

BEST PRACTICES FOR MODEL MULTIFAMILY CHARGING PROGRAMS



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1. Why Electric Vehicles

With transportation now the [largest contributor to greenhouse gas emissions](#) in the United States,¹ the country must rapidly scale adoption of electric vehicles (EVs) in order to meet national and international climate goals. In fact, increased adoption of electric vehicles is critical to support the U.S. goal of zero carbon emissions by 2050.² Without continued aggressive action, this problem will only get worse: by 2050, global demand for freight transportation will nearly triple, and demand for passenger transport is expected to double.³ In order to curb the worst impacts of climate change, improve public health and increase our energy security, the rapid electrification of the transportation sector is critical.

The significant and rapid growth in electric vehicles has the potential to bring substantial benefits to the entire country. EVs can provide clean, reliable, affordable transportation that saves families thousands of dollars – especially as more models (including more used electric cars) become available. All people, regardless of where they live, should have the opportunity to benefit from the lower operating costs, reduced maintenance needs and improved performance of EVs.

Why Invest in Charging

This transition requires combined investments in both EVs and electric vehicle supply equipment (EVSE) in order to meet charging infrastructure needs that take EVs to scale. The deployment of public EV charging infrastructure thus far, however, has remained far below what is necessary.









A recent analysis by Atlas Public Policy⁴ found over \$87 billion in charging infrastructure investment will be needed in the U.S. over the next decade, including \$39 billion for publicly accessible charging. In 2018, there were over one million passenger EVs on U.S. roads. By 2030, that number is expected to be 18.7 million. Powering those vehicles will require an estimated 9.6 million charging stations.⁵

Much of the investment in charging will be paid for by individual drivers through use fees over time or recovered through electric utility rates or other mechanisms. However, private and public investment is essential to jump-start the charging network, particularly until there is a critical mass of EVs using this infrastructure. The U.S. Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law) includes \$7.5 billion over five years in funding for electric vehicle charging infrastructure. This includes \$2.5 billion for competitive grants through the Charging and Fueling Infrastructure Discretionary Grant Program (CFI Program.)⁶

State and local governments, utilities, tribes and others must now consider how to best serve EV drivers in their communities and how to access charging infrastructure funds to meet these needs. This white paper summarizes years of experience and best practices to help these public and private leaders design programs, specifically for multifamily properties, that will ensure federal funds are spent efficiently, effectively and in ways that center equity. Other papers in this series address other key use cases for charging and best practices for addressing those needs.

2. Types of Charging

There are several common types of chargers, charging station models and network technologies that can also be combined to meet the needs of specific sites and drivers.

Slowest		Fastest	
Level	Level 1	Level 2	DC Fast Charging
Use Case	Home	Home/Work/Public	Public
Power	<2 kW <i>(Usually 1.2 kW)</i>	2.4 - 19.2 kW <i>(Usually 6.7 kW)</i>	25 - 350 kW <i>(Usually 150, 50, or 250 kW respectively)</i>
Plug Shape (Into Vehicle)	 J1772	 J1772	 CCS  CHAdeMO  Tesla
Outlet Shape	 120 V	 240 V	Electric Vehicle Supply Equipment (EVSE) 
Cost	\$	\$\$	\$\$\$\$

3. Why Charging for Multifamily Housing is Important

Approximately 80 million Americans live in multifamily housing (MFH) which includes apartments and condominiums.⁷ Home charging is a significant part of the EV ownership experience, with 88% of owners saying they “often” or “always” charge at home, according to a JD Power study.⁸ Yet approximately 20% of Americans, and an even higher percentage of low- and moderate-income drivers are “garage orphans” which means they live in buildings that do not have access to off-street parking to charge an EV.⁹ Given this, increased charging at multifamily properties is a national priority and critical part of the strategy to scale EV driving.

The most efficient way for these urban dwellers to power up is through chargers where they park, in their building’s parking lot, but the nature of multifamily housing presents a number of barriers. In addition to space, parking structure and logistical limitations, MFH also faces complications such as power supply, load control, connectivity and billing. Inadequate access to convenient home charging makes multifamily residents less likely to convert to an EV even when tax incentives or other programs may reduce the purchasing cost.

Multifamily chargers generally have high utilization rates and are in use around the clock because of residential occupancy patterns and the fact that vehicles can charge overnight. At least one study

documented that charging stations in areas with an above-median number of multifamily residents lead to high utilization.¹⁰ These chargers are typically Level 2, which bring additional benefits. They are cheaper to install, use lower cost electricity and are better for the grid when compared to Level 3 fast chargers, which draw power at a much higher rate.

Multifamily Housing and Historically Underserved Communities

Access to transportation is a lifeline for people with low-incomes and affects their ability to get to work and obtain health care and other services. People with low incomes have an undue transportation burden, spending an average of 17.4% of their income on transportation.¹¹ Additionally, home values near public transportation are up to 24% higher than in other areas. This means low-income earners typically live further from public transport.¹² Yet, [commute time is the single greatest predictor of escaping poverty](#),¹³ and in most affordable neighborhoods in America, unfortunately, the fastest commute is in a car. Millions of families depend on unreliable, higher polluting vehicles that are expensive to maintain and fuel to get to work.

Historically underserved communities typically have a high concentration of renters that are very likely to live in apartments. Given this, equity is often a driver for multifamily charging because residents are less likely to have dedicated parking spaces or access to power, so they are less likely to see EVs as a viable transportation option. Centering equity is also a priority for federal funding as it aligns with the federal Justice40 Initiative which aims to deliver 40% of the overall benefits of federal investments in clean transportation to disadvantaged communities. For all these reasons, providing access to affordable charging that brings the benefits of EVs to people with low incomes is incredibly important.

4. Current State of Multifamily Charging

Sales of EVs are soaring, increasing 67% from 2021 to 2022 alone,¹⁴ which means more people living in MFH will be looking for a place to charge their cars. A 2022 survey from the National Multifamily Housing Council (NMHC) found that renters see chargers as an important amenity and are even willing to pay more for them.¹⁵ Given the demand, multifamily owners and managers are increasingly exploring EV charging options and face questions related to hardware and software, installation, payment structure and ongoing management and maintenance.

Several recent policies support the investment of charging in multifamily buildings. The U.S. Department of Energy adopted an International Code Council provision that requires apartment communities with 25 or more parking spaces to ensure at least 20% are ready to accommodate EV charging.¹⁶ California utilities have allocated \$240 million for EV charging infrastructure at multifamily properties since 2016.¹⁷ The federal Inflation Reduction Act reinstated a tax credit of up to 30% of the cost of multifamily EVSE. To date, however, charging access at multifamily housing - particularly at affordable housing sites remains extremely rare.

5. Challenges in Multifamily Charging

Multifamily housing owners and managers face unique considerations when installing charging stations, including:

Information and Motivation: Multifamily property owners and managers generally have limited information about electric vehicles and charging, and often do not see charging access as a problem they need to solve. They may fall back on unhelpful analogies (“we don’t provide gasoline, why should we provide charging?”) rather than helpful ones (“we provide bicycle parking to support cyclists, of course we should provide charging to support EV drivers!”) There are a few organizations working to overcome these barriers, but so far consumer demand is growing much faster than their outreach efforts.

Technical Complexity: Because every site is different, electrical infrastructure layout and power capacity sometimes vary significantly from building to building. Only a few multifamily buildings have the electrical infrastructure to support many chargers operating simultaneously. The cost of installing charging can also vary substantially based on the specific location, the amount of trenching or conduit required, and other site-specific factors.

Cost: Given this technical scope, EVSE costs, especially to retrofit existing buildings can be high and prohibitive for many owners without subsidy. Once existing panel capacity is used by the first few chargers, upgrades can quickly get complicated, time consuming and expensive, or power management solutions may be needed.

Stakeholder Complexity: Approval for new EVSE typically requires consent from several stakeholders including developers, owners, property managers, utilities, local governments and homeowners’ associations (HOAs.) With HOAs, infrequent meeting schedules or a few opposing individuals can cause significant delays. Managers must also select and negotiate with a charging company, which requires understanding their diverse pricing and services.

Parking Logistics: Parking management varies by building. Parking may be assigned or first-come first-serve and may be bundled with rent or billed separately. All of these factors impact the design and management of charging at a particular building. Assigned parking may not be near charging service and if parking is not assigned, managers may be reluctant to dedicate spots for EV charging.

6. Stakeholders for Multifamily Charging

The following individuals will likely be involved with the design and installation of multifamily EVSE:

- **Local government/public agency** may be the project lead or champion with responsibility for planning, project management and guiding community engagement, education and outreach and stakeholder coordination.
- **Property developers/owners/managers** may also be project leads in addition to hosting the EVSE, dedicating parking spots, and supporting each step of the process. They are likely the ultimate decision makers.

- **Electric utilities** may help evaluate sites for charging suitability and provide other technical assistance; support the project financially with incentives or a direct investment in the EVSE and may offer special charging rates. Utilities may also serve as program leads and play a more active role to encourage MFH charging.
- **Charging companies** may own and/or operate the chargers and be involved with the technology design and installation. These companies have different business models and pricing options that must be matched with project needs.
- **Community based organizations (CBOs)** may help program managers prioritize locations for charging and may be involved with outreach and engagement to promote the new chargers. They will advocate for clear community benefits and strategies to prevent unintentional gentrification from the EVSE investment.
- **Electricians/contractors** bring skills and experience installing chargers and will be responsible for implementing the final designs and possibly permitting and approvals. It is important to engage an experienced electrician early in the process to manage costs.
- **Public sector/permitting authorities** will support and ultimately approve the project for installation.
- **Residents/Drivers** are the users who will ultimately make the project successful by taking advantage of the new EVSE and paying to use the infrastructure. They include residents and nearby community members who already drive EVs or are making the transition.

7. Components of Successful Multifamily Charging Model

Based on national program models and evaluation of best practices, the following factors support successful multifamily charging programs:

Center Equity

The first step in developing a successful multifamily charging program is to center people, not technology. Too much of a focus on hardware, or simply placing charging in low-income areas, without ensuring benefits to current residents, may cause further harm by fueling higher rents, gentrification and displacement. Charging is important but only as a tool for unlocking access to affordable, reliable, clean transportation. Projects that start with the goal of providing affordable access to charging for historically underserved communities, especially those living in affordable rental housing, lead to better outcomes for everyone.

Designing for and with these historically underserved drivers generally involves 1) robust community engagement to determine community needs and build support; 2) hands-on outreach and technical assistance focused on lower income apartment managers and residents; 3) supportive programs that provide information, test drives, shared electric vehicles or electric vehicles for community-based organizations; and 4) affordable and convenient charging.

Ensure the Community Benefits

The federal government's Justice40 Initiative aims to deliver 40 percent of the overall benefits of federal investments in clean transportation to disadvantaged communities. However, simply placing 40% of charging hardware in such communities will not meet this goal. In fact, if local community members do not drive electric vehicles, such hardware may drive gentrification and displacement and cause additional harm to historically underserved communities. Charging programs should ensure local communities will benefit in ways that are meaningful to them.

Examples may include:

- Providing EVs for affordable housing managers or local community-based organizations, and/or EVs that can be rented by community members
- Providing community outreach and education, including "ride and drive" events, to help community members learn more about affordable electric vehicles and access available EV incentive programs to utilize vehicles that can use this infrastructure
- Supporting related infrastructure investments during charging installation, such as improved landscaping, walkways, lighting, signage, etc.
- Strengthening community resilience with the installation of solar and energy storage
- Creating job or training opportunities for residents, community members, or small minority or women-owned businesses; opportunities may range from charger maintenance to making it easier for gig drivers to go electric
- Improving local air quality and public health

Partners may wish to consider memorializing these benefits in a [community benefit agreement](#), which is a contract between a program manager and community-based organizations. The agreement spells out the benefits the community will receive in return for supporting the project.

Build Regional Alignment on Goals, Roles, and Process

High impact projects are part of a regional charging strategy in which local governments, electric utilities, and other key stakeholders are all aligned on the goals and approach. The broader regional goals are likely to include reduced climate emissions and air pollution, lower transportation expenses, broader and more equitable access to electric vehicles and increased mobility and economic opportunity. Proactive outreach and community engagement is critical in this regional strategy.

It is also critical to define partner roles early in program design and refine them through the planning phases. Draw on the stakeholder list in the previous section to build the team and set expectations. Each partner should have clearly defined metrics for success before the program launches.

Provide Proactive Hands-on Support

Many MFH charging programs simply offer rebates or incentives that property managers must apply for. These programs can work well for those who are well-informed, technically capable and relatively affluent. They do not work well, or scale, for affordable housing or lower income communities. Instead, successful programs will provide proactive outreach to help property managers understand why and how they can provide charging, walk them through the process, help them identify solutions and

support them with funding incentives as needed. The program should include support for high level needs assessments, site-specific technical assessments and hands-on work with property managers. This support should be provided by skilled brand-neutral advisors who are trusted by property managers and residents alike.

Every property is slightly different and will require a slightly different approach. Key factors include 1) a property's architectural design, parking layout, and location (underground, structured, or street level; gated or not); 2) how parking spaces are allocated and the related ownership model (assigned, deeded, or shared); and 3) the electrical capacity of existing panels, where power is routed, and whether utilities are bundled with rent or not. Programs can offer templates based on the most common conditions in the community but will need hands-on support to help customize approaches for every property.

Specification of Appropriate Chargers

To help decide what kind of charging is best for a given property, managers should consider how parking and electrical service are managed, as noted above. They will also need to consider a range of other factors, including how drivers are likely to use chargers; whether access will be restricted to residents or chargers will be made available to the public; and whether and how chargers need to be networked. This is also the right time to consider how best to support charging for electric bikes in bicycle parking areas. Finally, property managers should also think about whether they want to require payment to offset costs and manage demand, and how payments will be collected. The right fit for most MFH is likely Level 2 chargers because they are more affordable, reduce pressure on the grid, work well with residential occupancy patterns and offer flexible options for managing power use.

Work with Trusted Advisors

Outreach and technical assistance are generally most effective when it comes through trusted partners. This may mean staff at a utility or local government that has relationships with community members; a trusted community-based organization in the neighborhood where the chargers will be installed; or a regional multifamily housing association. Ideally, all of these partners will play a role in providing input, guidance, and support to ensure engagement is effective. This outreach must inform EVSE design and programmatic elements and help prospective users be aware of the chargers.

Outreach will enable the project to address diverse community needs and support fair access to EV charging and its related benefits. Stakeholder outreach that begins early and continues through EVSE operations helps ensure the people who have the most to gain from the chargers inform decision making at every step of the process. The outreach must be tailored to the needs, culture and characteristics of each targeted community.

Leverage Multiple Funding Sources

Most successful programs will draw on multiple sources of funding that may include federal, state or city grants, utility investment and philanthropic funding. Charging that serves people with low or moderate incomes are generally good candidates for public incentives or grants. However, other sources of funding will often be needed to support electric vehicles, mobility services, community engagement, workforce development or other efforts. When developing a project operating budget, include a user

fee structure which will help cover energy usage and operational costs. The U.S. Department of Energy's [Alternative Fuels Data Center](#) lists potential incentives to help offset the cost of EV chargers.

Evaluate and Improve

Define key success metrics up front and ensure program alignment around those metrics. While charger utilization is one key metric, others may include increased EV adoption in the community, reduced commuting costs, or lower pollution levels. Program managers should develop a plan to collect, analyze and report data from charging stations to evaluate these metrics for the duration of use. This should include charging utilization and charging behavior. In the first year, it's particularly important to regularly evaluate what works and what does not and to adjust operations and/or outreach accordingly. Incremental improvement will be necessary to support high utilization and local benefits, especially for historically underserved communities.

8. Additional Multifamily Housing Considerations

While not the focus of this paper, there are several other issues worth noting when it comes to multifamily charging.

Building codes: One of the policy levers to increase charging is through building codes that require "EV ready" construction. This can be helpful in the long run, but initial requirements typically focus first on new buildings. Because the housing stock takes a long time to turn over, this is a longer-term strategy. Furthermore, new projects generally serve people with higher incomes, so this does not serve people with low incomes terribly well. Code mandates can be controversial for builders who assume it will increase costs, so affordable housing is sometimes explicitly exempt. Overall, this is an important tool, but not the focus of this paper.

Right to Charge Laws: They are intended to prevent homeowner associations or landlords from arbitrarily blocking residents who wish to install charging. They ensure residents of multifamily housing have the right to install chargers for individual use provided certain conditions are met. Conditions may include coverage of all costs including electrical upgrades, meeting insurance requirements and complying with design standards. These laws can be an important way of forcing a conversation. However, they work best for residents with relatively more negotiating power, information and resources. They also do not help the property manager address the real challenges identified in this paper.

Level 1 Charging: One multifamily charging solution that offers a number of benefits is to simply provide Level 1 charging - a regular power outlet - freely available at all or many parking spaces. This offers an affordable and easy solution with simple 120-volt outlets. This option does not generally include the technology to manage billing, but the maximum power draw would be quite modest - perhaps a dollar or two per day. This type of charging generally does not qualify for third party funding, however, which is a significant challenge.

Public Charging Pods: An alternative solution may be groups of Level 3/DCFC chargers that provide fast charging very close to, but not collocated at, the multifamily property. These are typically third-party owned and managed. This would be less convenient for residents, however and public fast charging is usually the most expensive form of charging. In fact, it may be more expensive than the equivalent price of gasoline. However, one creative approach could be for a program manager to require charging operators to offer affordable or discounted charging fees, potentially as a monthly subscription for residents of their building. Many MFH residents will likely need to depend on public fast charging initially, until there is a better solution closer to their home.

9. Tools and Platforms to Support MFH Charging

The U.S. Department of Energy has funded numerous projects aimed at charging for multifamily housing and has developed tools and resources that can help program managers. This includes a list of lessons learned from previously funded projects¹⁸ as well as a list of resources and case studies.¹⁹

Through the Vehicle Charging Innovations for Multi-Unit Dwellings Project ([VCI MUD](#)) funded by the U.S. Department of Energy,²⁰ Forth and its partners developed a toolkit with resources to help residents, building managers and owners, homeowners associations and other stakeholders to more efficiently provide charging. The toolkit provides resources to overcome specific barriers outlined in this paper, including:

- Surveys to help estimate resident demand for charging, and a “self-evaluation” survey to help building managers evaluate their own readiness
- A “technology selection tool” to help access fact sheets and case studies based on site-specific barriers
- An installation checklist
- Resources for finding local electricians

Communities developing a charging program for multifamily housing are strongly encouraged to plug into this national effort.

Conclusion

The significant public investments in charging infrastructure underway in the U.S. and globally present an opportunity to efficiently, effectively and equitably bring the benefits of electric transportation to the millions of people who live in multifamily housing. Because of the income of people who typically live in this type of housing, it is possible to disrupt historic patterns of inequality and improve the quality of life of historically underserved communities, with careful thought and intention. Through the strategies and considerations laid out in this paper, local governments, utilities and multifamily housing property owners and managers can ensure these properties provide the charging, and complementary programming, to contribute to the global transportation transformation currently underway.

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References

- ¹ EPA [Sources of Greenhouse Gas Emissions](#), 2023
- ² White House Fact Sheet, [The Biden-Harris Electric Vehicle Charging Action Plan](#), accessed on 2023-03-27
- ³ Green Car Congress, May 19, 2021. [ITF: worldwide transport activity to double by 2050, emissions to rise 16% compared to 2015](#)
- ⁴ L. McKenzie, N. Nigro, [U.S. Passenger Vehicle Electrification Infrastructure Assessment](#), Atlas Public Policy, April 28, 2021
- ⁵ Forth, [Right-of-Way Charging, How Cities Can Lead the Way Report](#).
- ⁶ <https://www.fhwa.dot.gov/environment/cfi/>
- ⁷ Center for Disease Control and Prevention, [STATE System Multiunit Housing Fact Sheet](#).
- ⁸ J.D. Power Study, [Level Up: Electric Vehicle Owners with Permanently Installed Level 2 Chargers Reap Benefits from Their Investment](#), February 3, 2021
- ⁹ [Meeting of The Minds Report](#), Feb 17, 2020
- ¹⁰ Global Sustainability Mobility Partnership, [Policies for a Mature, Flourishing & Equitable EV Charging Ecosystem](#), accessed on 2023-03-20
- ¹¹ The U.S. Department of Transportation, [Household Spending on Transportation](#), accessed on 2023-03-17
- ¹² [American Public Transport Association](#), October 2019
- ¹³ Raj Chetty and Nathaniel Hendren, [The Impacts of Neighborhoods on Intergenerational Mobility](#), April 2015, accessed on 2023-03-37
- ¹⁴ Kelly Blue Book, [Electric Car Sales Outpace All Other Segments](#), October 17, 2022, accessed on 2023-03-27
- ¹⁵ National Multifamily Housing Council, [2022 NMHC/Grace Hill Renter Preferences Survey Report](#), January 18, 2022, accessed on 2023-03-27
- ¹⁶ International Code Council, [Electric Vehicles and Building Codes: A Strategy for Greenhouse Gas Reduction](#), accessed on 2023-03-27
- ¹⁷ Forbes, [Bringing Electric Vehicle Charging to Multifamily Housing](#), February 25, 2021, accessed on 2023-03-27
- ¹⁸ <https://cleancities.energy.gov/project-lessons-multifamily-housing/>
- ¹⁹ https://afdc.energy.gov/fuels/electricity_charging_multi.html
- ²⁰ <https://vci-mud.org/>