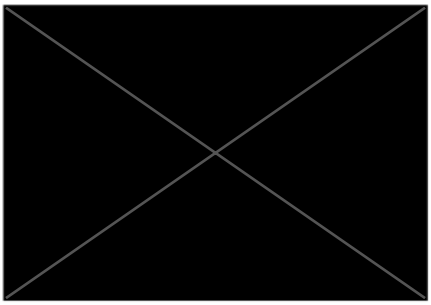
Manitoba Hydro

February 27, 2023



By email (10 pages)
kristen@secondstreet.org

RE: ***The Freedom of Information and Protection of Privacy Act*** **(FIPPA)**
Our File FOI 2023-01

I write in response to your access request received as of January 23, 2023 for the following information:

> *Please provide documentation* ***(memos, reports, emails, etc.)*** *on the impact to the province's electricity system and ratepayers due to the federal government's decision to require 100% of all passenger cars and trucks sold by 2035 to be zero emission. Please be sure to include any estimates or analysis on changes necessary to power generation needs, transmission requirements, local distribution infrastructure, household upgrades and the cost to consumers. Please also provide copies of any materials provided to the federal government related to this topic and their announcement. The time frame for this request is March 1, 2021 to present.*

Manitoba Hydro is currently engaged in the development of 2023 Integrated Resource Plan (IRP) which is expected to be completed in the summer of 2023. Detailed information about the IRP is available on our website at https://www.hydro.mb.ca/corporate/planning/.

The impact of electric vehicles on the electrical system is one of many topics under consideration and the various scenarios and assumptions related to electric vehicles can be found at page 6 of the record entitled "Key Input Assumptions" https://tinyurl.com/IRP-Key-Input-Assumptions. Information about the preliminary results of our initial modelling and analysis is also available in a record found online at https://tinyurl.com/IRP-Initial-Modelling.

Responsive information can also be found in our 2023/24 & 2024/24 General Rate Application (https://tinyurl.com/MBHydro-GRA) and in the following documents, specifically:

- Tab 2, pp. 35-39, https://tinyurl.com/4hyutnf8
- Tab 5, Energy Demand and Supply Assumptions, https://tinyurl.com/34rnwdev
- Appendix 5.1, Electric Load Scenario, https://tinyurl.com/5n98xe2f

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You may also find responsive information in Manitoba Hydro's response to Information Requests which can be found at https://tinyurl.com/MBHydro-GRAj.

As the above-described records are already available to the public, your request for access to these records is refused pursuant to subsection 6(1) of *FIPPA*.

Our search for records identified the following two (2) responsive records in addition to the publicly available records:

- December 2021 Submission in Response to RFI NRCan-170530 EV Grid Readiness Consultation; and

- January 2022 Submission in Response to ECC Light-Duty ZEV Consultation.

Your request for access to these records is granted in full and copies are enclosed.

Subsection 59(1) of *FIPPA* provides that you may make a complaint to the Manitoba Ombudsman about this decision, within 60 days from the receipt of this letter to:

Manitoba Ombudsman
750 – 500 Portage Avenue
Winnipeg, Manitoba R3C 3X1
Toll Free: 1-800-665-0531
Telephone: 204-982-9230
Fax: 204-571-5157
Email: ombudsman@ombudsman.mb.ca

If you have any questions or concerns, please contact Manitoba Hydro's Access & Privacy Coordinator, Amelia Au at 204-360-3855 or aau@hydro.mb.ca.

Yours truly,
MANITOBA HYDRO LEGAL SERVICES
Per:
Sandra Phillips
Sandra D. Phillips
Access & Privacy Officer

Encl.

EV Grid-Readiness consultation

Status: Request for information open until December 31, 2021

EV Grid readiness consultation (nrcan.gc.ca)

1. What are the implications of accelerated targets for requiring the sale of all new vehicles be zero-emission on the electricity grid? What challenges do they pose to the electricity system or electricity sector generally, what opportunities do they present?

Distribution Impact/Costs:

Electric Vehicle (EV) adoption will have increasing impacts on the electrical distribution system as customer adoption levels increase. Initially it is anticipated impacts will trigger local improvements (secondary service and/or transformer upgrades), particularly if there is a clustering of customers charging vehicles in an area.

As adoption levels increase it is anticipated increased investments in the distribution grid will be necessary in order to supply the peak electricity demand necessary to power EVs. The need for costly distribution upgrades is even greater when considering medium-duty and heavy-duty EV charging. The clustering of this level of charging can easily add several megawatts (MW) of load to already established circuits and stations.

Initially, these loads can be shifted among the feeders at the substation or other localized improvements, however substantial infrastructure upgrades may be required depending on the specific area system design and available capacity. Newer technologies such as Automated Metering Infrastructure (AMI) and Time of Use Rates which could facilitate customers to charge off peak hours may mitigate some of these concerns.

Substation upgrades are typically planned years in advance and the impact of increasing levels of EV adoption will have to be closely monitored. Depending on the extent of overall adoption of EV's in an area this could result in the need to add system capacity in the area to meet peak electricity demand requirements. These upgrades will be treated as system improvements and the cost will be applied to the general rate base. **This will have an inflationary impact on electricity rates, as the cost is borne by all ratepayers, even ratepayers who don't own a vehicle**.

EVs present the opportunity of a new revenue stream for the electricity sector.

2. Do you anticipate disproportionate impacts of challenges or opportunities for some electricity customer demographics more than others?

Misallocation of costs vs. benefits: If the utilities/ratepayers are left to fund measures aimed at tackling climate change and health/air pollution, versus all Canadians, then those paying electricity bills will shoulder the cost while all Canadians, even those not paying an electricity bill, will benefit. Therefore, decarbonization of transportation creates positive externalities

(GHG emission reductions, improved air quality, reduction in health-related costs) for all Canadians but only those paying an electricity bill, fund the cost of achieving those societal benefits. One remedy would be to fund distribution utility upgrades related to accelerated EV uptake through a federal funding mechanism.

Low-income populations: Further to the previous point, if the utilities/ratepayers are to fund the necessary distribution system upgrades to power EVs then it will result in higher utility charges. Increases in utility costs, due to distribution system upgrades, would be spread across the entire rate base. The resulting higher rates will have a disproportionate financial impact on low income ratepayers, as their electricity bill consumes a larger portion of their income.

Fleet Operators: Fleet operators could stand to benefit from reduced operating costs and significant GHG reductions by implementing fleet electrification. However, currently most fleet operators are skilled in logistics and internal combustion engine vehicle maintenance. They are rarely heavy electricity users. The electrification of their fleets could run into challenges/delays as they attempt to add MW's of charging capacity without consideration to the grid impacts, related demand charges and the reality that large sudden electric utility upgrades can require two years of lead time to implement. This lack of understanding of the electricity sector, inefficient fleet deployment of charging system, and lengthy utility upgrades will slow the pace of EV adoption and increase costs, particularly for fleet operators. Federal funding of fleet education and charging optimization efforts could prove to greatly improve outcomes.

Old Neighbourhoods: We expect that older neighbourhoods would most likely need distribution grid upgrades as their utility infrastructure was not designed to take on the new loads associated with EV charging.

Apartment Buildings and Condominiums: We anticipate that it could difficult for people living in multi-unit residential buildings to secure access to EV chargers at the apartment or condominium. For new construction, it may be possible to mitigate the impacts through building codes which require all new builds to implement EV-ready designs. Further action will be necessary to improve access at existing buildings.

3. How can the Federal government support electricity sector efforts to enable adoption of EVs at an accelerated rate?

Allocation of funds on a provincial basis: Mandating a minimum allocation of research funding or grid-readiness project funding to each province would ensure that those provinces which are less advance in this energy landscape transformation will still be able to use the fund to reach optimal outcomes for their provincial citizens rather than simply having their ratepayers shoulder the full cost of this energy transition due to focus on other near-term provincial priorities (i.e.: expanding renewable energy capacity by building Keeyask and expansion of transmission capacity).

AMI Independent Expert Research: The development of a federally funded research document, specifically aimed at the remaining provinces/utilities without advanced metering infrastructure (AMI), which is explicitly developed to be used as a means to justify the need (not just for EV adoption) and benefits of AMI at a public utility commission hearing. The research output of the AMI document/examination would ideally still be useful for several

years, in the case where it may only be brought to the provincial utility commission at a later date depending on provincial priorities/utility financial capacity.

Access to federal funding and low-cost capital to enable grid-readiness investments: Federal funding and access to low-cost capital, specific to distribution utilities, could aid in reducing the cost of implementing system upgrades necessary to meet electricity needs of accelerated EV adoption. If low-cost capital or preferably funding was provided, it would then reduce the need to implement electric rate increases which would impact all ratepayers, not just those purchasing EVs.

Not shifting load off-peak increases cost of operating the grid: As previously noted, accelerated adoption of EVs will result in increased pressure on the grid and thus costs; especially if EV charging is not shifted off-peak. The ability to shift or manage EV charging would benefit all ratepayers not just those with EVs. Therefore, electric utilities without AMI will need to make this significant investment in order to enable load shifting measures such as time variable rates and utility-controlled charging. Federal funding of research on AMI deployment and the subsequent AMI implementation would greatly reduce barriers to accelerated EV adoption and generally reduce the impact grid impacts on non-EV electricity use as well.

Publishing ZEV Mandate targets: Give the long lead times required for electric utilities to upgrade infrastructure for the deployment of EVs, it would greatly help with the planning process if the proposed federal ZEV Mandate established near-term and long-term targets, in a timely manner, to allow electric utilities to plan accordingly.

Federal Light-Duty Zero Emission Vehicle Consultation – MANITOBA HYDRO

Complementary Measures

1. In addition to the measures already implemented by the Government, are there other actions the Government should explore to complement the regulated sales mandate?

Electric Vehicle (EV) adoption will have increasing impacts on the electrical distribution system as customer adoption levels increase. The clustering of this level of charging can easily add several megawatts (MW) of load, and associated upgrade costs, to already established circuits and stations. These costly upgrades would delay the uptake of ZEVs and could increase electric rates which would negatively impact the adoption of ZEVs. The following are options to mitigate these negative impacts.

Allocate funding levers on a provincial basis: Each province is at a different stage of decarbonizing its transportation sector, with unique challenges and opportunities. Allocating funding provincially can ensure each province can support this transformation regardless of the province's current EV adoption rates or state of electricity infrastructure. In Manitoba, transportation accounts for the largest portion of GHG emissions, representing a significant emission reduction opportunity.

Fund AMI research and deployment: AMI can play a key role in managing the grid impacts of EV adoption. Accelerated adoption of EVs will result in increased pressure on the grid and electricity rates, especially when EV charging coincides with the current electrical system peak. NRCan funded research projects an increased winter system peak of over 600 MW in Manitoba due to EVs. The ability to reduce peak impacts by managing EV charging and other electrical loads through AMI and associated rates and technologies can benefit utilities and their customers by reducing grid impacts. Federally funded independent expert research that explains the need for and benefits of implementing AMI may assist provinces without AMI in justifying such an investment to their owners and/or regulators. In addition, making federal funding and low-interest financing available to utilities may enable them to implement AMI earlier and with less impact to rates.

Expand federal funding and low-cost financing to advance grid-readiness investments: Federal funding and access to low-interest financing can reduce potential rate impacts for customers and enable electric utilities to advance grid infrastructure upgrades necessary to meet electricity needs of accelerated EV adoption.

Establish EV-ready building codes: Ensuring new buildings are designed to support EV charging through enhanced building codes can assist electric utilities in planning the necessary electrical infrastructure for developments upfront, rather than upgrading infrastructure later. This can reduce utility costs, maintain the integrity of the building envelope (from an energy efficiency perspective, and support electrification.

Provide technical assistance and education for fleets: As mentioned, many fleet operators lack internal expertise related to purchasing, operating, and maintaining EVs and charging infrastructure. Providing technical assistance and early education for fleet operators can help them design charging to meet their near- and long-term EV fleet needs and manage their fleet and charging infrastructure to reduce electricity costs, including demand charges. This can benefit fleet operators (lower operating costs), electric utilities (reduced grid impacts), and broader electricity customers (reduced risk of electricity rate increase due to grid investments). Given the appropriate funding, technical assistance, education, online tools, and resources for fleet operators could be delivered through federal or provincial governments, or other entities such as electric utilities.

Enhance consumer education:
Given the newness of EV's, Canadians need education about all facets of EVs. Rather than a patchwork of provincial education, it would be beneficial to have a national online repository of educational resources and tools to educate Canadians about the various facets of EVs (plug-in hybrids vs. battery electric vehicles, charging options and speed, weather impacts on range, vehicle options, available rebates, environmental benefits and addressing common myths and misconceptions, etc.). Alternatively, provincial funding could be expanded to improve consumer education. Plug' n Drive's online resources (and physical education centre) are exemplary.

Publish ZEV sales mandates that include interim and jurisdictional targets: There are long lead times required for electric utilities to upgrade infrastructure for the deployment of EVs. Early insight into and publication of the proposed federal zero emission vehicle (ZEV) sales mandates can assist in this planning. Further, mandates that establish both interim and final targets (e.g., for 2025, 2030, 2035, etc.) and clarify if targets will need to be met on a provincial, regional, or national basis can provide important insight for electric utilities.

2. What is the role of other actors, including the private sector, to help complement the regulated sales mandate?

It is the role of electrical utilities to support our customers to ensure that there is enough electrical capacity available for customers (hopefully prior to) purchasing EVs and installing electrical vehicle charging equipment. In this regard, it would be ideal if any funding provided by Canada required customers to first engage with their local distribution utility prior to being approved for funding.

3. Should the Government scale up its existing efforts on incentives, infrastructure, and awareness and what are the priorities?

Electric grid infrastructure will be placed under significant strain as EV adoption accelerates. As noted in Response #8, accelerated EV adoption may require significant and costly electrical grid infrastructure upgrades some of which typically take 2 years to plan and implement. Therefore, if upgrades aren't made pre-emptively than individuals and businesses which would otherwise seek to adopt EVs will have to delay or substantially reduce their rate of EV adoption until the necessary distribution utility upgrades can be implemented. In

addition, depending on how these upgrades are financed, it could increase electricity rates therefore diminishing the economic benefit to customers over converting to ZEVs.

4. Should Canada explore other options to close the price gap between zero-emission vehicles and ICE vehicles, including feebates or measures that prevent higher leasing and lending rates for zero-emission vehicles?

n/a

Other considerations

5. What issues impede adoption of zero-emission vehicles in Northern and remote communities and by low-income households? How can the Government address these issues?

A significant number of remote communities are supplied by long radial distribution circuits that may not have enough capacity to accommodate the substantial increases in electrical demand without prohibitively costly upgrades. The adoption of HDZEV and/or significant amount of DCFC infrastructure is anticipated to have a higher impact on distribution system infrastructure in remote communities requiring more upgrades than non-isolated and urban communities.

Secondly, most DCFC's require 3-phase electricity. DCFC would be necessary on the routes serving these communities. Failure to power DCFC equipment with 3-phase electricity will often void the costly equipment's warranty. Remote communities and inter-regional roadways are the least likely to currently have 3-phase electricity. To date, a private sector project that was proposed to serve a route leading to a remote community was already terminated due to the millions of dollars that would have been required for upgrading long stretches of powerlines to 3-phase electrical service.

Another issue is deployment of EVs in the four northern off-grid diesel communities. Deployment of EVs in these regions would have minimal GHG benefits given the current source of electricity generation and the diminished performance of EVs in extreme cold weather climates.

Furthermore, some isolated First Nations in Manitoba are serviced by long seasonal winter roads. The range of HDZEV and ZEV vehicles will need to be sufficient to enable these vehicles to service the needs of the communities in the depths of winter (when the winter roads are open) as there are no charging services along many of those routes nor would it be easy to supply them with existing distribution infrastructure.

6. What role should plug-in hybrid electric vehicles play in achieving the one hundred percent zero-emission vehicle sales target?

Plug-in hybrids may be one of the few battery electric options which would be able to meet the use cases for Manitobans living in remote regions which are unlikely to have access to an extensive charging network and travel above average distances, in colder climates, more frequently than those living closer to urban centres.

7. What are the research and development gaps to support the uptake of zero-emission vehicle technologies and charging/refuelling solutions (such as higher-power charging solutions, vehicle-to-grid operation, energy storage, or other gaps)?

Pilot projects should be conducted on electrifying transportation options in remote northern, cold climate communities, such as those in northern Manitoba. Also, how to provide charging infrastructure to those traveling by EV or transporting goods between those northern regions in the winter and the larger urban centres where they would be required to seek non-urgent medical services, and goods and services not offered in their community. One pilot could be the performance of various charging strategies to provide DCFC in regions with inadequate electrical capacity to provide traditional DCFC. This could entail on-site energy storage (and possible local generation) tested for extreme cold, which is capable of fast charging without straining the grid. Therefore, perhaps slow charging of energy storage while allowing for rapid discharge when required.

R&D on long-duration energy storage would also be very helpful to accelerating the clean energy transition.

8. What challenges and opportunities do you anticipate for the electricity grid as a result of accelerating our electric vehicle sales targets?

Electric Vehicle (EV) adoption will have increasing impacts on the electrical distribution system as customer adoption levels increase. Initially it is anticipated that impacts will trigger local improvements (secondary service and/or transformer upgrades), particularly if there is a clustering of customers charging vehicles in an area; as is supported by research.

As adoption levels increase it is anticipated increased investments in the distribution grid will be necessary to supply the peak electricity demand to power EVs. ICF conducted research, funded by NRCan, which estimates that EV charging could add over 600 MW to Manitoba's current system peak. The need for costly sub transmission upgrades may be greatest when considering adding heavy-duty ZEV charging, in addition to light-duty ZEV charging. The clustering of this level of charging can easily add several megawatts (MW) of load and will likely need dedicated circuits.

Automated Metering Infrastructure (AMI), smart charging and time of use rates may help shift some of the peak. However, Manitoba Hydro currently does not have AMI and would be

required to make significant capital investments to implement AMI which is a prerequisite for time varying rates.

Substation upgrades and transmission system improvements are typically planned years in advance and the impact of increasing levels of EV adoption will have to be closely monitored. Depending on the extent of overall adoption of EV's in an area, additional system capacity may be required to meet peak electricity demand. These upgrades will be treated as system improvements and the cost will be applied to the general rate base. **This will have an inflationary impact on electricity rates, as the cost is borne by all customers, even those who don't own vehicles.**

Benefits:
EVs present an opportunity for new electricity revenue for electric utilities; however, analysis conducted by Manitoba Hydro suggests that grid upgrade costs will exceed the benefit of this additional revenue.

9. What role does Canada's critical minerals and battery supply chain have in helping Canada achieve its zero-emission vehicle targets?

n/a

10. What end of life electric vehicle battery strategies need to be in place to support our environmental goals while achieving the 100% zero-emission vehicle target?

n/a