

Staff Briefing Papers

Meeting Date	March 11, 2021	Agenda Item **4
Company	Minnesota Electric Utilities	
	E999/CI-17-879	
	In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure	
	E002/M-15-111	
Docket No.	E017/M-15-112	
	E015/M-15-120	
	E002/M-17-817	
	E002/M-18-643	
	E002/M-19-186	
	In the Matter of Utilities Annual Electric Vehicle Program Reports	
Issues	1. Should the Commission accept the utilities Transportation Electrification Plans?	
	2. Should the Commission accept the utilities Annual EV Reports?	
	3. Should the Commission take any other action related to transportation electrification?	
Staff	Hanna Terwilliger hanna.terwilliger@state.mn.us	651-201-2243

Relevant Documents (Docket 17-879)	Date
Otter Tail Power – Transportation Electrification Plan	Jun 1, 2020
Xcel Energy – Transportation Electrification Plan	Jun 1, 2020
Minnesota Power – Transportation Electrification Plan	Jul 6, 2020

Initial Comments

Greenlots	Oct 1, 2020
Department of Commerce	Sep 30, 2020
Clean Energy Groups (Fresh Energy, MCEA, NRDC, Sierra Club, UCS, Plug In America)	Sep 30, 2020

Reply Comments

Xcel Energy	Oct 9, 2020
Minnesota Power	Oct 12, 2020

Otter Tail Power	Oct 12, 2020
Clean Energy Groups	Oct 20, 2020
Department of Commerce	Oct 20, 2020

Other Relevant Documents

Docket No E002/M-15-111, E002/M-17-817, AND E002/M-19-186: Xcel Energy Compliance Filing-Residential Electric Vehicle Charging Tariff (Public and Trade Secret)	Jun 1, 2020
Docket 15-112: Otter Tail Power, Report	Jun 1, 2020
Docket 15-120: Minnesota Power, Compliance Filing - Annual Electric Vehicle Tariff Report	May 28, 2020
Docket No. E002/M-15-111, E017/M-15-112, E015/M-15-120, E002/M-17- 817, E002/M-18-643, E002/M/19-186 Department Comments, Public and Trade Secret	Jun 30, 2020

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The attached materials are work papers of the Commission Staff. They are intended for use by the Public Utilities Commission and are based upon information already in the record unless noted otherwise.

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Acronyms

DCFC	DC Fast Charger
BEV	Battery Electric Vehicle
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
HEV	Hybrid Electric Vehicle
IDP	Integrated Distribution Planning
LD	Light Duty
OCPP	Open Charge Point Protocol
PHEV	Plug-In Hybrid Electric Vehicle
TEP	Transportation Electrification Plan
ZEV	Zero Emissions Vehicle

Background

On December 28, 2017 the Commission opened the present docket to gain a better understanding of the following:

1. The possible impacts of EVs on the electric system, utilities, and utility customers, including the potential electric system benefits;
2. The degree to which utilities and utility regulatory policy can impact the extent and pace of EV penetration in Minnesota; and
3. Possible EV tariff options to facilitate wider availability of EV charging infrastructure.

On March 16, 2018, the Commission held a workshop with national and local experts on the major considerations surrounding the intersection of EVs and the electric utility industry.

In its February 1, 2019 Order Making Findings and Requiring Filings, the Commission required Minnesota Power, Otter Tail Power, and Xcel Energy to file “by June 30, 2019, a Transportation Electrification Plan identifying what EV-related initiatives the utility is contemplating over the next two years, including next steps as specific programs to scale up current or currently proposed EV pilots or tariffs.” By July 1, 2019, the three utilities filed their first Transportation Electrification Plans (TEPs). In its December 12, 2019 Order the Commission established annual filing requirements for TEPs.

Utility Transportation Electrification Plans

Table 1: EV Snapshot
April 2020 (unless otherwise noted)

	Minnesota Power	Otter Tail Power	Xcel Energy	Total
Number of Light Duty Vehicles in Service Territory ¹	180	60	9,048	9,288
Customers on Residential EV rate (% on EV Rate)	5 (2.8%)	8 (13.3%)	833 ² (9.2%)	846 (9.1%)
MWh sold on EV rate ³ (% off-peak)	14.7 MWh (81.7%)	23.6 MWh (100%) ⁴	2,861 MWh (94%)	2,899 MWh (94%)
Number of Heavy-Duty Vehicles in Service Territory	7	0	8	15
Customers on Commercial EV rate	2	0	1	3
MWh sold on Commercial EV rate ⁵ (% of off-peak)	Protected (66%) ⁶	0	437.6 MWh Protected	Protected
Distribution system upgrades	\$0	\$8,257 ⁷	\$546,261 ⁸	\$554,518
Known public Level 2 stations (total max capacity)	22 (170 kW)	10 (87.3 kW)	386 (4.1 MW)	566 (4.4 MW)
Known DCFC (total max capacity)	24 (1.5 MW) ⁹	1 (50 kW)	63 (6.3 MW)	88 (7.9 MW)

Note: some EV owners may be on whole house time-of-use rates and not captured here.

¹ As of February 2020

² Does not include customers on a whole house TOU rate. Xcel estimates 920 customers in Residential TOU Pilot also have EVs

³ May 2019 – April 2020

⁴ Otter Tail’s EV rate only offers off-peak charging

⁵ Commercial rates all started operating during the reporting period, therefore this is partial year data

⁶ Started in April 2020

⁷ Distribution extension to serve Otter Tail’s Fergus Falls DCFC

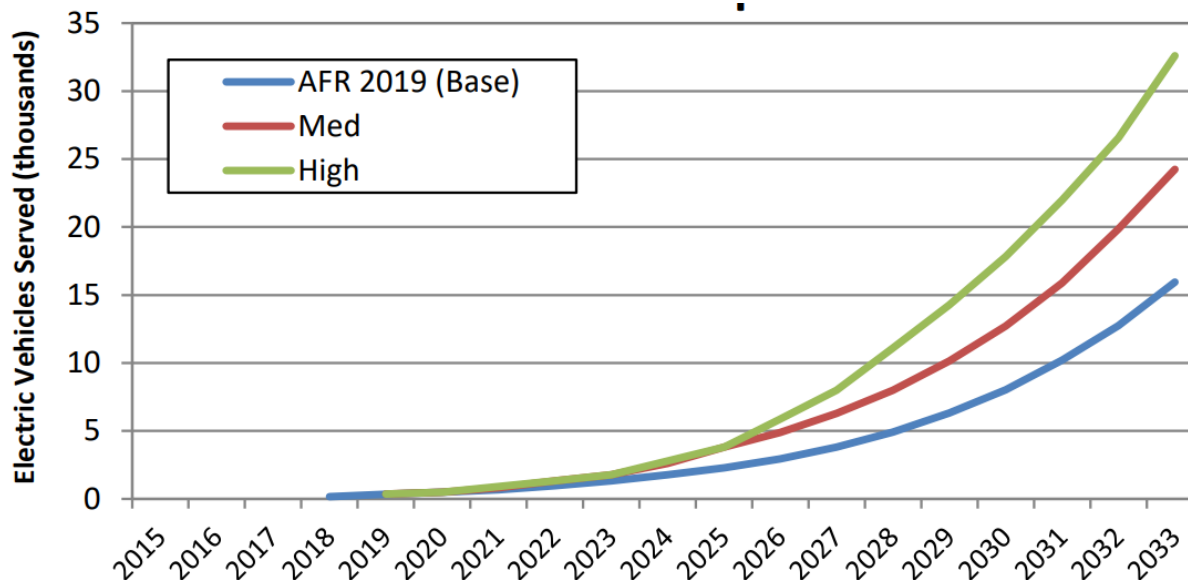
⁸ Upgrades to serve Metro Transit’s electric busses, both for depot charging and overhead on-route charging.

⁹ 16 public chargers, 8 private. 20 of the 24 are enrolled in Minnesota Power’s Commercial EV Pilot Rate

Utility Forecasts

Minnesota Power

Figure 1: Minnesota Power EV Adoption Forecast:



Minnesota Power EV Adoption Forecast provided a base, medium, and high adoption scenario for EV adoption. The Company estimated by 2030, EV penetration in its service territory would be greater than 7%, or around 8,000 EVs and 20,000 MWh of incremental energy sales from the residential sector. Minnesota Power estimated this would add around 2.5 of summer peak demand, and 7.2 MW in the winter.¹⁰

Otter Tail Power

Otter Tail provided a basic market analysis of EV adoption in its service territory using a 2018 customer survey. Results showed 2.6% of customers were somewhat or very likely to purchase an EV in the next 5 years. The Company indicated it expects lower adoption of EVs than other areas in the state in the near term, but that could increase as charging infrastructure is built out. Otter Tail anticipated 80% or more of charging would occur at home, and during off-peak periods.¹¹

In response to the Department's information request, Otter Tail provided more detailed EV adoption and EV kWh sales forecasts.

¹⁰ Minnesota Power, TEP, pp. 13-14

¹¹ OTP, TEP, pp. 6-7

Figure 2: Otter Tail EV Adoption Forecast

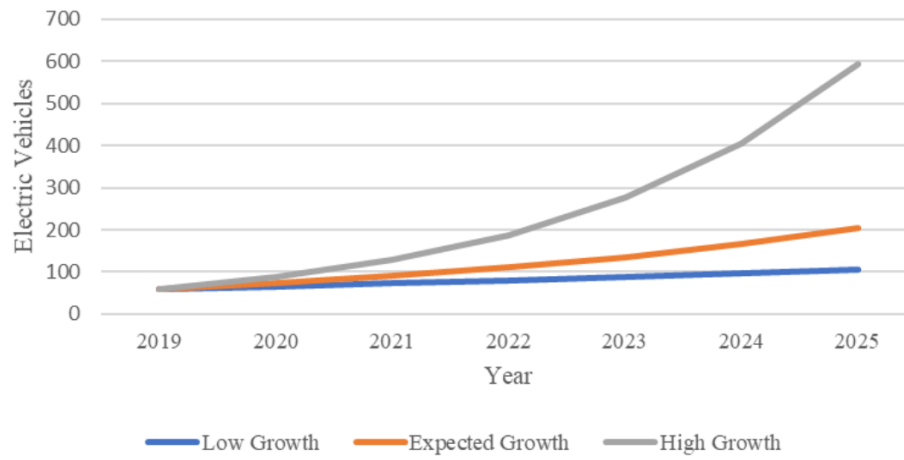
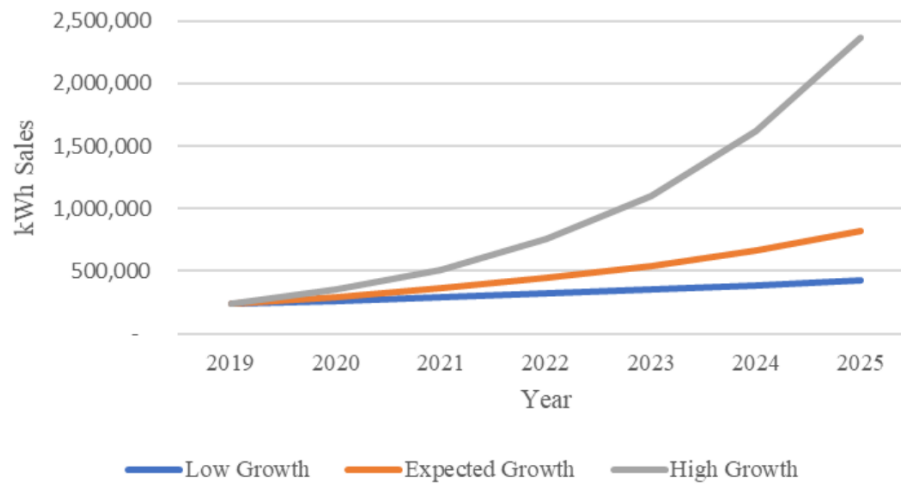


Figure 3: Otter Tail EV Energy Forecast



Xcel Energy

Xcel provided high, mid, and low adoption scenarios for the light, medium, and heavy-duty vehicle sectors. This included adoption, demand, and energy forecasts.

Figure 4: Xcel Light Duty EV Adoption Forecast

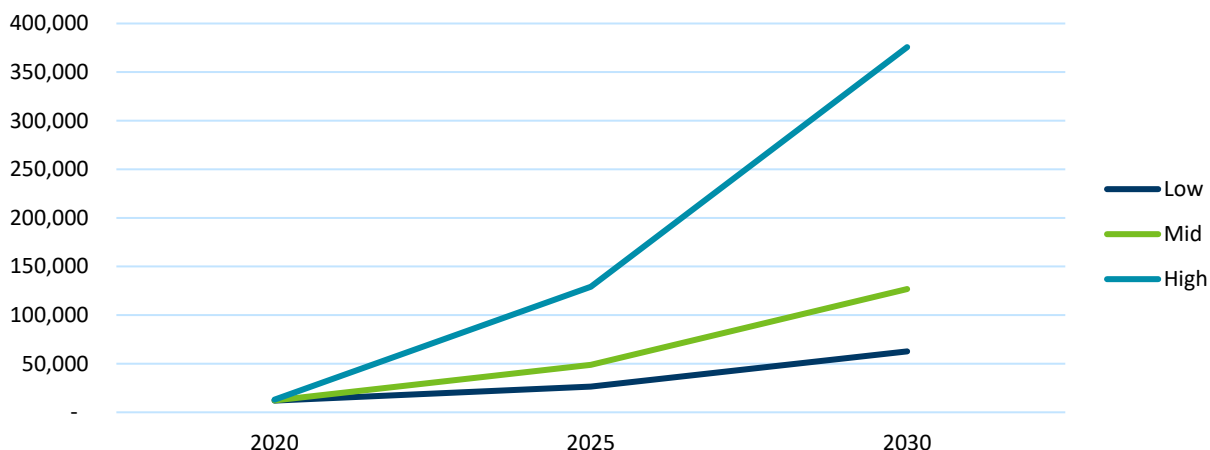


Figure 5: Xcel LD EV Energy Forecast (MWh)

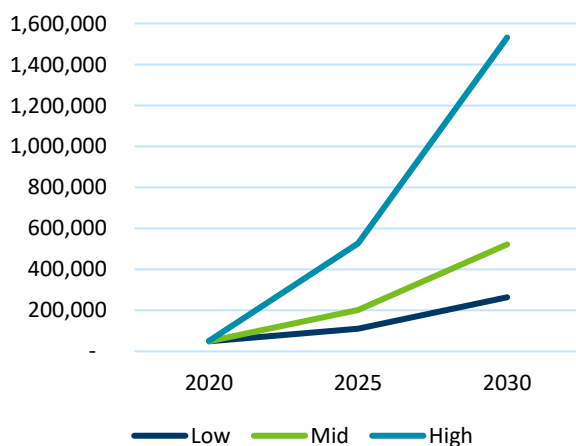
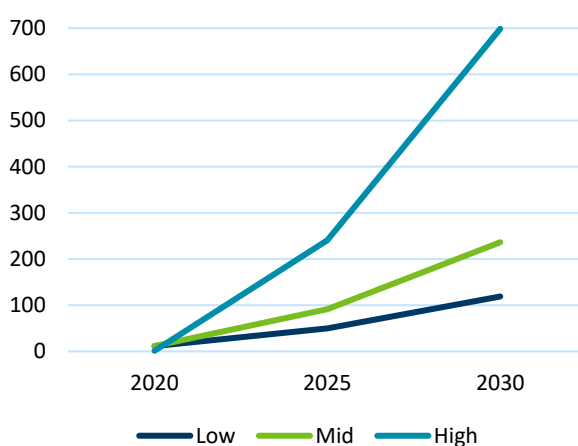


Figure 6: Xcel LD EV Demand Forecast (MW)



Greenlots noted it would be helpful for utilities to provide greater detail about their forecasting, and whether it includes the impacts of certain policy and market developments.¹²

Staff Analysis

Staff concurs with Greenlots that more information about external adoption factors would be useful for utilities to detail. As a starting point, Staff suggests utilities discuss the impact of utility pilot programs, the adoption of the MPCA's Clean Cars Rule, announcements by automakers about the complete electrification of their vehicle lines, the State's goal of 20% EVs by 2030, and the emergence of more four-wheel drive vehicles into the market.

¹² Greenlots, Initial, pp. 2-3

Staff also draws the Commission's attention to the magnitude of new EV demand. Xcel's mid-scenario for light duty vehicles alone forecasts over 235 MW of new demand by 2030, and a high adoption scenario forecasts nearly 700 MW. To place that in the context of resource planning, 235 MW is the size of a wind farm, while 700 MW would be similar to the size of a proposed gas plant. While not all EV demand would be online at the same time, nonetheless this is a significant amount of new load within the next decade.

Planned Transportation Electrification Efforts

Minnesota Power

Shortly after filing its 2020 TEP, Minnesota Power filed two new residential EV options: a charging rewards program and a charging rebate program (Docket 20-638, also heard at the March 11th, 2020 Agenda Meeting). Beyond its current proposals, Minnesota Power outlined near term EV pilots, including a mine-truck electrification project, DCFC network, and additional EV rate options for residences, fleets, and commercial customers.¹³ Minnesota Power also has a Commercial EV tariff in pilot phase (Docket 19-337).

Otter Tail Power

Since the filing of Otter Tail's TEP, the Commission approved the Company's proposed DC Fast Charging Network which will result in the construction of 11 fast charging stations throughout its service territory. Otter Tail will also offer a DCFC rate for third party charging providers under the approved program. In the same filing, the Commission approved an expansion of Otter Tail's existing load management rates to include EVs. Otter Tail also noted its filing of a residential Time-of-Day Pilot (Docket 20-331, currently pending before the Commission), that could expand options for customers to use off-peak rates.¹⁴

¹³ MP, TEP, pp. 14-15

¹⁴ OTP, TEP, p. 7

Xcel Energy

Xcel offered a table of existing and planned EV related offerings, updated by Staff to reflect the current status of various offerings.

Table 2: Xcel Energy's Existing and Planned EV Offerings

Proposal	Commission Status	Docket Number	Implementation Status
Residential EVCharging Tariff	Approved	E002/M-15-111	In Operation
Residential EVService Pilot	Approved	E002/M-17-817	Upgraded to permanent offering (Docket 19-559)
Fleet EV ServicePilot	Approved	E002/M-18-643	In Operation
Public ChargingInfrastructure Pilot	Approved	E002/M-18-643	In discussions with partners for mobility hubs in Mpls/St. Paul
Residential EV SubscriptionService Pilot	Approved	E002/M-19-186	In Operation
Customer- Provided (e.g., "Bring-Your- Own) Managed Charging Offering - Residential Smart Charging Pilot (<i>Charging Perks</i>)	Proposal Submitted Feb 19, 2019 Denied Jun 12, 2019	E,G002/CIP-16-115	New proposal filed in Docket E002/M-21-101
EV Home Service (Expansion of Residential EVService Pilot)	Approved	E002/M-19-559	In Operation
General TOU Service Tariff (Commercial EVRate)	Proposal filed Jan 17, 2020	E002/M-20-86	Comments in, Commission decision expected this spring
Multi-Unit Dwelling Charging Offering	Proposal filed Sep 10, 2020	E002/M-20-711	Comments in, Commission decision expected this spring
COVID Economic Relief EV Proposals	Proposal filed Sep 15, 2020	E002/M-20-745	Pending
Load Flexibility Pilot Programs – EV Optimization Pilot	Proposal filed Feb 1, 2021	E002/M-21-101	Comments due March 18, 2021
Electric School Bus Offering	Proposal filed Feb 1, 2021	E002/M-21-101	Comments due March 18, 2021
Metro Transit Additional Infrastructure and Other Fleet Services Offerings	In Development	New Docket	To Be Determined

Utility Facilitation of Charging Infrastructure and Rates

In its requirements for the TEPs, the Commission asked utilities to explain how they plan to facilitate public charging infrastructure, residential charging options, load flexibility, and fleet electrification.

Minnesota Power

Minnesota Power described its Level 2 EVSE pilot, where it is placing chargers throughout its service territory at businesses and municipalities. The Company plans to expand on this early effort by seeking Commission approval for a larger rollout of both a Level 2 and DCFC charging network it would own and operate. Minnesota Power participated in stakeholder meetings with the MPCA on its electric school bus pilot, and has been in discussions with local school bus providers about fleet electrification.¹⁵

Otter Tail Power

Public charging infrastructure in Otter Tail's service territory is limited. The single DCFC was installed via a joint venture with the Company. Otter Tail's recently approved DCFC pilot will build a backbone charging network throughout western Minnesota, while also offering a DCFC rate for 3rd parties to develop their own charging facilities. On residential charging, the Company indicated it plans to work with multi-unit owners to address charging, including looking at EV-ready construction. Part of Otter Tail's EV portfolio approved in 20-181 expanded its existing demand response programs to allow EV charging. On fleets, the Company indicated while it is not a focus for this TEP due to a lack of eligible participants, it plans to engage with medium and heavy duty vehicle users and likely start designing rates in coming years.¹⁶

Xcel Energy

Xcel highlighted its numerous residential EV offerings, including its most recent EV Subscription Pilot (Docket 19-186). The Company's more recent residential programs were designed to overcome the high upfront cost of charging infrastructure needed to participate in a time-of-use rate. Xcel noted a gap in its residential offerings for the multi-family sector, and since the time of its TEP filing proposed a multi-dwelling unit pilot (Docket 20-711).¹⁷

In the public charging sector, Xcel used the National Renewable Energy Laboratory's (NREL) EV Infrastructure Pro-Lite Tool to estimate charging needs for its mid-EV forecast. By 2025 Xcel's Minnesota service territory would need 2,500 workplace and 1,800 public level 2 charging stations, and 500 DCFC stations. By 2030 the need would grow to 6,500 workplace, 1,800 level 2, and 1,100 DCFC plugs. This significantly lower than the existing number of plugs in Xcel's service territory today.¹⁸

¹⁵ MP, TEP, pp. 15-16

¹⁶ OTP, TEP, p. 7-8

¹⁷ Xcel, TEP, p. 14; 16

¹⁸ Xcel, TEP, p. 15

Party Comments

Response to TEPs

Three groups submitted comments to the Commission: The Department of Commerce, the Clean Energy Groups (CEG),¹⁹ and Greenlots. All recommended the Commission accept the utilities TEPs.

CEG indicated overall support for Xcel Energy's efforts but suggested a more targeted focus on heavy and medium duty vehicles in its next TEP. First, trucks and busses emit larger and more harmful amounts of emissions, especially along heavily transited corridors that bisect low income and BIPOC neighborhoods. Second, the MSP metro area is home to multiple Fortune 500 companies with large fleets that Xcel could both support and encourage to transition to electric vehicles. Finally, some large companies have also already committed to electrifying their fleets, as such Xcel would need to ensure it is prepared for this fleet electrification.²⁰

CEG recommended the Commission require Xcel file a V2G School Bus pilot; however, since comments were filed, Xcel submitted its load flexibility proposal in Docket No. E002/M-21-101, which includes a V2G school bus demonstration pilot.²¹ Staff notes the Commission may wish to ask CEG if it should still take action on this recommendation.

CEG encouraged Otter Tail to follow Xcel and MP's multi-unit dwelling programs and consider expanding its own offerings to include a similar pilot. They also supported Minnesota Power's engagement with the MPCA's electric school bus pilot project.²²

Additions/Modifications to Existing TEP Components

The Department recommended two additional components for future TEPs: a more detailed budget, both historical and future, and evaluations of EV programs that have moved beyond the pilot stage.

For the budgets, the Department recommended a 5-year future looking budget along with historical expenditures broken down by program and category (ex, marketing, EV charging infrastructure). Additionally, the Department recommended "an estimate for each system upgrade needed to accommodate EV charging, and an estimate of the expenditures on other investments that improve a utility's ability to serve EV load."²³

For evaluations of EV programs that are no longer pilots, continuous evaluation of utility programs will be necessary to ensure costs and benefits are appropriately assigned to ratepayers as well as the level of subsidization necessary to encourage transportation electrification. According to the Department, evaluation should focus on the cost-effectiveness of individual programs and how it could be improved. Therefore, in the 2021 TEPs, the

¹⁹ The Clean Energy Groups include Fresh Energy, Minnesota Center for Environmental Advocacy, National Resources Defense Council, Sierra Club, Union of Concerned Scientists, and Plug In America

²⁰ CEG, Initial, pp. 6-7

²¹ CEG, Initial, pp. 8-9; Docket No. E002/M-21-101, p. 39

²² CEG, Initial, pp. 11-12

²³ Department, Initial, p. 15

Department recommended utilities analyze all costs and benefits of non-pilot EV programs including:

- Upfront capital and ongoing O&M expenses of each program.
- Estimated (if any) increases in annual distribution costs due to the addition of EV load, including during on-peak and off-peak times.
- Identification of any costs not specifically included in the budgets of EV programs.
- Additional kWh sales over which distribution costs will be divided.
- Changes in distribution costs per kWh sold; and
- Increases in revenues generated from EV programs²⁴

Xcel Energy and Otter Tail Power were willing to provide the additional information requested by the Department, but recommended the TEPs then be moved to a biennial filing cycle.²⁵ The Department agree with this recommendation in reply comments.²⁶

Greenlots indicated a more robust analysis of medium and heavy-duty vehicle electrification opportunities in each utility service territory could help utilities prepare and seek out opportunities to electrify these sectors.²⁷

Staff Analysis

The information provided by utilities in the TEPs provides a solid foundation for the Commission and stakeholders to stay informed on utility transportation electrification efforts. As evidenced by the numerous filings the Commission has received and approved over the past year, Minnesota's utilities are actively supporting transportation electrification throughout the state.

Staff supports the information requested by the Department, and believes moving the TEPs to a 2-year cycle is reasonable. While the bulk of reporting would occur every two years, it may make sense to require an annual compliance filing with some basic information – for example, the number of EVs and participants in a managed charging rate. This information could be a compliance filing. Staff recommends utilities file a June 1, 2021 TEP, and then the next TEP on June 1, 2023. Staff also recommends the Commission delegate authority to the Executive Secretary to work with utilities, the Department, and stakeholders to finalize the new additions for future reports and non-TEP year filing data.

In addition to the local information provided by utilities, recent announcements from the federal government, state leaders, automobile manufacturers, and major businesses indicate the pace of EV adoption will likely increase throughout the coming years. Staff believes adding scenario planning to the next TEP could help utilities, stakeholders, and the Commission better understand the impacts of EV adoption if it happens more quickly than currently expected. Staff recommends the Commission ask utilities to discuss the following scenarios for their service territory:

²⁴ Department, Initial, pp. 16-17

²⁵ OTP, Reply, p. 2; Xcel, Reply, pp. 1-2

²⁶ Department, Reply, pp. 1-2

²⁷ Greenlots, Initial, p. 2

1. The State of Minnesota sets a goal of powering 20% of light duty cars with electricity by 2030.²⁸ Under this scenario please discuss:
 - a. What a 20% statewide EV penetration would look like in each specific utility service territory, given regional variations in EV adoption
 - b. Annual energy and capacity requirements
 - c. Public charging infrastructure needs, including the number of public DCFC and Level 2 chargers
 - d. Impacts to peak demand, including how that could be mitigated by managed charging programs
2. How the utility would address the rapid electrification of a large fleet (for example, a corporate warehouse or school bus fleet)
3. How the utility would accommodate rapid heavy-duty vehicle charging along major transit corridors

Staff emphasizes this is not meant to spur new filings at this time, nor to create an ongoing filing requirement, but to be proactive about thinking through future scenarios in the next TEP, before high EV penetration occurs. A common theme echoed at industry panels is that the transportation sector moves more quickly than the regulatory one – and fleet providers in particular do not want to wait around for regulation to catch up. Engaging in early scenario analysis will help identify possible problems before they arrive. To-date, utilities are not providing this type of scenario analysis in their IDP DER Scenario Analysis even though EVs are a type of DER for IDP purposes. The TEP EV Scenario Analysis should help inform IDPs.

Decision Option 3 adopts the Department's additional TEP components

Decision Option 4 adopts Staff's suggested scenario analysis

Decision Option 5 moves the TEPs to a biennial filing requirement

Decision Option 6 allows Staff to work with utilities and stakeholders to finalize reporting requirements

Reasonable Rates

In its notice for comment, Staff asked:

Do current and proposed EV programs achieve a reasonable rate as outlined in Minn. Stat. 216B.03? Please address:

- Whether current EV programs achieve equitable outcomes for customers
- If there are gaps the Commission should address to ensure equitable application for customers

In response, the Department focused on issues surrounding cross subsidization between EV owners and non-EV owners, pointing out in the near-term, higher income customers are more likely to purchase EVs and drive system upgrade costs borne by all customers. For the Department, this reinforced the need for more comprehensive budget details in future TEPs. It suggested the following actions to improve equity among customers:

²⁸ MN DOT: Accelerating Electric Vehicle Adoption: A Vision for Minnesota.
<http://www.dot.state.mn.us/sustainability/docs/mn-ev-vision.pdf>

- Properly assigning all EV-related costs to EV customers.
- Properly allocating costs among different customer classes. One possibility for the future is to assign EV customers their own customer class.
- Ensuring that EV programs are available to the broadest range of customers within a class. For example, ensuring that customers that live in multi-dwelling units can participate in EV programs.
- Ensuring that as many customers as possible are on time-of-day rates that encourage them to charge their EVs when system load is lowest which minimizes the need for increased distribution system or generation costs.
- Limit programs, such as rebates for EVs, that are likely to subsidize higher-income customers unless the value of the contribution of one EV's revenues to non-EV customers can be quantified, and is positive, and after confirming that the customer would not have made the investment absent the rebate/subsidy.²⁹

CEG focused on equitable access to transportation electrification, especially because the benefits it can bring are much higher for communities exposed to air pollution – of which low income and BIPOC communities are the most exposed. CEG pointed to several resources for the Commission could use to create an environmental justice framework, not just for evaluating electric vehicle dockets, but for regulatory work as a whole. One of the referenced resources was the work done by the MPCA to create an environmental justice framework and policy.³⁰

Greenlots suggested the Commission require utilities to provide a discussion on how they plan to achieve “equitable access to transportation electrification, both from an urban-rural standpoint, and socioeconomic standpoint.”³¹

Staff Analysis

Parties highlighted important areas for equitable EV programs: access to electrified transit, reduced air pollution, and ensuring minimal cross subsidization across customers classes.

Staff draws the Commission's attention to an additional topic. Like any emerging technology, early adopters of EVs are far more likely to be white, affluent, and homeowners. As the market matures in the next several years beyond the early adoption stage into widespread adoption, ensuring access to electric vehicles, and in particular electric vehicle charging infrastructure, will be critical to ensuring adoption does not stay in a homogenous demographic of Minnesotans. This also raises an important consideration for programs aimed at residential customers: early pilots, and early data may not be representative of the driving behaviors and charging patterns of the typical Minnesotan driver, and likely significantly underestimate how low-income and BIPOC residents would use an electric vehicle.

As the Commission considers future pilots and programs, requiring better analysis of pilot participants to ensure a representative population sampling will be critical. Indeed, it may be prudent for utilities to do specific outreach to underrepresented EV drivers in its initial pilots and pursue additional data collection to make sure programs are designed to serve all EV

²⁹ Department, Initial. P. 17-18

³⁰ CEG, initial, pp. 4-5

³¹ Greenlots, initial, p. 3

drivers. For example, an individual who works an overnight shift may not be best served by an off-peak charging tariff, and may instead benefit if they charged at their place of work on a night-time rate. Conversely, it may make sense for that same workplace to price electricity at a higher price during the day to encourage day-time workers to charge during lower-cost times of the day. Equitable charging infrastructure should allow anyone who owns, or wishes to own, an EV access to charging at the times of the day when electricity is cheapest, whether that is at home or work.

Residential EV Reporting under 216B.1614 and other Annual EV Reports

Under Minn. Stat. 216B.1614, Minnesota Power, Otter Tail Power, and Xcel Energy are required to offer “a tariff that allows a customer to purchase electricity solely for the purpose of recharging an electric vehicle” that is “either a time-of-day or off-peak rate, as elected by the public utility.” Utilities are also required to submit annual reports on the number of customers on the tariff, the amount of electricity sold, and “other data required by the Commission.”

Xcel Energy

Xcel submitted annual reports for the following EV programs:

1. Residential EV Service – Rate Code A08 (Docket No. 15-111)
2. Residential EV Pilot Service – Rate Code A80, A81 (Docket 17-817)
 - a. Now EV Home Service (Docket 19-559)
3. Residential EV Subscription Pilot Service – Rates Codes A82, A83 (Docket No. 19-186)
4. Fleet EV Service and Public Charging Pilots – Rate Codes A87, A88, A89 (Docket No. 18-643)

Reports included narratives, and for the pilots, sub-hourly demand and consumption data.

The Department reviewed and summarized Minnesota Power’s, Otter Tail Power’s, Xcel’s reports and recommended the Commission accept them.

Staff Analysis

Regarding Xcel’s original Residential EV Service, CEG raised two possible modifications to the Company’s Residential EV Service. Staff does not address those modifications in these briefing papers and does not believe acceptance of the reports would have an impact on the issues raised by CEG.

Staff highlights data from Xcel’s demand and consumption data in Attachment A to these briefing papers. Minnesota Power and Otter Tail do not yet have any pilots that have reached an annual reporting stage and data from their existing tariffs are included in Table 1.

Decision Option 1 accepts utilities annual reports.

Decision Options

Annual EV Reports

1. Accept Minnesota Power, Otter Tail Power, and Xcel Energy's 2019 Electric Vehicle Reports filed in Dockets 15-111, 15-112, 15-120, 17-817, 19-186, and 18-643 (*Utilities, Department*)

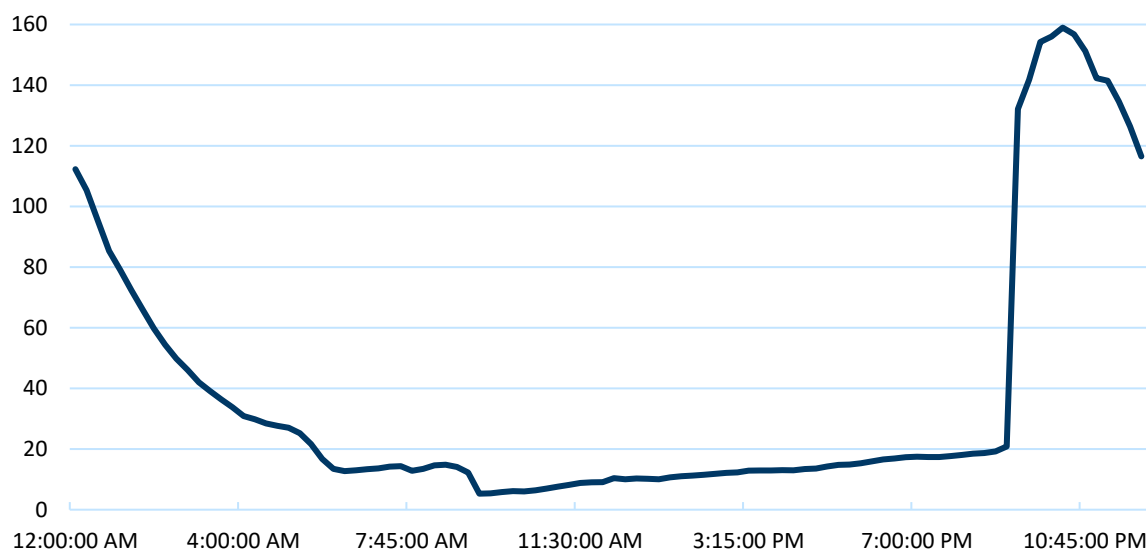
Transportation Electrification Plans

2. Accept Minnesota Power, Otter Tail Power, and Xcel Energy's 2020 Transportation Electrification Plans (*Utilities, CEO, Department, Greenlots*)
3. Require utilities to include the following information in their next TEP (*Department*)
 - a. the 5-year budget for future expenditures, as well as historical expenditures, for each non-pilot EV program, by budget category. In addition, the budget categories by program should be aggregated so that the Commission and stakeholders can see the total amounts that are being proposed or expended for each budget category (e.g., marketing, EV charging infrastructure, etc.).
 - b. an estimate for each system upgrade needed to accommodate EV charging, and an estimate of the expenditures on other investments that improve a utility's ability to serve EV load.
 - c. non-pilot EV program evaluations that examine the cost-effectiveness of the programs as currently designed and potential changes that could improve their cost-effectiveness
4. Require utilities to provide a discussion on the following scenarios in their TEP due June 1, 2021: (*Staff*)
 - a. The State of Minnesota sets a goal of powering 20% of light duty cars with electricity by 2030. Under this scenario please discuss:
 - i. What a 20% statewide EV penetration would look like in each specific utility service territory, given regional variations in EV adoption
 - ii. Annual energy and capacity requirements
 - iii. Public charging infrastructure needs, including the number of public DCFC and Level 2 chargers
 - iv. Impacts to peak demand, including how that could be mitigated by managed charging programs
 - b. How the utility would address the rapid electrification of a large fleet (for example, a corporate warehouse or school bus fleet)
 - c. How the utility would accommodate rapid heavy-duty vehicle charging along major transit corridors
5. Establish a biennial filing requirement for the TEPs, starting with the June 1, 2021 TEP. (*Xcel, Otter Tail, Department*)
6. Delegate authority to the Executive Secretary to work with utilities, stakeholders, and the Department on formatting for new TEP filing requirements and a set of annual EV data to be filed in non-TEP years. (*Staff*)

Attachment A: Staff Analysis of Xcel EV Charging Data – PUBLIC VERSION

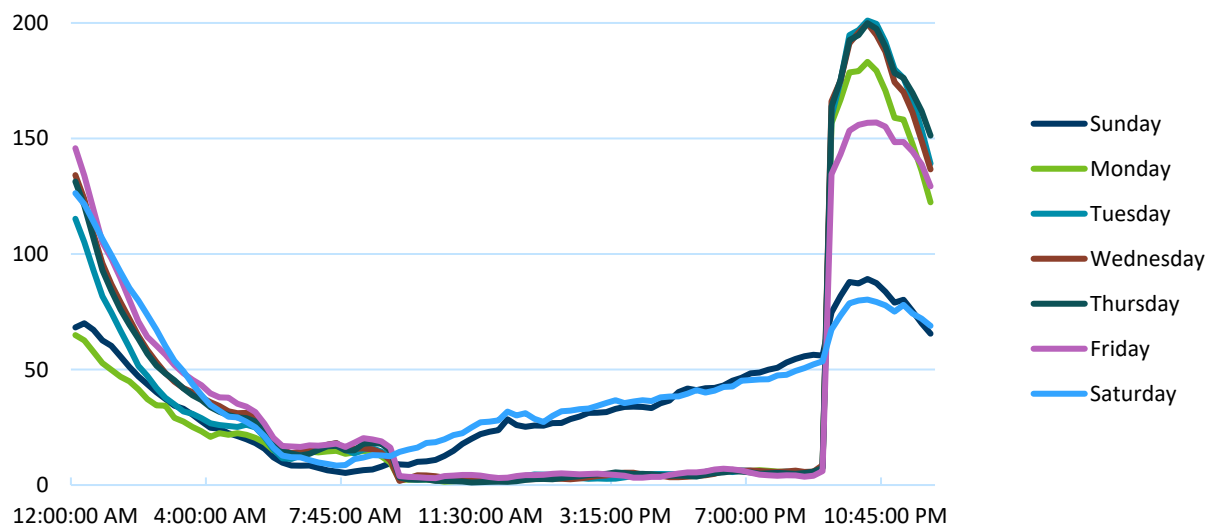
Residential EV Demand Data

Figure A1: Average 15-min demand (kW), EV Service Pilot
April 2019 - April 2020



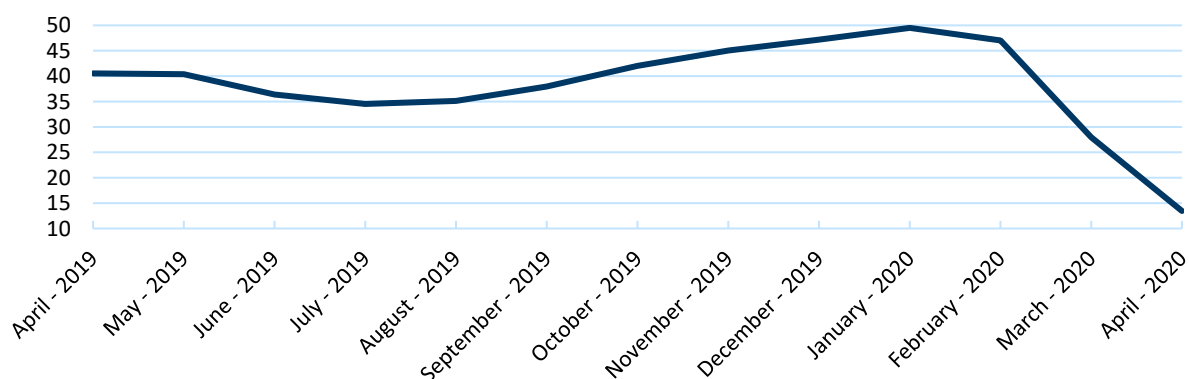
Predictably, demand spikes at 9pm each evening when the off-peak charging period begins. Demand peaks at an average of almost 160 kW at 10:15 pm, then gradually slopes downward until 9am when the on-peak charging period begins. While 160 kW is the average peak, the max peak experienced during the pilot was almost 300 kW, almost twice the average. While likely not an issue at present levels of adoption, a sharp spike of charging coming online at the start of the off-peak period could present future issues, especially in neighborhoods with clusters of EVs. However, simply dividing off-peak EV charging into different customers segments starting at staggered times may not completely mitigate the problem, as it would create multiple evening spikes. Direct control of EVs through active management of charging by the utility or program operator (compared to current, passive-management of charging through price signals) could provide better relief during evening spikes.

Figure A:2 Avg 15-min demand (kW) by day of the week , EV Service Pilot
April 2019 - April 2020



Breaking down demand profiles by day, weekend charging sessions have a different profile than weekdays. Weekends are considered off-peak. Weekends see more daytime charging that gradually ramps up throughout the day with a modest bump at 9pm. When weekday charging is isolated, average demand during the daytime is under 5kW. This provides interesting insights into EV consumer behavior, indicating many consumers are sophisticated enough to set different charging schedules in response to different weekend and weekday charging periods. An important point to note is pilot participants are likely early EV adopters, and not representative of the general population.

Figure A3: Average monthly demand (kW)
April 2019 - April 2020



The impact of the COVID-19 pandemic, and resulting stay-at-home order, is evident in this monthly breakdown of charging demand. March and April 2020 show a steep drop off, especially when April is compared to the prior year.

Commercial EV Charging

Xcel provided consumption and demand data from its Fleet EV service, however as there was only a single customer, Metro Transit, the data was classified as non-public. Xcel explained the first year of data was likely to not be representative of future years. The first months of energy data from the pilot indicated around **[Protected Data Begins Protected Data Ends]** percent of charging occurred off-peak. Figure A4 shows the average demand for the fleet EV charging throughout the day.

Figure A4: Fleet EV Pilot Daily Demand Profile

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Staff notes Metro Transit is likely not a good representative of the heavy-duty fleet sector. As a transit operator, it does not have flexibility when it decides to run its busses, necessitating some charging during the day while the busses are on route. If next year's data continue to indicate **[Protected Data Begins ...**

... Protected Data Ends] additional follow up with Metro Transit to find out more about how they charge their busses may be helpful. However, for this year Staff provides the data above as informative early results and not a cause for concern.