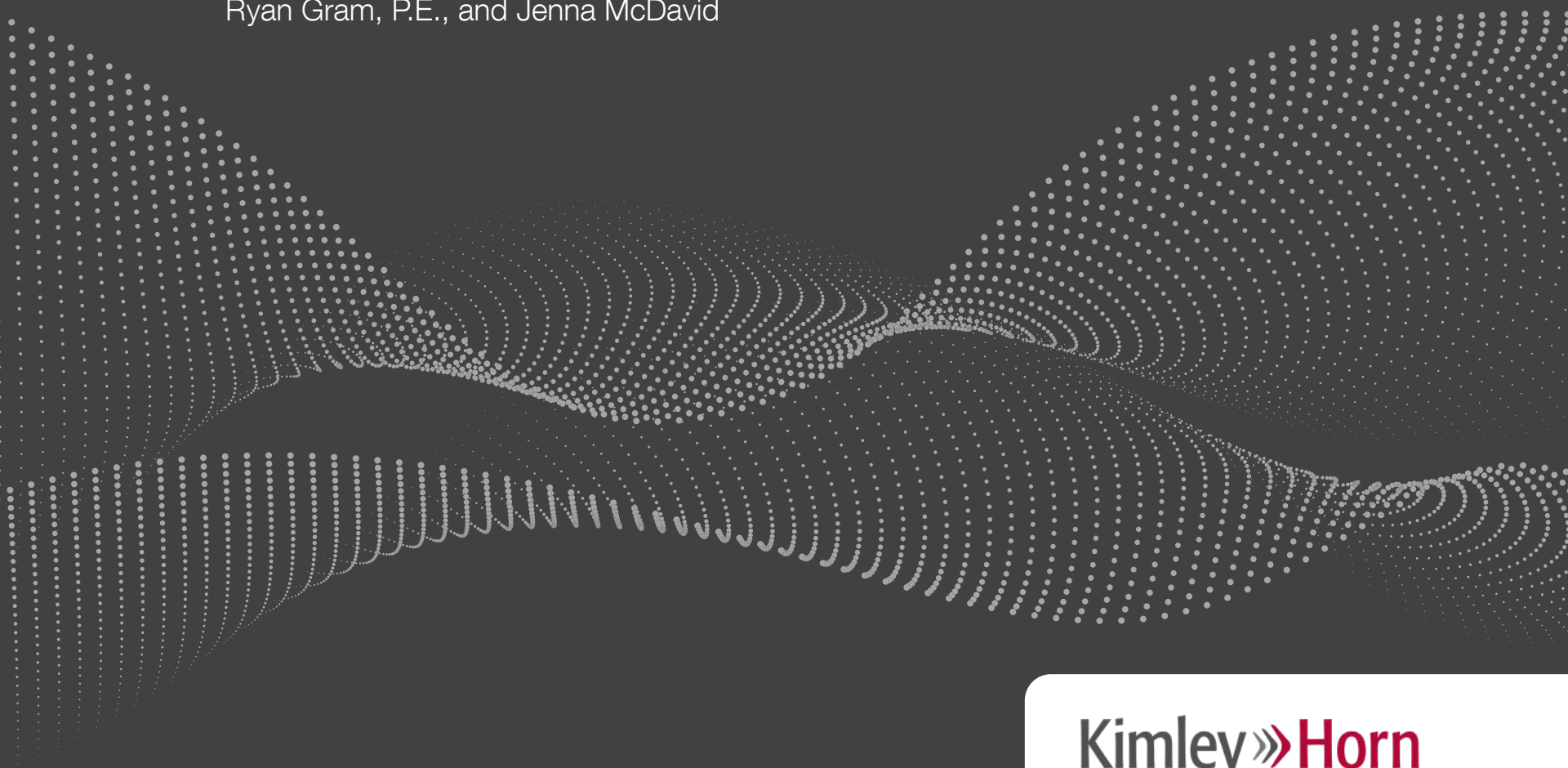
A Developer's Guide to *Electric Vehicle Charging*

By: Jess Cain, P.E., Bryce Christensen, P.E., Ryan Gram, P.E., and Jenna McDavid



Kimley»Horn

Expect More. Experience Better.

A Developer's Guide to Electric Vehicle Charging

If you're a commercial, residential, or industrial property developer considering the electric vehicle (EV) charging stations at your sites, this is for you. In this guide, Kimley-Horn EV specialists share the benefits of adding EV charging to your sites as well as charging station options, quantity considerations, location factors, and funding resources for EV charging stations.

Kimley»Horn

What are some benefits of adding EV charging to my site?

There are several benefits of installing EV chargers at your facility. These vary depending on what type of facility you own and your target patron.

Use-Specific Benefits

OFFICE

74% of EV drivers strongly prefer having an option to charge their vehicle at work. Aside from potential revenue benefits, employee retention and recruiting are factors that should not be overlooked.

Read more in *COVID-19 Hasn't Dimmed the Electric Vehicle Market's Spark*

RETAIL

EV charging puts your facility on the map. With EV chargers installed at your retail site, your location is on the map with apps such as *PlugShare* and many others. Your location will be seen as a charging destination and EV drivers will be more likely to shop there. Drivers who are charging their vehicles have been found to spend twice as much time at the charger location.

RESIDENTIAL

As the options for EV models continue to increase in availability and decline in price, the need for EV charging infrastructure in residential spaces will also increase—in both multifamily and single family developments.

Taking EVs into consideration when configuring the electrical system for a new build could turn into a great selling point for future buyers. Often, the most expensive part of installing at-home charging is reconfiguring the electrical system to have capacity for the charger. Saving the time, money, and hassle of installing an EV charger is a big draw for current EV owners and those looking to purchase.

INDUSTRIAL

Industrial sites frequently have unique charging needs when considering fleets with small-, medium-, and heavy-duty vehicles, as well as employees and visitors who may need to charge their personal vehicles. Offering EV-ready sites can set you apart from other developers and/or owners, lock in power supply from the utility, and save you money in the future.

Read more in *Future Proofing Your Industrial Site to Support Fleet Electrification*

Patron Priorities

Sustainability sells. Patrons are becoming more environmentally conscious, often opting to support businesses, products, and services that prioritize sustainability and environmental conscientiousness in their day-to-day operations. For example, *Nielsen conducted a study* comparing three unrelated markets: coffee, chocolate, and bath products. The study found that the goods that promoted sustainability had a better growth rate than those that did not. Providing patrons with EV charging options sends a message that your business prioritizes sustainable, forward-thinking solutions.

Environmental, Social, and Governance Goals

Adding EV charging infrastructure to your site can help you meet environmental, social, and governance (ESG) goals, along with business-specific sustainability goals.

Revenue Generation

EV charging infrastructure deployment may have monetary benefits as well. Depending on the business model you choose for your chargers, you may be able to generate additional revenue through patron use of chargers at your site. Additionally, in some states, there are opportunities to gain revenue through Low Carbon Fuel Standard (LCFS) credits, which monetize carbon offsets associated with EV charging.

Utilize Grants and Incentives While Available

Now is the time when funding is most available to support this type of infrastructure. Developers should act now to share the cost as there is no guarantee of future funding.

What factors should I consider for EV chargers at my development?

1. Use Case

Another major consideration for installing EV chargers on your site involves how patrons and staff will use them. For example, if you are developing a multifamily residential site, you probably do not need infrastructure for fleet charging.

Some common use cases include:

- Destination (e.g., providing EV charging stations at a traditional gas station)
- Workplace
- Fleet conversion
- Charging hubs for fleets or rideshare vehicles

2. Demand

Understanding who your drivers are and the current or projected need for EV charging can help you select a system that yields a return on your investment. Ask yourself:

- Is your property in an under-served charging market?
- Would offering EV charging at your location fill a gap in the existing network (e.g., alternative fuel corridor-adjacent locations)?
- How long does your average patron spend at your site?
- Do your patrons already own EVs or do they plan to in the next 2-5 years?
- Will your site be used by private fleets (e.g., medium or heavy duty industrial fleets, e-commerce vans, etc.)?
- Is your site easily accessible to ride sharing, such as Uber/Lyft?

These are just a few of the driver demands to consider when determining your installation needs.

Top 4 Considerations for EV Charging at Your Site:

1. Use Case
2. Demand
3. Cost
4. Site Characteristics

3. Cost

Let's not ignore the bottom line. Managing capital and operating costs is more important than ever, and EV charging infrastructure installations need to be assessed relative to your property's income and operating budgets. The good news is there are multiple low-cost charging options which can be tailored to meet your budget.

Additionally, local, state, federal, and private sector incentives continue to promote the use of EVs throughout the country. These incentives can add up to help you bridge the financial gap often caused by initial capital expenditures related to installations.

LEGISLATION AND GRANTS

The federal government and many states have issued legislation to increase adoption of zero-emission vehicles (ZEVs), which include EVs, over the next two decades. To incentivize development of the infrastructure necessary to meet these goals, the federal government has announced many EV-related investments as part of the $1.2 trillion Infrastructure Investment and Jobs Act (IIJA), including $5 billion allocated to the National Electric Vehicle Infrastructure (NEVI) formula program and $2.5 billion in the Community and Fueling Infrastructure (CFI) grant program.

UTILITY

Many electric utilities offer customer incentive programs that can help offset EV charger deployment costs. Depending on your geography, utilities in your area may offer special EV charging rates, rebates, and other incentive programs (e.g., additional equipment provisions, design services, etc.).

In some markets, there is also new state-of-the-art technology available to help set your property apart from others and maximize savings. Vehicle-to-Grid (V2G) bidirectional charging infrastructure can generate passive income, save on building energy costs, and simultaneously help meet EV regulations and goals. *Read more about what our experts have to say about V2G technology.*

4. Site Characteristics

It is important to consider certain site characteristics when adding EV charging infrastructure to your site. The main considerations include:

- Electrical constraints and site layout
- Charger placement
- Accessibility
- Space constraints regarding technology integration
- Energy access, management, and load sharing
- Floodplain
- Phasing and future proofing
- Traffic patterns
- Visibility/screening
- Easements

Kimley-Horn has a long and successful history of navigating clients through these considerations and specific site characteristics in order to determine best EV charging options and placement.

What EV charging options are available?

There are multiple EV charging options currently available. It is important to consider the needs of your site and patrons when deciding on the type of charger you should install. For instance, if you own a coffee shop along a stretch of highway known for long-distance travel, you probably want to install DC Fast Chargers (also known as Level 3 chargers). DC Fast Chargers allow users to charge about 80% battery capacity in 25-30 minutes.

On the other hand, a shopping mall might consider a Level 2 charger because most patrons who shop at malls are there for between one and two hours. In that time, the Level 2 charger will provide between 40-60 miles of range, allowing drivers to continue their days without being forced to return home to charge.

Level 1 chargers may make more sense for sites where patrons will park at for long periods of time, such as residential developments, or even long term parking at airports.

Charge Level	Devices with similar power requirements	Approximate travel distance gained in a 10-minute charge duration	Power	Approximate time to fully charge a typical EV
Level 1 Charger	Toaster	1 mile	1.0-1.2 kW (AC)	1-2 days
Level 2 Charger	Clothes dryer	3-15 miles	3.6-19.2 kW (AC)	8-13 hours
Level 3 Charger	5-10 central air conditioners	25-300 miles	20-350 kW (DC)	20 minutes

What business model should I use?

Ultimately, the business model you should use depends on your goals, time investments, and funding. There are many types of business models to choose from, but some of the primary models include:

Ownership Type	Cost	Potential Revenue
Third-Party Owned and Operated	$ Program management	$
Self-Owned, Third Party Operated	$$ Hardware, software, program management	$$
Self-Owned and Operated	$$$ Hardware, software, operations, maintenance, program management	$$$ Likely requires subsidies to break even
Leased or Charging as a Service (CaaS)	$$ Subscription fee, program management	$$ Shared with third party
Advertising-Supported Free Charging	$ Program management	$ Monthly site host payment (typically small)

Note: $ (Low cost/revenue potential), $$ (moderate cost/revenue potential), $$$ (high cost/revenue potential).

Based on Table 1 in Forth's 2020 publication, "*Right-of-Way Charging: How Cities Can Lead the Way.*"

Are financing options available?

Good news: if the capital cost required to install and own your charging network seems like a daunting expense, there are multiple lower-cost options available.

Commercial providers are looking to expand their programs nationally using a variety of creative models. With these models, the site host (that's you) can bear little to no cost for installation while generating revenue from under-utilized parking facilities.

Other equipment providers offer a low-voltage DC system, which operates from the existing power infrastructure. This results in a reduced installation cost and there are several available options to finance this approach.

How many EV chargers should I install?

The right number of chargers for your site depends on many factors, including:

- Today's patron demands
- Future patron demands
- Proximity to existing public charging sites
- Electrical capacity at the site
- Local regulations
- Future-proofing your site for additional charging infrastructure roll outs

The most cost-effective path is to install the needed below-ground infrastructure all at once. Determining cost may seem daunting, but Kimley-Horn can help you with this step.

Does it matter where I locate my EV chargers and facilities?

In short, yes. Just as EV charging facilities continue to evolve, so do the land use and energy codes of permitting agencies.

Site Selection

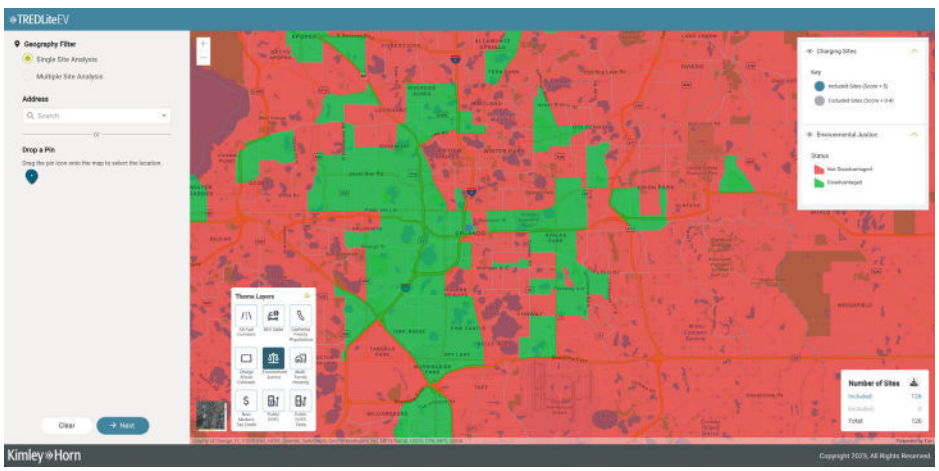
To maximize potential EV charger utilization, you will need practical data to make strategic decisions about where and when to deploy EV charging infrastructure, whether you are already working with a specific site or examining a portfolio of existing sites.

Placement on Site

After you have selected the site that your EV chargers and facilities will be installed on, you will need to consider the site's unique characteristics. Additionally, considerations such as Americans with Disabilities Act (ADA) requirements, quantity and location of charging facilities, parking count, signage, and landscape improvements all factor into the initial planning, design, and permitting process. Future EV charging demand will also impact where you should install your chargers.

Good news: Site selection and has never been easier! Kimley-Horn offers ground-breaking market solutions to help developers pinpoint optimal charger sites. *Read more about our TREDLite EV program here.*

»TREDLiteEV



TREDLite EV: Your Site Selection Software

Maximize EV charger utilization to increase revenue.

Strengthen customer loyalty by offering chargers where they are needed most.

Access real-world data and analytics through a straightforward and intuitive user interface.

Your Partners for Success

Trying to absorb all this information may feel a bit overwhelming. Kimley-Horn is here to help.

Kimley-Horn is proud to be a leader in planning, designing, and implementing of EV charging stations throughout the country. Our dedicated professionals have worked on EV charging projects for more than a decade, and our team helped write the EV charging standards for the International Parking & Mobility Institute (IPMI) including design approaches and charging station considerations for new parking garages.

Reach out to one of our EV experts for more information on how to develop EV charging stations at your facility.

About the Authors

Jess Cain, P.E.

Raleigh, NC

Jess.Cain@kimley-horn.com

A professional civil and environmental engineer with more than two decades of experience in renewable energy and telecommunications, Jess is an expert at developing creative design solutions for challenging sites. Jess has led a wide range of projects—from EV charging stations to 5MW-80MW ground-based solar projects to rooftop solar developments to battery storage systems—and she has extensive experience with EV chargers, microgrids, solar energy project development, procurement, construction, operations, and maintenance.

Bryce Christensen, P.E.

Aspen, CO

Bryce.Christensen@kimley-horn.com

Bryce is a senior partner on multiple nationwide programs including national EV programs. He has worked on hundreds of EV charging station sites across the country—including parts of one of the first coast-to-coast EV charging routes. Bryce has a true passion for EV and a strong desire to see sensible infrastructure development and public education in this space. Bryce's expertise includes EV charging station design, site planning and layout, grading and drainage design, erosion control, stormwater management system design, utility design, utility coordination, permitting, construction observation, pavement assessment and rehabilitation, parking assessments and planning, and site/stormwater inspections.

Ryan Gram, P.E.

Nashville, TN

Ryan.Gram@kimley-horn.com

Ryan specializes in implementing EV infrastructure in creative ways across the country. His EV experience began in 2014 as a project engineer for some of the earliest direct-current fast charging (DCFC) in the country. Since that time, Ryan has led teams across the U.S. and consulted on more than 3,000 EV projects in more than 40 states, positioning him as a leading authority and trusted advisor in the EV industry to public and private clients alike. Ryan is currently partnering on some of the most innovative EV programs in the nation and working with many developers and jurisdictions on the beginning of their EV implementation. He is leading teams across the firm and the U.S. to plan, design, permit, and install EV charging stations at a rapid pace to keep up with the ever-expanding EV industry. He has assisted clients with site selection and due diligence; EV charging station design, including civil, electrical, and structural management; EV readiness plans; fleet electrification; utility coordination; permitting; construction phase services; evaluation of new technology and processes; and more.

Jenna McDavid

Oakland, CA

Jenna.McDavid@kimley-horn.com

Jenna is highly experienced in clean energy and clean transportation. She specializes in delivering data-driven insights to support strategic decision-making. Her current and recent engagements focus on delivering expert advice regarding deployment of light-, medium-, and heavy-duty EVs and charging infrastructure as well as the policies and strategies to support these deployments. A recognized leader in the energy industry, Jenna serves as Vice President of the Board of Directors for the Association of Women in Water, Energy & Environment (AWWEE) and Treasurer of the Board of Directors for the International Energy Program Evaluation Conference (IEPEC). She served as Conference Chair for the 2019 IEPEC and has served as presenter or moderator for numerous conference sessions and webinars regarding zero-emission transit buses; charging infrastructure technologies and markets; and equitable siting of public charging infrastructure. Prior to joining Kimley-Horn, Jenna served two terms as Commissioner on Energy Use and Climate Change for the City of Somerville, MA, and as Expert Advisor to the California Public Utilities Commission (CPUC) on their Long-Term Energy Efficiency Strategic Plan process.

Kimley»Horn

www.kimley-horn.com