Which customers have Level 2 EV chargers and what programs should you offer them?

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Key takeaways

- Account for Level 2 electric vehicle (EV) chargers, which have a higher power draw than Level 1 chargers, in your distribution system planning.
- Use E Source Data Science to identify which of your customers are using Level 2 EV chargers.
- Use market research to segment these customers and target them with customized programs.
- Educate your customers about how EV chargers and EV pricing work.
- Offer EV customers time-of-use rates, demand response and managed charging programs, and incentives for ENERGY STAR chargers.

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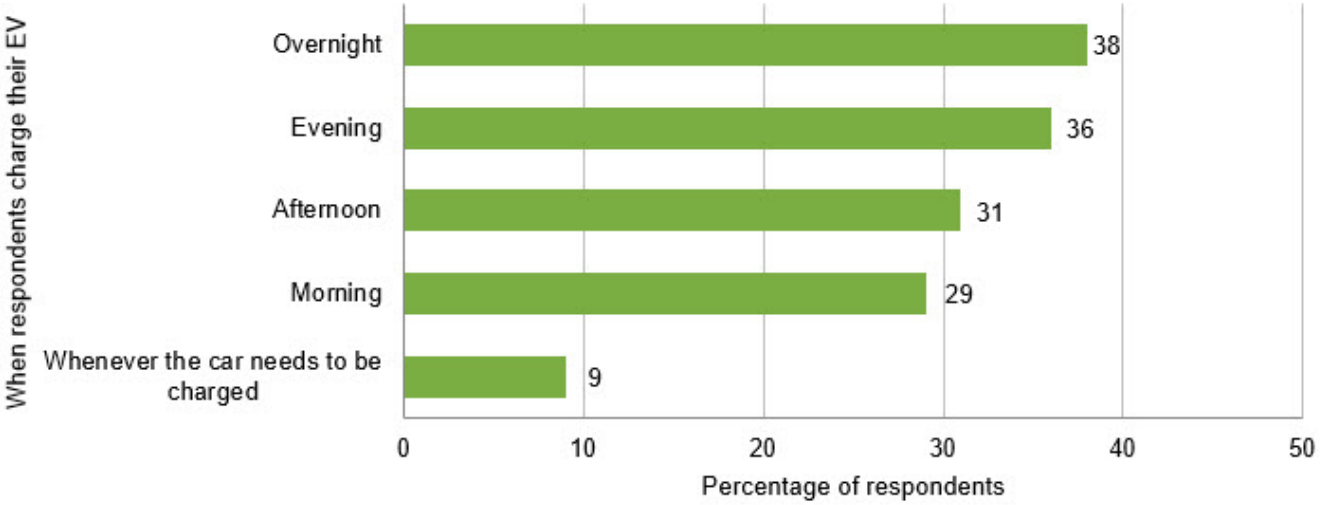
As EV adoption increases, you should identify customers who use Level 2 chargers to help in your distribution planning. You should also offer them programs to minimize the chargers' impact on the grid.

Identifying and segmenting your Level 2 EV charging customers

You often don't know when residential customers purchase EVs and install Level 2 chargers, which can stress your peak demand periods if you don't manage the loads. And in the 2020 E Source Electric Vehicle Residential Customer Survey, we found that only 38% of respondents who own an EV reported charging their vehicle during off-peak hours (**figure 1**).

Figure 1: Few EV owners charge during off-peak hours

In the 2020 E Source Electric Vehicle Residential Customer Survey, 38% of respondents indicated that they charge their EV overnight.



Base: Respondents from the US or Canada who or have a BEV or PHEV and who charge at home, n = 964. **Question S4_7:** Thinking about your typical daily routine, what time of day do you prefer to charge your vehicle at home? Select all that apply. **Notes:** BEV = battery electric vehicle, EV = electric vehicle, PHEV = plug-in hybrid electric vehicle. "I don't know" and "I wouldn't charge my vehicle at home" response options not shown here because percentages were less than 1% © E Source (2020 Electric Vehicle Residential Customer Survey)

Identifying these customers will also help in your distribution planning. Because Level 2 chargers draw more power than Level 1 chargers, they'll increase residential load and you'll need to replace grid infrastructure sooner.

We can help you locate these customers. If you have advanced metering infrastructure (AMI), we can use your customers' daily meter data to identify who's using a Level 2 charger. For utilities without AMI, we can combine customer demographic data with standard billing data to identify them. We used both methods to identify customers who use Level 2 chargers in PPL Electric Utilities' territory.

Interested in locating your customers with Level 2 charging?

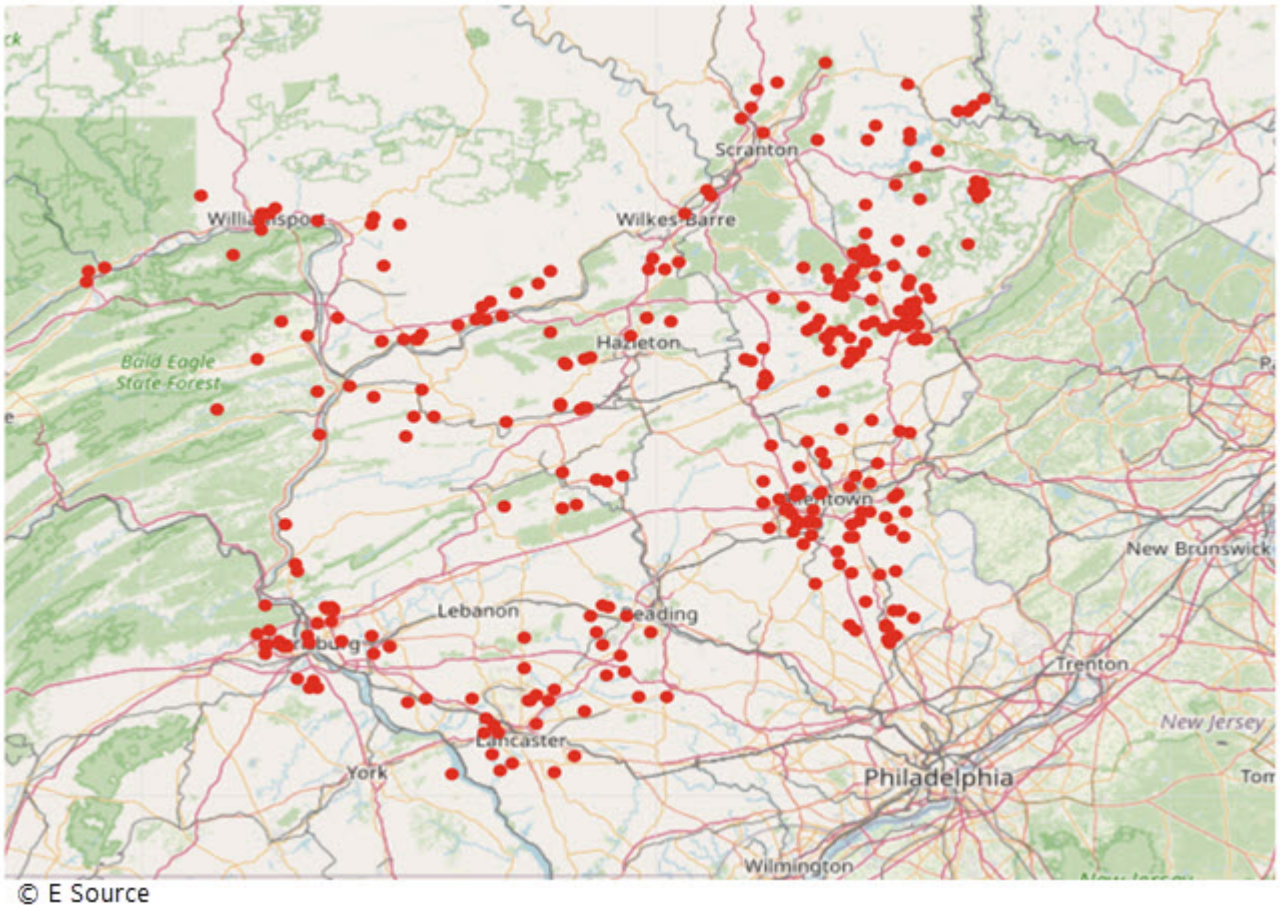
If you're interested in identifying and segmenting your EV and Level 2 charger customers, contact us.

How we identified PPL customers with and without AMI data

With AMI data. To identify customers with Level 2 chargers in PPL's territory, we asked utility staff if they had one and analyzed publicly available data—we identified six customers. We analyzed their daily AMI meter data from September to December 2019 to understand what the customers' meter data looked like when they charged their EV. We then used software to analyze data from all 1.2 million residential customer AMI meters to identify customers that had the same daily load characteristics as the six known customers with Level 2 chargers. We assigned each residential customer a score from 0 to 1 to indicate the likelihood of that customer having a Level 2 charger in their household, with 1 being the highest likelihood. **Figure 2** shows the location of customers with a score of 0.9 or higher.

Figure 2: Locations of customers who are most likely to have a Level 2 charger

We used the known load shape characteristics of customers with Level 2 chargers to identify other residential meters that most closely matched those load shapes. Each dot on the map represents a customer who had a likelihood score of 0.9 or higher, with 1 being the highest likelihood.



We used the Level 2 EV charger load shapes to create a template that the utility could use to identify other customers. Then we ranked variables that predicted whether a customer had a Level 2 charger, such as the

shape of the load and the number of daily peaks. We identified 359 meters (1% of PPL's residential customers) that had the distinct Level 2 charger load shape and were likely to have Level 2 EV chargers.

Without AMI data. If you don't have AMI meters, we can still help you identify customers with Level 2 chargers in your territory. To identify PPL customers without using the AMI data, we used a combination of:

- Income data
- Average bill amount
- Kilowatt-hour usage
- EV registration data

This method was 99% accurate. And we can apply this model to specific data from your territory, or we can generalize our model and apply it to your territory without additional data from you.

How we can segment your customers

Once we have identified customers using Level 2 chargers, we use the data to understand those customers' other behaviors, like what time of day and how frequently they charge their EV. We combine our data with market research and segmentation data to determine what types of programs you should offer these customers and how to target specific customer segments.

Offering the right EV charging programs

Once you understand which customers own Level 2 chargers, you can start targeting them with programs that will help them save money and charge more efficiently while helping you manage loads. You should also consider initiatives that will educate potential EV or EV charger buyers.

Managing load and reducing cost

> **To make EV ownership and charging as cost-effective for customers as possible, offer a combination of special pricing and incentive programs to your EV customers.**

Offer your customers special pricing and incentive programs to encourage them to charge their EV during off-peak hours and reduce their costs. These programs can work together to help you manage EV load and increase charger efficiency.

Time-of-use programs. EV time-of-use rates offer EV customers a cheaper rate during certain off-peak hours to encourage them to charge then. Some programs offer customers an EV rate that uses the existing house meter. Others require customers to install a second, dedicated utility meter for EV charging. Some utilities pay for the second meter and others require customers to pay for it.

Managed charging. You can manage residential EV charging to shed load during peak demand events. Behavioral, or passive managed charging programs use special rates—like TOU rates—coupled with incentives to encourage customers to charge their EV when it's beneficial for the utility.

> **Some programs offer customers an EV rate that uses the existing house meter. Others require customers to install a second, dedicated utility meter for EV charging.**

To participate in passive managed charging, EV owners voluntarily set charging times that align with off-peak periods using a timer on their EV or through a computer within the EV. Check out Mopping up the solar spill: Using optimized managed charging to absorb excess solar generation for more details on managed charging program options.

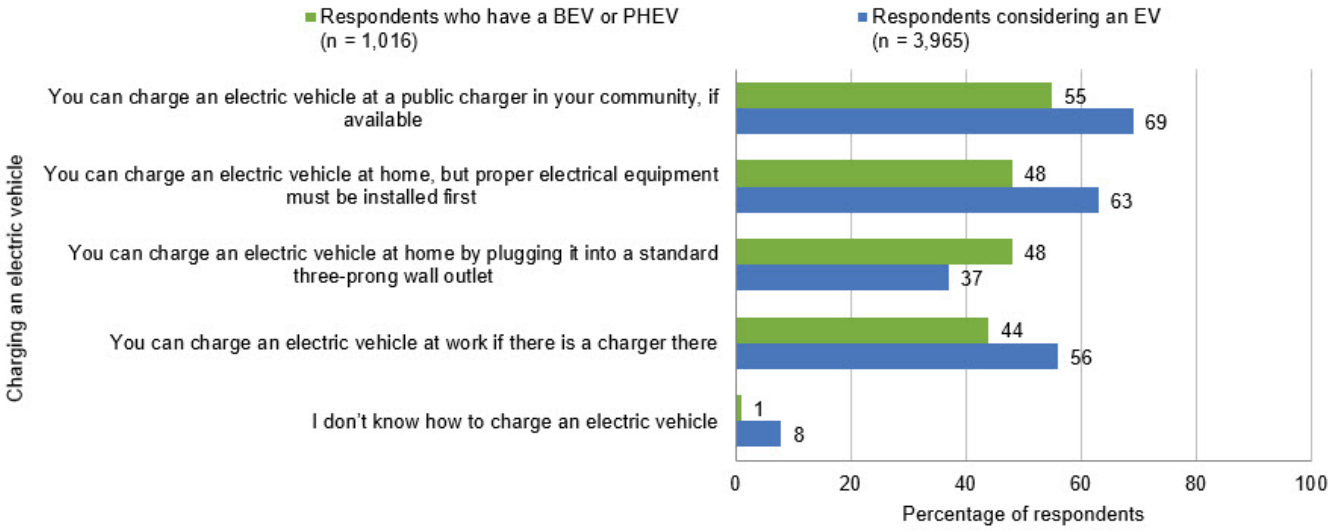
ENERGY STAR equipment rebates. Help your customers charge more efficiently by offering incentives for ENERGY STAR–certified EV chargers. You can require customers enroll in a demand response or special pricing program to receive efficient charger incentives.

Educating customers

Some of your customers might be slow to adopt Level 2 charging because they don't understand the technology. For example, we found that 63% of customers that are considering purchasing an EV think that proper electrical equipment must be installed to charge an EV at home (**figure 3**).

Figure 3: How are EVs charged?

Only 37% of respondents considering purchasing an EV and 48% of respondents that own an EV know that you can charge an EV at home by plugging it into a standard three-prong outlet.

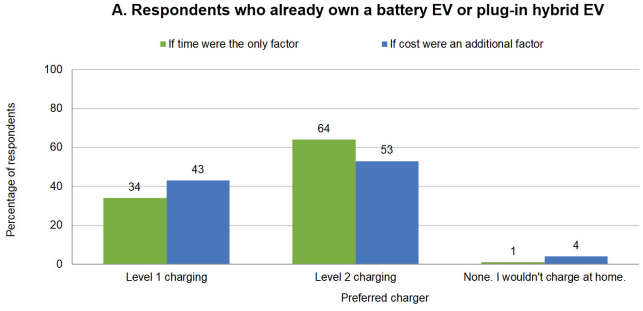


Base: Respondents from the US or Canada, n varies as shown. **Question S4_1:** A standard gas-powered vehicle refuels at a gas station. How can you charge an electric vehicle? Select all that apply. **Note:** BEV = battery electric vehicle, EV = electric vehicle, PHEV = plug-in hybrid electric vehicle. © E Source (2020 Electric Vehicle Residential Customer Survey)

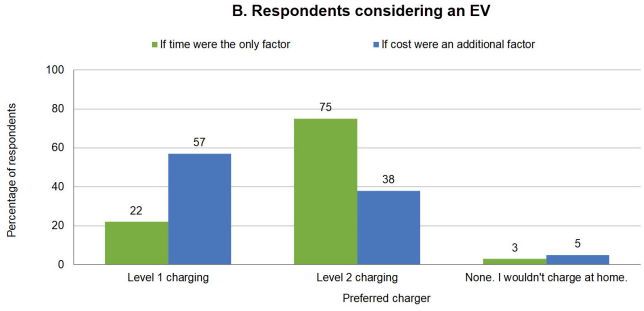
Your EV education initiatives will help potential EV buyers better understand how EV charging works and the benefits of using a Level 2 charger. In our survey, we found that those considering an EV preferred Level 1 charging to Level 2 charging when cost was a factor, but the majority of EV owners prefer Level 2 chargers regardless of time or cost (**figure 4**). To educate your customers, partner with EV dealerships and target specific customer groups with marketing campaigns. You should start educating EV buyers as early as possible because many customers install Level 2 chargers either before they buy an EV or soon after (**figure 5**).

Figure 4: Customers' preferred chargers

Respondents who already own an EV prefer Level 2 chargers whether or not cost was a factor (A), but respondents who are considering an EV prefer Level 1 when considering cost (B). The difference in preference between EV owners and those considering an EV is likely because EV owners understand that charging an EV with a Level 2 charger is still less expensive than gasoline. They're also less likely to change charging habits that they already have and they might have higher incomes than potential EV owners.



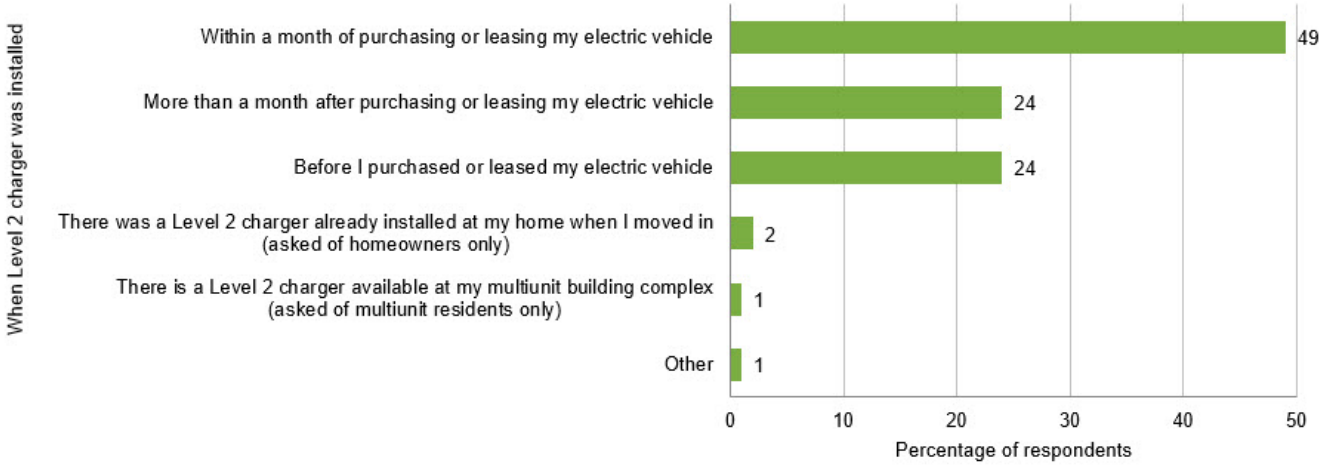
Base: Respondents from the US or Canada who have a BEV or PHEV, n = 1,004. **Question S4_2:** If time were the only factor, which charging option would you prefer to use at your home? **S4_3.** If cost were another factor, which charging option would you prefer to use at your home? **Note:** BEV = battery electric vehicle, PHEV = plug-in hybrid electric vehicle. © E Source (2020 Electric Vehicle Residential Customer Survey)



Base: Respondents from the US or Canada who are considering an all-electric vehicle, n = 3,662. **Question S4_2:** If time were the only factor, which charging option would you prefer to use at your home? **S4_3.** If cost were another factor, which charging option would you prefer to use at your home? **Note:** BEV = battery electric vehicle, PHEV = plug-in hybrid electric vehicle. © E Source (2020 Electric Vehicle Residential Customer Survey)

Figure 5: When customers install Level 2 chargers

Just under a quarter of respondents with an EV and Level 2 charging said they installed their Level 2 chargers before they purchased an EV. Almost half said they installed it within the first month of having an EV.



Base: Respondents from the US or Canada who have a BEV or PHEV and who already have Level 2 charging, n = 274. **Question S4_4b:** When did you have level 2 charging equipment installed at your home or residence? **Note:** BEV = battery electric vehicle, PHEV = plug-in hybrid electric vehicle. © E Source (2020 Electric Vehicle Residential Customer Survey)