Proposal for Bus shelter with electric vehicle charging station

Submitted by

Shree Solar Ventures Pvt Ltd

Shree solar ventures pvt ltd is professional electric bus shelter manufacturing shree solar in since 2011 work as company in Indian market.

ABOUT SSVPL

Shree solar delivers immediate savings to businesses through the low cost of solar energy. We help commercial and mid-scale clients become more competitive by providing distributed renewable energy solutions at no upfront cost, generating long term economic and environmental returns. With over100 MW of global experience,we work daily to power a more sustainable world.

BUSINESS LINES

Shreesolar has established a successful track record of providing solutions to its clients in all stages of the solar PV project lifecycle. Offering two business lines,shreesolar provides businesses with turn-key solar solutions from conceptualization to construction as well as providing project owners with engineering, procurement, andconstruction (EPC) services. Our 10 years of experience as solar and ev

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What is the difference between shelters?

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Budget

The ranges available mean that you do not need to compromise to stretch your budget Brookes glue a lot of value, but the additional premium for the City Light Sharp and Utopia is supported by their fantastic and mining excellence City Light Sharp and top shelters are a module structure-processing engineered to higher standards and consistency. They are pre-assembled and tested in

We have four bus shutter designs/styles

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Cleaning is quicker and cheaper and it is safer as cleaning can be done without ladders.

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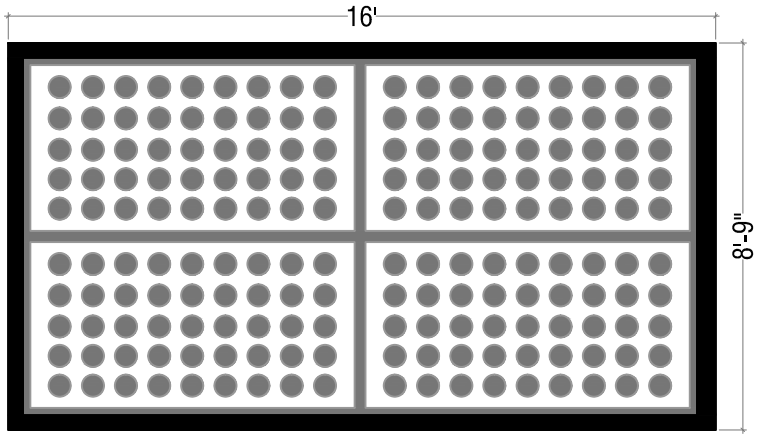

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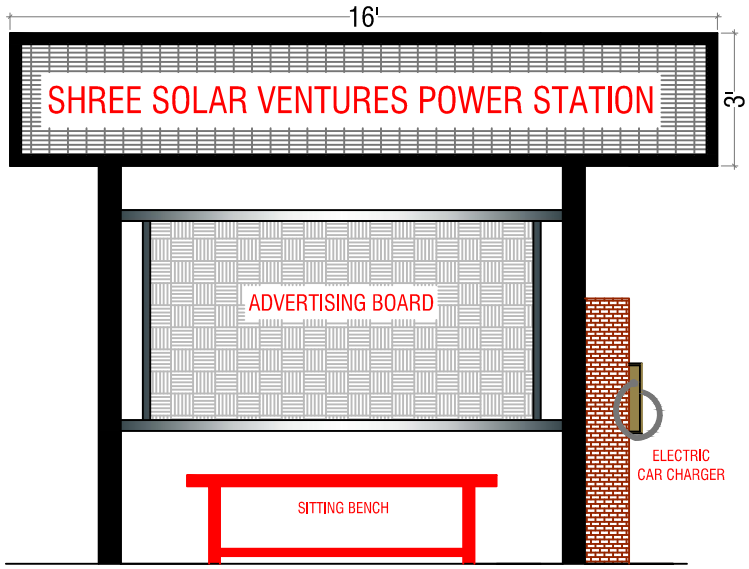
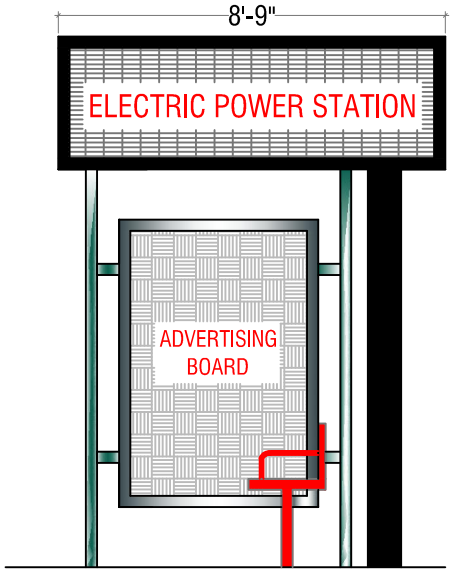


SECTION FRONT VIEW



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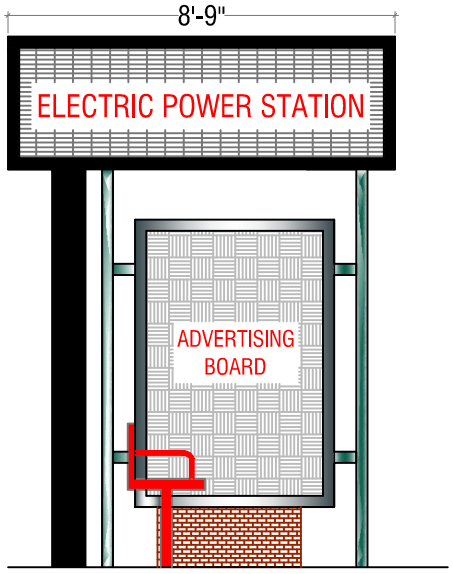

SECTION VIEW RIGHT SIDE

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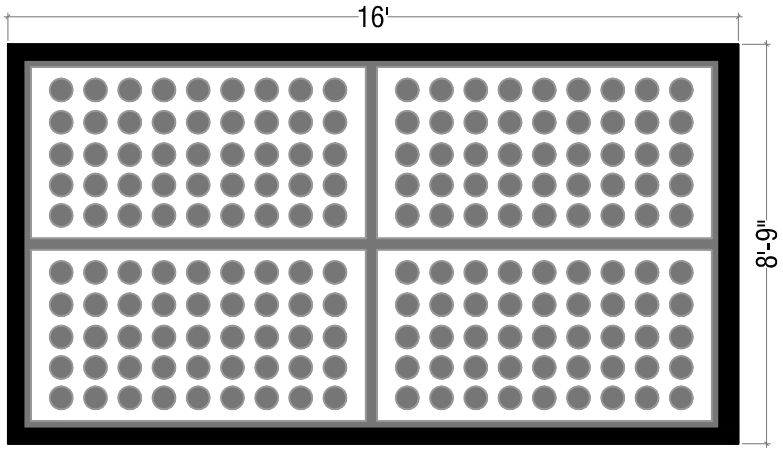

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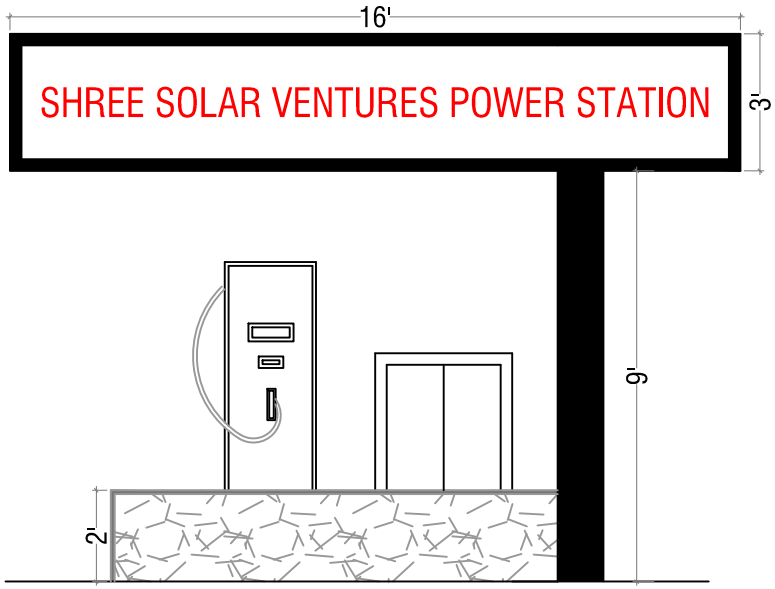

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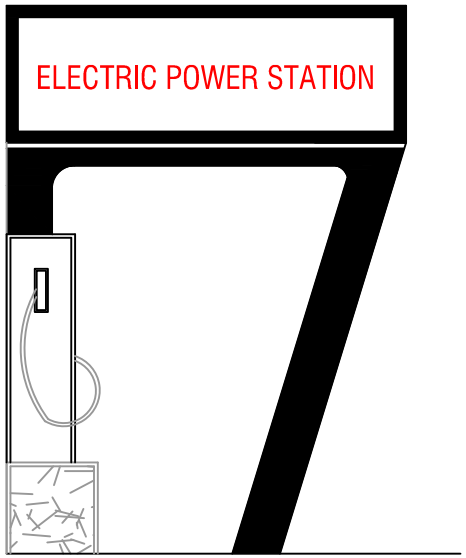

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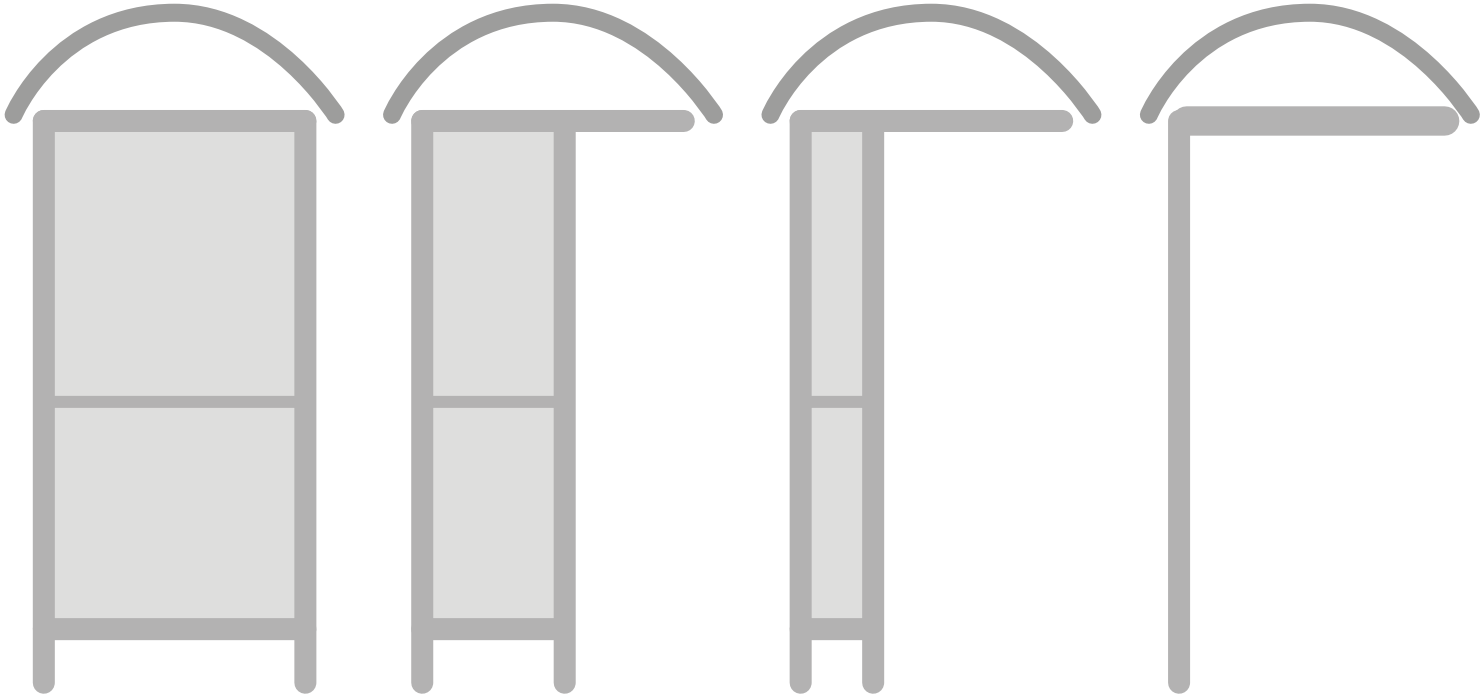
FAQ
What are the different end panels I can have?

You have 4 options when it comes to the side panels of your bus shelter. You can have them "See-through" (with poly-carbonate or glass), "Perforated" (aluminium with small holes punched through) or "Solid" (zero visibility - made from solid panel of aluminium).

The side panels can be supplied as a 'full drop' panel or as two smaller panels with a mid-rail as per graphics below.



A
Full-End

B
Half-End

C
Quarter-End

D
Cantilever

End/Side Panel Examples

Half-end panel on nearest end. Full-end panel on farthest end. Giving customers appropriate access and protection.

When access to the bus shelter is narrow or on a very busy footway, it might be best to have no ends at all. This is also 'cantilever' shelter.

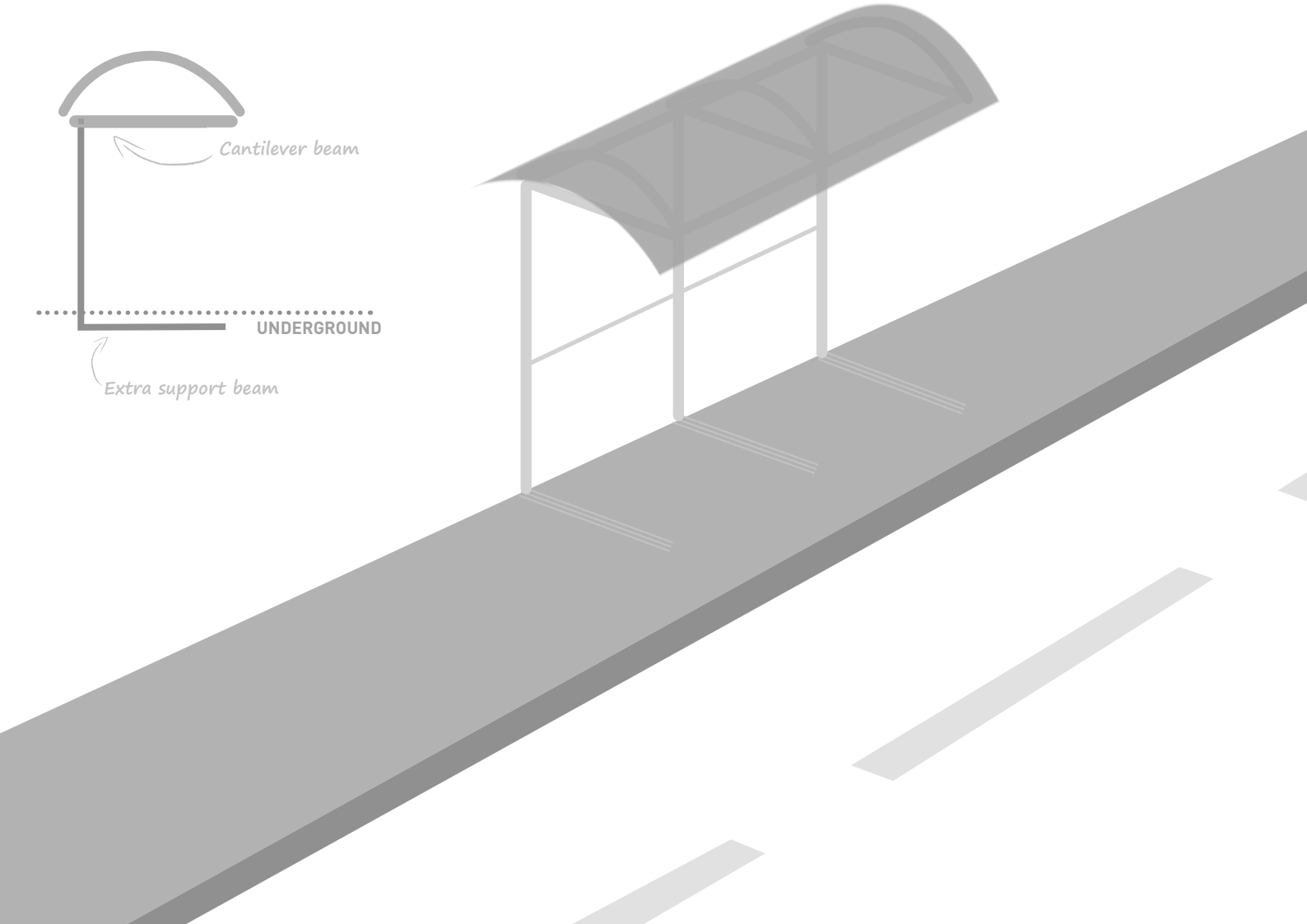
This is on quite a narrow footway, but there was enough space to fit quarter-end panels to the shelter and provide some protection for passengers.

An example of half-end panels. Why? Because, although the shelter could have had full-ends, aesthetically, it looks better due to the shelter's size.

FAQ

What is a “Cantilever Shelter”?

When a shelter has no side panels and no front panels, it becomes “top heavy” and would be unstable if it was just being held up by its standard supports positioned at the back of the shelter. Therefore, the roof needs to be supported by a self-supporting cantilever beam at the top of the shelter. And, we also need additional support under the ground to add strength and stability to the shelter.

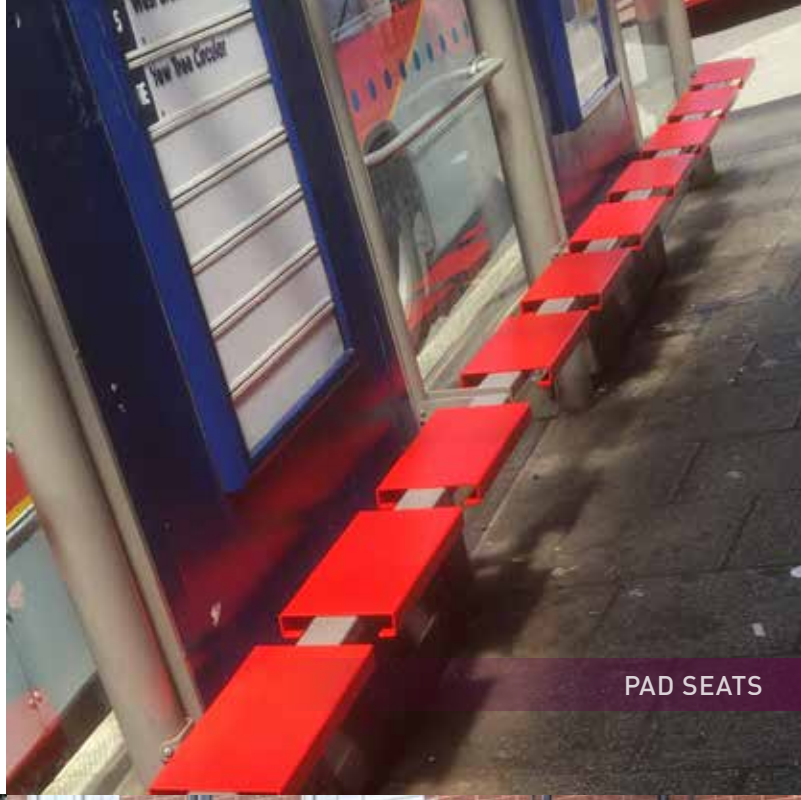


Seats

The choices are bench seats, pad or perch seats. Many passengers (for example, the elderly) do not prefer the perch seats as they are not as comfortable. However, they take up less room and can not be slept on.

Bench seats come with or without arms. Arms are good for those who are maybe a bit unsteady to use to push themselves up. Arms also mean the shelter cannot be used by "sleepers".

Benches, perches or pads can be mounted on brackets attached to the shelter or fixed into the ground - which is strong, but will be more expensive.



PAD SEATS

BENCH SEAT (NO ARMS)

BENCH SEAT (WITH ARMS)

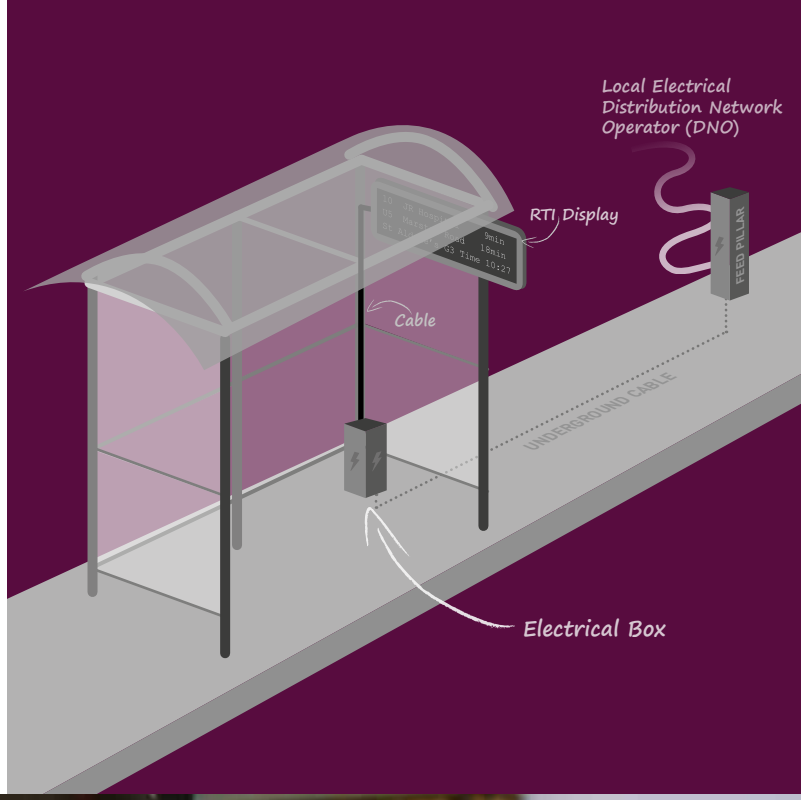
Real Time Information (RTI)

You might want a shelter that is RTI-ready. That means an electrical cable is run from the bracket that will hold the RTI display to an electrical box within the shelter.

For safety, this connects to a feeder pillar which is separate from the shelter on the footway.

The feeder pillar will be fed by your local electricity Distribution Network Operator (DNO), but it might be your responsibility to connect from the feeder pillar to the shelter.

An important thing to note is that the bottom of the RTI display has to be 2100mm above the footway.



"RTI Ready" The cabling and fixing brackets are ready for the RTI supplier to fit their sign.

Timetable & Poster Cases

All our bus shelters can have poster cases and timetable cases fitted.

We have our own range of timetable cases or we can work with Trueform and/or Bissell cases.

There are a wide range of poster case sizes available. Most timetable cases will be "Double Royal" size (as per image below). These are a standard paper size used across the country. Sometimes the A1 size will be used.

Cases can be retro-fitted but it is harder on glass than on polycarbonate or metal.

TIMETABLE CASE


"DOUBLE ROYAL" SIZE POSTER CASE

CROSSTOWN
timetables made simple

Did you know that, with our timetable generation software, we can create and print your timetables for you?

Or, you can easily do it yourself.

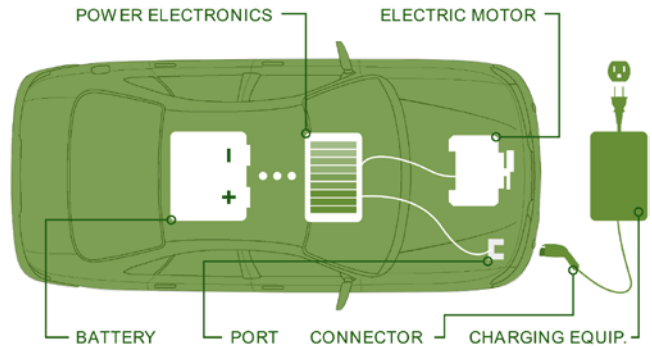
1 Electric Vehicle Technology and Charging Equipment Overview

1.1 Electric Vehicles

Electric vehicles (EVs) use electric motors powered by electrical energy stored in a battery for propulsion. These vehicles are available in a variety of models with varying ranges and capabilities and are plugged in to a source of electrical power to recharge.

The terminology associated with EV technology is evolving. Many of the fundamental EV design concepts actually predate gasoline internal combustion engines. In the early 1900's there were more EVs on our nation's roads than gasoline fueled vehicles. Today, there are several models for sale at Vermont auto dealers and their presence is expected to significantly grow over the next 20 years. Advances in battery storage technology, lightweight vehicle construction, electric grid automation and other factors will increase the attractiveness of EVs for consumers, businesses and government agencies and support long term shifts to more efficient transportation options.

Figure 1.1 Types of Plug-in EVs



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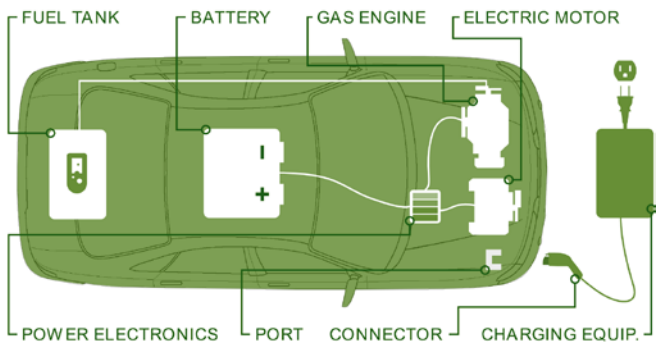


Plug-in Hybrid Electric Vehicle (PHEV)

Source: DriveElectricVT.com

There are two basic types of EVs:

1. **All Electric Vehicles (AEVs)** are powered solely by energy stored in the vehicle's battery system. There is no backup power generation in the vehicle, so when the battery runs out of charge it requires recharging before operating again. The Mitsubishi i-MiEV, Nissan Leaf, Tesla Model S and Ford Focus Electric are examples of AEVs currently registered in Vermont.

2. **Plug-in Hybrid Electric Vehicles (PHEVs)** are capable of operating solely on electric energy for a certain distance after which an auxiliary internal combustion engine is engaged to offer additional range. PHEV's are often categorized according to their range in electric mode. The battery of a PHEV-10, such as the Toyota Prius Plug-in, has approximately a ten mile electric range while a PHEV-40, like the Chevrolet Volt, has approximately a forty mile electric range. The Chevrolet Volt, Ford C-Max and Fusion Energis and Toyota Prius Plug-in are examples of PHEVs currently registered in Vermont.

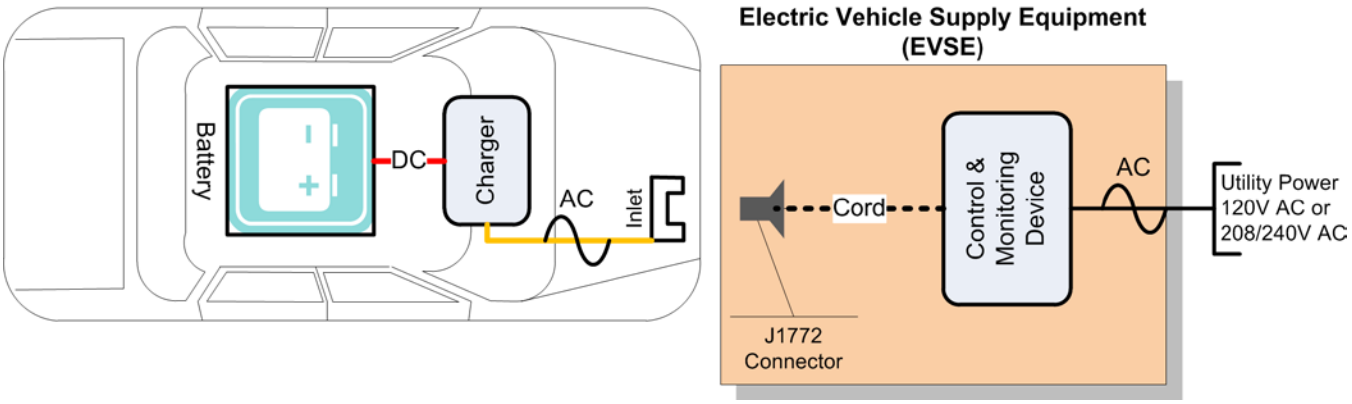
In Vermont, the average distance a vehicle travels in a day is around 33 miles[4], making EVs capable of meeting the mobility needs of the majority of Vermonters on most days. Despite their ability to

accommodate normal travel patterns, the lower range and lack of charging infrastructure compared to gasoline vehicle fueling can affect the range confidence of prospective EV owners, particularly for all electric vehicles.

Recharging EVs is accomplished through connections to electric vehicle charging equipment, also referred to as Electric Vehicle Supply Equipment (EVSE). This is a protective system which communicates with the vehicle and monitors electrical activity to ensure safe charging. While the actual "charger" is contained in the vehicle, the appliance commonly referred to as a charging station or EVSE is the conduit, control, and monitoring device which connect the vehicle to the electric grid. Figure 1.2 is a diagram of the overall charging energy flow from the power grid, through the EVSE (shaded in orange) and into the vehicle through the industry standard J1772 port connector. With alternating current (AC) EVSE, charger electronics within the vehicle invert the AC power supplied by the EVSE into direct current (DC) for storage in the battery. Fast charging DC EVSE delivers high voltage (typically over 400 V) direct current straight to an electric vehicle's battery system.

With the EVSE safety features built-in to all new vehicles and charging equipment, EVs can be operated and recharged in all types of indoor/outdoor conditions, such as rain, snow, low temperatures and other harsh environments drivers may encounter in Vermont.

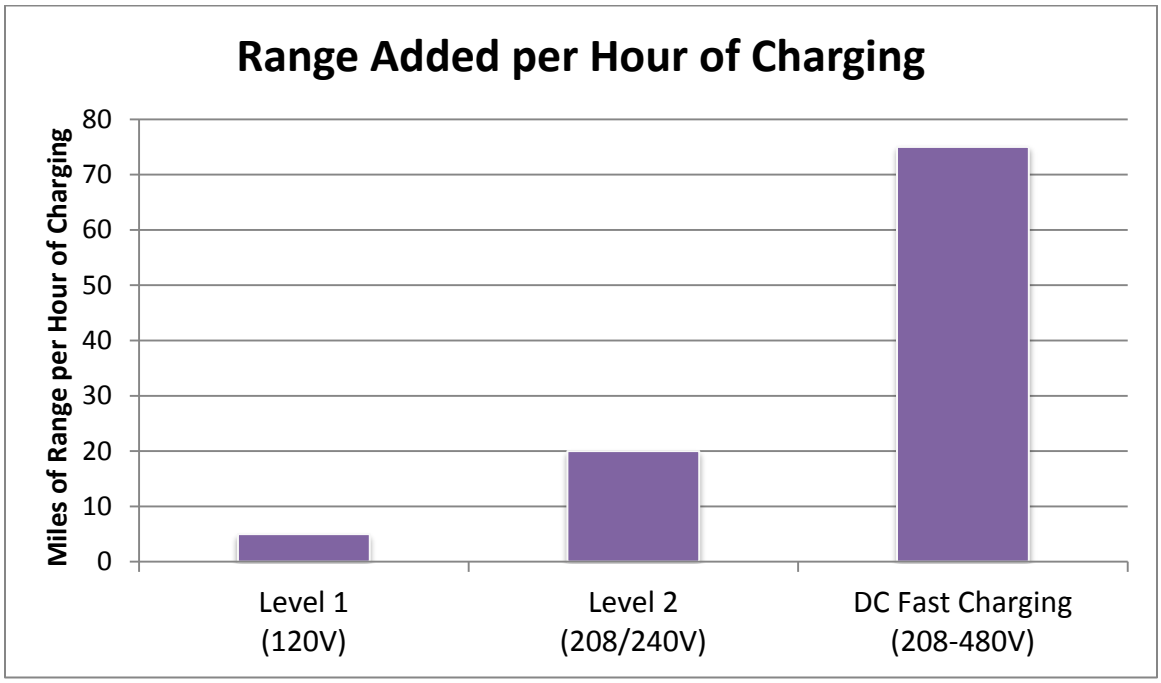
Figure 1.2: Electric Vehicle AC Charging Equipment Diagram



1.2 Electric Vehicle Charging

There are three levels commonly used to describe the charging power of EVSE: Level 1, Level 2 and DC Fast Charging. The amount of range provided for each of these is shown in Figure 1.3 below with additional details in the following sections.

Figure 1.3: Charging Range Added per Hour of Charging



1.2.1 Level 1, 120 Volt Charging

This simplest form of charging uses a 120V AC connection to a standard residential/commercial electrical outlet capable of supplying 15-20 amps of current, for a power draw usually around 1.4 kW when charging.

EVs come equipped from the manufacturers with portable Level 1 chargers, such as the one shown in Figure 1.4. AEVs with 60-80 miles of range will require 10-14 hours for a full charge using Level 1 EVSE. At Vermont's average residential electric rate of $0.16/kWh[5], one hour of Level 1 charging costs about $0.25.

Advantages

- Low installation cost
- Low impact on electric utility peak demand charges which are often applied to commercial accounts

Disadvantages

- Charging is slow - around 3 or 5 miles of range added per hour of charging

1.2.2 Level 2, 208/240 Volt Charging

Level 2 charging requires a 208/240V AC power connection and significantly reduces charging time. Home users commonly use 240 V power for electric clothes dryer appliances and many commercial customers have 3 phase electric service with 208 V power. Either voltage works well for "Level 2" charging. The J1772 standard connector used by most EVs can theoretically provide up to 80 amps of current (19.2 kW), although most vehicles presently available only use up to 30 amps for 3.3 to 6.6 kW[6] charging.

AEVs with 60-80 miles of range will usually require 3-7 hours for a full charge using Level 2 equipment, depending on the capacity of the EVSE and the vehicle charging system. EVs with smaller batteries, such as a PHEV with 10 miles of range (e.g. Toyota Prius Plug-in) may require less than an hour to reach a full charge. Figure 1.4 includes one model of a Level 2 charger and a J1772 connector. At Vermont's average residential electric rate of $0.16/kWh, one hour of Level 2 charging costs $0.50-$1.00.

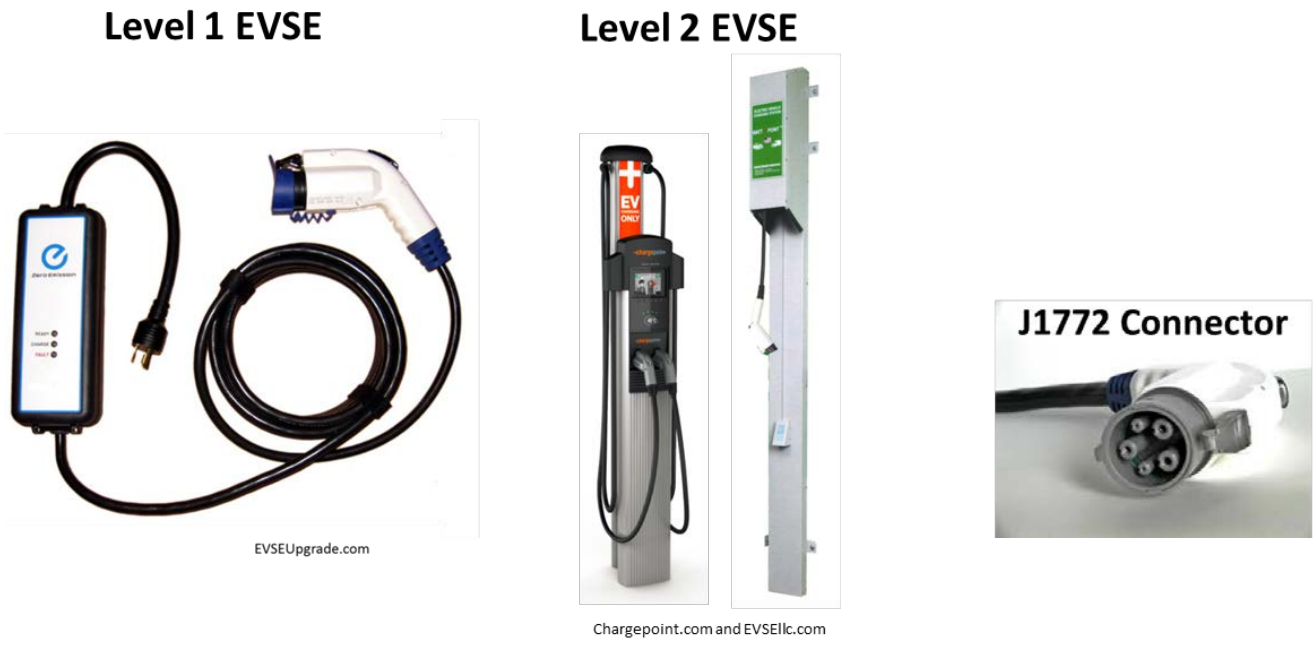
Advantages

- Charge time is significantly faster than Level 1. EVs will get between 10 and 20 miles of range per hour of charge
- More energy efficient than Level 1 for short duration charge events less than one hour
- Variety of manufacturers provides differentiated products for distinct markets and requirements

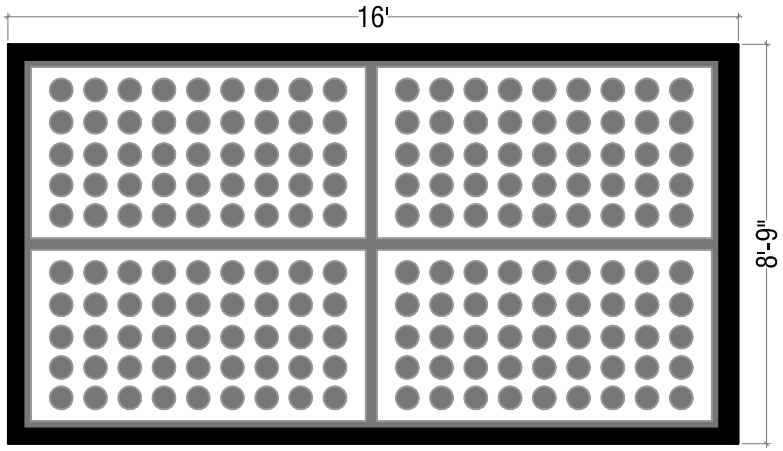
Disadvantages

- Installation costs are higher than Level 1 and are highly variable depending on equipment and installation issues
- Potentially higher impact on electric utility peak demand charges

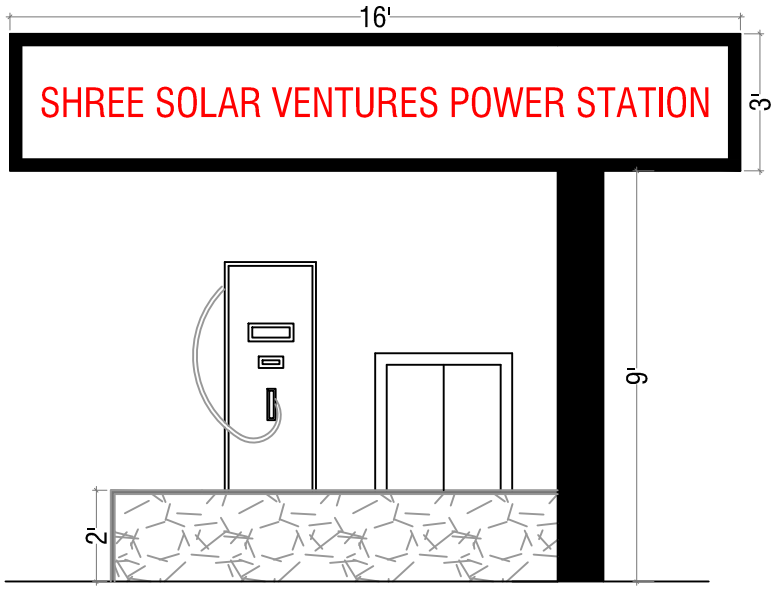
Figure 1.4: Level 1 and Level 2 EVSE Equipment and J1772 Connector



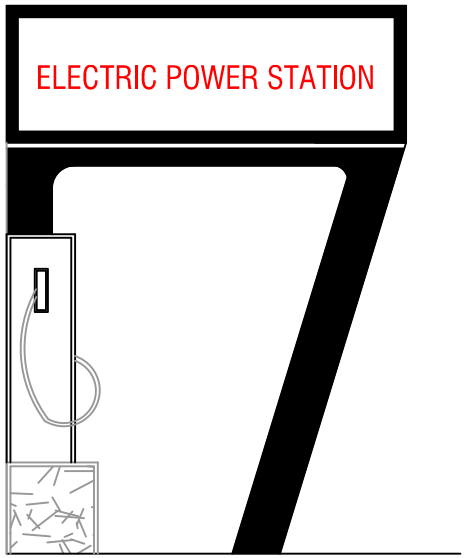
[6] Tesla vehicles can be configured with charging capacity up to 20 kW



ROOF TOP SOLAR PANEL



SECTION FRONT VIEW



SECTION SIDE VIEW

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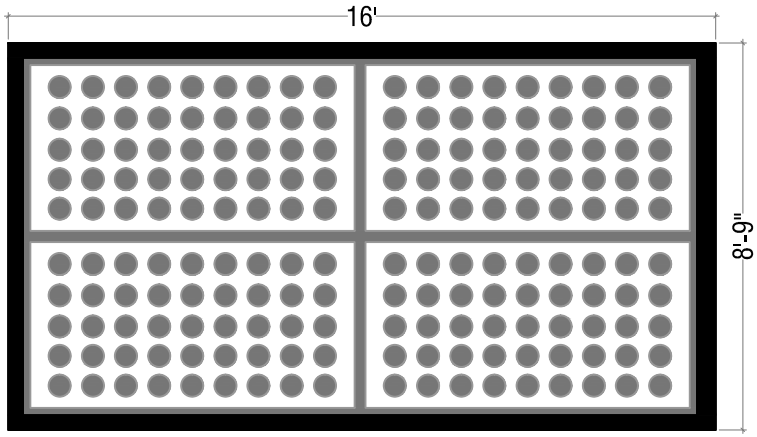

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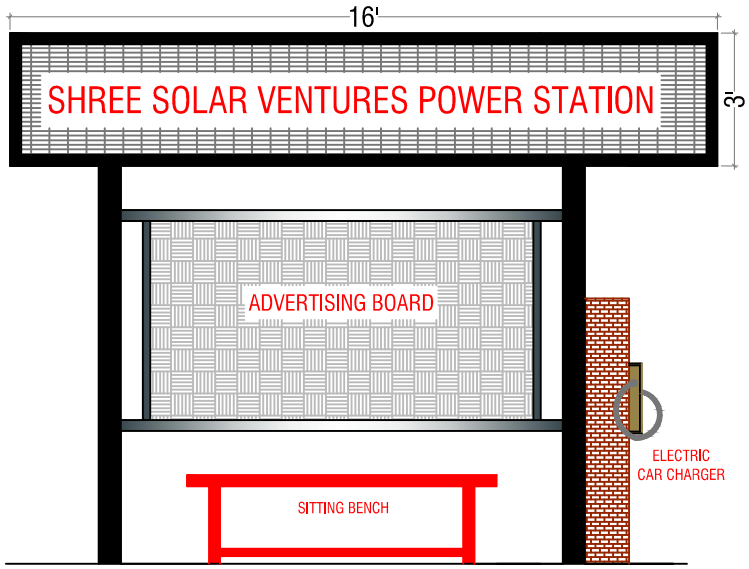

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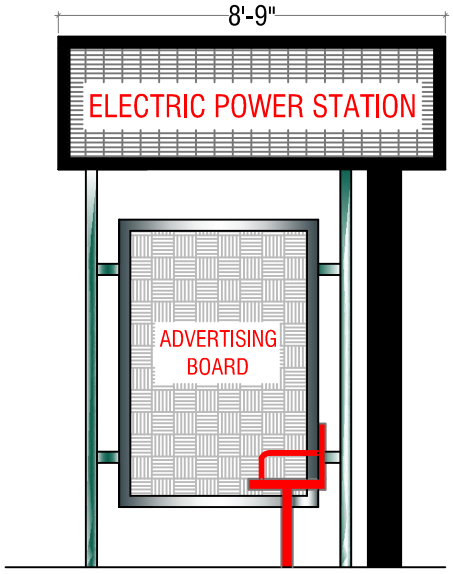

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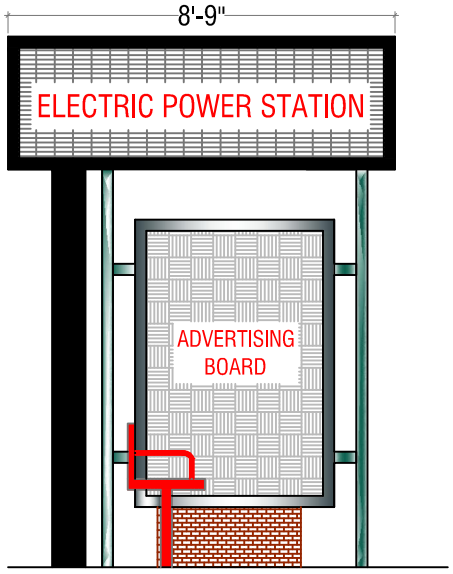

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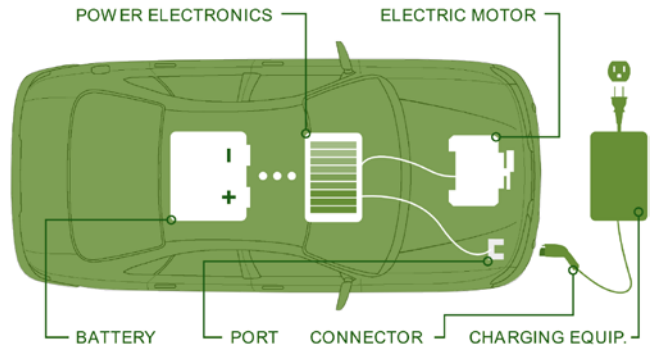
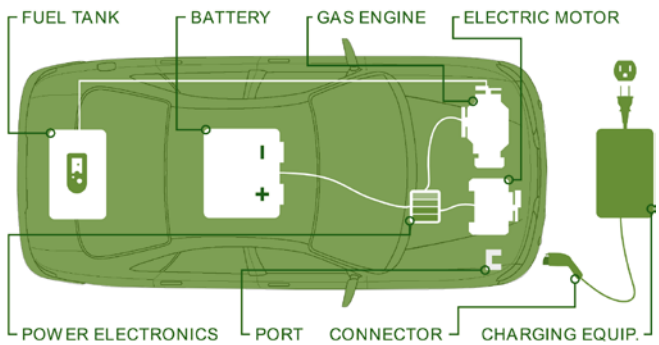


All Electric Vehicle (AEV)



Plug-in Hybrid Electric Vehicle (PHEV)

Source: DriveElectricVT.com

There are two basic types of EVs:

1. **All Electric Vehicles (AEVs)** are powered solely by energy stored in the vehicle's battery system. There is no backup power generation in the vehicle, so when the battery runs out of charge it requires recharging before operating again. The Mitsubishi i-MiEV, Nissan Leaf, Tesla Model S and Ford Focus Electric are examples of AEVs currently registered in Vermont.

2. **Plug-in Hybrid Electric Vehicles (PHEVs)** are capable of operating solely on electric energy for a certain distance after which an auxiliary internal combustion engine is engaged to offer additional range. PHEV's are often categorized according to their range in electric mode. The battery of a PHEV-10, such as the Toyota Prius Plug-in, has approximately a ten mile electric range while a PHEV-40, like the Chevrolet Volt, has approximately a forty mile electric range. The Chevrolet Volt, Ford C-Max and Fusion Energis and Toyota Prius Plug-in are examples of PHEVs currently registered in Vermont.

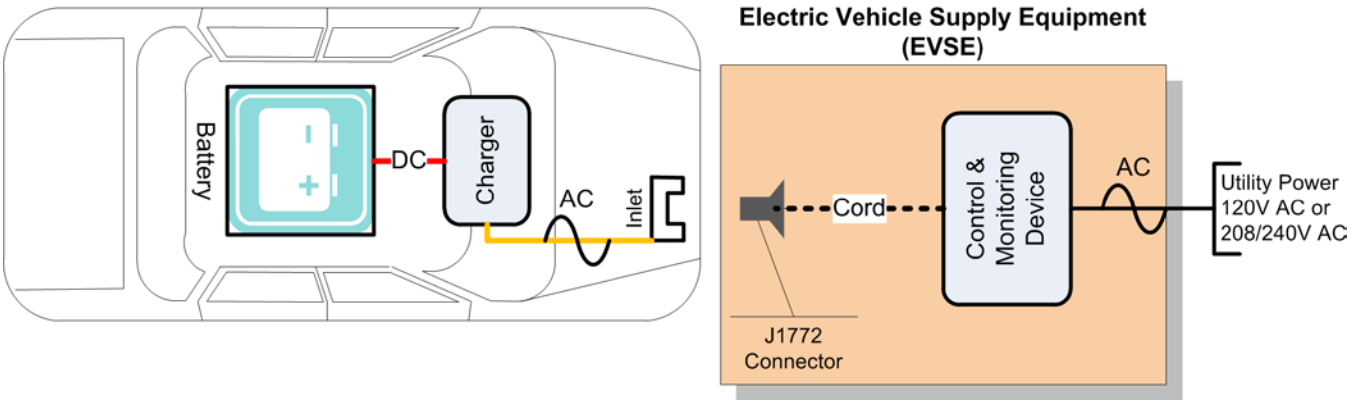
In Vermont, the average distance a vehicle travels in a day is around 33 miles[4], making EVs capable of meeting the mobility needs of the majority of Vermonters on most days. Despite their ability to

accommodate normal travel patterns, the lower range and lack of charging infrastructure compared to gasoline vehicle fueling can affect the range confidence of prospective EV owners, particularly for all electric vehicles.

Recharging EVs is accomplished through connections to electric vehicle charging equipment, also referred to as Electric Vehicle Supply Equipment (EVSE). This is a protective system which communicates with the vehicle and monitors electrical activity to ensure safe charging. While the actual "charger" is contained in the vehicle, the appliance commonly referred to as a charging station or EVSE is the conduit, control, and monitoring device which connect the vehicle to the electric grid. Figure 1.2 is a diagram of the overall charging energy flow from the power grid, through the EVSE (shaded in orange) and into the vehicle through the industry standard J1772 port connector. With alternating current (AC) EVSE, charger electronics within the vehicle invert the AC power supplied by the EVSE into direct current (DC) for storage in the battery. Fast charging DC EVSE delivers high voltage (typically over 400 V) direct current straight to an electric vehicle's battery system.

With the EVSE safety features built-in to all new vehicles and charging equipment, EVs can be operated and recharged in all types of indoor/outdoor conditions, such as rain, snow, low temperatures and other harsh environments drivers may encounter in Vermont.

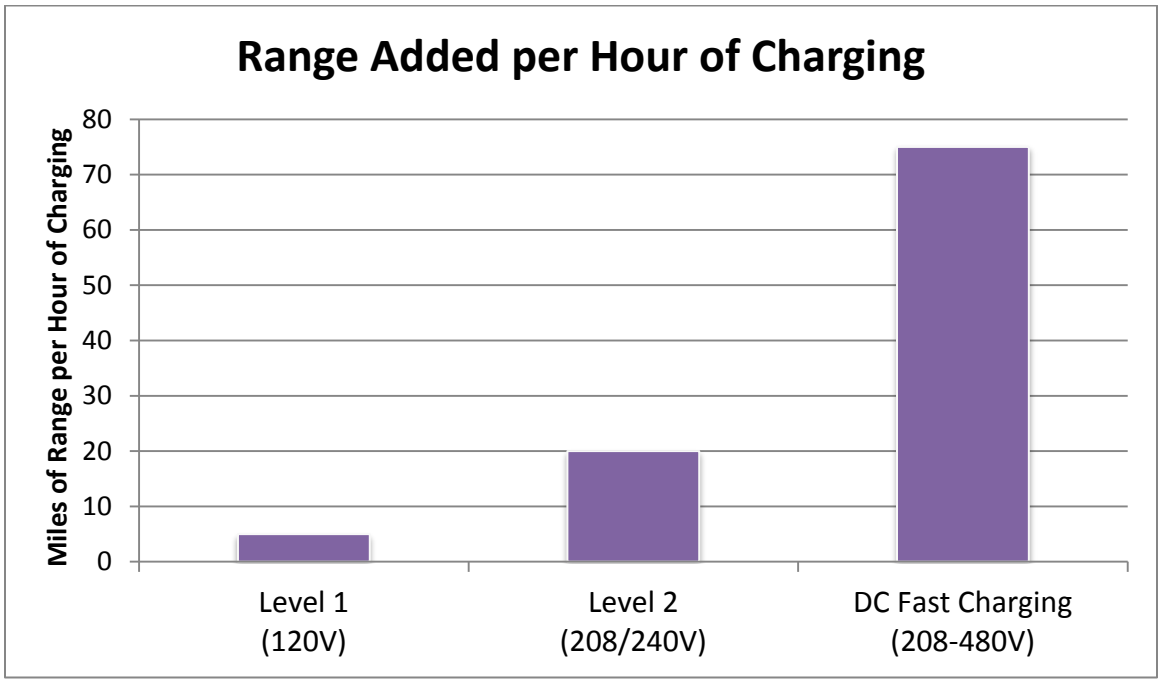
Figure 1.2: Electric Vehicle AC Charging Equipment Diagram



1.2 Electric Vehicle Charging

There are three levels commonly used to describe the charging power of EVSE: Level 1, Level 2 and DC Fast Charging. The amount of range provided for each of these is shown in Figure 1.3 below with additional details in the following sections.

Figure 1.3: Charging Range Added per Hour of Charging



1.2.1 Level 1, 120 Volt Charging

This simplest form of charging uses a 120V AC connection to a standard residential/commercial electrical outlet capable of supplying 15-20 amps of current, for a power draw usually around 1.4 kW when charging.

EVs come equipped from the manufacturers with portable Level 1 chargers, such as the one shown in Figure 1.4. AEVs with 60-80 miles of range will require 10-14 hours for a full charge using Level 1 EVSE. At Vermont's average residential electric rate of $0.16/kWh[5], one hour of Level 1 charging costs about $0.25.

Advantages

- Low installation cost
- Low impact on electric utility peak demand charges which are often applied to commercial accounts

Disadvantages

- Charging is slow - around 3 or 5 miles of range added per hour of charging

1.2.2 Level 2, 208/240 Volt Charging

Level 2 charging requires a 208/240V AC power connection and significantly reduces charging time. Home users commonly use 240 V power for electric clothes dryer appliances and many commercial customers have 3 phase electric service with 208 V power. Either voltage works well for "Level 2" charging. The J1772 standard connector used by most EVs can theoretically provide up to 80 amps of current (19.2 kW), although most vehicles presently available only use up to 30 amps for 3.3 to 6.6 kW[6] charging.

AEVs with 60-80 miles of range will usually require 3-7 hours for a full charge using Level 2 equipment, depending on the capacity of the EVSE and the vehicle charging system. EVs with smaller batteries, such as a PHEV with 10 miles of range (e.g. Toyota Prius Plug-in) may require less than an hour to reach a full charge. Figure 1.4 includes one model of a Level 2 charger and a J1772 connector. At Vermont's average residential electric rate of $0.16/kWh, one hour of Level 2 charging costs $0.50-$1.00.

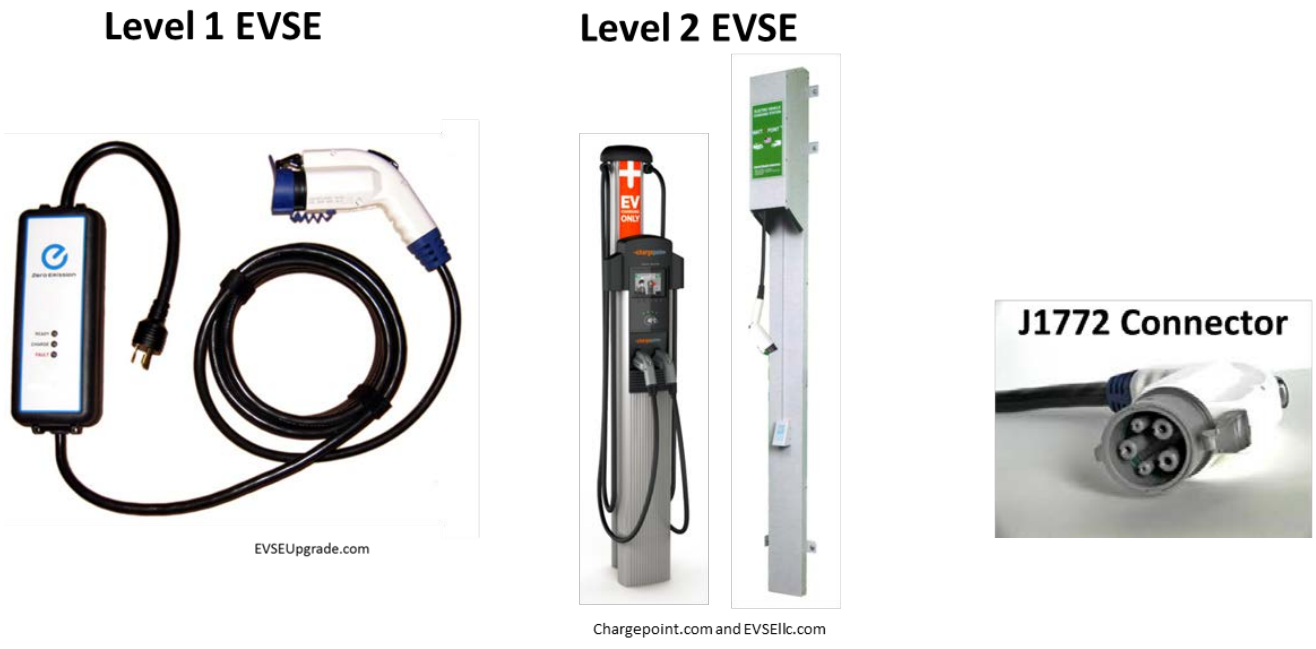
Advantages

- Charge time is significantly faster than Level 1. EVs will get between 10 and 20 miles of range per hour of charge
- More energy efficient than Level 1 for short duration charge events less than one hour
- Variety of manufacturers provides differentiated products for distinct markets and requirements

Disadvantages

- Installation costs are higher than Level 1 and are highly variable depending on equipment and installation issues
- Potentially higher impact on electric utility peak demand charges

Figure 1.4: Level 1 and Level 2 EVSE Equipment and J1772 Connector



[6] Tesla vehicles can be configured with charging capacity up to 20 kW