

Innovative Clean Transit Implementation Toolkit

SCAG supports transit agencies in meeting California Air Resources Board Innovative Clean Transit (ICT) regulation requirements by leveraging its strengths in regional coordination and collaboration across the transit ecosystem. SCAG provides forums and platforms that bring together transit agencies, utilities, manufacturers, and local jurisdictions to share information, discuss implementation challenges, and exchange lessons learned.

This toolkit, developed as part of SCAG's "ICT Regional Assessment Study," supports this collaborative approach. The toolkit includes a series of focused factsheets designed to translate complex data, technologies, processes, and state policies into accessible, actionable information to support transit agencies across the SCAG region.



**Zero-Emission
Bus Technology
Selection Framework**



**Charging/
Refueling Station
Permitting Checklist**



**Available Funding
Opportunities to
Transit Agencies**



Smart Charging



**Utility Engagement
Starter Kit**

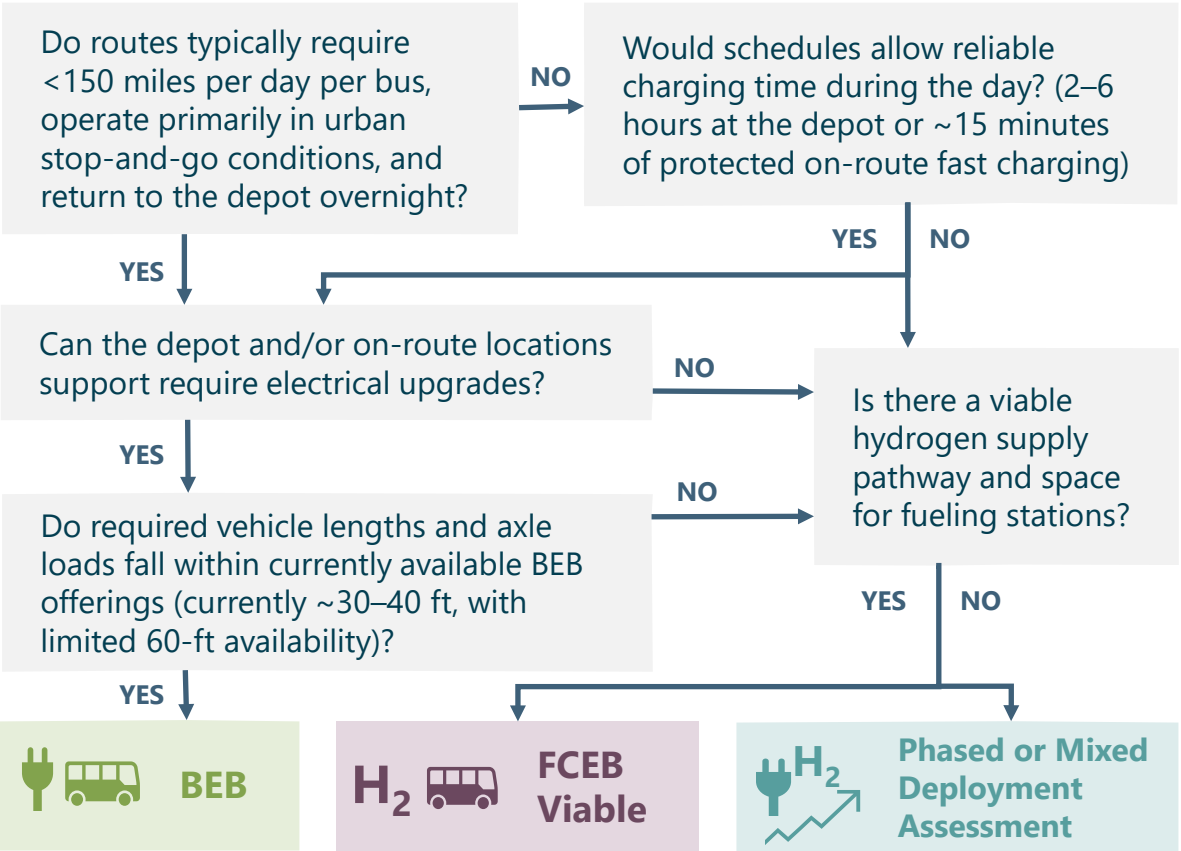


**Workforce
Development for
Transit Agencies**

Zero-Emission Bus Technology Selection Framework

Transitioning to zero-emission buses requires evaluating how battery electric buses (BEBs) and fuel cell electric buses (FCEBs) compare across operational fit, cost, infrastructure needs, and readiness. This framework offers foundational guidance for technology selection and will evolve as technologies advance.

Step 1: Initial Screen for Operational Feasibility



Mixed BEB and FCEB fleets may be appropriate. Start with a pilot to assess BEB/FCEB suitability.

Step 2: Refine Deployment Approach and Timing

Key Decision Questions	BEB Considerations	FCEB Considerations
Where do most costs occur?	Lower vehicle and charging costs per mile; infrastructure costs grow with charger count and power	Higher vehicle and station costs; fuel cost depends on hydrogen price; improves with scale
What funding is available within the project timeline?	Near-term; utility/ make-ready programs and voucher support	Longer-term; hydrogen hub programs and clean fuel grants
What workforce training is needed?	Builds on existing electric vehicle and electrical skills	Requires hydrogen fueling safety (pressure management, leak detection) and fuel-cell training, plus high-voltage systems
How complex is maintenance?	Fewer moving parts; batteries and thermal systems drive reliability	More complex systems but reliable operation is achievable
How fast does the fleet need to grow?	Expansion depends on depot space and electric grid capacity; growth is gradual	Expansion relies on fueling station throughput; larger fleets can be supported from shared hubs

Zero-Emission Bus Technology Selection Framework

The zero-emission bus market continuous to evolve. To help transit agencies evaluate what technologies best align with their operational needs, this framework outlines key factors to consider and identifies resources on where to seek clarification to support effective decision making.

Vehicle & Route Requirements

- Bus length, axle limits, passenger capacity requirements
- Route length and daily block miles
- Average speeds and grades

Who to ask

- Original equipment manufacturers (OEMs)
- Fleet manager/operator



Depot & Site Readiness

- Available space for recharging/refueling equipment
- Yard layout, circulation, and safety constraints
- Ability to stage vehicles and equipment

Who to ask

- Facilities/operations staff
- Electrical engineering staff



Costs & Funding

- Vehicle and infrastructure capital costs; electricity/fuel and maintenance costs
- Available incentives and timing

Who to ask

- Finance and procurement staff
- Vendors
- Funding program administrators
- Electric utility/hydrogen supplier



Schedules & Layovers

- Where buses stop
- Typical dwell or layover times
- Whether dwell time is protected or often disrupted

Who to ask

- Fleet manager/operator



Energy Supply, Utility Constraints & Scalability

- Electric capacity and upgrade timelines
- Electricity tariffs, demand charges
- Hydrogen supply options and reliability
- Utility roadmaps, station throughput

Who to ask

- Facilities/operations staff
- Electric utility/hydrogen supplier



Maintenance & Workforce

- Existing maintenance skills and required training needs
- Parts availability and OEM support

Who to ask

- Fleet manager/operator
- OEMs
- Fleet maintenance technicians



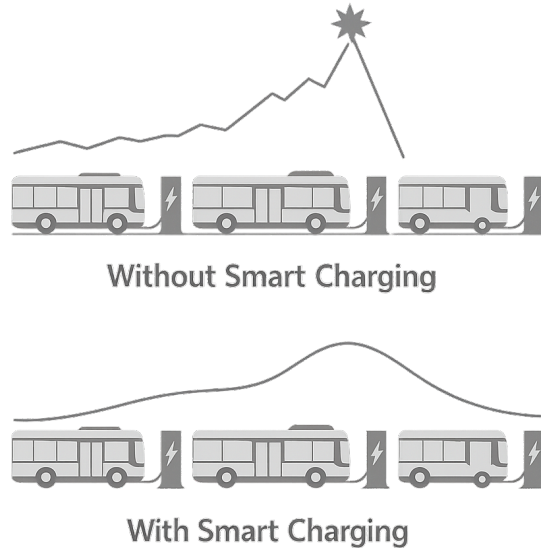
Smart Charging

What is Smart Charging

Smart charging uses software to control:

- When vehicles charge
- How fast they charge
- Which vehicles get priority

Instead of all buses charging at once, power is intelligently managed to protect the site and reduce costs.



Why it Matters

RELIABILITY

Smart charging prevents electrical overloads that can shut down charging operations.



OPERATIONAL READINESS

Ensures vehicles reach required state of charge before departure.



COST CONTROL

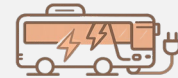
Reduces peak demand charges and shifts charging to lower-cost hours.



Smart charging uses software to manage power demand across vehicles and chargers, optimizing charging. This framework describes what smart charging is and highlights practical examples of how it can support operational needs, align with utility rate structures, and improve reliability while reducing costs.

Smart Charging in Practice

Examples of transit agencies evaluating and implementing smart charging include:



Antelope Valley Transit Authority

- Evaluated smart charging using real operational data from 30 buses (expanding to 80 buses during the project).
- Simulation analysis estimated up to a 40% reduction in annual utility costs or about \$11,460 per bus per year.



Santa Clara Valley Transportation Authority

- Deployed 5 buses and 5 chargers with an integrated smart charging energy management platform.
- Reduced peak demand by 31-65% and nearly eliminated charging during utility peak periods.

References: Smart Charging for Fleets: [Smart Charging for Fleets: A Practical Guide](#), BetterFleet; [California E-Bus to Grid Integration Project \(CEC-500-2021-014\)](#), CEC; [VTA Advanced Transit Bus Vehicle-Grid-Integration Project \(CEC-500-2022-012\)](#), CEC

Smart Charging

Smart charging coordinates site power limits, vehicle priorities, and charging schedules. This framework presents common strategies to help transit agencies balance operational needs, maintain service reliability, and manage utility and infrastructure constraints.

How Smart Charging Works

 1. How much power can the site safely use?

- Every site has limits:

 - Grid connection limits
 - Electrical panel and feeder limits
 - Other building loads (HVAC, bus wash, offices)
- Smart charging ensures total power draw never exceeds what the infrastructure can handle.

 2. Which buses should charge first?

- The system can then decide which bus receives power and how much power based on:
- Departure time
 - State of charge
 - Route priority
 - Emergency needs

 3. When should charging happen?

- Smart charging can:

 - Shift charging to off-peak hours (time-of-use optimization) and limit peak electricity demand
- Align charging with bus departure times
 - Respond to utility demand response events when configured

Common Charging Strategies

Strategy	How It Works	Best When
Even Share (Load Balancing)	Power is distributed evenly across all connected buses.	Depot schedules are predictable and dwell times are long.
First-In/First-Out (FIFO)	Buses charge in the order they plug in.	Departure times are consistent and similar across routes.
Priority-Based Charging	Charging priority is assigned based on operational rules (departure time, battery level, route importance).	Some routes or departures are more critical than others.
Schedule-Driven Charging	Charging aligns with dispatch schedules or duty cycles.	Agencies use structured scheduling systems (e.g., fixed pull-out times).
Peak Demand Management	Charging power is adjusted to avoid demand spikes.	Utility demand charges significantly impact costs.

Examples of Vendors Commonly Used in Transit Smart Charging Deployments		
Charging & Energy Management	Vehicle-Level Charging Controls	Operations & Scheduling Integration
ChargePoint • BetterFleet • Olivine • Amply	Proterra • BYD	Clever Devices • Trapeze

Charging/Refueling Station Permitting Checklist

This checklist provides transit agencies with steps to identify the local charging infrastructure permitting process, highlighting critical steps and key information needed to streamline electric vehicle charging station permitting process and support timely project implementation.

California's permit streamlining law, AB 1236, requires every city, county, or city and county to adopt an ordinance that creates an expedited and streamlined permitting process for electric vehicle charging station (EVCS) by September 2016 or 2017, depending on their population size.

Although EVCS permitting practices can still vary among local jurisdictions, AB 1236 mandates that each city or county has an EVCS permitting checklist online, covering both residential and commercial projects.

Where to look? The EVCS permit streamlining status, as well as ordinance and checklist if available, can be found on the EVCS Streamlining Map managed by California GO-Biz team.

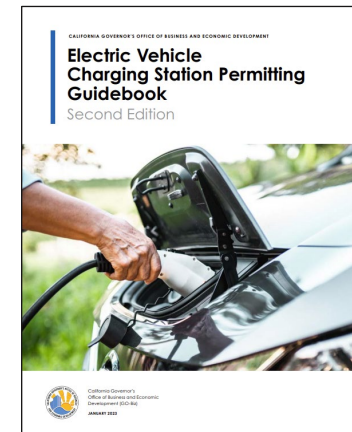
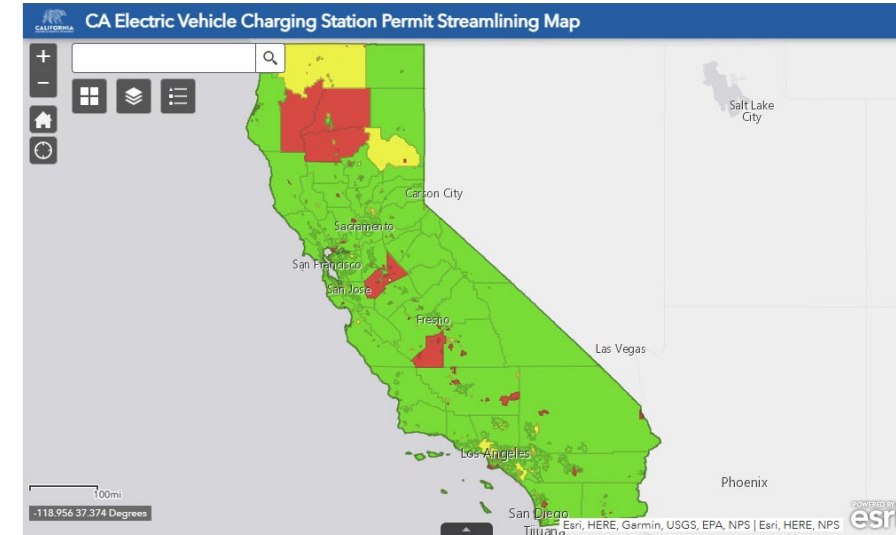
Additionally, the Electric Vehicle Charging Station Permitting Guidebook (Second Edition) by GO-Biz team was presented as a statewide resource designed to help local jurisdictions and stakeholders to streamline, standardize, and accelerate the EVCS permitting process, including information on what to include in your permitting application.

What to include? Each city or county has its own EVCS permitting checklist that can be found through direct contact or EVCS streamlining Map. There are several items commonly required across jurisdictions:

- Project details (e.g., location and number of EVSE)
- Application details (e.g., applicant name, contractor name, owner name)
- Site details (e.g., charging level, voltage, mounting of EVSE)
- Electrical plan (e.g., system voltage, rating of panel supplying EVSE and circuit)

What to avoid?

- Assuming all jurisdictions require the same document
- Waiting too long to involve utilities for information gathering, such as details of project and site, and electrical plan.

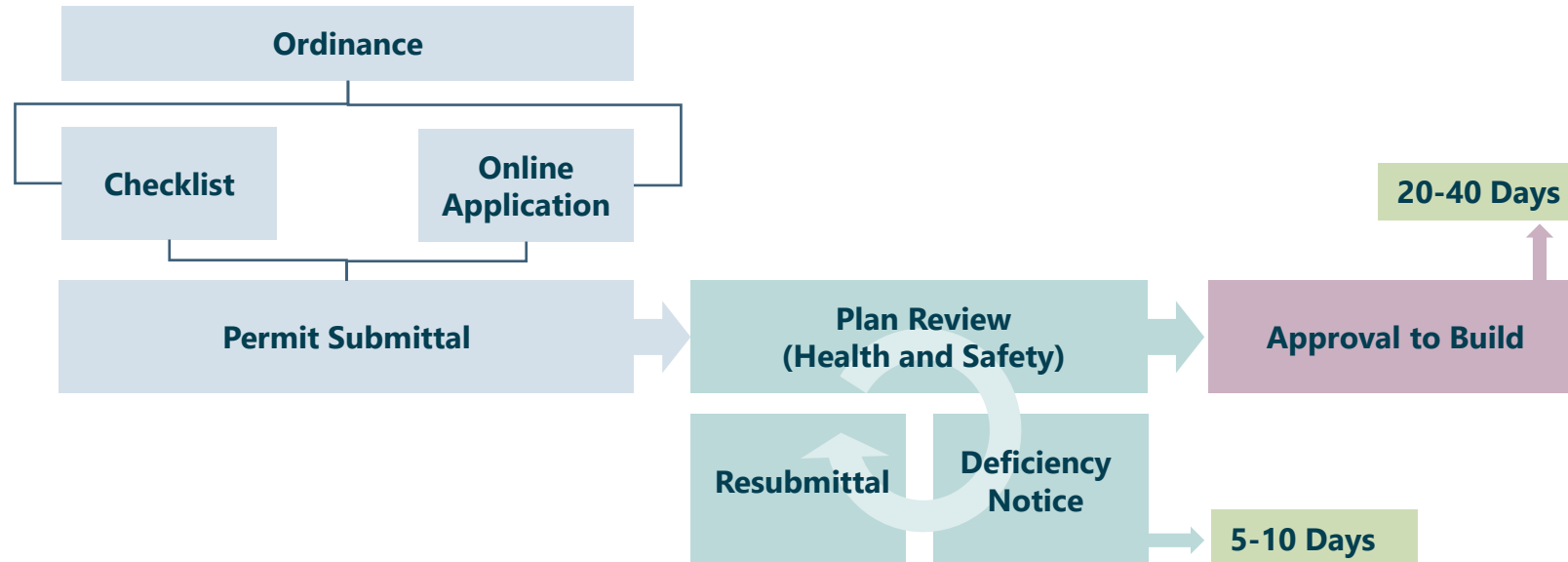


Charging/Refueling Station Permitting Checklist

Under California's AB 970, EVCS permits are subject to binding, expedited review timelines to ensure consistency and timeliness statewide. This timeline provides transit agencies with a clear overview of the permitting process from application submittal through plan review and approval to build.

Charging/Refueling Station Permitting Timeline

In California, AB 970 (effective January 2022 or 2023, depending on the jurisdiction's population size) establishes binding timelines to the expedited, streamlined review of EVCS permit applications. The law sets clear deadlines for application completeness and approval decisions to ensure a consistent and timely permitting process statewide. The EVCS permit application process and review timeline established under AB 970 is depicted below.



Source: EV Charging Station Permitting Guidebook



Charging/Refueling Station Permitting Checklist

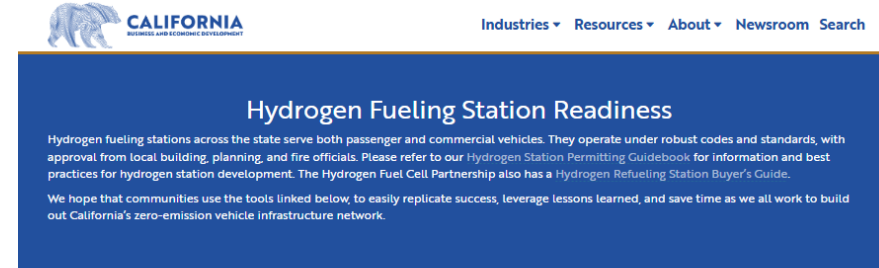
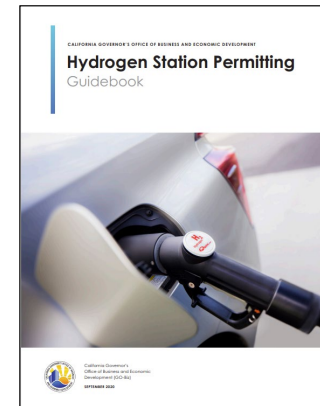
Developed by the GO-Biz team, the *Hydrogen Station Permitting Guidebook* outlines information on station development, permitting checklist, and permit review timeline. The list below also identifies the key information required for the hydrogen fueling station permitting process.

SB 1418 requires all cities and counties in California to adopt nondiscretionary permitting procedures for hydrogen infrastructure, focusing strictly on health and safety requirements, by September 2025 or 2028, depending on their population sizes. SB 1418 was designed to reduce permitting delays, ensure consistency across jurisdictions, and support the growing demand for hydrogen fuel particularly for medium- and heavy-duty vehicles as the state works toward its ZEV goals.

Where to look? In the [Hydrogen Station Permitting Guidebook](#) developed by the GO-Biz team, with information on station development, hydrogen and FCEV ecosystem, and how to permit temporary fuelers. The guidebook also includes a Checklist Template.

What to include? Here are items required per the checklist template:

- Project details (e.g., project address, fueling type, location and number of dispensers)
- Contact information (e.g., applicant name, owner name, contract name)
- Site/Station plans and equipment (e.g., existing or proposed site plan, elevation/perspective drawings)
- Permit package plans and drawings (e.g., civil/architectural plan, fire plan, building plan, mechanical plan, electrical plan, Title 24 report/forms)



Statewide Hydrogen Station Permit Streamlining Laws

California passed two statewide hydrogen fueling station permit streamlining laws to drive the deployment of hydrogen infrastructure and zero emission vehicles:

SB 1291 (Archuleta, 2022): Requires all California cities and counties to develop an expedited, streamlined permitting process for hydrogen fueling stations according to specific criteria.

SB 1418 (Archuleta, 2024): Builds on SB 1291 and requires jurisdictions to create an expedited permitting ordinance and checklist for hydrogen fueling stations. Additionally, jurisdictions must limit project review to health and safety requirements.

Cities and Counties: How to Meet Permit Streamlining Requirements

GO-Biz offers support to California cities and counties working to streamline permitting for hydrogen fueling stations under SB 1418, by providing model ordinances, checklists, and technical support. Additionally, GO-Biz helps businesses engage and communicate productively with city officials to develop hydrogen station infrastructure.

Step 1: Check Compliance Deadline

Step 2: Understand Streamlining Requirements

Step 3: Adopt Hydrogen Fueling Station Streamlining Ordinance

Step 4: Confirm Hydrogen Fueling Station Streamlining with GO-Biz

Charging/Refueling Station Permitting Checklist

California SB 1418 establishes a streamlined hydrogen permitting framework to reduce delays, improve clarity and consistency, and support the accelerated ZEV deployment. The timeline below summarizes the process from planning review through construction and commissioning.

Understanding the Timeline

The hydrogen station development process diagram outlines processes involved and includes a range of estimated timelines. Overall, development timeframes may continue to reduce as local authorities become increasingly familiar with hydrogen station permitting, more entities enter the supply chain, and economies of scale are achieved.



Pre-Application Outreach (ASAP)

Planning Review (1 day – 6 months)	Actual Average ~10.5 months	Conditional use permit or other discretionary approval		Design Process
		Planning application submittal	Public Meeting	
		Design and architecture review	Public Meeting	
		Planning approval		
Building Review (1 day – 6 months)		Detailed package submission		
		Review detailed package	Comment Package Pick-up	
		Respond to comments	Re-submittal	
		Review		
Construction (3 – 9 months)	Actual Average ~9 months	Approval to build		
		Encroachment permit		
		Construction		
		Milestone inspection (as required by State Building Codes)		
Commissioning (1 – 3 months)	Actual Average ~2.5 months	Notice of completion		
		Station developer commissioning		
		Final inspection/approval	Operational	
		Third-party validation	Open	

Source: Hydrogen Station Permitting Guidebook

Charging/Refueling Station Permitting Checklist

Below is an example of an EVCS permitting checklist from the city of Los Angeles, illustrating the typical level and type of information required. Because requirements can vary by jurisdiction, transit agencies should consult their local EVCS permitting checklist before assembling materials.



Contact your city or county building department or permit counter and ask for "EVCS permitting" or reach out to the Go-Biz team.

An example from the city of Los Angeles



PERMITTING CHECKLIST FOR ELECTRIC VEHICLE CHARGING STATION APPLICATIONS

Electrical installation for electric vehicle charging in single family dwellings and commercial buildings with up to **400 amps of service** (Including any needed charging equipment, service upgrade, receptacle and associated wiring), do not require plan check, and are readily issued as Express Permits in person or e-permits when done on-line.

EVCS shall comply with applicable sections of the California Electric Code (CEC). EVCS shall be listed by UL or another nationally recognized testing laboratory.

For all EVCS, other than those mentioned above, submit the following documents per the checklist below. Please complete the following information related to permitting and installation of electric vehicle chargers/ electric vehicle service equipment (EVCS / EVSE) as a supplement to the application for an electrical and/or building permit. This checklist contains the technical aspects of EVSE installations and is intended to help expedite permitting and use for electric vehicle charging.



Building Plan Check Submittal Documents Required:

Completed **Permit Application for Building Plan Check**, if submitting in person or apply online through ePlanLA (eplanla.lacity.org). **Plan Requirements – See below. Provide the following documents in your in person or electronic plan submittal.**



A. SITE/FLOOR PLAN

A site plan and a floor plan (if located inside a building) must be provided showing the following information:

- Existing building(s) and structure(s)
- Existing parking spaces and proposed location of EVCS parking space(s)
- Dimensioned layout of existing accessible parking spaces, including access aisles
- Location and layout of proposed accessible EV charging station
- Elevation of the charging unit sufficient to demonstrate compliance with the reach ranges for side or front approach to the unit by persons with disabilities as required in the Los Angeles Building Code
- approach to the unit by persons with disabilities as required in the Los Angeles Building Code



B. ARCHITECTURAL PLANS

Architectural plans shall show the following information:

- EVCS installed are in compliance with LABC Section 11B-228.3 for the minimum number of required accessible EVCS spaces.
- EVCS installed are in compliance with LABC 11B-812 for dimensions, accessible route, access aisles, reach range, identification signage, etc.
- Where rated assemblies are penetrated (through or membrane), an appropriate and listed assembly penetration shall be provided at the time of review and must be made available to the inspector at the time of installation. NOTE: It is not permissible to route conductors or raceways through required stair shafts or exit passageways.



C. STRUCTURAL PLANS

Structural plans and calculations must be signed and stamped by a California registered Civil or Structural Engineer who is responsible for the design and installation of the system. Architectural and Structural plans shall show the following information:

- Location and details for anchorage of EV equipment
- Seismic anchorage calculations for non-structural components per ASCE 7 Chapter 13



PERMITTING CHECKLIST FOR ELECTRIC VEHICLE CHARGING STATION APPLICATIONS



Electrical Plan Check Submittal Documents Required

Completed **Permit Application for Electrical Plan Check**, if submitting in person or apply online through ePlanLA (eplanla.lacity.org). **Plan Requirements – See below. Provide the following documents in your in-person or electronic plan submittal.**



A. SITE/FLOOR PLAN

A site plan and a floor plan (if located inside a building) must be provided showing the following information:

- Existing building(s) and structure(s)
- Existing parking spaces and proposed location of EVCS parking space(s)
- Dimensioned layout of existing accessible parking spaces, including access aisles
- Location and layout of proposed accessible EV charging station
- Elevation of the charging unit sufficient to demonstrate compliance with the reach ranges for side or front approach to the unit by persons with disabilities as required in the Los Angeles Building Code
- All disconnects sizes, conduits and conductors routing/sizes, and location of panel/sub-panels connected to the EVCS system and the meter panel.



B. ELECTRICAL PLANS

Electrical plans and calculations must be signed and stamped by a California registered Electrical Engineer who is responsible for the design and installation of the system. The electrical plans shall include the following information:

- Single-line diagram showing the electrical single line drawing showing the main service, sub panels and disconnecting means (as applicable) and the proposed EV charging unit(s). Include/show the size of all overcurrent protection devices (in amperes) for the main service, sub panels, disconnects and EV charger circuit supplies. Show conduit sizes and types, and conductor sizes and types.
- Electrical load calculations shall include existing and proposed load(s) that demonstrate that the electrical service and/or distribution equipment is not overloaded. Note: Unless all electrical equipment and overcurrent protective devices are listed for use at 100% of rated load, the calculated load on this equipment shall not exceed 80% of the nameplate rating of the equipment or the over-current protection device (OCPD).
- Electrical panel schedule
- Manufacturers' data sheets for the specified and listed charging equipment. If proposed to be located outdoors, the listing for outdoor use shall be included.
- Amperage supplied to charge the electric vehicle
- EVCS has an appropriate NEMA rated enclosure (CEC 110.28) and the wiring method complies with CEC 625.9(A) through (F).
- Based on proposed EVCS location, determine if cord length will reach a vehicle's charging inlet without excessive slack and does not exceed 25' in length (CEC 625.17).
- All enclosures shall have a mounting height between 36" and 48". Connector height shall be between 36" and 48" from the ground (CEC 625.29) unless otherwise indicated by the manufacturer.
- Ensure sufficient space exists around electrical equipment for safe operation and maintenance (CEC 110.26); The minimum required space is 30" wide, 3' deep and 6'6" high and will be higher depending upon system voltage.
- EVCS shall be installed per the requirements of Chapter 3 of the CEC. Conductors shall be sized to support 125% of the rated equipment load (CEC 625.21) unless permitted otherwise.



Charging/Refueling Station Permitting Checklist

Developed by the Go-Biz team, this hydrogen refueling station permitting checklist template offers a useful reference, outlining the typical level and type of information required, helping transit agencies and developers navigate permitting requirements more effectively.



Contact your city or county building department or permit counter and ask for “hydrogen station permitting” or reach out to the Go-Biz team.

(Replace with City or County Logo)

City/County of _____

CHECKLIST FOR PERMITTING HYDROGEN FUELING STATIONS (SB 1418)

Please complete the following information related to permitting and installation of Hydrogen Fueling Station as a supplement to the application for a building permit. This checklist contains the technical aspects of hydrogen fueling station installations and is intended to help expedite permitting and use for hydrogen fueling stations.

Upon completion of this checklist, a permit shall be issued to the applicant. However, if it is determined that the installation might have a specific adverse impact on public health or safety, additional verification will be required before a permit can be issued.

Section 1: Project Details

Project Address:

☐ Commercial/Industrial Zone (No Surrounding Residential Units)

☐ Existing Retail Fueling Station/Travel Center

Location and Number of Hydrogen Dispensers/Fueling Positions to be Installed:

Type of Fueling Available (i.e., Light-Duty Vehicle/Heavy-Duty Vehicle, Retail/Commercial, H35/H70, etc.):

Storage Type and Volume (i.e gaseous or liquid; storage capacity in kilograms or metric tonnes).

Description of Work

Section 2: Contact Information

Applicant Name:

Applicant Phone & Email:

Contractor Name (if applicable):

License Number & Type (if applicable):

Contractor Phone & Email (if applicable):

Owner Name:

Owner Phone & Email:

Section 3: Site/Station Plans & Equipment

Existing Site Plan:

Proposed Site Plan:

Page 1 of 2

(Replace with City or County Logo)

City/County of _____

CHECKLIST FOR PERMITTING HYDROGEN FUELING STATIONS (SB 1418)

Elevation/Perspective Drawings:

Section 4: Permit Package Plans & Drawings

Civil/Architectural Plan Set:

Fire Plan Set:

Building Plan Set:

Mechanical Plan Set:

Electrical Plan Set:

Title 24 Report/Forms:

I hereby acknowledge that the information presented is a true and correct representation of existing conditions at the job site and that any causes for concern as to life-safety verifications may require further substantiation of information.

Signature of Permit Applicant:

Date:

Page 2 of 2

Utility Engagement Starter Kit

Early and ongoing utility engagement helps transit agencies understand grid constraints, upgrade timelines, rate impacts, and available utility programs before key vehicle or infrastructure decisions are finalized. This starter kit outlines when and how to engage utilities and what data to request.



1. Identify your utility contacts

- Who provides electric service to the depot(s)?
- Does the utility have a dedicated transportation electrification or fleet team?



2. Prepare and share a high-level planning concept package

- Scope of work, including planned bus electrification activities, charging infrastructure installation, and any expected utility service upgrades.
- Specific site(s) under consideration.
- Target project timeline, including key milestones for planning, design, procurement, construction, and energization.
- Preliminary load demand estimate, informed by fleet size, anticipated charging needs, power levels, and operating schedules.
- Any anticipated funding sources and timelines.
- Key internal contacts (facilities, fleet, planning, finance).



3. Request an initial utility assessment

- Request preliminary service capacity and upgrade needs using the Utility Data Request Checklist on this page.



4. Align on timelines early and maintain ongoing coordination

- Maintain regular coordination as fleet phasing, upgrade schedules, and funding timelines evolve.

Utility Data Request Checklist

- ☐ Existing electrical service size at the depot
- ☐ Estimated spare capacity currently available
- ☐ Known constraints on the feeder or substation serving the site
- ☐ Preliminary load demand and load capacity to inform the likelihood that service upgrades will be required
- ☐ Typical timelines for utility upgrades
- ☐ Available incentive programs
- ☐ Applicable electric rate options for fleet charging
- ☐ Required steps to initiate formal load studies or interconnection

Funding Opportunities for Transit Agencies

This framework maps out currently available funding opportunities for transit agencies in the SCAG region. Users should refer to each funding program's website for recent information, including application opening dates, deadlines, and program requirements.

Federal Funding Sources

FTA

- Low or No Emission Program
- Buses and Bus Facilities Program
- Public Transportation Innovation—§5312
- Urbanized Area Formula Grants (§5307)

U.S. DOT

- Better Utilizing Investments to Leverage Development Grant Program

FHWA

- Congestion Mitigation & Air Quality
- Surface Transportation Block Grant

Stacking Rules:

For Federal Transit Administration (FTA) funds, they are generally stackable with non-federal funds and certain non-FTA or non-U.S. Department of Transportation (U.S. DOT) federal funds unless otherwise authorized. Note that funds cannot be stacked to exceed the maximum federal share. U.S. DOT funds are stackable with non-federal funds, and Federal Highway Administration (FHWA) funds are stackable with non-federal funds or other federal funds from FHWA, FTA, or discretionary grants.



State Funding Sources

CARB

- Volkswagen Environmental Mitigation Trust – Transit Bus Program
- Low Carbon Fuel Standard
- Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project
- Carl Moyer Air Quality Standards Attainment Program

CEC

- EnergIIZE Commercial Vehicles Project

CalSTA

- SB 125 Transit Program
- Zero-Emission Transit Capital Program
- Transit and Intercity Rail Capital Program

Caltrans

- Low Carbon Transit Operations Program

Regional/Local/Utility Funding Sources

SCAQMD: Carl Moyer Program

LA Metro: Zero-Emission Transit Capital Program

SCE: CHARGE Ready Transport

LADWP: Fleet Electrification Programs

Funding Opportunities for Transit Agencies

Preparing for the applicable package for identified funding opportunities can be challenging. This section outlines some of the common pitfalls to avoid, such as time management, technical concerns, and overall project management.

1. Timing

- Poor project readiness or unrealistic schedule.
- Missing deadlines or submittal requirements.

2. Preparation

- Incomplete or weak local match documentation (for federal and state funding opportunities), such as missing vendor quotes.
- Underestimating project readiness requirements (e.g., California Environmental Quality Act clearance, engineering feasibility, site control, and utility coordination, etc.)
- Incompatible procurement requirements (e.g., Buy America rules for some programs).

3. Technical

- Weak cost estimates and budget structure.
- Incomplete benefit-cost analysis or errors in benefit/impact modeling and quantification.

4. Management

- Weak community engagement (e.g., lack of community co-creation demonstration, letters of support, and documented outreach).
- Misalignment of project timelines and lack of coordination between vehicle and infrastructure planning.
- Missing considerations or dedicated resources for operations and maintenance, administrative and staffing, and compliance activities.
- Lack of proactive measures to ensure consistent and accurate reporting, such as the lack of documentation processes and internal quality assurance and control, especially for programs like ZETCP, STEP, and CMIS that require multi-year reporting obligations.



Funding Opportunities for Transit Agencies

The list below summarizes key **federal-level** funding opportunities available to transit agencies to support investments related to the transition to zero-emission transit buses and associated infrastructure development. Each program includes a link to provide more detailed and updated information.

BUILD Grant Program

- Recurring and competitive
- Funds major capital projects with regional significance, including ZEB maintenance and charging facilities.

Buses and Bus Facilities Program

- Funds remain available for obligation for four fiscal years. This includes the fiscal year in which the amount is made available or appropriated plus three additional years.
- Recurring and competitive funds for bus replacement or procurement, and facility upgrades, including ZEB infrastructure.
- Eligible recipients include fixed-route bus operators, states or local governmental entities that operate fixed route bus service, and Native tribes.

Congestion Mitigation & Air Quality

- Funds projects that reduce emissions and improve air quality, including ZEB purchases, charging stations, and transit improvements.

Low or No Emission Program

- Recurring and competitive funds for zero-emission and low-emission bus purchases, charging and fueling infrastructure, facility construction or leasing.
- Eligible applicants include direct or designated recipients of FTA grants; states; local governmental authorities; and Native Tribes. States and other eligible applicants also may submit consolidated proposals for projects in urbanized areas.

- Funds remain available for obligation for four fiscal years. This includes the fiscal year in which the amount is made available or appropriated plus three additional years.

Public Transportation Innovation (\$5312)

- Funds to advance innovative public transportation research and development.
- Eligible recipients include federal labs, state and local governmental entities, providers of public transportation, etc.

Surface Transportation Block Grant

- Funds projects about highways, transit capital, and public transportation assets including ZEB facilities.

Urbanized Area Formula Grants (\$5307)

- Funding are available the year appropriated plus five years.
- Funds capital, planning, and operating expenses; eligible for ZEB procurement and early transition planning.
- Funding for urbanized areas with a population of 200,000 or more is made available to designated recipients that are public bodies with the legal authority to receive and dispense federal funds.
- Funding for urbanized areas with a population of between 50,000 and 199,999 is made available to a state's or territory's governor or governor's designee.

Funding Opportunities for Transit Agencies

The list below summarizes key **state-level** funding opportunities available to transit agencies to support investments related to the transition to zero-emission transit buses and associated infrastructure development. Each program includes a link to provide more detailed and updated information.

Carl Moyer Air Quality Standards Attainment Program

- Ongoing, market-based
- Funds cleaner-than-required engines and emissions-reducing projects through local air districts; includes ZEB and infrastructure eligibility.

EnerGIIZE Commercial Vehicles Project

- Recurring, first-come first-serve with dedicated set-asides for transit fleets.
- Funded by the California Energy Commission's Clean Transportation Program and implemented by CALSTART, EnerGIIZE funds provide up to \$5 million for charging or hydrogen fueling infrastructure.

Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

- Ongoing and first-come first-serve.
- Point-of-sale ZEB bus vouchers, eligible for standard and enhanced (priority population) incentives.

Low Carbon Fuel Standard (LCFS)

- **Fuel-Based LCFS Credits:** Eligible electricity and hydrogen used as transportation fuels can generate LCFS credits when their carbon intensity is below the applicable annual benchmark.
- **ZEV Infrastructure Credits:** LCFS also provides credits for eligible hydrogen refueling and DC fast-charging infrastructure based on unused fueling capacity.

Low Carbon Transit Operations Program

- Recurring, formula-based annual GGRF funded program
- Fund projects including ZEB operations, bus purchases, ZEB charging infrastructure, and service expansions.

- For agencies with service areas that include disadvantaged communities, at least 50 percent of the total money received shall be expended on projects that will benefit disadvantaged communities

SB 125 Transit Program

- Provides \$1.1 billion formula allocations to support zero-emission transit and infrastructure projects statewide.

Transit and Intercity Rail Capital Program (TIRCP)

- Recurring and competitive funds for large-scale ZEB procurements, major charging and fueling facilities.
- The 2026 TIRCP grant cycle will program projects starting with the fiscal year 2026-27 and ending with the fiscal year 2030-2031.

Volkswagen Environmental Mitigation Trust – Transit Bus Program

- Provides up to \$400,000 per vehicle to replace older gasoline, diesel, CNG, or propane transit buses with new ZEBs.

Zero-Emission Transit Capital Program (ZETCP)

- Authorize regional transportation planning agencies (RTPAs) to use funds for zero-emission transit equipment, including, but not limited to, zero-emission vehicles and refueling infrastructure.
- Funds may also be used to fund transit operating expenditures that prevent service reduction or elimination in order to maintain or increase ridership.
- Transit Agencies should work directly with their RTPA to develop an Allocation Package that will be submitted to the California State Transportation Agency.

Funding Opportunities for Transit Agencies

The list below summarizes key **regional-level** and **local** funding opportunities available to transit agencies to support investments related to the transition to zero-emission transit buses and associated infrastructure development. Each program includes a link to provide more information.

LADWP's Fleet Electrification Programs (Commercial EV Charger Rebate Program)

- Ongoing, non-competitive funds for make-ready work and electric vehicle supply equipment rebates.
- Charger rebates to charge medium- and heavy-duty EVs of up to \$125,000 per charger depending on power output.
- Governor or governor's designee.

Metro's Zero Emission Transit Capital Program (ZETCP)

- Metro received and administered CalSTA's ZETCP funds for L.A. County, including \$320.6 million over four years in state ZETCP funds.

SCE's CHARGE Ready Transport

- Ongoing, non-competitive funds for utility-side make-ready, including design, trenching, transformers.
- Charge Ready Transport applications will be accepted through June 30, 2026, and program participation agreements must be signed by both parties by December 31, 2026, 11:59 PM.

SCAQMD's Carl Moyer Program (CMP)

- Recurring competitive funds for zero-emission bus purchases and infrastructure.
- To be eligible for CMP funds, project must meet the criteria and must meet the cost-effective limits per guidelines.
- Once awarded, projects must be fully in operation within 18 months of contract execution and are required to submit annual reports as specified in the contract.



Workforce Development for Transit Agencies

Zero-emission transit fleet deployment requires role-specific training across operations, maintenance, infrastructure, and safety functions. This framework summarizes the core training focus areas and key competencies needed for each workforce role, helping agencies build workforce capacity.

Role		Training Focus	Required Training
Bus Operators		Maximizing vehicle range and ensuring safe everyday operations.	☐ Regenerative braking proficiency ☐ State of charge (SOC) and range management ☐ Indicator awareness (high-voltage isolation faults, thermal management alerts) ☐ Safe fueling or charging ☐ Climate control management
Maintenance Technicians		Shifting from mechanical repair to high-voltage (HV) system diagnostics.	☐ HV isolation, Lockout/Tagout, Arc flash personal protective equipment, zero energy verification ☐ Technical systems (traction motors, battery management systems, fuel-cell stacks) ☐ Digital diagnostics using manufacturer software and telematics
Facility & Charging/Fueling Technicians		Keeping the power flowing and the fueling stations safe.	☐ Electric vehicle supply equipment maintenance, troubleshoot DC fast chargers ☐ Energy systems (breaker coordination, load management platforms, microgrid) ☐ Hydrogen infrastructure (compressor maintenance, leak detection, NFPA 2 safety)
Dispatch & Operations Control		Managing an energy-constrained fleet instead of just a schedule.	☐ Energy-constrained dispatching based on real-time SOC and weather conditions ☐ Charger queuing logic ☐ Crisis management for low-energy events mid-route or power outage incidents
Emergency Response Personnel		Containing incidents involving high-voltage or chemical hazards.	☐ Thermal runaway and safe evacuation ☐ Hydrogen hazards (invisible flames and rapid gas dispersion) ☐ Safe stabilization (high voltage cut points to de-energize a vehicle during an accident)

Workforce Development for Transit Agencies

Transit agencies can use this *Training Partner Request Checklist* when interviewing community colleges, original equipment manufacturers (OEMs), or training centers to evaluate training quality, ensure consistency in delivery, and support the development of a skilled and well-prepared workforce.

Training Partner Request Checklist

- ☐ **Industry Track Record:** How many transit agencies have you successfully trained in ZEBs? Can you provide references from agencies of a similar size to ours?
- ☐ **Standard Alignment:** Does your curriculum align with [APTA's ZEB Maintenance Training Recommended Practices](#) (Levels 100, 200, and 300)?
- ☐ **Hands-On Training:** Does the curriculum include hands-on practice (e.g., using a training charger or mock HV isolation points)?
- ☐ **Fueling/Defueling Protocols:** Does the training include SAE J2601 fueling protocols and steps for safely defueling a vehicle for indoor storage or major repair?
- ☐ **Load Management Software:** Will facility staff learn how to use the charge management software to avoid peak demand charges?
- ☐ **Safety Certifications:** Does the program offer NFPA 70E, equivalent high-voltage safety certification, or hydrogen safety certifications in compliance with NFPA 2? How do you assess qualified person status for our technicians?
- ☐ **OEM Alignment:** Is the training specific to the vehicle models in our fleet?
- ☐ **Data Literacy:** Does the course cover how to interpret fault codes and readings related to fuel cell stack and battery management system?
- ☐ **Post Training Support:** Do you provide a help desk or follow-up site visit to troubleshooting issues that arise once the buses are in service?

Workforce Development for Transit Agencies

Transit agencies that invest in their people before their fleet see lower maintenance costs, higher vehicle uptime, and a more empowered workforce. This section highlights multiple best practices and workforce training resources to support effective workforce development.

Best Practices: Roadmap to Success

- ❑ **Start Training Early (6-12 Months Lead Time):** Don't wait for the buses to arrive. Begin training well before the first vehicle or charger is on-site to build staff confidence and safety culture.
- ❑ **Conduct a Skills Gap Analysis First:** Before procurement, benchmark your team's current capabilities to target training budget where they are needed most.
- ❑ **Create Role-Specific Pathways:** Avoid one-size-fits-all training. Tailor curricula to the specific demands of each job to ensure deep competency.
- ❑ **Implement a Tiered Training Framework:** Structure learning as a progression, moving from Level 100 (Safety and Orientation) to Level 300 (Advanced Diagnostics) to avoid information overload. Consider certifying your senior staff to lead future onboarding trainees.
- ❑ **Prioritize High-Voltage & Hydrogen Safety Certifications:** Treat safety as a core operational requirement, not an elective. Require industry-standard certifications to mitigate risk.
- ❑ **Use Multi-Mode & Hands-On Learning:** Theory is not enough; technicians and operators need to touch the technology. Combine classroom learning with physical training labs with mock charging cabinets and simulated high-voltage isolation points.
- ❑ **Leverage National & Regional Resources:** Do not reinvent the wheel! Utilize established frameworks and federally supported programs to access standardized curricula, saving your agency both time and budget.



Examples of Workforce Training Resources and Partners

National Training Centers: [Transit Workforce Center](#) | Industry Standards: [APTA's ZEB Maintenance Training Recommended Practices](#), SAE [J3105/J2954/J2601](#) | OEM Training: [New Flyer](#), [Gillig](#), [BYD](#) | Educational Institutions: Community Colleges (e.g., [Rio Hondo](#), [AV College](#)) | Utilities: [SCE](#), [LADWP](#) | Emergency Response: Local Fire/HazMat, [NFPA 70E](#), [NFPA 2](#)