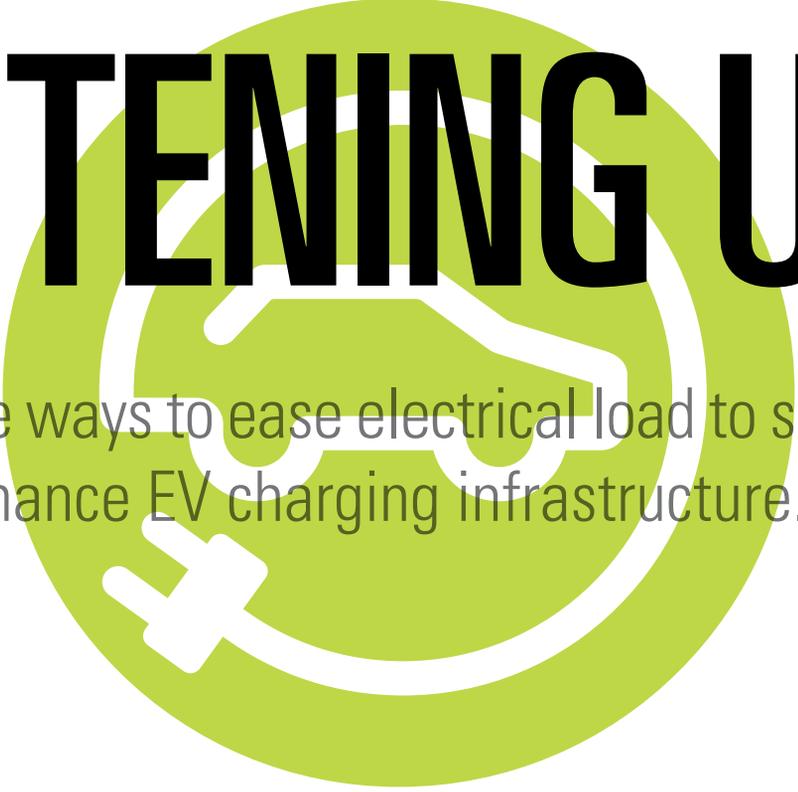


# LIGHTENING UP



Simple ways to ease electrical load to support and finance EV charging infrastructure.

By **Ken Sapp**

**P**lug-in electric vehicle (EV) pioneers Nissan and Chevrolet are in their third model years producing cars with this relatively new technology. Ford, Fiat, Honda, Mitsubishi, and Tesla have all introduced EVs, and BMW is launching two luxury EV models this year. The popularity of long-range EVs means sales of electric and plug-in hybrids could eventually reach 1 percent of the giant annual new car market; that means approximately 150,000 more EVs on the road every year.

As the technology matures, infrastructure improves, and more and more automakers enter the market, EVs will continue to become more affordable and attractive to consumers. With President Obama and the federal government committed to getting 1 million low- and no-emission vehicles on the road by 2015, proponents say EVs are on their way to becoming mainstream.

Many parking facility owners are contemplating offering EV charging amenities for employees, tenants, and visitors. EV drivers usually charge up at home while they sleep but will expect to be able to top off their batteries at the places they spend their waking time: at work, while dining or shopping, and while enjoying recreation and entertainment events. This means investing in EV infrastructure could offer a very real competitive differentiator in attracting the EV driver population, retaining customers and occupants, meeting government regulations, and, ultimately, improving profitability.

## **Get Charged Up**

There are several considerations when it comes to investing in electric vehicle supply equipment (EVSE).

Affordability is one such consideration. Many local governments and public agencies support acceleration of EVSE, as well as their own rebates and incentive programs. For example, California Gov. Jerry Brown announced a \$120 million commitment to fund the construction of a network of 10,000 EV charging stations across 1,000 locations throughout California. New York Gov. Andrew Cuomo announced Charge NY, an initiative to create a statewide network of up to 3,000 public and workplace charging stations in the next five years.

With such support available, it may be more affordable than ever for building owners and operators to purchase and install EV charging stations. However, there are other factors that can dramatically affect the cost of an installation. For example, can your existing electrical infrastructure handle the increased electrical load brought on by EVSE?

Most commercial charging solutions today are Level 2 stations, which means the electric vehicle draws about 6 kW per hour while charging. Next-generation Level 3 (DC fast charge) stations will be available by the end of this year. Level 3s provide very rapid charging, which



## City Center West Garage



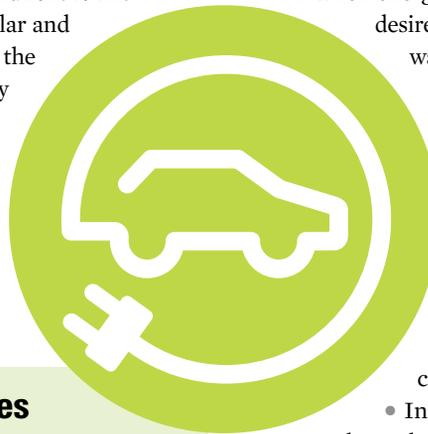
makes them ideal for public charging situations. But with these chargers, EVs will draw at a rate of 20+ kW per hour.

Thus, EVSE will increase your electrical draw and could overload many current electrical systems, as well as significantly raise the cost of your electricity. If your property was built prior to the 1980s, your electrical infrastructure might be outdated and unable to handle the new load without a complete retrofit. This could add greatly to the cost and scale and negatively affect your decision to embark on an EVSE project.

### Lighten Up

Fortunately, there are innovative solutions to this challenge. One of the most popular and cost-effective options is to reduce the overall electricity load of the facility before EVSE installation through a lighting upgrade.

Older facilities often have old fluorescent light fixtures and magnetic ballasts that house inefficient T12 or high-pressure sodium lamps. Typically operating



24 hours a day, seven days a week, this outdated lighting can really drain the grid, as well as make energy costs skyrocket.

The first step is to swap out older light fixtures with state-of-the-art, high-efficiency lighting and replace outdated ballasts with electric ballasts that allow light levels to be programmed to dim during nonpeak hours. There are several high-efficiency, low-maintenance lighting options available, including:

- **HID.** High-intensity discharge (HID) lamps use less power and are much brighter than most fluorescent and incandescent lamps. These are typically used when high levels of light over large areas are required and when energy efficiency and light intensity are desired. HID bulbs are fragile and need to warm up, and this lighting is susceptible to aging and wear.
- **LED.** Light-emitting diode (LED) lighting doesn't have a filament to burn out or break. Designed to have a 50,000-hour service life, these lights are very durable and require minimal maintenance. They are also instant-on, which makes them convenient for on-off cycling.

- **Induction.** Induction lighting is an electrode-less lamp that uses light-generation technology that spreads light evenly over surfaces. Because it does not use traditional electrodes or filaments, there are no parts to wear out. It offers five to 10 times the life of HID lighting and is designed to last an average of 100,000 hours.

These are all good high-efficiency lighting options, but each has advantages and disadvantages that must be considered carefully before being used in a lighting project. Contact a professional lighting or energy solution consultant to determine the best type of lighting to optimize results for a facility.

### Take Control

While upgrading the lights will provide impressive energy improvements, this alone might not offload the circuit enough to support charging stations. To deepen the energy reduction potential and reduce peak electrical demand, the new lighting needs to be paired with an advanced lighting control strategy that includes:

- **Wireless controls.** Automated controls allow facility managers to pre-determine lighting system requirements based on area, peak and nonpeak times, daylight, occupancy, or a combination of these factors. Facility managers can adjust the lighting system to behave differently for specific times of the day or week and holidays.

## At a Glance: EV Charging Station Types

There are three types of EV charging: Level 1, Level 2, and Level 3. These different charging schemes are distinguished by their utility requirement and total time for a full charge, and each fills an important niche:

- **Level 1 AC Charging.** Level 1 charging uses a standard 120V outlet and takes 11 to 20 hours to charge a depleted EV. Level 1 charging systems are designed to be portable and used in the case of an on-road emergency, when the driver is running low on charge and needs to plug into a readily available outlet.
- **Level 2 AC Charging.** Level 2 charging delivers AC power reliably and safely to the electric vehicle. The power from the charging station is fed to the car's on-board charger. An on-board charger is small enough to be integrated into the car and, with the Level 2 off-board charging station's help, can power up the battery in three to eight hours—usually at home when the driver is sleeping. This convenient charging regimen is often called "opportunity charging," because it calls for recharging during opportune down time, such as sleep, work, or play.
- **Level 3 DC Fast Charging.** Level 3 charging uses greater amounts of power and current to bypass the vehicle's on-board charger with a fast and reliable DC charge in minutes instead of hours. Level 3 stations are being installed in various markets and are ideal for public charging infrastructure, charging large vehicles with big batteries, such as buses, and commercial or service fleets with very little recharging downtime.

- **Occupancy detection.** Occupancy detection senses when areas of a building are occupied and allows facility managers to only light occupied areas. Sensors recognize when a person or vehicle approaches an area and signals the lighting to turn on automatically. Once the person has left the area, the lights turn off or dim after a pre-determined time period.
- **Daylight harvesting.** Daylight harvesting leverages natural daylight to reduce the need for artificial light while still providing an even level of light in an area. Sensors recognize the difference between artificial and natural light and where and when daylight is present, so ambient electric lighting is automatically reduced.
- **Bi-level tuning.** This control device allows facility managers to establish different light levels by space type or area. This is especially good for stairwells and other dark places, as lights can be set to dim but not go off and then brighten automatically when motion is detected.

Why wireless? Wireless lighting controls offer the same or better functionality as traditional wired controls systems but at a lower cost and with easier installation. Wireless systems generally don't require modifications to the existing electrical wiring or addition of new control wiring, and can be easily modified to adapt to changing space needs, schedules, or energy-reduction strategies through reprogramming. These systems also provide a centralized, web-based dashboard for facility managers so they can track and monitor energy use and adjust controls in real time over the internet from any computer, anywhere.

Using an automated lighting control system, lights are only on during peak hours and when needed instead of 24/7. This locks in energy savings and maximizes load-shedding capabilities. The combination of upgraded lighting and wireless controls can:

- Reduce total lighting electricity use by up to 50 percent.
- Reduce peak loads.
- Reduce annual energy costs.

This frees up electrical capacity that can then be used for EVSE requirements, while reducing utility costs. Added benefits of this approach include reduced maintenance and inventory costs and improved facility safety and security. And there is a usually a quick return on investment (ROI).

### Proven Solution: Oakland

Oakland, Calif., has one of the most ambitious energy efficiency efforts in the country and is always looking to reduce overall energy use.

With most sporting old and obsolete lighting fixtures, the city determined parking facilities were among its biggest energy wasters and targeted the garage at 1250 Martin Luther King Way for a modern

## Why Install EVSE?

With EVSE on the rise, EV drivers will gravitate to places where they can charge up while doing other things like working, shopping, dining, and going to the movies. Providing this popular amenity can help property owners:

- Attract the growing EV driver market.
- Reward employees who made early-stage investments in alternative transportation by offering free or subsidized charging.
- Comply with green regulations and sustainability initiatives, and help America achieve energy independence while fostering environmental stewardship.
- Add VIP services by offering EV charging.
- Increase parking revenue by adding a surcharge on top of a standard parking fees.

energy makeover. The city also wanted to install EV charging stations to support sustainability efforts, but the garage didn't have the power capacity for that. And, as with most government projects, organizers wanted to accomplish all this without increasing the city's operating budget.

Working with consultant ABM, the city implemented high-efficiency lighting and wireless lighting controls and reduced energy use by 45 percent. The energy savings offset the electric grid enough to allow for the implementation of EV charging stations without rewiring the facility's existing electrical system. And by leveraging federal and local energy incentives and creative low-interest financing, the city was able to pay for the entire project with its utility cost-savings. There was no upfront capital required, and the project contributed a positive cash flow to the existing budget.

### Making It Happen

Garage owners may find that an EVSE project is within reach and easier and less expensive than expected. However, the EVSE market is rapidly evolving and can be challenging. To reduce confusion and potential risks, it is best to work with an expert who can not only provide EVSE advice but also suggest innovative ways to reduce your electrical load. Look for a full-service vendor with a proven track record of installations to help you:

- Evaluate EV infrastructure needs and energy-saving opportunities.
- Make budget through flexible financing options, rebates, and local, state, and federal incentives.
- Determine requirements and provide the proper equipment.
- Install, service, and maintain the EVSE equipment.
- Design, install, and maintain high-efficiency lighting and controls.



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