SANDAG

Regional EV Charger Management Strategy

Next Steps Summary Report

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Expect More. Experience Better.

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Introduction and Purpose

The San Diego Association of Governments (SANDAG) and local partners were awarded a California Department of Transportation (Caltrans) Sustainable Communities Planning Grant to develop a regional strategy to assist public agencies with providing readily *and* consistently available public electric vehicle (EV) chargers. The *Regional EV Charger Management Strategy* focuses on developing a structure of steps and considerations for installing charging private passenger vehicles and publicly accessible parking areas, such as parking lots for public buildings, park & rides, transit stations, rest areas, parks, libraries, recreation centers, and other publicly-owned lots. *The Next Steps Summary* provides a starting point for future policy development, highlights emerging technologies, and identifies remaining barriers for deploying and managing charging assets throughout the San Diego region.

The authors of the present strategy document compiled key components from other reports prepared for this effort:

- Peer Agency Research and Analysis Summary Report (November 2021)
- Regional and Local Charger Management Practices Summary Report (December 2021)
- Asset Management Considerations Summary Report (March 2022)
- Regional Public Charger Operations and Management Strategy (September 2022)
- SANDAG Internal Roadmap and Responsibility Matrix (January 2022)
- Roadmap for Public Agencies (January 2022)

This project provided guidance for typical SANDAG-led EV charging deployments in partnership with transit agencies and Caltrans District 11 at public transportation facilities such as transit centers, park & ride lots, and mobility hubs. It is expected that in a typical deployment, SANDAG may oversee the design, procurement, installation, operation, and maintenance of public EV charging stations through an agreement(s) with an electric vehicle supply provider (EVSP). However, the approach may vary based on site specifics or existing jurisdictional arrangements.

Next Steps Summary

Outreach

Moving forward, SANDAG staff should continue to promote key and relevant findings of the Regional Public Charger Operations and Management Strategy (Task 3) and the implementation roadmaps (SANDAG Internal Roadmap and Roadmap for Public Agencies) (Task 4) to the transit agencies, Caltrans District 11, local governments, and other public agencies through pathways that can provide engagement and buy-in. Potential venues may include the SANDAG Mobility and Sustainable Communities Working Groups, task forces, and policy advisory committees. Additional engagement opportunities include the multi-stakeholder Accelerate to Zero Emissions Collaborative; the San Diego Regional Clean Cities Coalition; and interagency meetings.

Planning

Collaborative Opportunities

The National Electric Vehicle Infrastructure (NEVI) program, which was established through the Infrastructure Investment and Jobs Act, will provide California with $384 million for 150-kW-minimum DC Fast Chargers to be installed along some interstate highways and state routes. The California Energy Commission is the state's NEVI administrator and will seek grant proposals from fast charging companies beginning in 2023. for SANDAG and/or local governments and agencies could coordinate with charging

companies to encourage proposals that fund corridor charging in the region and facilitate public-private coordination.

Additionally, the NEVI program provides funding directly to communities through the Discretionary Grant Program for Charging and Fueling Infrastructure program, colloquially referred to as "Community Charging". This funding is allocated on a competitive basis to local communities, and stipulates that at least half of the funding awarded must be distributed through a community-based grant program that prioritizes underserved neighborhoods. SANDAG and/or local governments may consider applying for funding to both fund charging equipment at transit stations along designated alternative fuel corridors and develop a wider-reaching community grant fund to encourage EV charging installations throughout San Diego County.

Kimley-Horn and Energetics expect EV adoption to increase in 2023 as the Inflation Reduction Act's provision implementing the Used EV tax credit is implemented, making secondhand EVs more affordable to a wide demographic of San Diego County residents. As EV ownership increases, the need for reliable and accessible charging infrastructure will continue to grow.

Utility and community choice aggregator (CCA) investments are expected to expand infrastructure programs in the coming years, but new programs may take different forms than currently exist. For instance, the Electrify Local Highways project (SB 350) was a pilot that provided EV chargers at four park & rides, but has not been expanded to additional sites. Similarly, the Power Your Drive for Parks and Beaches pilot (Assembly Bills 1082 and 1083) that installed chargers at public sites may not be available in the future. SANDAG and local governments should continue to coordinate with and provide input to SDG&E and CCAs on future EV infrastructure programs.

Reach Codes

Many cities and municipalities in California have implemented reach codes – local policies that require or encourage additional EVSP development and construction. San Diego currently adheres to the standard state-level set of EV construction policies outlined in the California Building Code and CALGreen. Other jurisdictions, including several community-choice aggregators in the Bay Area, have outlined sets of sample reach codes that have been implemented at a local level. These typically perform functions such as increasing the number of EVSE that are required at public lots or mandating the construction of additional charger make-ready.

Financial Considerations

The Charger Management Strategy and implementation roadmaps lay out the financial considerations for installing and managing public EV charging. With these tools, SANDAG will be able to implement a strategy for EV charging at public transportation sites. Additionally, SANDAG should explore opportunities to participate in federal, state, utility, and CCA programs and seek public-private partnership options.

Barriers and Uncertainty

Market Changes

Despite significant improvements in vehicle efficiency, charging speeds, and segment diversity, the electric vehicle industry is still in a state of infancy. In California in 2022, EVs made up over 17% of new vehicles sold, with substantial growth forecasted as the state aims to meet its 2035 goal of phasing out sales of new gasoline vehicles. Large numbers of new models are expected to arrive in a variety of segments over the next decade, including improved diversity in the popular SUV and pickup truck markets, but vehicle demand and adoption will ultimately be influenced heavily by changing financial and market drivers.

Programs aimed at improving ZEV adoption within San Diego County may require focusing on making used ZEV vehicles more affordable for middle- and lower-income residents of the county, as SDG&E is currently the only investor-owned utility in California that does not offer a utility rebate for pre-owned vehicles. Income cutoffs for assistance from state-level programs generally do not account for cost-of-living adjustments, and may thus underserve a substantial portion of the population in high cost-of-living metropolitan areas.

EV service providers, including network providers and charging equipment manufacturers, will likely be subject to significant change over the coming decade as their market continues to shift and grow. Historically, manufacturers or network providers exiting the market have left equipment at risk of becoming stranded assets with no formal support. However, increasing requirements for interoperability through the Open Charge Point Protocol (OCPP) standard allow for easier replacement of either network providers or equipment, reducing the risk of abandoned stations. Best practice dictates that installed equipment and selected network providers should allow for contingency plans in the event of either company's dissolution or insolvency.

As seen during the COVID-19 pandemic, EVs are subject to many of the same globalized supply chain issues as internal combustion vehicles. However, the diversity of materials in an EV may make them more susceptible to interruptions in global trade. The US has taken action to increase domestic production of key pieces of the EV supply chain (ex. batteries, semiconductors, vehicle assembly), but these processes may take time to increase to a point where they can sustain domestic demand for electric vehicles. Further supply chain issues may constrain EV production and availability, and may reduce the ability for both private and public sectors to decarbonize their transportation.

Community-Level Barriers

Underserved communities face an uphill road to EV adoption. While California law protects tenants' rights to install EV charging at MUDs, tenants are still responsible for the costs associated with installing charging. In low- or moderate-income communities in the San Diego area, this may be a significant barrier to EV adoption, rendering charger availability in public settings (such as transit centers) a much more valuable opportunity for charging. Similarly, cost parity has yet to be reached between EVs and internal-combustion vehicles, and incentives for vehicles and infrastructure need to continue to be made available to residents of low-income and disadvantaged communities.

In times of grid instability, such as during utility-imposed Public Safety Power Shutoffs (PSPS) or during extreme heat waves, EVs may be a double-edged sword; while the batteries onboard EVs should be able to serve as valuable power reserves during rolling blackouts through vehicle to grid integration, it's important to ensure that vehicles are not further contributing to grid destabilization by charging during periods of maximum demand. During emergency load reduction periods, SANDAG should ensure its chargers utilize load management practices, disincentivize charging during these times, and communicate any planned temporary pricing changes. Vehicle-to-grid capabilities may further enhance the appeal of Chargers likely to be affected by PSPS events should have backup sources of power in the event of emergency power cuts – this may take the form of additional battery storage, solar panels, or a combination of the two.

Technical Assistance

The increase in EV availability raises the need for additional charging infrastructure throughout the County, which in turn will require site hosts to understand the process around planning and executing a charging installation. SANDAG and associated agencies may find themselves in the position of needing to offer technical assistance to site hosts interested in placing EV chargers at their properties. The information contained in the *Public Charger Operations and Management Strategy*, *Asset Management Considerations,* and *Regional-Local Practices Reports* will address the most frequently-asked questions,

but SANDAG should consider offering workshops and/or public dissemination events aimed to spark dialogue with interested site hosts.

Emerging Fields

Medium- and Heavy-Duty Fleet Support

To date, the primary focus of the electric vehicle market has been on private transportation and light-duty vehicles. However, state regulations and recent evolutions in battery chemistry and charging speed have enabled the electrification of larger and heavier-duty vehicles, including transit buses, refuse trucks, school buses, yard tractors, and Class 6-8 freight trucks. Successful regional deployments of these vehicles have been proven using traditional Level 2 or DC Fast charge infrastructure, but facilitating longer-distance and interregional travel (for applications such as long-haul trucking or rural bus routes) may require a different approach.

Enroute charging is important for long-distance routes and will likely play an important role in supporting electric fleet deployment for particularly extreme duty cycles. The time-sensitive nature of applications such as transit bus fleets demands minimal interruptions to a vehicle's route once it is dispatched from its garaging location. Similarly, the steady-state cruising conditions associated with long-distance trucking require large batteries and rapid replenishment.

These distinct use cases may be supported in two ways. The first is enroute opportunity charging, currently common with fleets operating small-battery transit buses such as King County Metro (WA) and Antelope Valley Transit Authority (Southern CA). These rely on high-powered pantographs or wireless inductive charging, located either at the depot stop on circulator routes or at stops along the route. Enroute charging can reduce electricity demand (and costs) at their base facilities by providing the bus (or other EV) a partial charge while on route, and could extend the service area that an EV can cover.

The second is the rest-stop model, typically requiring longer dwell times and serving larger batteries. This model is seen frequently with school buses and transit fleets operating buses on shorter routes or with larger batteries. This model takes advantage of vehicles' longer dwell times by reducing the delivered power, and will cost less to implement than an enroute charger.

Future Technologies and Policies

There are significant improvements in vehicle and charging technology that may impact SANDAG or other public agency charging deployments over the next 10 years.

Wireless Charging

Inductive charging (also known as wireless charging) has been deployed internationally and at several fleets throughout California and the nation. For example, the Antelope Valley Transit Authority has deployed static inductive charging on their bus routes to reduce electrical capacity and demand at their base facility and extend the effective range of their transit buses.

The primary advantage of wireless charging is the automatic initiation of charge sessions without a bus or vehicle driver needing to exit the EV to physically plug in their vehicle. Additionally, the unobtrusive nature of the infrastructure does not require permanent infrastructure that infringes on the public right-of-way as curbside charging does – an issue with which other cities (such as Seattle, WA) have struggled. This may improve and simplify permitting processes and improve overall charging system reliability, as there is no impedance to pedestrian, bike, or traffic flow, and the system has no moving parts or connectors.

A drawback is the necessity of an additional inductive "receiver" that is able to translate the electromagnetic frequencies from the pad to the vehicle, which can add significant bulk and weight

depending on the required power, as well as the additional need to bury or otherwise reliably anchor the charging "pad" at the designated charging spot.

Roadside/On-Street Charging

Streetside charging refers to public chargers installed along the public right-of-way, which has been explored in certain areas of San Diego and more thoroughly in Los Angeles and Sacramento, with over 400 chargers installed on streetlight poles throughout metro Los Angeles.

Two key issues with curbside public charging are overcoming the public permitting process - which tends to restrict undergrounding cables in the public right-of-way and heavily limits charging cables stretching across sidewalks and bike lanes - and the highly competitive environment for streetside parking, particularly in the denser residential and commercial neighborhoods of the city. However, modifications to the permitting process that provide an easily accessible path to allow drivers to install, reserve, and access EV chargers may be crucial in helping to develop and expand the EVSE network within San Diego.

800V Charging

High-voltage charging is quickly becoming attractive for both light-duty vehicles with large batteries and for heavy-duty vehicles, including transit buses and Class 8 semi-trucks. By increasing the charging voltage, new generations of 800V chargers allow for lower current passthrough, which reduces the heat generated by the charging process while maintaining the charging speed.

However, this technology is currently still in its infancy, and largely deployed for boutique or flagship light-duty electric vehicles at this time. When deploying DC Fast chargers, agencies should consider if chargers should be 800V capable (or whether infrastructure should be future-proofed at this time) to serve this growing segment of the vehicle market.

For higher-powered charging, the 800V electricity supply can further be increased to upwards of 1kV to enable charging speeds of 1000 kW / 1 MW, which is better able to serve vehicles requiring large amounts of energy delivered in a short amount of time (such as freight trucks or transit buses).

However, this comes at a significantly higher installation cost due to the robust electrical infrastructure required to support energy transfers of this magnitude, and the electricity throughput and power requirements may be extremely expensive without careful coordination with SDG&E.

EV Charging Site Reassessments

As the market for electric vehicles continues to constantly and rapidly evolve and shift, the demand and usage patterns for public charging sites will also be subject to expansion and change. To ensure that sites can keep up with projected increases in charging behavior, it may be useful for SANDAG to develop guidance for sites to reference to conduct a reassessment of how well their charging equipment and policies are serving driver needs and requirements.

Potential guidance could resemble questions for the site host to ask of themselves, including:

- How often are the chargers fully used? Are drivers forming a queue to charge?
- How costly are the electrical bills? Are drivers charging during peak pricing hours?
- What drivers are using the chargers? Are they mostly visitors to the site or are they visiting other locations?

EV Charger Decommissioning and Recycling

EV chargers generally have lifespans of 10-15 years, depending on their environment and usage cases. However, changing conditions at charging sites (increased usage, unexpected need for additional functionality, etc.) may dictate early replacement. In cases where chargers are still in good working order,

there is a strong resale market for commercial-level EV chargers, and equipment should easily be moved back into the consumer stream. If chargers require replacement due to wear or age, they can be sent to an electronics waste disposal or recycling site.

In Los Angeles, a major EVSP has partnered with Homeboy Industries to train their technicians on how to break down and recycle their chargers; in San Diego, the San Diego Urban Corps may represent a similar opportunity for the establishment of an EVSE-specific recycling program. In all cases, the recycling of chargers should be encouraged or required to minimize the disposal of valuable components or otherwise operational chargers.