

Sacramento EV Blueprint



Task 6.3: Identify Advanced E-Mobility Options

ARV-17-042

Prepared for the City of Sacramento by DKS Associates and Frontier Energy

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Task 6.3: Advanced E-Mobility Opportunities

The goal of this report is to document e-mobility project successes and challenges, identify recommendations for improvement, and provide lessons for replicating projects in other geographies. This task also recommends a concept for an e-mobility hub.

Mobility hubs are a new concept; many cities are talking about them, some are funded, few are operational. Mobility hubs don't have a "typical" site; some are large transit centers, other are park and ride lots, while others may be limited to a bus stop with a car and a bike. They are, ideally, centers of connectivity at which multiple modes of travel converge. The concept is to provide an integrated suite of mobility services like from transit to bike share to parking along with wayfinding and urban design enhancements and technologies that include dynamic parking management strategies, real-time traveler information, and real-time ridesharing. Mobility hubs may include pick-up/drop-off zones for ride-hailing and "kiss-and-ride," freight delivery hubs and connections to bike and pedestrian routes.¹

An e-mobility hub is Sacramento's concept that takes the mobility hub one step further by adding the infrastructure and support services to encourage every vehicle to be electric instead of running on petroleum. It includes charging stations for a variety of vehicles, potentially energy storage, and amenities that can serve all populations.

To understand the elements and potential business models for an e-mobility hub, the EV Blueprint team interviewed companies and organizations that operate individual elements of a future e-mobility hub.

Summary e-mobility operator interviews and other sources

The following is a summary of interviews conducted with advanced mobility operators, most of whom operate electric-vehicle programs in Sacramento. The team also interviewed mobility operators in West Sacramento, Squaw Valley, and Seattle, Washington. Companies operating outside Sacramento were contacted for interviews but declined to participate.

Interviews were with the following mobility providers, all of which responded to requests for interviews:²

- Sloane Morgan of GIG Care Share
- Allen Bates of Envoy
- Gina O'Neal and Anne Marie Flynn of Our Community CarShare
- Alva Carrasco of SacRT
- Sarah Strand of the City of West Sacramento

¹ *Electrifying Ride-Sharing: Transitioning to a Cleaner Future*

² Interviews focused on community EV car share operators, in addition to micromobility projects. Additional interviews were requested of other local operators that did not respond to interview requests.

- Casey Gifford of King County Metro Transit
- Stephen Murray of Downtowner

All interviews were conducted between April and June 2019 and supplemented by online research and other sources.

Electric Car Share

Car sharing refers to a model of car rental where vehicles are rented out for shorter periods of time (usually on a per hour basis) and often intended for shorter distance trips in urban areas where personal car ownership can be challenging. Car sharing is often seen as a popular alternative method of transportation in cities because it is more flexible than mass-transit, car ownership may be too expensive, or the dense urban environment may make vehicle ownership unfeasible. Car sharing has also been shown to reduce vehicle ownership and vehicle trips, enabling participants to “shed” personal vehicles, using a car-share vehicle only when needed, and relying on transit or active transportation as primary travel modes.

Round-trip or docked car share is “traditional” car sharing that requires users to borrow and return vehicles at the same location. In larger urban areas, multiple carshare vehicles or groups of vehicles may be available within just a few block radii, while in smaller towns or suburban centers, round-trip carshare vehicles may need to be strategically placed to capitalize on locations with a strong user base, like pockets of dense housing, rail stations, and employment centers. When round-trip carsharing is placed in a lower-density environment, it often needs an anchor tenant that can guarantee a certain level of usage to support the costs of locating the vehicles. The *Bay Area Carsharing Implementation Strategy* developed by the Metropolitan Transportation Commission stated, “Including on-site vehicles at more locations can help reduce single occupancy vehicle trips, and the deployment of EVs at more dispersed locations could help build out the availability of charging infrastructure. Public and private fleets can reduce their vehicle numbers and increase their utilization by using carsharing vehicles.”³

One-way carsharing works best in dense neighborhoods and urban centers because it needs a mass of users to meet demand and avoid costly rebalancing measures (moving cars from low-demand areas to places where they are more likely to be picked up). The two models of one-way car sharing are:

- Free-floating that includes a fleet of vehicles that can be located and reserved by app, then picked up or parked at any legal parking spot within a specific geographic zone (often an entire municipality).
- Point-to-point (also called A/B) carsharing in which users park and pick up cars designated locations. This kind of carsharing typically works best when many destinations are within two-to-four miles of one another.

³ http://policies.sharedusemobilitycenter.org/uploads/documents/carsharing_report_vfinal_06.21.18.pdf

UC Berkeley's study of car2go free-floating car sharing in five cities found that one car served an average of eight people a day and that each car-share car eliminated between seven and 11 personally owned vehicles.⁴ San Francisco Metropolitan Transit Authority's On-Street Car Sharing Pilot Program with ZipCar found that one car served an average of 19 people a day.⁵

Three common categories of car-share operation are:

- Peer-to-Peer Car Sharing—a community of existing car owners make their vehicles available for others to rent for short periods of time. Car sharing software matches owners of cars that are available to other drivers to rent.
- Business to Consumer (B2C) Car Sharing—a company owns a fleet of cars and facilitates the sharing amongst members.
- Not-For-Profit or Co-Op Car Sharing—a local organization facilitates sharing vehicles to provide social and environmental benefits.

GIG, Envoy, and other operators like ZipCar, car2go, Flinkster, Autolib, and cambio are B2C car sharing. Our Community CarShare is a public, subsidized program funded by grant dollars.

GIG Car Share Interview

GIG Car Share, which is powered by AAA Northern California, Nevada and Utah (AAA NCNU), operates in the Bay Area and Sacramento, is an on-demand, short-term free-floating car share service. As a project of AAA NCNU, GIG Car Share is a non-profit, with revenues and learnings reinvested back into member services. Users can use the GIG app to reserve a hybrid or electric vehicle (in Sacramento, all the vehicles are electric) up to 30 minutes in advance, locate the closest car, use the car for a trip of any length, and return it to GIG's designated service location, that is, they can end the trip in any legal on-street location that allows parking for one hour or more, including metered or residential parking (certain restrictions apply). In this way, cars can "free-float" throughout the service area, with trips beginning and ending in different locations.

According to Sloane Morgan, Grocery shopping is the most popular use of GIG vehicles and 26% of trips are shared with another person, providing a viable alternative to vehicle ownership for several demographic groups. GIG supports active modes of transportation such as bicycling, one reason that every GIG vehicle has with two bike rack on the roof.

GIG's car share service began in April 2017 in the San Francisco Bay Area and currently covers a 26-square-mile service area in San Francisco, Albany, Alameda, Berkeley, and Oakland, and has provided hundreds of thousands of trips with its hybrid fleet. The service was expanded to Sacramento in March 2019 with an all-electric vehicle (EV) fleet of 260 Chevy Bolts. The GIG program in Sacramento is the largest launch of free-floating electric car share service in the United States, and one of the largest EV car share services in the nation. GIG believes its service will be well received in Sacramento because of Sacramento's relatively high urban density, low crime rates, and support of EV fleets.

⁴ http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf

⁵ <https://www.sfmta.com/blog/one-car-19-people-3-key-findings-how-sf-uses-street-car-sharing>

From March to May 30, 2019, Sacramento GIG cars drove more than 133,000 zero-emission miles and 17,000 people downloaded the app. In the month of May 2019, after the official program launch, people took over 9,400 trips and logged 65,000 electric miles. The current rental rate is 40 cents per minute or \$15 per hour, whichever is less, up to \$85 per day and AAA members receive a 10% discount. and Figure 2 is the GIG app on a smartphone.

Figure 1 is a picture of the GIG home zone, the 13-square-mile area in which travelers can pick up or drop off a car and Figure 2 is the GIG app on a smartphone.

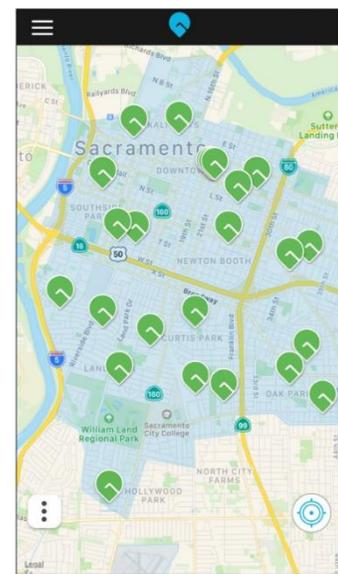
Figure 1: GIG 13-square-mile home zone



Approximately fifty percent of GIG's Sacramento service area covers low-income and/or disadvantaged community areas. GIG doesn't require a subscription or membership fee; the intention is that GIG's pay-as-you-go model will encourage trips by users of all economic levels. The costs for fuel/charging, insurance, and parking are all included in the vehicle rental price. GIG is a partner to Electrify America and the City of Sacramento's Green City Initiative. GIG can measure trips to and from low-income and disadvantaged communities by evaluating trip origins and destinations by zip code.

Initial lessons learned from this new program are the challenge of communicating this new car-sharing concept to prospective users, many of whom may not have driven an EV before. As a result, GIG is devising and testing new ways to communicate to potential customers to overcome the challenge of 'mode shift' in California's auto-oriented culture, and adoption has increased as people become more familiar with this concept. GIG is also designing new ways to communicate with its customers to explain that electric GIGs are charged and ready to go and how to charge a GIG for long-distance trips. Providing parking locations near transit locations and installing EV charging, especially DC fast charging, will assist operations at e-mobility hubs. However, in general, service launch issues have centered more on issues of parking, rather than the electrified nature of the service.

Figure 2: Screenshot of GIG Carshare app (Source: GIG)



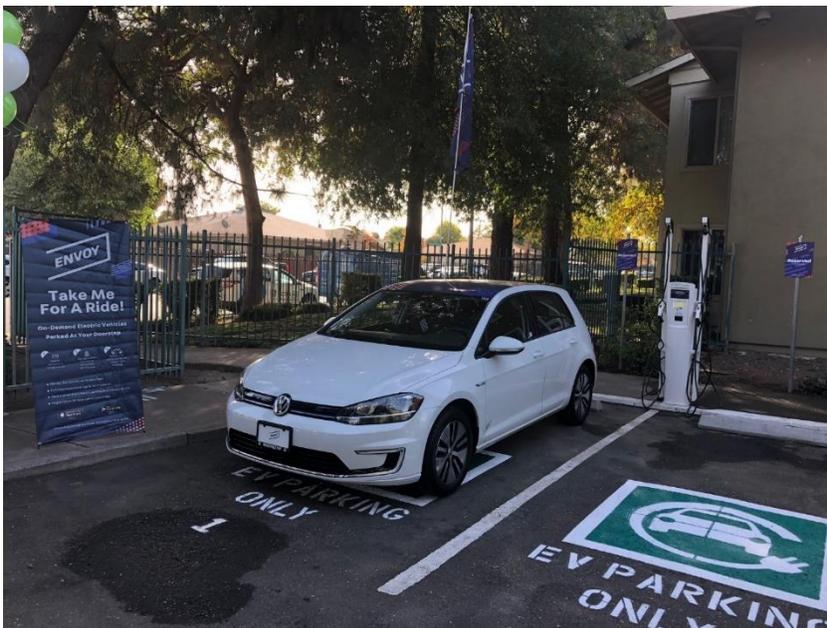
Envoy Technologies Interview

Also, part of Sacramento's Green Cities Initiative, Envoy Technologies is a commercial startup that operates a "docked" electric car share program; trips begin and end at the same location. Envoy car-share began in Southern California as a mobility amenity to market-rate residential development.

The company, Envoy Technologies, as describes itself as "an integrated technology platform and operations solutions that allows property owners to implement mobility as a community or municipal amenity founded by a team of seasoned real estate investors with a passion for technology." It is a for-profit, private company.

Typically, property managers pay Envoy Technologies to provide the car-share amenity at the property and residents, tenants, or guests pay to rent the car by the minute or hour. The company installs attractive Level 2 chargers, as seen in Figure 3 and, at some locations, an on-site car wash station; Envoy Technologies also provides full insurance, fleet maintenance, and 24/7 customer support for property owners and drivers. Drivers use the Envoy app to reserve and unlock cars.

Figure 3: Envoy's docked car share at Whispering Pines apartment complex in Sacramento



Envoy Technologies and the site host typically operate under a revenue-sharing model, which reduces or completely offsets costs to the site host as utilization increases. However, through partnership with Electrify America in Sacramento, Electrify America invested in vehicles and EV charging infrastructure for Sacramento properties, allowing Envoy Technologies to provide its service at no cost to site hosts. Residents of properties pay to rent the car by minute or hour and vehicles are only available to residents of the host property.

Envoy Technologies' Sacramento operation is tailored to address specific needs of low-income and disadvantaged communities. Envoy's goal was to deploy 140 Volkswagen e-Golfs at 70 specific locations. As of mid-June 2019, Envoy car-share operates at approximately twenty residential properties in Sacramento through the Electrify America program, with over 75% of properties located at low-income and/or disadvantaged communities as defined by CalEnviroScreen. Deployment of additional cars to meet the target of 70 properties is ongoing.

Envoy is committed to serving all populations with sustainable transportation options and continually learning the best way to serve low-income/disadvantaged communities, which includes evaluating the costs that site hosts and drivers pay and ability to use vehicles without an app. At the time of report preparation, Envoy vehicles are available at 15 cents per minute or \$9 per hour, up to \$45 per day.

Envoy evaluates effectiveness by measuring the number of people who use service, vehicle utilization time, awareness of the service, and from self-reported survey. Envoy's Sacramento program, which began operation in March 2019, is in the early stage of deployment. Using experience in other cities, Envoy's best carshare sites appear to be locations with one or more of the following attributes:

- Private car ownership is low
- Limited or no parking
- Close to transit and other mobility options
- Limited access to basic services (i.e. near a "food desert")
- Proximity to students
- Willing marketing partners

To date, the most popular sites in Sacramento have been student housing sites.

In addition to Sacramento, Envoy operates in Culver City, Orange County, Irvine, Los Angeles, Marina Del Rey, and one location in New York City. Locations primarily multifamily apartments and condos, although two Southern California locations are hotels and one is a WeWork shared workspace. The New York location is student housing for State University of New York (SUNY) Brockport campus. (None of the locations outside Sacramento meet the criteria for low-income housing.)

Envoy Technologies is also implementing projects in Sacramento and the Bay Area with an award of \$1.5 million from the California Energy Commission.⁶ These programs will have a different cost-share model, which is under development, and stated that want to use EVs and fuel cell electric vehicles (FCEVs) in areas that have easy access to one or more hydrogen station in Sacramento and the Bay Area.

Our Community Carshare Interview

Our Community CarShare is a free, membership transportation available to residents of affordable housing communities that started in May 2017. The program is funded by a partnership of multiple public agencies to place docked EV car-share vehicles and Level 2 charging at low-income housing communities throughout Sacramento. Residents use an app to reserve and use the cars for up to three hours at a time and up to nine hours per week without charge. Since starting, membership has grown to 504, about 30% of the eligible population. Members must be over 21, have a driver's license, and an email.

⁶ https://ww2.energy.ca.gov/contracts/GFO-16-605_NOPA.pdf

Figure 4: Our Community Carshare with member and resident, Susan Brown (Source: Sacramento County)



Each of seven communities has two car-share EVs and two Level 2 chargers. Three of the communities are managed by Sacramento Housing and Redevelopment Agency (SHRA) and the other four by Mutual Housing. Two additional EVs are at the Sacramento Valley Train Station, hosted by the City of Sacramento. Breathe California is another project partner supporting with outreach, and Zipcar is managing car share operations.

As a new mobility service, Our Community CarShare identified and continues to address barriers to users accessing the cars, including language, risk aversion, familiarity with technology, and the age and mobility of residents. SHRA and Mutual Housing continue to help bridge the barriers: Mutual Housing conducted outreach in eight languages spoken by community residents and provided more ground support, frequent events, a call-in number with answering services, representatives at each site, full-time project management, and websites in most languages. They have also collaborated with Breathe California, a non-profit organization promoting healthy air quality. SHRA is focused on sustainability by providing more cars at a lower price.

Anecdotal information helped contextualize the effectiveness of serving low-income and disadvantaged communities. Program administration by the Air District and site host staff has been critical to program success. Residents needed assistance enrolling in the service, understanding the technology, and reserving the vehicles, and learning how to charge the vehicles. Due to the Air District's funding of the program, the Air District was equipped to overcome program barriers for low-income participants. For participants without credit cards, the Air District created a work-around to the standard Zipcar requirement that all participants provide a credit card, which allowed "unbanked" individuals to participate in the program.

Site staff serve as ambassadors for the program, with residents volunteering to chauffeur other neighboring residents using their own CarShare credits to provide mobility to residents that are unable to drive themselves. Breathe California staff worked to understand other barriers and challenges and learned that many people are precluded from participating due to legal issues that prevent them from obtaining driver's licenses. Through the program, Breathe California staff provide supportive resources to address barriers and increase participation in the program.

Collection of additional data is ongoing to refine and evaluate the program. A survey was distributed but only 1% of users responded. New surveys are being launched but results are not yet available.

One technical lesson learned is that several of the communities opted for the lowest-cost EVSE that is no longer supported by the manufacturer. In a June conversation with the program manager, two of the EVSE have failed and need to be replaced. The program manager stated the future projects will not go to the most reliable, not the lowest cost, vendor. Sacramento Metro AQMD is also leading an effort to expand Our Community CarShare with more vehicles at existing locations and more locations. In a June 2019 conversation with Air District project leads, they stated that up to 10 of the new vehicles will be FCEVs that can use existing hydrogen infrastructure and have longer range than battery EVs. The program started with seven Kia Soul EVs but has since expanded to six Chevy Bolts and one Chrysler Pacifica plug-in hybrid to support people that have longer-range trips.

On-demand transit

On-demand transit (ODT), also called microtransit and demand responsive transit, is an integration of ride-hailing and shared-ride services. It can function as a replacement for a fixed route, particularly in low-density areas where fixed bus routes are infrequent, or as an overlay of existing transit service to help people with the first-mile/last-mile transportation; how they get to and from the bus stop. Transit agencies across the country are experimenting with ODT as transit ridership falls and cities are adding ODT to reduce congestion, decrease emissions, and serve marginalized populations.

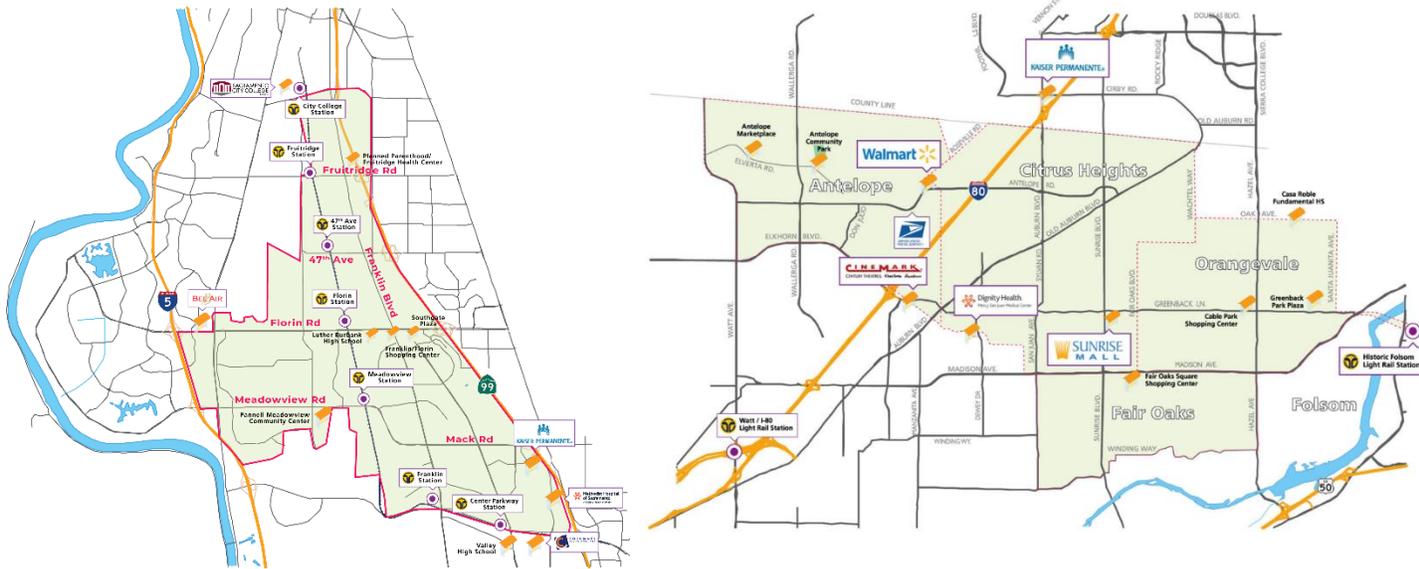
The following is a summary of interviews with ODT operators around Sacramento and beyond.

Sacramento Regional Transit

SmaRT Ride is a microtransit⁷ service operated by Sacramento Regional Transit (SacRT). Currently SmaRT operates two service areas shown in Figure 5: Citrus Heights, Antelope and Orangevale; and Franklin-South Sacramento. SacRT will add a Downtown, Midtown and East Sacramento route in mid-June 2019.

⁷ SacRT uses “microtransit” instead of ODT

Figure 5: SmarT's Franklin Blvd. and Citrus Heights Service Area (Source: <https://smartride.sacrt.com/>)



SmaRT Ride passengers download a smartphone app to request a ride, similar to how ride-hailing apps work, and pay the same amount as a bus or light rail ride. A shuttle bus, which will soon be an electric shuttle in the Franklin service area, picks up the passenger and will drop off anywhere within each designated service area. The shuttle will pick up and drop off other passengers on the way. SmaRT Ride service began in February 2018 and has served more than 95,000 passengers. Each vehicle can seat between 10-22 passengers and is equipped with two wheelchair positions. Approximately 12 to 16 vehicles are in use per day from 6:00 AM to 9:00 PM, Monday through Friday.

Students can ride SmaRT Ride for free, and every group of five passengers rides free as well.

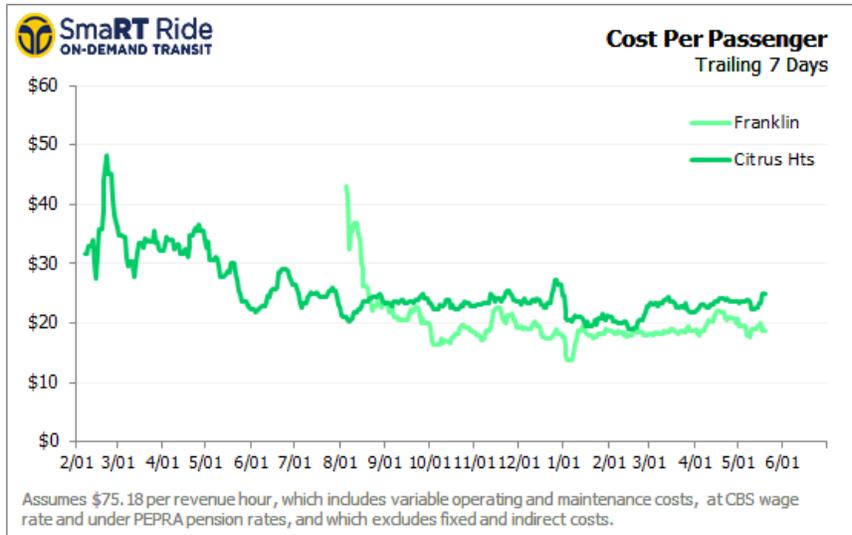
The Franklin service has been in operation since August 2018, with average daily ridership between 350-450 riders. The service averages 40 revenue hours per day (the number of buses * the number of operating hours) compared to 60-to-70 revenue hours per day for the Citrus Heights service. As Figure 6 shows, the number of riders per day is less on the Franklin route. It's important to note that the Citrus Heights route operates in an area that has traditional bus service as an overlay whereas the Franklin neighborhood was not previously service by transit.

Sacramento RT outreach in multiple languages to the diverse Franklin community, Figure 7 shows an uptick in the riders per hour. SacRT set its budget based on three boardings per hour and is averaging about four riders per hour.

The program costs SacRT \$75.18 per revenue hour, which equates to \$19 to \$25 per passengers. In comparison, it costs SacRT \$8.11 per passenger for a standard transit bus and \$19.77 per passenger

for the Community Bus Service, which is deployed in three neighborhoods.⁸ Figure 6 shows that the cost-per-passenger is decreasing as people become more aware of the program.

Figure 6: SmaRT Ride Per-Passenger Operations Costs (Source: SacRT)



In a conversation, Chris Flores, Special Assistant to the CEO/GM at Sacramento Regional Transit District, was asked if he foresaw on-demand transit replacing transition fixed route buses. He answered no, with a caveat. He said that ODT can increase ridership on light rail and commuter routes, and believes it is a wise investment in addressing transportation equity in neighborhoods where it is difficult to operate a fixed route. However—the caveat—electric shuttles for ODT might be more cost effective to operate and may be a way to expand transit service to other, underserved regions without investing in 30- or 40-foot zero emission buses.

The Franklin service area will soon transition to three fully electric GreenPower shuttles in October 2019, to replace the existing three diesel shuttles, paid for by Electrify America. Electrify America is also investing in two DC fast chargers to support the service with charging speeds of up to 150-kW. Future expansion plans include additional service to 12 areas contingent upon funding. Additionally, SmaRT Ride will test six zero emissions vehicles and purchase up to 20 after evaluating the vehicles' reliability during the testing period.

The team contacted the Franklin Neighborhood Development Corporation to understand the impacts of SmaRT Ride in the community but could not schedule an interview.

Via-operator Interviews

Via is an on-demand mobility service that operates in the United States and in Europe through its joint venture with Mercedes-Benz vans. Via's technology is also deployed worldwide in partnership

⁸ <http://www.sacrt.com/documents/Performance/KPI0319.pdf>

with public transportation agencies, private transit operators, taxi fleets, private companies, and universities. In some cases, Via provides first and last mile connections and in others serves in lieu of fixed-route transit. Via initially launched in September 2013 in New York City and expanded to other metropolitan areas including Chicago, Washington DC, Arlington TX, West Sacramento and Seattle. Worldwide, Via has more than 2 million members and 50 million rides. Via provides technology and operates routes as a contracted service to agencies, but also operates as a private ride-hail mode in dense geographies.

To book a ride on Via, users download and use the Via app or call Via's live support phone line. In some cities, passengers can pay using a transit pass. In others, riders pay by credit card or set up an account from which rides are deducted.

Figure 6: West Sacramento's on-demand transit pilot
(source: City of West Sacramento)



In May 2018, the City of West Sacramento began an on-demand rideshare pilot in partnership with Via's subsidiary NoMad Transit LLC, pictured in Figure 7. The City expected roughly 200 to 250 average daily rides. By March 2019, ridership had surpassed the early estimates by 50% and continues to grow. By spring 2019, Via was averaging seven rides an hour. In June, the program expanded operating hours to 6:00 AM to 11:00 PM Monday through Saturday, and in

August it will add more vans and start operating on Sunday. Originally funded by grants from SACOG and AARP, Via West Sacramento will continue operation with funding from a voter-approved sales tax measure.

Because West Sacramento's program is specific to the City and not part of the county-wide regional transit, riders pay by credit card or a pre-paid account: \$3.50 per ride or \$15 a week for four rides a day. Seniors and disabled people pay a discounted rate.

Results from a recent survey of Via riders indicate that:

- Passengers of ages, incomes, educational backgrounds, and genders use Via, however people under the age of 21 appear to be the most-frequent users, followed by older adults (50+).
- Riders are more likely to come from households with between \$15,000 and \$35,000 household income and are slightly more likely to be women.
- Half of survey respondents said they were using the ODT service instead of taking Uber/Lyft and 34% said they were using it instead of driving alone or catching a ride from a friend or family member.
- 66% of respondents feel safer getting around town and 59% had a greater sense of independence, and 41% said their access to healthy foods and medical care had increased, especially among women, younger (under 21) and older (60+) riders, and households that earn less than \$35,000 a year.

In addition to these statistics, the Washington Unified School District stated that participation in after-school activities at the high school increased by 40% during the 2018/2019 school year because students had a means of getting home.

Downtowner

Downtowner is private app-based microtransit service that contracts with transit and public agencies to provide fixed route, on-demand, and deviated route service. This shared mobility provider's priorities are to reduce single-occupancy trips and improve first-mile/last-mile connections to transit. In California's Sierra Mountains, the nonprofit Squaw Alpine Transit Company (SATCo) selected Downtowner to provide on-demand rides to ease traffic and parking congestion in Olympic Valley and Alpine Meadows ski areas. The service operated during the 2019 ski season from December 1, 2018 to April 30, 2019. At the April 18 SATCo board meeting, the board voted to extend the Downtowner contract. Rider statistics, survey results and lessons learned will be presented at the July board meeting, which is after the date of this report.

Downtowner also operates in Aspen and Vail Beaver Creek, Colorado; Summit County, Utah; Savannah and Sea Island, Georgia; and Tampa, Florida.

Downtowner is in the process of electrifying its operations, however, cold temperatures and the local need for all-wheel drive prevented Downtowner from using electric vehicles in its alpine locations. Tampa's program, which is free, uses a fleet of nine Chevy Bolts because the average passenger load is small, and the service is limited to the two-square-mile downtown core. The cars charge overnight at the company's operations base using Level 2 chargers.

Comparison of program outcomes and key service indicators

Despite some apparent similarities, each of these advanced mobility providers operate and track data differently making apples-to-apples comparison challenging. Table 1 summarizes available data from each service evaluated.

Table 1: Comparison of Mobility Programs

Program type	Service dates	Participation	Costs
<i>Our Community CarShare</i>	May 2017-present	504 members, about 30% of the eligible population	Free to driver Grant funded
<i>GIG Car Share (Sacramento)</i>	March 2019-present	15,000 trips	40 cents per minute or \$15 per hour, up to \$80 per day and AAA members receive a 10% discount. Electrify America funded
<i>Envoy (Sacramento)</i>	March 2019-present	Not disclosed	Fees not disclosed Electrify America funded
<i>SmaRT Ride</i>	February 13, 2018 to present	95,000 passengers	Riders pay transit fare costs; students ride free and groups of five or more ride free Costs SacRT \$75.18 per revenue hour; depending on trip demand, the cost per passenger is \$19 to \$25.

Program type	Service dates	Participation	Costs
<i>Via West Sacramento</i>	May 14, 2018	350 ride per day	Riders pay \$3.50 per ride or \$15 a week with discounted fares for seniors and disabled. First year of operation cost the City of West Sacramento \$890,000 from grant funding; continued operation is funded by sales tax.
<i>Downtowner (SATCo)</i>	December 2018-April 2019	Downtowner “Lessons Learned,” rider statistics, and rider survey findings to be presented to SATCo board on July 18.	Squaw Alpine Transit Company (SATCo) funded Downtowner through the combination of a one percent assessment on lift tickets sold on-site by Squaw Valley/Alpine Meadows, and a one percent assessment on lodging and vacation rentals within Squaw Valley and Alpine Meadows

Analysis of business and service models

Envoy’s docked car-share in Southern California and GIG’s Bay Area car-share program are venture-funded start-ups. Both companies’ deployments in Sacramento are funded by Electrify America as part of the Sac to Zero program, and Envoy Technologies was recently awarded Energy Commission funding.

The mobility pilots in Table 1 were led, launched, funded, or planned by local agencies to increase mobility, reduce vehicle miles traveled, and decrease greenhouse gas emissions. Each has a revenue model that relies on external funding to cover the gap between revenue and costs. Each company has a business strategy, but needs more time and data to understand which methods are effective for increasing ridership and decreasing operating costs.

Recommendations and opportunities for the e-mobility hub demonstration

Mobility hubs are centers of connectivity at which multiple modes of travel converge. Building on lessons from the projects outlined above, the concept is to provide an integrated suite of mobility services from transit to bike share to parking along with wayfinding and urban design enhancements and technologies that include dynamic parking management strategies, real-time traveler information, and real-time ridesharing. Mobility hubs may include charging for shared vehicles, pick-

up/drop-off zones for ride-hailing and “kiss-and-ride,” freight delivery hubs, and connections to bike and pedestrian routes.⁹

An e-mobility hub is a concept for Sacramento to take the mobility hub concept one step further by adding the infrastructure and support services to encourage every vehicle to be electric instead of running on petroleum. It includes charging stations for a variety of vehicles, potentially energy storage, and amenities that can serve all populations.

Task 6.2, *E-Mobility Hub Recommendations*, analyzed concepts and plans of other regions’ mobility hubs and expanded on those concepts to create an e-mobility hub. This report identifies how to accelerate the mobility hub principle a step further by ensuring that all vehicle transportation be electric. However, the emphasis should remain on active transportation and shared rides, including transit. Figure 8 shows an example of transportation modes that a traveler would ideally use to get to or from light rail or an electric bus.

Figure 8: E-mobility hub travel



Active transportation first: Enable people to walk or bike for five minutes on protected, well-lit lanes. People arriving at the hub by bike need secure storage. Include a charging dock for scooters and e-bikes so fully charged micromobility is ready to go when travelers arrive.

Connect people to affordable and clean shared rides: Prioritize transit connections in site design and layout with adequate loading spaces and quick connections to light rail and/or buses. Use distinctive, illuminated shelters with signage for pick-up and drop-off facilities for ODT and carpools. Include dedicated DC fast charging for drivers so that ride-hailing and on-demand transit vehicles can quickly charge on site or very close by between passengers or when waiting for transit to arrive.

Electric cars where transit doesn’t go: Ensure adequate parking and use parking apps so that long-distance commuters can reserve spots in advance. Electric car-share vehicles are on site and fully charge. Equip parking lots with Level 2 charging—some dedicated to car-share vehicles and some for commuter cars—and Level 1 outlets so long-distance drivers can plug in continuing the commute on transit.

Sustainable design: Activate the hub with attractive design, art, and services that can encourage people to visit nearby business and community gathering spots. Provide free and fast Wi-Fi and plugs for charging cell phones. Enable travelers to order a shared ride or check out shared vehicles from a kiosk or from attendant or kiosk at the hub. Install electronic reader boards with real-time

⁹ Electrifying Ride-Sharing: Transitioning to a Cleaner Future

transit travel information that can be read from a distance. Incorporate solar energy and energy storage where appropriate to reduce grid demand. Add e-commerce lockers and a dedicated cargo delivery space so that people can pick up packages, groceries, or other items at the e-mobility hub.

Mobility hubs might also include charging stations for transit buses, but hubs may be at light rail stations and travelers will use other modes of transit to quickly reach their destinations.

Locating an e-mobility hub

Ideally, e-mobility hubs will be located where multiple mobility modes already converge. To optimize first/last mile transit connections and utilize existing passenger facilities, transit centers and park-and-ride facilities are ideal. Task 6.2 included a list of candidate locations, however, to optimize recommendations in the EV Blueprint project, the team proposed a modular concept that can be at or near any high-capacity transit station.

This concept envisions re-configuring surface parking into a flexible, modular design prototype that can be scaled up or down depending on available space, mobility demand, and electrical capacity. Optionally, some elements could be adjacent to the transit stop—across the street or at a nearby community center.

As the anticipated demand for shared e-mobility services continues to grow, facilities can be expanded and replicated at other transit facilities to provide a regional multi-modal e-mobility network. The modular approach also future proofs the regional transit system as share mobility becomes more convenient and economical than private vehicle ownership. For example, commuter parking spaces can gradually be replaced with docks for shared vehicles, a larger drop-off zone, or additional light rail tracks.

The Sacramento e-mobility hub can include the features listed in Table 2: E-mobility hub components.

Table 2: E-mobility hub components

Feature Category	Components
Transit	<ul style="list-style-type: none"> • Direct connection to light rail or electric transit buses • Mobility-as-a-Service (MaaS) software to integrate arrival and departure of transit vehicles with other mobility services
Microtransit (On-demand transit)	<ul style="list-style-type: none"> • Curb space for two microtransit vans to board and alight passengers • Layover facilities for microtransit vans to park and charge between trips • If this is a separate area, visible signage and bright lighting
Ride hailing and car sharing	<ul style="list-style-type: none"> • Parking stalls for ride-hailing vehicles to pick-up and drop off passengers • DC Fast Chargers or higher-wattage Level 2 chargers for shared EVs and PHEVs • Vacuums, pressure washers, and waste and recycling containers to clean vehicles between uses • If this is a separate area, visible signage and bright lighting

Feature Category	Components
Micromobility	<ul style="list-style-type: none"> • Docks for parking, securing and charging electric scooter-share • Docks for parking, securing and charging electric bike-share • Lockers with electrical outlets to park and charge personal commuter bikes and scooters • Protected lanes for bikes and passengers to enter and exit the e-mobility hub
Commerce	<ul style="list-style-type: none"> • Lockers for delivery of merchandise from e-commerce vendors, food bank deliveries, or other parcels • Parking stalls with 50-amp charger for medium-duty vehicles like food trucks, bookmobile, cargo vans, and microtransit. Can double as a loading bay for e-commerce locker delivery
Amenities	<ul style="list-style-type: none"> • Accessible restrooms • Traveler information kiosk with reader boards displaying real-time transit and microtransit information; potentially attended • Kiosks that issue transit passes, conduct route mapping, call a shared ride, and check in and out shared vehicles • Kiosk or mobile office that has car seats, bike repair tools, cleaning supplies, first aid kits, and other materials that travelers need to rent, buy, or borrow • Free public WiFi • Electrical outlets for charging cell phones, tablets, etc. • Electrical supply to support events, including musicians, pop-up shops, and food vendors • Seating and tables for waiting passengers • Garbage, recycling, and compost disposal • Overhead solar canopy to provide weather and sun protection and off-set energy use • Motion sensor activated bi-level lighting for safety and theft deterrence while reducing energy use • Security cameras and emergency call station for personal safety • Landscaping vegetative buffers • Cultural art
E-features	<ul style="list-style-type: none"> • EV charging for all shared mobility • In suburban locations with commuter parking, Level 2 and Level 1 charging • Onsite energy storage to capture and store solar energy production, buffer grid impacts, and reduce electrical demand charges • Solar canopy to provide shade and weather protection and generate electricity to offset portion of electrical demand, sized as large as possible to provide maximum electrical generation and weather protection.

Feature Category	Components
	<ul style="list-style-type: none"> Support infrastructure including transformer, smart meter, service cabinets, etc. To account for anticipated growth in transportation electrification, electrical support infrastructure should be sized as large as possible, providing capacity for installation of additional and higher capacity chargers that required larger conduits, meters, transformers, additional breaker panels, etc. Several manufactures such as Siemens and ABB currently produce modular charging systems that can be upgraded to support additional chargers.

Conceptual Site Layout

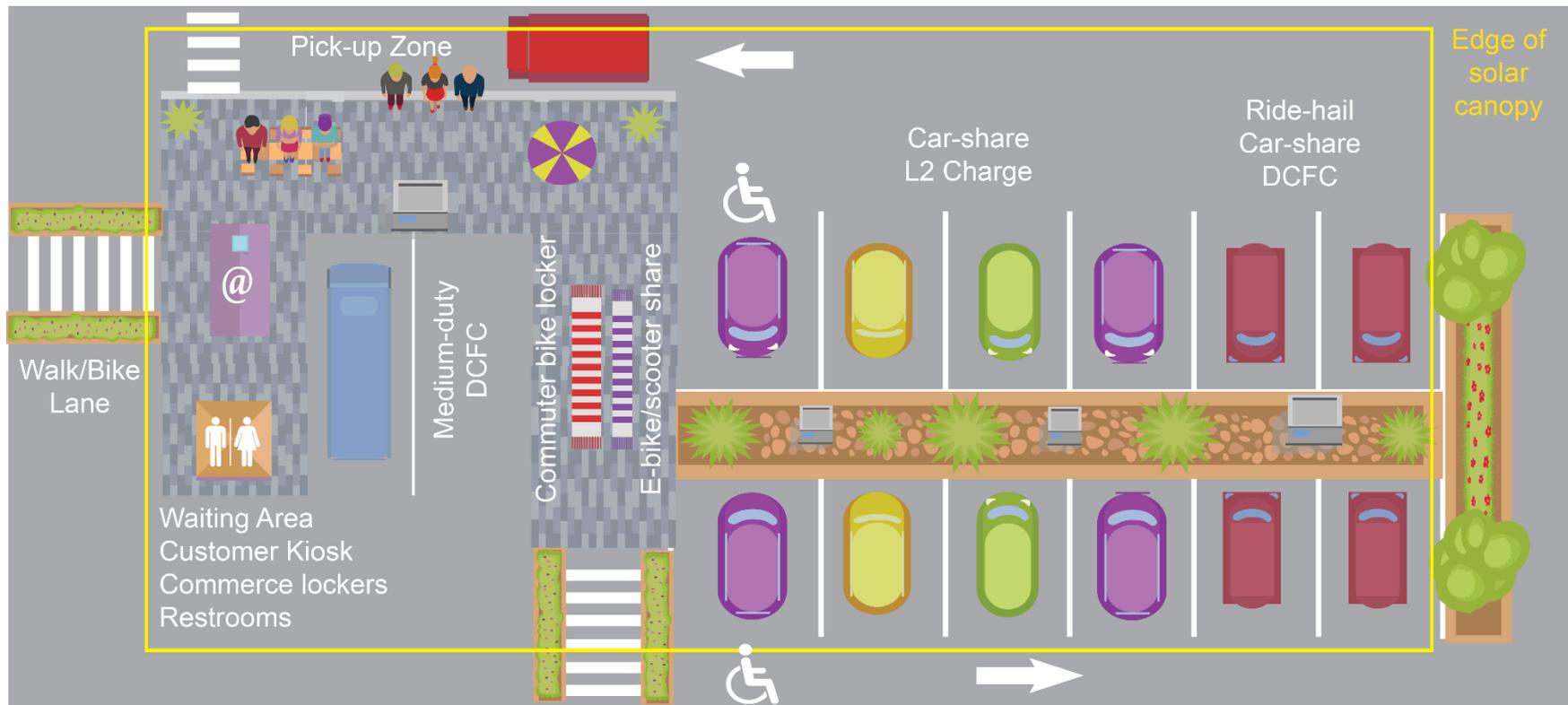
The layout of the e-mobility hub concept is intended to fit within a standard park-and-ride lot, which allows the e-mobility hub to be scaled up or down without impacting the design or operation of the lot.

Figure 9: E-mobility hub concept is a concept drawing that fits within a row of parking stalls that is two parking spaces deep (36-40 feet) by approximately 20-25 parking spaces wide (170-215 feet). It assumes that this row would be the closest to the light rail station. Some of the existing parking spaces would be transformed into a structure with public amenities concentrated at one end of the site. The other end would be for parking and charging car-share and ride-hailing EVs. The concept shows 12 spaces for shared-ride passenger cars and leaves two spaces for medium-duty vehicle charging.

To expand in the future as transportation becomes more dependent on shared EV mobility, the e-mobility hubs should be within the longest rows of parking at the transit center. This enables adding more chargers and/or expanding the active transportation portions as housing and commerce grow closer to the hub.

This is a concept drawing that will be modified to be appropriate for an individual site.

Figure 9: E-mobility hub concept



This drawing shows two car-share spaces that are ADA accessible. One charger in the center aisle can serve four vehicles. Plants in the center of the row ensure this is not interpreted as a walkway to the amenity area. The bike lockers and shared ridables are placed together so that one power source (conduit that all operators can tap into) can charge personal and shared bikes/scooters. The protected bike lane in this configuration enables people to safely cross the area where shared cars are pulling in and out. The 90-degree parking spaces allow for a protected bike lane in this configuration. Seating and waiting areas can be expanded to fit available space. The purple-and-yellow circle represents the customer service kiosk. This could be an attended station, a self-service kiosk, or a convenience store or coffee shop. A mobile office staffed by a person in an electric van could serve as an attendant who moves from hub to hub. A delivery van can pull into the medium-duty charger and quickly charge while unloading goods into the e-commerce lockers (marked with @ in the drawing). This can reduce VMT from the van and the person who might otherwise drive to a store, food bank, or library.

This drawing includes a solar canopy that covers the entire hub to provide weather protection and shade but does not show the necessary anchor mounts. It may be more feasible to build a roof with roof-mounted PV. The drawing does not show battery storage or electrical cabinets, which would presumably be located near other electrical systems for ease of maintenance and maintain lines of sight around the hubs. (No big boxes obstructing the view of people, bikes, and cars.)

This concept can also be deployed as individual elements. For example, the University and 65th Street transit station doesn't have a parking lot. The concept can still be deployed by moving the car-share vehicles to an adjacent parking lot accessed by a protected walkway and adding a dedicated pick-up zone for shared rides (microtransit and ride-hailing). The Department of General Services operates a park-and-ride lot under the I-80 freeway between X and W Street that has only car parking and bus stops. A portion of that lot could be transitioned to a waiting area and a fleet of shared micromobility vehicles that would all go downtown in the morning and all come back to the lot in the afternoon.

Potential Operational Structure

As cities and counties look to implement mobility hubs, local government is a likely candidate for leadership. Figure 10 from Seattle's *EVSE Roadmap for Shared Mobility Hubs*¹⁰ summarizes roles within the primary phases of the project. The *Roadmap* states, "Successful implementation of the program relies on strong collaborative partnerships, clearly distinguished roles and responsibilities, frequent and open communication, and methods for tracking deliverables and success throughout the project period."

Figure 70: Seattle Department of Transportation's Roles and Responsibilities for Shared Mobility Hub

	SDOT	EVSE Provider	SCL	Shared Mobility Service Providers	Outreach Provider	OSE
Program Development	●	●		●	●	●
Community Outreach & Engagement	●				●	●
Electrical Feasibility Analysis			●			
Site Selection & Deployment	●	●		●		
Program Evaluation	●	●		●	●	●
EVSE Operation & Maintenance		●				
● = Participant ● = Lead						

Because of the importance of transit access, mobility hubs are typically targeted for public sites, often on land owned and managed by transit agencies or on state-owned or municipal property on behalf of or in conjunction with transit agencies. Federal funding provided by the Federal Transit

¹⁰ <https://www.seattle.gov/transportation/projects-and-programs/programs/new-mobility-program>

Administration (FTA) is the primary source of funding for passenger facility infrastructure and FTA requires long-term interest in the property, typically through ownership or long-term lease or license if the facility is located on a privately-owned site. The site owner or leaseholder typically manages the facility. Therefore, it is feasible that Sacramento RT would be the site operator for a mobility hub in a SacRT park-and-ride lot, while the City of Sacramento or another agency could be the operator of a hub on City property, and/or a contracted vendor to be the operator of a hub on a private or public property.

Because local government support is essential to ensure the hub serves social and environmental goals, the City should provide program management or management support for hub development, but not lead actual day-to-day operations. A third-party non-profit or community-based organization could manage daily operations. The City of Sacramento Public Works Department could provide overall program oversight, including:

- Facilitate necessary conversations between project partners, stakeholders, and community stakeholders to guide project implementation.
- Work with the private industry partners to communicate and enforce City objectives, such as an emphasis on reducing vehicle miles traveled.
- Coordinate project partner meetings which to occur quarterly (at a minimum) and serve as the line of communication between the City and other regional partners.
- Hold the funding agreement with potential third-party funders and execute other contracting mechanisms with project partners and additional partners as appropriate but not own or have any legal interest in the equipment installed through this agreement.
- Coordinate with other departments that may contribute to the program like Transportation, Parking, Engineering and Facilities as well as the Department of Community Development including Planning and Building, and Information Technology Department.

Private industry, which includes providers of EVSE, shared rides, and micromobility, could take on one of two roles:

1. Be a contractor to the operator/property owner/site host (e.g., to the City of Sacramento, SacRT)—the operator/site host would pay the contractor to provide a service and the operator/site host could potentially collect revenue. It's a similar model to how many cities currently contract parking services.
2. Be licensed to provide an amenity at the e-mobility hub—the operator/site host would hire the provider as a concessionaire with access to the site. The provider would pay the operator/site host a monthly or annual fee and the contractor would collect the revenue. This is similar to the way State government provides food service operations at State buildings. In some scenarios, a contractor would provide revenue share with the site host to offset ongoing monthly or annual fees.

Under scenario 2, providers are concessionaires, the operator/site host would negotiate a contract with companies to provide EVSE, car-share vehicles, micromobility, and on-demand transit. The operator/site host may also sign a contract with a Mobility-as-a-Service provider to integrate the individual providers. This is especially important to coordinate ride-hailing and on-demand dispatching to reduce wait times at the e-mobility hub and the number of “empty” trips; those trips without passengers.

Providers should be held to performance standards to ensure working vehicles are available to match customer demand and the operator should require access to all data to understand how the system is working; not just if one element is successful. It is most likely that grants will be required to fund each providers' start-up costs and may need to fund the gap between revenue and operational costs for the first two years.

The concept has three, potentially four, EVSE implementations:

- DC fast charging
- Level 2 charging for car share
- Level 2 charging for commuter cars
- Potentially, charging for electric buses

The operator/site host would, ideally, contract all services to one EVSE provider. The provider could collect revenue from fee-for-charge and/or from the car-share operator. The provider could sell the Low Carbon Fuel Standard credits,¹¹ potentially use the site for load balancing and collect revenue from the utility and take advantage of future revenue models. The operator/site host would be relieved from maintenance of the chargers and staying abreast of developing revenue models.

Anticipated Costs

Table 3 is an estimate of the initial start-up costs based on public records of similar projects' initial costs. These do not include operational costs for the first two years because data isn't currently available.

Table 3: E-mobility hub cost estimate

Item	Cost	Source/Example/Potential funding sources
Land acquisition	\$0	Project assumed to be in an existing parking lot
Engineering, design, and construction	\$500,000-\$800,000	SACOG grants for developing light rail stations ¹² and Safe Route to School improvements ¹³
PV array and battery storage	\$130,000 (PV) + 10,022 (storage)	Refer to cost analysis in EV Blueprint tasks 3.2 and 6.2
Establish car-share hub	\$750,000-\$1,300,000	Energy Commission grants for ZEV car share programs. ¹⁴

¹¹ <https://www.arb.ca.gov/fuels/lcfs/electricity/electricity2.htm>

¹² https://www.sacog.org/sites/main/files/file-attachments/description_of_funded_projects_round_7.pdf

¹³ <https://www.sacog.org/funding-award-recipient/2019-regional-atp-funding-awards>

¹⁴ https://ww2.energy.ca.gov/contracts/GFO-16-605_NOPA.pdf

Item	Cost	Source/Example/Potential funding sources
		Initial grant for Our Community CarShare that included purchase of eight cars and four Level 2 EVSEs ¹⁵
Expand microtransit	\$849,000	City of West Sacramento cost to establish and operate Via for one year after deducting operator's revenue ¹⁶
Establish bike/scooter share	\$0	To date, operators have not applied for grant funding
Implement technology solutions	\$536,000	FTA award to San Diego for integrated app for paratransit ¹⁷
Installation of DCFC	(\$2,000)	EVgo pays the City of Sacramento a \$2,000 annual licensing fee for curbside DCFC ¹⁸
Total estimated funding needed	\$2.7-\$3.5 million	

If the mobility hub also installs Level 2 charging in the parking lot for commuter cars that the operator will own and operate, the cost would include \$13,637 for each networked Level 2 EVSE with two connectors. If a provider owns and operates the Level 2 EVSE, the cost should be \$0.

¹⁵ <http://policies.sharedusemobilitycenter.org/#/policies/853>

¹⁶ <https://blob.cityofwestsacramento.org/civica/filebank/blobload.asp?BlobID=16816>

¹⁷ <https://www.transit.dot.gov/funding/grants/grant-programs/access-mobility-partnership-grants-fy2019-project-selections>

¹⁸ <http://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric-Vehicles/EVgo-Charging-Southside-Park.pdf?la=en>