

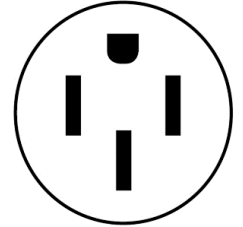
Home Charging

Voltage



120-volt (left) is the standard household outlet, capable of delivering roughly 40 miles of EV range overnight.

240-volt (right) is the upgrade outlet most EV owners upgrade to. Range varying from 200 to 300 miles, depending upon connection amps available and limitations of the vehicle itself.



Amps

Amps (amperage) supplied for charging can vary, based on install decisions you make as an EV owner. More typically results in faster charge times. The 240-volt outlet (above) is capable of 50 amps, which equates to a maximum speed of 9.6 kW. Direct hardwiring can be faster, if the vehicle supports it.

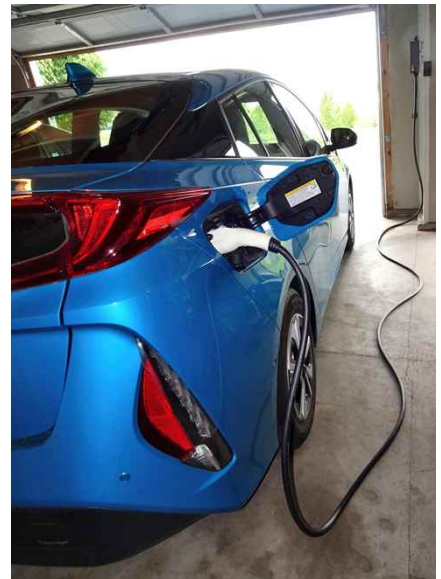
EVSE

EVSE (Electric Vehicle Supply Equipment) is box connected to the electricity source. It is just a large adapter providing the plug, cord and safety features. Conversion of electricity from AC to DC is inside your EV, which is why speed varies based upon the vehicle itself.



EVSE placement is flexible, especially if your provider supports wireless metering for off-peak discounts.

Installing one or more meters next to your primary meter is another option available.



kW

kW (kilowatts) is the measure of charging speed. For example, 9.6 kW means you'll get a maximum of 9.6 kWh per hour. From 3.0 mi/kWh efficiency, that equates to roughly 200 miles overnight (8 hours).

kWh

kWh (kilowatt-hours) is the measure electricity quantity. This is the value to pay attention to when determining costs related to driving & charging.



Charging Costs









Kilowatt-Hour

Cost of charging is based on the price of electricity measured by kWh (kilowatt-hour). For example, it takes roughly 57 kWh for about 200 miles of range (assuming 3.5 mi/kWh efficiency). At a standard home rate of \$0.14 per kWh, it would cost \$7.98 for the charge. At a DC fast charger, which is always more expensive than home charging, that could vary from \$24.51 to \$35.19 based on the pricing examples shown below.

DC Fast Charging

Per kilowatt-hour price can vary greatly for each DC fast charger location. Factors like peak timing and provider membership can influence price too. Some stations may also include a session and/or idle fee.

Look up the station using a phone app or your EV navigation system to see pricing detail.

Saint Cloud, MN	 
4255 Roosevelt Rd, Saint Cloud, MN, United States	71.89 mi
<hr/>	
 274-6517-02	
 Combo CCS  Up to 180kW 2 Available	\$0.43/kWh
<hr/>	
 274-6517-01	
 Combo CCS  Up to 180kW 2 Available	\$0.43/kWh



JOLENE - 350 kW DC Fast Charging

CCS Combo	\$0.600/kWh
Session Fee	\$0.99
You can avoid session fees and access lower pricing by enrolling in an EVgo subscription plan. Visit the Plans section to explore options.	

Time of Use Schedule

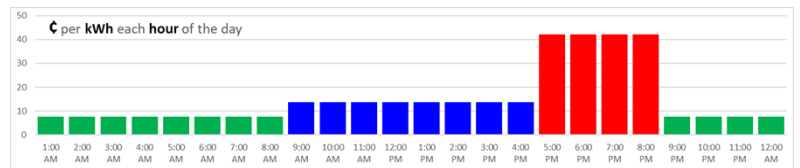
Super Off-Peak	\$0.48/kWh
12AM-4AM	
Off-Peak	\$0.53/kWh
4AM-10AM	
8PM-12AM	
On-Peak	\$0.60/kWh
10AM-8PM	

AC Slow Charging

AC charging (known as “level-2”, is much slower than DC) can be found at the grocery stores, nearby parks and local coffeeshops. Pricing will usually range from free to \$0.20 per kWh. Some have fees.

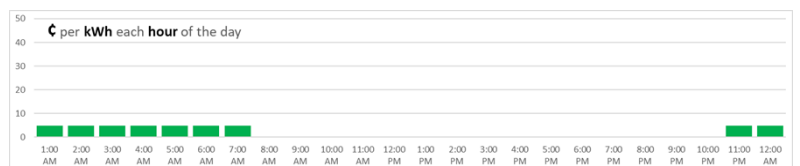
Time of Use

Some electricity providers offer discounts for 240-volt home charging. When you charge will determines price per kilowatt-hour. Price is lower while demand for electricity is lower.



Off Peak

Better 240-volt home charging discount price than time-of-use can sometimes be available; however, charging may only be enabled during overnight hours.



Charge Timing

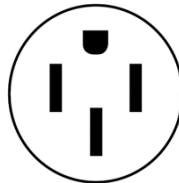
Voltage

Level 1: 120-volt AC



Basic home charging, enough overnight to cover most daily driving. In 8 hours, expect 40 miles.

Level 2: 240-volt AC



Fast home charging, enough overnight to provide full capacity. In 8 hours, expect 200 to 300 miles.

DC Fast Charging: 400 - 800 volts DC

Public charging, from 20% to 80% capacity will take from 30 to 60 minutes. Times vary based on vehicle design, battery type, charge level, temperature and station activity.

If your EV offers preconditioning, that will warm the battery prior to plugging to enable faster charging.



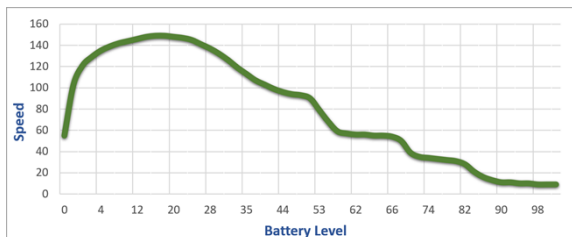
NACS

New standard for 2026 vehicles.



CCS

Charge Curve



This generalized graph demonstrates the relation between battery level and charging speed. The lower the level, the faster the speed will be.

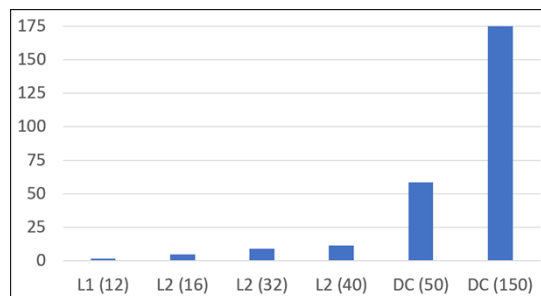
When traveling, you can take advantage of this by favoring the battery being nearly depleted to reduce charging time, then stop as speed drops.

Estimating

Understanding how much electricity will be drawn and how many miles that charging session will deliver can be difficult. Basically, more amps and higher volts equates to faster charging.

Here's an estimated outcome from 20 minutes of charging, based on 3.5 miles/kWh efficiency:

Type	kW (speed)	kWh (quantity)	Miles (distance)
Level-1 (12 amps @ 120 volts)	1.44	0.48	2
Level-2 (16 amps @ 240 volts)	3.8	1.3	5
Level-2 (32 amps @ 240 volts)	7.7	2.6	9
Level-2 (40 amps @ 240 volts)	9.6	3.2	11
DCFC (125 amps @ 400 volts)	50	16.7	59
DCFC (250 amps @ 400 volts)	150	50	175



Fast Charging

Home

Household electricity is limited to volts & amps much lower than what DCFC (DC Fast Charger) has to offer. Charging from a standard AC (120 volts) output will deliver about 5 miles per hour. Charging output varies from high-power AC (240 volts) connections, but in general deliver about 25 miles per hour.



Travel

Fast charging DC (480 volts) stations are available for EV owners who need much more speed than available at home. The charging rate itself varies based on a wide variety of factors, such as temperature and station output. Ideally, an EV's battery can be charged from 10% to 80% capacity in about 30 minutes.

Cost

Price is based upon kWh (Kilowatt Hour) quantity the EV receives while charging. There may also be a connection fee. For roughly 150 miles of range, you would need approximately 45 kWh of electricity. At an average of \$0.55 per kWh (much more expensive than home charging), that would be \$24.75.

Precondition

Some EVs provide a feature to "precondition" the battery in preparation for faster DC charging, prior to plugging in. Temperature target is 95°F to 122°F (that's 35°C to 50°C). Taking advantage of it saves time, but reduces available range by consuming the battery's electricity.



Charge Curve

Charging will be faster the lower SOC (State Of Charge) is for the battery. As SOC increases while charging, the speed will slow at an increasing scale. Illustrated on a graph, that is represented as a curve. This is why DC charging works best when the EV has very little range remaining.

Plug Type

2026 model EVs bring about a standard, eliminating bulky combinations of the past. This plug type is known as NACS (North American Charging System). Automakers are providing adapters for both old and new EVs. So, there should be no concern about compatibility during the transition.



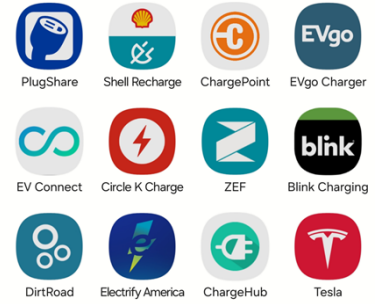
Finding Chargers

Phone Apps

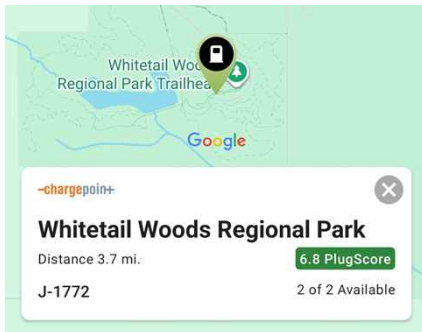
A wide variety of apps are available for helping you find chargers, in addition to your vehicle's navigation system and Google.

Each provides a means of searching & filtering. In addition to pricing information, some include current availability status at each location.

If the station itself does not provide a credit-card reader, the app can also be used for starting a session & payment.



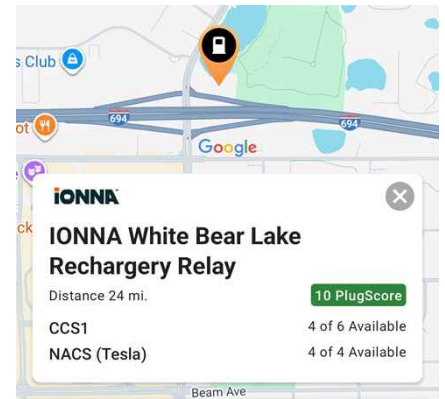
Charger Types



Since charging time is directly related to charger type, search tools are vital.

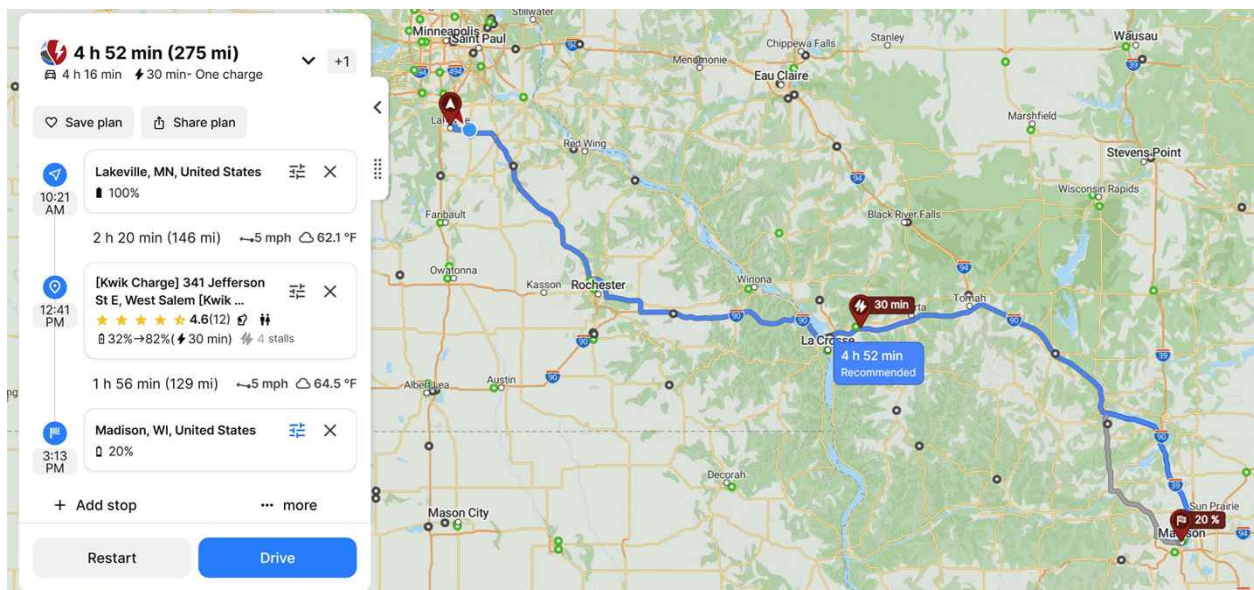
Whether you're looking for fast DC chargers (CCS1 & NACS) or just slow AC chargers (J-1772), both are easy to search for.

These examples provided by "PlugShare" show availability information and review scores.



Route Planning

Many phone apps and websites provide the ability to plan a drive route. You can specify battery-level from trip start to destination with flexibility to change suggested charging locations. For example, using ABRP (A Better Routeplanner), it determines charging times & duration for your trip.



Winter Driving

Range

Winter demands of cabin & battery warming, plus longer drive times due to slower traffic, will reduce the number of miles available. That range reduction will be up to 35% when outside temperature is well below freezing. Warming the vehicle prior to unplugging is helpful.

Efficiency

Impact of cold temperatures can easily be observed by watching electricity consumption. That value is depicted by mi/kWh (Miles per Kilowatt Hour). Lower indicates greater winter impact. It will return to being higher when spring arrives.



Cabin Warming

Take advantage of heated seats to offset electricity consumption for warming the cabin (passenger) area. That will help retain range, since some EVs use a less efficient resistance-heater rather than a heat-pump.

Battery Temperature

Electrical resistance increases significantly when temperature of the battery itself is below freezing, resulting in reduced range. Setting the battery-heater to warm while plugged in will minimize winter impact.

Fast Charging

Some EVs provide a feature to "precondition" the battery in preparation for faster DC charging, prior to plugging in. Taking advantage of it saves time. Temperature target is 95°F to 122°F (that's 35°C to 50°C).

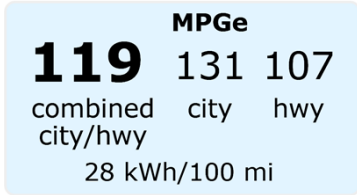
Snow & Ice

Due to the heavier weight and lower center-of-gravity from the battery, EVs typically maintain traction and handle very well in winter driving conditions.



Understanding Efficiency

Energy



EVs are far more efficient than traditional vehicles. They convert over 77% of the energy from electricity to power the wheels. In contrast, only 12% to 30% of the energy from gasoline gets converted to power the wheels.

MPGe is a value provided by the EPA to make efficiency comparisons easier. It represents the MPG equivalent for an EV.

Measurement

Electricity efficiency is measured in a variety of ways.

mi/kWh (miles per kilowatt-hour) is the most common, since it resembles the familiar MPG (miles per gallon) where higher represents better efficiency.

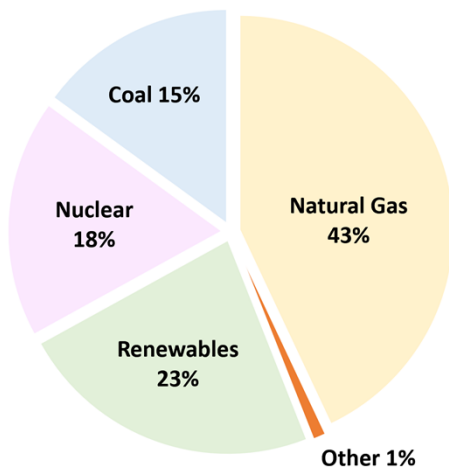
kWh/100mi (kilowatt-hour per 100 miles) is the more informative efficiency measure, since it enables simple recognition of electricity quantity consumed.

Wh/mi (watt-hour per mile) is the preferred format for conveying the same information as kWh/100mi.

mi/kWh	kWh/100mi	Wh/mi	mi/kWh	kWh/100mi	Wh/mi
5.0	20.0	200	3.5	28.6	286
4.9	20.4	204	3.4	29.4	294
4.8	20.8	208	3.3	30.3	303
4.7	21.3	213	3.2	31.3	313
4.6	21.7	217	3.1	32.3	323
4.5	22.2	222	3.0	33.3	333
4.4	22.7	227	2.9	34.5	345
4.3	23.3	233	2.8	35.7	357
4.2	23.8	238	2.7	37.0	370
4.1	24.4	244	2.6	38.5	385
4.0	25.0	250	2.5	40.0	400
3.9	25.6	256	2.4	41.7	417
3.8	26.3	263	2.3	43.5	435
3.7	27.0	270	2.2	45.5	455
3.6	27.8	278	2.1	47.6	476

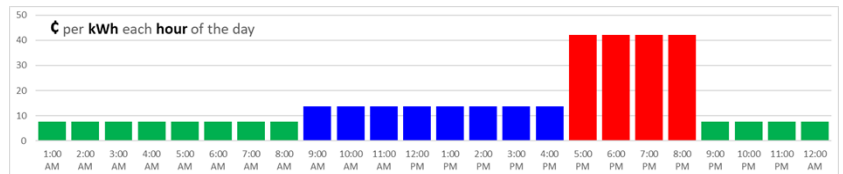
Sources

Electricity Sources - United States 2024



A commonly overlooked aspect of EV efficiency is how the ratio of sources come into play. Electricity generators using fossil fuels are most efficient operating at a constant rate. A result of this is excess capacity during overnight hours. Providers offer discounted rates to EV owners to take advantage of electricity that would otherwise be wasted.

This electricity pricing example illustrates the time of day when demand is high and when discounts are available.



Driving

Efficiency is also dependent upon EV driving. Choices you make regarding speed and heater settings will have a major impact. Watch gauges as you drive to learn how your actions make a difference. Awareness is key. And don't forget, things like tire-pressure and battery-temperature can be an influence too.



OBD-II Data

Port & Reader

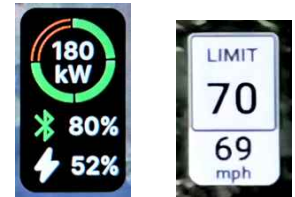


The first image is the OBD-II port, a handy connection that enables the ability to access vehicle data ordinarily hidden from drivers. It's located under the dashboard.

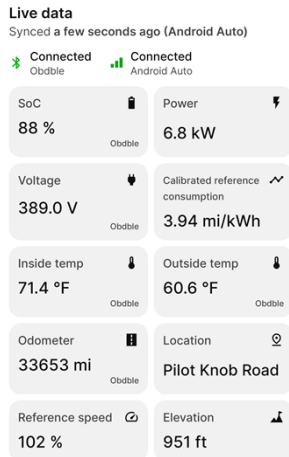
The second image is example of an OBD-II reader, a device that wirelessly transmits vehicle data from the OBD-II port. This is an aftermarket purchase.

App Integration

The most basic benefit is allowing your Apple CarPlay or Android Auto app to have access to vehicle data. That integration provides data such as current battery state-of-charge and driving speed.



Hidden Detail



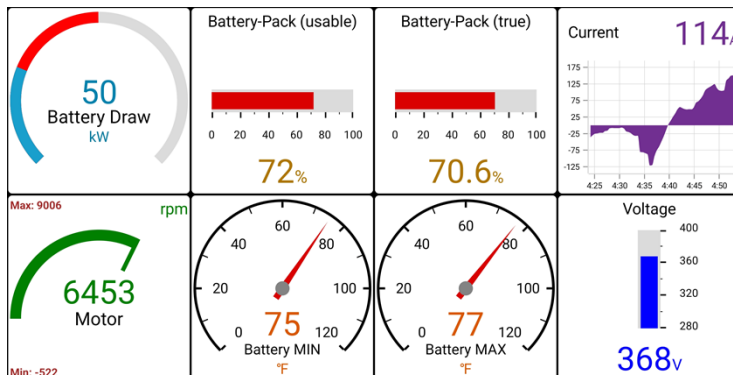
Some apps, like ABRP (A Better Routeplanner), provide an interface to display live data. Seeing detail not provided on the vehicle's dashboard can be quite informative.

Other apps, like "Car Scanner Pro", allow access to all sensors visible with OBD-II. From that, you can create customized displays to see diagnostic detail.

For an EV, checking Ah (amp-hour) is how you determine battery health. That value drops as the battery ages.

All sensors	
[EV] EV Battery Current	133.8 A
[EV] 12V Battery current	0.16 A
[EV] 12V Battery voltage	12.66 V
[EV] Battery Pack #1 full charge capacity	196.14 Ah
[EV] Battery Pack #2 full charge capacity	196.12 Ah
[EV] Battery Pack #3 full charge capacity	196.14 Ah
[EV] Battery Pack #4 full charge capacity	196.13 Ah
[EV] Battery SoC	83.53 %
[EV] Motor RPM	4736 rpm
[EV] Total odometer	33657.92 miles
[EV] Accelerator position	40.5 %
[EV] A/C power consumption	0.25 kW
[EV] Battery pack #1 average voltage	3.97 V

Custom Gauges



When you have access to all sensors, that app will typically offer the option to create a collection of custom gauges to display.

For an example of this, scan the following to view an EV driving video.

