The Role of Community Colleges in Developing an Electric Vehicle Infrastructure in Illinois


Submitted May 18, 2012
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EXECUTIVE SUMMARY

The electric vehicle (EV) offers the potential to reduce our dependence on foreign oil, produce fewer air emissions than conventional cars, save consumers money in a time of high gasoline prices, and catalyze green jobs. Illinois has shown a commitment promoting EV technology and developing a comprehensive public charging station network. Illinois Green Economy Network community colleges can play an important role in advancing EV technology in the state. This role may include providing community education about EVs; offering training to support an EV workforce; building a network of charging stations on community college campuses; and purchasing or leasing EVs for college use. This white paper, presented by the Illinois Green Economy Network Electric Vehicle Task Force, provides recommendations and background information on EV technology to assist Illinois community colleges in fulfilling this role.

INTRODUCTION

In fall 2011, the IGEN Electric Vehicle Task Force was formed to research the status of EVs in Illinois and to investigate the role that Illinois community colleges and IGEN can play in advancing an EV infrastructure in the state.¹ The Task Force—comprised of sustainability professionals representing community colleges across the state—began by researching several key areas including:

- The status of EV activity in Illinois
- Current community college activity
- Potential partnerships and funding sources for community colleges
- The connection to colleges’ sustainability goals
- Curriculum opportunities and workforce training needs
- The role of community colleges in EV public education and outreach

Based on the results of this research, the Task Force developed this white paper, which functions as a resource for community colleges that wish to advance EV education and community outreach by learning about existing

¹ Task Force topics are identified by community college sustainability professionals at IGEN retreats, identified by the IGEN administrative team, or requested by the IGEN Presidents’ Steering Committee. Once formed, the Task Force conducts research with a global scope, limited by parameters and desired outcomes specified by the IGEN administrative team and the Task Force.
initiatives, available funding sources, current technologies, and lessons learned by other Illinois community colleges. The white paper additionally makes recommendations to IGEN and community colleges on how to fulfill the appropriate role that community colleges can play in supporting the Governor’s initiative to have a network of EV charging stations in Illinois to support the possibility of 100,000 EVs on Illinois roads by 2015.

**Current Community College Activity**

Several Illinois community colleges have already taken steps to educate their communities about EVs, convert gasoline powered automobiles to electric, or install charging stations on their campuses. Their efforts are profiled in this white paper, and can provide a model and lessons learned for other colleges. To identify current activity related to EVs at Illinois community colleges, the Task Force reviewed colleges’ responses to the IGEN College Initiative Survey distributed in November 2011, as well receiving anecdotal accounts of EV projects on campuses. Currently Lake Land College, Lewis and Clark Community College, Heartland Community College, and Joliet Junior College have conducted activities related to EV technology or education. Case studies profiling these colleges’ activities are interspersed throughout the white paper.

**Electric Vehicle Technology in Illinois**

The State of Illinois has shown a commitment in promoting EV technology and in developing a comprehensive public charging station network. The Illinois Electric Vehicle Advisory Council (EVAC), discussed further on page 18, describes the EV environment in the state:
According to the EVAC, the Governor’s initiative is to install a network of EV charging stations in Illinois to support the possibility of 100,000 EVs on Illinois roads by the year 2015.

THE ROLE OF COMMUNITY COLLEGES

Illinois community colleges are poised to play several key roles in EV education and adoption due to the vast demographic they serve, the array of educational programs they offer, and their accessibility to the public. Community colleges can play several roles in helping EVs gain a foothold in the market, which include:

- **Providing Community Education** The community colleges can play a vital role in community education and outreach by allowing members of the public to interact with EVs, pioneering charging station installations, and providing information on the benefits of EVs. Communities rely upon their community college to serve as an unbiased and educational source, especially on evolving green technologies. Community colleges can strengthen their role in the community by providing an up-close look at these technologies, as well as forums for educating consumers.

- **Offering Courses and Training to Support an Electric Vehicle Workforce** Community colleges can identify the skills and training needed to support an EV workforce in Illinois and provide the necessary training.

“Illinois has provided early leadership in supporting the adoption and use of electric vehicles (EVs). The Illinois Environmental Protection Agency (IEPA) offers rebates toward EV purchases; the Illinois General Assembly appropriated up to $10 million in capital funding for the Department of Commerce and Economic Opportunity (DCEO) to award EV manufacturing and infrastructure grants and loans; and the Illinois Commerce Commission (ICC) launched a Plug-in Electric Vehicle Initiative (PEV Initiative) to explore regulatory issues related to EV deployment.

Through its partnership with the City of Chicago and the Chicago Area Clean Cities Coalition, Illinois is in the midst of installing one of the most comprehensive public charging station networks in the United States. In addition, collaborative efforts among local officials, business leaders, and educational institutions to create EVTown in Bloomington-Normal and to pass an EV infrastructure ordinance in Kane County serve as models for local EV initiatives throughout the nation.”

—*Illinois Electric Vehicle Advisory Council Final Report, December 2011*
• **Building a Network of Charging Stations** Currently, a primary barrier to widespread adoption of EVs is the vehicles’ limited range, as well as the local availability of charging stations. Most commutes to IGEN community colleges are within the range of current EV batteries, but in some cases, charging stations would need to be available at the colleges to complete the round-trip. By installing a charging station, Illinois community colleges can participate in building a network of charging stations in public locations and showcasing charging station technology.

• **Purchasing or Leasing Electric Vehicles for College Use** The purchase or lease of EVs for campus fleets can contribute to reducing a college’s carbon footprint—particularly if the college purchases electricity from renewable sources—and will also decrease fuel and maintenance costs.

**Providing Community Education**

Making a new car purchase can be overwhelming, especially when factoring in new technologies and tax incentives. Community colleges can help consumers understand what to expect when they purchase an EV. Installing a charging station on a campus simultaneously can add a hands-on layer to community education. Opportunities to educate the public about electric vehicles may include:

• Offering a workshop that covers EV technology, maintenance, and expectations, geared toward the consumer.
• Hosting a Q & A panel with representatives from EV manufacturers to allow consumers to ask specific questions about cost, rebates, length of charge, etc.
• Partnering with local car dealers to showcase their vehicles and offer test drives.
• Offering a course on how to convert a gas-fueled vehicle to an electric vehicle.
• Hosting a viewing of *Revenge of the Electric Car*.

A model for community education forums can be found in the series of EV Forums held around Illinois in April – June 2012, sponsored by DCEO and the American Lung Association. The forums were developed through the work of the state EVAC, and both Moraine Valley Community College and Southwestern Illinois College hosted forums. Please see Appendix D for the agenda of the forum hosted by Moraine Valley Community College.
Additional resources for offering EV community education in Illinois include:

- The **National Alternative Fuels Training Consortium**, based at the University of West Virginia, offers a wide array of EV trainings and has a training location in Illinois at Chicago Vocational High School.
- **ACE Technologies, Inc.**, offers professional training in partnership with community colleges focusing on converting vehicles to EVs. While the company is based in Kentucky, Texas and Michigan, it may be able to do training in Illinois.
- **Plug In America** (PIA) is a California-based nonprofit that grew from a group of EV enthusiasts into a nonprofit organization. The website has extensive information on EVs, and PIA hosts webinars to answer EV-related questions.

The following case study offers an example of community education conducted by one Illinois community college.

### CASE STUDY: Lake Land College Introduces the Community to Electric Vehicles

One aspect of Lake Land College’s sustainability role includes community education and outreach programs related to green technologies. Since 2008, the college has held an annual sustainability conference which showcases sustainability and renewable energy initiatives from the community. As part of the conference, various local car dealerships have demonstrated hybrid and other technologically-advanced vehicles, including EVs. Conference presentations have addressed the advantages of EVs and the technicalities associated with EV ownership. Highlights for participants included the reduced maintenance cost associated with EVs and the reduced cost of ownership due to lower fuel bills. To learn more about Lake Land College’s sustainability conference, contact Jeff Oder, Director of Sustainability, at (217) 234-5368 or joder@lakeland.cc.il.us.

### Offering Training to Support an Electric Vehicle Workforce

Courses related to EV technologies may be developed as part of a community college’s automotive program or incorporated into engineering and technical programs. As EV technology continues to emerge in Illinois, the community colleges should monitor workforce training needs and adapt curriculum as relevant.
Topics related to EV technology that might be incorporated into the community college curriculum include:

- The physics behind energy and power and the applications in transportation
- The adaptation of renewable or alternative energy sources
- Power and micro electronics
- Smart grid technology and battery storage

EV training could be incorporated into the curriculum of a number of certificates and degrees including Renewable Energy, Alternative Energy, Sustainable Energy, or Renewable Energy Management. As part of these courses, students could also convert an internal combustion engine vehicle to an EV. The case study below describes a vehicle conversion project at Lake Land College.

**CASE STUDY: Lake Land College Converts the “Lightning Bug”**

Lake Land College offers a course through its Automotive Technician program on hybrid vehicles, which share many similarities with pure EVs. One example of an EV conversion on a campus is the conversion Lake Land performed on its Volkswagen Beetle. Nicknamed the “Lightning Bug” by the college, it was converted from an internal combustion engine to a 96 volt DC electric drive with 16 Trojan deep cycle lead acid batteries, totaling approximately 13.9 KWh of energy. The Lighting Bug has a range of about 62 miles per charge, and a simple calculation shows its equivalent fuel consumption to be:

\[
\frac{62 \text{ mi}}{0.4 \text{ gal}} = 155 \text{ mpg}
\]

With a top speed of 66 mph, the Lighting Bug’s most efficient speed is 35 mph, and thus it has rather limited practical applications. However, painted in the school colors, it offers exceptional public relations and is a major attraction at events. To learn more about Lake Land College’s “Lightning Bug,” contact Jeff Oder, Director of Sustainability, at (217) 234-5368 or joder@lakeland.cc.il.us.

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An additional case study describes a co-curricular vehicle conversion project at Joliet Junior College.
CASE STUDY: Joliet Junior College Automotive Service Technology Program Converts Truck to EV

Joliet Junior College (JJC) continues its longstanding commitment to sustainability through two projects initiated by its Automotive Service Technology Program. The first project was the addition of a hybrid electric vehicle to be used as an enhancement to the curriculum. The second project was the conversion of an existing gasoline powered truck to battery-electric power as a student-driven, co-curricular activity.

The Hybrid 2007 Mercury Mariner vehicle was added to the automotive curriculum because it reflects technology that exists on the road today. The vehicle is used in multiple classes, as the hybrid technology affects many different operating systems on the vehicle. The students gain hands-on experience diagnosing and repairing the gasoline-electric powertrain and its related systems, and the experience and knowledge gained will serve the students well when they enter the workforce or transfer to a four-year university.

The conversion of the gasoline powered truck to battery-electric power is a co-curricular project sponsored by the JJC Automotive Service Technology Program. The students are removing all the components related the gasoline operation and replacing them with an electric motor, storage batteries, and the needed electronics to control the system. The vehicle has been engineered to operate at up to 40 mph for 40 miles before it needs to be recharged. When complete, the vehicle will be fully functional and legal to drive on the street. This unique, hands-on experience allows the students to understand the concepts behind the operation of the electric vehicle.

Both projects have been very well received by the students. The opportunity to work with emerging technology has generated a new level of excitement in the classroom and the desire to learn has increased as well. Even though the electric vehicle conversion project is extra-curricular and no grade is earned, over 90 students signed up to be a part of the project. These types of projects are one of the many reasons the enrollment in the automotive program remains at maximum levels. For more information about JJC’s projects, please contact Curt Ward, Associate Professor of Automotive Technology, at (815) 280-2554 or cward@jjc.edu.

Emergency Management Training

With the increase in EVs on the road comes a need for safety training about how to respond to automobile crash sites involving EVs. Emergency management training sessions addressing new car technologies are taking place across the state, as well as in current fire safety courses. For firefighters and first responders that have been in the workforce for some time, current “train the trainer” courses on electric/hybrid vehicle safety are being conducted nationwide as collaborations between local fire districts and the National Fire Protection Association (NFPA). The training sessions cover the electrical system design of new car technologies, the extrication process, risk of electric shock, handling new types of batteries, and challenges presented by
charging stations, as well as how to safely disable the system. The information for the sessions is based on the safety manuals that new car technology manufacturers are publishing for emergency responders. Examples of current manufacturer safety manuals can be accessed through the NFPA website listed in Appendix A.

This type of professional training is crucial as the number of EVs on the road continues to grow. Illinois community colleges can serve a pivotal role in providing a location host site for these “train the trainer” sessions. Community colleges interested in serving as location hosts should contact their local area fire district.

Building a Network of Charging Stations

For EVs to achieve market penetration, consumers need assurance that they will be able to drive their EV without “range anxiety”—the fear of depleting the battery and becoming stranded. The proximity of many community colleges to major interstate systems, as well as their role as community centers, makes them logical locations for public charging stations. Additionally, a community college network of charging stations would enable the colleges to move toward purchasing EVs to travel to and from other community colleges for intercollegiate events (e.g. athletic meets, conferences, or meetings), and would serve as a valuable educational resource for community members and students.

Current manufacturers of electric vehicle supply equipment (EVSE), or charging stations, include companies such as AeroVironment, Better Place, Clipper Creek, Coulomb Technologies, Eaton, ECOTality, General Electric, Leviton, and PEP Stations.² Coulomb Technologies, one of the largest charging station suppliers, was selected to install the stations in the Chicagoland area (see page 19). Its stations include a computer which allows charging for electricity, tracking station use, and connecting to the Chargepoint Network that allows drivers to locate the station.³ Both Heartland Community College and Lewis and Clark Community College installed Eaton charging stations. Certain manufacturers offer solar powered charging stations. To see the various brands and models of charging stations currently available, visit Advanced Energy’s Charging Station Technology Review for Plug-in Electric Vehicles.

To assist colleges in researching the optimal charging station option for their campuses, below is an overview of EVSE types and costs.

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² For an overview of companies offering charging stations, visit “Need an Electric Vehicle Charging Station?” http://www.plugincars.com/need-electric-car-charging-station-here-are-companies-are-building-them-49735.html
³ http://www.coulombtech.com/chargepoint-network.php
Charging Station Technologies and Costs

EVSE manufacturers offer numerous charging stations configurations and designs. A few basic factors to consider when selecting a charging station include whether the station will be indoors (garage) or outdoors (parking lot) and the desired recharge time. Outdoor equipment must be weatherproof, whereas an installation in a residential or public garage can be less robust.

Charging stations are rated as Level I, Level II, or Level III. The higher the level, the more rapidly the vehicle will recharge. The recharge time is a direct function of the voltage available at the installation site. More power means a quicker recharge, but necessitates more investment in the electric components of the charging station and connection to the electrical service. As the complexity of the charging station components increases, so does the cost.

Residential charging stations are typically Level I or Level II. The charging stations found at retail stores, restaurants, and other public areas are Level II, while Level III are commercial-grade charging stations that are designed for rapid charging at gas stations. **Level II charging stations are currently most applicable to community college campuses.** Below is additional detail on the available levels of charging stations.

- **Level I.** This is the most basic option, only requiring access to a three-prong, 120 volt, 16 amp circuit (usually available in a residential setting). A standard, three-prong extension cord may be used to connect the EV to the power source. The recharge time will be 8-10 hours for a full charge. This option does not involve investment in a “charging station” since it only involves connecting a three-prong drop cord from a wall outlet to the EV. But remember, it is slow!

- **Level II.** With this option, suitable for residential or commercial settings, access to a 240 volt, and up to 80 amp circuit, is required. Connection between the EV and power source requires an SAE J1772 specified plug. With a Level II, full recharge is obtained in 2 – 3 hours. This is expected to be the most typical installation.

- **Level III.** The typical design of the Level III charging station is still under development, but this set-up requires more than 240 volts and higher amperage. Level III stations will be limited to commercial installations such as highway rest stops, fleet garages, vehicle dealers, and fueling stops. Connection between the power source and EV will require specialized equipment to insure safety and prevent power overloads. The benefit will be a recharge time of less than 30 minutes.

- **DC Fast Charge.** DC Fast Charge stations differ from the above options in that they utilize direct current rather than alternating current. They will require a 480 volt, 100 amp circuit, and will provide a 30 minute full recharge. Specialized connections between the EV and power source will be required. As with Level III stations, these systems will typically be located at commercial sites. The DC Fast Charge
stations will be more costly due to the power supply requirements and specialized equipment components.

Typical Installation Configurations

In addition to various power levels, charging stations have various mounting characteristics. Standard installation configurations include a floor mount, or bollard-style charging station, a pole/wall mounted station, or a ceiling mounted station. Bollard and pole mount stations are discussed below.4

• **Floor Mount (Bollard Style).** This unit is mounted on the ground and wired through the base. Typically this style has the largest “footprint” and requires concrete work. While it offers the flexibility of being located anywhere, it must draw electricity from the nearest facility, and the installation costs vary based on how much site modification and electrical work is required.

• **Wall / Pole Mount.** This unit can be wired through the wall or pole mounting, requires less space, and allows relatively flexible placement options, making it a good choice for garage or carport installations.

Cost Estimate

The cost of purchasing a Level II charging station is estimated to be between $1,500 to $5,000, depending on the manufacturer, model and features. The cost is impacted by site characteristics, need for weatherization, mounting style, and pavement modification. Installation costs also range significantly depending on the degree of site modifications and rewiring required. Generally, a college would expect to spend between $4,000 and $10,000 on the installation. The case study below highlights the types of costs a college might expect.

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CASE STUDY: Heartland Community College Installs Two Eaton Level II Charging Stations

Heartland Community College installed two Eaton Level II charging stations on its Normal campus in December 2011. Through funding from the Energy Efficiency and Conservation Block Grant Program, the town of Normal purchased 33 EV charging systems to be installed in and around Normal. Organizations and businesses applied to the town’s Electric Vehicle Charging Station Grant Program to receive the stations free-of-charge. Through the program, the organizations were required to cover the cost of installation and maintenance and to offer the charging stations free of cost for at least 5 years.

Heartland installed the two stations outside of its Workforce Development Center (WDC) and Astron Community Education Center (ACEC), as these two buildings serve the community population most often. The college’s cost to install both charging stations totaled $17,480, which included labor, wiring and conduit trenching, electrical block and pouring a concrete pad. The WDC installation cost the college around $11,000 as the charging station wiring had to be run into an electrical room in the building, whereas the ACEC charging station was tied into the existing electrical line for the street lamp. The college does not expect maintenance costs to be significant unless physical damage occurs. The cost of offering free charging is also expected to be minimal due to the minimal power required to charge a vehicle and the limited number of electric vehicles currently on the road, although this is expected to change in coming years.

Heartland has put minimal policies in place to regulate the charging stations. Service is based on a first-come, first-served basis and once a vehicle is charging, it is expected that the vehicle owner will unplug and move the vehicle if necessary. Access to the chargers follows the building hours, so after 10:00 p.m., any cars left at the charging station will be towed. Since the charging stations are Level II stations, owners can expect to fully charge their vehicles in about four hours. The college’s location between two major interstates, I-55 and I-74, and high-quality and sustainably-minded campus facilities make it an ideal location to host sustainability focused meetings that span the four hour charging time. For more information about Heartland’s EV charging station installation, contact Adrienne Tucker, Associate Director of the Green Institute, at (309) 268-8238 or Adrienne.Tucker@heartland.edu.

The following case study from Lewis and Clark community college provides valuable lessons learned in purchasing an EV charging station.

CASE STUDY: Lewis and Clark Community College Installs Eaton Charging Station

In early 2011, Lewis and Clark Community College installed an Eaton brand EV charging station near the college’s facilities building. The station included one 240 volt spot for a full-sized electric vehicle. In the fall of 2011, the college also installed wiring on the west side of the Math and Science Education Center (MSEC) for an EV charging station. The installation cost was estimated around $11,000 as the wiring was to be run into an electrical room in the building, whereas the MSEC charging station was tied into the existing electrical line for the street lamp. The college does not expect maintenance costs to be significant unless physical damage occurs. The cost of offering free charging is also expected to be minimal due to the minimal power required to charge a vehicle and the limited number of electric vehicles currently on the market. However, the college held retrofit courses which taught people to retrofit their own vehicles to EVs, adding a 120 volt plug on their vehicles. In order for these users to utilize the charge station, they would need to purchase an extender. Due to both of these issues, this unit has not yet been installed.

In the future, the college would prefer to purchase a name brand unit, such as Coloumb through Lilypad, Carbonday or Clipper Creek, that will eventually talk to other units on campus. The unit purchased will accommodate web technology at a later date. For more information about Lewis and Clark’s EV charging station, please contact Marcia Lochmann, Director of Sustainability and Public Engagement, at (618) 468-4827 or mlochmann@lc.edu.

The following case study from Lewis and Clark community college provides valuable lessons learned in purchasing an EV charging station.

Purchasing or Leasing Electric Vehicles for College Use
Colleges must develop a climate action plan that addresses global warming and greenhouse gas emissions if they plan to participate in the American College and University Presidents’ Climate Commitment. The Clean Air Cool Planet Campus Carbon Calculator includes contributions from vehicle emissions due to students, faculty, and staff commutes. In many cases, daily commutes to the campus account for more than 65 percent of a campus’s carbon emissions. In addition to carpooling, public transportation, and online courses, use of EVs by members of a campus community can contribute to reducing a college’s carbon footprint, if renewable sources of energy are used. Likewise, in addition to environmental benefits, colleges will realize reduced fuel and maintenance costs by using EVs. Electric vehicles also offer benefits associated with a smart grid, in that EV batteries might be used to store energy produced at a home or business or offset peak demand for electricity.

**Environmental Benefits**

Critical to realizing environmental benefits through the use of EVs is sourcing the electricity from renewable sources. Comparing the emissions of a conventional internal combustion engine and an EV charged from a coal-fired power plant shows that there is only a slight reduction in emissions from an EV when coal is the electricity source. The calculation below compares the all-electric Nissan Leaf and an internal combustion engine vehicle that gets 33 miles per gallon. The assumptions are:

**Internal Combustion Engine**

\[
\begin{align*}
\text{22# CO}_2/\text{gallon of gas} & \quad \text{33 mpg} \\
\end{align*}
\]

**Nissan Leaf**

\[
\begin{align*}
\text{1.5# CO}_2/\text{KWh} & \quad \text{24 KW} h \text{ battery pack} \quad \text{60 mile range on 90% of charge, 85% charge efficiency} \\
\end{align*}
\]

**Emissions Per Mile:**

For the Internal Combustion Engine

\[
\frac{22\# \text{CO}_2/\text{gal of gas}}{33 \text{ mpg}} = 0.66 \# \text{CO}_2/\text{mile}
\]

For the Leaf

\[
\frac{24 \text{ KW} h \times 0.9}{0.85} \times \frac{1.5\# \text{CO}_2/\text{KWh}}{60 \text{ mi}} = 0.63\# \text{CO}_2/\text{mile}
\]

Note that there is a slight reduction of CO₂ emissions from an EV compared to a traditional vehicle when coal-fired electric plants are the electricity source; however, renewable energy sources must be used to achieve
significant reductions. As electricity in Illinois is increasingly generated by renewable sources, the environmental benefits of EVs will increase.

**Reduced Maintenance and Fuel Costs**

All commercially-available EVs are equipped with three-phase induction motors for the traction drive; therefore, there are no wear components associated with the motor other than the two main bearings. Unlike the internal combustion engine, there isn’t any oil to change, nor are there any spark plugs, air filters, or internal components in a three-phase induction machine. Maintenance for an EV should therefore be minimal when compared to an equivalent model powered by a gasoline engine.

The cost of fuel for the same EV will come in lower than a gasoline car as well. Comparing fuel cost for an EV and a conventional internal combustion engine vehicle shows this savings. The assumptions are:

**Internal Combustion Engine**

33 mpg, Gasoline $3.30/ gallon

**Nissan Leaf**

24 KWh Battery pack, 60 mile range on 90% of charge, 85% charge efficiency, $0.12/KWh

For the Internal Combustion Engine

$$ \frac{3.30 \text{ per gal}}{33 \text{ mpg}} = 0.10 \text{ per mile} $$

For the Leaf

$$ \frac{24 \text{ KWh} \times 0.9}{0.85} \times \frac{0.12/\text{Kwh}}{60 \text{ mi}} = 0.05 \text{ per mile} $$

As shown, the fuel cost per mile for the EV is half that of a similar car powered by gasoline, and combined with reduced maintenance costs, the overall ownership cost of an EV should be comparable with that of a conventional vehicle. The diagram on the next page depicts some of the costs and benefits of EVs compared with traditional gasoline powered vehicles.
CASE STUDY: Lake Land College Uses Electric Golf Carts On Campus

Included in the vehicle fleet at Lake Land College are nine electric powered golf carts used by the physical plant and one “presidential” golf cart. Currently Lake Land is in the process of converting the presidential golf cart to solar power, helping to reduce the campus’s carbon footprint and demonstrating Lake Land College’s commitment to sustainability. This effort mirrors a major push by colleges and universities around the country to run campus golf carts on solar power. To accomplish this, solar photovoltaic panels are installed on the cart’s canopy, connected to the batteries through a charge controller. Depending on the usage, these solar powered golf carts should never need to be plugged in again! After Lake Land converts the presidential golf cart, the college plans to follow with converting the remaining golf carts used on campus. For more information on Lake Land’s electric powered golf carts, contact Jeff Oder, Director of Sustainability, at (217) 234-5368 or joder@lakeland.cc.il.us.
Illinois Electric Vehicle Advisory Council (EVAC)

In July 2011, Governor Quinn signed two bills into law concerning EVs, the first of which created an Electric Vehicle Coordinator position within the Department of Commerce and Economic Opportunity (DCEO) and an Electric Vehicle Advisory Council (EVAC) (HB2902). The second law (HB2903) developed a grant available to car sharing programs to incorporate EVs into their vehicle fleets.

The EVAC was tasked with investigating and recommending “strategies that the Governor and the General Assembly may implement to promote the use of electric vehicles, including, but not limited to, potential infrastructure improvements, state and local regulatory streamlining, and changes to electric utility rates and tariffs” (Public Act 97-0089). The EVAC was comprised of diverse stakeholders including representatives from local governments, Illinois state agencies, electric utilities, charging station providers, automobile manufacturers, car share programs, and nonprofit environmental organizations. A member of the IGEN Electric Vehicle Task Force also participated in the EVAC.

The EVAC submitted its final report to Governor Quinn and the Illinois General Assembly on December 30, 2011, which is included under Appendix C of this white paper. Broad recommendations of the EVAC final report included:

- Encourage and facilitate EV infrastructure installation
- Encourage EV purchases and charging infrastructure development through incentives
- Promote efficient and renewable electricity use by EVs
- Educate the public on EVs, their use and benefits
- Support the EV and EVSE industry and associated job creation in Illinois

IGEN and institutions of higher education are specifically named in the following report recommendations:

4.9: “Educational institutions and providers and IGEN should provide information on EVs to their students and communities.”

5.5: “DCEO, universities, colleges, and IGEN should train new and current members of Illinois’ workforce with the knowledge, skills, and expertise that EV/EVSE businesses are seeking. Initiatives to provide this training should include:

- Establishing partnerships between businesses and community colleges, and designing curricula and degree programs to provide education tailored to employers’ needs; and
- Utilizing IGEN to replicate successful training and education models throughout the community college network.”
IGEN and its member colleges can support the work of the EVAC and encourage statewide implementation of the EVAC recommendations. Community colleges can play a role in community education and workforce development, infrastructure installation, the purchase of EV vehicles for campus fleets, and by establishing goals for employee EV use.

Cook County/Chicago Charging Station Installation

The City of Chicago, with the support of state funding and federal grant dollars from the American Recovery and Reinvestment Act, contracted with 350 Green to install 280 electric vehicle charging stations in-and-around Chicago. The I-GO car sharing organization also installed charging stations and purchased EVs to incorporate into its fleet. Eighteen solar powered charging stations were being installed with assistance from DCEO, the Chicago Area Clean Cities Partnership, and the Illinois Clean Energy Community Foundation. The solar powered charging stations will accommodate I-GO vehicles as well as private vehicles.

Electricity Utilities

Electric utilities may have electric vehicle initiatives, and it may be possible to partner with them on charging station installations. According to its website, ComEd focuses on four areas for charitable giving including the environment. However, community colleges would not currently qualify for ComEd grants; qualifications include being a 501(c)3. Ameren’s grant program also limits eligibility to 501(c)3 organizations. ComEd offers resources on EV technology and purchase.

POTENTIAL FUNDING SOURCES

State Incentives/Grants

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Fulfilling a recommendation in the EVAC report, in May 2012, DCEO announced a rebate program for the installation of charging stations by public or commercial entities or individual property owners in Illinois. Qualifying organizations include municipalities, businesses, educational institutions, and nonprofits, as well as owners of single- or multi-unit residential buildings. The rebate covers 50 percent of the equipment and labor costs to install a Level II charging station up to a maximum of $3,500 for publicly accessible stations or $3,000 for non-publicly accessible stations. While the deadline to apply this fiscal year is June 15, 2012, DCEO anticipates reopening the rebate program next year. For the rebate guidelines and application packet, visit the DCEO Electric Vehicle website.

Additionally, the Illinois Environmental Protection Agency Green Fleets program provides a $4,000 Alternate Fuels Rebate to an individual, business, local government unit, school, or organization on the purchase of an EV. As of December 2011, eligible vehicles included the Nissan Leaf, Chevrolet Volt, Mitsubishi i-MiEV, and Ford Focus Electric.

Federal Incentives/Grants

*Current:* Individuals and private-sector businesses receive a $7,500 federal tax rebate on the purchase of an EV. Community colleges are not eligible for this rebate as they do not have a tax liability. However, recommendation 2.4 of the EVAC report is for the Governor’s Office, state agencies, and the Illinois’ Congressional Delegation to encourage conversion of the rebate to a point-of-sale discount so that entities without a tax liability, such as community colleges, can also benefit.

*Department of Energy:* In 2011, the United States Department of Energy (DOE) offered $8.5 million in funding to Clean Cities partnerships under the Clean Cities’ Community Readiness and Planning for EVs and charging stations. Clean Cities partnerships are DOE-recognized public and private partnerships that “advance the nation’s economic, environmental, and energy security by supporting local actions to reduce petroleum consumption in transportation.” 2011 Clean Cities funding was not awarded in the state of Illinois. Community colleges, independent of the Clean Cities programs, are not eligible for DOE funding under this grant program. Community colleges as public partners could potentially join a Clean Cities coalition.

OTHER ELECTRIC VEHICLE INITIATIVES

ChargePoint America
ChargePoint America was a $37 million program funded by the American Recovery and Reinvestment Act and administered by the U.S. Department of Energy. Coulomb Technologies, a charging station manufacturer, received the grant to provide 4,600 free, networked, Level II charging stations to companies and municipalities in ten metropolitan regions across the country. The goal was to install the charging stations in a variety of settings including public places, private garages, airports, train stations, malls, movie theatres, rental car agencies, restaurants, and other likely locations where owners of electric vehicles park their cars and need to charge. The metropolitan areas included:

- Austin
- Boston
- Los Angeles
- New York
- Orlando/Tampa
- Sacramento
- San Jose/San Francisco Bay Area
- Redmond/Beaverton, Washington
- Washington DC/Baltimore
- Southern Michigan (including Grand Rapids, Lansing, Ann Arbor, Detroit)

Currently, all of the charging stations have been distributed, and it is unclear whether DOE will replicate this initiative in other regions in the future.

**ChargePoint Network**

Coulomb Technologies also maintains the ChargePoint Network, an online network which connects EV drivers to charging stations. This network currently includes more than 120 charging stations in Illinois and more than 1,300 nationwide. Locations can be viewed on the “Find Stations” page of the ChargePoint Network website. The network of charging stations is accessible through the Internet and through smartphones, allowing users to easily identify if locations are available in real-time. The charging stations can also be setup to accept reservations if desired. Most charging stations in Illinois are open to the public and free of charge, but they can be setup to accept credit cards for payment if desired. A variety of reports can be generated to identify usage, greenhouse gas and gasoline savings.

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8 [http://chargepointamerica.com](http://chargepointamerica.com)
8 [http://carbondayautomotive.com/?page_id=212](http://carbondayautomotive.com/?page_id=212)
Carbon Day Automotive

Carbon Day Automotive is the Midwest distributor for the ChargePoint Network, as well as a distributor of EV infrastructure. Carbon Day Automotive offers multiple types of charging stations (Level I, Level II) that can be mounted in several manners (wall, pole, or bollard mount), and the networked charging stations offer the capability to charge for the electricity and provide usage reports.

TASK FORCE RECOMMENDATIONS

For the Illinois community colleges to maximize their role in advancing EV technology and infrastructure across the state, the Electric Vehicle Task Force makes the following recommendations.

1) Community colleges should partner with area auto dealers and EV industry representatives to host events on their campuses that introduce the public to EV technologies and help consumers feel more comfortable with an EV purchase. The colleges can additionally incorporate EV technologies into existing sustainability-related forums they offer for the community, such as sustainability conferences and Earth Day fairs. Colleges might host a Q & A panel with representatives from EV manufacturers; showcase vehicles and offer test drives; or offer workshops for community members that cover EV technology, maintenance, and expectations.

2) Community colleges should monitor workforce development needs related to emerging EV technologies and adapt course offerings to accommodate these needs. This training may fall under Automotive Technology and Electric Technology programs, or may involve additional disciplines. For example, the colleges might partner with first responder entities to develop training on the hazards associated with EVs in automobile accidents. Automotive programs can incorporate alternative-fueled vehicles into their programs, and students might convert an internal combustion engine vehicle to an EV, perhaps even a vehicle in the campus fleet. Colleges should also consider providing instruction on how to convert a gas-fueled vehicle to an EV. Additionally, because EV technology correlates to smart grid technology, education may be offered to address both. The IGEN EV Task Force might conduct additional research on training needs and experts available to meet these needs. As workforce development needs arise, IGEN may consider providing training through IGEN member colleges on a network level.

http://carbondayautomotive.com
3) IGEN should continue to educate community college sustainability professionals, facilities directors, and administrators about EV technology to help the colleges evaluate the pros and cons of an EV purchase. The IGEN EV Task Force should compile information and calculators on the total cost of ownership for an EV versus a traditional internal combustion engine vehicle. Such a resource would be valuable to colleges as they make vehicle purchasing decisions. In addition, IGEN should invite an industry expert to address the IGEN membership at an IGEN retreat.

4) Community colleges should aim to install EV charging stations on their campuses to support the Governor’s statewide network plan and to provide visible demonstration units in their communities. IGEN might consider pursuing a “bulk purchase” of EV charging stations with interested community colleges, taking advantage of available state rebates. A first step might be to conduct a survey of IGEN colleges to gauge interest in a potential facilitated purchase and to determine if colleges would be willing to make up the cost differential for equipment and installation. In tandem with installing charging stations, colleges should continue to increase the percentage of renewable energy they purchase in order to realize the environmental benefits from EVs.

5) Incorporate EVs into college vehicle fleets. As campus vehicles need to be replaced, colleges should consider purchasing or leasing EVs. This might include vehicles in the facilities department, security vehicles, vehicles for employee use, or golf carts for transportation around campus. If the IGEN Electric Vehicle Task Force conducts a survey of IGEN colleges, this survey might also gauge interest in a facilitated purchase of electric golf cart vehicles, or EVs for employee or athletic use by colleges in the same geographic area, so that the vehicles could be driven between campuses and recharged.

6) IGEN and Illinois community colleges should support the work of the state EVAC and the implementation of the EVAC recommendations. A representative from the IGEN EV Task Force should continue to participate in the EVAC to ensure maximum communication and collaboration between the two groups. IGEN might formally communicate the network’s support for the EVAC recommendations and the interest from IGEN community colleges in playing a role in advancing EV technology in the state through the actions outlined in this white paper.

APPENDIX A: ADDITIONAL RESOURCES
AASHE Campus Electric Vehicle Fleets Website
http://www.aashe.org/resources/campus-electric-vehicle-fleets

AASHE Discussion Forum on EV Charging Stations
http://www.aashe.org/forums/charging-stations-electric-cars

Advanced Energy Website: Charging Stations
http://www.advancedenergy.org/transportation/charging_stations

Better Place Website: Battery Switch Stations
http://www.betterplace.com/the-solution-switch-stations

Carbon Day Automotive
http://carbondayautomotive.com

ChargePoint America
http://chargepointamerica.com

ChargePoint Network
http://www.chargepoint.net

ComEd Electric Vehicle Resources
https://www.comed.com/technology/electric-vehicles/Pages/default.aspx


DriveElectricIllinois.org: Illinois Electric Vehicle Forums
http://driveelectricillinois.org

Electric Vehicle Charging Solutions Brochure: Schneider Electric

EV Town: Bloomington–Normal, Illinois
http://www.evtown.org

Illinois Department of Commerce and Economic Opportunity (DCEO) Electric Vehicle Website
http://www.ildceo.net/dceo/Bureaus/Energy_Reycling/ev.htm
APPENDIX B: ACKNOWLEDGEMENTS

The Illinois Green Economy Network Electric Vehicle Task Force wishes to acknowledge the hard work of all of the Task Force members, who were integral in researching and writing this report. The members included:

- Elizabeth Koprowski, Prairie State College (Facilitator)
- Jeffrey Oder, Lake Land College (Facilitator)
- Joe Beuchel, Triton College
- Anthony Corso, Illinois Central College
- Cassie Blickem, Waubonsee Community College
- Allesandra Cairo, IGEN (IGEN Staff Liaison)
- Angela Davis, Danville Area Community College
- Richard Schultz, Kankakee Community College
- Karen Stallman, Southwestern Illinois College
- Adrienne Tucker, Heartland Community College
APPENDIX C: ILLINOIS ELECTRIC VEHICLE ADVISORY COUNCIL FINAL REPORT (DEC. 2011)


APPENDIX D: AGENDA FOR ELECTRIC VEHICLE FORUM (MORAINE VALLEY COMMUNITY COLLEGE)

The agenda for the Electric Vehicle Forum at Moraine Valley Community College, which may provide a model for other community colleges, is at: http://www.lung.org/associations/states/illinois/indoor--outdoor-air/drive-electric-illinois.pdf