EV charging infrastructure: Demand Transition Rate and Overnight Charging Rate. Both rate classes enable customers to gradually transition their fleets without overburdening them with demand charges. The demand transition rate is focused on fleets that need to charge throughout the day, such as a transit system. This rate class offers zero-dollar demand charges for the first six years, then gradually increases the demand charge for the next five years to match the large general service rate (see Figure 2). To balance the costs, the energy component of the rate is higher for the first five years, then decreases over the next five years. The overnight rate is designed for those who can charge their fleets at night, e.g. school buses. Again, peak demand rates are currently based at whenever the peak occurs for the month, even if it is in the middle of the night. To offset this imbalance, the BC Hydro's EV overnight demand (kW) rate is zero dollars from 10PM to 6AM, while demand rates from 10PM to 6AM are higher (see figure 2). Like the other EV-rate there remains a fixed-rate for the energy (kWh) used.

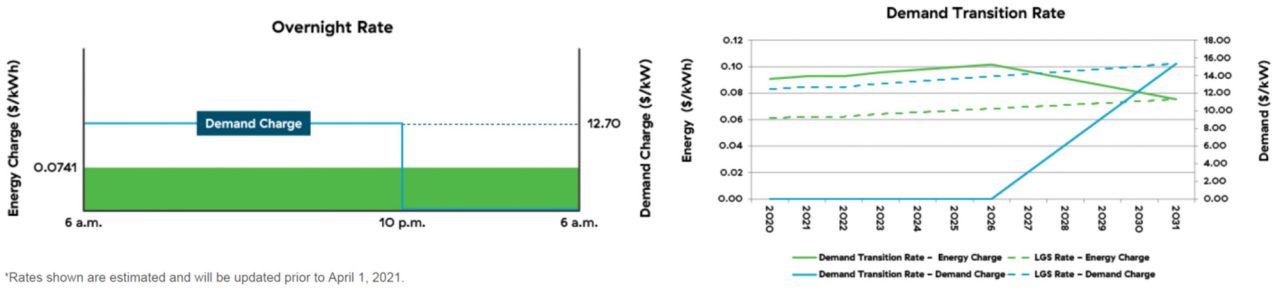


Figure 2: BC Hydro EV Rates Illustration

The EDA recommends that the LDCs and OEB collaborate on a new enabling electrified transportation rate. The approved BC Hydro business case can be reasonably adapted to meet the needs of the Ontario market.

4. Conclusion

Electrified transportation is needed to meet the country's environmental targets, and customers' preferences, and many municipalities are moving forward with this initiative to address part of their plans to address climate emergency declarations. Unfortunately, the LDCs, who are best suited to move this industry forward, do not have the necessary regulatory support or rate structures to lead this transformation. Inaction will create potential electricity grid issues, costs for LDCs and customers, and create significant EV adoption disincentives. One possible next step will be the creation of an OEB case file and generic hearing on incorporating electrified transportation into rates. The hearing would focus on the preferred mechanism(s) for inclusion of the assets into rates; the development of new rate structures; and transitionary tools needed to enable grid reliability and equity as the industry transitions. LDCs need to be empowered to promote and deliver needed electrification infrastructure and programs that will help to decarbonize the transportation sector. The costs should be amortized in the current rate-base and new enabling EV rates need to be created soon.

This position paper, focusing on the transportation sector, is the first in a potential series of papers on beneficial electrification**.** The next position papers developed by the EDA will focus on the electrification of buildings and the industrial sector.

Cover Photo: "ION LRT" by Kelly McMath, Kitchener-Wilmot Hydro Inc.