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U.S. DEPARTMENT OF  
**ENERGY**

Office of  
ENERGY EFFICIENCY &  
RENEWABLE ENERGY

# California Energy Commission and California Public Utilities Commission - Electric Vehicle Infrastructure Training Program (EVITP)

April 16, 2021

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U.S. Department of Energy  
Vehicle Technologies Office



# VEHICLE TECHNOLOGIES OFFICE FOCUS

## ALL LEVELS





# How Does Technology Integration Fit into VTO?



*VTO develops advanced transportation technologies to:*

- ✓ Improve energy **efficiency**
- ✓ Increase domestic energy **security**
- ✓ Reduce operating **cost** for consumers & business
- ✓ Improve global **competitiveness** of US economy

# Alternative Fuels Data Center (AFDC)

afdc.energy.gov

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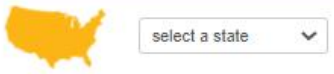


**Would a battery electric bus be cost effective for your transit fleet?**  
Check out a new financial analysis tool to find out.


The Information Source for Alternative Fuels and Advanced Vehicles


The Alternative Fuels Data Center (AFDC) provides information, data, and tools to help fleets and other transportation decision makers find ways to reach their energy and economic goals through the use of alternative and renewable fuels, advanced vehicles, and other fuel-saving measures.


Information by State




Information by Fleet Application

 Delivery Services

 Refuse Collection


 Public Transit

 School Transportation

Maps & Data

- U.S. Alternative Fueling Stations by Fuel Type
- U.S. Hybrid Electric Vehicle Sales by Model
- Light-Duty Alternative Fuel Vehicle Registrations


Fuel Prices




Tools

- Laws & Incentives
- Electricity Sources & Emissions
- Vehicle Cost Calculator
- Vehicle Search

Station Locator



 Download [iPhone app](#) or [Android app](#)

Fuels & Vehicles

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# Alternative Fueling Station Locator



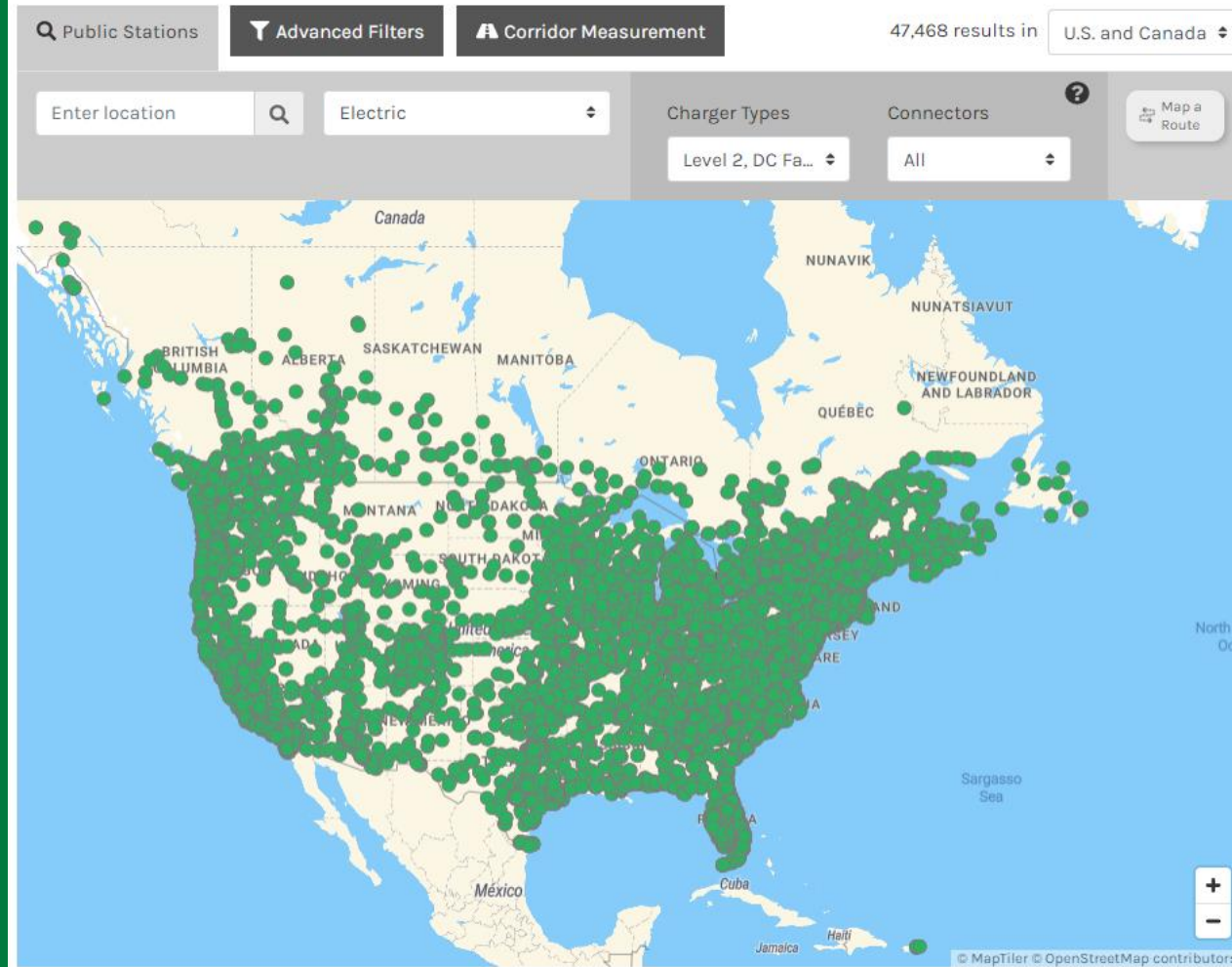
# Alternative Fueling Station Locator

Locate alternative fueling stations and get maps and driving directions.

[afdc.energy.gov/stations/](https://afdc.energy.gov/stations/)

## Alternative Fueling Station Locator

Find alternative fueling stations in the United States and Canada. For U.S. stations, see [data by state](#). For Canadian stations in French, see [Natural Resources Canada](#).



For Canadian stations in French, see [Natural Resources Canada](#).





# Alternative Fueling Corridor Tool

Use this tool to measure the driving distance along Interstate Highways between stations that meet the criteria under the Federal Highway Administration's Alternative Fuel Corridors Program.

[afdc.energy.gov/stations/#/corridors](https://afdc.energy.gov/stations/#/corridors)

## Alternative Fueling Station Locator

Find alternative fueling stations in the United States and Canada. For U.S. stations, see [data by state](#). For Canadian stations in French, see [Natural Resources Canada](#).

Public Stations

Advanced Filters

Corridor Measurement

Use this tool to measure the driving distance along Interstate Highways between stations that meet the criteria under the Federal Highway Administration's [Alternative Fuel Corridors Program](#). Explore more [resources for nominating corridors](#). Have a comment or a concern with this tool? [Please contact us](#).

All states

Electric

50 miles between stations allowed

Starting Station

Select a station on the map to choose your starting point.

Ending Station

Select a station on the map to choose your ending point.

☐ Advanced Route Preferences



[fhwa.dot.gov/environment/alternative\\_fuel\\_corridors/](https://fhwa.dot.gov/environment/alternative_fuel_corridors/)



# AFDC Electricity Pages

# Electricity Pages

Basics, benefits and considerations, stations, infrastructure development, vehicles, and more!

[afdc.energy.gov/fuels/electricity](https://afdc.energy.gov/fuels/electricity)

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Printable Version

Electricity Basics

Benefits & Considerations


Stations

Vehicles


Laws & Incentives

## Electricity


Electricity can be used to power plug-in electric vehicles (PEVs), including both [all-electric vehicles](#), also called battery-electric vehicles, as well as [plug-in hybrid electric vehicles](#). These vehicles can charge their batteries by drawing electricity directly from the grid and other off-board electrical power sources. In contrast, [hybrid electric vehicles](#) are fueled with liquid fuels, like gasoline, but use small batteries to recapture energy otherwise lost during braking (ultimately boosting fuel economy). PHEVs can use off-board electricity for power, which classifies them as a PEV, but can also use liquid fuels and operate similar to a HEV if necessary. Using electricity to power vehicles can have significant energy security and emissions benefits.

**Basics** ▶


Find information about using electricity to power vehicles, including production and distribution, and research and development.

**Benefits and Considerations** ▶

Explore the benefits and considerations of using electricity to power vehicles.

**Stations** ▶


Locate electric charging stations in your area and learn about charging infrastructure for PEVs.

**Vehicles** ▶

Learn about hybrid and plug-in electric vehicles and how they work, and find information about vehicle availability, conversions, emissions, batteries, deployment, maintenance, and safety.

**Fuel Prices** ▶

Find electricity prices and trends.



Download the Alternative Fuel Price Report

# Charging Infrastructure Procurement & Installation

Link to EVTIP resources

[afdc.energy.gov/fuels/electricity\\_infrastructure\\_development](https://afdc.energy.gov/fuels/electricity_infrastructure_development)

## Electricity Basics

### Benefits & Considerations

### Stations

#### Locations

#### Infrastructure Development

- Procurement & Installation
- Operation & Maintenance
- Charging at Home
- Multi-Unit Dwelling Charging
- Charging in Public
- Workplace Charging
- Signage

### Vehicles

### Laws & Incentives

## Charging Infrastructure Procurement and Installation

A variety of options for plug-in electric vehicle (PEV) charging infrastructure exist, thereby creating a multifaceted infrastructure procurement process. In addition to typical infrastructure considerations like cost, regulations, safety, siting, and type of equipment, installing charging infrastructure can involve complex payment structures, data collection, ownership models, parking, and signage requirements. Some organizations may also need to issue a formal solicitation, such as a request for proposal (RFP). See the Infrastructure Development Checklist for important factors to consider when selecting and procuring charging infrastructure.

For examples of how other organizations have completed the charging infrastructure procurement process, see the following case studies.

- [Public Charging Procurement Case Study: Colorado Energy Office: EV Fast-Charging Corridor Grant Program](#)
- [Multi-Unit Dwelling Charging Procurement Case Study: Green Rock Apartments](#)

### Identify the Need


An initial action in the charging infrastructure procurement process is to identify potential users (i.e., plug-in electric vehicle (PEV) drivers). It is important to understand their expected charging needs based on travel patterns, PEV ownership, amount of time it may take to charge the vehicle battery, and the number and type of PEVs expected to be served at each location. This type of information can help better determine the number and type of charging infrastructure required for the project.

The [EVI-Pro Lite tool](#) can also provide an informed estimate of the quantity and type of charging infrastructure necessary to support regional adoption of electric vehicles by state or city/urban area.

### Cost Considerations

Another important consideration is to determine the cost associated with the required charging needs. This includes equipment, installation, and [operation and maintenance](#) (including electricity, demand charges, and any annual charging network fees).

### Equipment

Equipment costs may vary based on factors such as application, location, [charging level](#), and type. Single connector [unit costs](#)  range from \$300 to \$1,500 for Level 1, \$400 to \$6,500 for Level 2, and \$10,000 to \$40,000 for DC fast charging. When choosing charging infrastructure,

### Infrastructure Development Checklist

- ✓ Determine project scope, budget, funding mechanism, and timeline using the following considerations
- ✓ Determine ideal project site, based on [existing infrastructure](#) and [infrastructure needs](#)
- ✓ Determine the number, type(s), and costs of [charging equipment](#) needed, typically:
  - [Workplaces](#) and [multi-unit dwellings](#) should consider Level 1 and Level 2 charging
  - [Public](#) charging hosts should consider Level 2 and DC fast charging
- ✓ Decide whether the stations will need to be networked, including if utilization data will be collected and if payment capabilities are necessary
- ✓ Determine if a formal solicitation is needed
- ✓ Choose a network and/or charging infrastructure manufacturer and provider
- ✓ Identify installation needs and costs, including upgrades to electrical wiring, and find a certified [electrical contractor](#)
- ✓ Obtain required permits
- ✓ Determine additional site needs, including signage and security
- ✓ Identify project partners, including electric utilities and [Clean Cities coalitions](#)
- ✓ Assess charging infrastructure maintenance and operation needs and costs



# Publications and Resources

# Highlight: Electricity Handbooks

- Fleet Managers
- Workplace Charging Hosts
- Public Charging Hosts
- Consumers

***[afdc.energy.gov/publications/](https://afdc.energy.gov/publications/)***



# Technical Assistance



# Technical Response Service (TRS)



*TechnicalResponse@icf.com*  
*800-254-6735*

- **First-level** resource for stakeholders, consumers, and others
- Research and response to general inquiries
- **Direct users to EVTIP** for more information
- Help with challenging questions
- Education for legislators and government officials

# National Network of Clean Cities Coalitions

Nearly 100 Clean Cities coalitions with thousands of stakeholders, representing ~80% of U.S. population

[cleancities.energy.gov](https://cleancities.energy.gov)





# THANK YOU

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