



SIEMENS

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Charging toward a smarter future

Answers for electric vehicle infrastructure

More than 100 years after its initial introduction, the electric vehicle (EV) is gearing up for mass market adoption. Urbanization, rising fuel prices and the desire to reduce carbon emissions has placed an even greater focus on making electric transportation a viable long-term solution. Nearly every major automotive original equipment manufacturer (OEM) has plans to launch an EV in the coming years, and various government and private entities have instituted programs to encourage the transition. If experts' forecasts are correct, EV sales could account for nearly 10 percent of new vehicle sales in the US by 2020. With all of the new EVs being introduced to the market, there are numerous questions that still need to be answered.



How does EV charging compare to filling up a gas-powered vehicle?

The future of fueling vehicles will be very different from what we experience today. With today's gas-powered vehicles, fueling occurs in one fashion – drivers stop at a service station to obtain fuel and then continue to their final destination. This can be referred to as a **trip continuation** fueling event.

EV drivers will still utilize trip continuation fueling through DC fast-charging stations; however, EVs will also change the paradigm that fueling can only be performed at a fueling station. Most EV fueling will be performed through **destination** charging events. Destination charging occurs at journey's end, such as at the home or workplace, and utilizes lower voltage AC charging to deliver energy into the vehicle.

Destination charging:	Level 1 (110/120 V) Level 2 charging (208/240 V)
Trip continuation charging:	DC fast charging (480 V)

What costs savings can one expect by making the switch to an EV?

Energy prices vary by state and time of use, but generally, pure electric driving can result in fuel savings of nearly 80 percent or more. Energy tracking software can deliver the information needed to understand true cost savings.

Siemens EV charging solutions have an integrated energy meter that delivers station utilization, energy consumption, greenhouse gas and fuel savings information to the charging station owner. If vehicle return on investment is an important metric, integrated software will provide the desired transparency.



Is it safe to use a charging station?

Yes. Safety is Siemens' top priority. In addition to integrated fault detection and surge protection, Siemens EV charging solutions conform to high levels of safety and compliance with standards for charging systems including:

- UL 2594
- UL 2231-1
- UL 2231-2
- UL 1998
- NFPA 70, NEC Article 625

Where will people charge their EVs?

Fortunately, North America has a vast electric grid infrastructure, which can be supplemented with various charging points. However, incorporating a broad network of charging stations presents a variety of challenges. The challenges can be as simple as identifying a user-friendly interface for drivers to more complex issues such as integration of the electric vehicle supply equipment (EVSE) into existing building automation systems with demand response capabilities.

Siemens understands these challenges and is providing turnkey EV charging solutions to address specific customer needs. Widespread EV infrastructure will take time and Siemens is building solutions for distinct applications to meet the needs of today, while preparing for the transportation of the future.

Will EV drivers be charged a fee to charge their vehicles?

This is dependent on the owner of the EV charging station. Today many companies deploying stations do not charge a fee. In some cases this is being performed to encourage EV adoption, while others are simply using the charging station as a marketing tool.

Other station owners have begun to establish business models for their EVSE. This includes subscription models, similar to mobile phone contracts, and hourly or session based fees per charge event. To perform these types of transactions, the EV charging station must be equipped with the appropriate hardware and software.



Siemens EV charging solutions provide a simple method to pay for a charge. Drivers simply use their radio frequency identification (RFID) card to gain access to the station. After quick authentication, the driver is ready to plug in and charge. RFID technology makes it quick, easy and maintenance free, resulting in increased uptime and utilization.



What implications does EV adoption have on today's electric grid?

The electric grid has several components that will be impacted with the deployment of EVs. EVs will initially be introduced in target markets – most of which are urban areas. Power generation is not an immediate concern because today's grid can accommodate a significant number of EVs. The impact will be felt further downstream, particularly in cases where multiple EVs charge at similar times within close proximity of one another. EV charge clustering can put a strain on residential and commercial transformers. To mitigate risk, multiple solutions are being investigated, including time-of-use incentives, networked charging infrastructure, and load shedding and demand response applications.

Siemens delivers complete solutions. By leveraging experience and expertise in Smart Grid applications, advanced building technologies and intelligent traffic solutions, Siemens is positioned to provide integrated charging infrastructure solutions. Integrated solutions will help maintain grid reliability and stability while enhancing the EV experience for all stakeholders – from energy suppliers and building operators to EV drivers.

What is required to establish an extensive network of charging stations to support EVs?

The EV infrastructure ecosystem will include various use cases, charging sites, business models and technical requirements. Few applications will be identical; however, many will be similar. Destination charging use cases will evolve as the market develops, but today four primary categories exist.

Home – Single family homes and multi-dwelling units will require EV charging capabilities and will be the place where charging takes place most frequently.

Work – Workplace charging will follow home charging as the second most common place to charge a vehicle. Drivers will take advantage of their vehicle being stationary during the workday and will desire a full charge to perform their after-work activities.

City – EV drivers will require infrastructure throughout the city for day and evening charging. Places such as hotels, movie theaters and theme parks are just a few of the many destinations where drivers will desire a charge.

Fleet – Defined routes and distinct vehicle utilization makes fleet electrification a very attractive option.

By understanding the use cases, specific applications can be identified and solutions created to meet customer requirements and project goals.

With all of the questions surrounding this innovative technology, Siemens works with customers to ensure they make informed decisions today, and answers with EV charging solutions that are engineered for tomorrow.



Answers for work and city

Community Charging Stations

Siemens' community charging stations are designed for public outdoor applications. The stations come in multiple mounting configurations – wall, pole and free standing – and are customizable to meet specific project requirements. Level 2 charging is delivered via a standard SAE J1772™ connector and 18-foot cable. The stations can be equipped with connectivity to align with program strategies and drive value for the owner while providing a simple, user friendly and safe solution for EV drivers.

Park and Charge – *Coming soon*

- Parking meter with integrated single port 208/240 V service
- Charging, payment and information functions combined in one station
- As easy to use as a multiple space parking meter
- Control and monitoring of status and usage from a central office
- Scalable – one charging station with up to nine satellites



Community Level II

Single port
208/240 V
service



Community Dual Level II
Coming soon

Dual port
208/240 V
simultaneous
service



Community Multi-level

Dual port
110/120 V and
208/240 V
simultaneous
service



Answers for home and fleet

Siemens' light commercial and residential charging stations are designed for "behind-the-fence" or private garage applications. The charging stations provide Level 2 charging via the standard SAE J1772™ connector and can be customized to meet specific needs.



Wall-mountable

Single port 208/240 V service

- Dual stand available for mounting two units on one pedestal



VersiCharge™

Coming soon

Single port 208/240 V service

- Easy to install and easy to use
- Cost effective and feature rich
- Flexible and customizable

Product specifications

	Wall-mountable	Community Level II	Community Multi-level		Community Dual Level II	
			Level II	Level I	Level II Port 1	Level II Port 2
Electrical input						
Input power		7.2 kW		1.9 kW	7.2 kW	7.2 kW
Input voltage		208/240 VAC		110/120 VAC	208/240 VAC	208/240 VAC
Input current		30 A		16 A	30 A	30 A
Input power connections		Line 1, Line 2, Earth		Line, Neutral, Earth	Line 1, Line 2, Earth	Line 1, Line 2, Earth
Recommended service panel		40 A double pole (non-GFCI type) on dedicated circuit		20 A double pole (non-GFCI type) on dedicated circuit	40 A double pole (non-GFCI type) on dedicated circuit	40 A double pole (non-GFCI type) on dedicated circuit
Standby power		5 W typical			7 W typical	
Electrical output						
Output charging power		7.2 kW		1.9 kW	7.2 kW	7.2 kW
Output voltage		208/240 VAC		110/120 VAC	208/240 VAC	208/240 VAC
Output current		30 A		16 A	30 A	30 A
Output charging connector		SAE J1772™ EV connector on 18' (5.48 m) cable		NEMA 5-20 receptacle	SAE J1772™ EV connector on 18' (5.48 m) cable	SAE J1772™ EV connector on 18' (5.48 m) cable
Functional interfaces						
Card reader		ISO 15693, 14443				
Ground fault detection		20 mA CCID		5 mA CCID	20 mA CCID	20 mA CCID
		Each includes auto retry (15-minute delay, 3 tries)				
Plug-out detection		Power terminated per SAE J1772™ specification		Programmable arm and trip current thresholds	Power terminated per SAE J1772™ specification	
Power measurement		2% at 5 minute intervals				
Local area network		2.4 GHz 802.15.4 dynamic mesh network				
Wide area network		Commercial CDMA or GPRS cellular data network				
Safety and operational ratings						
Safety compliance		UL listed for USA and cUL certified for Canada; complies with UL 2594, UL 2231-1, UL 2231-2, UL 1998, NFPA 70 - NEC Article 625				
Surge protection		6 kV @ 3,000 A. In geographic areas subject to frequent thunderstorms, supplemental surge protection is recommended				
EMC compliance	FCC Part 15 Class B	FCC Part 15 Class A				
Operating temperature		-22 °F to 122 °F (-30 °C to +50 °C)				
Operating humidity		95% non-condensing				
Enclosure		NEMA 3R per NEMA 250-1997				
Terminal block temperature rating		212 °F (100 °C)				
Maximum charging station per 802.15.4 radio group		24; each station must be within 150 feet "line of sight" of at least one other station				
Approximate shipping weights and dimensions						
Wall weight	26 lbs (12 kg)	55 lbs (25 kg)				
Wall height	33.2 in (842.5 mm)	22.56 in (573.0 mm)				
Wall width	22 in (558.8 mm)	12.02 in (305.3 mm)				
Wall depth	4.8 in (121.4 mm)	11.94 in (303.2 mm)				
Bollard weight		77 lbs (34 kg)		98 lbs (44 kg)		
Bollard height		50.47 in (1282.0 mm)		55.5 in (1410 mm)		
Bollard width				11.49 in (291.8 mm)		
Bollard depth				11.94 in (303.2 mm)		
Pole weight		52 lbs (23 kg)				
Pole height		22.56 in (573.0 mm)				
Pole width		12.73 in (323.4 mm)				
Pole depth		11.94 in (303.2 mm)				

Software overview

Siemens EV charging solutions provide network capabilities that add significant value to both the station owner and EV driver. The ChargePoint® Network, the largest and longest running EV charging services network in the world, simplifies EV charging by providing deliberate features for station management and control while providing a user-friendly interface to locate stations, plug-in and charge up.



Key features include:

Charging station owner

- Data tracking and reporting
 - Energy consumption and station utilization
 - Greenhouse gas and fuel savings
 - Alarm monitoring and control
- Fully functional web portals
 - Asset management
 - Pricing control and billing
 - Demand response capabilities
 - Advertising
- Wireless communication via cellular data network
 - Over-the-air firmware upgrades
 - Up to 24 stations can leverage a single gateway via IEEE 802.15.4
- 24/7 station monitoring and support
 - Increased uptime, utilization and return on investment

EV driver

- Data tracking and reporting
 - Energy consumption
 - Greenhouse gas and fuel savings
- Fully functional web portals and mobile applications
 - Station location and availability
 - Trip mapping
 - Reservations
- Wireless communication via cellular data network
 - Email/text alerts to indicate status of charge or session interruption
- 24/7 station monitoring and support
 - Around-the-clock telephone assistance

Installation and Siemens overview

Siemens understands the factors that contribute to variability in the commercial installation of EV infrastructure. Committed to a world-class project management program, Siemens answers these challenging questions by supplying certified turnkey installation services and post-installation support nationwide. Siemens implements a seamless service model supported by standard documentation made accessible to the installation network or the customer's preferred contractor.



The Siemens approach:

■ Stage 1: Product review

A team of application engineers are available to discuss the Siemens solution for EV charging and how it fits the customer's application.

■ Stage 2: Site survey

A certified installer walks the project site identifying options to optimize product configuration, address key deliverables and meet customer requirements.

■ Stage 3: Design and quotation

A certified installer supported by a team of application engineers develops a cost-effective site design that is tailored to the site. The customer is provided a firm quotation of services with a complete description of the design.

■ Stage 4: Installation

In conjunction with the rules and regulations defined by Authorities Having Jurisdiction (AHJ), a certified installer assembles, mounts and tests the charging station. The certified installer reviews standard documentation with the customer, as well as operations and key features.

■ Stage 5: Approvals

A certified installer is responsible for scheduling and obtaining approvals required by associated AHJ.

■ Stage 6: Post-installation support services

Installation is merely a portion of the complete solution. Customers have peace of mind knowing that Siemens' first-rate support is a telephone call away – 24 hours a day, seven days a week.

Siemens: The ideal EV charging solutions partner

Siemens has provided solutions to address complex issues in energy and industry for more than 160 years. Siemens is the only company delivering solutions for the entire energy conversion chain – from power generation, transmission and distribution to Smart Grid applications and smart consumption. Siemens also leverages its industry expertise, including innovations in building technology, traffic and mobility solutions. The breadth of experience and expertise positions Siemens as the ideal EV charging solutions partner.

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Published by and copyright © 2011:
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Order No. E50001-F810-A104-X-76US
Printed in USA
TD 2317T BR 0711.2

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