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➢ Summary of 60-Day Notice: V2X and Resilience Project

The following 60-Day Notice summarizes Public Service Company of Colorado's ("Public Service" or "the Company") action to update stakeholders of the Company's development of the V2X and Resilience Project within the Company's 2021-2023 Transportation Electrification Plan ("TEP"). This 60-Day Notice is issued in compliance with Decision No. C21-0017 in Proceeding No. 20A-0204E.

A copy of this notice will be available on our website at:
https://www.xcelenergy.com/company/rates_and_regulations/filings/transportation_electrification_plan

V2X and Resilience Project

In Decision No. C21-0017, the Colorado Public Utilities Commission ("Commission") approved the Company's proposed Partnerships, Research and Innovation ("PRI") portfolio. The objective of the PRI portfolio is to ease the process for customers to access electricity as a transportation fuel, minimize system costs, increase environmental benefits for charging, and help inform future Company TEPs. As a part of this portfolio, Public Service is proposing to direct a portion of the PRI budget to fund a V2X and Resilience Project.

Through this 60-Day Notice, Public Service is providing a description of the V2X and Resilience Project and the metrics that Public Service will report on and provide to stakeholders through its semi-annual TEP reporting. Through the first phase of the project, a research effort will inform the Company and Stakeholders as to the current state of V2X; what technologies exist and their relative costs, what value streams are achievable and what is their relative benefit. The second phase of the project will be a limited scale demonstration of V2X technologies, with a focus on how the technology can be used for resilience. To inform this proposal, the Company presented the concept at the Transportation Electrification Plan Stakeholder Group meeting on September 30, 2021 and had subsequent discussions with key stakeholders to incorporate their feedback.

➢ V2X and Resilience

A. Project Description, Goals, and Key Outcomes

The possibility of using electric vehicle ("EV") batteries as a back-up power source to support the electric system and hasten the transition to a more sustainable, carbon-free future has been widely theorized for over a decade. Much work in vehicle-to-grid ("V2G") and vehicle-to-building ("V2B"), collectively described as V2X, has been conducted across North America through various pilots and research efforts. With the transition of most vehicle classes to electric now being widely anticipated, it is important to understand how these vehicles may be leveraged to support Xcel Energy's vision to power 1.5 million EVs throughout its eight-state footprint and the State's goal of 940,000 EVs on the road, both by 2030. The V2X and Resilience Project proposes a two phased approach; a feasibility study to understand the current state and near-term capabilities of V2X technology, and a limited scale deployment to identify and demonstrate the most valuable use cases of these technologies.

Phase 1 – Feasibility Study

As previously mentioned, several V2X pilots and studies have been conducted over the years. Much of this work has been focused on specific markets in California. There is still uncertainty around the economic and technical feasibility of V2G or V2B within our service territory. Questions include:

- What vehicles are expected to be equipped with V2X technology and at what incremental costs?
- What impact does frequent charging have on a vehicle's battery longevity, performance, and warranty?
- What options are available for bi-directional charging, how common place is this infrastructure expected to be, and what incremental costs are associated?
- How is the value V2X can bring to the grid quantified, both from a distribution level and system level benefits?
- Would EV owners participate in V2X programs at incentive levels commensurate to the value provided to the grid?

The feasibility phase of this project is designed to answer these questions and form a foundation of knowledge for developing a future V2X roadmap for the Company. A consultant would be obtained to provide a comprehensive review of the current V2X technology space. This would entail reviewing the most relevant research and pilots conducted across North America, conducting interviews with researchers and technology providers within this space, and conferring with key customers, stakeholders, and other Company partners interested in this technology.

One V2X use case that is gaining attention is the use of EVs to provide resilience[1] in the event of an emergency. Natural and man-made disasters threaten the electric grid's ability to deliver reliable, high-quality power. At the same time, our modern lifestyle is becoming increasingly dependent on the electric grid for our health, safety, and economic well-being. The rising cost of grid disruptions underscores the need to identify cost-effective strategies and investments that can increase resilience for our customers. Utilizing V2B technology for resilience purposes may soon be achievable. Of particular interest would be the application with customers providing critical services who may be challenged with providing alternative forms of back-up power.

As cities, municipalities, and utilities begin to transition their fleets to EVs, they will, in essence, be creating a pool of mobile storage devices. During grid outages, these vehicles could be used to provide emergency back-up power to those most at risk. This could include residential customers with special medical needs or other critical load customers such as clinics and pharmacies. While these customers could purchase backup generators, we see the mobility of V2B as a potentially more efficient option because this one asset could be deployed anywhere and serve a multitude of customers over its useful life. V2B vehicles can also provide backup power without noise and emissions. Deployment of V2B could be targeted in historically underserved and/or vulnerable communities to help address equitable access to resiliency options. Such areas may include locations where electrical distribution infrastructure is older or more susceptible to outages, or in communities with higher concentrations of income-qualified customers.

Included in Phase 1 of this project is researching and identifying the potential market for this service, types of vehicles compatible, and the most effective way to interconnect either through bi-directional charging equipment or through other means. This work would include meeting with cities and stakeholders including equity stakeholders to develop a Community Needs Assessment in order to understand resilience needs within their communities.

The output of Phase 1 will be a report providing details of the research conducted, a summary of the V2X technology landscape and analysis of various V2X use cases and their benefits. This document would help inform the Commission, TEP stakeholders, and communities within our service territory on the current state of V2X. It would also be used as the basis for informing the Company's strategy supporting V2G and establishing a foundation on which future roadmap efforts could be built.

Phase 2 – V2X Demonstration

The research conducted in Phase 1 would inform Phase 2 of the project, conducting a limited scale deployment as proof of concept.

The Company believes that the most immediate use case to explore is V2B for resilience purposes. Some auto manufacturers are beginning to support the use of vehicles for emergency back-up

[1] Resilience is "the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents." Presidential Policy Directive 21 – Critical Infrastructure Security and Resilience. https://obamawhitehouse.archives.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil

power, which may soon set customer expectations for this capability. Furthermore, the use of V2B in emergency situations may or may not require specific interconnection agreements that are typically required when generation resources run in parallel with the utility grid, but this will need to be evaluated. Through working with our partners and stakeholders, three to five locations would be identified where bi-directional charging technology would be deployed. These sites would be used to demonstrate how the technology could be deployed and incorporated into an emergency preparedness plan as well as providing a better understanding of safety and other requirements that might be needed associated with larger-scale deployments. The Company believes this use case could augment and build from its efforts to enhance resilience at certain community sites as is being done through the Company's Community Resiliency Initiative (Proceeding No. 19A-0225E). These plans could be shared with local governments and other organizations to help inform and shape their emergency plans. We will work with our partners to identify appropriate sites where V2X value propositions can be demonstrated. Site selection criteria for resilience applications may include the following:

- Critical infrastructure facility type – Assessment of the criticality of services each facility type provides to the public and state.
- Geographical proximity – Identification of critical infrastructure facilities within close proximity to other potential deployment sites.
- Areas at high risk of natural hazard – Analysis of geographic areas at highest risk of being affected by a natural hazard.
- Population density – Assessment of the population by county and urban areas to determine where grid support from a V2B deployment would be most impactful in the event of an outage.
- Energy burden / underserved areas – Consideration of the energy burden to determine areas that are most underserved and therefore, where a V2B deployment would support equity in grid reliability.
- Community/customer support – Consideration of how the community/customer will support the pilot.

Additionally, these installations could be used to validate other V2G value streams identified in the feasibility portion of this project. Sites will seek to comply with any existing applicable rules, terms and conditions regarding interconnection processes.

Goals

This project is expected to address many of the objectives established in the approval of the PRI portfolio; specifically, increasing charging benefits, gaining insights and stimulating innovation, and promoting equity. As described, the feasibility phase of this project is specifically designed to investigate the benefits surrounding V2X. This body of work will allow the Company, the Commission, and stakeholders to gain insight into V2X current capabilities and near-term possibilities. Promoting equity is a key focus of the resilience aspect of this project, determining viable strategies for deploying V2B technology for resilience purposes in communities most prone to outages or at greatest risk of prolonged outages due to natural disaster or other emergency events.

Key Outcomes

- Create a body of knowledge on V2X technology and benefits to inform the Company, Commission and key stakeholders
- Produce a Community Needs Assessment template
    - Produce market research indicating the type and count of vulnerable customers who could benefit from resilience applications of V2B
    - Inform where the underserved communities are located within the core-urban, metropolitan, rural and mountainous areas, and which underserved areas may best be served by V2B for resilience
- Develop a white paper detailing the current state of V2X technology for resilience
- Create and outline a scalable and sustainable emergency preparedness plan incorporating V2B
- Create a V2B template for future deployment
- Increased public awareness and support of V2X technologies

B. Estimated Costs, Benefits, Value to Customers

Costs

The budget for the V2X and Resilience Project has been estimated to be about $700,000.

- Phase 1: $300,000 which includes operations and maintenance ("O&M") costs for research and consultative services that make up the feasibility study.
- Phase 2: $400,000 which includes a mix of capital and O&M costs that encompass the limited deployment demonstration.
    - Electric Vehicle Supply Infrastructure ("EVSI")
    - Bi-directional charging infrastructure
    - Use of Battery Electric Vehicles ("BEV")
    - Analysis
    - Reporting

Benefits

- Increased resilience to underserved customers
- Innovation of new technology with potentially new methods of deployment
- Informing future V2X technical, policy and regulatory implications
- Better understanding customer needs and impacts with Pilot data
- Better understanding grid needs and impacts with Pilot data

Value to Customers

- Reduced downtime of critical systems during outages

C. Equity & Commercial Viability

Equity

This project will strive to address equity issues by investigating how V2X can be deployed specifically for resilience purposes in underserved communities, defined both as "disproportionately impacted community" as currently codified in Colorado state law[2] and/or live in income-qualified communities and/or higher-emissions communities (HEC) as currently defined in the Company's TEP programs.

The V2B and V2G work will further provide realistic expectations on how customers of all types can utilize this new technology to reduce their energy bills or otherwise benefit by providing necessary grid services.

Commercial Viability

An objective of the project's feasibility study is to review newly emerging and existing EVs and charging technology to determine what V2X technology is currently viable today and when such technology might be expected to be widely adopted. Phase 2 of the project will offer a demonstration of these V2X capabilities which will help prove their commercial viability and spur greater adoption.

D. Education and Outreach Efforts

The Company will use the white paper created through this project to educate key stakeholders and communities within our service territory. Education efforts will be directed at some combination of the community at large, underserved communities impacted by the equity benefits of this work, technically focused peer organizations, as well as governing bodies, policy makers, regulators, and other ecosystem participants.

Additional outreach efforts might include posting program information on the Company's website, conducting digital and print campaigns, and producing case studies, technical white papers, videos, and other interactive media.

The Company plans on hosting in-person or virtual events to allow the stakeholders to see the technologies in demonstration and learn about their practical application. This may include events like "touch and see," question and answer sessions, ribbon cuttings, tours, and more.

[2] See Colorado HB21-1266. Section 3 of the Act defines "disproportionately impacted community" (DIC) as "a community that is in a census block group where the proportion of households that are low income, that identify as minority, or that are housing cost-burdened is greater than 40%; or any other community as identified or approved by a state agency, if the community: Has a history of environmental racism perpetuated through redlining, anti-Indigenous, anti-immigrant, anti-Hispanic, or anti-Black laws; or is one where multiple factors may act cumulatively to affect health and the environment and contribute to persistent disparities."

E. Process

Phase 1 will consist of a feasibility study which will consist of conducting market research into available V2B technologies, bi-directional charging equipment, program optimal EVs, and alternative connection options. We will identify market potential including qualified customers and loads, interconnection and infrastructure requirements, and any other associated costs. Furthermore, this study will create conceptual emergency response plans and how best to deploy the assets during outages and emergency events.

Phase 2 will consist of a limited deployment of the bi-directional charging equipment and infrastructure to demonstrate the concept and provide educational and research opportunities. The number of vehicles in deployment is anticipated to be one to two.

F. Reporting, Measurement, and Evaluation

As part of the Company's semi-annual reporting for TEP programs, the Company proposes to track and report on the following metrics regarding the proposed V2B and Resilience Project:

- Project costs
- Consultant(s) selected through a Request for Proposal ("RFP") process for producing the Phase 1 feasibility study
- Market research results indicating the estimated customer base who could participate in V2X applications

The Phase 2 demonstration will be informed by the results of the feasibility study. As details of the demonstration are developed the Company will report on:

- Technology providers being considered and those selected for the Phase 2 demonstration
- Technologies deployed and capital costs
- Impact on selected sites resilience and overall operations
- Forecast operations and maintenance expenses associated with the technology deployment
- Considerations on interconnection policies that should be addressed should wide scale adoption of such technologies be expected
- Recommendations on the types of customers and loads which may benefit from adoption of V2X technologies.

G. Partners

Successful completion of the V2X and Resilience project will require the Company to work in close partnership with a number of key stakeholders:

Targeted Partners

- Feasibility study consultant – through an existing RFP process, firms with expertise in the EV industry are being solicited to provide assistance in delivering various aspects of the Company's TEP, including efforts related to the PRI projects. A scope of work for the

Phase 1 study will be added to the work currently being contracted for with the winning RFP respondent.

- The City of Denver – Through our Energy Future Collaboration Memorandum of Understanding ("EFC MOU"), the Company and the City are engaged in finding mutually beneficial solutions to addressing impacts of a rapidly changing electric system. Of key interest to the City, especially their Office of Emergency Management and Climate Sustainability and Resilience Office, are new ways to increase the resilience of the City's critical infrastructure. Our existing EFC MOU creates an ideal mechanism to conduct a dialogue on resilience and advance V2X concepts for this purpose.
- Aurora Public Schools – Aurora Public Schools is adding seven electric school busses to its transportation fleet. School busses could be ideal resources for V2X applications as they typically have large batteries and are idle/available for known durations at predetermined locations.
- Colorado Smart City Alliance – The Colorado Smart City Alliance is actively engaged in the EV space and was instrumental in launching V2B and autonomous EV pilots in Colorado. Furthermore, this organization collaborates with over 25 cities across Colorado, making them an ideal conduit for gathering perspectives from a wide range of interested stakeholders and disseminating information once the project is complete.
- EV Service Equipment vendors – Vendors within the EV equipment ecosystem who focus on bi-directional charging and other V2X capabilities.
- EV manufacturers – As the Company looks to electrify its own fleet of vehicles, we are working closely with vehicle manufacturers to stay abreast of their latest offerings. Leveraging these relationships, we expect to be able to procure vehicles suitable for the demonstration phase of this project.

I. Stakeholder Involvement

During the development of the methodology and the identification of proposed V2X and Resilience Project, the Company engaged numerous stakeholders to gather feedback and refine its approach. The table below summarizes stakeholder involvement:

Stakeholder Group	Meeting Date
Transportation Electrification Plan Stakeholder Group [3]	9/29/2021
Environmental Justice Coalition[4], Energy Outreach Colorado, Natural Resources Defense Council, Southwest Energy	10/12/2021

[3] The TEP Stakeholder Group includes dozens of organizations spanning Colorado state government agencies, Colorado municipalities, environmental advocates, energy efficiency and electrification groups, other utilities, EV charging hardware and software providers, automobile manufacturers and dealerships, community groups, and many others. Nearly 100 people participated in the TEP Stakeholder Group meeting on September 29, 2021.

[4] The Environmental Justice Coalition includes representatives from the Colorado Latino Forum, GreenLatinos, GRID Alternatives, and Vote Solar.

Efficiency Project, and Western Resource Advocates	
Commission Staff	10/14/2021

In general, stakeholders were favorable towards the project. There were no negative comments or feedback related to the project.