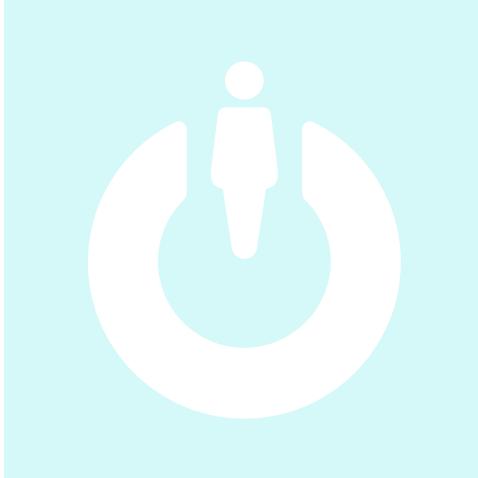
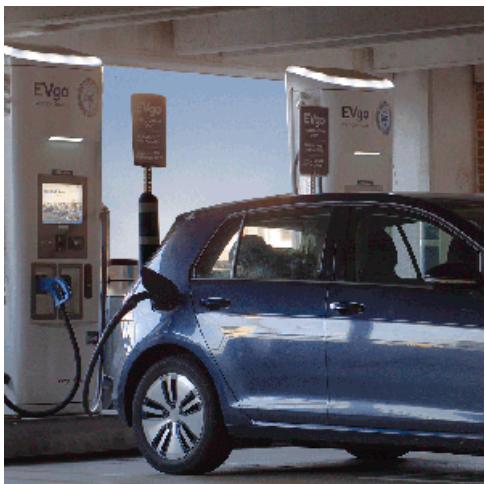
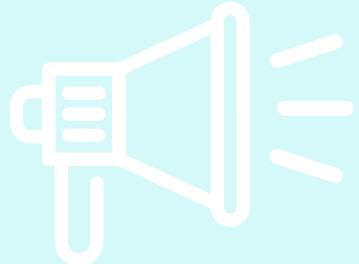




## VCI-MUD EMPOWERMENT TOOLKIT

# EV Charging for Multi-Unit Residents



# Table of Contents

---

03

## Introduction

---

04

## What You Need to Know

---

08

## Starting the Conversation

---

09

## Making Your Pitch

---

11

## Installation

---

12

## Resources

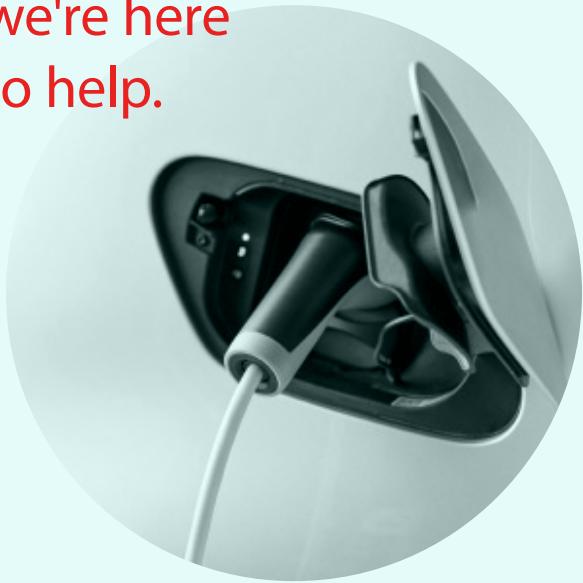
---

This material is based upon work supported by the Department of Energy under Award Number DE-EE0008473.

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer or otherwise does not necessarily constitute or imply its endorsement, recommendation or favoring by the United States Government or an agency thereof. The views and opinions of authors expressed herein do not necessarily reflect those of the United States Government or any agency thereof.



**Installing EV  
chargers at  
multi-unit  
dwellings can  
be tricky, but  
we're here  
to help.**



# Intro

The transportation sector is the largest contributor to U.S. greenhouse gas emissions,<sup>1</sup> and the sector's emissions are on the rise. Switching from a gas car to an electric vehicle is one of the most impactful personal actions you can take to reduce CO<sub>2</sub> emissions and drive our transition to clean energy forward.

As the demand for reliable charging infrastructure continues to rise, residential charging will be the most reliable and convenient option for most drivers. While there are approximately 25,000 charging stations nationwide and growing,<sup>2</sup> roughly 80% of charging currently takes place at home.<sup>3</sup>

This can present problems for electric vehicle (EV) owners who live in apartments or condominiums (referred to as Multi-Unit Dwellings), as it can be more difficult to get a charger installed. While single-family-home owners can easily make any electrical upgrades necessary to install an EV charger, condominium owners and apartment renters can experience significant barriers to installing charging in their building. These might include securing the approval of a Home Owners Association (HOA) or landlord, high upfront costs, ownership/maintenance responsibility, or insufficient parking spaces.

That's where this guide comes in. We'll provide an overview of the process to install charging at a Multi-Unit Dwelling (MUD), different options for different living arrangements, potential questions to consider, resources for further reading, and a road map to demystify the process.

<sup>1</sup> Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019.

<sup>2</sup> AP News, Plug it in: Electric car charging station numbers are rising, July 2020.

<sup>3</sup> NRDC, Electric Vehicle Charging 101, July 2019.

# What You Need to Know

## Introduction to Charging

There are three main types of EV charging: Level 1, Level 2, and Direct Current Fast Charging. Levels 1 and 2 charging speeds are the best and most common options for residential charging, while DC Fast Charging is more common for charging on the road.

### LEVEL I



- Plug into a typical 120-volt outlet
- Great for overnight charging
- All you need is the charging cable that comes with your car

### LEVEL II



- Plug into a typical 240v outlet like the one used by home appliances with your EVSE/Charger, or use a hard-wired EVSE to charge your vehicle
- Recharge in just a few hours
- Ideal for all-electric car charging at home, at work, or on the road

### DCFASTCHARGING



### CHAdeMO



### CCS

(COMBINED CHARGING SYSTEM)

- Plug into a public DC Fast Charger station that is compatible with your EV's plug/connector shape
- Charge up in less than an hour
- Ideal for on the road charging

## Shared vs. Private Chargers

When considering the level of charging you're hoping to install, it's also helpful to think about who might want to use it.

Does a single person want exclusive access to charging for their vehicle, or is there a community of people in your building that want to share charging? Knowing the difference will help you move forward with the decision-making process, and there are pluses and minuses to each.

Every building is different - there's no one-size-fits-all solution for installing charging at an apartment building or condominium. You might encounter hurdles when advocating for EV charging at your residence, but there are plenty of organizations who can help. Be sure to check out the resources at the end of this guide for suggestions.

### SHARED CHARGERS

The building or HOA installs multiple EV charging stations as an amenity to tenants. EV owners in the building have shared access to charging.

#### PROS

- Installing multiple charging units decreases the cost per unit
- By planning for the installation of multiple units at once to accommodate for more future EV owners, the building minimizes overall investment.
- May incentivize other residents to purchase an EV
- Local or utility incentives can help cover the cost of electrical upgrades and charging equipment

#### CONS

- Shared chargers typically require more education, more persuasion, and a voting process to get an HOA or building-owner on board
- With a limited number of shared chargers, not everyone will be able to charge at the same time
- Additional ongoing costs may occur to provide the necessary tracking, billing, and management of these shared chargers

### PRIVATE USE CHARGERS

A condominium homeowner gets the approval of their HOA or building owner to make the electrical changes necessary to provide access to charging.

#### PROS

- Potentially less persuasion is required if the state has "Right-to-Charge" legislation, since the building owner or HOA will not have to cover the costs
- Tenants have unlimited and exclusive access to EV charging, without worrying about sharing with their neighbors

#### CONS

- The tenants pay for all installation and equipment costs
- Installing chargers on a case-by-case basis as tenants request them will lead to higher costs than pursuing a single installation process as part of a larger plan

#### ADMINISTRATIVE RED TAPE

If you have an HOA or condominium association to persuade, it could take time to get on the agenda of a board meeting, have a vote, and approve a project. There may even be legal documents to review once the process gets rolling.

But don't be discouraged by slow movement! Take the time to get to know the decision-makers and the process by which they make decisions.

## Costs

Let's dive into what potential costs might look like in detail. Every building is different, meaning there's no one-size-fits-all pricing.

### CHARGING EQUIPMENT

\$  
LEVEL 1

Level 1 is the most affordable option because no special charging equipment is required, the drivers can use the charging equipment that comes with the vehicle, and the electrician simply needs to install a household 110v outlet at the point of charging if there is not an outlet already available.

Make sure the outlets installed for Level 1 charging are each on a dedicated circuit.

\$\$  
LEVEL 2

Standard non-networked Level 2 charges are more costly than Level 1 because an electrician must install 220/240-volt electrical service at the charging point. Charging station units are more expensive than Level 1 charging cables and must also be purchased.

Standard Level 2 chargers provide no network functionality to control the charger, nor information to the user about electricity usage.



#### HIGH UPFRONT COSTS

Building owners' first priority is their bottom line, and they may not have cash on hand for big projects. Be sure to research available financial assistance or incentives. Your utility company or state may have incentives available to help cover the cost of equipment, installation, or both. If this is the case, lead with this information.

If incentives are not available, you will need to organize a very persuasive argument to prove that the investment is worth it. Even if you own your condo and parking space, you will probably need permission to make the electrical upgrades required to install a charging station. The exact rules for each building or HOA will vary.

\$\$\$  
SMART LEVEL 2

Smart level 2 chargers require 220/240-volt electric service at the charge point and are more expensive than standard Level 2 chargers because the charging station unit has more features.

These stations are connected to the internet and can provide electricity usage data as well as allow for remote charging scheduling and monitoring. These are best for a shared charging scenario.

## INSTALLATION

### \$ LOWER COST SCENARIO

Charging point is nearby existing electrical service (the electrical panel) and individual electric meter. Minimal conduit work is required.

### \$\$ HIGHER COST SCENARIO

Electrical service and circuit panel are located farther away from the parking spot, requiring costly conduits through a building basement or across hardscapes, like cement or sidewalks.

## INFRASTRUCTURE

Most parking lots and garages were not built to provide electric service. In order to install charging at a parking space, it might take a considerable amount of work. There's no way to know the extent of electrical work necessary for a project until an electrician gets involved, but it can be easier to get an HOA or building owner to consider EV charging once you have a sense of cost to consider.

## OPERATION AND MAINTENANCE

### \$ LOWER COST SCENARIO

Non-networked Level 2 stations and Level 1 stations do not have any associated recurring fees. The cost of electricity is either free (covered by the HOA or building owner as an amenity) or priced according to the per-kilowatt cost of electricity you see on your utility bill.

### \$\$ HIGHER COST SCENARIO

The charging station is connected to a shared meter, which means there's no way to keep track of how much electricity is used for charging. A networked charging station could help appropriately allocate costs, but requires a monthly subscription cost for the network and transaction fees. A networked or smart charging station allows for the tracking, billing, and management of charging activities of multiple drivers.

### TIP!

There may be existing electrical service nearby your parking space, that is not tied to your meter.

Before you invest heavily in extending your electrical service from your unit's circuit panel and meter, you can try to negotiate an arrangement with your building management where you pay a flat monthly fee to access the building's existing electrical capacity.

## Don't let these costs conversations scare you!

There are potentially federal, state, and local incentives that can help offset these costs, and there are charging companies who can help.

Be sure to check out the resources at the end of this guide for suggestions.

# Starting the Conversation

Now that you've been immersed in EV charging, you're almost ready to engage with your HOA or landlord. It helps to have an army on your side though, or in this case, a group of neighbors who want the same things as you do: EV charging infrastructure. It's time to get your neighbors on board!



01

**First things first:  
Do any of your neighbors own an electric car?**

Take a stroll through the parking lot and see if anyone else drives electric. If you have neighbors who also own EVs, that means you have even more residents on your side. Get to know these neighbors and ask how they've been charging so far, and what their experience has been with the building's management. That can help inform your next steps.

02

**It's also good to see if there are any other residents who are considering buying an EV but haven't pulled the trigger yet.**

Maybe the lack of charging infrastructure in the building has been holding them back. This is a good opportunity to survey your neighbors. See if you can put something in their mailbox or reach out digitally via email or community platform. The more people you have on your side, the better your chances.

03

**On the off chance your survey is a bust and no one else is currently considering an EV, it's time to create some momentum on your own.**

Brush off those public speaking skills and get ready to present to your community about the benefits driving electric. We've developed a powerpoint presentation for you that you can use at an HOA meeting or even a Lunch & Learn event. You can work with your building's management company to get something on the calendar, and remember, people will always show up if you provide (free) food! You could even coordinate with your local EV dealership for a test drive component as well. We guarantee that after a fun and educational event like this, you'll have more neighbors ready to electrify their ride.

04

**Another angle to consider is local media.**

You could submit a letter to the editor to a local paper about the growth of EVs locally and the need for more charging infrastructure, and you can ask if there are local EV projects the media is tracking (generally handled by the Climate desk). Check out our resource here for help writing a Letter to the Editor.

## LACK OF AWARENESS ABOUT EVS

Stakeholders may not see the value of installing EV charging, especially if few tenants own EVs at the time the request is made. You can help mitigate this issue by introducing the benefits of electric vehicles to your neighbors, building owner, or HOA to establish common base of knowledge for the conversation about charging.

# Making Your Pitch

Now that you know which neighbors are in your corner, it's time to approach your HOA or building manager. Getting them on board is key, and it might not be easy. One of the most challenging aspects of getting chargers installed at multi-unit dwellings is finding a solution that provides the greatest cost-benefit ratio and convenience for the homeowner association, members, or tenants who use the system. Every MUD has its own situations and challenges, but there is a business case to be made.

Your next step is to submit a thoroughly outlined case in writing (and hopefully in advance of an in-person tenants & building management meeting).

Here are a few important points we've provided for you to make your case:

01

Include how many tenants also support EVs and want this change and explain why EV charging is in the building's best interest.

02

EV-readiness today is like the spread of broadband internet connection a few decades ago. While personal computers were not prevalent back then, access to the internet today is deemed as a basic utility just like water and electricity. Considering many states are adopting EV-readiness building codes or will be adopting the latest model codes from the International Code Council that will have EV-readiness requirements, it's important to recognize that EV charging will become more prevalent in future buildings. Therefore, it is time for building owners/managers and the association to consider and understand how to provide this service at the properties when tenants and residents start to request them.

## 03

It's important to see EV charging as an attractive investment with economic benefits. New buildings will come with the competitive edge of being EV-ready compared to the existing buildings. For building owners and management, it's vital to recognize that the competitiveness of your building is highly correlated with the property's value to the market.

## 04

With the projected increase in the adoption of EVs, it's very important for the condominium to consider following the trend or be ahead of the curve to stay competitive and increase the property's value. As more and more EVs hit the road, many unit owners and tenants will become EV drivers that would expect the convenience of charging at home.

## 05

Many states including California, Oregon, and Virginia have adopted "Right-to-Charge" laws to ensure unit owners' right to install EV charging at their property, it's very important for the condo association to be fully informed and prepared to coordinate with its members on charting a path forward for EV charging. (See our resources for case studies) In many states and at the federal level of the United States, there are laws to ensure fair access to charging for residents living in MUD buildings and incentives to help with the installation of electric vehicle charging stations.

There are financial incentives that might apply to your situation to help with the upfront cost. Be sure to check what incentives might apply to you.

Stay positive, but also firm in your request for EV charging. Look at this as an opportunity to educate your building's decision maker about the technology and support them as they learn and explore. This is a marathon, not a sprint, and additional research and assessments may be necessary before you get approval.

**We're here to help if you  
have any questions.**

# Installation

Once you get approval, it's time for a mini celebration. You've accomplished quite the feat. But the work isn't over! Here is a guide that walks you through a potential installation process.

## PRIMARY ROLES KEY

TENANT OR UNIT OWNER

PROPERTY OWNER/MANAGER

UTILITY

ELECTRICIAN

01

Tenant or unit owner requests EV charging.

02

Consult with the electric utility on existing service capacity, metering options and rates.

03

Assess the physical layout of the property and the distances from parking areas to electrical panels.

04

Evaluate existing capacity of electrical panels serving individual units and common areas.

05

Evaluate existing policies and constraints such as deed restrictions, common area usage policies and design issues.

06

Evaluate available options, i.e., 120V outlets vs 240V EVSE; existing capacity of property infrastructure; shared charging vs. individual unit installations.

07

Adopt any necessary revisions to policies and procedures to accommodate EV drivers and comply with SB 880.

08

Establish approval process for tenants and unit owners and cost recovery procedure. Select charging equipment to meet MUD requirements.

09

Establish installation procedure. Approve charging station installation.

10

Obtain permit and install!

11

Obtain local jurisdiction inspection; utility installs equipment as needed.

12

Plan for the future, such as efficiency upgrades to increase available electrical capacity or necessary upgrades to building electrical infrastructure.

## Source

California PEV Collaborative (CG6-5). Original source materials developed by San Diego Gas and Electric Co. and the Sacramento Municipal Utility District for the Electric Power Research Institute.

# Resources

There are plenty of resources that address the multiple aspects of getting EV chargers installed at a multi-unit dwelling. Here are a few to start:

## Financial Incentives

### Federal

Alternative Fuel Infrastructure Tax Credit  
(30% up to \$30,000)

### State

Many states have their own incentives.  
Check with your local [Clean Cities Coalition](#) to learn more.

If you think  
we're missing a  
resource, please  
reach out and  
let us know!

### Local

Look into local incentives at the city or county level.

### Utilities

There are many utilities across the country supporting EV charging infrastructure. Reach out to your specific utility to see if they can help.

## Business case studies

**Brannan** [www.veloz.org/wp-content/uploads/2017/08/MUD\\_Brannan\\_final.pdf](http://www.veloz.org/wp-content/uploads/2017/08/MUD_Brannan_final.pdf)

**Warehouse** [www.veloz.org/wp-content/uploads/2017/08/MUD\\_Warehouse\\_final.pdf](http://www.veloz.org/wp-content/uploads/2017/08/MUD_Warehouse_final.pdf)

**Madera** [www.veloz.org/wp-content/uploads/2017/08/MUD\\_Madera2.pdf](http://www.veloz.org/wp-content/uploads/2017/08/MUD_Madera2.pdf)

**Millenium Tower** [www.veloz.org/wp-content/uploads/2017/08/millenium\\_tower-copy.pdf](http://www.veloz.org/wp-content/uploads/2017/08/millenium_tower-copy.pdf)

**Broadstone** [www.veloz.org/wp-content/uploads/2017/08/MUD\\_Broadstone\\_rev.pdf](http://www.veloz.org/wp-content/uploads/2017/08/MUD_Broadstone_rev.pdf)

**Smart Columbus** [d2rfd3nxvhf29.cloudfront.net/legacy/uploadedfiles/playbook-assets/electric-vehicle-charging/mud-case-study-final.pdf](http://d2rfd3nxvhf29.cloudfront.net/legacy/uploadedfiles/playbook-assets/electric-vehicle-charging/mud-case-study-final.pdf)

## Other Resources

**ChargePoint** [www.chargepoint.com/files/brochures/br-multifamily.pdf](http://www.chargepoint.com/files/brochures/br-multifamily.pdf)

**Veloz** [www.veloz.org/wp-content/uploads/2017/08/MUD\\_Guidelines4web.pdf](http://www.veloz.org/wp-content/uploads/2017/08/MUD_Guidelines4web.pdf)

**BDC Network** [www.bdcnetwork.com/evcharging2020](http://www.bdcnetwork.com/evcharging2020)

**Clean Cities Coalition** [https://cleancities.energy.gov/files/u/news\\_events/document/document\\_url/78/2\\_-\\_mud\\_challenges\\_successes\\_6-22-15.pdf](https://cleancities.energy.gov/files/u/news_events/document/document_url/78/2_-_mud_challenges_successes_6-22-15.pdf)

**SemaConnect** [semaconnect.com/resources/case-studies-white-papers/ev-charging-apartments/](http://semaconnect.com/resources/case-studies-white-papers/ev-charging-apartments/)

**Forth** [forthmobility.org/why-electric/multi-unit-dwellings](http://forthmobility.org/why-electric/multi-unit-dwellings)

### Technology Fact Sheets!

If you want more information on some technologies that can help deal with the barriers to EV charging at MUDs, check out the Technology Fact Sheets on the VCI-MUD Website!