BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF SOUTHWESTERN PUBLIC SERVICE COMPANY'S APPLICATION FOR APPROVAL OF ITS 2021-2023 TRANSPORTATION ELECTRIFICATION PLAN; PROPOSED PLAN RIDERS AND CREDIT; AND OTHER ASSOCIATED RELIEF,	)	**Case No. 20-00XXX-UT**
SOUTHWESTERN PUBLIC SERVICE COMPANY,	)	
APPLICANT.	)	

DIRECT TESTIMONY

of

MATHIAS C. BELL

on behalf of

SOUTHWESTERN PUBLIC SERVICE COMPANY

July 21, 2020

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GLOSSARY OF ACRONYMS AND DEFINED TERMS

Acronym/Defined Term	Meaning
CO_2	carbon dioxide
Commission	New Mexico Public Regulation Commission
DCFC	Direct Current Fast Charging
DOE	Department of Energy
E3	Energy + Environmental Economics
EV	electric vehicle
EV Statute	NMSA 1978, § 62-8-12
NOx	nitrogen oxide
NPV	net present value
NREL	National Renewable Energy Laboratory
NSPM	Northern-States Power Company-Minnesota
O&M	operations and maintenance
PSCo	Public Service Company of Colorado
RFP	Requests for Proposals
SPS	Southwestern Public Service Company, a New Mexico corporation
TOU	Time of Use
TEP or Plan	Transportation Electrification Plan
Xcel Energy	Xcel Energy Inc.

XES	Xcel Energy Services Inc.

LIST OF ATTACHMENTS

Attachment	Description
MCB-1	SPS 2021-2023 Transportation Electrification Plan
MCB-2	Transportation Electrification Terminology
MCB-3	E3 Benefit-Cost Analysis of Transportation Electrification in the Xcel Energy New Mexico Service Territory
MCB-4	Workpapers

Case No. 20-00XXX-UT
Direct Testimony
of
Mathias C. Bell

I. WITNESS IDENTIFICATION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Mathias C. Bell business address is 401 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. On whose behalf are you testifying in this proceeding?

A. I am filing testimony on behalf of Southwestern Public Service Company, a New Mexico corporation ("SPS"), and wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy").

Q. By whom are you employed and in what position?

A. I am employed by Xcel Energy Services Inc. ("XES"), as Principal Consultant, Strategy & Performance on the Electric Transportation team.

Q. Please briefly outline your responsibilities as a Principal Consultant on the EV Team.

A. I am responsible for strategy, policy and regulatory work to promote the development of electric transportation throughout the service territories of Xcel Energy's operating companies.[1] I have supported filings and applications in Minnesota, Wisconsin, and Colorado.

[1] Xcel Energy's regulated operating companies include: NSPM (serving MN, SD, and ND),

Q. Please describe your educational background.

A. I graduated from Carleton College in Northfield Minnesota, with a Bachelor's degree in International Relations with a Concentration in Environmental and Technology Studies.

Q. Please describe your professional experience.

A. I have been employed by XES since December 2016. Prior to joining XES, I worked for OPOWER (which was acquired by Oracle), a software company focused on providing energy efficiency and customer care solutions to utilities, leading their policy and regulatory work in the Midwest. Before that, I worked at Rocky Mountain Institute, a clean energy-focused non-profit, where I led research teams and advised clients, including state agencies, city governments, and utilities. I have been recognized for providing leadership on energy policy issues, including being listed among the Top 40 in Energy by Midwest Energy News.

Northern States Power Wisconsin ("NSPW") (serving WI and MI), Public Service Company of Colorado ("PSCo") (serving CO), and SPS (serving NM and TX).

II. ASSIGNMENT AND RECOMMENDATIONS

Q. What is the purpose of your testimony?

A. My testimony supports SPS's 2021-2023 Transportation Electrification Plan ("TEP") and associated programs, which are designed to increase SPS customers' access to the benefits of electric transportation and encourage electric vehicle ("EV") charging, consistent with the Commission's required considerations set forth in NMSA 1978, § 62-8-12 ("EV Statute"). The EV Statute requires New Mexico electric utilities to submit an application to the New Mexico Public Regulation Commission ("Commission") by January 1, 2021 to expand the use of electricity to power vehicles and other equipment that transport goods or people. The TEP is provided as Attachment MCB-1 to my testimony.

Specifically, my testimony will:

- provide an overview of current transportation electrification in New Mexico and SPS's service territory;
- discuss the importance of the utility's role in helping to increase access to transportation electrification by targeting barriers to adoption, particularly in SPS's New Mexico service area;
- provide details on SPS's proposed TEP and its primary components: 1) residential charging, 2) public charging, and 3) advisory services, including customer education and outreach;
- discuss SPS's proposed annual budgets for the triennial TEP and associated programmatic and budget flexibility; and

- describe SPS's TEP evaluation proposal.

Q. Please summarize the TEP.

A. SPS has leveraged experience in other Xcel Energy jurisdictions to tailor a set of portfolios that it believes will help spur the transportation electrification market and meet the statutory considerations of EV Statute, while taking into consideration the specific needs of SPS's New Mexico service territory. The three portfolios in the TEP are:

- **Residential Charging –** offers customers performance incentives for charging off-peak ("managed charging") and helps reduce the upfront costs of home charging via rebates, including a higher rebate for low-income customers, and a charging service program.

- **Public Charging –** begins to address the charging infrastructure gap in SPS's service territory. SPS proposes to provide make-ready investments for public charging stations and also to invest in, own, and operate a limited Direct Current Fast Charging ("DCFC") charging network.

- **Advisory Services –** provides education, outreach, and advisory services for residential customers, fleets, and communities, to facilitate both increased EV adoption and participation in SPS programs.

In developing these programs, SPS strived to mitigate bill impacts of the Plan and enhance the customer experience while fulfilling the statutory considerations of the EV Statute. SPS paid particular attention to ensuring that investments in EV infrastructure and rates applicable to EV charging should share the potential benefits of electrification with SPS's electric customers, including

customers who do not own EVs. The TEP is designed to develop and manage charging infrastructure in a way that uses the power grid efficiently and increases access to the benefits of transportation electrification; in particular, the TEP encourages charging at off-peak times, considers evolving charging technology, supports low-income and underserved communities, and aims to help New Mexico achieve its goal of supporting widespread transportation electrification.

Q. Please summarize the conclusions reached in your testimony.

A. The SPS TEP seeks to increase access to transportation electrification, help reduce greenhouse gas emissions and air pollution, benefit the electric grid and mitigate bill impacts of the Plan for all customers, support increased customer choice in electric vehicle charging, and promote customer education and awareness. Thus, the Commission should approve SPS's TEP, including the proposed Residential Charging, Public Charging, and Advisory Services portfolios and their associated programs and budgets.

Q. Were Attachments MCB-1, MCB-2, and MCB-4 prepared by you or under your direct supervision and control?

A. Yes.

Q. Is Attachment MCB-3 a true and correct copy of the document that it purports to be?

A. Yes.

III. CURRENT LANDSCAPE FOR ELECTRIC VEHICLES

Q. What is the current status of transportation electrification in New Mexico and in SPS's service territory?

A. In New Mexico as a whole, there were roughly 3,400 EVs at the end of 2019, with about 1,000 of those sold in 2019 alone. SPS's service territory is still in the early phases of market development. At the end of 2019, there were roughly 100 EVs in SPS's New Mexico service territory.[2]

Today, throughout New Mexico, there are about 250 public charging outlets at 86 charging stations.[3] Many of these are level 2 stations[4] and outlets, which provide enhanced charging compared to a standard outlet but still require about 4-5 hours of charging for a 100-mile battery and longer times for more battery capacity. These stations help vehicles charge at or near workplaces, retail stores, and hotels and other lodging locations. Meanwhile, the number of DCFC

[2] Xcel Energy estimate based on car registration data.

[3] All data from the Department of Energy's Alternative Fuels Data Center Electric Vehicle Charging Station Locations.

[4] Attachment MCB-2 is a primer on EVs and charging technologies, including an explanation of level 2 charging. In addition, I also recommend that interested parties consult other external resources if they are interested in learning more, such as electric transportation research and information compiled by the U.S. Department of Energy's Alternative Fuels Data Center, the Edison Electric Institute, the Electric Power Research Institute, the National Governor's Association, and the Smart Electric Power Alliance, among others.

public stations is increasing, but there are only about 100 public fast charging ports throughout the whole state, at just 23 sites. DCFCs can provide requisite charging in 20-30 minutes rather than hours. Excluding Tesla sites, which are only accessible by Tesla vehicles, there are far fewer public fast charging outlets that all EVs can access, with 44 ports at 14 station sites. Table MCB-1 provides an overview of public chargers in New Mexico.

Table MCB-1: Number of Public Charging Stations in New Mexico as of July 7, 2020

	Charging Stations	**Charging Ports/ Outlets**
Level 2	64	151
DCFC	23	100
Tesla (DCFC)	*9*	*56*
Non-Tesla (DCFC)	*14*	*44*
Total	**86**	**251**

Note: Numbers may not add to totals. Some stations include both Level 2 public and DCFCs, which affects the total number of charging stations.

Source: Alternative Fuels Data Center, U.S. Department of Energy, accessed July 7, 2020.

While there is a charging infrastructure gap at the state level, this gap is even more prevalent for SPS's service territory where it's estimated that there are less than twenty publicly-available charging station ports. For EV adoption to increase, there will be a need for more public charging infrastructure and particularly public fast charging. Otherwise, these rural communities could be

left behind as the infrastructure development is focused largely in the Albuquerque and Santa Fe metropolitan areas.

Q. Please discuss SPS's forecast for EVs in its service territory.

A. SPS forecasts continued growth in EV sales in its service territory and anticipates there will be nearly 400 EVs in its service area by end of the three-year TEP (2023). SPS's forecast is independent of the effect the TEP's proposed portfolio offerings may have on EV adoption, given the number of factors and uncertainties involved in attempting to estimate the impact of the TEP on EV adoption. However, the entire TEP is designed to facilitate higher levels of EV adoption and to help convert EVs into grid assets.

Table MCB-2 provides SPS's forecasted cumulative vehicle adoption over the course of the Plan.

Table MCB-2: Cumulative EV Forecasts

	2020	**2021**	**2022**	**2023**
Light-duty vehicles	110	143	215	390

Importantly, SPS produced this forecast in May 2020, and it incorporates the initial impacts of the COVID-19 pandemic on future demand for EVs. However,

SPS recognizes that in any forecast there are uncertainties, especially in light of current economic conditions.

Q. If the EV market is expected to grow, is SPS's TEP necessary?

A. Yes. Although the market for EVs is expected to continue to grow, significant obstacles to EV adoption and their efficient integration into the electric system remain. Customer awareness of the vehicles and charging technologies and model types, higher initial costs for EVs, access to home and/or public charging infrastructure, and the availability and knowledge of charging rates suitable to the specific needs of residential and commercial vehicle charging have all been identified in recent years as obstacles to greater adoption. SPS's TEP addresses these obstacles.

Q. What can SPS do to advance the electrification of transportation in its service area?

A. SPS's TEP is just one element in the state's multi-faceted efforts to encourage electric transportation, recognizing the critical role that electric utilities can play in fostering a robust market for EVs and charging technologies and improving access to electric transportation in New Mexico. Targeted investments and program offerings for residential and commercial customers can help address each

of the three key barriers to greater EV adoption: (i) upfront costs, (ii) lack of information and awareness, and (iii) suboptimal incentives to charge when energy costs are low. The rebates, charging services, infrastructure investments, and charging stations proposed in this TEP are designed to address these barriers in ways that seek to maximize the benefits and minimize the costs of transportation electrification. As a result, SPS's proposed EV programs are intended to help grow a competitive market for EVs and charging in New Mexico and to assist in making EVs a grid asset to the benefit of all SPS customers.

Q. Is Xcel Energy participating in any research regarding transportation electrification?

A. Yes, Xcel Energy is currently working with the National Renewable Energy Laboratory ("NREL") to model and analyze the impacts of higher penetration levels of EVs on the Xcel Energy Minnesota distribution system. This project is part of a widespread Department of Energy ("DOE") research effort in that area.[5] The project will model 15 feeders on the distribution system with varying adoption levels of EVs on each feeder. The NREL model will compare

[5] See DOE Announces $80 Million invested in Advanced Vehicle Technologies Research, https://www.energy.gov/articles/department-energy-announces-80-million-investment-advanced-vehicletechnologies-research.

distribution impacts for both unmanaged and managed charging scenarios. The research project is underway, and Xcel Energy expects results to be available in late 2020 or early 2021. The results will inform stakeholders in all of the Xcel Energy operating company jurisdictions, including SPS's New Mexico service territory, about the distribution system impacts of EV charging now and in the future.

Q. Does Xcel Energy have experience with transportation electrification in its other service areas?

A. Yes. Xcel Energy and its utility operating companies are seeking to support transportation electrification in all eight states that it serves. Xcel Energy has implemented pilots and programs in other service territories and is also conducting evaluations and reporting on these initiatives. For example, Northern States Power Company-Minnesota ("NSPM") has proposed and received approval for several pilots and programs in its service territory, spanning the residential, commercial, and public charging market segments. As part of NSPM's Transportation Electrification Plan (Docket No. E999/CI-17-879), there will be reporting on these initiatives, and many of these lessons learned will be applicable

to SPS's New Mexico TEP. The pilots and programs that are in-market are included in the table below:

Table MCB-3: NSPM EV-Related Offerings

Proposal	Status	Docket Number
Residential EV Charging Tariff	Commission Authorized, Order Date: June 22, 2015 Annual Report Filed May 31, 2019	E002/M-15-111
Residential EV Service Pilot	Commission Approved, Order Date: May 9, 2018 Annual Report Filed May 31, 2019	E002/M-17-817
Fleet EV Service Pilot	Commission Approved, Order Date: July 17, 2019	E002/M-18-643
Public Charging Infrastructure Pilot	Commission Approved, Order Date: July 17, 2019	E002/M-18-643
Residential EV Subscription Service Pilot	Commission Approved, Order Date: October 7, 2019	E002/M-19-186
Expansion of Residential EV Service Pilot to Standard Offering	Commission Approved on May 7, 2020, (written order forthcoming). Expected Q1 2021	E002/M-19-559

In addition, Xcel Energy has recently proposed EV programs in Wisconsin and Colorado. In June 2020, the Wisconsin Public Service Commission voted to

approve a home EV charging program, very similar to NSPM's EV Home Service (E002/ M-19-559) and Commercial EV pilot intended to support development of commercial EV infrastructure, including providing "make-ready" services.[6] In Colorado, PSCo submitted its 2021-2023 TEP on May 15, 2020,[7] which includes 20 programs across five portfolios: (1) Residential, (2) Multi-unit Dwellings, (3) Commercial (including fleets, workplace, and public charging), (4) Research, Innovation, and Partnerships, and (5) Advisory Services. The proposed programs are intended to help address barriers to EV adoption, including lack of awareness and information, the upfront costs of infrastructure, and suboptimal incentives to charge when energy costs are lowest, while seeking to maximize overall benefits and minimize overall costs.

[6] Public Service Commission of Wisconsin Docket 4220-TE-104.

[7] Public Utilities Commission of the State of Colorado Proceeding No. 20A-0204E.

Q. Is Xcel Energy proposing the same EV programs across all of its operating companies?

A. No. Each regulated operating company is different, as is each of the many service territories in which Xcel Energy provides electricity to customers. This requires a tailored approach to EV program offerings that matches the specific needs of each service territory's EV market with utility programs that can best maximize the benefits and minimize the costs of transportation electrification. For instance, the larger and more densely populated service territories served by Xcel Energy in Colorado and Minnesota will require larger total investments to help meet the public policy goals of those communities.

Q. In addition to running pilots and programs in other jurisdictions, what else makes SPS specially qualified to implement the EV programs proposed in this TEP?

A. Beyond the pilots and programs Xcel Energy has successfully implemented and expanded upon in other service areas, three other factors make SPS ideally positioned to take a more active role in transportation electrification and to implement the programs it proposes in this application. Those factors are SPS's long-standing and trusted relationship with the customers in its service territory,

the central role and experience that SPS has in efficiently designing and maintaining electric infrastructure, and the levers that SPS has to ensure that transportation electrification develops in a way that benefits – rather than burdens – the electric grid.

SPS's trusted customer relationships will enable it to effectively communicate program offerings and educate customers on the benefits of electric transportation. Underlying those strong relationships is SPS's experience designing, owning, and operating safe, reliable, and reasonably priced electric infrastructure, which is key under any future scenarios for transportation electrification. Lastly, successfully integrating EV charging in the residential and public charging markets in ways that unlocks participant, customer, and societal benefits requires coordination on charging optimization programs, distribution systems, generation sources, information and awareness campaigns, and complementary program offerings across public, non-profit, and for-profit organizations in New Mexico. Doing so has the potential to reduce transportation costs, electricity costs, and vehicle-related emissions to the benefit of all SPS customers.

IV. BENEFIT-COST ANALYSIS OF TRANSPORTATION ELECTRIFICATION IN SPS'S SERVICE TERRITORY

Q. **Did SPS conduct a cost-benefit analysis of transportation electrification in its New Mexico service territory?**

A. Yes. SPS engaged Energy + Environmental Economics ("E3"), an energy consulting firm, to develop a cost-benefit analysis of light duty vehicle electrification in SPS's service territory for EVs adopted between 2020 and 2030.[8] The analysis focused on measuring three buckets of costs and benefits: EV drivers, SPS electric customers, and the state of New Mexico. The analysis from E3 is provided in Attachment MCB-3.

Q. Why did SPS ask E3 to conduct this type of analysis?

A. SPS asked E3 to assess the net benefits of transportation electrification in order to understand if there are net benefits for EV drivers, SPS electric customers, and/or the state of New Mexico from rising EV adoption. This information is critical in guiding SPS's planning regarding its TEP. It is also useful for the Commission and other stakeholders as it helps inform the role that SPS's TEP should play in fostering transportation electrification. Results on the net benefits shown in the

[8] Note that the analysis assumes a 12-year life for EVs adopted over the 2020-3030 timeframe. Therefore, the total net present value ("NPV") of costs and benefits of EV adoption are assessed over the 2020-2041 timeframe.

study can inform: a) decisions on whether EV investments create net benefits; b) who benefits from those investments; and c) if the EV investments do create benefits, how to design programs to maximize the benefits. As the EV Statute calls for, SPS's TEP should improve the efficiency of the electric grid and increase utilization during off-peak hours, and the E3 analysis shows that this is indeed possible through transportation electrification.

The E3 analysis does not, however, attempt to calculate exactly how many additional EVs would be deployed as a result of SPS's proposed TEP programs, given the challenges and uncertainties involved. Importantly, SPS designed all elements of the TEP to encourage the adoption of EVs, as discussed more in the next section.

Q. Please summarize the results of this study.

A. The major findings of this analysis show that transportation electrification provides net economic benefits to EV drivers, to electricity customers across SPS's service territory, and to the state of New Mexico. As a result, targeted efforts to encourage increased adoption of EVs through SPS's proposed TEP programs can benefit both its customers and the state of New Mexico.

In regards to the State of New Mexico, E3's analysis suggests that transportation electrification will confer a net benefit, or a positive net present value ("NPV"), of over $5,400 per EV adopted between 2020-2030. E3's research also indicates that incremental load from EV charging will eventually result in downward pressure on rates. More specifically, from a ratepayer perspective, E3's analysis suggests an NPV per EV of about $700, even when assuming no managed charging programs that help encourage charging at low-cost times and the efficient use of the grid. Importantly, SPS hopes to increase the amount of per-vehicle customer and societal benefits as a result of its EV Optimization program to further incentivize off-peak charging to the benefit of program participants, SPS electric customers, and the state of New Mexico.

Q. Did the E3 study address environmental benefits?

A. Yes. As shown previously in Table MCB-2, SPS forecasts approximately 280 new EVs will be acquired in its service territory over the course of this TEP. E3's analysis shows that those vehicles, as they are acquired by SPS's customers, will have immediate and lasting environmental benefits in their communities. The E3 analysis estimates that the emission reduction impacts of EV adoption in SPS's service territory between 2020 and 2030 will result in more than 49,500 metric

tons of abatement of carbon dioxide ("CO_2") emissions and 86 metric tons of nitrogen oxide ("NO_x") emissions. Reductions in CO_2 benefit all customers by supporting climate change mitigation, consistent with New Mexico's climate and clean energy goals.

The findings by E3 are supported by another analysis in 2020, commissioned by the Natural Resources Defense Council and Southwest Energy Efficiency Project for the state of New Mexico, conducted by MJ Bradley. MJ Bradley's analysis estimates that the cumulative net revenue by 2050 will be $0.4 billion and that revenue could be fed back to utility customers and potentially reduce rates for all electric customers. In 2050, the cumulative net benefits for New Mexico residents – inclusive of all the benefits to EV drivers, to electric customers, and to the state from emissions reductions – could be more than $5.3 billion.[9]

[9] See MJ Bradley and Associates,. "Electric Vehicle Cost-Benefit Analysis. Plug-In Electric Vehicle Cost-Benefit Analysis: New Mexico." January 2020. https://mjbradley.com/sites/default/files/NM-PEV-CB-Analysis-FINAL.pdf.

Q. Are there other reasons SPS believes its TEP has environmental benefits?

A. Yes. As SPS's generation facilities continue to be powered by more carbon-free energy resources, the environmental benefits from EV charging grow. Furthermore, the E3 study also projects 0.86 metric tons of reduced NOx emissions (from 2021-2023) as a result of light duty transportation electrification. Tables MCB-4 and MCB-5 illustrate the reductions in CO_2 and NOx through 2023 as a result of the electric vehicles that will be added to the system. EVs adopted between 2021-2023 will reduce emissions by over 1,127 metric tons of CO_2 and 0.86 metric tons of NOx.

Table MCB-4: Estimated CO2 Reductions

Year	Cumulative EVs	EV CO_2 Emissions (metric tons CO_2)	Gas Alternative CO_2 Emissions (metric tons CO_2)	Net Annual CO_2 Impact due to EVs (metric tons CO_2)
2020	110	224	372	-148
2021	143	275	479	-204
2022	215	388	710	-321
2023	390	657	1259	-602

Table MCB-5: Estimated NOx Reductions

Year	Cumulative EVs	EV NOx Emissions (metric tons NOx)	Gas Alternative NOx Emissions (metric tons NOx)	Net Annual NOx Impact due to EVs (metric tons NOx)
2020	110	0.27	0.36	-0.09
2021	143	0.33	0.47	-0.14
2022	215	0.46	0.71	-0.24
2023	390	0.79	1.26	-0.48

Q. What other conclusions did you draw from E3's analysis?

A. E3's analysis found that the low electricity supply costs for SPS, particularly overnight when the majority of charging is expected to occur, offer notable benefits for EV drivers and that electric vehicles can provide participant, ratepayer, and societal benefits. Also, investing in programs provides potential EV benefits, so utility programs, such as those in SPS's TEP, that accelerate and increase these benefits are important.

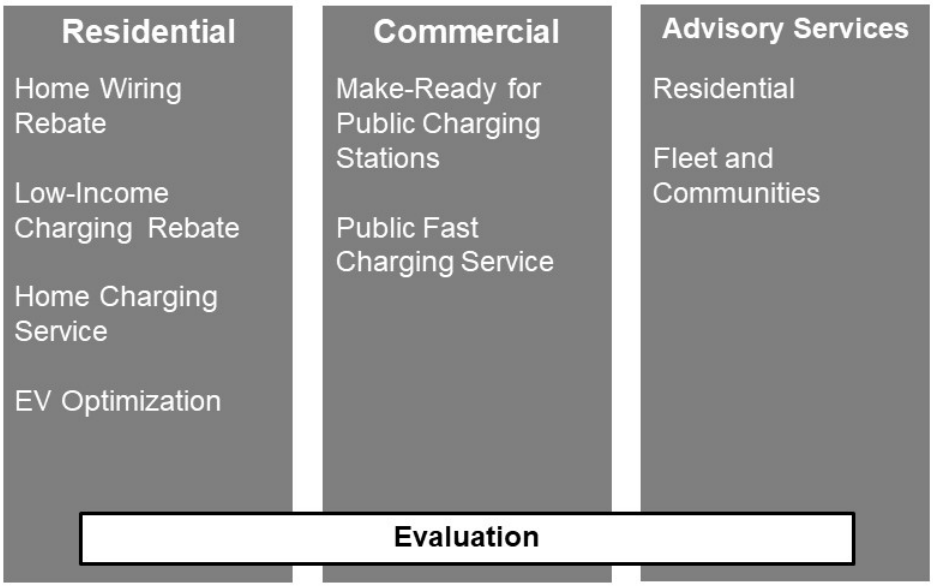
V. TEP AND ASSOCIATED PORTFOLIOS

A. Overview

Q. Please provide an overview of SPS's proposed TEP portfolios.

A. SPS is proposing a TEP of approximately $3.17 million in investments and spending to implement three portfolios, with eight underlying programs, that will support the deployment of EV charging infrastructure in its service territory:

FIGURE MCB-1



- **Residential Charging**: SPS will provide rebates for charging infrastructure for customers, offer incentives where customers receive performance incentives for charging off-peak, including a higher rebate for low-income customers, and offer a simple charging service to streamline the home charger installation process. As part of the program,

customers will have choices for charging equipment, including procuring their own charging equipment or obtaining SPS-owned charging equipment.

- **Public Charging**: SPS will work with communities, charging developers, and other site hosts to ensure that there is sufficient public fast charging infrastructure to help spur adoption and electrified transportation within and between communities. As part of this portfolio, SPS proposes to offer EV supply infrastructure (i.e., "make ready") service to help lower the costs of deploying public fast charging infrastructure for site hosts and developers and also a limited program in which SPS builds, owns, and operates public charging in areas of the service territory where there are gaps in public fast charging.

- **Advisory Services**: Education and outreach are important for enabling both EV adoption and participation in SPS's programs that encourage charging at times that are best for customer savings as well as for the electric grid. As part of this plan, SPS will offer advisory services for residential customers, fleets, and communities to help support awareness of EVs and program offerings and support EV planning efforts.

A detailed overview of the TEP is included in Appendix A to Attachment MCB-1.

B. Program Development Process

Q. Why did SPS design its TEP to offer only three portfolios: residential, public charging, and advisory services—as opposed to other Xcel Energy operating company proposals that offer more portfolios?

A. Given the unique characteristics of SPS's service territory and the status of the EV market in New Mexico, SPS determined that a targeted focus on some of the most crucial segments of the market was the best way to support transportation

electrification at this early stage. With programs directed at supporting level 2 charging at home, public fast charging, and education and advisory services, SPS hopes to help address three key barriers to increased EV adoption: upfront costs, lack of information and awareness, and suboptimal incentives to charge when energy costs are low. It is also important to note that this is SPS's first TEP, and future iterations could contain new and/or expanded portfolios, based on Xcel Energy's EV programs in other states, to support customers' charging needs in the future should conditions, such as increased EV adoption, warrant it.

Q. Why did SPS determine it should offer the Residential portfolio?

A. Residential EV drivers that charge at home make up the vast majority of the current EV market. These customers meet more than 80% of their fueling needs at home.[10] SPS determined that it should offer the Residential portfolio to help SPS's New Mexico residential customers overcome barriers to EV growth specific to them – namely, awareness of the benefits of EVs and charging technologies, upfront costs for level 2 home charging, and a lack of incentives to charge when its best for the grid.

[10] National Renewable Energy Laboratory. (2019). Electric Vehicle Charging Implications for Utility Ratemaking in Colorado. See https://www.osti.gov/biblio/1503821-electric-vehicle-charging-implications-utility-ratemaking-colorado.

To illustrate this last point, many customers who are not on a time of use ("TOU") rate will charge as soon as they arrive at home, which can lead to increases in electricity demand during the hours when the electricity system is facing peak demand.[11] Such a charging pattern will have greater impacts on peak demand in the future when the addition of solar resources could nudge the system's peak later in the day, when more customers are plugged in and charging. For these reasons, SPS designed its proposed Residential programs to help overcome key barriers to adoption while requiring enrollment in the EV Optimization program. SPS anticipates that this requirement will help reduce peak demand and lower system operating costs associated with EVs, helping all electric customers mitigate the Plan's bill impacts in the future.

Q. Why did SPS determine it should offer the Public Charging portfolio?

A. Similar to residential charging, access to public charging will be critical to creating a future with robust EV adoption. For SPS customers who do not have access to home charging, who travel between communities, and who may want to install charging at or near their place of business in order to encourage customers

[11] Electric Power Research Institute, 2018. Electric Vehicle Driving, Charging, and Load Shape Analysis: A Deep Dive Into Where, When, and How Much Salt River Project (SRP) Electric Vehicle Customers Charge.

to shop or stay longer, enhancing access to public charging is necessary to encourage widespread transportation electrification. As a result, SPS hopes to encourage publicly-available fast charging via two tracks of targeted infrastructure investments.

Q. Why did SPS determine it should offer the Advisory Services portfolio?

A. In SPS's view, the TEP's residential and public charging proposed program offerings would not be as effective as possible if there were widespread confusion among customers and communities about EV types and models, charging technologies, and what federal, state, local, and utility offerings exists that could help meet their electric transportation needs. As a result, SPS brings forward a targeted Advisory Services portfolio to help improve customers' awareness of EV offerings, help support their planning activities on EVs, and help improve their understanding of the benefits of transportation electrification.

Q. Did SPS solicit stakeholder input when developing its TEP?

A. Yes. While stakeholder input is not explicitly required by the EV Statute, input from stakeholders is vital in helping to develop a TEP that seeks to strengthen partnerships and leverage the best ideas to maximize the benefits of transportation

electrification. To accomplish this, SPS hosted a stakeholder workshop to elicit input on its proposed TEP.

In preparation for filing this Plan, SPS provided external stakeholders with the opportunity to contribute to its planning and provide feedback on its proposed ideas. SPS's stakeholder meeting included participation from environmental organizations, customer advocates, peer electric companies, charging equipment manufacturers, and government organizations.

SPS hosted an online webinar to gather feedback and input, which included representatives from Commission Staff, Office of the Attorney General, Western Resources Advocates, Chargepoint, Southwest Energy Efficiency Project, Alliance for Transportation Electrification, CALStart, Public Service Company of New Mexico, and El Paso Electric Company.

Q. As a result of the stakeholder engagement process described above, did SPS include elements the stakeholders recommended?

A. Yes, SPS has incorporated reporting requirements, including installation costs and charger utilization based on the stakeholder feedback received.

Q. What other factors did SPS consider when selecting its TEP programs?

A. In designing the TEP, SPS paid special attention to the unique challenges facing its low-income customers and communities. While the upfront costs of home level 2 charging equipment and even access to charging in the first place can be difficult, these challenges can be particularly acute for lower-income communities. As a result, SPS proposes two programs to help address these challenges: an enhanced home charging rebate for low-income residential customers and a public fast charging program whereby SPS proposes to install, own, and operate a limited number of public DCFC stations to ensure that there is a basic level of access to public charging.

C. Portfolio Summaries

1. Residential Portfolio

Q. Please provide a summary of the Residential portfolio included in the TEP.

A. The Residential portfolio of the TEP aims to ensure that EV adoption amounts to a grid asset while directly addressing the equipment selection, upfront cost, and installation barriers that many EV customers encounter. SPS proposes four programs within the Home Charger Service Portfolio: 1) a Home Wiring Rebate for level 2 charging equipment; 2) an enhanced Low-Income Charging Rebate for

wiring and chargers for qualifying low-income customers; 3) a Home Charging Service program to defray the cost of home wiring and streamline the home charging selection and installation process; and 4) an EV Optimization program to encourage customers to charge during select times that are more beneficial for the electric grid.

Q. What are SPS's objectives in implementing the Residential portfolio?

A. SPS's objectives for this portfolio include:

- increasing the number of customers participating in load management programs that reduce peak demand and lower system operating costs associated with EVs;
- increasing access to home charging by helping lower the upfront costs of EV infrastructure, including for SPS's low-income customers; and
- making the installation of charging equipment simple and easy for customers.

Q. Please explain the rebate amounts and how SPS determined those amounts.

A. SPS proposes rebates of up to $500 for the Home Wiring Rebate and $1,300 for the Low-Income Charging Rebate. One of the largest upfront costs to installing a level 2 charging station is the installation of a 240-volt circuit. SPS established the wiring rebate to offset a significant portion of the average costs for a customer in a single-family structure to install level 2 wiring for an EV. The much-expanded low-income rebate is intended to not only offset a significant

portion of the wiring costs but also much of the charger costs for eligible participants.

Q. Are there any limitations on the type of charging station a customer can buy and still qualify for a rebate?

A. Yes. First, SPS is not going to provide wiring rebates for level 2 charging equipment above 50 amps (provides a 12 kilowatt charging rate with 240-volt circuit) because it believes this cap provides enough charging speed for residential customers, while helping to limit adoption of the most high-powered equipment, which could significantly tax the distribution grid. This is one method SPS proposes to reduce peak demand and lower system operating costs associated with EVs. Other requirements include the ability to sync up with SPS's EV Optimization program, along with other safety and reliability requirements that SPS will develop as part of any vendor selection process.

Q. Please explain the Home Charging Service program.

A. Customers will have the option to obtain charging equipment through SPS and have that equipment installed and maintained at their home by SPS without making any upfront payment for the equipment or installation. These customers will pay a bundled service charge that will be applied to their monthly bill, which

includes cost recovery of an SPS-provided EV charger service. SPS will arrange the installation of the equipment. Importantly, customers will still be responsible for paying for their electricity usage, including from vehicle charging, on the rate on which they receive service.

Q. Please explain the EV Optimization program.

A. The EV Optimization program rewards customers for participating in managed charging through a year-end rebate. Through this program, customers select a preferred charging schedule that does not include the hours of SPS's summer peak of 12:00 pm to 6:00 pm. The customer's home charging will be programed on this schedule. This program reduces peak demand and lowers system operating costs associated with EVs. However, customers can override these settings in order to charge if needed, and SPS intends to use behavioral reinforcements, such as targeted emails and other outreach, to keep customers engaged and minimize on-peak charging. SPS recognizes this is a new program and will be examining the effectiveness of this incentive for encouraging charging during off-peak hours and improving system efficiency.

Q. Are customers who participate in SPS's Residential programs required to enroll in the EV Optimization program or the residential TOU rate?

A. Yes. Enrollment in EV Optimization and/or the residential TOU rate is required if a customer desires to participate in the Home Wiring Rebate or Low-Income Rebate programs. For participation in the Home Charging Service program, enrollment in EV Optimization is required. However, customers may opt-out of participating in the EV Optimization program or the residential TOU rate later.

Q. What are other eligibility Requirements for the Residential portfolio programs?

A. SPS has a strong desire to make the programs in the Residential portfolio widely available, though some basic eligibility requirements will apply. For example, participants must own or rent a single-family home and own or lease an EV. Customers who already own EVs and the charging stations may participate in the EV Optimization Program, if the customer owns a compatible charger or can participate through an eligible vehicle. The TEP, included as Attachment MCB-1, discusses the eligibility requirements for each program.

Q. What are the eligibility requirements for a customer to qualify for a low-income rebate?

A. SPS is utilizing the definition of "low income customer" as defined by the EV Statute, to determine whether a customer has a qualifying-income for the low-income rebate. The rule defines "low income" as "an annual household adjusted gross income, as defined in the Income Tax Act, of equal to or less than two hundred percent of the federal poverty level."

Q. What are the benefits of the Residential portfolio as part of the TEP?

A. SPS anticipates several benefits for participants, SPS electric customers at large, and the state of New Mexico from its proposed Residential portfolio. By increasing access to managed level 2 home charging through reducing complexity and installation costs, SPS aims to maximize the overall benefits of transportation electrification while minimizing the costs. These benefits include reduced household vehicle fuel and maintenance costs for participating customers, improved efficiency of the grid for all electric customers, and reduced air pollution for the State of New Mexico. Importantly, these benefits directly correspond with the criteria established in the EV Statute for the Commission to consider when evaluating TEPs. Those criteria include whether EV programs are

reasonably expected to improve the electrical system's efficiency, increase access to electricity as a transportation fuel and in particular for low-income and other underserved customers, and reduce air pollution and greenhouse gases, among the other considerations in the EV Statute that SPS witness Ruth M. Sakya discusses in her direct testimony.

2. Public Charging Infrastructure

Q. Please provide a summary of the Public Charging portfolio included in the TEP.

A. The Public Charging portfolio aims to support publicly-accessible fast charging in order to enable inter-community travel, expand access to charging for those who are unable to charge at home or at work, and to reduce the upfront costs of public charging infrastructure. This portfolio features two programs: an EV supply infrastructure for Public Charging Stations program and a Public Fast Charging Service program in which SPS proposes to own and operate a limited number of public fast charging stations to address any gaps in public fast charging stations.

Q. Why is public charging important for SPS's service territory?

A. As discussed in Section III of my testimony, SPS is aware of fewer than 20 public charging station ports in SPS's electric service territory, with less than 5 outside

of Tucumcari, New Mexico. From a public fast charging perspective, there are no DCFC charging stations outside of Tucumcari in SPS's service territory. This is far below what the market will require in the future to support widespread transportation electrification and makes driving an EV challenging for most of SPS's customers. As a result, SPS brings forward this TEP so that it can be a partner in helping to develop a market for public fast charging and join other for-profit, non-profit, and public entities working to increase access to public fast charging.

Q. How will SPS select locations for the placement of SPS-owned public charging stations?

A. SPS will first solicit applications for providing supply infrastructure for public fast charging projects through its proposed EV Supply Infrastructure for Public Charging Stations program. After selecting projects, SPS will then assess the current and future landscape for fast charging coverage in its service territory and select a limited number of additional sites for SPS-owned public charging stations if there are any gaps, based on distance from charging stations and density.

Q. How will customers be charged for using SPS-owned public charging stations?

A. SPS proposes to charge customers a per-minute rate that is in line with local market EV fast-charging rates. Please see the Direct Testimony of SPS witness Richard M. Luth for more details and discussion on the proposed fast charging rate.

Q. Does SPS also have a proposal to support privately-owned public charging stations in its TEP?

A. Yes. In its EV Supply Infrastructure for Public Charging Stations program, SPS proposes to provide support to customers that have applied and been selected for public fast charging projects. SPS will review applications according to pre-determined criteria that focuses on the considerations provided in the EV Statute, including operating the grid efficiently, providing access to charging, and improving air quality and reducing greenhouse gas emissions. This infrastructure support will come in two segments: via traditional line extension work to establish a new meter and any related infrastructure upgrades leading up to the meter along with EV supply infrastructure support whereby SPS will install, own, and maintain all infrastructure and wiring from the meter to the EV charger.

Q. What rate options will customers have when participating in the EV Supply Infrastructure for Public Charging Stations program?

A. SPS proposes that customers can select to receive service under any applicable commercial rate for which they are eligible. The Commission-approved commercial rates will encourage the efficient use of the electric grid when applied to EV charging.

Q. How will customers and SPS procure charging equipment for the proposed Public Charging programs?

A. SPS will require customers receiving EV supply infrastructure support to use charging equipment that meets applicable technical and safety standards, demonstrates interoperability, cyber security, and managed charging capabilities that enable customers to participate in managed charging rates or programs. For public charging stations that SPS proposes to own-and-operate, SPS intends to procure charging equipment from multiple vendors to help ensure choice and encourage competition in the early days for the market.

3. Advisory Services

Q. Please provide a summary of the advisory services included in the TEP.

A. Advisory Services include information on the benefits of EVs to customers and on SPS's EV program offerings and support of EV planning activities in SPS's communities.

Q. Why does SPS propose to offer advisory services in the TEP?

A. In this early state of the EV market, SPS believes it is important to not only offer EV wiring rebates, charging service, and charging optimization programs to support the growth of electrification but also a suite of information services. The barriers to faster EV adoption certainly stem from upfront costs, but barriers also stem from a lack of awareness of EV benefits, lack of awareness of electric charging and vehicle technologies, a misunderstanding of electric rates and available options, and how to navigate the multitude of information sources on EVs. Furthermore, these challenges apply to both residential and commercial customers. Through its Advisory Services portfolio, SPS hopes to directly address these information and awareness obstacles.

Q. Please summarize the residential advisory service included in the TEP.

A. For the residential market, SPS proposes several efforts to improve awareness of EVs and provide information that its customers will need to help them make informed decisions on whether an EV and level 2 charging at home is right for them. These efforts include engaging with media outlets and advertising channels, building partnerships with auto dealers and electricians, and implementing an online EV advisor tool to provide EV model recommendations and other information based on customer preferences.

Q. Please summarize the fleet and community advisory service included in the TEP.

A. For commercial fleets, SPS proposes to offer analytics support to fleet managers to help them assess how their vehicles are being used, which vehicles are well suited for conversion to EVs. In addition, SPS would advise fleets and communities on how charging infrastructure can be best sited and managed.

VI. TEP BUDGET

Q. Please summarize the proposed budget for the TEP.

A. SPS proposes approximately $3.17 million in investments and program spending over the three-year TEP timeframe. A significant portion of this investment and related spending will be focused on helping to provide publicly accessible fast charging. This focus on public fast charging stems from SPS's efforts to maximize the benefits of transportation electrification identified in the E3 analysis, particularly for public charging, and accounting for the characteristics of SPS's service territory and the state of the EV market. Table MCB-6 summarizes the breakdown of the budget by portfolio and by year.

Table MCB-6: Proposed TEP Budget by Portfolio

	2021	2022	2023	Total
Residential	$131,000	$98,000	$176,000	$404,000
Public Charging	$511,000	$599,000	$1,154,000	$2,264,000
Advisory Services	$100,000	$125,000	$125,000	$350,000
Evaluation	$50,000	$50,000	$50,000	$150,000
Total	**$791,000**	**$872,000**	**$1,504,000**	**$3,168,000**

Q. How did SPS determine the appropriate budget for each of its portfolio offerings?

A. SPS determined the budget for the Residential portfolio by forecasting EV adoption in its service territory and assessing the potential market demand for

home charging rebates and services that SPS proposed in this TEP. In doing so, SPS also concluded that directing limited investment and programmatic dollars toward the residential market segments would be a cost-effective approach to improving the efficiency of the grid, a key goal that the EV statute establishes. As discussed previously, a focus on residential charging is warranted given that the vast majority of vehicle electrification in the near future will be in the light duty vehicle sector, that most charging will occur at home, and that there is an opportunity today to convert home charging into a grid asset. The cost inputs stemming from estimated participation levels are the result of Requests for Proposals ("RFP") and discussions Xcel Energy has held with vendors in other states along with service and technology costs Xcel Energy has seen in other pilots and programs.

SPS determined the budget for the Public Charging portfolio in a similar way to the Residential portfolio, by forecasting EV adoption in the SPS New Mexico service territory and assessing the potential market demand for public fast charging programs. Given the challenges for public charging to become economic in certain situations, SPS concluded it is important to invest in public fast charging to support the growth of a nascent market. In fact, SPS believes

these investments should make up the bulk of the three-year TEP as a way to best enable faster EV adoption and maximize the benefits of transportation electrification while minimizing its costs. The cost inputs stemming from estimated participation levels are the result of RFPs launched in other Xcel Energy jurisdictions, site visits, cost information provided by Guidehouse, and assumptions regarding the timing of projects. With ongoing make-ready projects throughout the three-year TEP period, SPS has budgeted for the SPS-owned charging stations being more backloaded to allow for an assessment of the extent to which existing and future fast charging stations provided coverage across the service territory.

Finally, SPS crafted the budget for the Advisory Services portfolio to provide the right balance between offering tailored solutions to customers while being cognizant of the costs involved and the needs of communities. Xcel Energy's experience operating these types of programs across Xcel Energy's operating companies in recent years informed the costs estimates for implementing an Advisory Services portfolio in New Mexico.

Q. What is the breakdown of capital and administrative costs for each portfolio?

A. Table MCB-7 provides the breakdown of capital, rebates, and operations and maintenance ("O&M") costs by portfolio.

Table MCB-7: Capital Investments and Program Costs by TEP Portfolio

	Capital	Rebates	O&M	Total
Residential	$132,000	$112,000	$161,000	$404,000
Public Charging	$2,054,000	$0	$210,000	$2,264,000
Advisory Services	$0	$0	$350,000	$350,000
Evaluation	$0	$0	$150,000	$150,000
Total	**$2,185,000**	**$112,000**	**$871,000**	**$3,168,000**

Note: Numbers may not add to totals due to rounding.

Q. Does SPS expect to spend exactly this amount of money?

A. No. Market conditions, prices resulting from cross-jurisdictional RFPs, and actual customer uptake for program offerings are all highly likely to differ at least somewhat from the budget estimates. Especially in light of the COVID-19 pandemic, uncertainty will most likely make actual program spending differ from these projections. As a result, creating a process for budget flexibility from the outset is important. Ms. Sakya also discusses budget flexibility in her direct testimony.

Q. Does SPS's proposal include the flexibility to move funds within a specific portfolio?

A. Yes. SPS requests the ability to have flexibility at the programmatic, portfolio, and overall budget levels, though to varying degrees. Flexibility is critical for successful implementation of the TEP in order for SPS to adapt as the market develops based on actual customer interest and demand, actual market prices, and to aggregate economic activity in light of the uncertainties caused by the ongoing pandemic. This ability to adapt to the market, adjust the timing and magnitude of particular programs, and even offer new programs will help maximize the benefits that the TEP will create and help promote state policy goals for transportation electrification and reliance on zero carbon resources.[12]

Q. Please describe SPS's proposal for moving funds between portfolios.

A. SPS also requests the flexibility to adjust the allocation of spending across portfolios. However, SPS proposes to apply a limit on this type of cross-portfolio flexibility of up to 150% of the original budget. Again, given the uncertainty surrounding the timing and magnitude of customer demand across market segments for the particular programs and service proposed in the TEP, especially

[12] NMSA 1978, § 62-16-4 (A) (6).

in light of the COVID-19 pandemic, SPS proposes portfolio flexibility in order to adapt in real-time to the needs of customers and market costs. The ability to speed up or delay particular programs in light of these factors will help SPS implement the proposed TEP in a way that best promotes the transportation electrification goals of the state in a least-cost way.

For instance, if residential customer demand for TEP programs turns out to be higher than anticipated due to a desire for more EVs and faster home charging options rather than public transportation or conventional vehicles, then having the ability to increase or reallocate funding between portfolios would allow SPS to meaningfully respond to customer needs. Similarly, for commercial customers, portfolio budget flexibility can help SPS best meet the demand for fast charging. This flexibility will help SPS achieve the goals of increasing access to electricity as a transportation fuel and supporting customer choice in charging infrastructure, as outlined in the EV statute, by responding to the needs of the market.

Q. Does SPS's proposal include flexibility to increase or decrease the overall budget if conditions warrant it?

A. Yes. SPS proposes to have annual flexibility, though subject to a more stringent limit of 25% above the original budget, in order to ramp the annual total up in response to customer demand and actual market prices. Similarly, SPS could spend less than the proposed annual budget if overall customer demand and other market factors lead to slower program uptake and EV adoption.

Q. How does SPS propose to bring forward new programs during the three-year TEP, should new market opportunities develop, or to remove programs?

A. While SPS does not have plans at the moment to supplement the programs described so far in the TEP with additional offerings, it is helpful to communicate a process that SPS would follow for any program additions or removals during the three-year period covered by this first TEP. SPS proposes an expedited process in which SPS would submit an application for a program addition or removal under expedited consideration by the Commission.

VII. EVALUATION

Q. Does the EV Statute establish a set of evaluation requirements over the course of the TEP or at the end of any approved period?

A. No. However, the EV Statute does lay out several criteria for the Commission to consider when evaluating TEPs, as discussed in Ms. Sakya's direct testimony. To inform future TEP filings and to continually improve and hone its EV programs, SPS considers an evaluation component to the TEP to be vital.

Q. How will SPS evaluate its TEP programs?

A. SPS proposes an evaluation process to allow SPS, stakeholders, and the Commission to better understand the impacts of SPS's TEP program. Collecting data on the programs and their impacts not only helps SPS continue to improve future iterations of TEPs but also allow mid-course adjustments in response to customer feedback, internal and/or vendor cost changes, and customer uptake. SPS plans to evaluate how the programs are affecting EV adoption, customer awareness and satisfaction, charging behavior and peak demand, and local emissions. SPS proposes to provide this information, along with other participation and cost metrics as detailed in Attachment MCB-1, in an annual TEP compliance report. To support these efforts, SPS proposes an initial annual budget of $50,000 for a third-party evaluator.

Q. What metrics does SPS propose to examine each year in this report?

A. The proposed metrics are highlighted in the TEP (Attachment MCB-1) and include program costs, participation, and estimates for the amount of charging that occurs off-peak.

Q. When does SPS propose to file its report annually?

A. SPS proposes to file its report annually on August 1.

Q. How will SPS engage with stakeholders throughout the TEP period?

A. SPS proposes a process for providing TEP program updates to interested stakeholders and for gathering feedback and input on an annual basis.

Q. Does this conclude your pre-filed direct testimony?

A. Yes.

VERIFICATION

On this day, July 20, 2020, I, Mathias C. Bell, swear and affirm under penalty of perjury under the law of the State of New Mexico, that my testimony contained in Direct Testimony of Mathias C. Bell is true and correct.

/s/ Mathias C. Bell
MATHIAS C. BELL

Plan Years 2021-2023

Filed: July 21, 2020

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Glossary of Acronyms and Defined Terms

Acronym/Defined Term	Meaning
BYO	bring your own; eligible charging equipment furnished by the customer
Commission or NMPRC	New Mexico Public Regulation Commission
DCFC	Direct Current Fast Charging
EV	electric vehicle
EV Statute	NMSA 1978, § 68-8-12
Level 2 Charging	Level 2 Charging typically provides 10 to 20 miles of range per one hour of charging using 240VAC or 208V AC electrical service
managed charging	demand managed through a combination of pricing and load management
make-ready	all necessary electrical infrastructure to operate a charging station
SPS	Southwestern Public Service Company, a New Mexico corporation
TEP or Plan	Transportation Electrification Plan
Xcel Energy	Xcel Energy Inc.

SPS Transportation Electrification Plan

Introduction

In accordance with NMSA 1978, 68-8-12 ("Electric Vehicle ("EV") Statute"), Southwestern Public Service Company, a New Mexico corporation ("SPS"), an electric utility operating company that is a wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy"), respectfully submits SPS's 2021-2023 Transportation Electrification Plan ("TEP" or "Plan") to the New Mexico Public Regulation Commission ("NMPRC" or "Commission") for approval.

In passing the EV Statute in 2019, the state legislature recognized the role utilities have in supporting widespread transportation electrification by requiring electric public utilities to file an application with the Commission for a program to support widespread transportation electrification no later than January 1, 2021. This initial Plan is designed to enable access to the benefits of electric transportation by beginning to address barriers to EV adoption while remaining mindful of the cost impacts to SPS's customers. In designing the TEP programs, SPS took into account the unique considerations of its service territory, including the state of the EV market and the targeted ways in which SPS can help address EV adoption barriers to best serve the charging needs of customers. Those barriers include:

- **Upfront costs.** Despite cost savings that EV drivers can experience over time, upfront costs for the vehicles along with the new necessary charging infrastructure remain a barrier. Utilities can mitigate upfront cost barriers through customer programs.

- **Lack of Information and Awareness.** There is a significant awareness gap for EVs and their benefits. Improved education and outreach by utilities can help address this barrier.

- **Suboptimal incentives to charge when energy costs are lowest.** Depending on when and how EVs charge, increased EVs in the SPS service territory could create challenges to the grid. Utilities are well-positioned to help manage demand through a combination of pricing and load management (e.g., "managed charging"), in order to minimize the costs to the system of this new EV load.

To help address these barriers and capture these potential benefits, SPS proposes three transportation electrification portfolios, containing eight new EV programs in total, as part of its 2021-2023 TEP:

- **Residential Charging:** Customers will receive performance incentives for charging off-peak and a rebate for home wiring, with an enhanced rebate for eligible low-income customers. As part of the program, customers will have choices for charging equipment, including using their own charger or electing to have SPS provide charging equipment that customers can pay for on their bill.

- **Public Fast Charging:** SPS will work to address the charging infrastructure gap in its service territory by seeking to support site hosts and developers with "make-ready" infrastructure and, if necessary, invest in, own, and operate a Direct Current Fast Charging ("DCFC") network. SPS will start administering the program in 2021 and will complete construction at all sites and initiate operation of the DCFC network over the course of the three-year plan.

- **Advisory Services:** An education and outreach portfolio is important to enable adoption and participation in SPS's EV programs. Such outreach also encourages charging at times that

are beneficial for participants and for the efficiency of the grid. As part of its TEP, SPS will offer advisory services for residential, fleet, communities, and low-income partnerships.

Table 1 provides the proposed budgets for implementing these portfolios over the 3-year time period.

Table 1: Total TEP Budget by Portfolio[1]

Portfolio	2021	2022	2023	Total
Residential Charging	$ 131,000	$ 98,000	$ 176,000	$ 404,000
Public Fast Charging	$ 511,000	$ 599,000	$ 1,154,000	$ 2,264,000
Advisory Services	$ 100,000	$ 125,000	$ 125,000	$ 350,000
Evaluation	$ 50,000	$ 50,000	$ 50,000	$ 150,000
Total	**$ 791,000**	**$ 872,000**	**$ 1,504,000**	**$ 3,168,000**

Additionally, this Plan has been designed to meet the unique needs of SPS's customers and service territory. To date, many of the utility TEPs that have been proposed and approved around the country represent large utilities serving large metropolitan areas, and many of those areas already have tens of thousands or even hundreds of thousands of EVs. SPS, however, is a much more rural utility, serving smaller communities and less than 100 electric vehicles at the moment. Accordingly, this Plan has been designed to support a small and still developing market. However, without this Plan, the SPS service territory may see reduced EV adoption and less EV charging during low-cost times, foregoing valuable benefits to EV drivers, SPS electric customers, and the state of New Mexico.

Importantly, these three proposed portfolios constitute SPS's first TEP to help kickstart transportation electrification into the next phase in New Mexico. In the future, there will be the potential for SPS to deepen and/or expand its EV programs, should the state of the EV market and the policy goals of New Mexico warrant such investments.

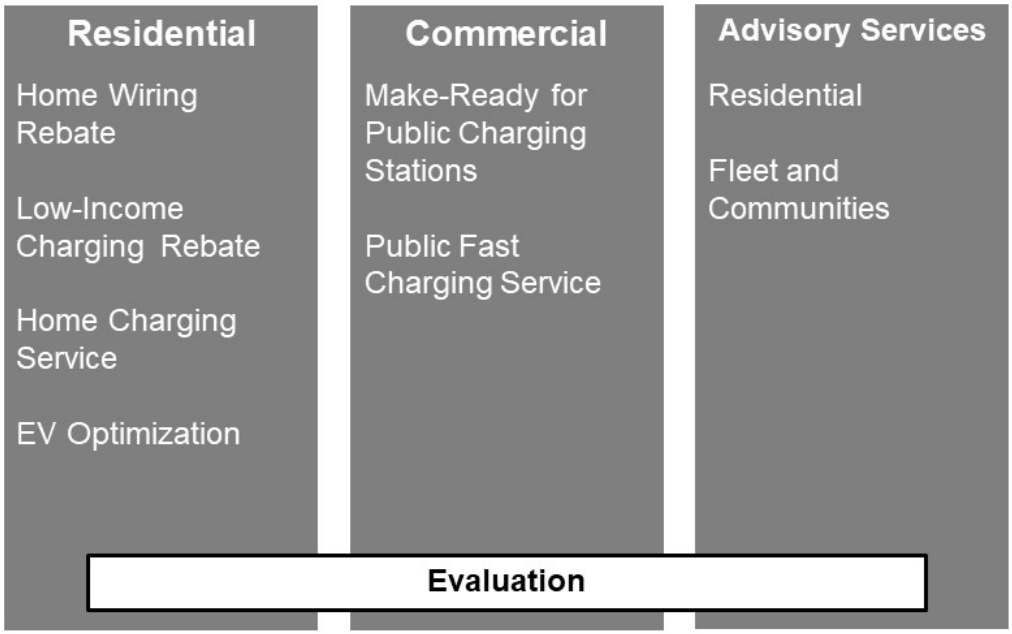
SPS's TEP

Overview

SPS's TEP is comprised of three portfolios and eight new programs (Figure 1).

[1] The budget numbers presented in this Plan are rounded to the nearest thousand. For budget numbers rounded to the nearest dollar, please see Attachment MCB-4 to the Direct Testimony of Mathias C. Bell.

Figure 1: SPS TEP Framework



A more detailed overview of the TEP is included in Appendix A to the Plan.

Forecasted Spend

Table 2: Budgets, Including Capital, Rebates, and O&M Expenses for SPS's 2021-2023 Transportation Electrification Plan

Portfolio	Spending Type	2021	2022	2023	Total
Residential	Capital	$ 66,000	$ 20,000	$ 47,000	$ 132,000
	Rebates	$ 19,000	$ 27,000	$ 66,000	$ 112,000
	O&M Expenses	$ 46,000	$ 51,000	$ 63,000	$ 161,000
	Total	**$ 131,000**	**$ 98,000**	**$ 176,000**	**$ 404,000**
Public Charging	Capital	$ 465,000	$ 538,000	$1,051,000	$ 2,054,000
	Rebates	$ -	$ -	$ -	$ -
	O&M Expenses	$ 46,000	$ 62,000	$ 102,000	$ 210,000
	Total	**$ 511,000**	**$ 599,000**	**$1,154,000**	**$ 2,264,000**
Advisory Services		**$ 100,000**	**$ 125,000**	**$ 125,000**	**$ 350,000**
Program Evaluation		**$ 50,000**	**$ 50,000**	**$ 50,000**	**$ 150,000**
Total		**$ 791,000**	**$ 872,000**	**$ 1,504,000**	**$ 3,168,000**

Note: numbers may not add up due to rounding

1. Portfolio Descriptions

1.1 Residential Portfolio

Description

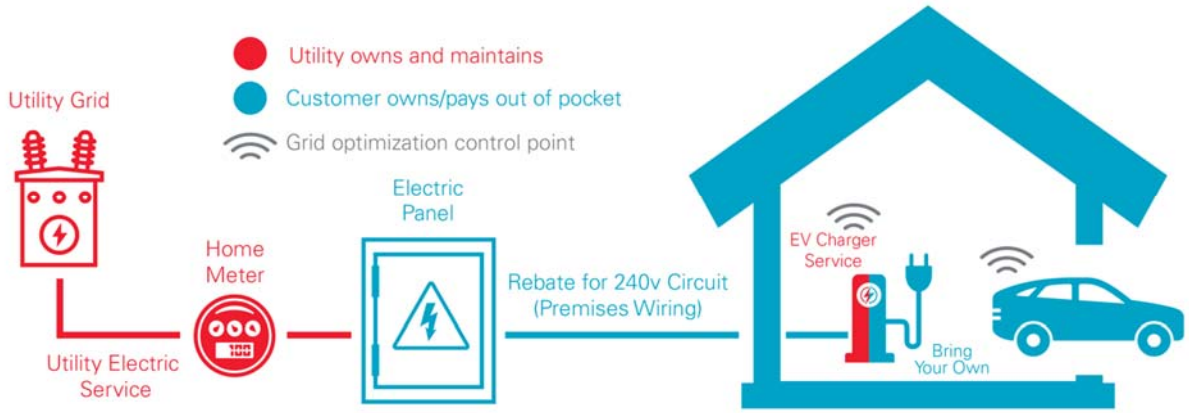
Today's EV market primarily consists of residential EV drivers, where currently 80% of EV charging occurs at home.[2] Even in a rural service territory (such as SPS's service area), most EV customers will likely meet the majority of their charging needs at home, and this new load could have an impact on the grid. This portfolio is designed to encourage EV charging during low-cost time periods. This portfolio is also designed to make it easy and affordable for residential customers to access the benefits of EV charging.

Table 3 summarizes and compares the main programs of the Residential Portfolio.

Table 3: Residential Portfolio Programs

Program	**Objective**	**Dependency**
Home Wiring Rebate	Increase access to home charging by helping lower the upfront costs of EV infrastructure	Must participate in EV Optimization and/or SPS's Time of Use rate
Low-Income Charging Rebate	Help enable access to EV infrastructure for low-income customers	Qualify as a low-income customer and must participate in EV Optimization and/or SPS's Time of Use rate
Home Charging Service	Increase access to home charging by making the installation of charging equipment simple and easy for customers	Must enroll in EV Optimization
EV Optimization	Reduce coincident peak demand and lower system operating costs associated with EVs	Must have eligible charging station or vehicle approved for participation in EV Optimization

[2] National Renewable Energy Laboratory. (2019). Electric Vehicle Charging Implications for Utility Ratemaking in Colorado. See https://www.osti.gov/biblio/1503821-electric-vehicle-charging-implications-utility-ratemaking-colorado.



Home Wiring Rebate

- **Reduced upfront costs for premises wiring for Level 2 charging equipment**—Installation of a 240-volt circuit, which enables charging that is faster than a typical home electrical outlet (level 1) but still less than at public DCFC stations (DCFC or level 3), is one of the largest upfront costs when installing a level 2 charging station in the home. These home wiring installations typically cost between $500-$800, but, in some cases, more than $2,000. This program provides a one-time wiring rebate per house to help offset this cost to customers. The proposed rebate will offset up to $500[3] for customers who enroll and participate in the EV Optimization program and/or the residential time of use rate (discussed below) and install a charging station that does not exceed 50 amps (provides a 12 kW charging rate with 240-volt circuit).

Low-Income Charging Rebate

- **Further reducing the costs to increase access for low-income customers**—Low-income customers are particularly sensitive to the upfront costs of EV charging infrastructure and are less likely to purchase an EV. Additionally, the costs to install EV chargers may be higher for low-income households that may need upgraded electric equipment, such as circuits and service panels, to accommodate EV charging. Thus, SPS proposes a larger rebate for low-income customers of up to $1,300[4] for the 240-volt circuit, any necessary upgrades to the customer's service panel, and the installed charging equipment costs.

Home Charging Service

- **A charging equipment option without the upfront costs**— Customers have the option to obtain their own charging equipment, or alternatively to obtain charging equipment through SPS. If the customer obtains the equipment through SPS, that equipment will be installed and maintained at their home without any upfront payment for the equipment or installation. These customers will pay a bundled service charge that will be applied to their monthly SPS bill, which includes cost recovery of an SPS-provided EV charger service.

[3] Rebates shall not exceed 100 percent of the costs paid by the customer.
[4] Rebates shall not exceed 100 percent of the costs paid by the customer.

- **Charging station product choice**—If the customer acquires the charging station from SPS, they will be able to choose from a list of eligible equipment. Xcel Energy will manage a competitive solicitation to make product choices for its New Mexico offering.
- **A hassle-free experience**—For SPS-provided charging stations, an SPS approved contractor will estimate installation costs, discuss these costs with the customer, and ultimately install the equipment. The customer's monthly cost covers any maintenance necessary to keep the charging station in working order.

EV Optimization

- **Simple charging management to improve the efficient use of the grid**—Through the EV Optimization program, SPS will encourage customers to charge during off-peak hours. As noted previously, enrollment in this program is required for customers participating in the Home Wiring Rebate, Low-Income Charging Rebate, and Home Charging Service programs.[5] However, an EV customer that does not participate in these three programs may still participate in the EV Optimization program provided they can work with an eligible vendor to participate. During the application process for these related programs and for EV Optimization, the customer will select a preferred charging schedule from several options that do not include the hours of SPS's summer system peak.[6] SPS will work with the customer and SPS-selected vendors to set and monitor the customer's charging schedule. Establishing the schedule and monitoring the use of the schedule can be done by working with several types of vendors, including charging station providers, automakers, and third-parties that are able to access vehicle data. SPS will select among these potential vendors through a competitive solicitation.
- **On-going incentives**—Customers will be rewarded for participating in EV Optimization with a performance incentive at the end of the year. Customers that are already on or join a time-of-use rate, may also realize additional bill savings from shifting their charging to off-peak periods.

EV Optimization Operations

There are three key elements of the EV Optimization program:

1. Schedule selection—During program enrollment, the customer will choose their preferred charging schedule. SPS will offer at least two schedule options to allow customers that charge during the day and night to participate. All schedule options will avoid the time during SPS's summer system peak, will prioritize hours that tend to have low power production costs and/or include a high proportion of renewable energy, and will stagger start times to help avoid challenges that could occur when charging across many vehicles starts at the same time and results in a sharp increase in electricity demand.
2. Opt-out—Customers will be able to opt-out of their chosen charging schedule with no restrictions. The method the customer uses to opt-out will be driven by their vendor's provided solution. Opt-out approaches may range from use of mobile apps, to texting, to changes made in the vehicle or on the charging station.
3. Behavioral reinforcements—Since the offering allows the customer to opt-out without penalty and the customer can also re-set their schedule at any time, SPS will utilize behavioral reinforcements through targeted emails and outreach to keep customers engaged and re-engage customers that are consistently opting-out or that have changed their schedule. Using vendor data, SPS will be able to track customer participation, and it will use this information to inform its behavioral strategy. While SPS expects the majority

[5] Customers may opt to enroll in the Time of Use rate in lieu of EV optimization for the rebate programs.
[6] SPS's summer peak hours 12 p.m. through 6 p.m., Monday through Friday during the months of June through September.

of customers to stick with the charging schedules they have selected, engaging and re-engaging to support off-peak charging can further improve the benefits for participants and SPS customers.

The combination of these elements will reduce the charging that occurs during SPS's peak summer hours and will also shift charging into lower cost hours of the day. These charging patterns provide current and future benefits by reducing the cost of charging for customers on Time of Use rates, providing annual performance incentives to customers through EV Optimization, and creating downward pressure on future electric rates by increasing demand for electricity at low-cost times. SPS expects the average reduction in peak demand to be 0.7-0.8 kW.[7]

[7] In the event that a customer participates in the Time of Use Rate and the EV Optimization program, the kW savings associated with EV optimization could be lower than 0.7-0.8.

Forecasted Participation and Budget

Table 4: Projected Participants in Residential Programs

	2021	2022	2023	Total
Home Charging Service	20	25	60	105
Home Wiring Rebate	25	40	100	165
Low-Income Charging Rebate	5	5	10	20
EV Optimization	30	45	110	185

Table 5: Residential Portfolio Budget

Category	**2021**	**2022**	**2023**	**Total**
Capital	**$ 66,000**	**$ 20,000**	**$ 47,000**	**$ 132,000**
Charging Equipment	$ 16,000	$ 20,000	$ 47,000	$ 82,000
IT	$ 50,000	$ -	$ -	$ 50,000
Rebates	**$ 19,000**	**$ 27,000**	**$ 66,000**	**$ 112,000**
O&M Expenses (Including Program Management)	**$ 46,000**	**$ 51,000**	**$ 63,000**	**$ 161,000**
Total	**$ 131,000**	**$ 98,000**	**$ 176,000**	**$ 404,000**

Note: numbers may not add up due to rounding

Process and Policy

Customer Eligibility

Customers must meet the basic eligibility requirements outlined below to participate in the Residential portfolio programs. Upon enrollment, customers will agree to a Customer Service Agreement. The agreement will further outline eligibility and terms and conditions that a participant must adhere to throughout their participation.

Home Charging Service:

- own or rent a single-family home, defined as a detached single-family home, townhome/row house, or duplex (if a renter, permission from the homeowner to participate is required)
- own or lease an electric vehicle
- have an active Xcel Energy account that receives electric service
- have a charging location that has access to Wi-Fi
- agree to charge using SPS-provided level 2 charging equipment
- agree to enroll in the EV Optimization program

Home Wiring Rebate:

- own or rent a single-family home as defined above (if a renter, permission from the homeowner to participate is required)
- own or lease an electric vehicle
- have an active Xcel Energy account that receives electric service
- agree to enroll in the EV Optimization program and/or the Time of Use rate
- demonstrate the charging station that relies on the 240-volt circuit for which the customer seeks the rebate is no greater than 50 amps
- demonstrate that a licensed master electrician performed the work to install the 240-volt circuit
- demonstrate and provide invoices that are dated on or after the launch of the program, for labor and materials to install a 240-volt circuit

Low-income Charging Rebate:

- meet the requirements for the Home Wiring Rebate. Additionally, customers must be able to verify that their annual household adjusted gross income, as defined in the Income Tax Act, is equal to or less than 200% of the federal poverty level as published annually by the United States Department of Health and Human Services.

EV Optimization:

- own or lease an electric vehicle
- have an active Xcel Energy account that receives electric service
- use eligible charging equipment (defined as charging equipment that facilitates participation in EV Optimization) or drive an eligible vehicle (defined as a vehicle that facilitates participation in the EV Optimization program through the vehicle's connection with its automaker and potentially the automaker's connection to relevant third parties)
- eligible charging equipment may be furnished by the customer (described as "bring your own" or "BYO") or by SPS through the Home Charging Service. Use a charging location that has access to Wi-Fi if the customer participates in EV Optimization through a charging station vendor

Technology Selection

SPS will use a competitive process to select technology providers that offer level 2 charging equipment and providers that can also facilitate optimization. SPS will work with level 2 charging equipment vendors whose technology enables optimization for customers who participate in the Home Charging Service, as well as identify other qualified technology or vendors capable of facilitating optimization for BYO customers.

Electrician Selection

SPS will select installation contractors for the Home Charging Service program. Xcel Energy will develop requirements that potential installation contractors must meet, including being licensed electricians and adhering to standard electrical practices when performing work so that all EV installations and associated wiring meet National Electric Code, state, and local code.

Engagement, Application, and Enrollment

SPS plans to educate and advise customers about the Residential portfolio programs. Digital placements such as search engine marketing, banners, and social media posts will direct car buyers and EV drivers to Xcel Energy's EV website. The website will consist of program information as well as the EV Advisor tool, which provides customers with EV model information and recommendations based on answers to a series of questions, to help customers decide whether and how to participate in the portfolio.

SPS plans to make program enrollment available at dealerships. SPS also plans to develop or work with partners, which include charging station providers, automakers, and dealerships, to identify whether program opportunities can be displayed during any mobile app installation and registration process the customer initiates or through push notification for customer's that already have installed the app. *See* the advisory section for more detail on Xcel Energy's work with auto dealerships and its marketing plans.

Customers will enroll in Residential portfolio programs through Xcel Energy's website. A customer will be required to complete an online enrollment form in the same way customers apply today to participate in energy efficiency rebates.

Once SPS has received a completed application, it will review the application to ensure the customer meets the program eligibility requirements. After eligibility has been established, SPS will notify the customer and initiate program installation and set-up.

Installation and Set-up

For customers that choose a company-provided charging station, SPS will contact customers through its electrician contractors to coordinate the installation of the charging equipment. SPS's installation contractors will provide customers detailed cost estimates before commencing any premises wiring work required to install the level 2 charging equipment. During the installation, the electrician will set the charging schedule according to the customer's preferred charging window, as selected in their application and as part of their participation in the EV Optimization program. Once the work is complete, the contractor will invoice SPS for the charging equipment installation costs and invoice the customer per their obligation to pay for any required premises wiring costs and associated permits.

It is the BYO customers' responsibility to install and maintain their charging equipment. SPS will work with the customer and their charging station vendor or automaker to enable their participation in the EV Optimization program.

Rebates and Customer Credits

During the installation visit and after any premises wiring work is completed, SPS's contracted electricians will submit an online wiring rebate application including an invoice for the premises wiring work to SPS on behalf of the customer. For BYO customers, the same online application will be available to them and their preferred electrician to submit wiring invoices that are eligible for rebating. SPS will process all rebate applications by reviewing eligibility for appropriate rebate levels and confirmation of participation in the EV Optimization program. SPS will offer a rebate of up to $500 for home wiring and up to $1,300 for low-income customers. These levels were established to cover a significant portion of level 2 wiring costs.

Rebates

Program	**Rebate Level**	
Home Wiring Rebate	$	500
Low-Income Wiring Rebate	$	1,300

Incentives

Program	**Incentive**	
EV Optimization	$	50/year

For customers who elect to participate in the Home Charging Service, a monthly charge will be applied to their electric bill. Because this charge is designed to cover the costs of providing the charger service, the Home Charging Service is not expected to increase bills for non-participating customers. Future changes in the proposed monthly charge may be driven by new costs for equipment, installation, and maintenance. The pricing in this proposal is based on known implementation costs from Xcel Energy's operational experience in its Minnesota service territory, where Xcel Energy has been operating an EV Home Service program similar to the Home Charging Service proposed here.[8] In the future, as time passes and the offering evolves, it may be necessary for SPS to reassess the monthly charge.

For participating in the EV Optimization program, a customer will be eligible to receive on-going incentives. These incentives are related to the grid benefits that are realized from managing the customer's charging.

Termination or Unenrollment from Programs

A customer can end their participation in the Home Charging Service at any time. Customers who have taken service for less than ten years will be subject to a $200 removal fee if they terminate the agreement. Customers who have taken service for more than ten years will not be subject to a removal fee. The removal fee covers SPS's costs for its qualified contractors to uninstall the charging equipment from a customer's home. SPS will retain ownership of the charging equipment and redeploy it at another customer's site if the equipment remains functional, without affecting SPS's service obligations to customers receiving the redeployed charging equipment.

A customer may elect to terminate participation in EV Optimization at any time. If a customer chooses to do so, they may continue to participate in the Home Charging Service.

[8] Currently, Minnesota is the only Xcel Energy service area implementing an EV home charging service ; therefore, that is the data SPS relies on in this plan.

1.2 Public Fast Charging

Description

SPS's Public Charging portfolio is intended to help address the current public charging infrastructure gap in our service territory, provide access to charging for those who cannot charge at home or at their business, and enable intra-community transportation. This portfolio has two programs:

- **EV supply infrastructure (e.g., "make-ready") service for public charging.** SPS will work with customers to provide EV Supply Infrastructure to help lower the upfront costs of transportation electrification. In this program, customers, including site hosts and developers, will be responsible for procuring, owning, and maintaining their charging equipment. SPS will solicit applications for these services during the first year of the TEP and determine which projects will be selected based on how they meet the considerations of the EV Statute.

- **Public fast chargers in areas the competitive market may not serve.** In rural service territories like SPS's, a common "chicken-and-egg" problem exists, where there may not be a sufficient market for private customers to serve EVs but also not enough public charging to give customers confidence in driving an EV. The EV supply infrastructure will help address this market challenge, but, in the event that some communities are not adequately served, SPS proposes to own and operate a limited number of public fast charging stations.

In addition to working with site hosts and developers, SPS also plans to seek community input within the first year or so of the TEP for helping select areas for placement of DCFC charging stations. SPS expects that the utilization of public chargers will be little in the early years but are still necessary as they provide an essential service to EV drivers. However, utilization of these chargers should rise over time as EV adoption increases.

Table 6: Infrastructure Public Charging Portfolio Components

Program	**Objective**	**Dependency**
Make-Ready for Public Charging Stations	Provide support for site hosts and developers interested in providing EV charging in SPS service territory	None
Public Fast Charging Service	Increase access to charging; enable travel throughout New Mexico	None, intended to be broadly available to the public and serve all EVs

Table 6 illustrates the charging infrastructure components and describes the key features of the Public Charging Portfolio.

Forecasted Participation and Budget

Table 7: Charging Ports Supported by Public Charging Programs

	2021	2022	2023	Total
EV Supply Infrastructure Service	6	3	-	9
Public Fast Charging Service	-	2	6	8

Table 8: Commercial Portfolio Budget

Category	**2021**	**2022**	**2023**	**Total**
Capital	**$ 465,000**	**$ 538,000**	**$1,051,000**	**$2,054,000**
EV Supply Infrastructure	$ 316,000	$ 269,000	$ 329,000	$ 914,000
Charging Equipment	$ -	$ 220,000	$ 672,000	$ 891,000
Installation Management	$ 49,000	$ 49,000	$ 50,000	$ 148,000
IT	$ 100,000	$ -	$ -	$ 100,000
Rebates	**$ -**	**$ -**	**$ -**	**$ -**
O&M Expenses (Including Program Management)	**$ 46,000**	**$ 62,000**	**$ 102,000**	**$ 210,000**
Total	**$ 511,000**	**$ 599,000**	**$1,154,000**	**$2,264,000**

Note: numbers may not add up due to rounding

Process and Policy

EV Supply Infrastructure Service

SPS proposes to install and maintain infrastructure for a new, dedicated EV service. This infrastructure consists of two segments:

- *Service Connections.* For the new service, SPS will install, own, and maintain all equipment on the utility's traditional side of the point of connection, which includes transformer upgrades, pads, poles, new service conductors, as well as metering equipment for EV charging separate from any existing service at the site. This work will be done by SPS and will be initiated under SPS's Rule 16 Line Extension Policy.
- *EV Supply Infrastructure*: SPS will install, own, and maintain new panels, conduit, and wiring up to the charger as well as any necessary civil construction work in compliance with state and local codes. This work, which is generally beyond the traditional point of connection, will be completed by third-party contractors overseen by SPS. The EV Supply infrastructure will be offered to site hosts and developers for public charging.

Site hosts and developers will be encouraged to apply, and SPS will evaluate the customers' applications and then select projects. Customers will then enroll in the offering. SPS will select projects based on pre-determined criteria focused on the considerations provided in the EV Statute, including operating the grid efficiently, increasing access to electricity as a transportation fuel, improving air quality and reducing greenhouse gas emissions, and supporting customer choice, among other goals.

Customers receiving EV Supply Infrastructure must use charging equipment that meets Xcel Energy's technical and safety standards, demonstrates interoperability, cyber security, and managed charging capabilities that enable customers to participate in managed charging rates or programs.

Public Fast Charging Service

SPS will first solicit applications for EV Supply Infrastructure projects to support public fast charging stations. After selecting projects, SPS will evaluate and then determine whether the proposals provide adequate coverage throughout its service territory. If they do not, SPS will select additional sites to cover the gaps, based on distance from other public charging stations and density of charging and procure charging equipment from multiple vendors. In this case, SPS will own the charging stations and be responsible for operating and maintaining the charging stations. The charging stations must meet applicable technical and safety standards and demonstrate interoperability, cyber security, and managed charging capabilities.

Design and Engineering

SPS will work directly with customers to 1) discuss the program and advise the customer on the number of charging stations, 2) help determine the infrastructure needs, and 3) to identify the most suitable locations for the installation of EV infrastructure. This determination will be based on factors such as proximity to transformers, length of trenching, and available transmission and distribution capacity. Through this process, SPS, with support from third-party contractors, will estimate the cost of providing infrastructure and complete design and engineering work for EV charging infrastructure. Once the design is complete, SPS will confirm with the customer that the site design meets their needs and is in compliance with all applicable laws, rules, and regulations.

Customer Eligibility Requirements

SPS plans to work closely with communities and customers to develop DCFC host sites. SPS will develop a customer application for communities and businesses and organizations in these communities who are interested in hosting DCFC facilities. SPS will work closely with site hosts to develop the sites for public charging. Applicants meet the following requirements to be considered a host for DCFC station:

- submit a completed application along with supplementary documentation;
- be a SPS non-residential electric customer located in New Mexico whose account is in good standing;
- if participant is not the owner of the premises at which the EV Supply Infrastructure is to be installed, participant must obtain express written consent from the property owner, in a form acceptable to SPS;
- commit to installing a minimum of 50 kW of charging capacity;
- provide SPS with any required license agreements, permits, or easements to install, own, and maintain the EV Supply Infrastructure, and, for the public fast charging service, the charging equipment;
- provide acceptable proof that they have purchased charging stations as well as dates for expected arrival of charging stations prior to SPS beginning deployment of EV Supply Infrastructure;
- agree to make charging station(s) for public use;
- be located within walking distance of amenities, like restaurants, shopping centers, and other points of interest;
- allow SPS to install permanent signage to increase awareness and understanding of the benefits and opportunities for transportation electrification; provide at least two parking

stalls for each charging station; additional parking stalls for future expansion will be preferred;
- agree that all charging-station load will be separately metered from any other load served at the premises; and
- participate in program evaluation activities, such as surveys and questionnaires.

Rates

For the EV supply infrastructure service, site hosts and developers may take service under any approved commercial rate for which they are otherwise eligible.

For utility-owned and operated public charging stations, drivers will be billed for their charging session energy in line with SPS's proposed rate.

1.3 Advisory Services

Description

SPS will provide broad advisory services to customers to provide information about the benefits of EVs, support planning efforts and increase awareness of SPS's EV-related offerings proposed in this TEP. There are several reasons to support advisory services for customers, including helping address barriers focused on:

- *Lack of awareness of EV benefits*. In surveys, 68% of consumers say they have no experience with EVs[9].

- *Lack of familiarity and perceived risks with the technology*. Even with auto dealerships and fleet managers, there are concerns that electric vehicles are challenging to operate and not easy for drivers to understand the lower costs associated with them.

- *Misunderstanding of rates and charging choices.* Consumers often need help understanding and navigating decisions concerning rate options and charging infrastructure options in both home, public, and/or commercial contexts.

- *Access to trusted sources of information.* There are conflicting sources of information about electric vehicles in the public domain, and utilities can provide help to customers to better understand vehicle options and choices.

Table 9: Advisory Services Portfolio Components

Program	**Objective**	**Dependency**
Residential Advisory Services	Conduct outreach to trade partners, including dealerships and electricians, while promoting the benefits of electric vehicles at events and through digital tools	None
Fleet and Communities Advisory Services	Support customers in understanding which vehicles are well-suited for going electric while offering advice on rates and infrastructure	None

[9] 2019 JD Edwards national survey, n=5,000 consumers

Forecasted Participation and Budget

Table 10: Forecasted Budget

Category	2021	2022	2023	Total
Residential Advisory Services	$ 50,000	$ 75,000	$75,000	$200,000
Fleets and Communities Advisory Services	$ 50,000	$ 50,000	$ 50,000	$150,000

Process and Policy

Residential Advisory

SPS intends to expand its mass-market electric vehicle advisory efforts, with a focus on awareness, outreach, and education. These efforts span multiple communication channels including sponsorship of community events, digital media, direct outreach, and traditional media channels like radio and print, and engagement with trade partners.

- **Advertising and Media**. SPS will provide relevant content when engaging with various media outlets. Advertising channels may include search-engine marketing, social-media, and traditional media such as print and radio.

- **Trade Ally Support for Auto Dealers and Electricians.** EV sellers are a key information resource for consumers to learn not only about EV models, but also other aspects of the EV experience, including charging options, electricity rates, and renewable offerings. Not all auto dealers, however, are knowledgeable about these topics. SPS proposes to build partnerships to help provide a positive customer experience from point of sale to charging at home. As part of the advisory services, SPS will conduct sales-team trainings on the benefits of driving an EV, provide educational materials for customers about charging and rate options, and other coordinated EV education and promotion efforts. Electricians are also important trade allies, and SPS plans to continue to build its Trade Partner Network for electricians who are interested in installing charging infrastructure and associated components. As part of this work, SPS will conduct trainings, which will include specific information about the EV market, SPS rate options, and specific metering and distribution standards and considerations. Collaboration with electricians will help enable an improved customer experience.

- **Advisor Tool Online**. This tool is intended to provide more personalized information on EVs and programs for our residential customers and will seek to provide more information on:

    - EVs available in the market;
    - environmental impacts of EVs;
    - costs and benefits of EVs, including fuel and maintenance costs;
    - auto dealers who are knowledgeable about EVs;
    - charging equipment options and estimated costs to install; and
    - available incentives for purchasing or driving an EV;

  Over the course of the TEP, SPS will seek to improve the online experience by providing self-service capabilities that allow customers to quickly generate more personalized calculations they need to feel confident in understanding the true costs and benefits of EV ownership and operation, where to buy an EV, and how to charge it.

Fleet and Community Advisory

This initiative seeks to provide information and technical assistance to help inform fleet conversion decisions and help communities plan for how to engage their residents and assess opportunities for public charging stations. As part of this service, SPS will work with customers that operate fleets to leverage analytics and monitor how fleet vehicles are being used such as track mileage traveled, fuel efficiency, and idling time. This data then is analyzed and helps identify which vehicles in the customers' fleet are best suited to be replaced with an EV model, based on operational needs and financial benefits. SPS will also advise customers and communities on their charging infrastructure, including promoting our charging infrastructure programs and sharing information on the choices for charging equipment. As part of this initiative, SPS will also support customers in connecting with charging equipment and service providers, understanding charging needs, and highlighting opportunities for electrification.

Program Evaluation, Reporting, and Stakeholder Feedback

One of the considerations laid out in the EV Statute prioritizes "transparency, incorporating public reporting requirements to inform design and commission policy." SPS discussed these topics during our stakeholder workshop and has developed a process for ensuring transparency and sharing lessons learned and assessing our customers' experiences and perceptions about EVs that could lead to increased adoption. As part of its TEP, SPS proposes to:

- *Provide data on key metrics in an annual EV compliance report.* SPS will provide updates on key metrics in an annual TEP compliance report, to be filed August 1 each year. Key metrics are discussed below.

- *Engage third-party evaluators to conduct an interim and final evaluation.* The evaluation of the TEP programs will provide information on certain metrics highlighted during our stakeholder workshop such as the customer experience and the impact pilot programs have on customer perceptions of electric vehicles.

These reporting and evaluation activities will help deliver critical insights and enable SPS to achieve the following objectives:

- impacts of programs and advisory services on customer attitudes about EVs;
- actual costs of charging infrastructure installations for TEP programs;
- impact of rates and managed charging programs on charging behavior and impact on peak demand;
- impacts on greenhouse gas and NOx emissions, including, to the extent possible, local impacts;
- need for additional managed charging programs, including new potential optimization charging programs and rate structures, that could be implemented in the future to serve EV customers; and
- potential enhancements and future design considerations.

As part of annual reporting, SPS will share information and provide reporting on metrics, including:

- estimated number of EVs in service territory, by type (e.g., light-, medium-, heavy-duty) where possible
- estimated number and capacity of known charging stations and ports in service territory
- number of participants in TEP programs, including estimated low-income customers and communities served
- TEP spending, broken out by portfolio and program category
- TEP revenue, broken out by portfolio and program category
- estimated consumption of electricity (in kilowatt-hours) by electric vehicles
- estimated level of demand (in kilowatts) resulting from electric vehicles
- estimates for the amount of energy sold to program participants during on-peak and off-peak time periods, where feasible
- average costs for charging installations, including EV supply infrastructure and charging equipment, where feasible
- estimate for utilization of SPS-owned public charging equipment
- geographical distribution of program participants and infrastructure investments

- estimates for reduced carbon emissions resulting from EVs and TEP programs
- estimates for reduced NOx emissions resulting from EVs and TEP programs
- insights drawn from customer experience and program performance, including customer surveys
- a summary of ongoing EV pilots and programs from other Xcel Energy service territories
- an annual reconciliation of the EV Infrastructure Rider to demonstrate revenues collected and funds expended

SPS estimates costs for evaluation and stakeholder feedback for the TEP will be approximately $150,000 over the three-year plan. The third-party evaluator would be selected by SPS after the TEP is approved by the Commission.

Appendix A: 3-Year Summary Matrix

Portfolio	Program	SPS Contribution	Customer Requirement and Contribution	Forecasted Quantity	Forecasted Spend
Residential	Home Wiring Rebate	$500 Rebate	Participation in optimization and/or TOU program and balance of home wiring	165	$85,000
	Low-Income Rebate	$1,300 Rebate	Participation in optimization program and/or TOU and balance of charging infrastructure	20	$27,000
	Home Charging Service	Installed L2 Charging Equipment	Participation in optimization program and monthly payment ($12.00)	105	$82,000
	EV Optimization	Participation Incentive	Qualifying charging station/vehicle & Load management	185	$15,000
Residential: Outside TEP	Residential TOU Rate	Time-varying rate	Load management		
				Admin/O&M **TOTAL**	$196,000 **$404,000**
Public Fast Charging	Make-Ready for Public Fast Charging	EV Supply Infrastructure	Line Extension, site locating/hosting, and charging equipment	9	$477,000
	Xcel Energy Public Fast Charging	EV Supply Infrastructure & DCFC	Rate per use (off-peak $1.05/min charge and on-peak $2.10/min charge)	8	$1,328,000
				Admin/O&M **TOTAL**	$459,000 **$2.26M**
Advisory Services	Residential	Education & Outreach			$200,000
	Fleets and Communities	Assessments, Outreach, Plans, and Implementation			$150,000
				TOTAL	**$350,000**
Evaluation & Engagement	Evaluation & Engagement				$150,000
				TOTAL	**$150,000**

Note: Numbers may not add to total due to rounding

Transportation Electrification Terminology

CHAdeMo: A connector and communication protocol for vehicle DC charging initially developed in Japan. It was first adopted into international standards IEC 61851-23/24 and IEC 62196-3 in 2014 and then into USA standard IEEE 2030.1.1 in 2015. Further updates to the protocol are managed by the CHAdeMO Association.

Charging Equipment: Sometimes used more broadly to mean charging station, whether AC or DC, but not including the make-ready infrastructure. May include multiple connectors (called multi-port) to charge several EVs or to serve EVs with different types of standard connectors (e.g., SAE Combo and CHAdeMO).

Combined Charging System (or Combo/CCS) Connector: A connector that supports both AC J1772 and DC Fast Charging and created by the Society of Automobile Engineers, which is a standards development organization for vehicle technology. The SAE Combo connector is sometimes referred to as the Combined Charging System or CCS Combo

Direct Current Fast Charger (DCFC): Charging at 20 kW and higher using direct current. Direct-current (DC) fast charging typically provides 50 to 170 miles of range per 20 minutes of charging with an electrical output ranging between 50-350 kW. A charging station that rapidly charges a car battery by connecting it directly to a higher power, direct-current source.

Charging Port: Plug or connector on charging equipment capable of plugging into a vehicle for charging it. One charging station may have multiple charging ports.

Level 1 (L1) Charging: AC Level 1 typically yields 1 to 5 miles of range per 1 hour of charging using 120VAC electrical service. Most, if not all, plug-in electric vehicles (PEVs) will come with an AC Level 1 charging equipment cord set.

Level 2 (L2) Charging: AC Level 2 typically provides 10 to 20 miles of range per 1 hour of charging using 240VAC or 208VAC electrical service. L2 charging is faster than L1 because it delivers a higher power level to the battery through the charging equipment. Many homes have 240V service available, and because Level 2 charging can charge a typical EV battery overnight, they will commonly be installed at EV owners' homes for home charging or are used for public charging equipment.

Make Ready: Service connection and supply infrastructure to support EV charging comprised of the electrical infrastructure from the distribution circuit to the stub of the charging equipment. It can include equipment on the utility-side (e.g., transformer) and customer-side (e.g., electrical panel, conduit, and wiring) of the meter.

Range: The maximum amount of distance that a vehicle can travel on a single charge.

Site: Location at which charging infrastructure is installed.

Transportation Electrification: The use of electricity from an external source to fuel all, or part, of the energy needs of vehicles, vessels, trains, boats, or other mobility equipment.

Vehicle Charge Port: Generally, refers to the location where the Charging Equipment connector attaches to the vehicle.

Benefit-Cost Analysis of Transportation Electrification in the Xcel Energy New Mexico Service Territory

June 2020

Energy+Environmental Economics

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1 Study Aims

This study aims to support Xcel Energy, policymakers, and other stakeholders in understanding:

- the costs and benefits of plug-in electric vehicle (PEV) adoption, from a ratepayer, driver, and broader societal perspective,
- potential carbon dioxide reductions from electrified transportation, and
- potential impacts of electric vehicles on utility planning, specifically electricity consumption and planning loads.

2 Methodology

2.1 Benefit-Cost Overview

To perform a Benefit-Cost Analysis (BCA) of transportation electrification in Xcel Energy's New Mexico service territory, E3 compared the costs and benefits accrued over the lifetime of each PEV adopted against an equivalent Internal Combustion Engine (ICE) vehicle. Whether a particular value stream is a cost or a benefit depends on the perspective taken. E3 performed BCAs from the perspective of EV owners (drivers), other utility customers, and New Mexico as a whole. Each perspective offers distinct insights that help describe the overall impact of EV adoption in Xcel Energy's New Mexico service territory and inform development of policy and programs. The three perspectives are as follows:

- Participant Cost Test (PCT): the costs and benefits to the vehicle driver or fleet owner in the case of buses – is the total cost of ownership higher or lower for the driver?
- Societal Cost Test (SCT): the costs and benefits to New Mexico State – do EVs provide net benefits for the state?
- Ratepayer Impact Measure (RIM): the costs and benefits to all Xcel Energy New Mexico ratepayers – will average utility rates increase or decrease?

Table 1 provides an overview of the various costs and benefits analyzed under each perspective:

Table 1. Cost and benefits associated with each cost test perspective

Cost/Benefit Component	PCT	SCT	RIM
Incremental EV cost	Cost	Cost	
Federal EV tax credit	Benefit		
EV O&M savings	Benefit	Benefit	
Fuel savings	Benefit	Benefit	
Electricity Supply Costs for EV charging		Cost	Cost
Charging infrastructure cost	Cost	Cost	
Electricity Bill for EV charging	Cost		Benefit
Emission savings		Benefit	

2.2 Modelling methodology

E3's EVGrid model performs BCAs from each of the perspectives described above and uses various input streams that are described in detail in the Inputs and Assumptions section. The model calculates the net present value of EV adoption relative to gasoline vehicles across a region of interest. Accurate forecasting of electricity supply costs and electricity bills depends strongly on the hourly load shape from PEV charging. Charging load shapes in turn vary substantially across the driver population and depend on several factors such as vehicle type, charging access, cost of charging and many others.

To model charging behavior E3 has developed a bottom-up modelling approach that simulates driving and charging of thousands of PEV drivers. Driving behavior is captured using travel survey data and converted to 15-minute driving patterns though a Markov-Chain Monte Carlo method. The driving population is characterized by drivers' access to charging and the type of EV they drive. For

personal Light-Duty Vehicle (LDV) cases there are 4 PEV types and 6 charging access types, resulting in 24 combinations or customer types. Potential charging locations are categorized into residential, workplace, and public areas and drivers choose where and when to charge by minimizing their charging cost through linear optimization subject to various constraints. This generates a normalized load shape for each customer type which is then weighted by the percentage of drivers that represent the customer type. The final load shape therefore captures the diversity of driving behavior, charging access, and PEV adoption across the driving population.

In addition, charging sessions can then be further managed to minimize peak loads or demand charges at each location through a heuristic cost minimizing method. This modelling framework enables PEV charging load shapes to be generated under various scenarios for Vehicle-Grid Integration (VGI), charging infrastructure deployment, and adoption scenarios. PEV charging load shapes that are output from EVGrid's load shape module have been benchmarked and calibrated using real Original Equipment Manufacturer (OEM) charging session data.

This study calculates the lifetime costs and benefits for every PEV adopted between 2020 – 2030. Only personal LDVs were modelled in this study but this encompasses a majority of future PEV adoption in Xcel Energy's New Mexico territory. The personal LDV case calculates the costs and benefits arising from personal light duty PEV drivers. We simulate four different PEV types and assume charging is unmanaged or uncontrolled. Drivers are still sensitive to the average cost of charging in each location and choose where to charge based on this cost, but when they arrive at a location that they plan to charge in they immediately

plug-in and the vehicle is charged at the maximum rate until the battery is full or the vehicle leaves the charging premises.

3 Inputs and Assumptions

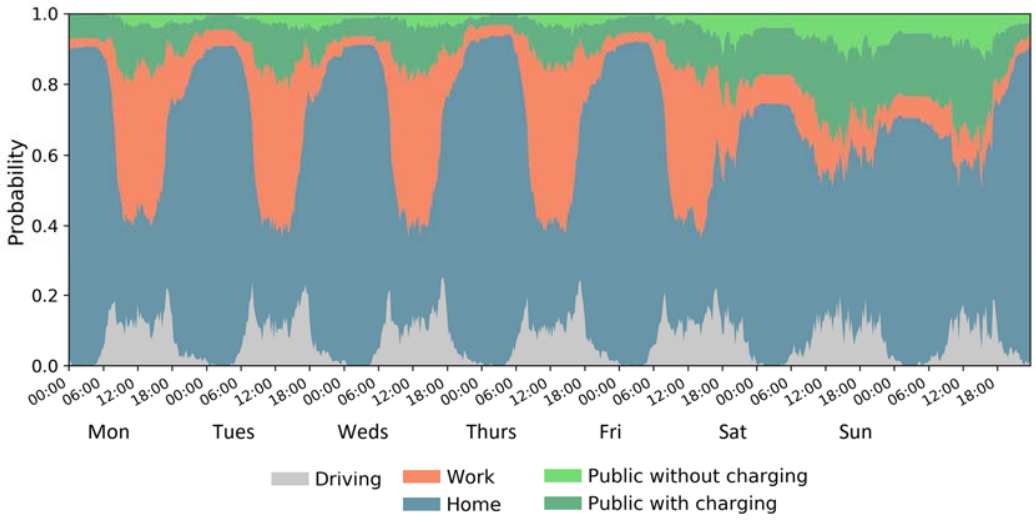
3.1 Driving and Charging Behavior

To simulate PEV driving and charging behavior the team utilized thousands of vehicle trips from detailed trip datasets. For the personal LDV case, trip data was extracted from the 2017 National Household Travel Survey (NHTS) (Federal Highway Administration, 2017). The dataset was cleaned, filtered for the specific vehicle of interest, and where possible filtered for trips in the New Mexico region. The origin and destination locations were categorized and the mileage was adjusted slightly to align with New Mexico specific annual VMT which was calculated to be 12,938 miles per year.[1]

A random sample of trips is then drawn from the dataset covering 500 driver days to construct driving profiles through a Markov-Chain Monte Carlo approach. An example weekly driving pattern for a group of drivers is shown in Figure 1.

[1] New Mexico personal LDV mileage from the Federal Highway Administration Highway Statistics 2018 ((Federal Highway Administration, 2018)

Figure 1. A weekly driving profile generated for personal LDV drivers using 2017 NHTS data and the Markov Chain methodology



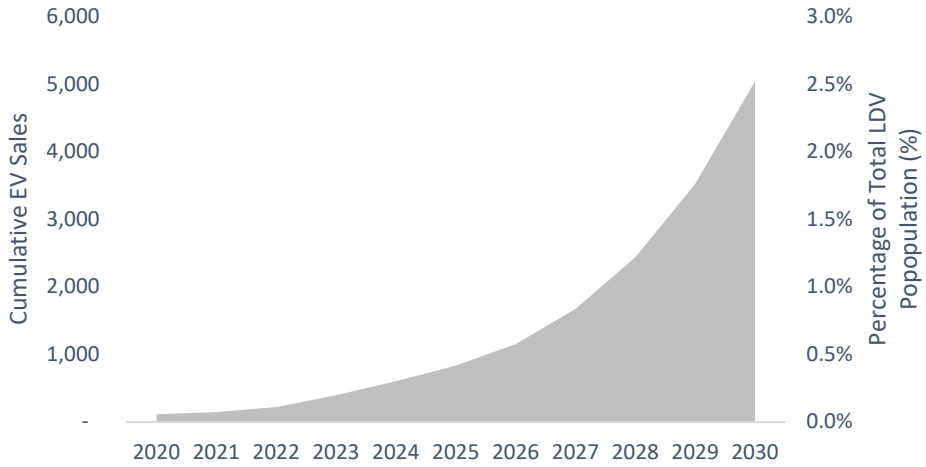
Drivers who had travel days that could not be completed using the EV and charging access options assigned to them were deemed to have 'unserved driving energy' and were dropped from the sample to generate the final aggregated charging loads. This implies that drivers with driving patterns where they cannot complete their travel day with the EV and charging access they were assigned would not purchase this EV type and would not therefore contribute to the final load. A minimum dwell time of 15 mins was set for charging, if the driver was parked at a destination for less time than this time, no charging was assumed to occur.

Due to the computational intensity of simulating driving and charging behavior only a winter and summer week in 2025 was simulated, the resulting load shapes were scaled based on PEV adoption and interpolated for adoption forecast between 2020 – 2030.

3.2 EV Adoption

EV adoption assumptions in this analysis are based on forecasts by Xcel Energy's EV strategy team for Southwestern Public Service Company's (SPS) New Mexico service territory. Personal LDVs are expected to grow cumulatively to 5,035 vehicles in Xcel Energy's territory in 2030, 2.4% of the total LDVs population. The total market for LDVs is expected to grow 1% per year, according to Xcel Energy's total LDVs forecast. In 2020, there are around 193,106 LDVs, including PEV and ICE vehicles, in Xcel Energy SPS's territory.

Figure 2. Overview of EV adoption for personal LDV



3.2.1 CHARGING ACCESS

To model charging behavior the driving population is segmented by where they have access to charging and by PEV type. For personal LDV cases six charging access types are modelled. The team used information on population and housing

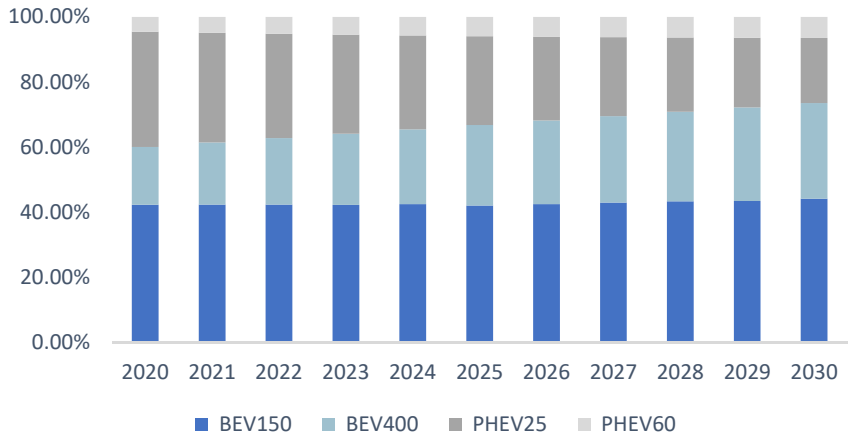
type from the American Community Survey (ACS) to estimate the number of households by type, the percentage of each household type that own a car, and the percentage of car owners that drive to work (U.S. Census Bureau, 2016). The team then used a report from University of California, Davis to estimate the availability of home charging at each type of housing and the percentage of vehicles that would charge at home, at work, and on public chargers (Nicholas & Tal, 2017).

3.2.2 PEV TYPES

The driving population was also segmented by the type of PEV driven; four PEV types were used distinguishing long- and short-range Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs). The split between BEV and PHEVs is based on the Bloomberg New Energy Finance EV outlook (BNEF, 2019) while the split between long and short range PEV types were used to ensure the average BEV and PHEV range was aligned with forecasts from NREL (Kontou, et al., 2018).

Figure 3 shows how the vehicle mix used in this study gradually changes towards 2030, assuming a growing role for battery electric vehicles as the market matures.

Figure 3. Cumulative change in vehicle mix - 2020 -2030



3.3 Vehicle and charger parameters

As described in section 3.2.2 for LDVs, four vehicle types were modelled, for which vehicle and charger parameters are shown in Table 2. Note that as described in section 3.1, only charging profiles for 2025 were simulated. The normalized charging profiles for each of the four LDV types were scaled using their relative proportion by year over the modelling period to represent growth in average BEV and PHEV ranges over time. Therefore, the range of BEVs and PHEVs selected represent the lower and upper end of potential vehicle ranges that may be on the market by 2030.

LDVs are expected to have an efficiency of 0.39 kWh/miles based on the weighted average of the LDV types currently on the market in New Mexico (U.S. Department of Energy, 2020; Auto Alliance, 2020).

Table 2. Vehicle and charger parameters of LDVs

Vehicle type	Electric range (miles)	Battery size (kWh)	Max DC charging power (kW)	Max AC charging power (kW)
BEV – long range	400	140	20	105
BEV – short range	150	52.5	20	50
PHEV – long range	60	21	3.6	n/a
PHEV – short range	25	8.75	3.6	n/a

3.4 Utility tariffs and charging costs

Residential locations were assigned Xcel Energy's Residential Service rate (Tariff No. 1018.19) and Secondary General Service rate (Tariff No. 4060.6) was applied to workplace locations.[2] It was assumed that all EV chargers were separately metered and therefore building loads were not included when calculating demand charges for the Secondary General Service rate. Since the intention is to measure the impact of EV charging on utility bills versus a counterfactual where an ICE vehicle is owned, all metering charges and fixed charges were not included in the bill calculation for simplicity. Tariffs energy and demand charges are assumed to stay flat in real dollars (i.e. only grow at the inflation rate of 2%/year).

The rates paid by the drivers are distinguished from the electricity bills paid by charging station site hosts for public locations, see Table 3. Commercial charging prices for L2 and DCFC chargers were selected from a publicly-available source[3]

[2] These were the latest tariffs available at the time of analysis, see Southwestern Public Service Company Electric Rate Book (Southwestern Public Service Company, 2019)
[3] Blink member charging fees for New Mexico taken from (Blink, 2020)

to reflect the charging costs EV drivers pay at public locations, which are often much higher than the Secondary General Service rate paid by charging station site hosts or owners. This difference will reflect again on the cost of charging to drivers in the PCT and the utility revenue for ratepayers in the RIM.

Table 3. Charging fees paid by EV drivers versus charging site hosts or owners

	Home	Workplace	Public
Drivers	Residential Service rate	Secondary General Service	Blink L2 or Blink DCFC
Charging Site Hosts	-	Secondary General Service	Secondary General Service

Table 4. Rate information

	Energy ($/kWh)		Demand ($/kW)	
	Summer	Winter	Summer	Winter
Residential Service	0.075186	0.063324	-	-
Secondary General Service	0.004634	0.004634	18.49	15.4
Blink L2	0.44	0.44	-	-
Blink DCFC	0.54	0.54	-	-

Note that this analysis did not incorporate the power factor adjustment or a cap on demand charge for commercial tariffs. The rates above were used to simulate PEV charging in EVGrid by minimizing the driver's electric bill.

3.5 Incremental Vehicle Costs

On average, electric vehicles are currently more expensive in purchase price than their ICE counterparts, mostly due to battery costs. E3 used the base assumptions on the purchase price for both electric and ICE LDVs in the US from recent projections by the International Council on Clean Transportation (ICCT, 2019). These were specified for vehicle mix and battery packages as used in this analysis, resulting in average incremental upfront vehicle costs of an EV over an ICE vehicle of $8,920 in 2020. As battery costs are forecasted to decline towards 2030, incremental vehicle costs are reduced to $1,721 in 2030.[4]

Table 5. Incremental upfront vehicle costs per vehicle category (Nominal $)

PEV category	2020	2030
Personal LDVs	8,920	1,721

Note that other costs for operating and maintaining the vehicle are discussed in the electric vehicle miles travelled section. Disposal costs for batteries are sometimes included in total cost of ownership studies but are not included in this analysis. While there is much research underway for second life applications, recycling, and disposal of PEV batteries there is still great uncertainty on costs and who will bear those costs. A rough estimate for recycling costs, one of the more expensive end of life options, is around 300 - 500 $ per EV battery, but more research is required to obtain reliable figures (IER, 2019).

[4] In nominal dollars - based on battery costs projections by the International Council on Clean Transportation (ICCT, 2019)

3.5.1 TAX CREDITS

All EV drivers in New Mexico benefit from federal tax credits, which reduces the impact of upfront incremental vehicle costs. Federal tax credits amount up to $7,500 per BEV purchased, phasing out when at least 200,000 vehicles have been sold by each manufacturer in the U.S, which E3 assumed would occur by 2023 (Internal Revenue Services, 2020). New Mexico has proposed a state tax credit for PEVs but the bill did not pass the 2020 legislative session and although it is expected to be proposed again in 2021 no state tax credit was included in this analysis.

3.6 Avoided Electric Vehicle Miles Travelled (eVMT)

Avoided electric Vehicle Miles Travelled (eVMT) costs in our analysis are based on two factors: avoided fuel costs and avoided operation and maintenance (O&M) costs. For avoided fuel costs, we calculate the amount of fuel an ICE vehicle would have used under the same circumstances over the lifetime of the vehicle, multiplied by the costs of fuel in each year. The average annual fuel consumption avoided per EV per year is assumed to decrease over time according to the relative improvement in ICE vehicle fuel efficiency projected by NREL in their Light-Duty Vehicle Attribute Projections prepared for the California Energy Commission (Kontou, et al., 2018). The assumed fuel efficiencies per vehicle category are shown in Table 6.

Table 6. Fuel economy assumptions

Year	LDVs (miles/gallon gasoline)
2020	32.6

2025	36.3
2030	37.2

Gasoline and diesel forecasted prices are derived from the EIA Annual Energy Outlook 2020 and include an inflation rate of 2%/year to convert them to nominal dollars. Table 7 shows the projected fuel costs for both gasoline and diesel for several end years (U.S. Energy Information Administration, 2020).

Table 7. Fuel price forecast (Nominal $)

Year	Gasoline (nom $/gallon)
2020	2.65
2025	2.83
2030	3.29
2035	3.89
2040	4.49

Note that these gasoline prices are based on the EIA's latest long-term price forecasts which were published in January 2020 and therefore do not include recent price impacts of the 2019 novel coronavirus disease (COVID-19). While it is uncertain what the long-term price impacts are, the EIA's current Short-Term Energy Outlook shows the price impacts are expected be largest in the second quarter of 2020 and then dissipate over the following 18 months (U.S. Energy Information Administration, 2020). Given that much of the avoided gasoline in this study occurs beyond 2025 based on PEV adoption forecasts, this should not have a substantial impact on the analysis.

To calculate annual O&M savings, E3 multiplied annual mileage of different vehicle categories by an estimation of the per mile difference between maintenance costs for ICE and electric vehicles. To inform these estimates for

LDVs, E3 used data provided by the International Council on Clean Transportation, estimating conventional vehicle maintenance costs for LDVs at $0.061 per mile versus $0.026 per mile for their electric counterparts (ICCT, 2019).

3.7 Electricity Supply Costs

Utility electricity supply costs are calculated by multiplying the hourly marginal electricity supply costs with hourly electric PEV charging load. Recall that this study focuses only on adoption between 2020 – 2030 but to account for costs and benefits over the each PEVs' 12-year lifetime, electric supply costs are calculated for charging load out to 2041, when it is assumed all EVs adopted from 2020 to 2030 will have been retired.

The marginal electricity supply cost used in this analysis is comprised of three components. Xcel Energy provided marginal energy costs ($/MWh), avoided transmission and distribution capacity cost ($/kW-year), and combustion turbine generation capacity cost ($/kW-year) from 2020 to 2041.

Table 8. Marginal Electricity Cost Components of PEV charging load

Component[5]	Description of cost from PEV charging load
Energy	Increase in costs due to change in production from the marginal generator
Generation Capacity	Increase in fixed costs of building new generator to meet the incremental EV load

[5] All cost components have loss factors included.

Transmission and Distribution Capacity	Increase in fixed costs of building or maintaining transmission and distribution lines to meet the incremental EV load

To allocate the kW-year generation and transmission capacity costs to hourly values in $/kWh, the PCAF (Peak Capacity Allocation Factor) methodology was used[6]. Using hourly Xcel Energy New Mexico load in 2019 a threshold (MW) corresponding to the top 250 net load hours was selected. In hours where the net load exceeds the threshold, the exceeded load is divided by the total exceeded load for the 250 hours to create an hourly PCAF allocation factor that sums to 1 over the year.

$$\text{Exceeded load}_t = \min(0, \text{load}_t - \text{the } 250^{th} \text{ top load in a year})$$

$$\text{PCAF}_t\ (\%) = \text{Exceeded load}_t \,/\, \text{total exceeded load in a year}$$

$$\text{Capacity value}_t\ (\$/\text{kWh}) = \text{PCAF}_t\ (\%) * \text{capacity value}\ (\$/\text{kW-year})$$

3.8 Avoided Emissions

Avoided emissions are calculated based on the difference between electric vehicle emissions from charging load and gasoline or diesel combustion. For CO_2, E3 calculated avoided emissions for ICE vehicles based on 0.0085 metric ton/gallon of gasoline.[7] Electric sector emission rates are constant throughout the

[6] The methodology was first developed by PG&E in 1993 (California Public Utilities Commission, 2016) and has since been used in various regulatory reports, for example see (Energy & Environmental Economics, 2012)
[7] Derived from the Argonne GREET Model

study period. To convert avoided emissions to costs, E3 assumed social costs of carbon of 20 $/MWh, which is equivalent to around $37/metric ton.

3.9 Charging Infrastructure

3.9.1 CHARGER NETWORK DENSITY

E3 calculated the required number of electric vehicle supply equipment (EVSE) chargers to support the vehicle adoption forecasts using NREL's EVI-Pro Lite model (NREL, 2018). EVI-Pro Lite can provide a state specific estimation of the number of workplace, public and DCFC charging required to meet a given adoption forecast. Note that this model only provides a value for meeting personal LDV adoption, does not account for the impacts of managed charging, and only provides values for a maximum PEV market penetration of 10% of total LDV stock. Under these assumptions, the PEV adoption forecast for SPS's New Mexico service territory requires the installation of 4,579 EVSE charging ports by 2030, 94% of which are L1 or L2 home chargers. Table 9 provides an overview of the number of EVSE chargers for 2025 and 2030.

Table 9. Number of required charging ports in SPS's New Mexico service territory

EVSE type	2025	2030
Home L1	315	1,914
Home L2	396	2,403
Workplace L2	23	142
Public L2	17	104
Public DCFC	3	16
Total	**754**	**4,579**

3.9.2 CHARGER COSTS

Charging infrastructure costs in this analysis are based on two components: EVSE hardware costs and installation costs ("make-ready" costs). The latter component includes all *behind the meter* costs required to get the charging unit working. We assume that infrastructure costs "in front of meter" are paid for by the utility and therefore included under electricity supply costs.

The costs of charging infrastructure are outlined in Table 10. These costs are based on data provided by the International Council on Clean Transportation, with installation costs of home charging averaged based on the proportion of existing types of homes in New Mexico (ICCT, 2019). Installation costs for public, workplace and DCFC 150 kW chargers are based on costs per charger with 2 chargers per site.

Table 10. Charging Infrastructure Costs

	Hardware	Installation	Total
Home L2	$ 742	$ 1,299	$ 2,040
Public L2	$ 3,127	$ 3,020	$ 6,147
Workplace L2	$ 3,127	$ 3,020	$ 6,147
DCFC (150 kW)	$ 75,000	$ 38,047	$ 113,047

For DCFCs, the BCA includes the costs a utility is required to make to upgrade transformer capacity.

4 Results

Benefit-cost results are shown on both a total net present value basis and an average per vehicle adopted basis. The total value results show the full magnitude of costs and benefits from PEV adoption in the SPS's New Mexico service territory but are heavily influenced by the PEV adoption forecast input. The average per vehicle results are more robust to adoption forecast uncertainty and can be useful in PEV program design since an incentive or program cost per-vehicle can be directly compared to the per vehicle net benefit.

E3 forecasts that electrification of personal LDVs in SPS's New Mexico service territory will generate benefits for ratepayers, drivers, and for the State of New Mexico. Table 11 summarizes the total present value of costs and benefits from each of these perspectives. These values represent the total costs and benefits over each vehicles' 12-year lifetime, summed for every vehicle adopted from 2020 to 2030 and discounted using SPS's weighted average cost of capital.[8]

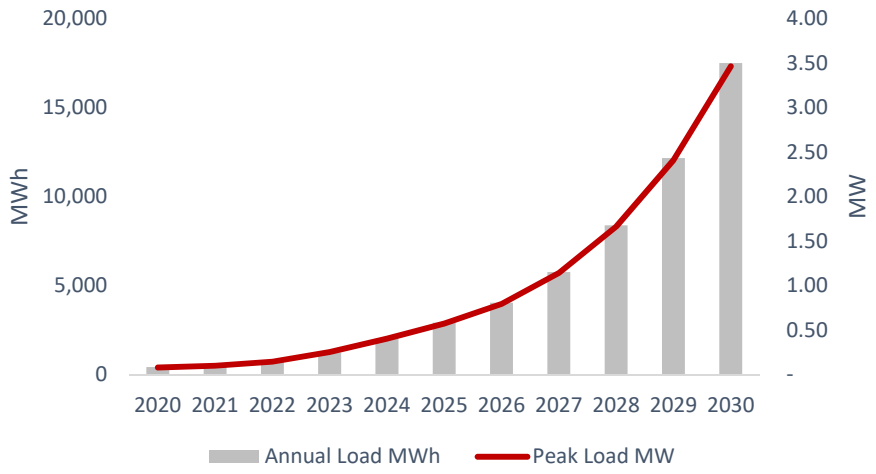
Table 11. Present value of costs and benefits for all vehicles adopted between 2020 – 2030 in ($ Million)

Perspective	Costs	Benefits	Net Benefit
Ratepayers	6.31	8.32	2.01
Drivers	34.92	43.00	8.08
New Mexico State	28.66	44.32	15.66

[8] Note that the costs and benefit streams that contribute to the NPV values calculated extend out to 2041 since all vehicles adopted in the last year of the study period, 2030, would continue to provide costs and benefits over their full lifetime which is assumed to be 12 years.

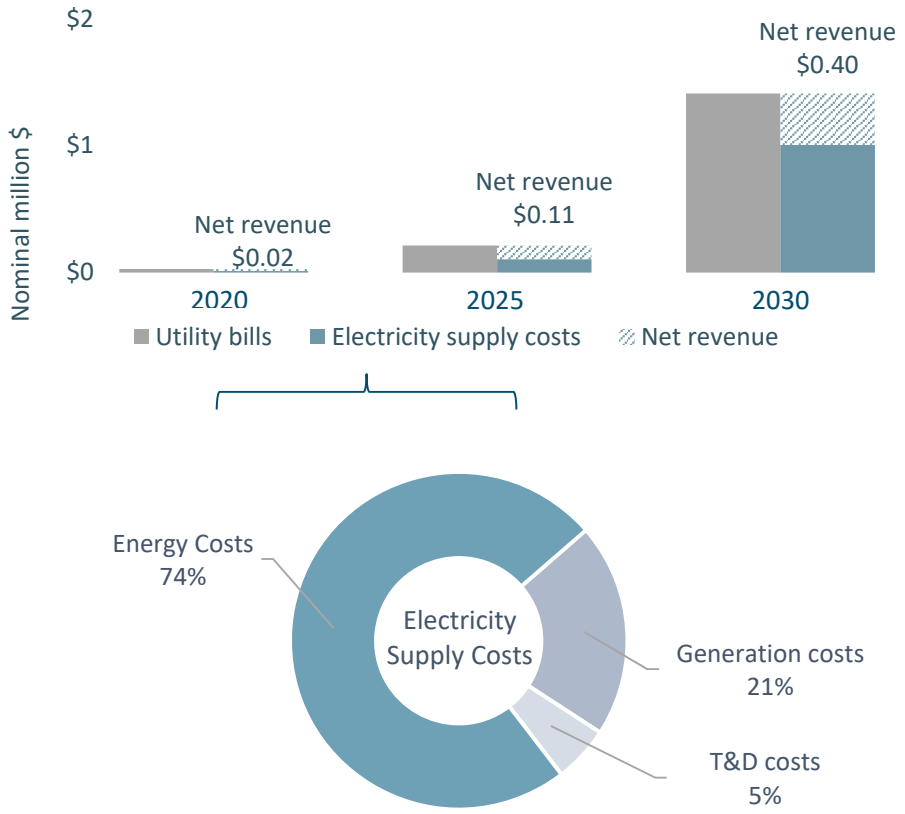
To understand these results we first look at the annual electricity consumption of PEV charging from personal LDVs which rises from 422 MWh / year in 2020 (~0.01% of 2019 total energy consumption Xcel Energy's New Mexico Territory) to 17,494 MWh / year in 2030 (~0.21% of 2019 total energy consumption), as shown in Figure 4. By 2030 coincident charging load could contribute around 3.5 MW to SPS's New Mexico 2019 peak load of 1,377 MW, which is around 0.25%.

Figure 4. Annual Load and Peak Load of Personal LDVs: 2020-2030



The cost for SPS to serve this new PEV charging load will be around $1 million or 0.06 $/kWh on average by 2030 (in nominal 2030 dollars) while the revenue collected from tariffs is over $1.4 million or 0.08 $/kWh. The aggregate impact of this charging load on SPS's ratepayers is summarized in Figure 5. Recall that this scenario assumes PEV charging is unmanaged.

Figure 5. Annual utility net revenue from transportation electrification ($ nominal)

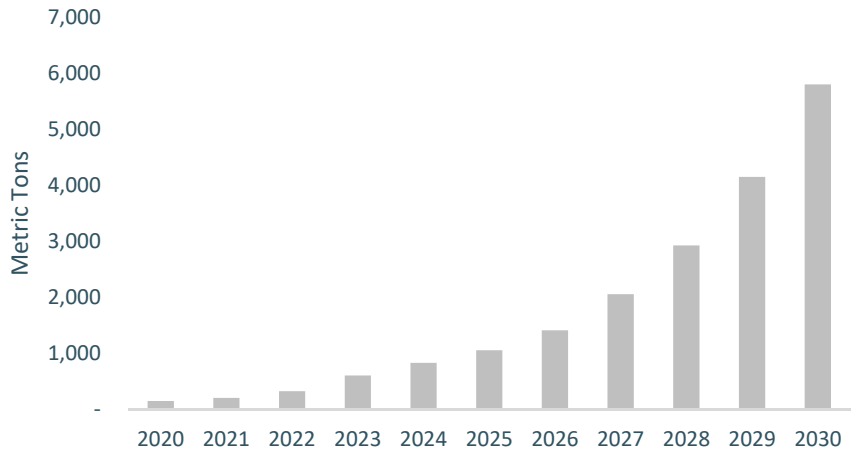


Marginal energy costs constitute 74% of the total cost to serve PEV charging load while 21% is from increased generation capacity, and 5% from transmission and distribution capacity upgrades. It is important to be aware of the uncertainties in these benefit-cost projections. As discussed in the Inputs and Assumptions section, this study is not a detailed feeder by feeder level analysis of the distribution impacts from PEV charging. Higher resolution analysis of distribution grid impacts with greater EV penetrations, EV clustering, and higher-powered

charging could result in higher utility costs that would reduce ratepayer benefit. Furthermore, Xcel Energy's electric tariffs may evolve substantially over the next decade, which would have strong implications for these results. This analysis assumes tariffs stay constant in real terms (i.e. only grow with inflation) but if rates were to be lowered, ratepayer benefits could also decrease.

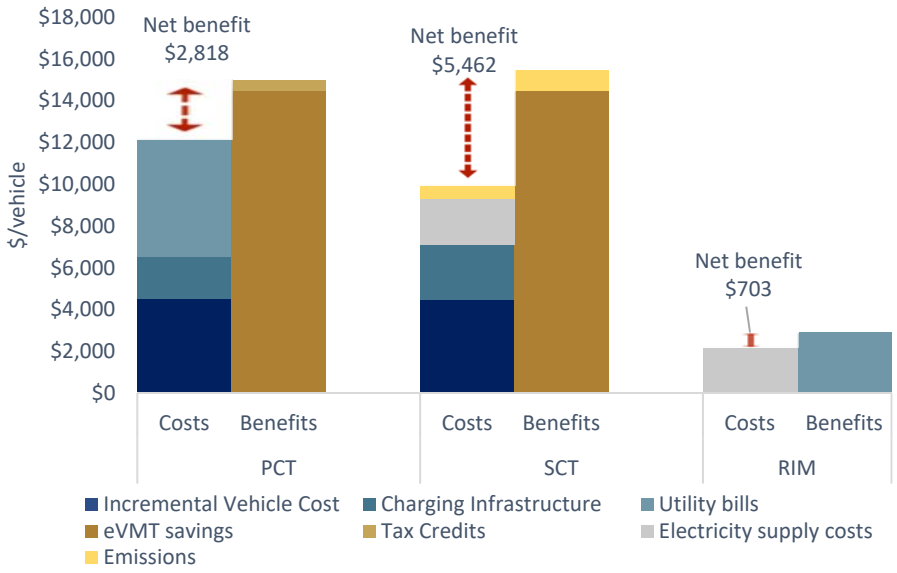
As with many other studies, this analysis shows that GHG emissions associated with the combustion of gasoline in modern efficient ICE vehicles is generally higher than the additional electric sector emissions from PEV charging load. The lifetime emission savings for all PEVs adopted between 2020 – 2030 total 49,552 metric tons of CO_2 across Xcel Energy's New Mexico territory. In addition, NO_x emissions are reduced by 86 metric tons but SO_2 emissions are *increased* by 328 metric tons. Figure 6 illustrates annual avoided CO_2 emissions are scaled with EV adoption between 2020 – 2030.

Figure 6. Annual avoided CO_2 emissions from personal LDVs



Results show that personal LDVs adopted between 2020 and 2030 could provide $2M in net present benefits to SPS's New Mexico ratepayers, $8M in benefits to drivers, and $16M in benefit to New Mexico state. Figure 7 shows these NPVs averaged over all vehicles adopted during the study horizon. For drivers, the present value benefits total $2,818 per vehicle over its useful life. For the state of New Mexico and for Xcel Energy ratepayers the NPV per vehicle benefits are $5,462 and $703, respectively.[9]

Figure 7. Costs and Benefits of Personal LDV Adoption



Drivers see a net benefit over the lifetime of the vehicle since PEVs are have lower fuel and maintenance costs that outweigh the higher upfront vehicle cost and the

[9] As mentioned, the average NPV per vehicle values are calculated by taking the total NPV result for all vehicles adopted between 2020 – 2030 and dividing it by the total number of vehicles adopted during this period.

cost of buying charging infrastructure. The more miles the driver covers annually, the higher the benefit and New Mexico drivers have a relatively high VMT compared to other states.

From the perspective of New Mexico, PEV adoption brings a lifetime net benefit of $5,462 per PEV by reducing gasoline consumption, O&M costs, and net emissions. Ratepayers see a modest net benefit for each PEV adopted as the revenue collected from electricity bills exceeds Xcel Energy's cost to supply the additional load from PEV charging. Recall that it is assumed that what drivers pay to charge in public is not the same and often significantly higher than what the electric bill paid by the site host. Hence the utility bill from the utility (RIM) perspective is much lower than from the driver (PCT) perspective.

Note that this study was focused purely on assessing the relative costs and benefits of PEVs that charge in an unmanaged or uncontrolled manner. It is likely that future charging loads could be controlled through charger timing or more sophisticated vehicle-grid integration technology that could further reduce electric supply costs and utility bills. Various studies have concluded that managed charging generally increases benefits for drivers, ratepayers, and society but this was beyond the scope of this analysis.

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Capital and O&M

	2021	2022	2023	Total
Residential	$ 130,600	$ 97,887	$ 175,758	$ 404,245
Public Charging	$ 510,841	$ 599,347	$ 1,153,545	$ 2,263,733
Advisory Services (Residential, Fleets, and Communities)	$ 100,000	$ 125,000	$ 125,000	$ 350,000
Evaluation and Ongoing Engagement	$ 50,000	$ 50,000	$ 50,000	$ 150,000
Total	**$ 791,441**	**$ 872,234**	**$ 1,504,303**	**$ 3,167,978**

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Portfolio	Expense Type	2021	2022	2023	Total
Residential	Capital	$ 66,000	$ 20,000	$ 47,000	$ 132,000
	Rebate	$ 19,000	$ 27,000	$ 66,000	$ 112,000
	O&M Expense	$ 46,000	$ 51,000	$ 63,000	$ 161,000
	Total	**$ 131,000**	**$ 98,000**	**$ 176,000**	**$ 404,000**
Public Charging	Capital	$ 465,000	$ 538,000	$ 1,051,000	$ 2,054,000
	Rebate	$ -	$ -	$ -	$ -
	O&M Expense	$ 46,000	$ 62,000	$ 102,000	$ 210,000
	Total	**$ 511,000**	**$ 599,000**	**$ 1,154,000**	**$ 2,264,000**
Advisory Services	**Total**	**$ 100,000**	**$ 125,000**	**$ 125,000**	**$ 350,000**
Evaluation	**Total**	**$ 50,000**	**$ 50,000**	**$ 50,000**	**$ 150,000**
Total		**$ 791,000**	**$ 872,000**	**$ 1,504,000**	**$ 3,168,000**

Residential Summary

Category	2021	2022	2023	Total
Capital	**$66,000**	**$20,000**	**$47,000**	**$132,000**
EV Supply Infrastructure	$0	$0	$0	$0
Charging Equipment	$16,000	$20,000	$47,000	$82,000
Installation Management	$0	$0	$0	$0
IT	$50,000	$0	$0	$50,000
Rebates	**$19,000**	**$27,000**	**$66,000**	**$112,000**
O&M Expenses (Including Program Management)	**$46,000**	**$51,000**	**$63,000**	**$161,000**
Total	**$131,000**	**$98,000**	**$176,000**	**$404,000**

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Residential Participants

	2021	2022	2023	Total
EV Home Service	20	25	60	105
Premises Wiring Rebate	25	40	100	165
Low-Income Rebate	5	5	10	20
EV Optimization	30	45	110	185

Portfolio	Program	Capital + Rebates/incentives Budget	
Res	EV Home Service	$	81,900
	Premises Wiring Rebat	$	84,920
	Low-Income Rebate	$	26,655
	EV Optimization	$	14,949
	Subtotal	**$**	**208,424**
	Check	**$**	**208,424**
	O&M and IT	**$**	**195,821**
	Total	**$**	**404,245**
Public	Make Ready for Public Charging	$	477,431
	Public Fast Charging	$	1,327,723
	Subtotal	**$**	**1,805,155**
	Check	**$**	**1,805,155**
	O&M and IT	**$**	**458,578**
	Total	**$**	**2,263,733**
Advisory	Residential	$	-
	Fleet and Communities		
	Subtotal		
	Check		
	O&M and IT	$	350,000

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Public Charging

Category	2021	2022	2023	Total
Capital	**$465,000**	**$538,000**	**$1,051,000**	**$2,054,000**
EV Supply Infrastructure	$316,000	$269,000	$329,000	$914,000
Charging Equipment	$0	$220,000	$672,000	$891,000
Installation Management	$49,000	$49,000	$50,000	$148,000
IT	$100,000	$0	$0	$100,000
Rebates	**$0**	**$0**	**$0**	**$0**
O&M Expenses (Including Program Management)	**$46,000**	**$62,000**	**$102,000**	**$210,000**
Total	**$511,000**	**$599,000**	**$1,154,000**	**$2,264,000**

Public Charging Ports Supported

	2021	2022	2023	Total
EV Supply Infrastructure Service	6	3	0	9
Public Fast Charging Service	0	2	6	8

Advisory Services

Category	2021	2022	2023	Total
Residential Advisory Services	$ 50,000	$ 75,000	$ 75,000	$ 200,000
Fleets and Communities advisory Services	$ 50,000	$ 50,000	$ 50,000	$ 150,000

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			Total			
			2021	2022	2023	Total
Portfolio	Residential Charging					
		Total	$ 130,600	$ 97,887	$ 175,758	$ 404,245

			2021	2022	2023	Total
Portfolio	Public Charging					
			$ 510,841	$ 599,347	$ 1,153,545	$ 2,263,733

			2021	2022	2023	Total
Portfolio	Advisory Services	Total	$ 100,000	$ 125,000	$ 125,000	$ 350,000

			2021	2022	2023	Total
	Evaluation	Total	$ 50,000	$ 50,000	$ 50,000	$ 150,000

			2021	2022	2023	Total
Total	Total	Total	$ 791,441	$ 872,234	$ 1,504,303	$ 3,167,978

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			Capital			
			2021	2022	2023	Total
Portfolio	**Residential Charging**	EV Supply Infrastructure	$ -	$ -	$ -	$ -
		Charging Equipment	$ 15,600	$ 19,500	$ 46,800	$ 81,900
		Installation Management	$ -	$ -	$ -	$ -
		IT	$ 50,000	$ -	$ -	$ 50,000
		Total	**$ 65,600**	**$ 19,500**	**$ 46,800**	**$ 131,900**

			2021	2022	2023	Total
Portfolio	**Public Charging**	EV Supply Infrastructure	$ 316,180	$ 268,753	$ 328,953	$ 913,886
		Charging Equipment	$ -	$ 219,524	$ 671,745	$ 891,269
		Installation Management	$ 48,500	$ 49,470	$ 50,459	$ 148,429
		IT	$ 100,000	$ -	$ -	$ 100,000
		Total	**$ 464,680**	**$ 537,747**	**$ 1,051,157**	**$ 2,053,584**

			2021	2022	2023	Total
Portfolio	**Advisory Services**	**Total**	**$ -**	**$ -**	**$ -**	**$ -**

			2021	2022	2023	Total
	Evaluation	**Total**	**$ -**	**$ -**	**$ -**	**$ -**

			2021	2022	2023	Total
Total	Total	**Total**	**$ 530,280**	**$ 557,247**	**$ 1,097,957**	**$ 2,185,484**

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			Rebates			
			2021	2022	2023	Total
Portfolio	Residential Charging	Premises Wiring	$ 12,500	$ 20,400	$ 52,020	$ 84,920
		Low-income Rebates	$ 6,500	$ 6,630	$ 13,525	$ 26,655
		Total	**$ 19,000**	**$ 27,030**	**$ 65,545**	**$ 111,575**

			2021	2022	2023	Total
Portfolio	Public Charging		$ -	$ -	$ -	$ -
			$ -	$ -	$ -	$ -
			$ -	$ -	$ -	$ -
		Total	**$ -**	**$ -**	**$ -**	**$ -**

			2021	2022	2023	Total
Portfolio	Advisory Services	**Total**	**$ -**	**$ -**	**$ -**	**$ -**

			2021	2022	2023	Total
	Evaluation	**Total**	**$ -**	**$ -**	**$ -**	**$ -**

			2021	2022	2023	Total
Total	Total	**Total**	**$ 19,000**	**$ 27,030**	**$ 65,545**	**$ 111,575**

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			O&M			
			2021	2022	2023	Total
Portfolio	**Residential Charging**					
		Program Management	$ 43,000	$ 43,860	$ 44,737	$ 131,597
		O&M	$ 1,500	$ 3,672	$ 9,051	$ 14,223
		EV Optimization Incentives	$ 1,500	$ 3,825	$ 9,624	$ 14,949
		Total	**$ 46,000**	**$ 51,357**	**$ 63,412**	**$ 160,769**

			2021	2022	2023	Total
Portfolio	**Public Charging**					
		Program Management	$ 43,000	$ 43,860	$ 44,737	$ 131,597
		O&M	$ 3,162	$ 17,739	$ 57,651	$ 78,552
		Total	**$ 46,162**	**$ 61,599**	**$ 102,388**	**$ 210,149**

			2021	2022	2023	Total
Portfolio	**Advisory Services**					
		Total	**$ 100,000**	**$ 125,000**	**$ 125,000**	**$ 350,000**

			2021	2022	2023	Total
	Evaluation					
		Total	**$ 50,000**	**$ 50,000**	**$ 50,000**	**$ 150,000**

			2021	2022	2023	Total
Total	Total					
		Total	**$ 242,162**	**$ 287,956**	**$ 340,800**	**$ 870,918**

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2021
2021

100% after June 1

		2021											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chargers	Home						$ 2,229	$ 2,229	$ 2,229	$ 2,229	$ 2,229	$ 2,229	$ 2,229
	Public Charging						$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 2,229**	**$ 2,229**	**$ 2,229**	**$ 2,229**	**$ 2,229**	**$ 2,229**	**$ 2,229**
EV Supply Infrastructure	Non Residential						$ 52,097	$ 52,097	$ 52,097	$ 52,097	$ 52,097	$ 52,097	$ 52,097
	Total						**$ 52,097**	**$ 52,097**	**$ 52,097**	**$ 52,097**	**$ 52,097**	**$ 52,097**	**$ 52,097**
IT							$ 150,000	$ -	$ -	$ -	$ -	$ -	$ -
Total							**$ 204,326**	**$ 54,326**	**$ 54,326**	**$ 54,326**	**$ 54,326**	**$ 54,326**	**$ 54,326**
												$ 364,680	$ 530,280
													$ 530,280

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2022
2022

90% outside of winter months

3 winter months

9 non winter months

		2022												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Chargers	Home	$ 650	$ 650	$ 1,950	$ 1,950	$ 1,950	$ 1,950	$ 1,950	$ 1,950	$ 1,950	$ 1,950	$ 1,950	$ 650	
	Public Charging	$ 7,317	$ 7,317	$ 21,952	$ 21,952	$ 21,952	$ 21,952	$ 21,952	$ 21,952	$ 21,952	$ 21,952	$ 21,952	$ 7,317	
	Total	**$ 7,967**	**$ 7,967**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 23,902**	**$ 7,967**	
EV Supply Infrastructure	Non Residential	$ 10,607	$ 10,607	$ 31,822	$ 31,822	$ 31,822	$ 31,822	$ 31,822	$ 31,822	$ 31,822	$ 31,822	$ 31,822	$ 10,607	
	Total	**$ 10,607**	**$ 10,607**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 31,822**	**$ 10,607**	
IT		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Total		**$ 18,575**	**$ 18,575**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 55,725**	**$ 18,575**	
													$ 557,247	
													$ 557,247	

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2021 90% outside of winter months

		2023											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chargers	Home	$ 1,560	$ 1,560	$ 4,680	$ 4,680	$ 4,680	$ 4,680	$ 4,680	$ 4,680	$ 4,680	$ 4,680	$ 4,680	$ 1,560
	Public Charging	$ 22,391	$ 22,391	$ 67,174	$ 67,174	$ 67,174	$ 67,174	$ 67,174	$ 67,174	$ 67,174	$ 67,174	$ 67,174	$ 22,391
	Total	**$ 23,951**	**$ 23,951**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 71,854**	**$ 23,951**
EV Supply Infrastructure	Non Residential	$ 12,647	$ 12,647	$ 37,941	$ 37,941	$ 37,941	$ 37,941	$ 37,941	$ 37,941	$ 37,941	$ 37,941	$ 37,941	$ 12,647
	Total	**$ 12,647**	**$ 12,647**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 37,941**	**$ 12,647**
IT		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total		**$ 36,599**	**$ 36,599**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 109,796**	**$ 36,599**

$ 1,097,957
$ 1,097,957

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Total Number of Ports/Stations

		2021	2022	2023	Total
Home	Wiring Rebate	25	40	100	165
	Low-Income	5	5	10	20
	Total	30	45	110	185
Public	EV Supply Infrastructure ("Make Ready") Service	6	3	0	9
	Public Fast Charging Service	-	2	6	8
	Total	6	5	6	17
Total	**Total**	**36**	**50**	**116**	**202**

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Budget Assumptions

Residential Portfolio Inputs and Estimates

Home Wiring Rebates									
	Charger Type	2021	2022	2023	Total	2021	2022	2023	Total
Premises Wiring Rebate	Level 2	25	40	100	165	25	40	100	165
Low income Rebate	Level 2	5	5	10	20	5	5	10	20
Total		**30**	**45**	**110**	**185**	**30**	**45**	**110**	**185**

Home Charging Stations Estimated Number of Utility-provided Charging Station Ports									
	Charger Type	2021	2022	2023	Total	2021	2022	2023	Total
EV Home Charging Service (non-low-income)	Level 2	15	20	50	85	15	20	50	85
EV Home Charging Service (low-income)		5	5	10	20	5	5	10	20
Total		**20**	**25**	**60**	**105**	**20**	**25**	**60**	**105**

EV Portfolio Infrastructure Inputs and Estimates (Costs for 2020)

Rebate for premises wiring

EV Supply Infrastructure	per port
Premises Wiring Rebate	*$ 500*
Total Capital per port	**$ 500**

Rebate for LI premises wiring

EV Supply Infrastructure	per port
Premises Wiring Rebate	*$ 1,300*
Total Capital per port	**$ 1,300**

Other Estimated Program Costs

Ongoing Load Management Incentives	
Annual EV Optimization Incentive	$ 50.00

Installed Charging Stations Costs	
Level II charging stations	$ 530
Level II charging installation	$ 250
Total	$ 780

Marketing		
Marketing (annual)	$ -	see advisory services

Contract Labor				
Type	*Position*	*Est Wages*	*FTE*	*Total*
Program Management	Program Manager III	$ 172,000	0.25	$ 43,000
Construction Management Labor	Construction Manager III	$ 194,000	0	$ -
Construction Management Labor	Electrical Engineer III	$ 120,000	0	$ -
Construction Management Labor	Legal Assistant II	$ 50,000	0	$ -
Pilot Management Labor	Pilot Manager II	$ 142,000	0	$ -
Total			0.25	$ 43,000

IT and Data Management	
Charging Optimization Data Management Services (Annual) per port	$ 30
IT Costs	$ 50,000

Additional Assumptions

Maintenance Assumptions	
Annual Maintenance for Charging Station	$ 30.00

Cost Escalator	
Escalation Assumption	2%

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EV Home Service Budget Summary

	1 2021	2 2022	3 2023	
Rebates for Premises Wiring				
Premises Wiring Rebate	$ 12,500	$ 20,400	$ 52,020	$ 84,920
Low income Rebate	$ 6,500	$ 6,630	$ 13,525	$ 26,655
Subtotal Rebates for Premises Wiring	$ 19,000	$ 27,030	$ 65,545	$ 111,575
Contingency	0%			
Subtotal Capital for Premises Wiring w/ contingency	$ 19,000	$ 27,030	$ 65,545	$ 111,575
Capital for Charging Equipment				
Total EV Home Charging Service	$ 15,600	$ 19,500	$ 46,800	$ 81,900
Subtotal Capital for Charging Equipment w/o contingency	$ 15,600	$ 19,500	$ 46,800	$ 81,900
Contingency	0%			
Subtotal Capital for Charging Equipment w/ contingency	$ 15,600	$ 19,500	$ 46,800	$ 81,900
Total Rebates w/o contingency	$ 19,000	$ 27,030	$ 65,545	$ 111,575
Total Rebates w/ contingency	$ 19,000	$ 27,030	$ 65,545	$ 111,575
Total Capital w/o contingency	**$ 15,600**	**$ 19,500**	**$ 46,800**	**$ 81,900**
Total Capital w/ contingency	**$ 15,600**	**$ 19,500**	**$ 46,800**	**$ 81,900**
Program Administration, IT, and O&M				
Marketing (see advisory services tab)	$ -	$ -	$ -	$ -
Advisory Service (See advisory services tab)	$ -	$ -	$ -	$ -
Program Management Labor	$ 43,000	$ 43,860	$ 44,737	$ 131,597
Installation Management Labor	$ -	$ -	$ -	$ -
Pilot Management Labor	$ -	$ -	$ -	$ -
Charging Optimization Incentive Costs	$ 1,500	$ 3,825	$ 9,624	$ 14,949
Operations and Maintenance for EV Charging Equipment	$ 600	$ 1,377	$ 3,277	$ 5,254
Charging Optimization Network Costs	$ 900	$ 2,295	$ 5,774	$ 8,969
IT Costs	$ 50,000	$ -	$ -	$ 50,000
Subtotal w/out contingency	$ 96,000	$ 51,357	$ 63,412	$ 210,769
Contingency	0%			
Subtotal w/ contingency	$ 96,000	$ 51,357	$ 63,412	$ 210,769
Total Program Administration w/o contingency	**$ 96,000**	**$ 51,357**	**$ 63,412**	**$ 210,769**
Total Program Administration w/contingency	**$ 96,000**	**$ 51,357**	**$ 63,412**	**$ 210,769**
Total Program Administration (capital) w/o contigency	$ 50,000	$ -	$ -	$ 50,000
Total Program Administration (capital) w/ contingency	$ 50,000	$ -	$ -	$ 50,000
Total Capital, Rebates, and Program Administration w/o contingency	**$ 130,600**	**$ 97,887**	**$ 175,758**	**$ 404,245**
Total Capital, Rebates, and Program Administration w/ contingency	**$ 130,600**	**$ 97,887**	**$ 175,758**	**$ 404,245**

Budget Assumptions

EV Public Charging Portfolio Infrastructure Inputs (Size)

Public Charging (Make Ready Ports/Stations)									
Estimated Number of Ports/charging stations for Make-Ready infrastructure		2021	2022	2023	Total	2021	2022	2023	Total
Make Ready Projects		6	3	-	9	6	3	-	9
Public Fast Charging (Own/Operate)		-	2	6	8	-	2	6	8
Total		**6**	**5**	**6**	**17**	**6**	**5**	**6**	**17**

Public Charging (Charging Stations)									
Number of Utility-provided Charging stations		2021	2022	2023	Total	2021	2022	2023	Total
Public Fast Charging (Own/Operate)		-	2	6	8	-	2	6	8
Total		-	2	6	8	-	2	6	8

Public Charging Infrastructure Inputs and Estimates (Costs for 2020)

Use Case - Public DCFC 50 kW Corridor

EV Supply Infrastructure	per station	
Subtotal EV Supply Infrastructure per station	*$*	*43,906*
Total Capital per station	**$**	**43,906**

Use Case - Public DCFC 150 kW Corridor

EV Supply Infrastructure	per station	
Subtotal EV Supply Infrastructure per station	*$*	*43,914*
Total Capital per station	**$**	**43,914**

Other Estimated Program Costs

Marketing		
Marketing (annual)	$	-

Contract Labor				
Type	*Position*	*Est cost (loaded)*	*Labor Amounts*	*Total*
Program Management	Program Manager III	$ 172,000	0.25	$ 43,000
Construction Management Labor	Construction Manager III	$ 194,000	0.25	$ 48,500
Construction Management Labor	Electrical Engineer III	$ 120,000	0	$ -
Construction Management Labor	Legal Assistant II	$ 50,000	0	$ -
Pilot Management Labor	Pilot Manager II	$ 142,000	0	$ -
Total			0.5	$ 91,500

IT and Data Management		
Charging Equipment Data Management Services (Annual) per port	$	162
IT Costs	$	100,000

Additional Assumptions

Installed Charging Stations Costs (for reference)		
DC fast charging (50 kW) station	$	29,775
DC fast charging (150 kW) station	$	89,675

Maintenance Assumptions	
Annual Maintenance for Make Ready Infrastructure (EV Service Connection as a % of installed cost	1%
Annual Maintenance for Charging Station	$ 5,667

Cost Escalator	
Escalation Assumption	2%

EV Public Charging Budget Summary

	1 2021	2 2022	3 2023	Total 3 years
Capital EV Supply Infrastructure				
Use Case-EV Supply Infrastructure	263,483	134,376	-	$ 397,859
Use Case- Public Fast Charging (Own/Operate)	-	89,584	274,128	$ 363,712
Subtotal Capital for EV Supply Infrastructure w/out contingency	$ 263,483	$ 223,961	$ 274,128	$ 761,571
Contingency	20%			
Subtotal Capital for EV Supply Infrastructure w/ contingency	$ 316,180	$ 268,753	$ 328,953	$ 913,886

Capital for Charging Equipment				
Use Case- Public Fast Charging (Own/Operate)	-	182,937	559,787	$ 742,724
Subtotal Capital for Charging Equipment w/o contingency	$ -	$ 182,937	$ 559,787	$ 742,724
Contingency	20%			
Subtotal Capital for Charging Equipment w/ contingency	$ -	$ 219,524	$ 671,745	$ 891,269.06
Total Capital w/o contingency	**$ 263,483**	**$ 406,898**	**$ 833,915**	**$ 1,504,296**
Total Capital w/ contingency	**$ 316,180**	**$ 488,277**	**$ 1,000,698**	**$ 1,805,155**

Program Administration, IT, and O&M				
Marketing	$ -	$ -	$ -	$ -
Program Management Labor	$ 43,000	$ 43,860	$ 44,737	$ 131,597
Installation Management Labor	$ 48,500	$ 49,470	$ 50,459	$ 148,429
Pilot Management Labor	$ -	$ -	$ -	$ -
Operations and Maintenance for EV Supply Infrastructure	$ 3,162	$ 5,849	$ 9,139	$ 18,150
Operations and Maintenance for EV Charging Equipment	$ -	$ 11,560	$ 47,163	$ 58,723
Charging Equipment Data Management Services (Annual) per port	$ -	$ 330	$ 1,348	$ 1,679
IT Costs	$ 100,000	$ -	$ -	$ 100,000
Subtotal w/out contingency	$ 194,662	$ 111,069	$ 152,847	$ 458,578
Contingency	0%			
Subtotal w/ contingency	$ 194,662	$ 111,069	$ 152,847	$ 458,578
Total Program Administration w/o contingency	**$ 194,662**	**$ 111,069**	**$ 152,847**	**$ 458,578**
Total Program Administration w/contingency	**$ 194,662**	**$ 111,069**	**$ 152,847**	**$ 458,578**
Total Program Administration (capital) w/o contingency	$ 148,500	$ 49,470	$ 50,459	$ 248,429
Total Program Administration (capital) w/ contingency	$ 148,500	$ 49,470	$ 50,459	$ 248,429
Total Capital and Program Administration w/o contingency	**$ 458,145**	**$ 517,967**	**$ 986,762**	**$ 1,962,874**
Total Capital and Program Administration w/ contingency	**$ 510,841**	**$ 599,347**	**$ 1,153,545**	**$ 2,263,733**

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EV Advisory Services

		2021	2022	2023	Total
Home					
	Total	**$50,000**	**$75,000**	**$75,000**	**$ 200,000**
Fleet					
	Total	**$ 50,000**	**$ 50,000**	**$ 50,000**	**$ 150,000**

		2021	2022	2023	Total
Home	Total	$ 50,000	$ 75,000	$ 75,000	$ 200,000
Fleet and Communities	Total	$ 50,000	$ 50,000	$ 50,000	$ 150,000
Total		$ 100,000	$ 125,000	$ 125,000	$ 350,000

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Source: Guidehouse (formerly Navigant Consulting)

	Non-Residential (public 50 kW)						Non-Residential (public 150 kW)					
	Total			Per Port 2			Total			Per Port 2		
Infrastructure Component	Low	High	Average	Low	High	Average	Low	High	Average	Low	High	Average
Utility-Side Infrastructure			**$ 40,900**			**$ 20,450**			**$ 40,900**			**$ 20,450**
New Utility Service - Utility			$ 24,000			$ 12,000			$ 24,000			$ 12,000
New Utility Service - Customer			$ 16,250			$ 8,125			$ 16,250			$ 8,125
Utility Submetering			$ 650			$ 325			$ 650			$ 325
Customer-Side Infrastructure Installation			**$ 127,362**			**$ 63,681**			**$ 247,178**			**$ 123,589**
Charger Hardware			$ 55,800			$ 27,900			$ 175,600			$ 87,800
Engineering Design	**Confidential Proprietary Information**		$ 28,000	**Confidential Proprietary Information**		$ 14,000	**Confidential Proprietary Information**		$ 28,000	**Confidential Proprietary Information**		$ 14,000
Construction			$ 43,262			$ 21,631			$ 43,262			$ 21,631
Permitting			$ 300			$ 150			$ 316			$ 158
Customer-Side Infrastructure O&M			**$ 39,240**			**$ 19,620**			**$ 116,570**			**$ 58,285**
10-Year Charger Maintenance			$ 36,000			$ 18,000			$ 113,330			$ 56,665
10-Year Communication Network Fee			$ 3,240			$ 1,620			$ 3,240			$ 1,620
Installed Charging Stations Cost			$ 3,750			$ 1,875			$ 3,750			$ 1,875
Total			**$ 207,502**			**$ 103,751**			**$ 404,648**			**$ 202,324**

Infrastructure Component												
EV Service Connection			$ 24,650			$ 12,325			$ 24,650			$ 12,325
EV Supply Infrastructure			$ 87,812			$ 43,906			$ 87,828			$ 43,914
Installed Charging Stations Costs	**Confidential Proprietary Information**		$ 59,550	**Confidential Proprietary Information**		$ 29,775	**Confidential Proprietary Information**		$ 179,350	**Confidential Proprietary Information**		$ 89,675
Operation and Maintenance (O&M) Annual			$ 3,924			$ 1,962			$ 11,657			$ 5,829
Total TEP Capital			**$ 147,362**			**$ 73,681**			**$ 267,178**			**$ 133,589**
Total Capital			**$ 172,012**			**$ 86,006**			**$ 291,828**			**$ 145,914**
Total			**$ 175,936**			**$ 87,968**			**$ 303,485**			**$ 151,742**

O&M annual value factor 10

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