Electric vehicles and chargers: A fact sheet for property owners

Roughly a dozen different electric vehicle models are available today, and potentially dozens more are expected on the market from a variety of manufacturers in the next few years. Electric vehicles (EVs) are a rapidly expanding market, and will play a key role in reducing emissions and fostering energy independence in the near future. The region and the nation also gain additional economic development benefits because EVs use American energy including renewable energy, while 50% of petroleum is imported at high cost.

Electric Vehicles run on batteries alone and travel 75-300 miles depending on the vehicle model. Plug-in Hybrid Vehicles (PHEVs) travel 15-40 miles on electricity and 300+ miles on gasoline. 80% of vehicle trips in the U.S. are less than 40 miles per day. This means EVs and PHEVs are well suited to greatly reduce petroleum use.

In order to facilitate the adoption of EVs across Colorado, we need to take advantage of opportunities to prepare for EV infrastructure now. EV charging involves electrical conduit and wiring, which is much cheaper to add during construction or remodeling than after the fact. If you are considering EV charging, CLEER can assist with technical knowledge and advice whether you’re doing a remodel or new construction.

What’s the energy cost? Electricity costs of driving a plug-in hybrid or electric vehicle is roughly $0.03/mile. 10,000 miles annually uses 3,000 kWh. This costs about $25/month or about 75% less than using gasoline.

Electric Vehicles can charge in several ways:

AC Level I – “Wall plug” charging, equivalent to running a hair dryer (120V).
  • Recharges roughly 5 miles of driving range for each hour plugged in.

AC Level II – Special electric car plug, equivalent to a clothes dryer (240V).
  • Recharges roughly 25–50 miles of driving range for each hour plugged in.

DC Fast Charging – Electric car charging unit, uses direct current (DC).
  • This option charges rapidly – roughly 100 miles for each hour.
  • Use will likely be limited to gas stations, city centers, etc.

Recommendation from CLEER/GCE to prepare for Electric Vehicles:
  • If paving sidewalks or parking lots, install low-cost electrical conduit to certain parking spaces.
  • Plan to have spare capacity in electrical panels for addition of 120V or 240V circuit breakers.
  • One empty conduit ending between 2 parking spaces is sufficient—you can charge a car in the left or right parking space from a single charger or wall plug.
  • In the near term, install a few “household wall plugs” and give away energy at minimal cost. Charging an EV 10 hours per day using a wall plug costs roughly $1 per day. The City of Rifle already has wall plugs for electric cars in its parking garage, primarily used by city-owned EVs.

Will I incur energy costs if no cars charge? There should not be any monthly costs from your electricity provider for unused electric capacity until you actually begin to see demand from electric vehicles. Upfront costs are limited to hardware, eg. the cost of electrical conduit installed. Further, since Level II chargers can bill vehicle owners directly for energy consumed, you need not bear any energy costs.
Additional information: Providing Electricity to Electric Vehicle Charging Stations

AC Level I
- Recharges roughly 5 miles of driving for each hour plugged in.
- “Wall plug” charging, equivalent to running a hair dryer.
- Dedicated 125V 15A or 20A branch circuit (~1500 Watts, ~$0.15 per hour).

This level is very basic and because of the low amount of energy transferred, very few charger companies offer a “point-of-sale charger” that accepts payment. As a result, this charging is often done with a simple wall plug. In many locations, Level I charging is offered for free.

- Energy cost per hour for a charging vehicle is roughly $0.15. Over a 10-hour parking period, the maximum amount of energy used by a vehicle at a charging station is $1.50 per day.*
- In the near term, provide energy at minor cost using low-cost wall plugs (Level I).
- In the long term, you can remove Level I wall plugs and replace them with faster Level II chargers operated by a 3rd party.

AC Level II - EVSE (Electric Vehicle Service Equipment)
- Recharges roughly 25–50 miles of driving for each hour plugged in.
- Industry-standard electric car plug, equivalent to using an electric clothes dryer.
- Dedicated 240V 40A (typical) branch circuit (~7000 Watts, $.70 per hour).

- All automakers now use a standardized plug (SAE 1772) (image at right)
- Level II likely to be the most common for public parking.
- Level II will also be commonly installed by homeowners in garages at a cost of $1,000 or so if the EV owner wants faster recovery of charge than can be offered by a wall plug. (In other words: anyone who drives more than 40 miles per day on electricity and wants to fill up faster than 8 hours is going to desire access to a Level II charger).

What about chargers at multi-family housing? Multi-family housing requires careful attention to the specific property’s layout. A key step is to determine if sufficient electrical capacity exists near parking areas. Contact Mike Ogburn at CLEER for advice or work with an electrician to determine the options for your facility.

Can I sell electricity to cars? The resale of electricity to electric cars is now permitted in Colorado. HB 1258 passed the Colorado legislature April 24th, 2012, allowing charging stations to re-sell energy to electric vehicles. Previously, electric charging stations sold a parking space by the hour regardless of energy use.

How long does it take to fill up each day? It depends! Electric cars and plug-in hybrid cars are typically charged on a daily basis and therefore often start charging when they are partly full. For example: if you fueled your gasoline car daily, you might need 1 gallon each evening. Similarly, a plug-in car battery may be full in just a few hours from a wall plug. On the other hand, if daily driving results in an empty battery every day you might want to install a Level II charger for faster recharging. A Level II charger refills 50+ miles in just 2 hours!

* General note on providing energy to vehicles: Do not assume that every car arrives at a charge station empty when forecasting energy usage. A vehicle that drove two miles to your charge station may only need to charge up those two miles using roughly $0.06 worth of energy. On the other hand, some drivers who arrive empty with an all-electric car with 100 miles of range may require as much as $3 in energy over a 24-hour period of charging from a Level I plug.

ALSO: Visit the Garfield Clean Energy EV page: http://www.garfieldcleanenergy.org/trans-EV.html
Check out the Colorado Clean Cities EV page: http://www.electricridecolorado.com
For more information, contact CLEER: info@cleanenergyeconomy.net or call (970) 704-9200