

Sacramento EV Blueprint



Task 5.2: EV Economic Pathways

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EV Economic Pathways

The purpose of this memo is to identify local programs to prepare the workforce for advanced transportation employment opportunities, identify an operational structure for a potential zero-emission vehicles (ZEV) service center, and develop a guide for agency efforts to strengthen the local ZEV workforce.

Summary of Key Findings

Most zero-emission vehicles (ZEVs), which includes plug-in hybrids, battery electric, and fuel cell electric vehicles, are leased from major automakers. Dealerships performs all maintenance, and leased cars are typically returned before they need major servicing, and dealerships hire technicians that have completed automaker-specific training. Dealerships stated that ZEV servicing is more like data analysis than automotive repair, and that auto mechanic classes offered at community colleges and trade schools neither equip students to work on ZEVs nor attract people who have an aptitude for data.

Fleet managers expect that their staff will eventually take on maintenance tasks related to electric vehicles (EVs), but do not anticipate offering training. Instead, they expect to hire people who have necessary certifications. At least one individual instructor teaches an EV certification course for experienced mechanics.

Journeyman electricians were identified as the largest employment gap in the next five years related to EV workforce needs. The International Brotherhood of Electrical Workers Local 340 estimates a current shortage of 1,500 people in the apprentice program. Apprenticeship, however, has significant barriers to entry.

All industries identified a need for people with customer service soft skills: from service writers at automotive repair to insurance estimators to agents answering phone calls about EV chargers or car-sharing, companies reported difficulty hiring qualified employees.

Specific steps that could develop a ZEV-ready workforce include:

- Integrating ZEV servicing into computer classes at high school, community college, and adult education. Computer and technology classes are often presented as a pathway to a four-year degree and a desk job. Demonstrating the link between data analysis and cars could entice a new segment of people into EV service classes.
- Extending the City of Sacramento's Community Workforce Training Agreement (CWTA)¹ to include apprentices for mobility-related projects to provide a pathway for residents of low-income and disadvantaged communities. CALeVIP recipients will be required to pay installers a prevailing wage² and could create a pathway to using electrical contractors that participate in CWTA.

¹ http://sacramento.granicus.com/MetaViewer.php?view_id=22&clip_id=4129&meta_id=512761

² <https://calevip.org/faq/what-are-applicant-requirements-0>

- Offering targeted tutoring, potentially through “bridging” classes or pre-apprenticeship programs—to help people pass reading comprehension and math tests required for apprenticeship programs
- Partnering with each council member to stage a customer service bootcamp followed by career fair with local business and e-mobility providers.
- Arranging for one or more train-the-trainer sessions to certify local instructors to teach the Automotive Career Development Center’s (ACDC) EV certification course to experienced mechanics. Grow Sacramento Funds³ or Rapid Acceleration, Innovation, and Leadership (RAILS) grants⁴ could provide funding for a private company to lead this effort and purchase equipment for training.

Jobs that ZEVs can Bring to Sacramento

The ZEV industry employs workers in many industries, some of which require specialized training or work experience. The U.S. Department of Labor, Bureau of Labor Statistics (BLS) tracks jobs related to electric vehicles and infrastructure.⁵

Sacramento has many technology and clean energy businesses and the Great Sacramento Economic Council is particularly focused on attracting more of these companies that bring high-paying science, technology, engineering, and math (STEM) jobs in the region. With two state universities—Sacramento State and UC Davis—and the private William Jessup University, Sacramento is well positioned to have a workforce of scientists, engineers, software developers, and industrial designers for the ZEV-related STEM occupations in Table 1 that BLS identified that typically require a college or post-graduate degree. Some occupations may also be filled by people with two-year degrees from one of Sacramento’s many community colleges or technical and vocational schools.

Table 1: ZEV-related occupations in STEM fields

ZEV-related occupations	Median annual wages in Sacramento metro area ⁶
Chemists	\$82,460
Materials scientists	\$85,680
Electrical engineer	\$115,250
Industrial engineer	\$91,580
Mechanical engineer	\$98,290
Mechanical engineering technician	\$63,480
Software developer	\$106,870
Industrial designer	\$68,780

³ <https://www.cityofsacramento.org/Economic-Development/Grow-Here/Incentives/Grow-Sacramento-Fund>

⁴ <https://sacramentocityexpress.com/2018/07/05/2018-19-rails-grants-support-innovation-and-entrepreneurship-in-sacramentos-underserved-communities/#0>

⁵ https://www.bls.gov/green/electric_vehicles/

⁶ May 2018 National, State, Metropolitan, and Nonmetropolitan Area Occupational Employment and Wage Estimates https://www.bls.gov/oes/current/oes_40900.htm

Sacramento has one employer that assembles vehicles, Siemens, and Clipper Creek that manufactures and distributes electric vehicle service equipment (EVSE). A few small companies manufacture vehicle or EV-related components. Mather Business Park has been particularly interested in attracting manufacturing to the transformed base. In 2016, a Chinese bus manufacturer considered Mather Business Park for an assembly plant, but ultimately located in Orange County. As manufacturers arrive in Sacramento, they will look for a skilled workforce that has specific on-the-job training, completed an apprenticeship program, or received technical training at a community college, trade school, or high-school career pathway program. Table 2 lists ZEV-related occupations in manufacturing and assembly that may come to Sacramento.

Table 2: ZEV-related occupations for manufacturing and assembly

ZEV-related occupations	Median annual wages in Sacramento metro area
Equipment assemblers	\$41,390
Team assemblers and fabricators	\$31,780
Computer-controlled machine tool operators, metal and plastic	\$47,280
Machinists	\$40,810

Automotive service technicians and mechanics need special skills and knowledge to work on electric vehicles. ZEV technicians generally are trained to work on vehicles made by a single manufacturer and the auto manufacturers typically provide the training. Dealerships already report a shortage of ZEV-certified technicians because none of Sacramento's schools offer an automaker's Professional Automotive Career Training (PACT) program. Table 3 lists vehicle service-related jobs. (BLS does not have a separate category for ZEV service technicians.)

Table 3: ZEV-related occupations for vehicle maintenance and repair

ZEV-related occupations	Median annual wages in Sacramento metro area
Service technicians (light-duty vehicles)	\$49,680
Service technicians (bus and truck)	\$57,810
Heavy-equipment mechanic (e.g., construction equipment)	\$58,320

Building charging stations and hydrogen stations will require changes to existing infrastructure. Urban and regional planners will be involved in planning the infrastructure upgrades, electrical power-line installers and repairers will lay the wires, and electricians will install charging stations. According to interviews for this report, stakeholders expect that infrastructure will be the biggest source of ZEV-related jobs in the next five years. Table 4 lists common occupations related to infrastructure, most of which require degrees and/or training to receive a license and can be considered a STEM pathway.

Table 4: ZEV-related occupations for infrastructure

ZEV-related occupations	Median annual wages in Sacramento metro area
Urban and regional planners	\$87,780
Electrical power-line installers and repairers	Information not released
Electricians	\$61,190
Electrical drafter	\$71,240
Electrician helper ⁷	\$39,850
Construction project manager	\$109,260 ⁸

BLS also considers jobs in sales and customer service, which are becoming increasingly important across all business sectors. Although customer-facing jobs rarely require advanced education or extensive training, employers and business associations point out a sharp decline in people who have the soft skills needed to interact with customers. In Sacramento, customer service jobs are about 15% of all jobs in the metropolitan area. Table 5 lists customer service jobs that are related to ZEVs and mobility.

Table 5: ZEV-related opportunities for customer service

ZEV-related occupations	Median annual wages in Sacramento metro area
Insurance appraiser, auto damage	\$72,390
Customer service representative	\$40,410
Office clerks	\$36,370
Driver/Sales worker ⁹	\$39,500
Executive administration	\$63,530 ¹⁰

BLS does not have a listing for “data scientist,” a job that Deloitte, the Center for American Mobility, Boston Consulting Group, and others identified as an important need in government and industry and will become more important as connected and autonomous vehicles take the road. In April 2019, Uber had 91 job openings with “data scientist” in the job title. The basic duties are:

- Interpret data to develop analytical insights
- Design experiments and interpret the results to draw actionable conclusions
- Build production grade models on large-scale datasets
- Understand user behavior and predict future performance
- Translate data-driven learnings into actionable insights

⁷ In Sacramento, this position is usually called “wireman assistant” and is a pre-apprentice job

⁸ The BLS wage classification closest to “project manager” position used by EVgo, ChargePoint, Black & Veatch, and Fiedler Group

⁹ The BLS wage classification closest to the “field technician” position used by JUMP, Gig, and other shared mobility providers

¹⁰ The BLS wage classification closest to the “project manager” position used by Center for Sustainable Energy and Frontier Energy

Existing Higher Education

American River College (ARC)¹¹ and Sierra Community College (SCC)¹² have certificate courses in auto repair and offer limited training in ZEVs, but are aware of the demand for technicians that can service electric vehicles. Neither school offers an automaker-specific certification course, often called a Professional Automotive Career Training (PACT) program.

Both colleges expressed that access to vehicles is an impediment to implementing ZEV programs. Combustion vehicles are inexpensive and easy to obtain for hands-on training—which is not the case with advanced technology vehicles. More than 15 years ago, Rio Hondo College developed relationships with Toyota and with SunLine Transit to train mechanics for the Prius and SunLine’s alternative fuel fleet. The Sacramento area schools don’t have the same access to vehicles. In a project with Sacramento Metro AQMD, Frontier Energy arranged:

- A connection between ARC and AC Transit (in the Oakland area) about hands-on education with AC Transit’s battery and fuel-cell buses.
- Communication between ARC and Ryder about curriculum that Ryder is developing about heavy-duty high-voltage electric vehicles. ARC submitted a proposal to Ryder and the program is in development. ARC may offer this as a certificate program in late 2019.
- A connection between Sierra College and the regional Nissan EV testing center to facilitate donating a vehicle and electric drive-train components for hands-on education. Nissan donated five hybrid electric transmissions and a vehicle will be donated in early 2019.

Through the Sacramento Plug-in Electric Vehicle Collaborative, additional steps started to arrange for retired SMUD EVs to be donated to one or both programs and a decommissioned Smith Electric Truck was donated to ARC. ARC also formed a partnership with The Lion Electric Company, a Sacramento-based manufacturer of electric school buses and cargo trucks, to create a Lion-certified mechanic program.

In partnership with the National Association of Fleet Managers and ARC, Sacramento Clean Cities holds a one-day workshop about new technologies for existing fleet managers and technicians. The June 2019 workshop had nearly 200 attendees, many of whom had their first exposure to battery and fuel cell vehicles. Sacramento Clean Cities plans more of these workshops.

In the Los Rios Community Colleges, only Consumes River College (CRC)¹³ offers a class in data analysis. None of the community college classes equip students with data scientist skills.

UC Davis is headquarters to the renowned Plug-in Hybrid & Electric Vehicle (PH&EV) Research Center.¹⁴ The Center collaborates closely with California utilities, automakers, regulators, and other research institutions about research aimed at developing a sustainable market for plug-in vehicles.

¹¹ http://web.arc.losrios.edu/~autotech/cert_alternatefuel.htm

¹² <https://www.sierracollege.edu/academics/divisions/baape/auto-tech.php>

¹³ <https://www.crc.losrios.edu/catalog/areas/cis>

¹⁴ <https://phev.ucdavis.edu/>

The Institute of Transportation Studies,¹⁵ a post-grad program, offers a master and doctoral degrees in transportation technology and policy, and the university has a host of STEM degrees. UC Davis also has a Data Science Initiative¹⁶ and a degree program with a statistical data science track for statistics majors.

Sacramento State¹⁷ has undergraduate and graduate degrees in STEM fields, and master's degree programs in public policy and urban land development. Several of the theses on the website include mobility.¹⁸ The College of Business Administration's Center for Business Analytics has workshops that are open to the public and cost about \$250 for a one-day class.¹⁹

William Jessup,²⁰ a private college, has areas of study that include geographic information systems (GIS) and will introduce degrees in public policy and administration beginning the fall 2019 semesters.

Opportunity for Sacramento

It's challenging for colleges to offer coursework and degrees in developing fields of study. For example, in the late 1970s and early 1980s, personal computers were just entering the market. Computer-related courses at post-secondary schools taught skills related to mainframes and minicomputers. Many of the people who established the microcomputer industry, including Bill Gates, Steve Wozniak, Steve Jobs, and Larry Ellison, were self-taught. Colleges started offering coursework and degrees in microcomputer programming, networking, databases, and software applications after PCs were established in business.

Early movers in ZEVs, like the City of Sacramento, can influence college students through guest lectures, participating in mixers, and inviting students and teachers to job shadow. It may be years before colleges can invest in ZEV-specific degree programs or major coursework.

Training Programs

Sacramento Works, the website of the Sacramento Employment and Training Agency, has a list of local training providers²¹ with details about certifications/degrees, costs, and time commitments. Training programs (excluding community colleges) that are applicable to ZEV-related jobs include:

1. Building construction, cost \$5,500, time 16 weeks
2. Electrical training, cost \$12,995, time 50 weeks
3. Electrician training, cost \$14,995, time 42 weeks
4. Commercial Electrician Trainee, cost \$16,500, time 26 weeks
5. Energy Apprenticeship, cost \$0, time 4-5 years
6. Electrician trainee, cost \$6,777, time 3 years
7. Data analyst (entry level), cost \$8,000, time 11 weeks
8. Data analyst (Level 2), cost \$8,4000, time 17 weeks

¹⁵ <https://its.ucdavis.edu/>

¹⁶ <http://datascience.ucdavis.edu/>

¹⁷ <https://www.csus.edu/>

¹⁸ <https://www.csus.edu/uld/thesis-project/bank/>

¹⁹ <https://www.csus.edu/cba/analytics/certificate.html>

²⁰ <http://jessup.edu/>

²¹ <http://seta.net/pdfs/etpl.pdf>

Several schools offer electrician training, which is reflected in multiple costs and timelines (items 2, 3 and 4 in the preceding list). The International Brotherhood of Electrical Workers (IBEW) offers Energy Apprenticeship (item 5) that is paid for by union dues. The Electrician trainee program (item 6) is the cost of the classroom education, books, and materials for non-IBEW apprentices. The two data analyst classes (items 7 and 8) are offered by a for-profit computer training center.

Many of the training programs offer computer classes that range from a \$90 class in computer basics to specialized certifications (e.g. mobile app development, network security) that cost several thousands of dollars.

The International Association of Machinists offers a California Automotive Apprenticeship Program but doesn't include ZEV-related programs and has no job sites in the Sacramento area.

Alternative Education

Alternative programs seek prepare targeted populations for jobs and careers. Examples of several local programs are identified below.

Green Tech (www.greentechedu.org) is a community-based organization (CBO) that trains “opportunity youths” between 12 and 21 for “green collar” jobs. The school conducts weekly classroom instruction in urban farming, forestry, and aquaponics and weekly web-building bootcamps. Instructors take participants on tours of green environmental-related manufacturing businesses and expose them to clean energy jobs opportunities. Funding is a combination of donations, Sacramento County Office of Education, and grants. Facility are from Consumnes River College and Hacker Lab.

The California Conservation Corps operates the Sacramento Energy Hub (ccc.ca.gov/locations/sacramento-energy-hub/), a nonresidential program to teach Corpsmembers about energy efficiency retrofits (lighting, solar installation, smart power, etc.) Corpsmembers are California adult between 18 and 22 that are free of felony convictions and not on parole. In addition to serving the State of California and learning a trade, Corpsmembers can earn a high school equivalency degree, take community college courses, and earn scholarship money for continuing education.

Sacramento Regional Conservation Corps (www.saccorps.org) is an education and workforce training program established by the Sacramento Metro Chamber of Commerce. It serves adults 18–25 years old, 90% of whom are high school drop outs and read below grade level. Funded by state and local government agencies, foundations, corporate grants, sponsorships, and private donations, its work-related education focuses on recycling, litter abatement, and roadway maintenance.

Northern California Construction Training (NCCT) (www.ncct.ws/) is a pre-apprenticeship training program for construction trades apprenticeship programs. NCCT is a non-profit, community-based organization. NCCT students receive unpaid classroom training and hands-on building experience. When the student completes training he or she can join an apprenticeship program. NCCT offers preparation and testing for high-school equivalency, work boots, and tools. Many of students are referred by county probation departments and school districts Career Training Education (CTE) programs.

Asian Resources (ARI) (asianresources.org/) serves limited-English and low-income Sacramento communities. Among its services, ARI assists people with job training and job placements to drive economic growth. The adult program includes weekly workshops and computer classes. The youth program has a two-week summer camp for at-risk youth that includes career, life, and leadership skills training followed by a paid internship. Funding is from grants, local government, and donations.

Opportunities for Sacramento:

Job training recommendations are covered in the following sections.

Interviews with Sacramento-area Stakeholders

Table 6 is a list of people and organizations identified for interviews. This table includes all stakeholders identified for interviews, regardless of whether responses were received to interview requests. The purpose of including all stakeholders Table 6 is to ensure a record of stakeholders for this issue areas and provide a good starting point for future engagement and advancement of opportunities anticipated by this report.

Table 6: People and organizations identified for interviews

Person/Organization	Description	Purpose	Status
Electrified Garage	An independent Tesla service center	Understand business model, training needed or acquired	Did not respond
Argonaut	An independently owned auto repair shop in Berkeley that repairs hybrids and EVs	Understand business model, training needed or acquired	Short phone interview
Craig Van Batenburg, ACDC	Helps existing mechanics learn how to service EVs and provides equipment lists	Understand business model, training needed or acquired	Long phone interview and follow up emails
Nissan Leaf data center	Collects and analyzes data	Understand training needed or acquired, projected job growth	In-person interview
AAA	Previously operated an EV service center in Sacramento	Understand business model and why center closed	Short phone interview
Tim Taylor	Executive director of Clean Cities Sacramento	Understand training that Clean Cities offers, needs of local fleet operators, future job needs	Phone interview
Kniesel's Auto Service Centers	Operates three automotive service centers in Sacramento	Understand business model, training needed or acquired,	Phone and in-person interviews

Person/Organization	Description	Purpose	Status
	and repairs collision damage to Tesla cars	future workforce needs	
AutoNation Honda Service Center	Local Honda dealership that services plug-in and fuel cell Hondas	Understand business model, training needed or acquired, future workforce needs	In-person interview
Mark Stevens, City of Sacramento	Manages City fleet, including ZEVs	Future workforce needs, training needed and acquired	Phone interview
Sacramento/Shasta Butte Area Electrical Training Center	Job training programs for electricians	Future workforce needs, training needed and offered, barriers to education	Multiple phone and in-person interviews
Noah Painter, KMP Strategies	Apprenticeship programs for the City of Sacramento	Future workforce needs, training needed and offered, barriers to education	Multiple phone and in-person interviews
Connie Samla, Commercial Education Specialist Energy Education & Technology Center, SMUD	Training programs and workshops	Past and future education	Phone interview
ALLDATA	Local manufacturer of diagnostic equipment for auto repair shops	Equipment for an EV service center	Did not respond
Charles A Jones Career and Education Center	Adult education program aimed at low-income students	Integrating EV-related training	Did not respond
Sacramento RT	Operator of electric buses	Future workforce needs, training needed and offered	Did not respond
Transdev	Contractor for municipal transit services; operates YoloBus and others	Future workforce needs, training needed and offered	Did not respond
Dealership ²²	Local service center for ZEVs	Understand business model, training needed or acquired, future workforce needs	In-person interview

²² Asked that name not be used in report

Person/Organization	Description	Purpose	Status
John L Sullivan's Roseville Toyota	Local service center for Prius Prime and Mirai	Understand business model, training needed or acquired, future workforce needs	Did not respond
Brian Moore, Manager, Honda PACT program	Oversees the dealership-specific training program in Northern California	Opportunities to offer Honda PACT at local colleges	Could not schedule interview within project time frame

Independent Service Centers

Kniesel's Auto Service Centers is a local repair business that operates three facilities in the Sacramento area. The company does not perform repair or maintenance on EVs or plug-in hybrids, but its Roseville location is certified to perform collision damage repairs to Tesla cars. Owner Rebecca Kniesel stated, "We haven't had a demand for EV service and maintenance yet. Most of the cars are leased and the dealerships do all the work. That might change, and it would be good to get our managers and senior staff more knowledgeable about EVs."

Tim Taylor, Executive Director of Sacramento Clean Cities, said that fleet operators often have their own technicians, but currently don't need people who service EVs. Echoing Rebecca's sentiment, he stated that most fleet vehicles are leased and include dealership servicing in the lease price. "The used EV market will start to create a demand for non-factory technicians who can work on EVs, but we're years away from that." Clean Cities has an annual two-day "academy" for technicians and fleet managers that covers a wide range of alternative fuels. It is not a hands-on maintenance program, but does educate technicians about fuels, equipment, terminology, and overall needs

Mark Stevens from the City of Sacramento said, "as we transition the City fleet to ZEVs, technicians will be necessary to repair the EVs. We expect that our staff will be trained to make these necessary repairs." He expects that the City will hire people with factory training or college-level certifications for ZEV repair but thinks it will be more than five years before the City has the volume of ZEVs to need a full-time technician.

Craig Van Batenburg teaches experienced mechanics to work on EVs and hybrids with the goal of helping independent shops stay open as cars become more electrified and less mechanical. "In 1999, I bought a Honda Insight—serial number 157—and I wanted to know how to work on it," he said during a phone interview. Craig taught himself to be a hybrid mechanic and soon started teaching others at his Automotive Career Development Center (ACDC) in Worcester, MA.²³

Craig is devoted full time to training, consulting, technical writing, and class development for hybrid and electric cars. He and his three full-time instructors trained more than 15,000 people and "and 95% of classes are outside of Massachusetts. I come to California a lot!" he exclaimed.

²³ <http://www.fixhybrid.com/>

Classes include disassembling cars that the school owns (Leaf, Bolt, Volt, Civic hybrid, Prius, etc.) and hands-on diagnostics and repairs. “Each class sells out in less than two days,” he said. His seven-day train-the-trainer class costs \$5,000 plus travel expenses. Online training is video recordings of instructors teaching live classes and cost \$60 per class. ACDC also sells textbooks that Craig wrote (one of which is in Spanish), cut-away parts, cars, tools, and equipment.

Rebecca was interested in sending people to the ACDC training, but only if it was offered locally. The online courses were intriguing, particularly the Hybrid 101 series, which is a series of eight 60-minute classes. Rebecca said, “It would be hard to get someone to stay with one 60-minute recorded class. I’m not sure we’d get the value from it.”

Among the ACDC classes is a series called Shop Management. It includes “Hybrid and EV Service Writer Training” that includes teaching EV terminology that EV owners know, but service writers often do not. Rebecca, and several of the other interviewees, liked the idea of a class to teach service writers and customer service agents the terminology, if done in a self-paced, engaging manner.

Opportunities for Sacramento:

- Arrange for an ACDC train-the-trainer class in Sacramento, or send a group from Sacramento to Worcester, to educate and certify local instructors.
- Use grant funding to create interactive, online classes from ACDC’s recorded training. Sacramento’s Rapid Acceleration, Innovation, and Leadership in Sacramento (RAILS) Grant program, Clean Cities, SMUD, and the Energy Commission are among programs that have awarded grants for EV education and innovation in the past.
- Purchase a license to the Service Writer Training and offer a version as adult or CTE education through Sacramento Works/ETP training partners. This could be leveraged into internships and jobs with existing auto service centers.
- Create a pool of cars and cut-away parts from retired municipal fleet vehicles or from auto dealerships that instructors could borrow for classes.

EV Service Centers

In 2005, AAA of Northern California, Nevada, and Utah launched the Greenlight Initiative to help build awareness about alternative fuels and vehicles. During Greenlight, the AAA Car Care Plus facility on Power Inn Road became a “model shop” for servicing hybrids. None of the AAA people interviewed for this report were familiar with the service center, and no records can be found. The California Fuel Cell Partnership (CaFCP) was a Greenlight Initiative partner and provided some insight into the service facility that operated between 2006 and about 2010.

The facility held classes for hybrid drivers and conducted alternative fuel vehicle outreach events. For a short while, AAA operated a mobile charging truck, in Figure 1, that could give a stranded EV driver enough charge to drive a few miles. AAA operated the trucks in five cities, but they saw little action and were retired in 2016.

Figure 1: AAA Mobile charging truck in 2011



Service technicians were authorized to perform maintenance on the cars' mechanical systems, but not batteries. Few modifications were made to the service center to accommodate vehicles with batteries or fuel cells. CaFCP staff recall antistatic mats placed at every service position and that technicians immediately disconnected the 12-volt battery before servicing. (Neither of these are necessary.) The center also had an NRG-funded charger that included an inductive connector and now-standard connector. In 2012, AAA wrapped up the Greenlight Initiative and the service center became an office, and the office does not have an EVSE.

The independent auto repair businesses and dealerships contacted for this report all say that EV repair is a small part of their overall business. Equipment needs are minor; insulated tools, an Ohm-meter, scopes, and probes. Some vehicles require automaker-specific scan tools used to download data, but other cars use laptop computers with automaker software. Each automaker also has custom tools for removing the battery and/or motor, but service centers said those tools are rarely necessary.

The most important tool that an EV service center needs is a Level 2, high-amp charger. One dealership (not in Sacramento) has been trying to install Level 2 electric vehicle service equipment (EVSE) for almost six months. "The EVSEs are sitting in a crate in the back," Mr. X said during an interview. "We keep having to redraw and resubmit the plans to install them. So far, the planning has cost more than the equipment."

Opportunities for Sacramento:

- Use the business license database to identify existing independent service centers and conduct targeted outreach about servicing ZEVs. This might include an educational package about terminology, an equipment list, and a streamlined process for installing EVSE. Consider a priority application for small shops to use Grow Sacramento Funds²⁴ for EVSE.

Dealership Service and Repair

Nick Gilliland, the Director of Service for AutoNation Honda in Roseville, is very interested in developing ZEV technicians. Of the five Sacramento-area Honda dealerships, only AutoNation services all-electric vehicles (battery and fuel cell.) Other dealerships service Honda's hybrids, "but only the mechanical systems. Everything electrical comes here," he stated.

²⁴ <https://www.cityofsacramento.org/Economic-Development/Grow-Here/Incentives/Grow-Sacramento-Fund>

AutoNation has 44 full-time technicians and 12 service writers. All the technicians completed a Honda Professional Automotive Career Training (PACT) course. Butte College in Oroville is the closest Honda PACT training center to Sacramento. “Almost all our new technicians commute every day from Oroville,” Nick said.

Five of his current technicians are trained to service ZEVs, and all five are recent hires. “I tried training some of the technicians that have been here for a long time, but they just don’t get it,” he said. “Working on ZEVs is completely different than conventional cars.” With engines, mechanics are used to seeing, feeling, smelling, and hearing problems with the equipment, and they start to develop short cuts to service the cars more quickly. ZEVs require looking at data and performing each step in order.

He gave an example of a plug-in hybrid car that the driver said lost power during acceleration. “The cars store all the data internally and the technician plugged in a laptop to read the data. He could see the power loss but couldn’t replicate the problem.” The tech reset the battery and sent the car home. It came back—twice. One of the new EV techs looked at the data with an analytical eye and found that the problem was related to incline; the car lost power when driving up the mountain, not a flat road. She changed a setting in the car and solved the problem.

“I think we’re targeting ZEV repair to the wrong people,” Nick said. “I need people who look at EVs as investigation instead of fixing.”

When asked, Nick mentioned three barriers to employment he seen at automaker service centers:

1. Service shops are not female friendly for customers or employees. “When our first female service writer joined the team, I realized that our shop was more playful than professional. We changed the culture here, but the overall service center culture needs to change so that more women see themselves in this type of workplace.”
2. The availability of PACT training. “It’s not just that the training is in Oroville, it’s that the training is in person, in English, and expensive.” A PACT program for any dealership is typically four semesters (16 months) and costs \$3,200, excluding boarding. PACT training through a private school like Universal Technical Institute can be faster—18 weeks—but costs up to \$10,000.
3. Reaching young people who have an aptitude for EV repair. “Right now, we’re squeezing EV repair into auto mechanics, but it’s entirely different approach.” Nick suggested that students in computer, technology, and robotics classes could be told that ZEV repair is a technology career pathway. “We pay technicians up to \$45 an hour, with benefits. It’s a good living that doesn’t require a four-year degree.”

MITO, a technical training school in New Zealand, EV Service Automotive Engineering certificate program on March 28, 2019.²⁵ Funded by the New Zealand government, the program targets working adults that have some background in automotive repair with online, self-paced training. In 2018, MITO tested a scaled-down version of the class—a six-week EV Service Technician certificate course—that was offered free to 120 unemployed single mothers. At a presentation in November 2018 a MITO representative stated that 110 students graduated and found jobs within 30 days.

²⁵ <https://www.mito.org.nz/get-qualified/our-industries/automotive/electricvehicle/>

Opportunities for Sacramento

- Sacramento’s new car dealerships are concentrated in the Auburn Blvd./Fulton Road and Florin Road areas, both of which have active property business improvement districts (PBIDs). Partnerships with the Fulton Avenue Association and Florin Road Partnership could create a workforce training initiative that includes internships and/or pre-apprenticeships. (Apprenticeships are discussed later in this report.)

Infrastructure and Electricians

“Demand for EVSE installation is growing the fastest,” said Tim Taylor from Sacramento Clean Cities, “and there’s demand for the kind of professionals who can plan for and install EVSE and provide competent project management.”

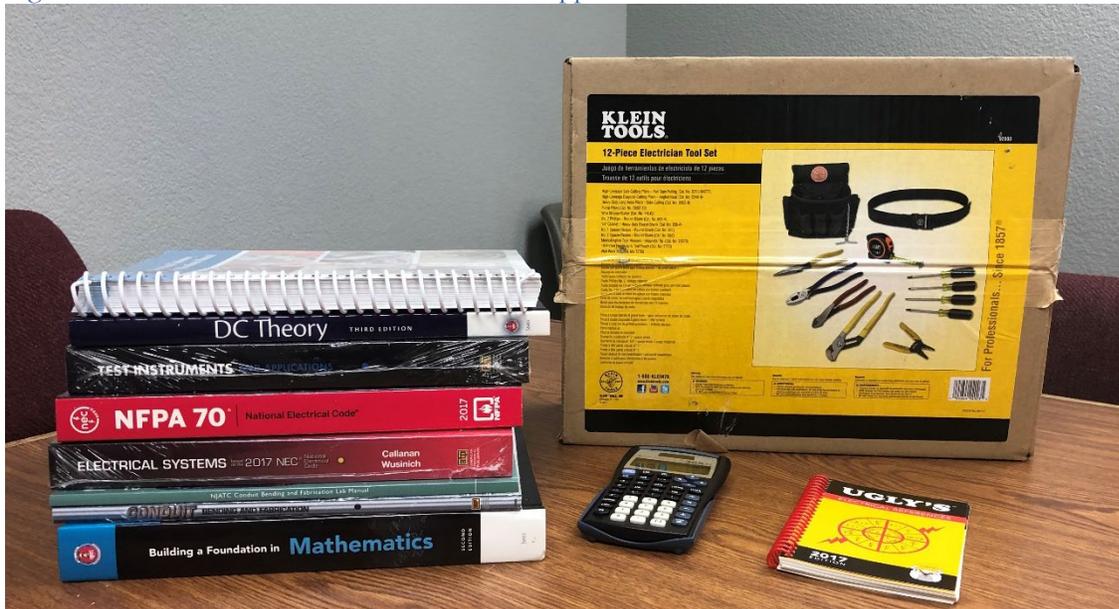
The City of Sacramento’s Mark Stevens said, “Any electrician can handle the requirements of installing chargers. Eventually, our Facilities Division may need to train staff to repair the chargers.”

Matt Nootenboom is the training director for the Sacramento/Shasta Butte Area Electrical Training Center that is operated by the International Brotherhood of Electrical Workers (IBEW) Local 340. In an email Matt wrote, “Electric vehicle infrastructure has been a passion in the electrical industry for several years now. We’ve seen an influx of jobs in EVSE installation and maintenance in Southern California, and a lot of the work is being done by apprentices and journeymen.”

The process of becoming a State of California certified electrician starts with an apprenticeship program that consists of 1,000 hours of classroom training and 8,000 hours (4-to-5 years) of paid, supervised work experience and on-the-job training. After completing this training, an apprentice can take the state test to be licensed as a journeyman. After two years of full-time work, which may include supervising apprentices, a journeyman can take the test to become a master electrician. Master electricians can pull permits, design wiring systems, and supervise job sites.

Apprenticeships may be through union or non-union organizations or employers, including private employers, labor unions, the U.S. military, apprenticeship training centers, and community colleges. The largest apprenticeship program is the Electrical Training ALLIANCE, a joint program established under the National Electrical Contractors Association (NECA) and the International Brotherhood of Electrical Workers (IBEW). Apprentices in the NECA/IBEW program do not pay for classes. Sacramento’s Local 340 also provides the books and a starter toolkit for free, as pictured Figure 2. Matt added, “Apprentices can also earn an associate degree from American River College by taking a few general education classes to supplement the college credit they receive from apprentice training.”

Figure 2: Books and starter toolkit for electrical apprentices



IBEW, and non-union electrician training programs,²⁶ also offer the Electric Vehicle Infrastructure Training Program (EVITP). Bernie Kotler with EVITP explained, “EVITP is a non-profit partnership of automakers, utilities, EVSE manufacturers, energy storage device manufacturers, electrical inspectors, electrical contractors, electrical workers, and first responders. It was established in 2011 to provide a structured platform to facilitate training and certification for EVSE installation in the residential, commercial, and public markets.” Experienced volunteer instructors teach the program nationwide to state-certified electricians who pay \$75 per person for the two-day class to cover materials costs.

In Sacramento, the IBEW training center is the only place that offers the class. “The community colleges in Sacramento don’t offer it, and it’s easy to understand why. They need to charge for the class to cover expenses, the IBEW offers it for just the \$75.”

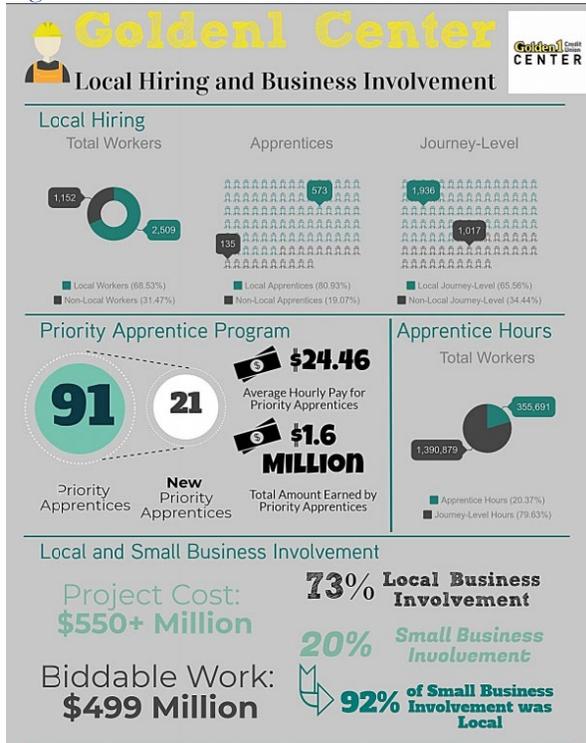
At an in-person meeting and tour of the IBEW training center, Matt stated that they have incorporated EVITP into the apprenticeship program. “Every new apprentice leaves here knowing exactly how to install and maintain EVSE.” The training center has several Level 2 chargers installed in the parking lot for students to use for hands-on training, albeit they are older units and not networked.

Noah Painter with KMP Strategies joined the meeting and tour at IBEW. Noah worked with the City of Sacramento during construction of the Golden1 Center to create the Community Workforce Training Agreement (CWTA). “Industry committed to the City of Sacramento to employ 25% of the apprentices on that project from targeted communities within the City boundaries,” Noah explained. “Essentially, it was job creation for those who need it most. It was a smashing success for the City and the apprentices who gained careers as a result.”

²⁶ From American River College, Western Electrical Contractors Association, and Independent Training & Apprenticeship Program. All charge a fee ranging from \$6,000 to \$16,000.

A report²⁷ by the Office of the City Auditor concurred, as shown in Figure 3 from the report. Noah said that the City continues to use the agreement in other projects.

Figure 3: Results of CWTA at the Golden1 Center



Noah and Matt are working together to fill the Sacramento/Shasta Butte Area Electrical Training Center’s pipeline with prospective apprentices. To qualify for the apprenticeship program, applicants must:

- Be 18 or over
- Have a valid driver’s license
- Graduated from high school or have equivalency
- Read and write in English
- Pass an aptitude test in math and reading comprehension
- Pass drug test
- Be able to lift 50 pounds

Matt said, ““We need about 1,500 people in the pipeline. We get plenty of applicants, but few qualified applicants.” When asked about the difference between a qualified and unqualified applicant, Matt answered that it came down to two things, “People don’t pass the drug test, which is getting more difficult with legalization of cannabis. The other is that people can’t pass the aptitude test.”

Community colleges also find that first year students do not have the reading and math comprehension required for college-level work. A 2017 study by the State of California Legislative

²⁷ http://sacramento.granicus.com/MetaViewer.php?view_id=22&clip_id=4129&meta_id=512761

Analyst Office found that 75% of first-time community college students and 40% of university students needed remedial reading, writing, and math skills.²⁸ A national study stated 68% of community college students require at least some developmental education.²⁹

Washington State launched the Integrated Basic Education and Skills Training Program (I-BEST) in 2005 to quickly teach students literacy, work, and college-readiness skills so they can move through school and into living wage jobs faster. Pioneered by Washington's community and technical colleges, I-BEST uses a team-teaching approach. Students work with two teachers in the classroom: one provides job-training and the other teaches basic skills in reading, math or English language. Students get the help they need while studying in the career field of their choice; they learn by doing.

Northern California Construction Training (NCCT) is a pre-apprenticeship program that feeds IBEW. NCCT pairs hands-on skill training with language and math tutoring. A similar approach in Sacramento high schools' Career Technology Education classes and adult education may help students pass aptitude tests for apprenticeship programs and for entry-level jobs. Working directly with IBEW, educators could conduct test prep specifically for the basic algebra that electricians need to know.

Noah works with the community colleges and SETA to identify residents of low-income and disadvantaged communities (LIC/DAC) that could join the program. He noted that 35% of new applicants are low-income and a significant portion have Slavic backgrounds. He admitted that even a free program has significant barriers for some participants. "The training center is not on a transit route—people have to drive to get here—and they have to drive to work sites. Most of the classes are at night and weekends, which presents a problem for people who need child care." English literacy is a requirement, too, because the books are only in English.

Women Employed, a national nonprofit aimed at improving working conditions for women, worked with community colleges across the country to identify actions to reduce barriers to education for single mothers.³⁰ Recommendations that could open access to apprenticeships (and education in general) in Sacramento include:

- Offering tutoring or classes (e.g. art, sports) for school-aged children while parents are in college classes. Tutoring has different staffing and legal requirements than child care and may help children be more successful in school as well.
- Forming cohorts of three or four apprentices that work and study together. Research shows that students, and women in particular, are more successful when part of a team. The cohort can also include a mentor from outside the education program.
- Providing small "emergency" grants to cover immediate needs, like a car repair or a shortfall until pay day. The Women Employed study noted a high percentage of women dropped out of college when they hit a financial bump in the road.

²⁸ <https://lao.ca.gov/handouts/education/2017/Overview-Remedial-Education-State-Public-Higher-Education-Segments-030117.pdf>

²⁹ https://www.ccsse.org/docs/underprepared_student.pdf

³⁰ <https://womenemployed.org/sites/default/files/resources/LowIncomeSingleMothersatCommunityCollege2012.pdf>

Opportunities for Sacramento

- Address the transportation issue, which may include a pilot program with a shuttle or mobility hub at the Richards Blvd. light rail station that could transfer students to and from the training center on the nights that classes are in session.
- In collaboration with the Natomas Community Center or Parks Department, launch a pilot project with tutoring and recreation programs for students' school-age children.
- Extend the CWTA principles and practices to contracts that will install EVSE that receive CALeVIP funding. This will require coordination with Center for Sustainable Energy and the Air Resources Board to understand the process and implications on the State's requirement to pay a prevailing wage.
- Following the I-BEST principles, work with Green Tech, Asian Resources, Sacramento Regional Conservation Corps, and other community-based programs to develop and implement a pre-apprenticeship program that includes paid work experience with tutoring to pass the aptitude test.

Data Collection and Analysis

ZEVs and infrastructure both collect massive amounts of data, and data analysts separate meaningful data from noise.

At a Nissan office tucked into a quiet office park, test drivers take cars out on the road and drive a prescribed pattern that includes roads, speeds, charging/fueling, and commands like accelerate quickly or coast to a stop. The cars are in a blind study with a control vehicle and one or more cars that have an undisclosed modification. Data analysts sift through and analyze the data to make the cars more efficient—or perhaps to have a super power. (Nissan doesn't say.)

According to American Public Power Association, data collection for EVs and EV charging was one of the top 2018 trends.³¹ Utilities want data to understand charging patterns, jurisdictions want data to understand mobility use and needs, automakers collect data to build more-competitive cars, and data is becoming more important with connected roadways and mobility as a service.

In December 2018, Natural Resources Canada launched a \$7 million project to “improve the operation and deployment of charging infrastructure for EVs by demonstrating charging based on the innovative and intelligent use of real-world, vehicle-side data.”³² In April 2019, the U.S. Department of Energy issued funding opportunity announcement of \$4 million to “collect, validate, analyze, and make summary results publicly available an updated national dataset that includes a variety of vehicle and charging equipment types, climate conditions, and end-user segments that will be of high value to government at all levels, the research community, local planners, industry, and others.”³³

In 2017 and 2018, Frontier Energy facilitated workshops with councils of governments and metropolitan planning organizations nationwide to develop action plans for autonomous and

³¹ <https://www.publicpower.org/periodical/article/data-collection-charging-patterns-among-top-2018-ev-trends-report>

³² <https://www.nrcan.gc.ca/energy/funding/icg/19496>

³³ <https://eere-exchange.energy.gov/#Foald439d5a28-e6a1-48a2-b453-093d3bfb1df>

connected vehicles. In each workshop, cities and counties identified ‘data science’ as a workforce gap. Groups made the following recommendations:

- Look for conventional and unconventional ways to develop technical skills, including boot camp/hacker lab events.
- At high schools that teach computer programming, consider a STEM path for data science to create a skilled workforce that will be needed in the next 5-to-10 years.
- Review job descriptions at municipalities ensure a city (county or state) can hire data scientists, including appropriate pay.
- Use an “externship” model in which local tech companies spend time with government counterparts to share their knowledge and methods.

Opportunities for Sacramento

- Review City job descriptions and future-proof by creating job descriptions and internships for data scientists. Collaborate with UC Davis and Sac State.
- Partner with Hacker Lab and I/O Labs, a recipient of a 2018 RAILS grant, to have companies like Uber, Jump, EVgo, and GIG explain their data needs to tech entrepreneurs.
- Partner with Code for Hood³⁴ to host a transportation-focused hackathon.

Soft Skills and Customer-Facing Jobs

Businesses across the region talk about the difficulty in finding good employees. When asked to define good, the answers were surprising. Matt Nootenboom from the Sacramento/Shasta Butte Area Electrical Training Center said that new apprentices are surprised to learn that a job start time isn’t “a window to shoot for” and that they are expected to work on days they are scheduled.

From greeting customers to handling complaints, many businesses owners said that people new to the workforce don’t understand customer service skills. In an interview for a regional business magazine, the owner of a mortgage broker said she hired a receptionist who seemed great, “but answered the phone by saying ‘Yeah! Speak!’” The receptionist didn’t last the day.

Customer service, like every other skill, needs to be taught. Businesses interviewed for this report underscored the need customer service education and all of them volunteered to participate in a training program.

In West Sacramento, the Chamber of Commerce teamed with the City of West Sacramento and River City High School to conduct bootcamps in the high school’s resource center. Open to every student and parent, local employers will explain what they expect from employees. Students will practice skills like answering the telephone and resolving customer problems. Those that complete the bootcamp will receive a digital badge.

“These are highly important skills,” said Kniesel’s Auto Centers owner Rebecca Kniesel. “We assume that people know how to do these things. Having a certificate or badge that says you completed customer service training would be great!”

³⁴ <http://codeforhood.com/>

Soft skills and customer service translate into one often-overlooked EV-related job: insurance estimator. “Body damage is body damage,” said a participant who asked not to be named. “But Teslas are different. I can estimate the repair to a Leaf or a Mirai in about 10 minutes. I need to take a Tesla apart to see what’s broken. It takes an hour or more, and the customer is fuming the whole time.” Tesla teaches people to estimate repairs, but Mr. X said, “they don’t teach you how to talk to customers. I had to learn that.”

Multilingual customer service representatives (CSRs) are in particularly high demand. In April 2019, the Center for Sustainable Energy (CSE) had job postings on its website for rebate processing specialists that speak Tagalog, Russian, Mandarin, Korean, and Hmong. CSE manages clean vehicle rebates for California, Massachusetts, and New York and will soon manage Oregon’s program. The company also manages CALeVIP and has applied to manage other California mobility voucher programs. All rebate processing is done in San Diego, but CSE recently opened an office in Sacramento.

Opportunities for Sacramento

- Partner with high school and adult education, business associations, and PBIDs to host customer service bootcamps in each council district. At the end of the bootcamp, area businesses and Sacramento’s mobility providers might host a job fair.
- Collaborate with Sacramento Works and CSE to expand the Sacramento office to include a multilingual rebate processing center. Coordination with on-the-job training providers to teach specific skills, including customer service, computers, and EV terminology, may qualify CSE for a tax credit.³⁵

Cost of a ZEV Service Center

LoopNet shows an auto repair business at 4520 Auburn Blvd. listed for sale at \$675,000.³⁶ Pictured in Figure 4, the shop is properly zoned and is in high-traffic area. A neighboring business, in Figure 5, is for lease with a monthly rent of about \$6,000. Obtaining equipment, tools, a lift, business license, EVSE, and insurance is between \$50,000 and \$60,000. Overhead (excluding lease) and supplies average \$10,000 a month, plus salaries, employment taxes, and worker’s compensation. A one-person shop needs to gross about \$200,000 a year to break even.³⁷

The service center operators interviewed for this report all stated that servicing only ZEVs (or hybrids and ZEVs) is not financially viable. Many interviewees stated that most people lease ZEVs and the dealerships service the cars, but they also pointed out that ZEVs don’t need oil changes, tune-ups, and smog checks that are the bread-and-butter for most service centers.

³⁵ <http://www.sacramentoworks.org/employers-business/assistance-incentives/>

³⁶ <https://www.loopnet.com/Listing/4520-Auburn-Blvd-Sacramento-CA/15474006/>

³⁷ Based on interviews with auto service and repair businesses

Figure 4: Auto repair shop for sale in Sacramento County

4520 Auburn Blvd \$675,000

Sacramento, CA 95841 - Retail For Sale



RETAIL PROPERTY FOR SALE Get Financing

Price	\$675,000	No. Stories	1
Property Type	Retail	Year Built	1961
Property Sub-type	Auto Repair	Tenancy	Single
Building Class	C	No. Drive In / Grade-Level Doors	1
Sale Type	Owner User	Zoning Description	GC, Sacramento
Lot Size	0.17 AC	APN / Parcel ID	240-0132-031
Gross Leasable Area	3,200 SF		

Figure 5: Auto repair shop for lease in Sacramento County

4500 Auburn Blvd \$12.00 /SF/Yr

Sacramento, CA 95841 - Retail For Lease



AUTOMOBILE REPAIR SHOP

Rental Rate	\$12.00 /SF/Yr	Gross Leasable Area	5,988 SF
Property Type	Retail	Year Built	1961
Property Sub-type	Auto Repair		
Listing ID: 15036260	Date Created: 1/31/2019	Last Updated: 3/26/2019	

Potential Business Partnerships

In writing this report, five potential partnerships models were identified:

1. Automotive Apprenticeships – Nick Esquivel is the California Apprenticeship Initiative (CAI) Coordinator for the California Community Colleges Chancellor’s Office. He coordinates State and Federal funding sources and issues grants of up to \$500,000 to community colleges so they can partner with businesses to establish apprenticeship programs. Advanced transportation is one of the CAI’s priority areas.³⁸ All of the auto service centers interviewed for this report, including those that want to remain anonymous, said they would gladly participate in a ZEV apprenticeship program for technicians, service writers, and data analysts. Several were particularly interested in partnering with initiatives to bring women into the automotive field. A program that provides flexible, self-paced learning with the ACDC curriculum and on-the-job paid training at neighborhood service centers could make this a career path within reach of people in LIC/DAC neighborhoods. The Florin Road and Fulton Avenue PBIDs may partner in this effort.
2. Fill the IBEW apprenticeship pipeline—Noah Painter was not aware potential recruiting points including Mutual Housing where Community CarShare is based, Green Tech, the Franklin Neighborhood Development Corporation, or community-based organizations serving Asian and Russian communities. Introducing Noah to these groups can help identify qualified people, and these groups can target education that can help their participants pass the entry exam. Partnering IBEW with EVgo and other EVSE manufacturers can provide students with newer equipment to use, and perhaps open a pathway to teach electricians how to network the EVSE.
3. Create a business around the Del Paso Blvd. mobility hub pilot to teach students and adults how to collect, read, and make decisions based on data. A partnership with CleanStart³⁹ could create a pathway for area entrepreneurs to deploy their new ideas while mentoring students that can collect and analyze data.
4. In late 2019 or early 2020, the California Air Resources Board (ARB) will accept applications for the Clean Mobility Voucher Pilot Program.⁴⁰ The intention of the program is to “fund small-scale car sharing and ridesharing projects with zero emission vehicles that enable users in disadvantaged communities to have short term access to transportation modes on an as-needed basis.” Defining a pilot project that includes training and workforce development now will ensure that Sacramento will be first in line for the program when voucher applications open.
5. Clean Cities is working with American River College to expand the course offerings about alternative fuel vehicle maintenance. A pipeline of students from Twin Rivers to American River College could demonstrate student demand for the classes. The appropriate people are already coordinating and are aware that they can include the City of Sacramento in requests for support.

³⁸ <https://foundationccc.org/What-We-Do/Workforce-Development/Workforce-Services/California-Apprenticeship-Initiative>

³⁹ <https://cleanstart.org/>

⁴⁰ At the writing of this report, ARB had awarded the contract for administering the program, but not contracted the program.

Toolkit for Economic Pathways

The City of Sacramento can take steps to implement or encourage three of the recommendations in this report in concert with other City departments.

Extend the City of Sacramento’s Community Workforce Training Agreement (CWTA) to include apprentices for mobility-related projects. Noah Painter from KMP Strategies already works with the City on the CWTA and is aware of the EV Blueprint. One option is to ensure that project funded from local sources, like an Energy Commission grant for installing infrastructure or an AQMD grant for mobility pilots, includes a provision that contractors participate in CWTA for grant-funded EVSE.

Arrange for train-the-trainer sessions to certify local instructors to teach the Automotive Career Development Center’s (ACDC) EV certification course to experienced mechanics. The State of California workforce development initiative might fund for a private company to lead this effort and purchase equipment for training. One option is to work with the Franklin Neighborhood Development Corporation, which has expressed interest in helping their local auto service business learn to service EVs and hybrids. A series of one- or two-day classes for mechanics in the neighborhoods where they work could increase interest in installing EVSE at their business as well as teaching mechanics new skills.

Separate funding, potentially from a technology grant like the Rapid Acceleration, Innovation, and Leadership in Sacramento (RAILS) grant program, could transform ACDC’s recording training into interactive, online classes that are shorter and more engaging for computer-based learning. Short courses that teach basics of EV customer service, service and maintenance issues, working with high voltage, charging behavior are a good starter set for people who may go on to learn more. If online training is coupled with one or more hands-on sessions, it can be a low-cost introduction to well-paying jobs in EV repair and customer service.

Finally, to support this effort, the City can create a pool of cars and cut-away parts from retired municipal fleet vehicles that instructors could borrow for classes. Potentially managed by Clean Cities or Sacramento Works, certified teachers could check out equipment and return it when done.

Explore establishing a multilingual customer service center for clean mobility partners. A one- or two-day class with Sacramento Works partners like Asian Resource Center, Green Tech, Sacramento Food Bank, and Sacramento Urban League can teach basics of customer service, computer skills, and terminology about electric cars and charging. An additional day (or separate class) might focus on energy efficiency programs that utilities offer their clients. A partnership with the Center for Sustainable Energy that operates several rebate programs for ZEVs and energy efficiency could incorporate on-the-job training or practical experience.

Other actions are outside the direct sphere of influence of a city government and are summarized here so that other groups that are vested in developing a strong, skilled workforce might identify ideas that they can implement.

- Integrate ZEV servicing and data science into computer classes at high school, community college, and adult education to demonstrate the link between data analysis and mobility.

Partnering with Hacker Lab, I/O Labs, and Code for Hood may reach a variety of tech audiences

- Offer targeted tutoring to help people pass reading comprehension and math tests required for apprenticeship programs.
 - Develop and implement a pre-apprenticeship program that includes paid work experience with tutoring to pass the aptitude test.
 - Partner with CBOs to focus on reading and math skills
- Stage a customer service bootcamps followed by career fairs with local business and e-mobility providers.
- Address barriers to night-time classroom education that apprenticeships require
 - Target mobility hubs between light rail stations and classrooms to transfer students to and from the training centers on nights that classes are in session.
 - Collaboration with the community centers or Parks Department on a pilot project to have tutoring and recreation programs for students' school-age children.
- Review City job descriptions and future-proof by creating job descriptions and internships for data scientists.

Appendix A: All Recommendations

All recommendations in this report are listed below. Potential partners, funding, and benefits are detailed in the body of the report.

- Integrate ZEV servicing into computer classes at high school, community college, and adult education. Computer and technology classes are often presented as a pathway to a four-year degree and a desk job. Demonstrating the link between data analysis and cars could entice a new segment of people into EV service classes.
- Extend the City of Sacramento’s Community Workforce Training Agreement (CWTA) to include apprentices for mobility-related projects to provide a pathway for residents of low-income and disadvantaged communities. CALeVIP recipients will be required to pay installers a prevailing wage and could create a pathway to using electrical contractors that participate in CWTA.
- Offer targeted tutoring, potentially through “bridging” classes or pre-apprenticeship programs—to help people pass reading comprehension and math tests required for apprenticeship programs
- Partner with each council member to stage a customer service bootcamp followed by career fair with local business and e-mobility providers.
- Arrange for one or more train-the-trainer sessions to certify local instructors to teach the Automotive Career Development Center’s (ACDC) EV certification course to experienced mechanics.
- Apply for or encourage another training organization to apply for grant funding to create interactive, online classes from ACDC’s recorded training.
- Purchase a license to the Service Writer Training and offer a version as adult or CTE education through Sacramento Works/ETP training partners. This could be leveraged into internships and jobs with existing auto service centers.
- Create a pool of cars and cut-away parts from retired municipal fleet vehicles or from auto dealerships that instructors could borrow for classes.
- Use the business license database to identify existing independent service centers and conduct targeted outreach about servicing ZEVs. This might include an educational package about terminology, an equipment list, and a streamlined process for installing EVSE. Consider a priority application for small shops to use Grow Sacramento Funds for EVSE.
- Partner with the Fulton Avenue Association and Florin Road Partnership to create a workforce training initiative that includes internships and/or pre-apprenticeships at the auto dealerships concentrated in these two areas.
- Increase access to apprenticeships (and education in general) by:
 - Offering tutoring or classes (e.g. art, sports) for school-aged children while parents are in college classes.
 - Forming cohorts of three or four apprentices that work and study together. The cohort can also include a mentor from outside the education program.
 - Providing small “emergency” grants to cover immediate needs, like a car repair or a shortfall until pay day.

- Address the transportation issue, which may include a pilot program with a shuttle or mobility hub centering at a light rail station that could transfer students to and from training centers for night classes.
- Review City job descriptions and future-proof by creating job descriptions and internships for data scientists.
- Partner with tech entrepreneur incubators to have companies like explain their data needs to tech entrepreneurs and/or host a transportation-focused hackathon.
- Develop a multilingual rebate processing center that includes on-the-job training to teach customer service, computers, and terminology specific to EVs and energy efficiency.