Southern California Edison's Electric Vehicle Charging Network Reinforcement Plan for Public Safety Power Shutoff Support Pursuant to Commission Decision in OIR Phase Two of R.18-12-005

Rosemead, CA
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I. Background

On December 19, 2018, the California Public Utilities Commission (Commission or CPUC) opened Public Safety Power Shutoff (PSPS) Order Instituting Rulemaking (R.)18-12-005 (OIR) to examine the rules that allow electric utilities, under the Commission's jurisdiction, to de-energize power lines in case of dangerous conditions that threaten life or property in California. On June 4, 2019, the Commission issued Decision (D.)19-05-042 (PSPS OIR Phase 1 Decision) which established the PSPS Guidelines. The PSPS OIR Phase 2 Decision, D.20-05-051, adopting updated and additional PSPS guidelines was issued on June 5, 2020. In D.20-05-051, the Commission ordered the electric IOUs to support electric vehicle (EV) drivers during PSPS by "designing a plan in coordination with charging network providers to reinforce networks and key charging locations with backup generation."[1] Pursuant to that directive, SCE hereby submits its EV Charging Network Reinforcement Plan (the Plan).

In the Plan, SCE outlines its proposal and potential solutions to meet the requirements of this directive. SCE has coordinated with key EV charging network providers to solicit ideas and input in drafting the Plan. SCE has also assessed its previous PSPS events and protocols and evaluated various options in preparing the Plan to provide feasible backup generation solutions at key EV charging locations during potential future de-energization events. SCE will investigate the feasibility, safety implications, and customer benefits of various backup generation technologies as a first step in exploring options to reinforce key charging locations with backup generation. SCE's research will be used to inform decisions regarding potential pilot development to test backup generation solutions at existing EV charging locations, collect data, and explore opportunities for potentially scaling plans if the pilots are successful.

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[1] CPUC Decision 20-05-051, Appendix A, p. 7.

II. Customers Impacted by De-Energization

Customers who live in high fire risk areas (HFRA), as defined by the Commission, are more likely to experience a de-energization event. However, customers who do not live in HFRA may also be affected due to the design and interconnection of the electrical grid.

Although the frequency and scope of PSPS de-energization events are expected to lessen as more of SCE's Wildfire Mitigation Plan activities are deployed, PSPS will continue to be an important tool in mitigating wildfire risk and protecting public safety during times of severe weather and high fire potential index (FPI).[2] As part of SCE's wildfire mitigation efforts, SCE has been able to limit the number of customers experiencing PSPS events by using sectionalizing devices to de-energize segments instead of entire circuits and by relying on real-time weather information, as well as other factors, to make informed PSPS decisions.

More than 80% of EV charging takes place at home, which presents a moderate risk for residential customers impacted by PSPS.[3] Sampled EV driver customers in SCE's HFRA tend to drive on average of approximately 51 miles per workday.[4]

Currently there are 34 public charging plazas within a three-mile radius just outside of areas most highly impacted by PSPS events in 2019.[5] While customers may be able to access charging stations outside of an outage area during PSPS events, some customers may need access to public charging options within a PSPS outage area for emergencies or other purposes. As a result, SCE proposes in the Plan to focus on reinforcing key public EV fast charging locations that have been most frequently impacted by PSPS events in areas where public charging options for customers are limited.

SCE continues to work diligently to reduce the impacts of PSPS events on customers and understands that access to functioning public EV charging infrastructure is important for EV customers during PSPS events. SCE has engaged in conversations with internal and external stakeholders, including EV Supply Equipment (EVSE) service providers, members of SCE's Interconnection and PSPS Incident Management Teams, regarding various backup

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[2] FPI is an internal tool used to define, estimate and articulate wildfire potential based on actual weather and fuel conditions. Weather inputs include not only wind, but the dryness of the air near the ground and how receptive existing fuels are to fire with specific inputs involving the moisture content of the vegetation.

[3] EV charging information is based on the U.S. Department of Energy's "Charging at Home" page: https://www.energy.gov/eere/electricvehicles/charging-home.

[4] Workday vehicle miles traveled are based on SCE's Clean Fuel Reward Program data.

[5] Charging station information compiled using the U.S. Department of Energy's Alternative Fuel Data Center (AFDC) accessed on June 17, 2020, and SCE's PSPS data.

generation technology solutions, procedures and rules to safely disconnect from the electric grid, and the operational and logistical challenges associated with retrofitting existing EV charging infrastructure. SCE believes that additional work is required to study, test, and evaluate backup generation technology solutions before developing pilots and deploying any options at scale.

Therefore, SCE will conduct research into the feasibility, safety implications, cost-effectiveness, and customer benefits of various technology options that will inform decisions about potential pilot designs. Key learnings from executed pilots will be used to inform the feasibility of larger programmatic efforts aimed at reinforcing EV charging networks to ensure customers maintain access to public EV charging facilities during PSPS de-energizations.

III. Timeline and Deliverables

In response to the Commission's PSPS OIR Phase 2 Decision, SCE has spent the past 60 days conducting foundational research and engaging in conversations with numerous internal and external stakeholders to develop the Plan to reinforce key EV charging locations with backup generation.

As a first step, SCE proposes to evaluate numerous backup generation technology options and study their cost-effectiveness, safety and operational implications, and potential customer benefits. This research will commence following the submission of the Plan and extend through the end of 2020.

By Q1 2021, SCE will leverage results derived from the research phase to inform future work potentially including the development of pilots. Testing the selected viable technologies and proposed processes may continue through 2021.

SCE is currently in the process of replacing its obsolete Customer Service System with a more modern, stable and agile SAP-based customer technology platform.[6] The implementation of the Plan may be impacted due to limitations of a system freeze by the Customer Service Re-Platform (CSRP) project. The implementation timeline of the Plan will need to align with the CSRP release schedule. In lieu of this dependency, SCE will explore options for leveraging microsites or other web-accessible internet sites outside of SCE.com to provide customers with EV charging station information in the near-term, with the intent of exploring integration with other SCE's platforms after CSRP stabilization.

[6] This is known as SCE's Customer Service Re-Platform (CSRP) project. See SCE's 2018 General Rate Case Application (A.)16-09-001 (Exhibit SCE-04, Volume 3), and also described in A.17-12-012 (SCE's 2018 Rate Design Window application).

IV. Identification of Key Charging Locations

SCE is utilizing Geographical Information System (GIS) mapping to identify key EV public charging locations in HFRA. Currently there are 172 public Level 2 charging network plazas and 28 public Direct Current Fast Charging (DCFC)[7] charging plazas in SCE's HFRA. In areas within SCE's HFRA and within three miles of HFRA that experienced three or more PSPS de-energization events in the 2019 fire season, there are 27 public Level 2 charging plazas (with a total of 107 public Level 2 charging stations) and 7 public DCFC charging plazas (with a total of 42 public DCFC charging stations).[8]

Given the complexity, timing, and costs associated with reinforcing existing public EV charging plazas with backup generation, SCE plans to take a targeted approach when deploying backup generation solutions. Since customers' charging needs during PSPS de-energizations differ from those of a typical day, functioning public fast chargers will enable customers to attain sufficient levels of charge quickly, particularly if evacuation in the impacted area becomes necessary. As a result, SCE will explore the feasibility of reinforcing public charging plazas with DCFC capabilities.

SCE proposes a tiered approach in identifying and selecting key public DCFC charging locations to potentially reinforce. SCE will prioritize those public DCFC charging plazas in areas that are both within SCE's HFRA and within three miles of areas that experienced three or more PSPS events in 2019. SCE will also consider prioritizing charging plazas based on PSPS events in 2020. Once options at those locations have been identified, SCE will explore the possibility of deploying backup generation solutions at select key public DCFC charging locations within SCE's HFRA more broadly.

Although SCE will not focus on public Level 2 charging stations, procedural elements and key findings from the pilot phase can be leveraged to deploy customer-owned backup generation for Level 2 charging stations in a wider implementation, if warranted based on the pilot's results.

[7] Level 3 is not standardized terminology defined by the Society of Automotive Engineers. The correct terminology is Direct Current Fast Charging (DCFC).
[8] Charging station information compiled using the U.S. Department of Energy's Alternative Fuel Data Center (AFDC) accessed on June 17, 2020, and SCE's PSPS data.

V. Potential Backup Generation Technology Solutions

SCE has identified three potential technology solutions to support continued access to EV charging stations during PSPS de-energizations. Since PSPS events are dynamic, SCE will explore the viability of a combination of mobile, temporary, and permanent backup generation solutions after performing research and implementing pilot programs in order to inform broader decisions about the placement of backup generation at key public DCFC charging locations.

The first technology option is a mobile and deployable cluster of charging stations powered by a large battery storage unit. With this solution, charging stations are mounted on a trailer with a large battery storage unit sufficient to power several charging stations. This setup can be hauled to impacted charging station plazas so customers can still charge their vehicles during PSPS de-energizations. This technology offers a quickly deployable solution that does not require the installation of temporary or permanent backup generation equipment onsite. When the battery is fully depleted, the mobile unit can be replaced with another fully charged unit and the depleted unit can be taken back for recharging. While this solution would not provide backup generation to existing charging infrastructure in the strict sense, it provides a new, temporary charging infrastructure and it can help to meet the public charging needs of EV drivers during PSPS de-energizations.

SCE recognizes that the Commission has also ordered the IOUs to "investigate the feasibility of mobile and deployable EV Level 3 fast charging." SCE believes that this solution can meet the requirements of both directives.[9] SCE estimates that a mobile system with a 200-500 kWh battery and one DCFC charging station could cost approximately $300,000 to $600,000 per system. Additional costs could be involved in vehicles to transport the chargers, as well as costs for operations and maintenance. Costs may vary significantly if SCE leases or rents these systems. However, without off-the-shelf solutions readily available in the market, new development of this technology may be the only option. SCE will investigate this technology during the research phase.

A second solution is to deploy a battery energy storage system (BESS) to support a site transformer, thereby reinforcing multiple charging stations at a plaza during PSPS de-energizations. This effort may require installation of equipment and construction of isolated circuits to enable safe islanding and isolation from the de-energized circuit, as well as interconnection of the BESS to the electric grid. During a PSPS event, the energy stored in

[9] CPUC Decision 20-05-051, Appendix A, p. 7.

the battery would be discharged to provide backup power to charging stations at the plaza. SCE estimates that installing a 200-500 kWh BESS to power a single DCFC plaza with two EV charging ports each could cost approximately $1,000,000 to $3,000,000 per system.

There are numerous challenges with the BESS approach. Space constraints may limit the feasibility of this option, as the selected plazas for the program would need to be large enough to accommodate such large storage equipment without impacting the amount of parking space available in the plaza. In addition, the complexity of the associated primary switching requirements may require SCE to identify sites with dedicated EV transformer and existing primary switching capabilities in order to isolate the battery pack from the electric grid safely during PSPS de-energizations. SCE may also need to develop specific outage procedures and the capability to perform remote primary switching or deploy a manual line crew to ensure the BESS is isolated from the electric grid prior to discharging any energy from the battery. Engineering and permitting may be costly and obtaining the required permits may be time consuming. Grid interconnection processes under Rule 21 would also need to be followed prior to implementing the pilot or implementing this solution at a larger scale.

A third solution would be to deploy temporary diesel backup generators at key public charging locations to keep the DCFC chargers functioning during PSPS de-energizations. With SCE service personnel and proper or permitted equipment, during a PSPS de-energization, the EV service equipment would safely disconnect from the grid and connect to the generator. SCE anticipates that renting a mobile diesel generator large enough to power a DCFC plaza with two EV charging ports for up to three days could cost approximately $7,500 to $11,200 per equipment rental.

Space constraints at the EV charging site may limit deployment of this solution, as mobile diesel generators may require a large footprint for the generating unit, which may significantly impact available parking space in the plaza. In addition, consideration may need to be made for safety clearances, noise, heat, and exhaust. Another potential complication in deploying a mobile diesel generator and connecting it to existing equipment is the possibility that vehicles may already be parked in the stall(s) necessary for the generator. Generators generally need to be placed close to the switchgear; potentially having to place them farther away can present a safety and access issue with large power cables crossing parking areas.

Additionally, retrofitting existing sites would require site-specific grid interconnection equipment in order to connect at the meter or switchgear, which, if feasible given the other barriers noted herein, but could cost approximately $60,000 to $100,000 or more and would need to follow SCE's Rule 21 processes. SCE would also need to mitigate potential challenges relating to the mixing and managing of SCE-owned assets with existing customer-owned assets at the EV charging site. An alternate option may be to provide an incentive to EV Standards Panel developers to design new projects with the interconnection ability built into the system.

SCE's due diligence into mobile diesel backup generation solutions for its non-residential Critical Infrastructure providers indicates that Air Quality Management District (AQMD) permits may be required depending on the use case, particularly in instances where the diesel generators are not eligible to receive Portable Equipment Registration Program (PERP) designation. In instances where generators do not qualify for PERP, securing AQMD permits may require lead times of two to three months. SCE will need to work with local air districts to determine the specific compliance requirements associated with deploying mobile backup diesel generators at public DCFC charging plazas. Potential implications for California's Green House Gas (GHG) emissions reductions targets, and for State environmental policy overall, would also need to be considered in evaluating mobile diesel generators.

All the solutions discussed above will involve additional research into specific code implications that might be required. Depending on the nature of the existing site to be retrofitted, potential design and permitting implications might include data connectivity for point-of-sale activation, safety and security lighting, and further assessment of outage impacts to Wi-Fi or cellular operation of the EV service equipment. Remote PSPS locations may have limited or inconsistent cellular coverage that may be further impacted by a PSPS de-energization. Some of these locations have hard-wired data connections to the host facility as either primary or back-up connectivity that may not function during an outage. Retrofitting these data facilities may prove to be an additional logistical complication and increase costs.

SCE will study each of these solutions in greater detail prior to developing any pilots that aim to test the technologies and their abilities to scale. During the research phase, SCE will investigate how differences in site design impact the feasibility of a mobile, temporary, or permanent backup generation solution as well as the necessary hardware and software changes required to connect a charging station to a backup generator. Additionally, SCE will explore the operational and procedural implications associated with each of the proposed technology solutions to ensure that backup generation solutions can be isolated from the electric grid safely.

Other areas for further research include assessing the performance of charging stations when connected to backup generation and potential changes, if any, to the customer experience when charging at a station that is running on backup generation. SCE will look to investigate any potential power quality issues that affect charger function or reliability.

VI. Easement Rights

It is important to note that many of the existing public charging sites are EVSE provider-owned, operating on third party-owned land with complex leasing arrangements. If SCE were to deploy backup generation solutions at key public DCFC charging locations during the pilot phase, SCE may need to secure easement rights or grants from the property owners in order to construct, alter, add to, use, operate, or maintain overhead and underground electrical supply systems and internal communication systems in the property where backup generation will be deployed. Delays in acquiring grants or property access may delay deployment of the pilot backup generation solutions.

VII. Collaboration with EVSE Service Providers and EVSE Site Hosts

SCE recognizes that collaboration with EVSE service providers and EVSE site hosts will be essential during the due diligence phase to inform decisions about whether and how to design potential pilot projects, as differences in site design, operational logistics, and contractual arrangements with site hosts will directly influence the viability and scalability of SCE's three proposed technology solutions.

SCE will start by working with EVSE service providers with fast battery charging equipment in highly impacted PSPS areas to scope the technical, logistical, and procedural requirements or changes that would be necessary to successfully deploy backup generation at select, mutually agreed upon EV charging plazas. SCE will coordinate with EVSE service providers to develop any appropriate pilots that test the feasibility, safety, and customer value of the technology and procedures.

VIII. Interconnecting Customer-Owned Backup Generation with the Grid

While SCE explores the feasibility of deploying backup generation solutions at key existing EV charging locations, customers will have the ability to install backup generation at EV charging locations independently. In these instances, customers or charging station suppliers must apply for permission to interconnect with the electric grid and receive SCE's approval.

There are three common types of backup systems: (a) parallel operation, (b) momentary parallel operation, and (c) isolated operation. Parallel operation is a backup system that will interconnect and operate "in parallel" with SCE's electric system for more than one second. Momentary parallel operation is a backup system that interconnects and operates on a momentary parallel basis with SCE's electric system for a duration of one second or less through transfer switches or operating schemes specifically designed and engineered for such operation. Isolated operation mode is a backup system that will be isolated and prevented from becoming interconnected with SCE's electric system through a transfer switch or operating scheme specifically designed and engineered for such operation.

While customers operating backup systems under either momentary parallel or isolated mode are not obligated to enter into an interconnection agreement with SCE, an application for interconnection to the electric grid still needs to be completed to satisfy SCE's notice requirements for operating such generation facilities per California Health and Safety Code Section 119085(b). Customers can apply online using the Grid Interconnection Processing Tool (GIPT) at https://gridinterconnection.sce.com/.

IX. Conclusion

SCE strives to minimize the impacts of PSPS events on customers and recognizes the importance of access to functioning public EV charging infrastructure during PSPS events for EV drivers. SCE will investigate the feasibility, safety implications, and customer benefits of three backup generation technologies as a first step in exploring options to reinforce key charging locations with backup generation. This research will inform decisions regarding pilot development and the ability to deploy any of the proposed backup generation technology solutions after reviewing results of the pilot phase. Once the technologies identified in the Plan have been evaluated, SCE may implement pilot programs for those technologies it considers feasible and cost-effective to pursue. After completion of the pilot programs, SCE will review the findings and observations from each pilot program and develop recommendations for further deployment of any programs that may seem feasible and worthwhile to pursue at scale.