

Alternative Fuel Vehicles Trends And Issues



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Presented to the
Regional Utilities Committee
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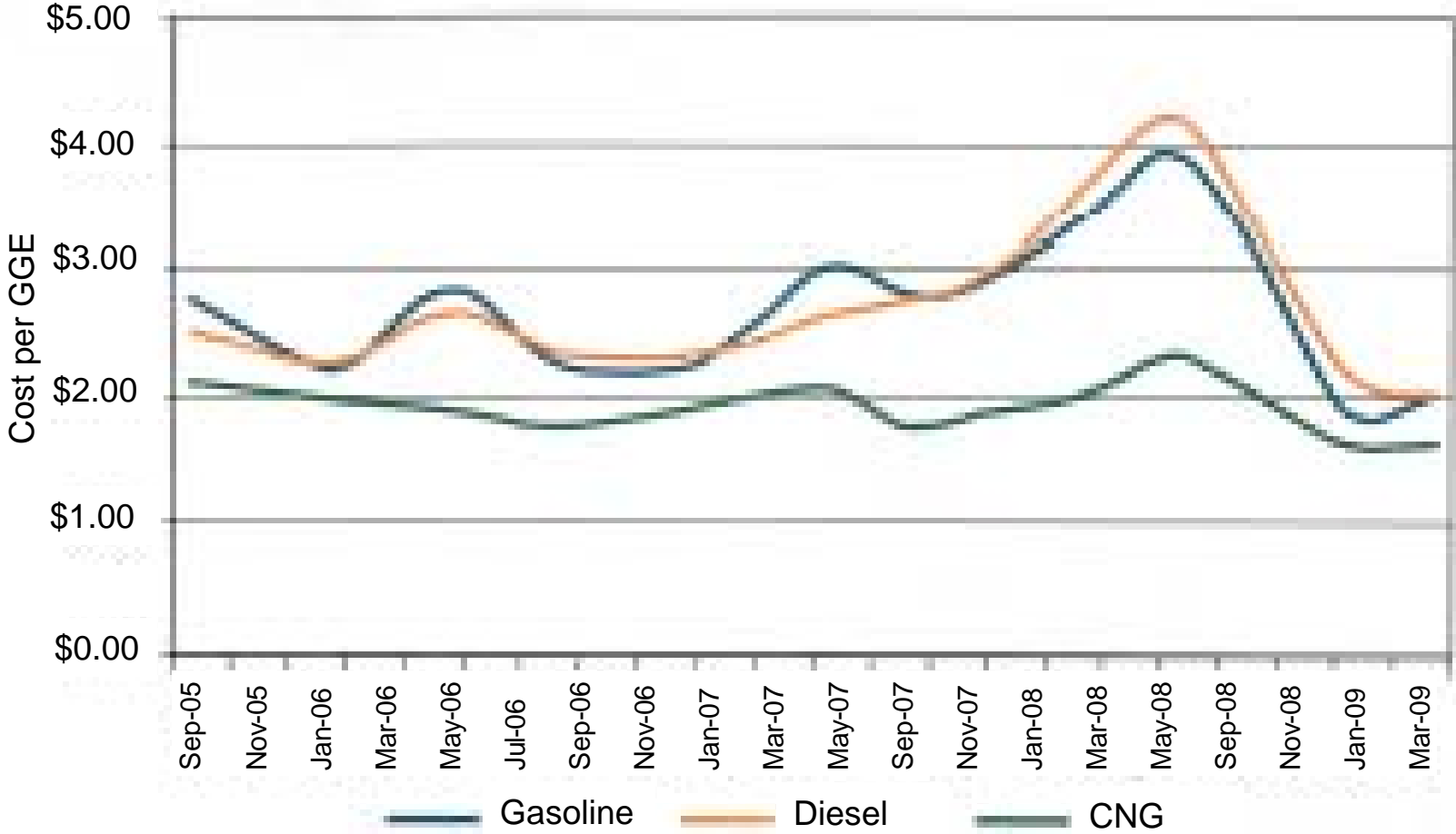


Presentation Outline

- Fuel Costs
- CO₂ Emissions
- Market Trends
- Electric Vehicle Charging Issues
- City/GRU Programs
- Discussion

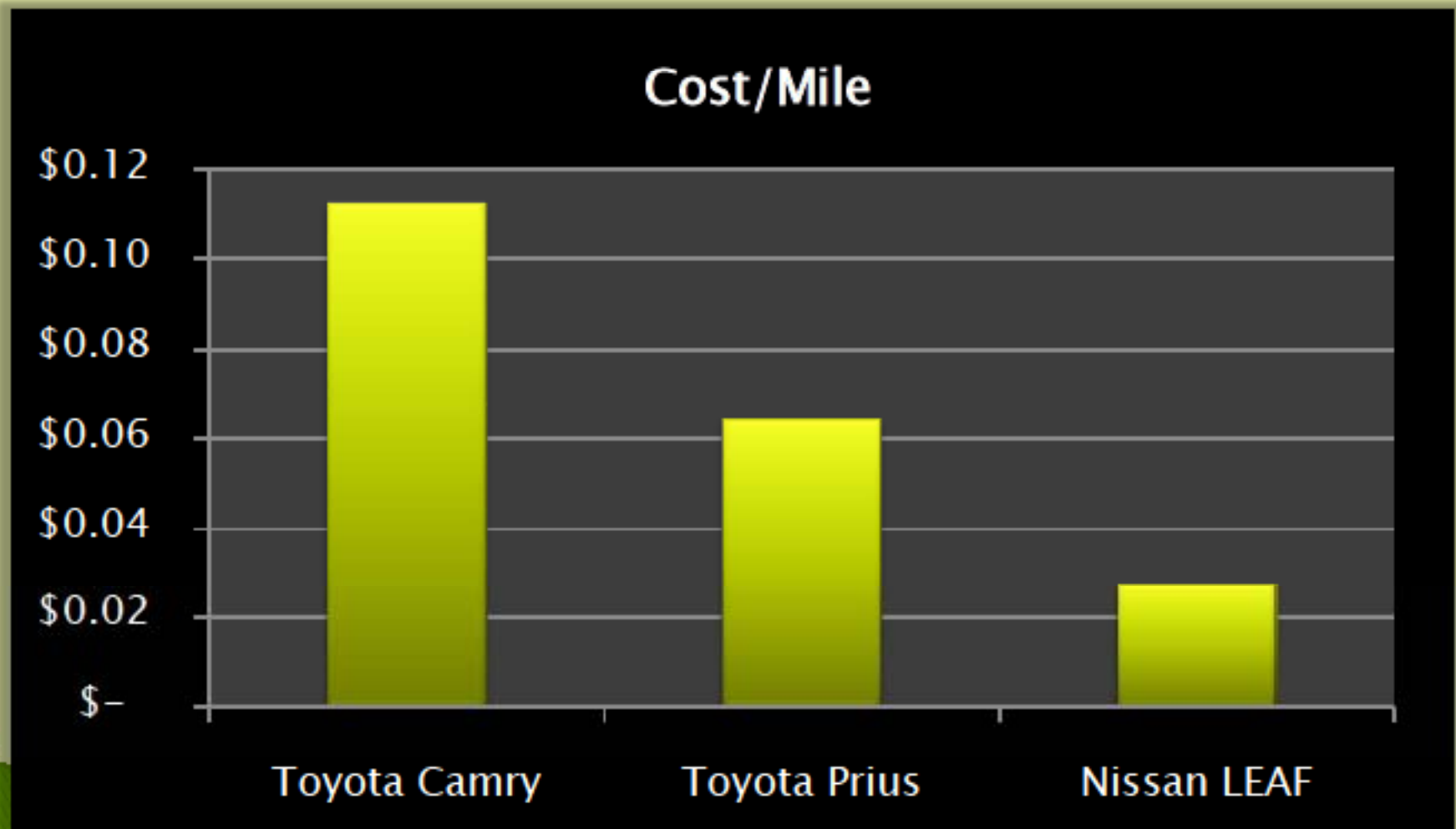
Nationwide Average Retail Gasoline, Diesel and Natural Gas Prices

(GEE – Gasoline Gallon Equivalent)



Reference: U.S. Department of Energy, April 2010

Comparing “Fuel” Costs



Source: OUC 2011

CO₂ Emission Comparisons

Fuel Type	Efficiency	Annual Tonnes-CO₂
Gasoline	20.4 mi/gal	5.38
CNG	28.0 mi/gal equiv (includes compression electricity)	4.29
Electric Mid-Range	345 Watt-hrs/mi	3.66

Assumption: 240 miles/w eek

EPA IPCC Emission Factors

Source: GRU Strategic Planning

Alternative Fueled Vehicles In Use In The United States 2003-2008

(By Fuel Type)

Fuel Type Configuration	2003	2008	Average Annual Growth Rate
Compressed Natural Gas (CNG)	114,406	113,973	-0.1%
Electric*	47,485	56,901	3.7%
Ethanol, 85 Percent (E85)	179,090	450,327	20.3%
Hydrogen	9	313	103.4%
Liquefied Natural Gas (LNG)	2,640	3,101	3.3%
Liquefied Petroleum gas (LPG)	190,369	151,049	-4.5%
Other Alternative Fuels	0	3	n/a
Total Vehicles	533,999	775,667	7.8%

*Excludes hybrids as they are not deemed “alternative” by DOE. Hybrids in use:

2006	252,000	
2011	2,000,000	(50% annual average compound growth rate)

2012 USA Electric Vehicle Market

(170,000 Vehicles)

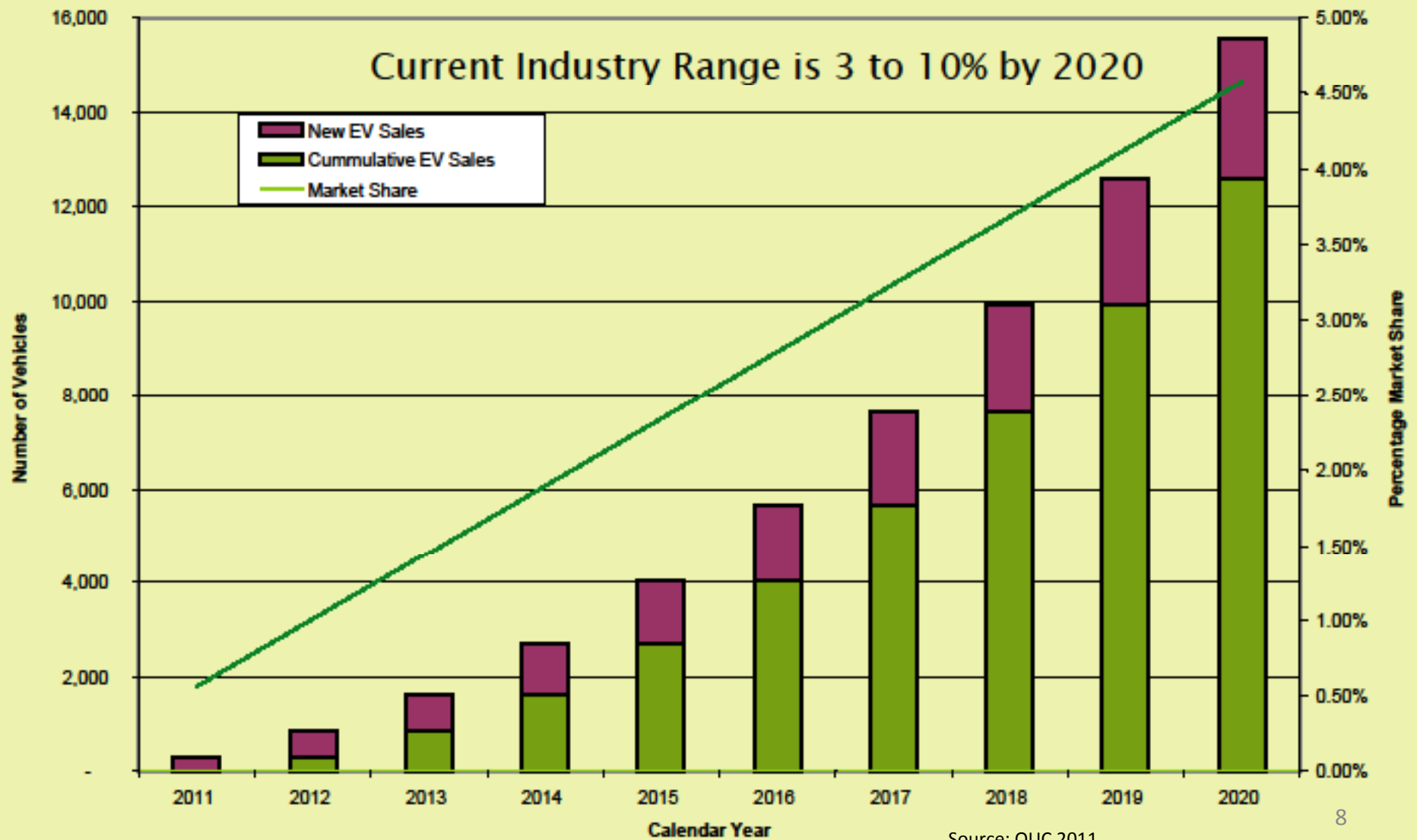
Automaker	Model	Car Type	2012 Production for the USA Market	Price*	Driving Range (miles)
Nissan	Leaf	Battery Electric	60,000	\$32,780	100
Chevy	Volt	Plug-in Hybrid	60,000	\$39,995	40 elec, 500 gas
Ford	Focus	Battery Electric	15,000	\$34,000 (est.)	100
Tesla	Roadster	Battery Electric	1,000	\$110,000	240
Toyota	Prius	Plug-in Hybrid	5,000	\$27,000 (est.)	14 elec, 600 gas
Honda	Fit	Battery Electric	500	\$28,000	70
Mitsubishi	iMiEV	Battery Electric	27,990	\$27,990	80
Smart	Fortwo ED	Battery Electric	250	\$28,752	84
Fisker	Karma	Plug-in Hybrid	500	\$90,000	50 elec, 300 gas

*Price is exclusive of \$7,500 tax credit

Source: Clean Fleet Report, totaling 170,000 vehicles in 2012.

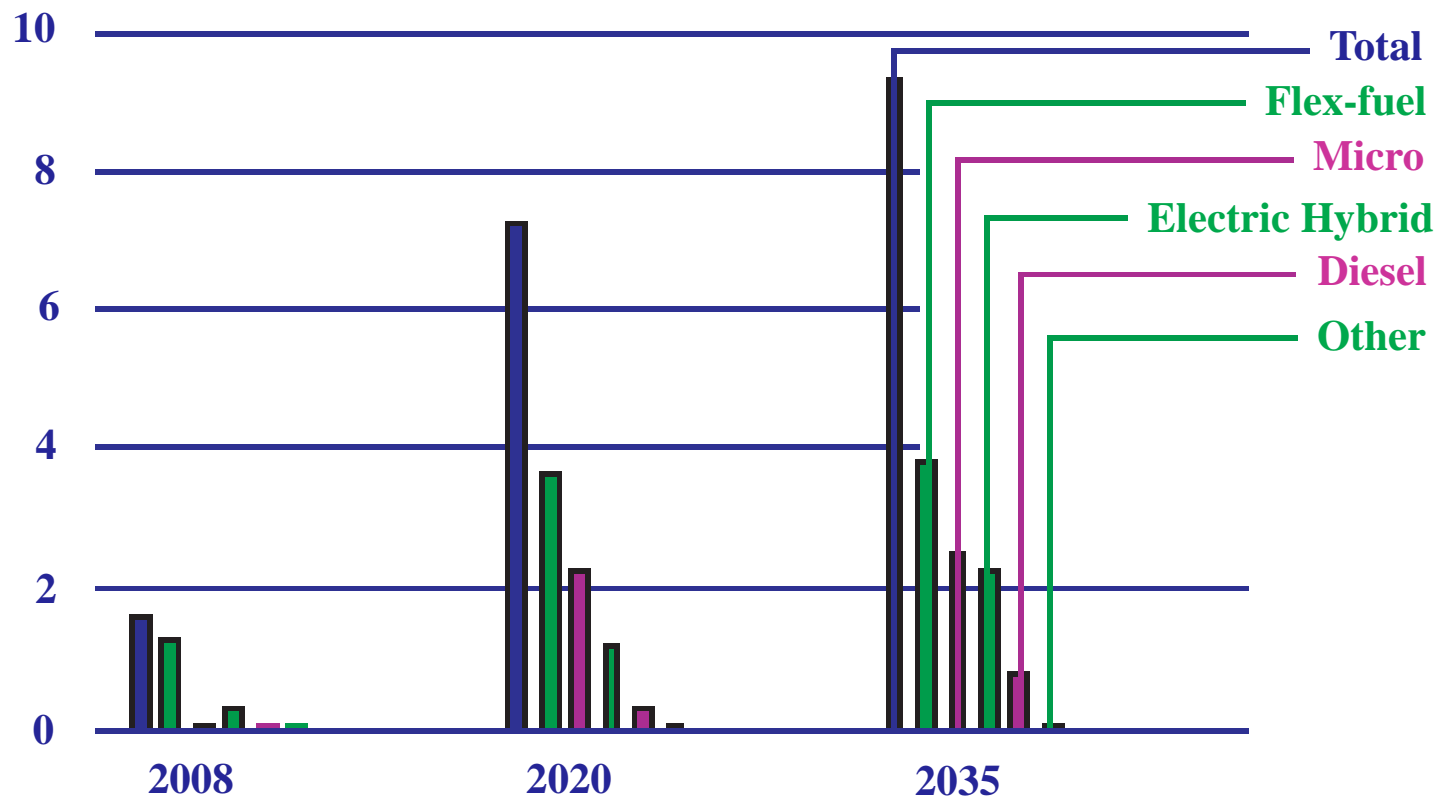
<http://www.cleanfleetreport.com/clean-fleet-articles/top-electric-cars-2010/>

EV Sales Forecast within OUC Territory



Source: OUC 2011

Unconventional Vehicle Technologies Approach 50 Percent Of Sales In 2035



Reference: U.S. Energy Information Administration/ Annual Energy Outlook 2010

Charging Locations and Anticipated Usage



Source: OUC 2011

Alternative Fueling Stations in Florida

Biodiesel 20	15
Compressed Natural Gas	16
Ethanol 85	56
Electric Vehicle Plug In*	124
Hydrogen	0
Liquefied Natural Gas	0
Liquefied Petroleum Gas	69
TOTAL	280

* Does not include residential electric charging infrastructure.
U.S. Department of Energy – Energy Efficiency and Renewable Energy
Station data last updated on 7/31/2011

Charging Stations (EVSE)

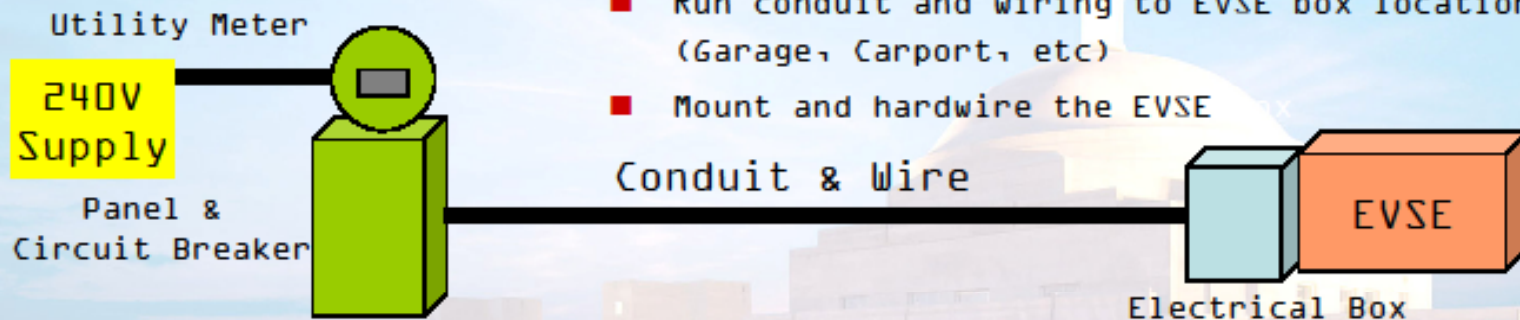
Type	Power Level	Full Charge Time (LEAF)	Customer Needs
Level 1 -120 V	1.4 KW	18 Hrs	Trickle Charge
Level 2 (LOW) 240 V	3.3 KW	6-8 Hrs	Daily Charge
Level 2 (HIGH) 240 V	7.2 KW	3-4 Hrs	Daily Charge
DC Fast Charge 480 V	50 KW +	20-30 Min	Fast Charge

Source: OUC 2011



RESIDENTIAL EVSE INSTALLATION

- Level 2 EVSE
- Add a dedicated 40A circuit breaker
- Run conduit and wiring to EVSE box location (Garage, Carport, etc)
- Mount and hardwire the EVSE



<u>Breaker / Panel Upgrades</u>	<u>Installation & Materials Cost</u>	<u>EVSE</u>	TOTAL
\$50 - \$725	\$125 - \$700	\$500-\$700	\$675-\$2125



EV Charging Business Models

Utility-Driven

- Utility owns EVSE and charges for KWH or a flat monthly fee

Customer-Driven

- Customer purchases EVSE from retailer or auto dealer and connects behind the meter

3rd Party- Driven

- 3rd party owns and installs EVSE and leases to customer or provides onsite “charging service” to users

Source: OUC 2011

Rate Considerations for Electric Vehicles

- Charging the cars is a high demand activity, drawing a lot of power all at once.
- GRU would like the EVs' load at night, when total load is down, but many will need to also, or only, charge during the day when the vehicle is in use.
- Ensuring any special rates/meter created for EVs are only used for charging and not household use options under considerations.
 - Time of use
 - Lower Electric Vehicle Rate to promote EV use
 - Demand and Energy structure rate

Support Required from Local Government

Support
Public
Charging

Train First
Responders

Streamline
Permitting

Revise
Building
Codes

One Utilities' Approach

LIPA **Plug-in** Electric Vehicle Rebate Program

Plug-in Electric Vehicle (PEV) technologies allow vehicles to plug into the electric grid to charge their high capacity batteries to better utilize the vehicle's electric motor while driving. This results in a vehicle capable of achieving very high fuel economy, in some cases exceeding 100 miles per gallon of gasoline, at a reduced vehicle fueling cost and with reduced tailpipe emissions. **There are 2 types of plug-in electric vehicles:**

A Plug-In Electric Vehicle (PEV) is powered by an all electric motor rather than a gasoline engine and must be connected by a plug to the electric grid. A PEV is also combined with rechargeable batteries that can be restored to full charge by connecting a plug to an external electric power source.

A Plug-In Hybrid Electric Vehicle (PHEV) has an electric motor, rechargeable batteries and an internal combustion engine; and therefore, is not entirely dependent on plugging into the electric grid as a fuel source.

- [Download the Rebate Application Form](#) (PDF)
- [Frequently Asked Questions](#)
- [Read LIPA's Press Release](#)
- [Watch the Press Event on YouTube](#)
- [Get More Information](#)



One Company's Solution

Coulomb Technologies ChargePoint™

Plug-in Electric Vehicle Charging Stations

Product family includes

- Pole-mount
- Wall-mount
- Bollard Stations



All models available in 110v 15A or dual mode 110v/220v 15A-80A versions

Purchase cost – Installed cost estimated at \$8,000 - \$10,000 per station

New Level III Quick Charge Station

- Small electric vehicle charge in 15 minutes
- Cost unknown

ChargePoint™ Stations Provide

- Method to pay for electricity, maintenance and capital
- Value to station host – host receive a payment based on station use
- Authorization access to eliminate energy theft
- Specialized safety features to reduce liability
- Elimination of cord theft
- Web based portals for subscribers, hosts and the utility
- Reporting – station monitoring and diagnostics
- Fleet recharging management
- Aggregated carbon credit management

ChargePoint™ Network Subscriber Plans

Account set up fee - one time \$2

Subscription - basic access fee + plan fee

- Plans costs vary depending on:
 - When you charge (day, night, anytime)
 - Number of sessions per month
- Plan costs range:
 - Approximately \$25 per month for up to 10 nighttime charges per month
 - About \$70 per month for unlimited anytime charging

Pay-as-you-go (Ad-Hoc) charging

- Don't have to be a ChargePoint™ subscriber
- Call 800 number – buy a single session with a credit card
- Rate is highest single session fee for that station plus a \$2 fee

Other rate plans available – i.e. for fleets or utilities that want to act as host

Hybrid and Alternative Fuel Vehicles in City/GRU Fleet

- Currently 13 Hybrid vehicles with plans to add electric vehicles as they are available in our region
- Over 20 vehicles in service are able to use E85 fuel
- 31 Aerial Devices (Bucket Trucks) Diesel on road, Electric operation on job sites. This saves an estimated 6.6 gallons of fuel per hour per truck.
- Vehicle Plug in stations have been installed at the new Public Works Building on 39th Avenue.
- Plans are to install charging stations at the new garage for visitors, employees and city owned vehicles. The number is yet to be determined. Charging stations may be added at City Hall and the Down Town Parking Garage.
- Storage will be provided for alternative liquid fuels at new garage.



Discussion

Special Thanks to:

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