

THE SWITCH

Wiring a green tomorrow



Electric vehicles present challenges and optimism for electricians



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Electric vehicles used to be a fantasy, a mode of transportation that only came to fruition in science fiction movies and daydreams of the future. It may seem like a fantasy but the electric vehicle is now leaving tracks in the here and now. In fact, researchers estimate there to be up to 9 million electric vehicles on our roads by 2020. When numbers like these are discussed, it sounds like the electric vehicle has been embraced by the masses. While it is exciting to think of this green alternative taking hold worldwide, there are issues, concerns and consequences associated with electric cars.

Many agree that the electric vehicle is a great and promising development. It has numerous positive attributes, the most attractive quality being its small carbon footprint. But, challenges do exist; these challenges include the sticker cost of the vehicle, the cost to charge it, the current infrastructure in place to support these vehicles when they hit the road and park in residential garages, and the vehicles mileage per charge limitations that exist with most models. There are hesitations in the marketplace because of these challenges.

First of all, the cost of an electric vehicle will be substantially higher according to PricewaterhouseCooper. An electronic vehicle will cost \$7,000 to \$20,000 more than a combustion gas engine vehicle of comparable size and luxury. While the sticker shock can be hard to swallow, there are incentives in place by the government to help absorb some of the costs associated with

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Electrical Vehicles Optimism Continued

making the 'green' choice. The United States government has pledged a tax credit of up to \$7,500 towards the purchase of fully electric and extended range vehicles in 2010. In addition to the federal incentive many states also provide a financial motivator. For example, Oregon offers an additional \$1,500 to purchase a hybrid electric vehicle (HEVs) or dual-fuel vehicle. These incentives, while not permanent, are meant to help bridge our society to embrace the electric vehicle migration.

The next challenge of the electric vehicle boom is the issue of charging. There are three levels of charging. Level one is 120v and takes roughly 8 to 12 hours to provide a full charge and can be done in most home garages. The second level of charging is known as a level two charger. This charger is 240v and will cut the level one charging time in half. It can be installed in residential garages, parking lots and transit centers. The third level of charging is the DC Quick Charge. This will provide an electric vehicle with a full charge in 20 to 40 minutes. These are this type of station people will find in high traffic and high volume areas.

The level one charge only costs as much as the energy used, but many consumers may be turned off by the 8 to 12 hour charging time. The level two charger station retails at roughly \$2,000. This option is an opportunity for Oregon electricians to work; since it must be installed by a licensed professional and then be tested for electrical safety by the local authority. A four to six hour period to fully charge one's vehicle is very attractive.

The third option is the DC Quick Charge and is the fastest charging station available. These are predominantly for public use or for private fleet charging. Because of the charging stations price tag, as well as its wattage requirements and voltage usage, it is unlikely that an individual consumer would purchase this type of charging station for their home. But, that is not to say it wouldn't be an opportunity for the electrical industry. These charging stations, like the level two charging stations, will need a licensed electrician to install them.

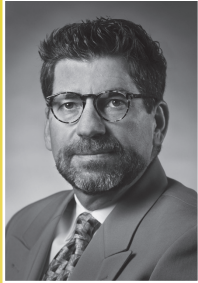
The third challenge relates to the charging station infrastructure. Many worry that the charging stations will not be installed, that they won't be in the correct locations and that they won't be available to all those who have made the switch to an electric vehicle by the time the consumer switches. These are issues that face the electric vehicle industry and have the potential to cripple its move to mainstream.

The issues over infrastructure are valid concerns. Currently Oregon has 29 electric car charging stations in place for public use and an additional seven operational stations owned and operated by private businesses for their customers and employees. While this is a start, there will need to be a larger, more consistent infrastructure in place for the electric vehicle to be a more reasonable option.

The good news is that there is a desire by Oregonians to go 'green' when at all possible. A big step in that direction would be to purchase an electric vehicle. Electricians will play a vital role in the sustainability and success of the electric vehicle industry. Without electricians to make the charging stations operational, the car itself becomes useless and the electric car movement will stall.



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Greetings from Tim Gauthier, Oregon Columbia NECA Chapter executive manager *Oregon Electricians Pursue New Market*



Electrical contractors are aggressively pursuing the new market for electrical charging stations. They are not just coming; they are here in the Northwest!

Not only is this a growing trend on the West Coast from the Mexican border to the Canadian border, including California, Oregon and Washington, the federal government has also stepped up with the new "green highway" initiative.

The states of Oregon, Washington and California have been provided with federal stimulus funds to install the fast-charging stations, as well as residential and commercial charging stations.

Several of our member contractors, including Hughes Electric, Tice Electric and E.C. Company, Oregon Electric Group and Cherry City Electric have installed commercial charging stations while West Side Electric and Heil Electric have been certified for the new home-charging stations through the Nissan Leaf Program.

"Oregon has also taken the initiative in approving new building codes requirements to utilize the popular minor label for residential units. Recognizing and removing unnecessary barriers is key to encouraging use of electrical vehicles and green transportation options," said Governor Ted Kulongoski. "We want to make sure these essential home-charging units are installed without delay just in time for the influx of state-of-the-art electrical vehicles in Oregon."

Nine hundred all-electric Nissan vehicles have started to arrive in Oregon as part of the EV Project, which is a national demonstration project to gather data on electrical vehicle driving needs. Oregon was chosen as one of only five test areas in the United States.

Oregon also has approved a statewide Alternative Method for the approval of the use of demand factor tables for calculating electrical vehicle charging equipment services and feeders. This alternative method allows electrical contractors to apply demand factors to services and feeders that supply electrical vehicle charging stations. The alternative method will allow for demand factor tables and the installation of similar equipment in mobile home parks, recreational vehicle parks, marinas, boat yards and electrified truck parking spaces.

Studies performed while monitoring battery charging processes demonstrated that the peak current draw did not exceed 50% of rated loads. The level of charging required for individual battery modules varied widely. For these reasons, application for the demand factor is justified by the technical substantiation.

It is anticipated that in many of the installation situations, contractors may even have the possibility of updating the current service in residential units for homeowners as well as other commercial applications in order to bring EV charging stations to homeowners and the public at large.

Once again, Oregon is leading the way with NECA/IBEW contractors and electricians providing technical and professional service to the public.

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Greetings from Clif Davis, IBEW Local 48 Business Manager

EV's Open the Door to Opportunities

It is obvious electric vehicles (EVs) are and will continue to be an increasing part of our society. This is especially true in urban areas where short commutes are the norm and the feasibility of such technology allows EVs to be economically viable. The short and long term effects of transitioning to this form of transportation will have great potential for our industry.

EVs currently have a range of 40 to 100 miles. This is below the normal daily commute for most users but certainly is not beyond the round trip or incidental usage for a large percentage of users. Thus EVs require charging stations in those areas they are most likely to be parked for extended periods. This includes homes, work places, parking structures and downtown streets as well as retail facilities. This translates into hundreds of thousands of work hours for our members in charging station installations alone. In addition, repair of EVs certainly is within our industry. I would argue that the issue of safety demands only skilled, licensed and trained electricians be allowed to work on EVs due to the electrical dangers inherent with the potential hazards these vehicles have. This extends to training in the event of accidents for rescue workers and firemen.

While we as electricians may view this technology as pretty straight forward it is imperative we keep an eye on the training opportunities required by the manufacturers. Already it has been required by at least one car manufacturer that you have their certification prior to installing the charging station provided with the purchase of the EV or the customer warranty will not be valid. Many of our contractors have already invested in this certification. To avoid redundant training, the industry is developing standards for the different levels of charging stations. Without such standardization we could literally end up with as many different types of charging stations as there are styles of vehicles. Your IBEW and NECA representatives are working hard to ensure a consistent and efficient technology is adhered to.

The opportunities in Oregon and Washington for EV development and usage are endless. The culture for such technology has long been embraced locally. In fact, a market already exists once a cost efficient product is offered. With our lower electricity costs, skilled workforce and high technology base it seems a natural fit for EVs to be produced in the northwest. It is up to our industry to continue to court and promote such production. The rewards could be tremendous.



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What's going on with electric vehicles?

By: Topher Edwards

(Topher Edwards has over 11 years in the electrical trade with experience in commercial and industrial installations and most recently working as a service electrician specializing in troubleshooting and installation of variable frequency drives and Building Automation Systems. Topher has a B.S. from the School of Allied Arts and Architecture at the University of Oregon and completed the NJATC's National Training Institute in 2008. He has been teaching at the NIETC full time since 2005.)

Training electricians is a challenge, they always want to know what's new, what's next. Maybe it's the ever changing nature of our trade or the type of individual that is attracted to being an electrician. Either way, every single day that I come to work as an electrical trade instructor and electric vehicle enthusiast, I know there is one question that my students will ask me: "what's going on with electric vehicles?"

Many of them are thinking of when they will be driving their own electric vehicle (EV). Some are trying to distract me from handing out our weekly test. Most are curious about how these new vehicles are going to change our industry and what they need to do to prepare for the future. One thing is for sure, keeping track of the emerging EV market is a very challenging task.

The National Electrical Code always seems to be a good place to start, however, the NEC doesn't cover vehicles, only the charging equipment in permanent locations. That doesn't mean that the NEC isn't a factor. With new technologies, following the NEC is critical in creating installations that protect life and equipment. Fortunately, because of the commitment to craftsmanship and safety by the IBEW and NECA we understand that setting aside the laws for governing electrical installations to speed the adoption of a new technology could ultimately result in the failure of that technology.

The department of Transportation and the Department of Energy are both doing their best to help coordinate the efforts of government and private business to move towards integrating electric vehicles. Unfortunately, one of the best ways to do this is to avoid restrictions and rules before we know what technologies are clear winners. State governments are taking more initiative and creating standards that many manufactures are adopting in lieu of federal standards, such as California's three level charging standard that is now used by charging station manufacturers across the country.

Listing agencies like Underwriter's Laboratories are a good source for monitoring the manufacturers of EV equipment. As new technologies are developed or put together in new ways, listing agencies create standards and testing protocols for each new product group. Unfortunately, there is still no way of knowing which technologies will have the biggest impact on the electrical industry.

Like many other reasons to be proud of Portland, one of the best sources for what is happening with electric vehicles can be found by the local Do-It-Yourself group, the Oregon Electric Vehicle Association (OEVA). This local chapter of the National Electric Vehicle Association (which has been around since 1967) is an excellent resource for everything EV, from how to build your own electric vehicle to how to purchase a brand new one. The OEVA has been instrumental in choosing locations for charging stations in Portland and Hillsboro. They have helped to bring test drive events for

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Standard of Excellence

When thinking about the duties of an electrician, a few things come to mind: hard work, craftsmanship and dedication to getting a job done right and on time. Yet there is another role that our electricians in the Pacific Northwest are increasingly taking on – the role of sustainable and renewable technology expert. While scientists and technicians develop innovative tools to reduce the carbon footprint of residents in Oregon and Washington, it is frequently skilled union electricians that install this technology for the customer to use. We form a bridge between the “behind the scenes” businesses that develop and manufacture a product, and the general public who uses it.

We form a bridge between the “behind the scenes” businesses that develop and manufacture a product, and the general public who uses it.

One shining example of this is the recent proliferation of electric car recharging stations. With NECA/IBEW 48 leading the way in training for green and renewable technology, it is frequently our local out on the street, in parking lots and in view of the public installing these exciting products that will help create a greener world for our children and grandchildren.

Among the 17 tenets contained in the IBEW Code of Excellence is our pledge to “always strive to conduct ourselves in a way that promotes a positive image of the IBEW.” We are fortunate to be part of an organization that is not only the regional leader, but a national leader in the installation of sustainable technology. We must remember not to rest on our laurels, but rather to take pride in our work and in the good that we are creating to in our communities and our environment. Like firefighters and police officers are symbols of our public safety, our electricians are symbols of innovation and the greening of our future. Take pride in your role and represent the local well.

What's Going on with Electric Vehicles Continued

the Nissan Leaf, Chevy Volt and the Tesla Roadster and have helped local charging station developers test their equipment. The OEVA has been holding an electric vehicle appreciation day in Pioneer Courthouse Square since 2001.

Although seeing into the future seems nearly impossible, we are already prepared to meet today's demands. Knowledge of safety devices, interlocking, battery charging systems, protection of wiring, grounding and bonding, raceways and terminations are all part of what we teach every day. The high level of education and experience that the NECA-IBEW Electrical Training Center provides help to ensure that no matter what type of equipment is installed, or where it is installed, it is done safely and to the highest level of craftsmanship our industry has to offer.

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Electric Vehicle Charging Safety

By: Barry Moreland

As the holidays and colder weather approach, families will gather their festive lighting arrangements, decorations and space heaters to add color, sparkle and warmth to holiday festivities. The use of these electric decorations and related connections can be very dangerous if not installed properly and with a basic understanding of the hazards electricity poses to our health and well-being.

The same principles apply whether we are plugging in strings of lighting decorations or connecting electric vehicles to charging stations. To illustrate this point I will compare the similarities between OSHA's electrical safety standards to the National Fire Protection Association requirements for the safe installation and use of vehicle charging stations.

OSHA 1926 Subpart K & 1910 Subpart S

NFPA 70 (NEC) Article 625

Both standards require wiring methods with proper polarization of conductors and cord ends / couplers that utilize grounding poles that are first make / last break. Non-interchangeability from the standard configuration design is also required.

OSHA requires the use of ground fault circuit interruption for protection from shock in construction and for similar tasks in maintenance settings. The NEC in article 625.22 Personnel Protection System, requires similar shock protection for those who use vehicle charging stations and specifies the exact location of the protective device to be integral to the connector or located not more than 12 inches from the plug when located on the power supply cable.

Both require proper ratings of supply cable for maximum applied voltage and type of insulation applicable for the environment. I.E. Hard Service (SO) for construction and for charging systems.

Both require labeled disconnecting means to be located in a readily accessible area and contain means to apply a lock. Additional NEC marking requirements on charging equipment to include, "FOR USE WITH ELECTRIC VEHICLES & VENTILATION REQUIREMENTS."

The NEC also requires interlocks to de-energize cable and connector whenever it is disconnected from the vehicle and to prevent a back feed condition if the primary source voltage becomes disrupted.

The primary objective of the NEC is for the protection of property and personnel. The primary objective of OSHA is the protection of employees from occupational hazards. As for electrical hazards, whether installing charging systems or using them, we must be familiar with their design features and respect electricity for the consequences of accidental contact with energized equipment and circuits.



Journeyman Spotlight David Trapp



David Trapp's family has a background in construction. So when it came time to make a decision about his future, David pursued a career in the trades. Upon graduating from high school, David was accepted into the NECA-IBEW Electrical Training Center apprenticeship program.

"I figured being an electrician would be a good fit for my life and make a rewarding, stable career," said David. "Even when the economy is down, people always seem to be building or fixing something that requires electricity."

David has been an electrician for 14 years now. He completed all of his apprenticeship with Shaw West and has worked with Hughes as a signing supervisor and general foreman for the past four years. His favorite part of the job is overcoming the everyday challenges of different types of service-related electrical work.

One project David recently worked on was wiring Oregon's first rapid-charge electrical vehicle (EV) station at the World Trade Center. He and another journeyman, Dave Thompson, worked on the install over the course of a week or so and then attended the ribbon cutting event.

"It was exciting to see the reaction from the manufacturers of that station," said David. "I think they were impressed with how quickly we put it together and how the finish product looked."

Although the electrical part of this project wasn't extremely technical, David noted that the biggest challenge to installing most EV chargers is feeding the stations with power. "Customers always seem to want them on the sidewalk next to the street, which is a hard place to get to," he said. And he meant that literally because it usually requires them to work with other contractors to cut concrete and dig trenches.

Like most electricians, David never anticipated he would be working on such cutting-edge projects, but he looks forward to being involved as the EV market continues to emerge in the Portland area.

NECA/IBEW 48 thanks David Trapp for his commitment to his community and trade.



Contractor Spotlight Hughes Electrical Contractors



Electrical Solutions with Lasting Quality

Hughes Electrical has been operating in Oregon for more than three decades and while some sectors of the business have stayed the same, many parts have evolved.

Pat Hughes followed in his father's footsteps and became an electrician. In 1979, he and his wife Cindy started their own company. One of the main stays of the business has been their relationship with a large, very prominent Portland property owner, who called and hired Hughes in response to its Nickel Ads in the early days. While this may be unheard of today, the connection has proven to be a strong one given they are still a customer.

Like most businesses, Hughes knows that long-time customers are critical to their success, but also realizes that new customers are just as important. That's why they have one particular person who spends much of his time focusing on this.

Pat and Cindy's son, Gabe, has worked for the company in various capacities since he was a teenager. In 2003, Gabe came on as a full-time employee after completing his business management degree. His role currently entails estimating, project management, and researching and building relationships with customers – especially those in emerging markets.

One such market happens to be electric vehicles (EV) . Earlier this year, PGE reviewed its bid list and selected Hughes to install a rapid-charge EV station at the World Trade Center – the first of its kind in Oregon and on the west coast! Hughes has also installed several other charging stations, including a few for private companies downtown.

"Although our main focus is on taking care of existing customers, the EV market seems to be taking off and we'd like to continue being involved," said Gabe. "This type of work is a good fit for us."

That's why the Hughes team is not only keeping up on today's business, but also looking ahead to tomorrow. And that's a good position to be in with the construction industry as competitive as it is right now.

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Family Fun Night:

On the evening of Saturday, December 11, nearly 500 electricians and their families came to the Rose Garden to celebrate Family Fun Night with the Winterhawks. The game was made extra special by it being the Annual Teddy Bear Toss, a program dedicated to supplying Portland area hospitals and children's charities with teddy bears for the holiday season.



Most of the first period went scoreless but then at the 12:44 mark of the first period, Ty Rattie scored the first Winterhawk goal. The crowd erupted with cheers and over 12,000 teddy bears rained down from the Rose Garden seats onto the ice. It took nearly 15 minutes to clear all the bears so the game could resume.

It was a great night of celebrating who we are and what we do, as well as showing appreciation for the hard work done by NECA/IBEW Local 48 members. In the end, the Winterhawks beat Prince George in a 7 to 4 victory.



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