Workplace Charging at Virginia Clean Cities

Case Study
Summer 2016 Argonne Internship
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Case Study

1. Background

Increasingly more employers across the U.S. are offering electric vehicle charging on-site to their employees. Workplace charging has many benefits for employees, employers and building owners, including:

- attracting new hires
- furthering sustainability practices and objectives
- improving public image and employee satisfaction
- adding value to the property
- providing a greater driving range to workers who drive electric vehicles which improves their flexibility and driving security

Virginia Clean Cities at JMU opened a publicly-accessible, workplace charger in April 2015 in a dual effort with The Center for Wind Energy at JMU. The charger was installed to provide electric vehicle charging capabilities primarily to the employees in the building but also to any electric vehicle drivers passing through. The Level 2 charger is 240 volts and 30 amps, and features two connectors so that two cars can charge simultaneously. The charger supplies electricity for approximately 30 miles worth of driving range per hour, and can completely charge an electric vehicle in about 6 hours.

2. Significance

The expansion of workplace charging across the U.S. is an important effort in the advancement of the nation's economic, environmental, and energy security. Workplace charging initiatives, such as the one at Virginia Clean Cities, encourage more people to purchase electric vehicles because of the convenience and added range security. Eric Fitzgerald, the Director of Career and Technical Education at Rockingham County Public Schools, regularly uses the Virginia Clean Cities charger and stated that the location of a charging station close to his office was a key factor in his decision to purchase an electric vehicle. Increased electric vehicle use means less dependency on petroleum, which reduces harmful carbon emissions, decreases U.S. dependence on foreign oil, and is economically more stable, because petroleum is a finite resource while electricity can be generated from renewable sources. Fueling a car with electricity is also less expensive than using gasoline. Workplace charging encourages more electric vehicles to be on the road, which means a more sustainable future.

3. Savings

Usage

Virginia Clean Cities' workplace charger is regularly used by four electric vehicle owners. These vehicles include a two Nissan LEAFs and two Chevrolet Volts. These four vehicles have the following monthly electricity consumptions, determined by their commute distances and driving and vehicle charging habits:

- Nissan LEAF 1 (30-mile daily roundtrip commute): 180 kWh per month, 4.5 miles per kW. 810 mile of electric range. Displaces 37.8 gallons of gasoline.
- Nissan LEAF 2 (8-mile daily roundtrip commute): 60 kWh per month, 4.5 miles per kW. 270 miles of electric range. Displaces 12.6 gallons of gasoline.
- Chevrolet Volt 1 (100-mile daily commute, exceeds electric range): 144 kWh per month, 4 miles per kW. 576 miles of electric range. Displaces 26.9 gallons of gasoline.
- Chevrolet Volt 2 (40-mile daily commute): 80 kWh per month, 4 miles per kW. 320 miles of electric range. Displaces 14.9 gallons of gasoline.

Cost

The cost of electricity in the building is estimated to be $0.10/kWh, so the cost of electricity for each vehicle is:

- Nissan LEAF 1: $18.00 per month.
- Nissan LEAF 2: $6.00 per month
- Chevrolet Volt 1: $14.40 per month
- Chevrolet Volt 2: $8.00 per month

One benefit to using electricity as a motor fuel is that the price is not as volatile as gasoline. The price of a kWh of electricity does not fluctuate on a daily basis and $.10 per kWh is equivalent to $1.00 per gallon of gasoline.

Comparison to Gasoline

According to GasBuddy, the average price of gasoline in Virginia in August 2016 is $1.90 per gallon. Assuming the drivers were to drive a gasoline vehicle with average fuel efficiency, 21.4 mpg (USDOT, 2014), the cost of the same driving commute with a gasoline vehicle would be:

- Nissan LEAF 1: $71.82 per month
- Nissan LEAF 2: $23.94 per month
- Chevrolet Volt 1: $177.56 per month
- Chevrolet Volt 2: $71.04 per month

Comparing these costs may not reflect the total money saved when using an electric vehicle, because it must be taken into account that owners of electric vehicles also often charge their vehicles at home. There is also reduced operations and maintenance costs because electric vehicles require fewer oil changes than internal combustion engine vehicles. With these additional factors it is apparent that owning and operating an electric vehicle is much less expensive per mile of travel than using a gasoline vehicle.

4. Community Benefit

The implementation of the Virginia Clean Cities workplace charger has also had substantial benefits to the Harrisonburg community. The charger is currently the only publicly-available station in northern Harrisonburg, which adds value to the community and attracts visitors and travelers. The availability of the charger also reduces the use of petroleum with increased operation of electric vehicles, which reduces air emissions and improves the air quality of Harrisonburg.

The charger also gives Virginia Clean Cities an opportunity to spread awareness for its business and create meaningful connections. Electric vehicle drivers that stop to use the station are invited to meet VCC staff and learn about the organization. Virginia Clean Cities also leaves a sign on the charger with information for electric vehicle drivers who choose to not come outside or who visit outside of business hours, so that they are also informed about the organization and its goals. Some of the visitors of the charging station have also been able to present business partnerships and opportunities to Virginia Clean Cities. The Virginia Clean Cities charger has had visits from representatives of the Department of Energy, Eastern Mennonite University, and Rockingham County Public Schools.

5. More Information

To learn more about electric vehicle charging and workplace charging in Virginia, visit virginiaev.org.

Companies can join the U.S. Department of Energy's Workplace Charging Challenge as "Partners", in which they pledge to provide electric vehicle charging capabilities to their employees. For more information visit: http://energy.gov/eere/vehicles/ev-everywhere-workplace-charging-challenge.

Workplace Charging Challenge
U.S. DEPARTMENT OF ENERGY

6. Appendix

A letter from one of the primary users of the Virginia Clean Cities electric vehicle charger, Eric Fitzgerald, is attached.

VIRGINIA CLEAN CITIES

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August 11, 2016

Matthew Wade, MPA
Deputy Director
Virginia Clean Cities
1401 Technology Drive
Harrisonburg, VA 22807

Dear Mr. Wade,

I want to express my sincere gratitude for the instillation of the Electric Vehicle Charging station located at the Virginia Clean Cities office next to the Rockingham County Public Schools Central Office. I work for Rockingham County Public Schools as Career and Technical Education Director and use the charging station about four days a week. Each day, I plug my Chevrolet Volt into the charging station and use approximately 5 kWh of electricity. Since I live about 20 miles from the office, this allows me to virtually drive to and from work without the use of fossil fuels. The location of a charging station close to my office was a key factor in my decision to purchase an electric vehicle.

Thanks again for installing and maintaining the charging station at the Virginia Clean Cities Office. I appreciate the work that you and your staff are doing and hope that we will see more charging stations in our community.

Sincerely,

Eric L. Fitzgerald
Director, Career and Technical Education