

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO**

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IN THE MATTER OF THE APPLICATION)
OF PUBLIC SERVICE COMPANY OF)
COLORADO FOR APPROVAL OF ITS) PROCEEDING NO. 23A-____E
2024-2026 TRANSPORTATION)
ELECTRIFICATION PLAN.)

DIRECT TESTIMONY AND ATTACHMENTS OF C. ANDRE GOUIN

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

May 15, 2023

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LIST OF ATTACHMENTS

Attachment CAG-1	Managed Charging Program Benefit Analysis
Attachment CAG-2	Potential of V2X Research Paper

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1 I. **INTRODUCTION, QUALIFICATIONS, PURPOSE OF TESTIMONY, AND**
2 **RECOMMENDATIONS**

3 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

4 A. My full name is Charles Andre Gouin, but I am commonly referred to as Andre
5 Gouin. My business address is 1800 Larimer Street, Denver, Colorado 80202.

6 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?**

7 A. I am employed by Xcel Energy Services, Inc. ("XES") as a Business Technology
8 Consultant. XES is a wholly owned subsidiary of Xcel Energy Inc. ("Xcel Energy"),
9 and it provides an array of support services to Public Service Company of Colorado
10 ("Public Service" or the "Company") and the other utility operating company
11 subsidiaries of Xcel Energy on a coordinated basis.

1 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?**

2 A. I am testifying on behalf of Public Service.

3 **Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.**

4 A. As a Business Technology Consultant on Xcel Energy's Clean Transportation
5 team, I am responsible for providing technical expertise in the development of
6 customer facing products and services, focusing on areas of energy management,
7 demand response, renewable energy, and electric vehicles ("EV"). A description
8 of my qualifications, duties and responsibilities is set forth in my Statement of
9 Qualifications at the conclusion of my testimony.

10 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

11 A. The purpose of my Direct Testimony is to support the Company's proposed
12 modifications to: (1) the managed charging program; and (2) the Innovation
13 portfolio, formerly called Partnerships, Research and Innovation ("PRI"). As part
14 of the current Innovation portfolio, I address Company plans to launch a full
15 Distributed Intelligence program, contingent on the Company's resolution of
16 certain pre-existing settlement conditions. I introduce the Company's new bi-
17 directional home charging option for residential customers, referred to as the EV
18 Accelerate At Home ("EVAAH") backup power option. I also introduce the
19 Company's new Commercial Customer Sited Battery program, involving
20 demonstration projects of the battery developments. These proposals are part of
21 the Company's 2024-2026 Transportation Electrification Plan ("TEP").

1 **Q. ARE YOU SPONSORING ANY ATTACHMENTS AS PART OF YOUR DIRECT**
2 **TESTIMONY?**

3 A. Yes, I am sponsoring Attachments CAG-1 and CAG-2, which were prepared by
4 me or under my direct supervision. The attachments are as follows:

- 5 • Attachment CAG-1: Managed Charging Program Benefit Analysis
- 6 • Attachment CAG-2: Potential of V2X Research Paper

7 **Q. WHAT RECOMMENDATIONS ARE YOU MAKING IN YOUR DIRECT**
8 **TESTIMONY?**

9 A. I recommend that the Colorado Public Utilities Commission (“Commission”)
10 approve the following elements of the Company’s 2024-2026 TEP:

- 11 • the proposed modifications to its managed charging programs;
- 12 • the proposed modifications to the Innovation portfolio;
- 13 • the new backup power option for EVAAH, as part of the Residential
- 14 portfolio; and
- 15 • the new Commercial Customer Sited Battery program.

II. EV MANAGED CHARGING

2 Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

3 A. In this section I will discuss the Company's managed charging programs and
4 support the proposed modifications to the programs.

5 Q. PLEASE DESCRIBE THE GENERAL CONCEPT OF MANAGED CHARGING
6 FOR ELECTRIC VEHICLES.

7 A. Generally, managed charging refers to programs that assist customers in ensuring
8 that EV charging occurs in ways to achieve a variety of utility grid goals, such as
9 reducing load during peak periods or promoting the use of excess renewable
10 generation. Managed charging for EVs recognizes that EV loads have unique
11 characteristics apart from other loads, creating an opportunity for the utility to
12 manage the EV load independently or in novel ways. With use of communication
13 protocols, hardware, and software, managed charging can be used to promote
14 numerous goals.

15 Q. WHAT IS THE DIFFERENCE BETWEEN PASSIVE (STATIC) AND ACTIVE
16 (DYNAMIC) MANAGED CHARGING?

A. Managed charging promotes EV charging at a specified time, typically during periods of low electricity demand. Passive managed charging works by modifying customer behavior to limit EV charging to preferred times. Time-of-Use (“TOU”) rates and predetermined charging schedules are examples of passive managed charging. Active managed charging relies on communication between utilities or aggregators and EVs or chargers to optimize EV load based on forecasted or detected in real time grid conditions.

Q. PLEASE ADDRESS HOW THE COMPANY PROMOTES MANAGED CHARGING THROUGH ITS TARIFFS THAT ARE NOT AT ISSUE IN THIS PROCEEDING.

A. As I mentioned previously, TOU rates are examples of passive managed charging efforts, and the Company has default, as well as optional, TOU rates. Notably, for residential customers that have advanced meters, they receive default electric service pursuant to a TOU rate. The Company is in the process of installing advanced meters for its residential customers, allowing the TOU rate to become the default rate for this customer class. The default nature of the residential TOU rate is important, as customers that charge their EVs at home will receive a price incentive to charge during off-peak, lower-cost time periods. Additional TOU rate options also exist for other customer classes, such as for commercial and industrial service. In all, TOU rates are a very important component of the Company's overall approach to promote rate structures that aim to enhance the efficient operation of the electric grid. The TOU rates themselves have primarily been addressed in proceedings outside of TEP cases, but they have great significance in terms of promoting the managed charging of EVs.

Q. WHAT TYPE OF MANAGED CHARGING OPPORTUNITIES IS THE COMPANY PROPOSING IN THIS PROCEEDING?

A. As part of its current TEP, the Company has a passive managed charging program and an active managed charging pilot. For the 2024-2026 TEP, the Company is proposing to combine these two separate offerings into a single program, allowing the customer to select either a passive or active managed charging option as best

1 suits their charging needs. Below, I first address the Company's existing managed
2 charging offerings, and then I address our proposed enhancements for the 2024-
3 2026 TEP.

4 **A. EXISTING OPTIMIZE YOUR CHARGE PROGRAM**

5 **Q. HOW DOES THE COMPANY'S OPTIMIZE YOUR CHARGE ("OYC")**
6 **PROGRAM WORK?**

7 A. The OYC program is a passive control managed charging program that promotes
8 EV charging during off-peak hours. It is available to residential customers. These
9 customers select one of three, nine-hour EV charging schedules: (1) 9 p.m. - 6:00
10 a.m.; (2) 12:30 a.m. - 9:30 a.m.; or (3) 6 a.m. - 3:00 p.m. Customers are then
11 required to charge during the window they have selected for at least 25 percent of
12 the time, and in return they receive an annual credit on their electric bill of \$50 for
13 each year that they participate in the program. The credit is issued to participants
14 in October. Customers that seek a charger or wiring rebate from the Company or
15 have a level 2 charger provided by the Company must participate in the OYC or
16 the Charging Perks Pilot (discussed below) for a minimum of one year, though
17 income-qualified ("IQ") customers may opt out of this requirement.

18 **Q. HOW MANY CUSTOMERS ARE SUBSCRIBED TO OYC?**

19 A. As of March 1, 2023, the Company has enrolled 2,956 customers in the OYC
20 program.

1 **Q. HAS THE PROGRAM BEEN SUCCESSFUL IN ENCOURAGING CUSTOMER**
2 **CHARGING DURING OFF-PEAK HOURS?**

3 A. Yes. Approximately 90 percent of OYC participants are complying with the
4 requirement to charge at least 25 percent of the time within their selected charging
5 window. The Company also works with non-compliant participants to remind them
6 of their charging window. To increase accessibility and participation, the Company
7 has worked diligently to add eligible EV models from auto manufacturers, including
8 Tesla, Hyundai, Kia, Lexus, and Toyota.

9 **Q. PLEASE FURTHER EXPLAIN WHY THE COMPANY HAS FOUND IT**
10 **NECESSARY TO ADD EV MODELS TO THE OYC PROGRAM.**

11 A. OYC can be offered to customers owning EVs of any make and model if they use
12 a level 2 charger provided by the Company. To enable OYC for customers who
13 do not use a Company provided charger, it is necessary to communicate with the
14 customer's EV directly to establish a charging schedule. This process can be
15 challenging as not all original equipment manufacturers ("OEM") allow third party
16 communications with the vehicle in the same manner. As new EV models become
17 available, the Company has been continually working with its vendors to allow
18 opportunities for even greater customer participation.

19 **B. CHARGING PERKS PILOT**

20 **Q. PLEASE DESCRIBE THE EXISTING CHARGING PERKS PILOT.**

21 A. As part of its Demand Side Management ("DSM") offerings, the Company
22 launched the Charging Perks pilot, an active control charge management option.
23 This pilot, with an original cap of 600 participants, seeks to promote EV charging

1 at times when renewable energy production is high and demand on the energy
2 grid is low. When participating customers plug in their EVs at home, the Company
3 and its EV energy-service provider or the customer's vehicle OEM work together
4 to automatically schedule the charging of the vehicle. The customer's EV charges
5 at the appropriate time to provide grid benefits, while ensuring the customer's
6 vehicle will be ready when needed. Customers receive a \$100 gift card upon
7 enrollment and can earn up to \$100 annually, depending on the speed of the
8 charger. The pilot was made available to Tesla drivers in June 2021. Charging
9 Perks then expanded to drivers of certain Plug-in Hybrid EV models from Ford,
10 BMW, Honda, and General Motors in September 2021.

11 **Q. HOW MANY VEHICLES ARE ENROLLED IN THE PILOT AND HOW QUICKLY**
12 **HAS IT GROWN?**

13 A. As of March 1, 2023, the Company has enrolled 631 customers in Charging Perks.
14 Due to continued interest from both customers and auto OEMs, the Company
15 increased the participant cap to 1,000 and extended the pilot through the end of
16 2023, as part of its Demand Side Management programming.

17 **Q. WHAT ORGANIZATIONS DOES THE COMPANY WORK WITH TO PROVIDE**
18 **ITS MANAGED CHARGING OPTIONS?**

19 A. The Company is currently working with WeaveGrid, multiple automobile
20 manufacturers, and charger companies to administer the pilot.

1 **Q. WHAT CHALLENGES HAS THE COMPANY EXPERIENCED WITH THE**
2 **CHARGING PERKS PILOT?**

3 A. The primary challenges with the Charging Perks pilot have been with processing
4 customer enrollments. Interested customers sign up on one of our providers'
5 websites. That enrollment data is then sent electronically via secure file transfer
6 protocol to the Company. At that time, the interested customer's data must be
7 verified to ensure they are eligible for the program and are in fact a Public Service
8 electric customer. Once this verification is confirmed, the customer can be enrolled
9 in the program and the Company can process the enrollment incentive. Upon
10 launching the pilot, these steps were largely manual in nature, time intensive, and
11 difficult to scale. Over the preceding months, the Company has automated many
12 of these tasks and it is continually considering opportunities for additional
13 automation. With these improvements, the Company is well positioned to handle
14 the growth of the program.

15 **Q. WHAT HAS THE COMPANY LEARNED FROM ITS ROLL-OUT OF THE PILOT?**

16 A. The Company has learned that the pilot is effective, with 94 percent of charging
17 occurring during off-peak hours outside of 1-7 p.m. The program demonstrated
18 that charging could be shifted to periods of high concentrations of renewable
19 generation, resulting in up to 0.55 kilowatt hours ("kWh") of renewable curtailment
20 avoided per vehicle per day. The Company also learned of the significant
21 technological resources required to effectively manage such an offering.

1 **C. NEW MANAGED CHARGING PROGRAM APPROACH**

2 **Q. DOES THE COMPANY PLAN ON EXPANDING ITS USE OF MANAGED**
3 **CHARGING IN THE 2024-2026 TEP?**

4 A. Yes. The Company is pleased with the successes of its managed charging
5 programs, and it seeks to grow managed charging as a core element of its 2024-
6 2026 TEP.

7 **Q. WHAT IMPROVEMENTS TO MANAGED CHARGING IS THE COMPANY**
8 **PROPOSING IN ITS TEP?**

9 A. The Company is proposing two structural changes to its managed charging
10 offerings. First, is a gradual phase-out of its passive control Optimize Your Charge
11 program, while transitioning customers to active control charge management
12 options.

13 Second, the Company proposes to make its active control Charging Perks
14 Pilot a permanent option for customers. Charging Perks has great potential to
15 align EV charging with the needs of the grid, especially in relation to taking
16 advantage of time periods that provide the greatest benefit by either reducing load
17 impacts on the grid or taking advantage of high concentrations of renewable
18 generation. Integral with making Charging Perks a permanent program is
19 removing the current participant cap, allowing the Company to begin promoting
20 and encouraging larger adoption of this managed charging option. The Company
21 will also move Charging Perks out of the Company's DSM portfolio and into the
22 suite of its TEP offerings. This change is appropriate given the importance of
23 managed charging to the success of overall EV adoption and EV charging

1 management to the benefit of the electric grid. The change is also consistent with
2 the terms agreed to in the Unopposed Comprehensive Settlement Agreement in
3 Proceeding No. 20A-0287EG and Decision No. R21-0081 approving the
4 settlement.¹

5 **Q. WHY IS THE COMPANY PROPOSING TO PHASE OUT THE OPTIMIZE YOUR**
6 **CHARGE PASSIVE MANAGEMENT OPTION?**

7 A. Optimize Your Charge essentially incentivizes customers to charge during off-peak
8 periods. This program was launched before the Company's wide-spread
9 deployment of advanced meters and the adoption of TOU rates as the default rate
10 for residential customers with advanced meters. TOU rates, with their lower off-
11 peak pricing structure, provide a built-in incentive for customers to shift their
12 charging. The very nature of the rate design captures the value associated with
13 shifting loads away from system peak. With TOU becoming available to all
14 residential customers, there is limited incremental system value that can be
15 obtained from this passive control program, whereas greater potential system
16 value lies with active control charge management options.

17 **Q. WHAT IS THE COMPANY'S PLAN FOR PHASING OUT THE OPTIMIZE YOUR**
18 **CHARGE PASSIVE CONTROL CHARGE MANAGEMENT PROGRAM?**

19 A. Once the advanced metering roll-out is complete and the Residential Energy Time-
20 of-Use ("RE-TOU") is the default rate, Optimize Your Charge enrollees will be
21 notified that the Optimize Your Charge program has been discontinued. They will

¹ See Section VII of the settlement agreement approved in that proceeding.

1 be encouraged to enroll in the active control managed charging program that offers
2 additional incentives. In this way, existing Optimize Your Charge customers can
3 become a pipeline to grow enrollment in the active control charge management
4 program. This passive control program offering will only be available to customers
5 who have not yet had an advanced meter installed and are therefore not yet eligible
6 for the RE-TOU rate. Once all customers have the option of being on RE-TOU,
7 the passive control charge management program will cease.

8 **Q. WILL THE COMPANY PROVIDE ANY OTHER PASSIVE CONTROL MANAGED**
9 **CHARGING OPTIONS?**

10 A. Yes, the Company is proposing a new off-peak subscription rate option in this TEP
11 to provide customers with the option of a consistent monthly price with a strong
12 incentive to charge during off-peak hours. This rate option is supported by
13 Company Witness Mr. Derek Klingeman.

14 **Q. HOW DO THESE CHANGES IMPACT CURRENT TEP PROGRAM ELIGIBILITY**
15 **REQUIREMENTS?**

16 A. Currently, customers who participate in one of the Company's residential TEP
17 offerings must also participate in one of the Company's two managed charging
18 options. The Company will modify this requirement to require customers to be on
19 the residential TOU rate, the off-peak subscription rate option, or participate in the
20 active control managed charging program. Passive control via Optimize Your
21 Charge will not be an option for new customers, unless they have not yet had an
22 advanced meter installed.

1 **Q. HOW DOES THIS CHANGE IMPACT INCOME-QUALIFIED CUSTOMERS THAT**
2 **PARTICIPATE IN THE COMPANY’S RESIDENTIAL TEP OFFERINGS?**

3 A. Currently, IQ customers that participate in the Company’s residential TEP
4 programs can opt out of the managed charging requirement. The Company will
5 maintain that approach for the 2024-2026 TEP, but does note that IQ customers
6 that are on TOU rates will still receive the pricing signal to charge off-peak.

7 **Q. HOW DOES THE COMPANY PROPOSE TO SCALE ITS MANAGED**
8 **CHARGING PROGRAMS?**

9 A. With EV adoption rapidly increasing, the Company anticipates a proportional
10 growth in its managed charging program. To accommodate this growth, the
11 Company plans to partner with an EV charging aggregator who has demonstrated
12 proficiency in providing customer-centric programs in this space. The Company’s
13 process to select the charging management provider will take place through a
14 competitive Request for Proposal (“RFP”) process, which is planned to be held
15 later this year.

16 **Q. WILL INCENTIVE AMOUNTS FOR MANAGED CHARGING PROGRAMS STAY**
17 **THE SAME?**

18 A. No, the Company is proposing to reduce customer incentives. Although the
19 Company believes that managed charging is an important strategy to proactively
20 mitigate the grid impacts of vehicle electrification, the current incentives exceed
21 current grid benefits. An analysis of benefits associated with our current managed
22 charging programs was prepared by Guidehouse Consulting (“Guidehouse”), and
23 it is provided as Attachment CAG-1 to my Direct Testimony. This analysis

1 attempted to value the annual grid benefits achieved from active control managed
2 charging, both by shifting load to off-peak times and greater utilization of increased
3 renewable generation. Guidehouse's analysis indicates that the Charging Perks
4 pilot delivers less than \$25 of benefit per participant. This amount does not take
5 into consideration the potential future benefits that may be realized if and when
6 active control charge management evolves to control assets to mitigate localized
7 distribution constraints.

8 **Q. WHAT NEW INCENTIVE AMOUNTS IS THE COMPANY PROPOSING?**

9 A. The Company is proposing a \$50 annual customer incentive for all of its managed
10 charging options. An additional \$50 signing incentive will be offered to customers
11 that are new to the active control managed charging option. Incentives will be in
12 the form of a customer bill credit allocated once per year. This annual incentive
13 will also apply to customers who are not yet on the RE-TOU rate and elect the
14 passive control charge management option.

15 **Q. WHY IS THE PROPOSED INCENTIVE LEVEL REASONABLE?**

16 A. A higher incentive level is not warranted based on the benefit analysis mentioned
17 previously. Nevertheless, the grid benefit of managed charging may increase over
18 time as methodologies to quantify locational, geo-targeted values associated with
19 managed charging are developed. As the program evolves, the Company will
20 continue to analyze its benefits and costs, and the Company will seek to modify
21 incentive amounts as appropriate.

1 **Q. HOW WILL THE PROGRAM ALIGN WITH THE CHANGING CONCENTRATION**
2 **OF RENEWABLE GENERATION ON THE COMPANY'S SYSTEM DURING**
3 **2024-2026?**

4 A. Charging Perks is well aligned to accommodate the Company's grid changes
5 through 2026 and beyond. As greater concentrations of intermittent, renewable
6 resources are added to the grid, the Company will need greater flexibility in its
7 ability to control loads. The active control nature of the Charging Perks program,
8 where the Company sends customers charging signals based upon grid
9 conditions, provides this type of flexibility.

10 **Q. HOW WILL EXPANDING THE COMPANY'S MANAGED CHARGING**
11 **PROGRAMS IMPROVE THE CUSTOMER EXPERIENCE?**

12 A. Effective managed charging programs, such as those proposed in this TEP, help
13 assure that customers' vehicles are charged during off-peak periods when
14 residential energy rates are lower. This enables customers to reduce their overall
15 cost for charging and EV ownership. Many EV owners also are environmentally
16 conscious, wishing to minimize their carbon footprint. The active control signal that
17 schedules charging during periods of high renewable concentrations helps assure
18 consumers that they are using the Company's lowest carbon content energy for
19 EV charging.

20 **Q. WILL THE MANAGED CHARGING PROGRAMS INTEGRATE WITH THE**
21 **COMPANY'S VEHICLE-TO-EVERYTHING EFFORTS?**

22 A. As discussed further below, vehicle-to-everything ("V2X") technology is still in its
23 nascent stages with very limited availability of both vehicles and chargers with bi-

1 directional capability. The advancement of V2X pilots will take place through the
2 Company's Innovation portfolio. However, managed charging and V2X
3 technologies will continue to evolve and mature and, at some point, will become
4 intertwined. The Company will continue development of these programs with that
5 end-state in mind.

6 **Q. DO YOU EXPECT THE MANAGED CHARGING PROGRAMS TO IMPROVE**
7 **OVER TIME?**

8 A. Yes, managed charging programs are likely to continue to improve. Active control
9 managed charging will become ever more important as utilities begin to integrate
10 local distribution system constraints into their control schemes. Charging signals
11 could one day be provided at the distribution feeder or even individual service
12 transformer level, allowing for higher levels of EV penetration, while managing the
13 need for grid investment. In theory, at some future point these improvements will
14 be made available to customers in a seamless fashion that will require little if any
15 customer involvement. Having their vehicle charged and ready without having to
16 worry about optimizing for cost, grid, or environmental impacts will become the
17 customer expectation, similar as to how customers expect their lights to come on
18 when a light switch is flipped today.

19 **Q. WHAT INCENTIVE BUDGET IS THE COMPANY PROPOSING TO SUPPORT**
20 **MANAGED CHARGING?**

21 A. The proposed customer incentive budget for Managed Charging is \$2,395,900.
22 This figure was arrived at by looking at the Guidehouse forecast of expected EV
23 adoption required to meet the state's EV adoption target, as sponsored by

1 Company witness Mr. Jean-Baptiste Jouve. For program participation, an
2 escalating percentage was applied to those adoption forecasts, with a resulting 22
3 percent participation in 2024, 38 percent in 2025, and ultimately 50 percent
4 participation in a managed charging program by 2026. These participation counts
5 were then multiplied by the incentive amount of \$50 per participant.

6 **Q. IS THE COMPANY PROPOSING TO EXPAND MANAGE CHARGING OPTIONS**
7 **TO COMMERCIAL AND FLEET CUSTOMERS?**

8 A. Yes, the Company is proposing to expand managed charging to commercial and
9 fleet customers, though these segments pose some unique challenges. First,
10 these customers are receiving electricity for charging under Commercial tariffs,
11 which range from flat per kilowatt hour ("kWh") rates, TOU rates, demand charge
12 rates, and include specially designed EV charging rates already designed to
13 incentivize off-peak usage. Second, how these vehicles are being used is specific
14 to each customer, making it far more challenging to design program parameters
15 than it is for a much more homogenous group like residential EV users. Third, how
16 automotive OEMs interact with their fleet customers is different from their
17 consumer interactions, meaning different control strategies need to be developed
18 for these segments. For these reasons, in the future, the Company is proposing
19 to launch a pilot for commercial and fleet managed charging. The pilot could
20 potentially be part of the Open Innovation project within the Innovation portfolio
21 that I discuss later in my testimony.

1 **Q. CAN YOU PROVIDE ADDITIONAL DETAILS ABOUT THIS COMMERCIAL AND**
2 **FLEET MANAGED CHARGING PILOT?**

3 A. Not at this time, as the pilot is only in the early stages of development. The
4 Company plans to work with its fleet and auto OEM stakeholders to inform the
5 design and ultimate objectives of such a pilot. This work will take place later this
6 year and into 2024, after which the Company may put forward a detailed plan for
7 the pilot through a 60-Day Notice.

1 **III. INNOVATION PORTFOLIO**

2 **Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?**

3 A. In this section, I will discuss the Company's Innovation portfolio, formerly called
4 Partnerships, Research, and Innovation ("PRI"). I support the proposed
5 modifications to the projects that make up this portfolio.

6 **Q. PLEASE DESCRIBE THE CONCEPT AND THE GOALS OF THE INNOVATION**
7 **PORTFOLIO.**

8 A. This portfolio is intended to bring forward innovative pilots, projects, partnerships,
9 and research, with the goal of expanding overall access to electricity as a
10 transportation fuel, minimizing system costs, and increasing environmental
11 benefits. The pilots and projects funded through this portfolio also seek to inform
12 future TEPs by testing technologies, tools, and approaches, which is especially
13 important given the nascent state of certain sectors in the EV and clean
14 transportation ecosystem and marketplace.

15 The Innovation portfolio often focuses on specific technologies where the
16 Company's involvement can provide a needed push to accelerate adoption or
17 where the technologies pose such significant promise that investments should be
18 made early to understand the system impacts and prepare for the future adoption
19 of such technology. Similar to our initial TEP, this portfolio remains committed to
20 providing funding to continue to promote the equitable advancement of vehicle
21 electrification by focusing project opportunities that support our customers,
22 including IQ customers and equity-eligible communities.

1 **Q. WHAT DID THIS PORTFOLIO ACCOMPLISH IN THE INAUGURAL TEP?**

2 A. Summarized for brevity purposes, this portfolio achieved several key
3 accomplishments in the inaugural TEP. Working with stakeholders and through
4 the 60-Day Notice process, the Company initiated seven innovative projects. The
5 projects represent a balanced mix towards addressing key gaps and challenges
6 facing utility infrastructure and customer needs with regards to promoting EV
7 adoption and equity, making EV charging accessible and addressing EV impacts
8 on the grid. The portfolio launched all three of its rebate programs including for
9 Equitable Car Sharing, Paratransit Fleet Electrification, and Refuse Fleet
10 Electrification. To date, the portfolio has provided rebates for five EV refuse trucks,
11 five paratransit buses, 25 EV car share cars, and associated chargers and
12 infrastructure for these programs. The Company has established a partnership
13 with the National Renewable Energy Laboratory (“NREL”) and is actively building
14 a new grid planning tool to assess the impacts of EV adoption in residential
15 neighborhoods, and it is about two thirds of the way to completing the project. The
16 Company, with its consultant Guidehouse, has completed a V2X feasibility study,
17 and established three V2X workstreams. The workstreams include a: (1) Vehicle
18 to Home (“V2H”) study; (2) Vehicle to Building (“V2B”) project engaging local small
19 businesses; and (3) Vehicle to Grid (“V2G”) study, engaging two local school
20 districts. The Company has also identified a capacity constrained site in a rural
21 Colorado mountain town for implementation of the program’s Direct Current Fast
22 Charging (“DCFC”) + Storage project and has contracted with a vendor to develop
23 the site.

1 **Q. PLEASE DESCRIBE WHAT IS BEING PROPOSED FOR INNOVATION IN THE**
2 **2024-2026 TEP.**

3 A. For the 2024-2026 TEP, the Innovation portfolio will focus on four projects:
4 (1) Special Application Vehicle Electrification; (2) V2X; (3) School Bus
5 Electrification; and (4) Open Innovation. Within each of these projects are
6 workstreams that facilitate the intent of the overall project. The Innovation portfolio,
7 its projects, and the workstreams are more fully addressed in our 2024-2026 TEP,
8 Attachment HS-1 to the Direct Testimony of Company Witness Ms. Huma Seth.
9 Below, I provide an introduction and high-level overview of the same.

10 **A. SPECIAL APPLICATION VEHICLE ELECTRIFICATION**

11 **Q. PLEASE DESCRIBE THE SPECIAL APPLICATION VEHICLE**
12 **ELECTRIFICATION PROJECT.**

13 A. This project aims to accelerate and promote the adoption of EVs, particularly
14 trucks, and heavy equipment in three sectors, including: (1) agricultural
15 communities and regional trucking; (2) construction, mining, and long-haul
16 trucking; and (3) emergency response. The Company will assist in accelerating
17 the adoption of EVs in these sectors by providing up-front rebates to eligible
18 participants for eligible vehicle types, along with funding for EV charging
19 infrastructure and equipment, including hydrogen electric, if applicable.

20 **Q. WHY IS IT IMPORTANT TO INVEST IN VEHICLE ELECTRIFICATION WITHIN**
21 **THESE SECTORS?**

22 A. Emissions from vehicles within the three sectors at issue correspond with medium-
23 and heavy-duty vehicles that are more difficult to electrify but are often among the

1 highest emissions on a per vehicle basis. In addition, fuel costs represent a higher
2 percentage of these vehicles' operating expenses due to long operating hours.
3 This project will help demonstrate how the economic benefits of EVs, for these
4 hard to electrify sectors, can lower customer fuel bills, provide cost savings, reduce
5 emissions, and promote equity and innovation among the communities served by
6 these vehicles.

7 **B. VEHICLE-TO-EVERYTHING**

8 **Q. WHAT IS V2X?**

9 A. V2X relates to how EVs enabled with bi-directional charging capabilities have the
10 potential to be used as a source of power. The Company is focused on V2H, V2B,
11 and V2G applications. All these variations rely upon EVs and vehicle chargers
12 with bi-directional capability. A key differentiator between systems the Company
13 has seen in the market is how they are interconnected to the grid. Current V2H
14 applications, like the Ford Pro Home Integration System, can draw power from the
15 EV, but only when the home is disconnected from the electric grid. V2B
16 applications run in parallel with the grid, but the exported power serves the building
17 load and is consumed onsite. V2G applications are those that export power
18 directly to the grid. These distinguishing characteristics are likely to blur as
19 technology evolves but based on the current state of the market, they help
20 distinguish the type of use cases being supported. The V2X workstream within
21 the Innovation portfolio is designed for the creation of projects that will increase
22 the Company's understanding of V2X capabilities, while accelerating opportunities
23 for market adoption of the technology, benefitting customers and the grid.

1 **Q. WHAT EXPERIENCE HAS THE COMPANY GAINED REGARDING V2X?**

2 A. The Company has been closely following V2X development for over a decade. In
3 2008, the Company participated in one of the first V2G field pilots conducted by
4 NREL using a 2008 Ford Escape plug-in hybrid EV. Since then, EV technology
5 has significantly advanced, but V2X has made what might be considered only
6 incremental improvements. To establish the current state of V2X, the Company
7 conducted its V2X and Resilience project in the 2021-2023 TEP. That project
8 consisted of: (1) commissioning a research paper to review the current state of the
9 V2X market; (2) a V2H pilot looking at how EVs can provide back-up power to
10 homes; (3) a V2B pilot examining how EVs can help commercial customers
11 manage their building's peak demand; and (4) a V2G pilot showing how electric
12 school buses can be utilized as grid resources. A research paper on the potential
13 of V2X has been completed and is provided as Attachment CAG-2. The pilot
14 projects are in progress. Additional details can be found in the Company's TEP
15 semi-annual reports filed in Proceeding No. 20A-0204E.

16 **Q. WHAT BENEFITS DOES V2X OFFER THE COMPANY'S CUSTOMERS?**

17 A. EVs can be thought of in some respects as rolling batteries. Therefore, the
18 potential benefits that could be provided from V2X share some characteristics of
19 stationary battery energy storage systems ("BESS"). There are two, potential
20 primary direct benefits V2X could offer individual customers. The first is providing
21 resilience using an EV as a back-up power system for a home or business in the
22 event of a power outage. Second is the conducting of tariff arbitrage to reduce
23 energy costs or demand costs by charging during low-cost periods, and powering

1 home/business with EV(s) during higher-cost, higher demand periods. This
2 strategy is likely to be beneficial to individual customers only in areas where there
3 is a substantial on-peak/off-peak energy price differential, given the fact the
4 customer would have to factor energy loss from charging/dis-charging their battery
5 as well as battery degradation into the financial equation. In considering any
6 potential direct benefits to the V2X customer, the customer also has to weigh any
7 other tradeoffs associated with V2X, including the impact on the vehicle's
8 availability to be used for its primary purpose, transportation. Additionally, V2X
9 has the potential to provide grid services that indirectly benefit all customers.
10 Examples of these grid services include providing additional capacity at times of
11 system peak and relieving distribution constraints at the feeder level. V2X may
12 also help with the integration of high penetration of renewables. Managed
13 charging can help absorb excess renewable generation, but V2X may provide the
14 ability to smooth the output of intermittent renewable resources.

15 **Q. WHAT ARE SOME OF THE CHALLENGES ASSOCIATED WITH DEVELOPING**
16 **V2X CAPABILITIES?**

17 A. As indicated by the Company's early work with NREL in 2008, V2X has been
18 technically possible for some time. The challenges revolve around what it will take
19 to make the technology scalable. Some of the primary challenges include
20 interoperability, battery degradation, valuation, and grid interconnection.
21 Additionally, customer willingness to participate in demonstrations and pilots will
22 be needed to further develop the technology and systems to support V2X.

1 **Q. WHAT CHALLENGE DOES LACK OF INTEROPERABILITY POSE?**

2 A. Currently, V2X lacks a common set of standards. Though this is evolving, many
3 vehicle and charger OEMs are developing their own proprietary systems. This
4 complicates widespread adoption by requiring many systems to interface with each
5 proprietary application. Vehicles from one OEM may not interface with chargers
6 from another. Software management systems are also charger- and vehicle-
7 specific. These issues increase the cost and complexity of deploying V2X.

8 **Q. HOW DOES BATTERY DEGRADATION IMPACT V2X?**

9 A. The issue of how V2X impacts battery degradation is still largely un-resolved.
10 Nissan has stated that V2G operation will not void the warranty of their Leaf vehicle
11 model and to-date this remains virtually the only light duty vehicle option for V2X
12 applications. Ford, who advertises using their F-150 Lightning for emergency
13 home back-up power applications, limits this usage within their battery warranty
14 language. Generally, it is recognized that discharging the vehicle battery for V2X
15 purposes creates similar degradation as driving for an equivalent kWh. However,
16 OEMs have yet to establish how that impacts their warranties and whether V2X
17 ultimately has greater, lesser, or equivalent impact on battery degradation.

18 **Q. HOW DO ISSUES AROUND V2X VALUATION IMPACT ADOPTION?**

19 A. How V2X should be valued and by extension what it is worth to the customer to
20 participate is also unclear. A simple valuation would be looking at what a customer
21 could achieve by using an EV for V2H or V2B arbitrage of standard rates, using
22 their vehicle as a source of energy at times instead of energy from the grid.
23 Customers could perform this calculation, and after factoring in impacts on battery

1 life and warranty implications, determine if this strategy is worthwhile. Valuation
2 of grid costs and benefits associated with V2X add an additional layer of
3 complexity. System capacity value is well documented and addressed in other
4 proceedings. Based on the analysis of V2G applications prepared within the
5 Guidehouse research paper (Attachment CAG-2), simple payback calculations
6 using system capacity value for this type of application would exceed ten years.
7 There may be potential to layer on additional value for avoiding localized grid
8 constraints, but those instances are geographically unique, making determination
9 of a “typical” value very difficult and/or unachievable. These challenges in
10 determining a specific value for V2G will make it in turn difficult for utilities to
11 establish incentives and attract customers to programs. Perhaps the greatest
12 value proposition to customers will be the ability of V2X to provide backup power.
13 The assurance of resilience in emergency situations may be more compelling to
14 customers than what monetary incentives utilities can provide as compensation for
15 grid services.

16 **Q. WHAT GRID INTERCONNECTION ISSUES MUST BE RESOLVED?**

17 A. All resources that produce power in parallel with the electric grid, connected to and
18 operating simultaneously as the electric grid, must go through a utility approved
19 interconnection process. This ensures the continued safe and reliable operation
20 of the grid and protects customers and utility workers from potential hazards.
21 Commercially available bi-directional charging equipment is relatively new and
22 standards for such equipment are just being codified. Utilities will need to evaluate
23 how this new equipment complies with standards to ensure it can be safely

1 interconnected, like the process used for interconnecting other distributed energy
2 resources such as solar or stationary BESS. And just as specific interconnection
3 guidelines were developed by the Company for stationary battery interconnection,
4 it will likely be necessary to modify or create new guidance for the interconnection
5 of V2X applications. Compounding this challenge is the possibility of mass
6 adoption of V2X, potentially creating a need for greater standardization and
7 automation of the interconnection review process to handle large volumes of
8 requests. This prospect is made even more daunting given that many OEMs are
9 pursuing proprietary systems making standardization more difficult.

10 **Q. PLEASE ELABORATE ON THE V2X PROJECT PROPOSED IN THIS TEP.**

11 A. As previously mentioned, the Company launched several V2X technical pilot
12 projects through the inaugural TEP. This project workstream will continue to
13 expand upon the foundational V2H, V2B, and V2G work the Company has
14 established. Specifically, the Company will expand opportunities to enable V2G
15 with medium- and heavy-duty vehicles, enabling light-duty vehicles to participate
16 in V2B and V2G applications, develop tools to help in the management of EVs as
17 grid assets, and further explore how EVs can be deployed as resilience resources
18 during emergencies. These efforts rely on the advancement of V2X technology,
19 and the Company will continue to work proactively with vehicle and equipment
20 OEMs to advance these opportunities when they become market ready.

21 **Q. DOES THE COMPANY EXPECT V2X PROGRAMS TO IMPROVE OVER TIME?**

22 A. Yes. Improved standards should lead to greater interoperability, standardization
23 should simplify grid interconnection, and mass adoption is anticipated to drive

1 down equipment costs. As the electric grid transitions to more intermittent
2 renewable resources, flexible loads like V2X may become more beneficial. All of
3 this points to a future where V2X may become a grid resource. Another key factor
4 will be customer behavior and preferences. For these reasons, it is important to
5 make continued investments in understanding this technology. It may take an
6 additional five to ten years before V2X becomes widely available to customers, if
7 ultimately successful, but the Company needs to be ready when that day comes
8 to ensure a continually stable and resilient grid and to provide integration for
9 customers' vehicles in a manner that delivers the benefits of EVs.

10 **C. SCHOOL BUS ELECTRIFICATION**

11 **Q. PLEASE DESCRIBE THE SCHOOL BUS ELECTRIFICATION PROJECT?**

12 A. The 2021-2023 TEP offered a school bus electrification rebate project that covered
13 the incremental cost between an internal combustion engine ("ICE") vehicle and a
14 battery electric bus ("EBus"). The project was met with limited success due to
15 prospective customers' hesitancy over adopting a newer technology, a lack of
16 funds to cover costs not encompassed by the rebate, and a lack of available
17 vehicles due to supply chain shortages. The intent of this original project was to
18 promote the electrification of an important and large segment of vocational vehicles
19 serving school children, to reduce harmful vehicle emissions and greenhouse
20 gasses ("GHG"), to study how to achieve electrification at scale, to better
21 understand the customer and grid impacts of electrification at scale, and to pioneer
22 optimization of electrified transportation at scale. The project's original intent is

1 still valid for our second-generation school bus program, and the Company has
2 confidence that an improved EBus offering can help mitigate customer concerns.

3 **Q. HOW DOES THE COMPANY PROPOSE TO IMPROVE THE SCHOOL BUS**
4 **ELECTRIFICATION PROJECT?**

5 A. The Company proposes three modifications to increase success. First, the
6 Company proposes to increase the rebate amount up to the full cost of the EBus
7 or approximately \$400,000, but the company recognizes that inflation may
8 increase that cost estimate marginally by the time the project deploys. Preference
9 will be given to school district participants serving equity-eligible communities, with
10 added consideration for some participants being in geographically diverse settings
11 from one another, including rural communities, and/or those who can bring
12 matching funds, including from state and federal programs. This strategy should
13 help extend program funding by leveraging other funds where available, while also
14 providing a pathway to electrification for eligible districts that may not qualify for
15 other subsidies.

16 Second, the Company proposes to work with a limited number of
17 participating districts, ideally two to four, who are willing to electrify by adding
18 preferably a minimum of eight EBuses to their fleet. This approximate volume of
19 vehicles per participant creates better economies of scale for electrified fleet
20 operations. It reduces the administrative burdens for the operator associated with
21 procurement of the vehicles, as well as challenges for re-tooling fleet operations
22 to serve maintenance practices when compared to just a single or small handful of

1 electric buses being adopted. This approach allows the participating district to
2 better adapt practices towards adoption of an all-electric future.

3 Third, the Company proposes to invest in and cover the cost of supplying
4 bi-directional capable charging equipment and infrastructure. Providing this
5 investment removes a substantial burden associated with EBus adoption, as most
6 school districts are not currently prepared to bear the costs associated with EV
7 charging infrastructure.

8 The project will also conduct research with entities like the Electric Power
9 Research Institute (“EPRI”), the National Renewable Energy Laboratory (“NREL”),
10 customers, and others to inform optimal pathways for achieving transportation
11 electrification at scale. Insights from this work will be used to help develop the
12 Innovation School bus project, and its intended outcomes.

13 **Q. WHAT CONDITIONS MUST A PARTICIPATING DISTRICT AGREE TO IF THEY**
14 **ARE AWARDED FUNDING?**

15 A. As a condition to receive funding, participants will agree that the EBuses can be
16 used by the Company as grid resources. All EBuses procured through the project
17 will need to meet the requirement of being V2G capable. Likewise, the charging
18 equipment will be bi-directional and the associated infrastructure designed to
19 match that need, with consideration for future proofing optimization to allow for
20 further EV adoption and scaling over time. To participate in the project, school
21 districts must agree to allow the Company to engage the V2G capabilities of the
22 EBuses when they are not in use for transportation. Provisions regarding use of
23 the EBuses as a grid resource will be established with each participant, including

1 hours and frequency of use as well as minimum and maximum battery state of
2 charge limitations. The objective will be to enable use of the EBus as a
3 transportation resource first and providing grid resources as a second priority.

4 The project will also aim to deploy at least one Resilient Charging Hub
5 ("RCH"). The RCH will serve to ensure continuity of charging operations for the
6 district in the case of unintended grid interruption and inform the optimal design
7 and deployment of such a hub concept for other commercial electric fleet operators
8 in the future. The goal is to work with a school district or fleet operator who
9 currently has, or is willing to, install solar photovoltaic generation at their site within
10 the project timeline. The Company will pair this customer asset with battery energy
11 storage, switchgear, and controls to create the RCH. Approximately \$2,120,000
12 is being held in reserve for the development of this concept. However, if
13 necessary, these funds may be repurposed to offset unexpected increases in the
14 procurement costs of EBuses and bi-directional charging equipment as the impact
15 of inflation on the vehicles and associated infrastructure and bi-directional charger
16 remains unknown.

17 To further increase the benefits of the Company investment in this project,
18 the Company will explore the possibility of maintaining ownership of the EBus
19 battery at the end of its useful life. Vehicle batteries are projected to have a life of
20 ten to 15 years, depending on the application. At the end of this time, the batteries
21 may still find second life potential as stationary battery assets, which could act as
22 a grid resource and extend the benefits of these batteries. Second-life battery
23 options are just now developing and whether the Company could reasonably

1 pursue this path depends upon many factors, including the EBus vendors' supplier
2 agreements with the participating district. The Company will work with EBus
3 vendors and school districts to explore the potential of acquiring the second-life
4 rights to the EBus batteries.

5 **D. OPEN INNOVATION**

6 **Q. WHAT DOES THE OPEN INNOVATION PROJECT ENTAIL?**

7 A. Open Innovation has two objectives. First is to allow for the conclusion of two
8 projects from the 2021-2023 TEP. Second is to allow the Company to develop
9 new pilots and projects.

10 The first objective of Open Innovation is ensuring the funding, timing, and
11 approval necessary to conclude both the Company's DCFC Charging + Storage
12 Demonstration Project and the EV Load Detection and Disaggregation Pilot.
13 These were initiated in the 2021-2023 TEP pursuant to 60 Day Notices. Both have
14 been impacted by global supply chain and materials shortage issues. The projects
15 continue to represent the opportunity for gaining important and original insights
16 necessary for achieving transportation electrification at scale. The projects
17 continue to make significant progress in the form of key vendor procurements and
18 participant recruitment, and their outcomes continue to be relevant to inform grid
19 optimization as EV adoption continues.

20 The second objective of the Open Innovation project is to create an
21 opportunity for the proposal and development of a yet to be defined pilot or projects
22 that can address emerging EV utility infrastructure and/or customer needs as they
23 arise during the 2024-2026 TEP timeframe and in response to the rapidly evolving

1 EV ecosystem. The Company's inaugural TEP's Innovation portfolio essentially
2 took this approach in its entirety. Continuing to allow for some level of open
3 innovation flexibility recognizes that almost all aspects of the EV ecosystem are
4 quickly changing, including but not limited to new vehicle types being electrified,
5 evolving battery chemistries, varying charging technologies, and the emergence
6 of more sophisticated V2X applications. The Company desires to retain some
7 flexibility to dynamically identify, best consider, and propose solutions to gaps and
8 challenges that may arise based upon its own observations as well as customer,
9 and stakeholder feedback. New pilots or projects proposed in Open Innovation
10 will follow the existing 60-Day Notice process, and follow established Innovation
11 portfolio objectives around scalability, equity, and grid and customer benefits.

12 **Q. PLEASE MORE SPECIFICALLY DESCRIBE THE EV LOAD DETECTION AND**
13 **DISAGGREGATION PILOT.**

14 A. For background, this pilot has a purpose of enabling the Company to perform EV
15 load detection and load disaggregation on advanced meters by using
16 disaggregation analytics to identify EV charging. Specifically, the Company is
17 testing the capability of the advanced meter's Distributed Intelligence ("DI")
18 processing. The DI work is limited to the detection and disaggregation of EV load
19 only, informing grid planning and asset health evaluations as the Company
20 prepares for a distribution grid with increasing levels of EV adoption. The
21 Company does not directly market to customers in this research demonstration.
22 The Company estimated a budget to support the pilot of \$2 million during the first

1 TEP. The Company began work on the pilot after it went through the 60-Day
2 Notice process in Proceeding No. 20A-0204E.

3 **Q. WHAT IS THE CURRENT STATUS OF THE PILOT?**

4 A. The pilot is not able to successfully launch and conclude in 2023 under the 2021-
5 2023 TEP for three primary reasons. First, the Advanced Grid Intelligence and
6 Security (“AGIS”) settlement pursuant to which this pilot was developed was not
7 finalized until mid-2022. Second, there are limited vendors globally with the
8 knowledge and technical capability to successfully deploy load detection and
9 disaggregation in a manner consistent with the Company’s research needs. A key
10 vendor who was competitively selected for the work was adversely impacted by
11 economic conditions leading them to withdraw as the vendor of choice for this
12 work. Lastly, to the Company’s knowledge, alternate vendors who may be able to
13 perform the work will not have developed and tested technically viable platforms
14 until the 2024-2026 timeframe.

15 Going forward, the Company plans to spend between \$1,000,000 to
16 approximately \$2,800,000 on this program. The budget range is dependent upon
17 the accuracy of the core platform(s) delivered by alternate vendors, those
18 platforms’ reporting capabilities, and what augmentations the Company needs to
19 make to drive the performance and insights of those platforms necessary to
20 perform a relevant study and support the effort to build a viable scalable
21 commercial detection and disaggregation program.

1 **Q. DOES THE COMPANY PROPOSE TO TRANSITION THE EV LOAD**
2 **DETECTION AND DISAGGREGATION PILOT INTO A FULL PROGRAM**
3 **DURING THE 2024-2026 TEP?**

4 A. Yes. The Company reasonably expects the pilot to conclude during the 2024-2026
5 TEP. In the event the Company achieves its learning objectives through this pilot
6 or through similar efforts in other Xcel Energy jurisdictions, it will be necessary and
7 appropriate for the Company to convert the pilot into a full program, including the
8 option for the Company to use information gathered through load detection and
9 disaggregation to engage in customer-facing marketing. The benefits of identifying
10 EV load on our system for purposes of grid planning and marketing purposes are
11 likely substantial. The Company will complete all regulatory filing requirements
12 necessary to roll out a full EV Load Detection and Disaggregation program during
13 this TEP.

14 **Q. WILL THE EV LOAD DETECTION AND DISAGGREGATION PROGRAM**
15 **INVOLVE CUSTOMER-FACING MARKETING BASED ON DI?**

16 A. Yes. It is very likely that the program will use DI to offer customer solutions and
17 services. The offering of those solutions will involve customer marketing. DI can
18 be an effective tool in ensuring customers receive appropriate and accurate
19 marketing materials to identify their energy solutions based on their particular
20 needs.

1 **Q. WHAT TEP BUDGET WILL FUND THE ROLLOUT OF THE EV LOAD**
2 **DETECTION AND DISAGGREGATION PROGRAM?**

3 A. With any full program expansion of the EV Load Detection and Disaggregation
4 program, the Company will rely on the budget flexibility provisions approved by the
5 Commission for this TEP.

6 **Q. HOW WILL THE LAUNCH OF THE EV LOAD DETECTION AND**
7 **DISAGGREGATION PROGRAM COMPLY WITH THE COMPANY'S PRE-**
8 **EXISTING SETTLEMENT REQUIREMENTS?**

9 A. On March 7, 2022, the Commission approved a settlement to resolve Proceeding
10 No. 21A-0279E. That proceeding regarded the Company's amendment of its
11 Certificate of Public Convenience and Necessity for its AGIS initiative. The
12 settlement allows the Company to undertake its EV Load Detection and
13 Disaggregation pilot. However, the settlement requires the Company to resolve
14 through another application proceeding certain topics before it can deploy
15 customer-facing DI capabilities, such as those envisioned in the full rollout of the
16 program. Consistent with the settlement, the Company intends to address the
17 topics included in the settlement on customer-facing DI capabilities in its next
18 Demand Side Management ("DSM") plan proceeding. That application proceeding
19 is a reasonable venue to address the many topics as DI capabilities will also
20 involve DSM programming. Combining the many customer-facing DI capabilities
21 into a single proceeding, such as the upcoming DSM plan proceeding, is a more
22 efficient process to address the settlement commitments. For these reasons, the
23 Company's ultimate rollout of the EV Load Detection and Disaggregation program

1 is contingent on its compliance with the Proceeding No. 21A-0279E settlement
2 commitments regarding approvals for marketing, which again the Company
3 intends to address in its DSM plan application.

4 **Q. WHAT OTHER TYPES OF NEW PILOTS DO YOU ANTICIPATE THE OPEN**
5 **INNOVATION WORKSTREAM WILL SUPPORT?**

6 A. The Company anticipates proposing pilots that: address gaps for customers who
7 have yet to equitably realize the benefits that electric transportation has to offer;
8 projects that solve unforeseen systems integration impacts as a result of the
9 adoption of EVs at scale; projects that enhance customer experiences shopping
10 for, purchasing, driving, or managing EVs; and projects that promote education,
11 awareness, or workforce participation in the emerging clean transportation and
12 associated economy. Projects may, for example, explore the impacts of artificial
13 intelligence (“AI”) in EV systems integration and bi-directional charging load
14 management; the role that carbon free hydrogen can play in hydrogen electric
15 vehicle enablement; and addressing the needs of diverse communities who can
16 benefit from EVs, such as native and indigenous populations.

17 **Q. WHAT IS THE BUDGET FOR THE PROPOSED INNOVATION PORTFOLIO IN**
18 **THE 2024-2026 TEP?**

19 A. The total budget for the Innovation portfolio within the 2024-2026 TEP is \$63.2
20 million.

1 **Q. IS THE COMPANY COMMITTING TO SPEND AT LEAST A PERCENTAGE OF**
2 **THE INNOVATION BUDGET TO PROMOTE EQUITY?**

3 A. Yes. On an aggregate and yearly basis, the Company commits to spend at least
4 30 percent of its Innovation budget to advance equity.

1 **IV. EV ACCELERATE AT HOME BACKUP POWER OPTION**

2 **Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?**

3 A. In this section of my testimony, I will describe the Company's proposed EVAAH
4 backup power option offered as a demonstration as part of our Residential portfolio
5 and explain how it fits into our larger TEP framework.

6 **Q. WHAT IS THE EVAAH BACKUP POWER OPTION?**

7 A. EVAAH involves a monthly rental program to allow customers to avoid the upfront
8 cost of installing EV chargers. This option aims to expand on that model to conduct
9 a product demonstration. Specifically, EV drivers who participate in EVAAH
10 backup power will rent bi-directional charging equipment without the upfront cost
11 of installing it themselves.

12 **Q. PLEASE DESCRIBE THE TECHNOLOGY THAT THE COMPANY WILL OFFER**
13 **THROUGH EVAAH BACKUP POWER.**

14 A. It involves a monthly fee for the rental of a bi-directional charger, including an
15 inverter, critical load panel, dark start battery, other accessory equipment, and an
16 optional stationary battery energy storage system.

17 **Q. WHAT LOGISTICAL AND TECHNOLOGICAL CHALLENGES TO**
18 **INTEGRATING HOME ENERGY SYSTEMS MAKE THIS PRODUCT USEFUL**
19 **FOR CUSTOMERS?**

20 A. Vehicle enabled home backup power systems have not yet been widely deployed.
21 These systems require additional equipment other than a standard level 2 charger,
22 and the cost to install these systems is much higher than those incurred when
23 installing just a level 2 charger. In many cases, a customer's electrical panel may

1 need to be upgraded to accommodate a backup power system. These difficulties
2 will likely deter many customers from pursuing vehicle enabled backup power
3 systems.

4 **Q. WHY IS THIS OPTION CALLED A DEMONSTRATION?**

5 A. Because of the newness of the technology, the Company is introducing this
6 offering as a demonstration product, building upon the residential V2H technical
7 demonstrations approved under the initial TEP. The offering will have a cap of 160
8 total participants across the three years of the TEP. Learnings from this
9 demonstration offering will then inform future offerings within the next TEP.

10 **Q. WHAT VALUE DOES THIS OPTION PROVIDE THE CUSTOMER?**

11 A. The offering is designed to provide customers a way to avoid the high upfront cost
12 of installing bi-directional charging and associated equipment, while also mitigating
13 customer risks around long-term maintenance and ownership. It offers a cost-
14 effective, hassle-free option for customers seeking to use their vehicles for
15 resiliency purposes, as well as the opportunity to enroll in one of the Company's
16 managed charging programs and enjoy the ensuing benefits.

17 **Q. HOW DOES THIS OFFERING INTERACT WITH V2X PILOTS AND PROJECTS**
18 **UNDER THE INNOVATION PORTFOLIO?**

19 A. Through its Innovation portfolio, the Company is investigating new technologies
20 with the potential to impact the EV industry. While the Company is still in the
21 process of determining how it will utilize V2X technology, it seeks to prepare for
22 the future by investing in and learning about bi-directional charging capabilities
23 now.

1 **Q. HOW MUCH WILL CUSTOMERS PAY TO PARTICIPATE?**

2 A. Customers will pay a flat monthly fee that includes the bi-directional charger,
3 inverter, accessory equipment, and a stationary BESS system as optional. The
4 final customer pricing will be determined and submitted to the Commission for
5 approval after a partner OEM is chosen, as Company witness Mr. Klingeman
6 explains further.

7 **Q. DOES PARTICIPATION IN THE OFFERING REQUIRE CUSTOMERS TO**
8 **ENROLL IN MANAGED CHARGING FOR THEIR EV?**

9 A. Yes, as is consistent with our EVAAH program. Currently, EVAAH participants are
10 required to enroll in one of the Company's managed charging programs for a
11 period of one year following the installation of the residential charger with the
12 flexibility for IQ customers to opt out. The Company seeks to model this EVAAH
13 backup power option on the success of EVAAH and require EV charging
14 optimization for one year. The customer is free to end their participation in the
15 managed charging program after 12 months and can still continue renting their
16 equipment.

17 **Q. WHY IS APPROVAL OF THIS OFFERING APPROPRIATE?**

18 A. This demonstration is intended to acquaint the Company with the next generation
19 of EV technology: bi-directional charging. By providing interested customers with
20 a rental option for bi-directional charging and an optional stationary battery, the
21 Company is minimizing upfront costs to customers, while gaining a better
22 understanding of the benefits to customers.

1 **V. COMMERCIAL CUSTOMER SITED BATTERY DEMONSTRATION**

2 **Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?**

3 A. In this section of my testimony, I will describe the Company's proposed Customer
4 Sited Battery demonstration project to support third-party implementation of
5 DCFC. This demonstration will offer participants turnkey design, construction,
6 operation and maintenance services for BESS, while allowing participants to pay
7 for the costs of these systems on their bill over the system's lifetime, similar to the
8 existing charger rental offerings. Through this demonstration, the Company seeks
9 to make DCFC with BESS more economically feasible for customers and also
10 better understand how BESS may support DCFC installation in locations with grid
11 constraints.

12 **Q. HOW CAN STATIONARY BATTERIES HELP OVERCOME BARRIERS TO**
13 **DCFC IMPLEMENTATION?**

14 A. DCFC stations are a necessary component of vehicle electrification across both
15 private and public charging use cases. Fast, efficient charging is the expectation
16 among drivers for public charging and is also necessary for the widespread
17 electrification of vehicle fleets, particularly medium and heavy-duty vehicles. There
18 are two primary barriers to DCFC implementation frequently cited: high upfront
19 costs and high or uncertain operation and maintenance ("O&M") costs. Regarding
20 O&M costs, those refer specifically to utility bills and the associated demand
21 charges that come with high power, low load factor equipment like DCFC.

22 Regarding the first barrier, battery installations may help reduce upfront
23 costs or accelerate installation timelines in instances where capacity is not

1 available at a customer site to accommodate DCFC installations. These situations
2 can call for distribution upgrades to the system, which the customer would be
3 financially responsible for and can be both costly and time consuming. Customer
4 sited batteries may alleviate capacity constraints on a shorter timeline than
5 traditional utility line extensions.

6 Per the second barrier, batteries can work in conjunction with the
7 Company's charging rates to offer benefits to customers. The Company has the
8 S-EV rate, along with a critical peak pricing ("CPP") option, that offer lower demand
9 charges aimed specifically at customers operating EV charging stations.
10 Customers can pair battery technology with the Company's EV specific rate
11 designs to reduce operating costs and increase the financial viability of DCFC
12 stations. By installing a battery system in parallel with DCFC, charging station
13 operators can utilize the battery for peak shaving and to respond to CPP price
14 signals.

15 **Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE DEMONSTRATION**
16 **PROJECT.**

17 A. The primary objective of this effort is to facilitate the installation of public and
18 private DCFC stations, while minimizing potential impacts to the grid. The project
19 will provide participating customers a turnkey solution for acquiring BESS,
20 including the design, construction, operation and maintenance of the system.
21 Participants will pay for 80 percent of the capital cost of the associated BESS,
22 along with all O&M costs, all through a flat fee, which the Company will charge for
23 the ten-year lifetime of the asset. The Company will work with a group of pre-

1 approved vendors that are capable of providing full turnkey BESS services. The
2 customer will decide the BESS's use cases and operations.

3 **Q. PLEASE DESCRIBE THE CUSTOMER ELIGIBILITY AND PARTICIPATION**
4 **FOR THE DEMONSTRATION.**

5 A. This demonstration project will be made available to eligible Public Service
6 commercial customers that install DCFC stations. All BESS installed through this
7 demonstration must be installed in conjunction with a DCFC station. Participating
8 customers will receive turnkey design, construction and system O&M services that
9 they will pay for through a flat fee on their monthly utility bill. This on-bill payment
10 will cover all routine system O&M expenses with any non-routine expenses, such
11 as repairs, passed through to the customer via one-time payments. This payment
12 will also recover 80 percent of the project's capital costs, along with all earnings
13 and taxes associated with that capital cost. The costs not paid for by the customer
14 will be passed through the Transportation Electrification Programs Adjustment
15 ("TEPA") to all customers.

16 **Q. WHAT IS THE CAP ON THIS DEMONSTRATION PROJECT?**

17 A. Due to the novelty of this technology and the use cases referenced here, the
18 Company will be capping the demonstration budget at \$10 million dollars total, with
19 up to \$2 million in funding available for a single project. This will allow the
20 Company to assess grid and bill impacts of this demonstration to inform the
21 Company's approach to addressing barriers to DCFC installations in future filings.

Q. WHY WILL PARTICIPATING CUSTOMERS PAY 80 PERCENT AND NOT 100 PERCENT OF CAPITAL COSTS?

A. It is appropriate to socialize a portion of the project costs (i.e., 20 percent of capital costs) among all customers as the demonstration will accelerate deployment of DCFC stations in support of the State's vehicle electrification goals, while helping the Company learn how BESS may support DCFC installation in locations with grid constraints. High upfront costs associated with BESS pose a significant barrier to effective deployment. Even with the proposed on-bill payment structure, which reduces a participant's up-front capital requirement, BESS installations can still be cost prohibitive. The cost reduction provided by partial subsidization will make these projects more financially viable, facilitating participation in the demonstration. And requiring participants to enroll in the Company's S-EV-CPP rate helps ensure the BESS will be deployed in a manner that provides overall system benefits. As battery costs continue to decline over the coming years, the Company will reassess the need for cost subsidization.

Q. WHAT TYPES OF CUSTOMERS AND DCFC INSTALLATIONS WILL BENEFIT FROM THIS DEMONSTRATION?

A. DCFC charging stations are typically deployed to meet two different charging use cases: public charging and fleet charging, specifically medium- and heavy-duty vehicle fleets. Both use cases often require charging speeds above and beyond what typical level 2 charging can provide. Each use case faces similar barriers to DCFC implementation that batteries can help address but with some key differences in how and why BESS can overcome the barriers.

1 Public DCFC is a key component to vehicle electrification. To overcome
2 range anxiety among prospective EV drivers and encourage adoption, a robust
3 and reliable public fast charging network is necessary. However, due to the high
4 operating costs of these stations, public charging providers often find it difficult to
5 provide cost-effective service. The Company's EV rate offerings (S-EV and S-EV-
6 CPP) may alleviate some of these cost concerns, as they reduce customer bills
7 through lower demand charges. However, to take advantage of the S-EV-CPP
8 rate, the most cost-effective rate available, public charging operators incur the risk
9 of CPP events, with limited ability to curtail demand. Public charging operators do
10 not have direct control over when drivers choose to charge, and therefore, have
11 limited opportunity to avoid CPP events. Station operators can attempt to pass
12 price signals through to customers by increasing charging rates during CPP
13 events, but operators are often hesitant to do this due to customer experience
14 concerns. By installing a BESS alongside public DCFC stations, operators can
15 reduce load during CPP events without affecting end users. These batteries can
16 also be used for further peak shaving and bill savings outside of CPP events and
17 potentially provide backup power to charging stations in the event of an outage,
18 improving charger reliability and keeping a critical service available to the public.

19 Fleet managers looking to electrify their vehicle fleets require reliable
20 access to charging to make the transition to EVs. This reliable access is often
21 achieved through the installation of EV chargers on a fleet customer's premise to
22 provide on-site charging. DCFC can increase charging efficiency compared to
23 level 2 chargers, allowing more charging demand to be served by fewer stations.

1 Fast charging is especially necessary for medium- and heavy-duty fleet vehicles
2 with larger batteries and higher energy needs. Large DCFC installations can result
3 in significant load additions on the system, oftentimes multiple megawatts. This
4 load may create issues in areas of the grid that are capacity constrained,
5 necessitating upgrades to the distribution system. In these instances, the
6 customer responsible for triggering the distribution upgrades is responsible for
7 paying for a portion of the upgrades. Depending on the capacity available at the
8 site and the specific work required to meet a customer's needs, these upgrades
9 can be cost prohibitive and time-consuming. In certain instances, a customer-sited
10 battery can provide the capacity needed to install the necessary charging stations
11 on a shorter time scale than traditional system upgrades. Through this
12 demonstration, customers can receive a turnkey solution that is paid off over time
13 that has the ability to provide bill savings and resiliency benefits in addition to the
14 needed capacity.

15 **Q. WILL THIS DEMONSTRATION PROVIDE BENEFITS TO THE GRID?**

16 A. Yes. As stated above, all customers enrolling in this option will be required to
17 enroll in the S-EV-CPP rate. This requirement will incentivize demonstration
18 participants to utilize their BESS in a responsible manner that alleviates peak
19 demand and responsibly integrates DCFC into the Company's system. The
20 demonstration will also help the Company better understand how BESS may
21 support DCFC installation in locations with grid constraints.

1 **Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE IMPLEMENTATION PLAN**
2 **AND THE TYPICAL PROJECT PROCESS FOR THE DEMONSTRATION.**

3 A. Projects will be identified through standard recruitment channels. The Company's
4 Electric Vehicle Supply Infrastructure application process and EV advisory group
5 will direct customers whose charging needs align with the battery use cases.
6 Program staff will then work with the customer to understand their needs and
7 produce a preliminary design and cost estimate. If the customer chooses to move
8 forward with the project, it will be bid out to a group of pre-approved vendors
9 selected by the Company through a separate competitive bid process. To provide
10 services through this demonstration, vendors will need to demonstrate an ability to
11 provide turnkey battery services, from design through operation and maintenance.
12 A pre-approved list of vendors will be selected to expedite project contracting;
13 however, any vendor that can provide services and meet the Company's vendor
14 requirements can utilize the demonstration to offer their services.

15 Once a vendor is selected, they will provide a final system design and price
16 to the customer. At this point the customer will be given the option to move forward
17 with system construction or pay for the vendor's design work and walk away from
18 the project. Projects that move forward will undergo construction according to the
19 approved design. Construction will be executed and managed by the approved
20 vendor with Company and customer oversight. Once built, the BESS will be
21 operated according to the customer's needs while also being enrolled in the S-EV-
22 CPP rate. A customer service agreement will be executed dictating a
23 maintenance schedule and operating plan as well as payment terms between the

1 Company and the customer. Upon completion of the contract term, the customer
2 will be given the option to have ownership of the battery transfer to them, sign a
3 new agreement to continue Company and vendor O&M responsibilities, or pay to
4 decommission the battery.

5 **Q. DOES THE COMPANY HAVE EXPERIENCE OPERATING PROGRAMS**
6 **SIMILAR TO THIS?**

7 A. Yes. Xcel Energy currently implements an Empower Resiliency program in its
8 Wisconsin and Minnesota territories that offers similar services, but for a broader
9 range of technology and customer types. This demonstration is limited in scope
10 compared to other resiliency programs offered by the Company. Where Empower
11 Resiliency offers turnkey solutions for full microgrid systems with a focus on
12 resiliency, this demonstration will only offer turnkey BESS solutions to customers
13 installing DCFC with a focus on overcoming capacity constraints to expand
14 charging availability across the Company's service territory.

VI. CONCLUSION

1

2 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.**

3 A. I recommend the Commission approve the Company's Managed Charging
4 program, its Innovation portfolio, the EVAAH backup power option demonstration,
5 and the Commercial Customer Sited Battery demonstration, as proposed within
6 the 2024-2026 TEP.

7 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

8 A. Yes, it does.

Statement of Qualifications

Charles Andre Gouin

Charles André Gouin is a Business Technology Consultant for Xcel Energy. He provides subject matter expertise to the Clean Transportation group at Xcel Energy in a variety of energy related areas including vehicle-to-grid applications, battery energy storage systems, renewable energy, demand response, and building energy management.

Mr. Gouin has over 28 years of experience working in the energy field, 24 of those at Xcel Energy. During those years, he has held a variety of positions with a primary interest in developing customer facing products and services. He currently leads Xcel Energy's V2X demonstration projects and was responsible for developing the Company's Community Resiliency Initiative Microgrid project and the Panasonic Battery Storage Microgrid demonstration project. His work often focuses on developing custom solutions to meet specific needs of Xcel Energy's' customers.

Mr. Gouin has a Bachelor of Science degree in Mechanical Engineering from Northern Arizona University. He is a Certified Energy Manager and current board member and past president of the Rocky Mountain Association of Energy Engineers.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

* * * * *

IN THE MATTER OF THE APPLICATION)
OF PUBLIC SERVICE COMPANY OF)
COLORADO FOR APPROVAL OF ITS) PROCEEDING NO. 23A-____E
2024-2026 TRANSPORTATION)
ELECTRIFICATION PLAN.)

AFFIDAVIT OF C. ANDRE GOUIN
ON BEHALF OF
PUBLIC SERVICE COMPANY OF COLORADO

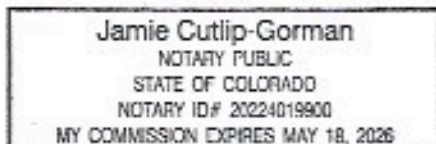
I, C. Andre Gouin, being duly sworn, state that the Direct Testimony and attachments were prepared by me or under my supervision, control, and direction; that the Direct Testimony and attachments are true and correct to the best of my information, knowledge and belief; and that I would give the same testimony orally and would present the same attachments if asked under oath.

Dated at Denver, Colorado, this 9th day of May 2023.



C. Andre Gouin
Business Technology Consultant

Subscribed and sworn to before me this 9th day of May, 2023.


Notary Public

My Commission expires May 18, 2026