SANDAG

Regional EV Charger Management Strategy

Regional and Local
Charger Management Practices
Summary Report

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1. Introduction and Purpose

The San Diego Association of Governments (SANDAG) and local partners were awarded a Caltrans Planning Grant to develop a Regional EV Charger Management Strategy. This project will develop a regional electric vehicle (EV) charger management strategy to support the reliable operation and expansion of public EV charger infrastructure located at public parking areas such as Park & Rides (including mobility hubs), transit stations, rest areas, and other commuter lots to serve light-duty passenger vehicles.

The project establishes a project stakeholder team with transit agencies, Caltrans District 11, San Diego Air Pollution Control District, governments, and other public agencies, and documents existing practices for treatment of public chargers. It will prepare a management strategy that addresses site-level and region-wide needs, develop a roadmap to implement the strategy through adequate policies and procedures, and engage stakeholders including those representing disadvantaged communities. This project directly supports implementation of SANDAG's Regional Transportation Plan, state transportation electrification policies, and state GHG reduction policies.

This Regional and Local Charger Management Practices Summary Report documents existing and planned practices regarding the planning, vendor procurement, installation, ownership, and ongoing operations and maintenance of publicly available EV charging stations at public lots within the San Diego region. The project team conducted interviews with representatives from transportation agencies, local government, higher education, and private electric vehicle service providers (EVSP). Interviews took place via conference call and typically lasted 30-60 minutes. This report summarizes the project team's findings and highlights common responses and themes, which will inform the next phase toward developing specifications for a regional procurement and guidelines for deployment. The report concludes with a discussion of the barriers and opportunities presented by these findings.

2. Agency Outreach Process

The interview team asked public agency staff a variety of questions on their existing EV planning methods, procurement process, operations and maintenance strategy, data utilization, and future intentions. Questions regarding the planning process focused on whether the agency had a formal strategic plan they followed, or whether it was done in an *ad hoc* manner. Procurement questions centered on the contracting mechanisms and installation process. Operations and maintenance questions revolved around the reliability of the agency's chargers, the costs of operating the chargers, who covered those costs, and the maintenance structure. The interview team asked questions regarding whether the agency had access to charger utilization data, and if so, what they did with that information and how it informed their planning process. Finally, agency staff were asked to look ahead to their future charging strategy and needs – namely equity considerations, changes to their existing charging contracts, resilience concerns, and interest in regional coordination or guidance.

Interviews with private companies covered the same topics but focused on their experience working with public agencies and public charging station deployments. Representatives shared successes and barriers they had experienced on public charging projects and provided some recommendations on what would encourage or enable them to pursue public projects in the future.

Representatives from the following entities participated in the interviews:

- Caltrans District 11
- City of Carlsbad
- City of Chula Vista
- City of National City
- City of Escondido
- North County Transit District
- Port of San Diego
- SANDAG
- San Diego County
- San Diego International Airport
- San Diego Metropolitan Transit System
- University of California, San Diego
- Tesla
- Volta

3. Existing Practices for Regional and Local Charging Infrastructure

3.1 Planning

3.1.1 Planning Process

Many of the agencies indicated their approach to planning has been informal and opportunistic for their early deployments, one influenced by funding availability, sustainability policies, or climate action plan goals, although there were some participants that had developed a formalized EV strategy. The County seemed to be closely following their Board adopted EV Roadmap. The University of California, San Diego, (UCSD) seemed the most proactive in its approach to developing a continuous process for EV charging deployment. UCSD's structured approach has enabled them to expand their EV infrastructure rapidly and take advantage of lessons learned quickly. Overall, a common focus for many agencies has been *ad hoc* deployments driven by grants with little or no out-of-pocket costs, utilizing funding opportunities such as SDG&E programs as well as state and federal grant programs.

> Many of the agencies interviewed indicated an informal planning strategy. The top focus for agencies has been on deployments driven by grants with little or no out-of-pocket costs.

Some agencies add charging station infrastructure to new construction or integrated within Capital Improvement Program (CIP)-funded facility upgrades. MTS, NCTD, and Caltrans were particularly interested in developing their charging strategy and planning to address the needs of transit, scooters, E-bikes, and other modes in addition to single occupancy cars. To that effect, National City pursued a Clean Mobility Options grant to a solar canopy and charging for shared mobility assets at the 8th street charging stations.

For transit agencies, EV charging was a lower priority than their primary goal of providing transit services. Parking lots are seen primarily as an amenity to support transit riders, and there is a natural tension between providing dedicated parking spaces for EVs and potentially displacing a parking space for transit patrons. Agencies are also considering joint development opportunities on transit lots. This new development would retain some transit patron parking and would likely include the California Green Building Code (CalGreen) Minimum.

Some of the initial deployments were treated as pilot projects; however, there is a now a need to develop further plans. SANDAG's last Regional Plan and associated Environmental Impact Report (EIR) including language that all new park & ride facilities must have ready infrastructure for EV charging. This requirement is likely to be strengthened to require full charger installation in the upcoming 2021 Regional Plan.

3.1.2 Site Selection and Prioritization

Methods for site selection and prioritization have been based on several factors:

- Ease of installation, such as at new facility construction or redevelopment sites
- Existing power capacity
- Existing parking utilization and turnover
- Grant applicability, such as equity and communities of concern
- Charging utilization data

Agencies stated that ease of installation was a major factor in site selection, and commonly leveraged new construction or redevelopment of public facilities to add charging with CIP funds. Early deployments intentionally took advantage of existing locations with sufficient power capacity to support charging infrastructure to minimize construction costs and avoid the lengthy process of installing new power service. Design requirements can also render an otherwise desirable site infeasible, such as clear space around transformers, which can be especially challenging to satisfy in densely populated areas like downtown.

> Site selection was governed by ease of installation, existing power capacity, expected utilization, grant requirements, and charger utilization data.

Another method for site selection was based on where chargers would be most highly utilized, such as in central business districts where there is high parking utilization or turnover. Agencies expressed the need to balance the natural trade-off between serving general parking needs and dedicating spaces to EV charging.

Grant requirements and equity considerations also shaped site selection and prioritization. Several grant opportunities required chargers to be located within Disadvantaged Communities (DAC) or Low-Income Communities (LIC). Some agencies have also prioritized filling infrastructure gaps where there was no private competition nearby, which often coincides with DACs and LICs, although some of these areas received private charging installations afterwards.

While many agencies stated that their ability to analyze charging utilization data is limited due to staffing constraints, some agencies have been able to use data to justify additional installations. In these cases, agencies prioritized deployment in areas where utilization has been highest.

3.1.3 Funding

The availability of grants and incentives was essential to funding most projects. Federal, state, and utility programs have all been used to support construction. The San Diego region was one of the original launch locations for the federally supported EV Project, led by a "predecessors of today's" Blink Charging. There have been various competitive California Energy Commission funded projects, both competitive grants and the jointly funded CALeVIP San Diego County Incentive Project. The region has also seen various utility funded programs by SDG&E, including Power Your Drive for Workplaces, Schools & Parks (AB082/1083), and Electrify Local Highways (SB350 Priority Review Project).

> The time limits built into some grant programs meant that a city would have needed to select a vendor before the funding opportunities opens.
>
> A bench of pre-qualified vendors could enable agencies to nimbly turn grant funding opportunities into shovel-ready projects consistent with the large volume of chargers that will be needed in the future.

Although grants and incentives were essential to making projects happen, pursuing them can be challenging for public agencies. Specifically, the time limits built into some programs meant that a city would have already needed to select a vendor before the funding opportunities open, since public procurement rules require a lengthy open-bid vendor selection process.

One agency was able to win a competitive CEC grant and then issue a solicitation for a vendor. This worked well given the time period allowed in the grant and the willingness of the agency to take the lead in issuing an RFP. Other agencies have been able to pursue grant funding without the open-bid process through the use of pilot projects. While this approach has been effective in the early adoption stage of infrastructure deployment, a bench of pre-qualified vendors could enable agencies to nimbly turn grant funding opportunities into shovel-ready projects consistent with the large volume of chargers that will be needed in the future.

In some case, agencies have fully paid for charging installation as part of larger construction projects. While it is cost-effective to include charging at the time of construction, the total amount of charging that can be deployed in this manner is limited by the number of sufficiently sized projects. In all cases, agencies pointed to many different funding sources that they had cobbled together to produce infrastructure they currently have.

3.2 Procurement

3.2.1 Procurement Process

While agencies have deployed chargers with multiple vendors throughout the region, ChargePoint and Blink are currently the most common EVSE suppliers. Interviewees had a breadth of experiences during the procurement process. Many agencies gravitated to the state's existing contracts and pre-approved vendors, but commonly expressed an interest in a SANDAG-developed list of pre-qualified vendors. Some state entities (UCSD and Caltrans) will have to purchase from the state contract under all circumstances.

When private vendors have come with the grant funds already in hand, agencies must get creative to allow them to build. These grant funds are often designed as limited pilot projects that could be bid out when it is time for replacement or expansion. A regional procurement may support more future projects that have reached a scale where they could not be considered a pilot.

Many agencies prefer a license agreement or easement to allow a vendor to place charging equipment rather than the agency procuring and installing equipment themselves. This is because the agreement to place equipment on city property may not trigger the requirements for a public procurement process in the same way as a city-led public works project.

Participation in utility programs such as Electrify Local Highways and SDG&E's Schools, Parks, and Beaches programs has proven challenging for agencies. Although most agencies have no problem with competitive procurement rules when participating in a utility program, the overall process—including granting an easement—can been time consuming, especially when city attorneys/legal involved. Often, the procurement process has covered both the equipment and the construction. Some agencies have used existing on-call contracts with electrical contractors, especially when it is installed on a make-ready or replacement of an existing unit. Some procurement processes did not consider the ongoing operations of stations beyond an initial term, or what to do with the equipment at the end of life.

3.2.2 Ownership and Operating Model

Many agencies currently utilize multiple types of ownership and operating models for different charging stations within their jurisdictions. The majority of interviewees, both public and private, preferred that the vendor owns and operates the equipment with as little cost or involvement by the agency as possible. Those that preferred the third-party owner/operator model typically cited limited public staff time for operations oversight, the desire to allow private industry to set user fees according to the market, and the desire for simplified (or eliminated) financial obligations between the private and public entities. Agencies acting as owner/operator preferred having more control of their assets. One example is UCSD, which expressed an interest in incentivizing charging at times when more renewable energy is available.

> Agencies are using a variety of operating models, but many stated they prefer to be as hands-off as possible.

Agency Owner/Operator

The site hosts owns the charging equipment and is fully responsible for operations of the station. The site host/station owner may pay a network fee and a payment processing fee to an EVSP/vendor but is responsible for paying the electricity costs and collects all revenue (after fees). The host either has a service contract with the vendor or would be responsible for repairs as needed. The host has full control over station operations including pricing and energy management.

Agency Owner, EVSP Operator with Revenue Share

This was a common model under certain grant programs. The stations were generally installed with limited out-of-pocket costs to the site host. The site host/agency owns the station after an initial grant term, but they share some of the operating costs and revenues with the station/network provider. Because the site host owns the station, they are responsible for removing or upgrading that station at the end of the useful life, or may need to sign an extended contract with the original vendor for the vendor to maintain responsibility.

Agency Make-Ready, Turn-Key Operator

The site host is responsible for installing the electrical infrastructure to bring power to the parking area. A third-party operator places their equipment, pays all costs of running the equipment, and collects all revenue. The site host does not have control over pricing or other operational decisions beyond what was specified in the original contract.

Utility Make-Ready, Agency Owner/Operator

The site host provides an easement and the utility provides the electrical infrastructure to the parking area. The site host can choose to one own and operate charging stations placed on that infrastructure or could use a turn-key operator. The utility may have a specific list of approved vendors and reporting requirements.

Utility Owner/Operator

Under this model, the public agency offers the utility an easement. The utility builds and owns all the electrical infrastructure up to and including the charging stations. In some cases, a small participation payment is required, but there are no other out-of-pocket costs for the site host. The utility is responsible for operating and maintaining the stations. The utility may be required to return the site to its original state at the end of the easement term. Utilities are limited by regulatory rules on the number of types of sites where they can own and operate charging stations.

The SDG&E Power Your Drive for Parks Public EV Charging Program is based on an easement with the utility company as the owner/operator. The program provides no-cost design, installation, and operation of SDG&E infrastructure and EV charging equipment at no cost to the agency for 8 years. SDG&E is responsible for installing the infrastructure, and selects an EVSP to provide charging and payment services to drivers.

EVSP Owner/Operator with a Public Site Lease

The site host provides a lease for a parking area or specific spaces for charging. The lessee/vendor is responsible for the complete installation and operation of charging within that space, including utility coordination, permitting, installation, and ongoing operations. The site host has no control over the stations beyond what is outlined in the lease. Lease terms usually are for 5-10 years with additional options, but the lessee may return the site with stations removed but utility upgrade still in place at the end of the term. Some public agencies receive revenue from the lease, but often it is structured as a no-cost lease. Both EVSPs interviewed for this study indicated that this operating model is desirable for public deployments.

Table 1 - Matrix of Operational Models

Operational Model	Example	Capital Costs	Network Costs	Payment Processing	Benefits	Challenges
Agency owner / operator	Carlsbad-ChargePoint	Part of City Parks CIPs	Paid by city, $20/port month	Network takes small percentage	Host has full control over pricing	More costly to city unless securing external funds
Agency owner / EVSP operator with revenue share	Port of San Diego-Blink	Shared, perhaps unevenly	Lower cost to site host	Higher overall % take of revenue by network	Partnership encourages high utilization designs, regular reporting, marketing	Record-keeping transparency, higher electricity cost to end user.
Agency make-ready / turn-key operator	County-ChargePoint	Site host builds make-ready (can be grant or Utility funded) EVSP provides equipment.	Limited cost to host	May be negotiable	Host may be able to influence retail prices to encourage EV adoption	Coordination of construction from potentially two entities (to-the meter/from-the-meter). Vendor may be less interested if unable to see hardware charge for network fees
Utility make-ready / agency operator	Future utility programs	Limited to purchase and installation of hardware	Negotiable by host	Negotiable by host	Host has more control	Utility easements and influence over location, minimum ports required
Utility owner / operator	SDG&E parks & Electrify Local Highways	Utility/rate payers	Paid by utility	No influence	Little host responsibility (Cost, etc.) or influence	5-10 year easements, potentially uncompetitive electric pricing compared to gasoline
EVSP owner / operator with a public site lease	Tesla, Electrify America	None to site host	None to site host	Expect none to site host	Limited responsibility, low/no cost to site host	5-10 year lease with renewal options, Issues with public contracting rules (need to go to RFP, private activity on public property), potentially uncompetitive electric pricing compared to gasoline

3.3 Operations and Maintenance

3.3.1 Reliability

Ongoing operations and maintenance have been challenging, especially as many of the charging stations that were originally installed with grants in the 2011-2015 range are reaching the end of their useful life. The EVSP market is growing very rapidly and agencies have felt the effect of the associated market volatility. Company mergers, bankruptcies, and acquisitions can result in service disruptions and charger reliability issues, which weakens customer confidence in public charging. Agencies should be aware that these issues may arise and take measures to reduce the effect on their charging services.

For example, one agency shared that their vendor was unresponsive for a number of years and did not seem to be adhering to their contractual agreement for station operations and maintenance. However,

> A regional maintenance procurement may improve customer confidence by providing a back-up maintenance option to bridge service disruptions caused by EVSP market volatility.

once the city began exploring the option of switching to a different provider to improve reliability, their vendor became much more involved and responsive. Other agencies have indicated that their stations have been very reliable and mentioned that their older systems rarely require maintenance.

Some vendors offer comprehensive service packages, although these can be cost-prohibitive. One city kept a service agreement in place with their most-used stations, but opted to repair chargers with lower utilization through on-call contractors as needed. UCSD often swaps out entire stations when one breaks instead of paying for the ongoing maintenance package through the vendor. Given their high number of stations, UCSD plans of getting a contract with a more cost-effective repair service who can group together multiple repairs in a single service call.

SANDAG could consider a similar regional maintenance procurement model to provide smaller agencies an affordable maintenance option, or as a back-up option to bridge service disruptions caused by EVSP market volatility. Development of standardized contract terms that specify performance metrics on reliability and maintenance requirements may also help agencies achieve more consistent performance results from vendors.

3.3.2 Parking Management

Parking management was a commonly raised issue, especially where lots are primarily used by commuters parking for longer than it requires to charge their vehicle. MTS, for example, is trying to balance 2-4 hour charging maximums with typical 8-10 hour parking turnover at their Park & Ride lots. Similarly, airport customers often charge for 4 hours but remain parked for multiple days. MTS would like

> Managing parking can be challenging when vehicles are parked for much longer than needed to charge. Smart energy management can reduce the need to move vehicles.

to prioritize EV charging for transit riders and has considered tying the charging fee to whether the driver switches modes at the station; however, this would require additional infrastructure, such as gates and connecting to the fare system that aren't feasible at this time.

UC San Diego notifies drivers when someone wants their charging spot, but due to difficulty finding campus parking, many drivers will risk a ticket rather than move their vehicle. One possible solution that UC San Diego has implemented in some parking locations is using PowerFlex for adjustable load management. This has allowed them to replace one aging Level 2 charger with three new ones without circuit upgrades. With these chargers, the driver provides their estimated time of departure and the number of miles they need to gain. The network then optimizes power delivery to serve users but doesn't exceed the circuit limit. Importantly, with more charging stations and the ability to shift power between stations, vehicles no longer need to be moved in the middle of the day.

3.3.3 Fee Setting and Revenue Generation

In general, agencies set charging fees to at least offset the cost of electricity, and when possible, to offset other operational costs as well. While some agencies were open to the possibility of revenue generation in the future, they generally wanted to make sure they were providing a reliable service.

Most of the legacy Blink stations are priced at $0.49/kWh, which is more expensive than gasoline on a cost equivalent basis. The price should cover the average electricity cost, but the fee collection is governed by a complicated revenue share agreement that has made it difficult to track how much revenue the agency receives.

For agency-owned ChargePoint units, the agencies have full control over pricing and have generally set pricing in the $0.30-$0.35/kWh range. At these prices, agencies can cover the cost of electricity and some or most of the other service fees, depending on usage. ChargePoint has a base monthly networking fee, as well as a small percentage for payment processing. Agencies with large numbers of charging stations have been able to negotiate with vendors(?) for lower per-port fees.

ChargePoint allows parking fees that can be billed concurrently or after charging has finished. This system encourages users to move their car as soon as it is done charging but can also be an additional source of revenue. However, it's not always practical in locations, such as in Park-and-Rides or medical centers, where people do not return for many hours. ChargePoint uses a per/kWh and parking fee model at stations they own and operate. UCSD prices their charging on the lower end to offer a reasonable price alternative to home charging, as well as to encourage mid-day charging on the university's lower carbon microgrid. The use of the PowerFlex System with long-dwell time charging offers the opportunity to shift charging to lower carbon times and also reduce the need for drivers to move their cars mid-day.

> Agencies usually set pricing with the goals of covering electricity costs and other operating expenses. Pricing can also be used as a tool for parking and charging management.

Low Carbon Fuel Standard (LCFS) credits greatly improve the economics of providing charging. By default, EVSP will collect these credits for public charging stations, but agencies can request to keep them. PowerFlex offers charging with no network fees when they are allowed to keep the LCFS credits; however, their system is most geared towards long-dwell time and large-scale charging. There are also record keeping requirements and transaction fees associated with monetizing LCFS credits. Agencies that can generate additional LCFS credits from fleet charging can pool the credits and reduce the overall burden of collecting and transacting them.

Caltrans cannot make a profit from charging and had to go through a process to become comfortable charging a user fee set only to recover costs. Caltrans is still seeking additional federal guidance on restrictions around charging revenues along interstate highways. SDG&E owned and operated stations from the Power Your Drive (PYD) and Electrify Local Highways stations use time-of-use charging that charges higher fees at time the grid is strained. PYD uniquely has demonstrated an ability and flexibility of drivers to limit charging during grid-constrained periods. Some agencies which have both PYD and other public stations report that employees will switch to public stations, which charge a flat fee, when the PYD stations enter peak pricing periods. This reduces the availability of public charging for others who may need it at that time and defeats the grid management purpose of increased price periods.

3.4 Data and Reporting

Overall, while most agencies had access to data about their chargers' usage, few were making full use of the information they have due to time and staff constraints. Some networks have had trouble regularly producing requested reports. One vendor indicated that they had worked with agencies that had set their own data requirements, but that in general they prefer when data requirements match what they are already required to report.

Agencies commonly expressed that they would like to use data to best fit the charger type to the use case. Many system operators pointed out that many locations with DCFCs actually experience travel patterns that are compatible with Level 2 chargers, which are easier on the energy grid. Agencies could benefit from regional guidance on analyzing utilization data to justify future deployments, recommend charger types, or optimize utilization by adjusting user fees.

> Agencies could benefit from regional guidance on analyzing utilization data to justify more stations or user fee adjustments.

3.5 Equity Considerations

Equity was cited as an important concern for all interviewees, but there was significant variability in the extent to which equity was a driver of deployment. Many agencies were actively pursuing grant funding that targets disadvantaged communities (DACs) and low-income communities (LICs). Others, particularly those with lower volume, were focusing on low-hanging fruit based on where the opportunity presented most readily. As the EV charging network expands in the next 5-10 years, a more strategic approach will likely be needed.

There are numerous equity issues associated with deployment of electric vehicles, ranging from disparate public health benefits, market-driven charging infrastructure gaps, security concerns, the digital divide, and financial barriers to entry and usage. The exhaust from internal combustion engines from cars and trucks affects the health of many residents of the San Diego region. The worst of these effects are felt in low-income communities of color. Transportation electrification can play a major role in improving air quality; currently however, the primary beneficiaries of electric vehicle incentive programs are those who can afford the high cost of entry, who typically also live in neighborhoods with cleaner air.

To maximize return on investment, EVSPs typically place charging stations where they are likely to get the highest utilization, resulting in charging infrastructure gaps in lower-income communities. Charging in an empty lot late at night after nearby amenities are closed can make some users feel unsafe, especially vulnerable populations such as women, LGBTQ, and seniors. Use of public EV charging typically requires ownership of a smartphone with a data plan, credit card, bank account, and enough technological literacy to set up an account through the EVSP's mobile app, all of which can present as barriers to low-income users, seniors, and people with limited English-speaking ability. Agencies should endeavor to fill infrastructure gaps in communities of concern, consider personal safety in parking lot design and lighting, and consider including specifications for methods of payment that do not require the use of a smart phone.

> Agencies should endeavor to fill infrastructure gaps in communities of concern, consider personal safety in parking lot design and lighting, and consider including specifications for methods of payment that do not require the use of a smart phone.

In an effort to encourage EV adoption within DACs, UCSD has a fleet of 10 Nissan Leafs available for 2-week ride-and-drives for employees living in 9 designated zip codes. MTS held a community meeting where attendees voiced disinterest in EV charging due to the high cost of electric vehicles, but were more interested in other amenities like e-bike and e-scooter charging, as well as increased service frequency, more and better next arrival signs, and subsidized transit passes for youth. Public education about the long-term benefits of public EV charging will be critical to help residents understand that while market penetration in these areas may be low for now, communities will need charging infrastructure to be prepared for market shifts in the auto manufacturing industry, as well as the state-mandated moratorium on new sales of internal combustion engines.

It is critical that any program to address clean mobility go beyond simply providing subsidies for vehicles and installing charging stations for private cars. An excellent resource for addressing the challenge of clean mobility for disadvantaged communities is the Greenlining Institute. Their website states : "While electric cars help to reduce pollution, they cannot fix all of our transportation problems. Electric cars still contribute to congestion and auto-centric cities, while car ownership remains a financial burden for low-income households. We recognized that we needed a way to determine how electric vehicles fit into the wider mobility space."

Today there are a multitude of new mobility technologies and services available, such as bikeshare, scootershare, carshare, on-demand services such as Uber, and autonomous vehicles. Greenlining Institute observed that despite the many new mobility options available today, no mechanism existed to assess which options are the most equitable, sustainable, or the best fit to meet community-identified mobility needs.

Although equity has been incorporated into EV charging deployment, it should be integrated into overall clean mobility efforts beyond supporting single occupancy vehicles.

SANDAG has been embracing clean mobility projects for those that do not want or cannot afford to own a car, although some agencies still need support and guidance in deploying these. It is critical to engage stakeholders from these communities to develop projects to improve pedestrian and cycling facilities, transit frequency and facilities, and programs for affordable micro-mobility to assure that clean mobility investment serve all residents. CARB provides "funding for zero-emission carsharing, carpooling and vanpooling, bike-sharing, scooter-sharing, innovative transit services, and ride-on-demand services in underserved communities" through its Clean Mobility Options program. Agencies are interested in these types of projects, although none have not been deployed in the region.

In addition, SANDAG can continue to ensure? its existing programming, projects and stakeholder engagement programs in disadvantaged communities are well-integrated with its clean mobility efforts, including EV charging.

3.6 Resilience

Although there was some interest in the resiliency of charging infrastructure, most agencies have not yet developed specific strategies to address EV infrastructure resiliency. Agencies stated concern regarding public safety power shut-offs (PSPS) and

Agencies expressed interest in energy grid resilience, but most have not developed specific strategies for improvement.

power outages due to disasters and energy grid overloads. There is a strong interest in charging that can integrate with solar and in microgrid integration with other energy projects. One agency was interested in solar and storage solutions that could reduce overall costs in addition to providing resilience benefits. The County has discussed resilience with SDG&E and is exploring partnership models to deploy microgrids in places that provide community resources during a disaster, in addition to energy storage for vehicle charging.

UCSD's campus hosts an advanced microgrid and is able to support EV charging along with critical building operations with multiple forms of generation and storage. However, they reported being very influenced by major blackouts in Texas to do more work in piloting grid resilience, especially in supporting emergency operations when the grid goes down. UCSD is working on a demonstration project to have a mobile diesel generator to support EV charging and other critical energy needs when other energy resources are unavailable..

Many public fast charging EVSPs are beginning to integrate storage to reduce utility costs, but not designed for grid independence. Both EVSPs and agencies will be looking to SDG&E for best practices and future pilots of grid-independent charging in areas subject to public safety power shut-offs. Agencies are also interested in other sorts of infrastructure hardening that could help ensure reliable charging operations through extreme weather events; however, they do not currently have practices in place.

3.7 Future Plans

3.7.1 Expansion and Upgrades

Agencies are starting to integrate the lessons they have learned as they plan for expansion and upgrades to their charging infrastructure, but more guidance is still needed. Agencies are looking to put clear policies in place regarding the requirements for charging at newly built public facilities to standardize the deployment.

Agencies are taking a more user-focused approach in deploying charging, considering things like driver safety by placing charging in visible, well-lit area. They are also considering payment systems that could take credit cards instead of requiring proprietary apps or RFID tags.

Incentives continue to drive new deployments with some agencies working with vendors who were able to secure CALeVIP funding. Other agencies are working with SDG&E to participate in their programs for schools and parks, as well as fleet and workplace charging.

Agencies are considering load management more in new deployments, both to increase the numbers of stations that can be deployed where electrical capacity is limited, as well as for reducing ongoing operations costs. Encouraging charging at times where renewables are abundant on the grid can offer cost advantages for the end user and increase the value of LCFS credits due to lower carbon intensity of the grid during those times.

> Agencies are deploying lessons learned to future expansions, including making deployments more user focused, and instituting load management.

3.7.2 Contract Changes

Agencies were very interested in having access to a regional bench of vendors, although they would consider going through their own routes if there were unique requirements they wanted to meet or they thought they would be able to get lower costs.

One key contracts consideration is the reliability of the vendor. Agencies did not necessarily want to go with the lowest possible bidder, especially if the vendor did not have the best service record. They also wanted to see stronger requirements for performance, such as equipment uptime or response time for repair requests. Agencies also want some assurance that if the company goes under, the vendor will remove the equipment and not leave behind unusable infrastructure. Agencies were interested in the ability to separate the hardware vendor from the network provider. This could help prevent stranded hardware if a network provider closes or lead to more competitive pricing for network subscriptions renewals. This is possible with Open Charge Point Protocol compliant hardware and network vendors, although none of the agencies interviewed have completed such a switch yet.

While some agencies are fine with owning and operating stations with the above safeguards, many agencies would prefer a 3rd party turnkey model that limits out of pockets costs and risks to the agency. This could be structure simple where the agency allots space to a vendor and the vendor is responsible for installation, operations, and maintenance. However, the agreement needs to be structured to avoid being a gift of public space to a vendor. Some agencies have similar contracts with beverage vending machine operators, including a small amount of revenue paid to the agency.

> While some agencies are fine with owning and operating stations many agencies would prefer a third-party turnkey model that limits out-of-pocket costs and risks to the agency.

One of the biggest challenges with a third-party approach is that vendors may only be interested in the sites where potential usage is the highest. Given the difficult economics of charging, even high usage sites may not generate enough revenue to support additional installations on lower usage sites, which could be essential deployments for equity considerations or filling other infrastructural gaps.

Agencies were interested in an expanded utility role, especially in places where private vendors are not interested in investing and the utility is able to use ratepayer funds to cover the cost of the installation and ongoing operations with no risk to the agency. However, SDG&E is limited in the number and types of projects they can build under CPCU decisions.

3.7.3 Regional Coordination and Guidance

Agencies have appreciated the guidance they received through past regional efforts and look forward to additional guidance to be developed through this project. Given the rapidly changing nature of the EV market, they were very interested in understanding how the economics of charging may be changing, and the influence this could have in contracting with vendors. This is especially true where the potential to reduce costs to the agency or even generate revenue is possible. Understanding how best to leverage the LCFS and other credits should be a part of the guidance as well.

Some agencies are interested in being active participants in a standards development committee, although others are happy to utilize whatever is developed in the process. Agencies cited SANDAG's leadership in developing a guidance on Mobility Hub amenities as a valuable source of regional guidance. Agencies were interested in more regional geospatial analysis that could help map areas were charging is needed and should be prioritized for public agency support to meet the state's aggressive goals.

> Given the rapidly changing nature of the EV market, agencies were very interested in understanding how the economics of charging may be changing and the influence that could have in contracting with vendors.

Additionally, guidance on signage to help users find charging and well as clarification on parking rules would be valuable, as well as ensuring stations are listed on websites and apps that are used to find chargers.

While some agencies report that the permitting process has advanced over the years, some guidance is still useful for permitting in compliance with AB 1236 (2015) and the recently passed AB 970 (2021). Other specific requirements include accessibility considerations, and equipment and billing requirements under the latest CARB and Division of Measurement Standards regulations.

4. Conclusions

In the past decade of EV Charging, jurisdictions have experienced uncertainty associated with the nascent period of EV infrastructure deployment. Cities, the County, and partner agencies in the San Diego region have taken steps to minimize risks while learning from initial deployments and advancing their sustainability goals through EV infrastructure. San Diego Region jurisdictions are eager to advance their sustainability goals—however, many continue to proceed cautiously due to the unique nature of public-private partnerships in public rights-of-way and the evolving legislative environment (e.g., CalGreen Title 24 on Accessibility in Parking Lots, Federal Public Rights of Way Accessibility Guidelines).

Below are some key findings from the interviews:

1. Current ownership models have varied due to the lack of examples available ten years ago. Agencies communicated a general preference for public-private partnership models emphasizing no (or little) cost to the public agency. However, with the rapid growth of approximately 150,000 EV chargers expected over the next ten years (6,800 in 2020 to 156,000 in 2030) agencies are also interested in the influence of the rapidly changing EV market environment, and strive to understand how technology and economics will compel changes in agency policies and procurements.

2. Provide a frequently updated list of pre-qualified vendors for EV charging infrastructure and services. Looking at examples from the last decade, grant funding has been the primary driver of EV charging deployments; a positive driver through funding availability, and a negative driver through "readiness" requirements of having a vendor selected prior to the due date of funding applications. Pre-qualification of vendors may allow for jurisdictions to remove a layer of uncertainty for their procurement opportunities, including hardware, network providers, installation contractors, and repair services.

3. Integrate equity considerations in providing EV charging infrastructure, including spatial distribution of stations for non-charger homes/dwellings, and coordination with comprehensive mobility strategies such as scootershare, bikeshare, and transit services.

4. Operationally, agencies are most often interested in EVSPs being the "owner-operator" of new charging infrastructure into the next ten years. However, agencies will need operations and asset management support for their existing EV charging infrastructure (i.e., maintenance requirements, electricity management, and working with network providers).

5. Guidance on fee/rates setting to allow for the following:

   a. A proforma (direct and indirect costs) to achieve a net zero cost or modest return on investment.
   b. Balance low-cost rates with parking/vehicle turnover to improve charging function utilization.
   c. Different management strategies for varying parking durations (e.g., transit stations with long duration park-n-rides, shorter durations for libraries or parks).
   d. Ongoing investment in EV charging to accelerate EV adoption within the community, especially in underserved communities

Using this feedback, subsequent research and analysis will focus on providing clear guidance to jurisdictions on managing their current EV charging assets and optimizing future investments. A strategic approach that incorporates these lessons learned from early deployments will be critical as the region looks ahead to scale EV charging infrastructure up to the volume that is needed by 2030 and beyond.

Acronym Reference

- Accelerate to Zero Emissions Collaboration (A2Z)
- Assembly Bill (AB)
- California Air Resources Board (CARB)
- California Energy Commission (CEC)
- California Electric Vehicle Infrastructure Program (CALeVIP)
- Disadvantaged communities (DACs)
- Department of Transportation (DOT)
- Direct current (DC)
- Direct current fast charging (DCFC)
- Electric Vehicle (EV)
- Electric Vehicle Charging Stations (EVCS)
- Electric Vehicle Supply Equipment (EVSE)
- Electric Vehicle Supply Service Provider (EVSP)
- Environmental Impact Report (EIR)
- Killowat-Hour (kWh)
- Low Carbon Fuel Standard (LCFS)
- Low-income communities (LICs).
- Open Charge Point Protocol (OCPP)
- Power Your Drive (PYD)
- San Diego Association of Governments (SANDAG)
- San Diego Gas & Electric (SDG&E)
- University of California, San Diego (UCSD)
- Zero Emissions (ZE)
- Zero Emission Vehicle (ZEV)