

# Preparing Your County for Electric Vehicles

*NACo Green Government 2011 Fall Webinar Series*

September 15th

**NACo is pleased to present this webinar in cooperation with Johnson Controls and the Department of Energy.**



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## **NACo Fall Green Government Webinar Series**

**Sept 15 Preparing Your County for Electric Vehicles**

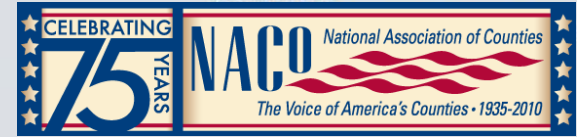
**Oct 13 Green Purchasing 2.0: No Compromising on Cost & Performance**

**Dec 1 The Future of Financing County Energy Projects**

## **Housekeeping Items:**

**If you are having technical difficulties, please send us a message via the chat box on your right. Our organizer will reply to you privately and help resolve the issue.**

**The chat box is on the right side of the webinar window. The box will collapse so that you can better view the presentation. To unhide the box, click the arrows on the top of the panel.**



**This webinar will be recorded and made available online to NACo members to view later or review.**

**Within the next few days you will receive an email notice with the link to the recording with your webinar evaluation survey.**

**Thank you in advance for completing the webinar evaluation survey. Your feedback is important to us.**

# Agenda

- 2:00**     **Welcome and Introductions**
  
- 2:05**     **Infrastructure Necessary for a Robust EV System**  
Russell Garcia, Johnson Controls, Inc.
  
- 2:15**     **County Case Study: Sonoma County**  
Amy Bolten, Sonoma County, California Water Agency
  
- 2:30**     **Overview of Tools**  
Mike Simpson, National Renewable Energy Laboratory
  
- 2:45**     **Q&A**

## Question and Answer Session Instructions

**Type your question into the chat window,  
and the moderator will read the question on  
your behalf.**

**Thank you for participating in NACo's webinar.**

**For more information about NACo membership, contact**

**Andrew Goldschmidt at [agoldschmidt@naco.org](mailto:agoldschmidt@naco.org)**

**or**

**Ilene Manster at [imanster@naco.org](mailto:imanster@naco.org)**





# Thank you for attending today's webinar.

**Next in NACo's Green Government Webinar Series:**

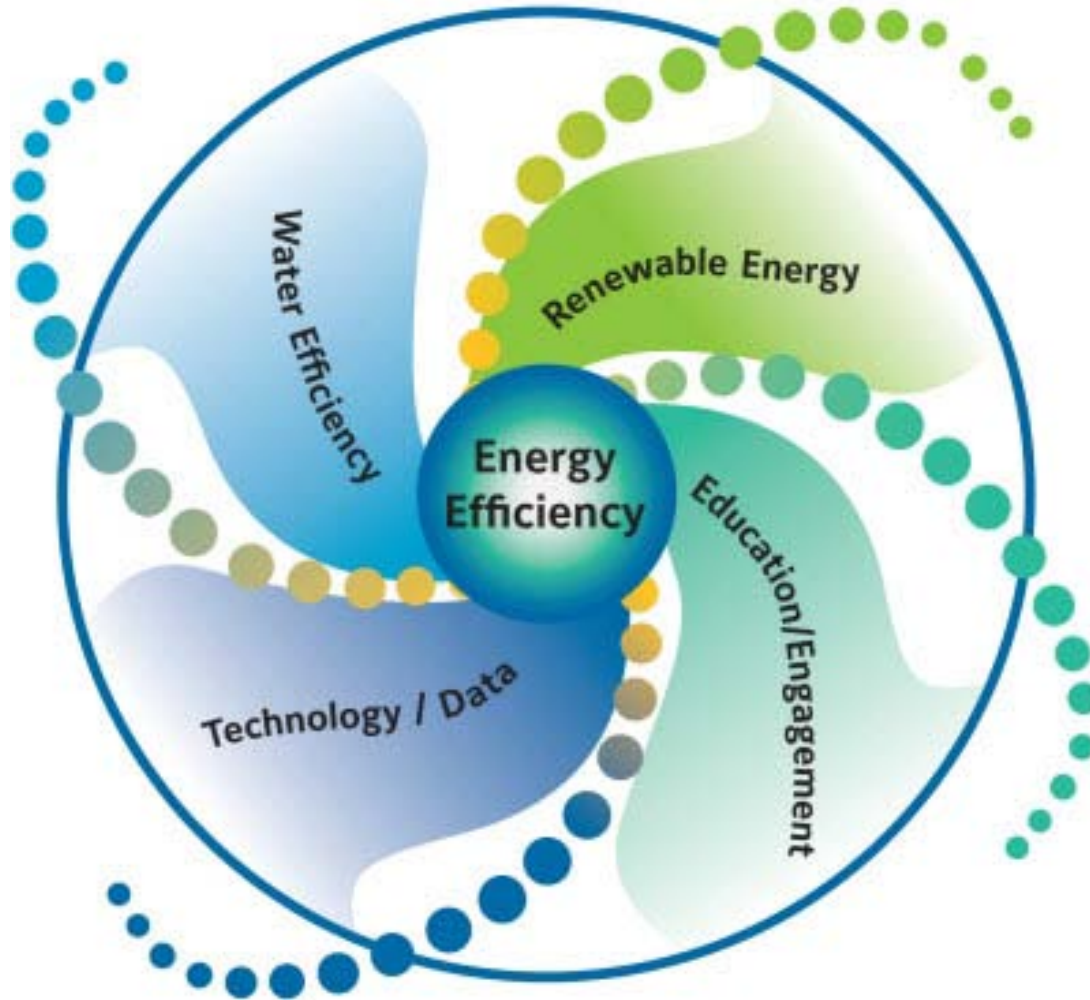
Green Purchasing 2.0: No Compromising on Cost & Performance  
October 13, 2011

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**#1 Government need: cut budgets yet develop economy for jobs**  
**#1 Budget item outside of salaries: energy plus always increasing**

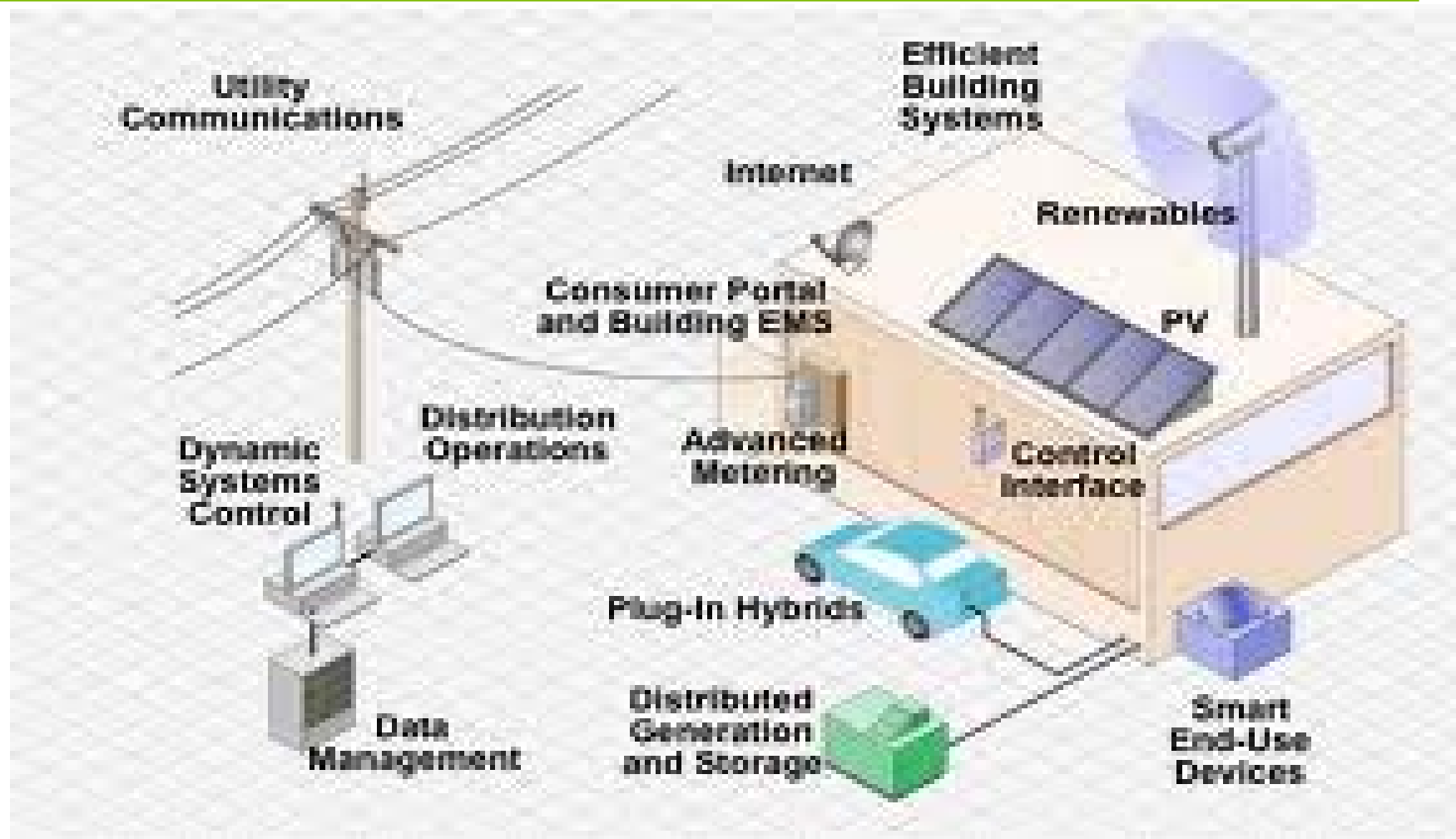
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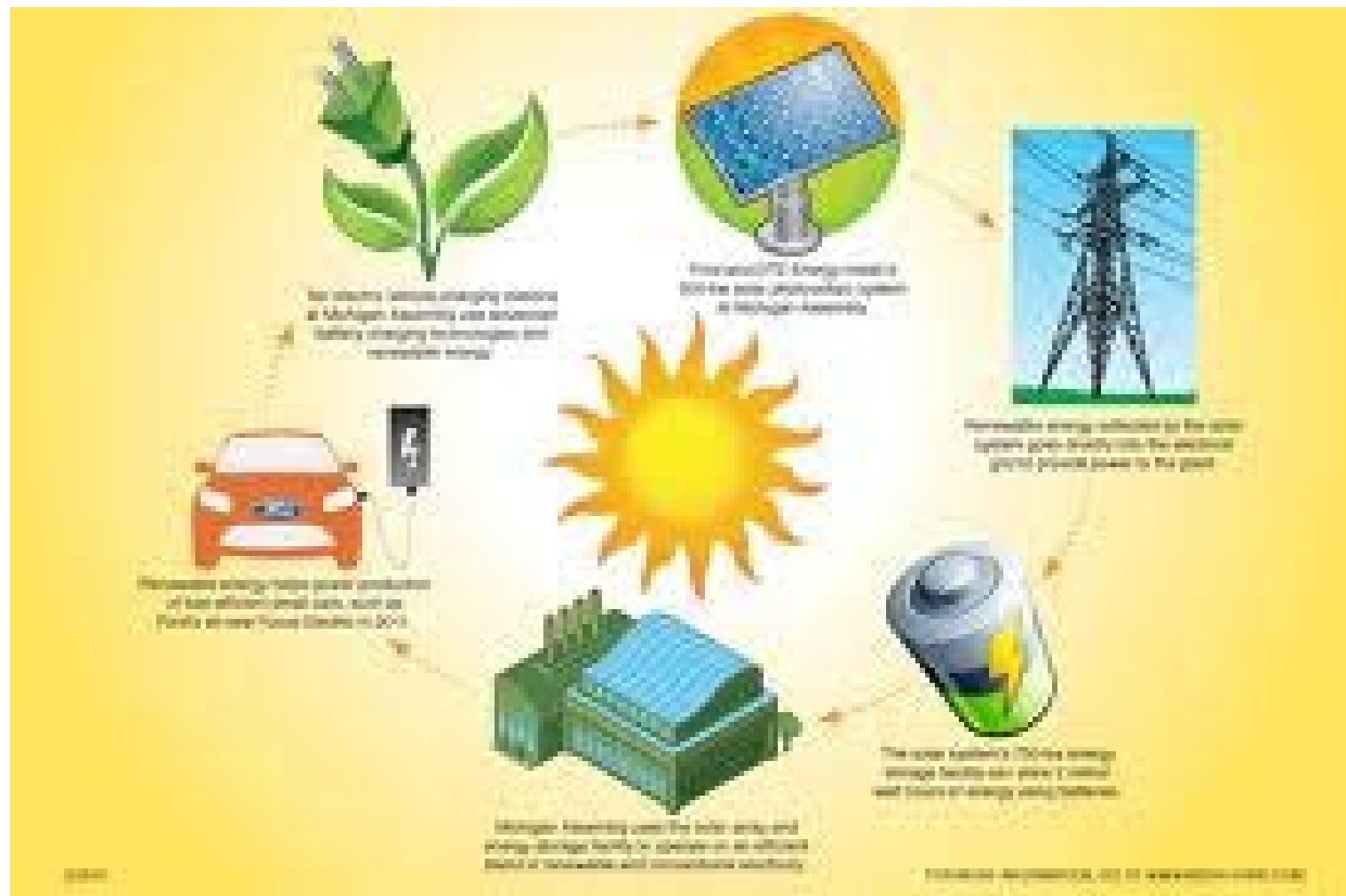
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**Russell.B.Garcia@jci.com 916-257-6863**  
**Mark.S.Johnson@jci.com 239-287-6960**

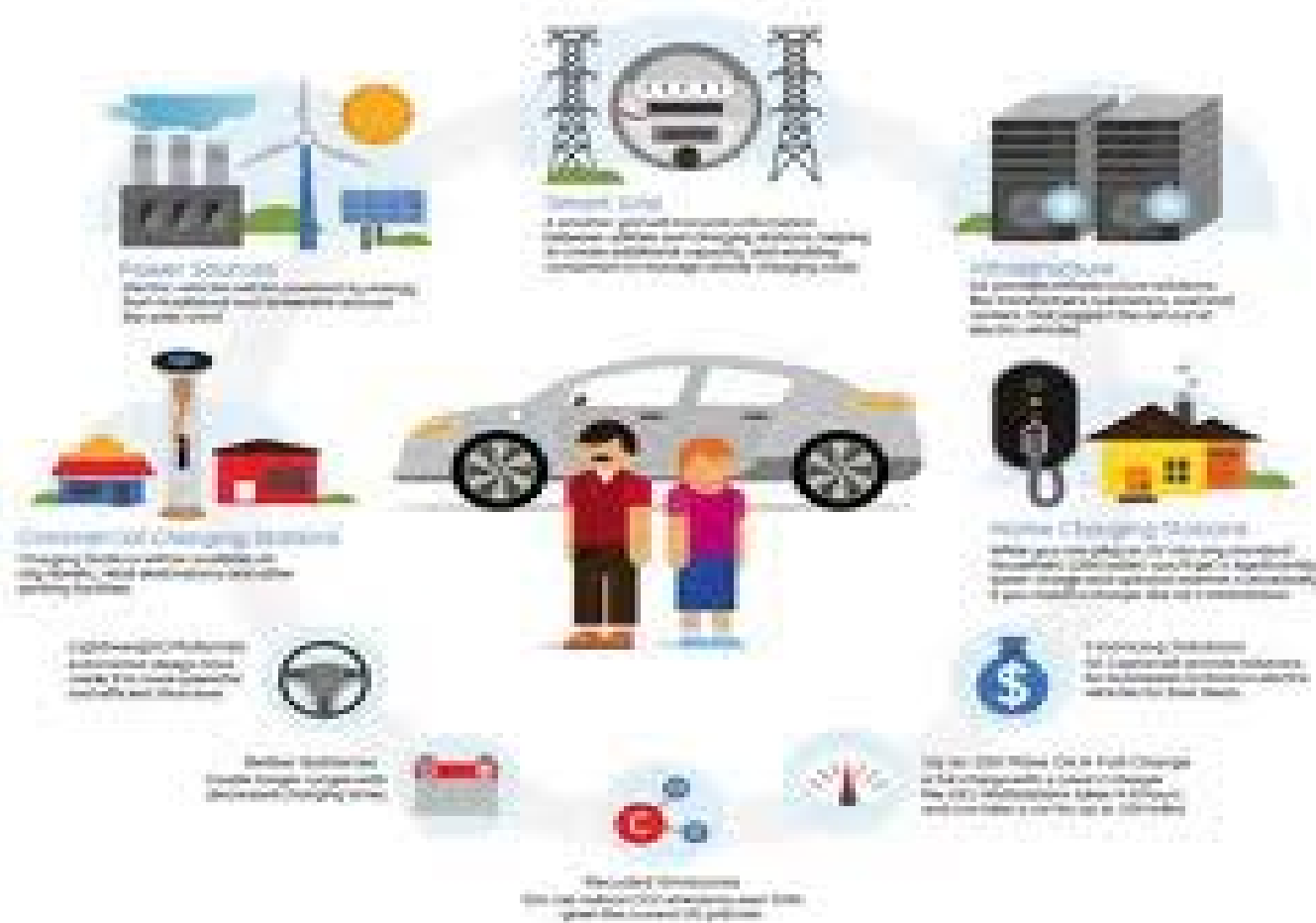
# EV city truck fleets integrated with your grid / Smart Grid:



# EV city truck fleets integrated with your grid / Smart Grid:



# EV city truck fleets integrated with your grid / Smart Grid:





Electric vehicles have completely sealed cooling systems that do not require refilling, replacement or flushing

- Electric vehicles require no oil changes or tune-ups
- There are no belts to wear out or break and no spark plugs or injectors to clean or adjust
- There is no exhaust system to replace and no liquid fuel system to freeze or clog

# Houston's City Hall EV charging station garage & Ford Transit Connect





# Project Discussion to Identify Goals:

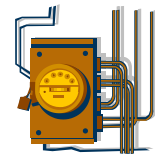
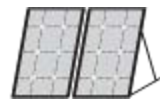
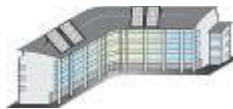
Preliminary audit/Site visit

Project commitment

Detailed audit  
Sophisticated analysis tools used to gather data and develop customized solution

Energy Performance Contract with Savings Guarantee

Improvements  
such as:



Lighting, water, HVAC, renewable energy, building upgrades, wireless, Controls/EV's

Lower  
Water Use

Lower  
Utility Use

Reduce  
Waste

Reduce  
Emissions

Reduce  
Ops Budget

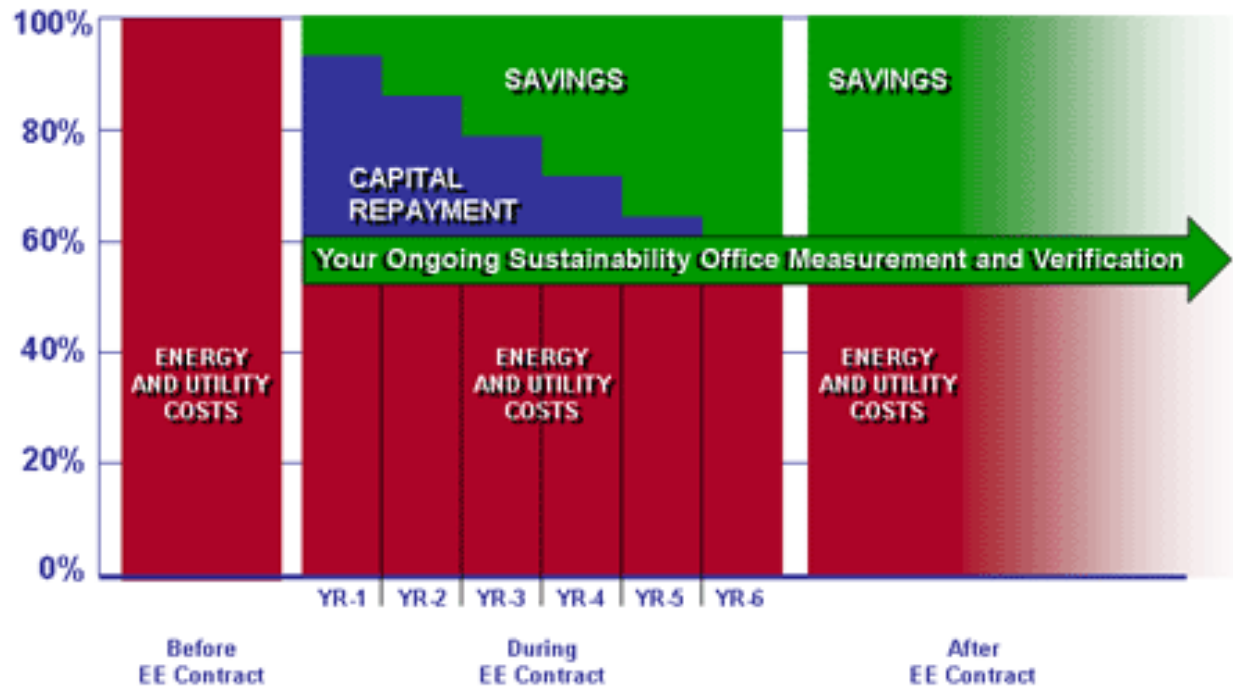
Electric  
Vehicle

Meet Project Goals



# How do you pay for your energy budget cuts, Electric Vehicles, EV Charging Stations, retrofits & upgrades: Energy Savings

Payback Example for a 5 YR Project

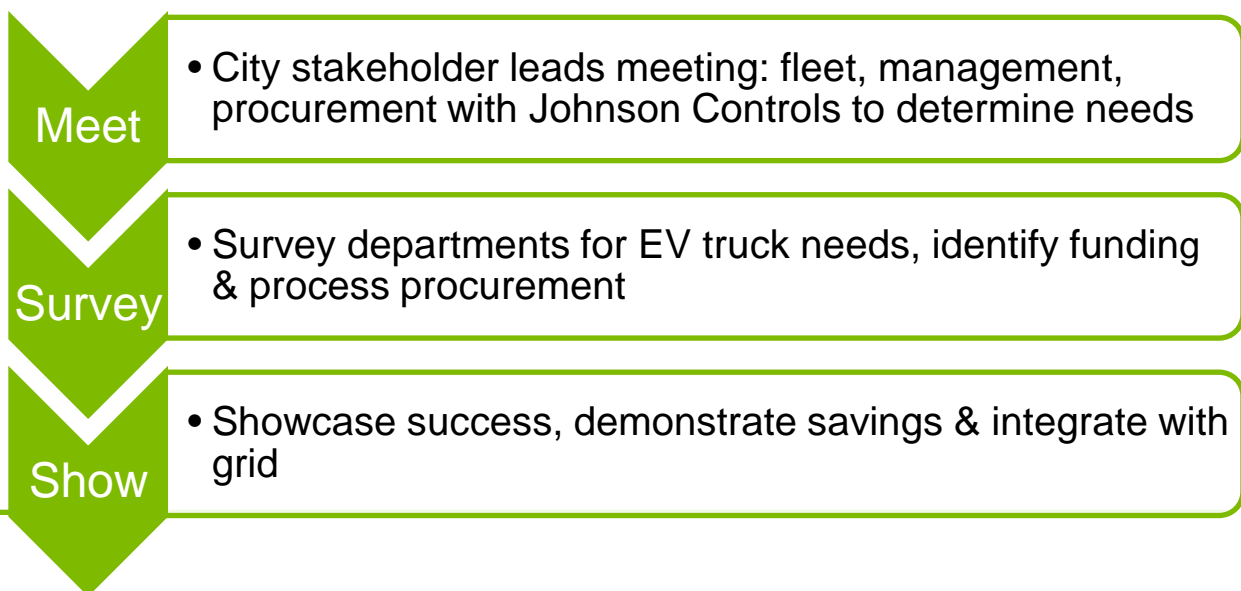


## Your ideal next steps

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# Smart Meters, Smart Grid, Sustainable City

The real power of the Smart Grid concept for municipal utilities goes far beyond metering technology and better system control. It lies in the communication network that makes the concept possible – while creating opportunities to deliver popular new services, attract businesses, energize economic growth, and engage residents in community improvement with sustainable solutions.



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## Questions and Answers



# Sonoma County Local Government Electric Vehicle Partnership



# Sonoma County Local Government Electric Vehicle Partnership – born in 2008!

County of Sonoma  
Sonoma County Water Agency  
Northern Sonoma County Air Pollution Control District  
Regional Climate Protection Authority  
Open Space District

Cities:

Santa Rosa  
Petaluma  
Rohnert Park  
Cotati  
Sonoma

Sebastopol  
Windsor  
Healdsburg  
Cloverdale

# EV Partnership Components

## Local Government EV Vehicles and Infrastructure Workgroup

- Transform public fleets
- Build local EV infrastructure

## EV Fleet National Demonstration Project – Bay Area Partnership

- Collaborate and Implement Regional EV Initiatives

## Statewide EV Workgroup

- Promote and align state wide efforts

# EV Vehicles and Infrastructure Workgroup Goals



Transform Public Fleets through conversion to hybrid and EVs

Facilitate Regional Efforts in infrastructure build-out

Demonstrate EV Viability for the general public

# Transform Public Fleets – Get them out on the road for people to see!

## County of Sonoma/Sonoma County Water Agency:

• Hybrid Light Duty Vehicles	296
• Plug-in Hybrid Sedans	18
• Electric Sedan	1
• Neighborhood Electric Vehicles	9
• Hybrid Medium Duty Trucks	5
• Hybrid Buses	15
<u>Total Hybrid and Electric Vehicles</u>	<u>344</u>





# Facilitate Regional Infrastructure Installations

Currently installed charging stations: **40**

To be installed by the end of the year through various grants:

MTC Fleet Grant - **31** for fleet use but public can use

MTC Public Charger Grant - **25** in public locations

ChargePoint America Grant /NSCAPCD  
Funds - **20-35** in public locations



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PROBLEM WITH STATION  
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NO PARKING  
FOR ELECTRIC VEHICLES  
WITH THE LAMP  
INDICATOR  
RED OR FLASHING  
RED OR BLUE  
VIOLATION  
FINE \$ 200

WHITE  
LINE  
STAY  
GREEN



# Demonstrate and Promote EV Viability

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Three simultaneous tracks:

1. Tourism – Sonoma County Electric Trail
2. Outreach to local businesses – Why and how to install charging stations
3. Branding and general public awareness – consistent logo, materials, map, website





# Demonstrate and Promote EV Viability

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# Questions

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Amy Bolten, Sonoma County Water Agency (Local outreach)

Dave Head, County of Sonoma (Fleet, technical, regional)





Alternative Fuels and Advanced  
Vehicles Data Center

**Mike Simpson**  
Vehicle Systems Engineer  
National Renewable Energy Lab



- [AFDC Home](#)
- [Alternative Fuel Station Locator](#)
- [Emissions Calculator](#)
- [Cost Estimations\\*](#)
- [State and Federal Incentives](#)
- [EVSE Permitting Template](#)
- Training and Education
  - [Clean Cities University](#)
  - [Clean Cities TV \(Installer Video\)](#)
- Publications/Outreach
  - [PEV Primer](#)
- [Technical Response Service](#)



*\*Cost calculator is not yet live, but will be soon*

# Alternative Fuel Station Locator



**Alternative Fueling Station Locator**  
[Help >](#)

**Basic Station Search** | **Map a Route** | **Stations by State**

**First: Select one or more fuels.**

- Biodiesel (B20 and above)
- Compressed Natural Gas (CNG)
- Electric
- Ethanol (E85)
- Hydrogen
- Liquefied Natural Gas (LNG)
- Liquefied Petroleum Gas (Propane)

**Second: Enter a complete address or zip code.**

Show stations within a  mile radius.

Show station type:  
 Level 1    Level 2    DC Fast    Legacy

[Advanced Options](#)

**Get Results**

---

Results 1 to 6 of 6

**A** Linn Benton Community College  
Electric  
Ellingson Rd SW  
Albany OR 97321  
Type: Level 2, DC Fast  
Phone: 408 370-3802  
Distance: 6.2 Miles  
Access: Public - see hours

**B** Linn Benton Community College  
Electric  
Ellingson Rd SW  
Albany OR 97321  
Type: Level 2  
Phone: 408 370-3802  
Distance: 6.2 Miles  
Access: Public - see hours

**C** City of Corvallis - Flaments Building  
Electric  
Type: Level 1, Level 2, DC Fast  
517 SW 2nd St  
Corvallis OR 97333  
Distance: 13.5 Miles  
Access: Public - see hours



Government-industry collaboration committed to establishing a repository of public EVSE location data for consumers and industry.

## Goals

- Avoid duplication of data collection efforts for EVSE locations
- Enhance the EVSE data in the AFDC station locator
- ***Ensuring DOE continues to collect and provide the most comprehensive collection of EVSE location data***
- Strengthen relationships and improve communication with new industry stakeholders



How fast a vehicle charges depends on the battery type and the type of charging equipment used.

Level 1 = 8 to 20 hours  
Level 2 = 3 to 8 hours  
DC Fast Charging = < 30 minutes



[Find electric charging stations near you.](#)

Alternative & Advanced Vehicles

Search  
Search Help > More Search Options >

**Light-Duty Vehicle Search**

**Heavy-Duty Vehicle Search**

**Flexible Fuel Vehicles**

**Natural Gas Vehicles**

**Propane Vehicles**

**Hybrid & Plug-In Electric Vehicles**

Basics

Benefits

Availability

Emissions

Charging

Batteries

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**Diesel Vehicles**

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**Resale**

**Technician Training**

**Idle Reduction**

**Fuel Economy**

**Emissions**

Site Map  
EERE Information Center

## Emissions from Hybrid and Plug-In Electric Vehicles

In general, hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and all-electric vehicles (EVs) produce lower emissions than conventional vehicles do. When measuring [well-to-wheel](#) emissions, the electricity source is important: for PHEVs and EVs, part or all of the power comes from the electric grid.

### Electricity Sources and Emissions

EVs and PHEVs running on electricity only have zero tailpipe emissions, but emissions may be produced by the source of electrical power, such as a power plant. Electricity generation is regional, so to get an accurate picture of the emissions created by an electric drive vehicle it is important to look at the sources used to create electricity in a particular area. If the electricity used to charge an all-electric vehicle comes from a nonpolluting, renewable source, such as wind or solar, driving the vehicle produces no emissions.

#### Compare Electricity Sources and Annual Vehicle Emissions

Enter a ZIP code to see a breakdown of the electricity sources used to charge EVs and PHEVs on a local grid and compare the annual emissions generated from vehicles using electricity from the grid, gasoline, or a combination of the two.

ZIP Code 
Find Data

#### Electricity Sources

Source	Percentage
Coal	49.61%
Nuclear	19.28%
Gas	18.77%
Hydro	6.50%
Oil	3.03%
Biomass	1.30%
Other Fossil	0.60%
Wind	0.44%
Others	-

#### Annual Emissions per Vehicle (lb of CO<sub>2</sub> equivalent)

Vehicle Type	Annual Emissions (lb of CO <sub>2</sub> eq)
EV	~7800
PHEV	~8500
HEV	~8200
Conventional Gas Vehicle	~13000

[Sources and Assumptions](#)

Clean Cities / 5



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**Alternative Fuels & Advanced Vehicles Data Center**

[About the AFDC](#) | [Fuels](#) | [Vehicles](#) | [Fleets](#) | [Incentives & Laws](#) | [Data, Analysis & Trends](#) | [Information Resources](#) | [Home](#)

## Alternative & Advanced Vehicles

- Light-Duty Vehicle Search
- Heavy-Duty Vehicle Search
- Cost Calculator
- Flexible Fuel Vehicles
- Natural Gas Vehicles
- Propane Vehicles
- Hybrid, Plug-in Hybrid, & All-Electric Vehicles
- Fuel Cell Vehicles
- Diesel Vehicles
- Conversions
- Resale
- Technician Training
- Idle Reduction
- Fuel Economy
- Emissions

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### Vehicle Cost Calculator

This tool uses basic information about your driving habits to calculate total cost of ownership and emissions for makes and models of most vehicles, including alternative fuel and advanced technology vehicles.

**Choose vehicles to compare.**  
Select from the vehicle makes and models below. [Find alternatives](#)

2011
Ford
F-150

[Assumptions](#)

Vehicle	MSRP
<input checked="" type="checkbox"/> 2011 Nissan LEAF	\$ [ ]
<input checked="" type="checkbox"/> 2011 Chevrolet Volt	\$ [ ]
<input checked="" type="checkbox"/> 2011 Ford F-150	\$ [ ]

Gas Price: \$  /gal

E85 Price: \$  /gal

**Results**

Vehicle	Annual Fuel Use	Annual Electricity Use	Annual Fuel Cost	Annual Operating Cost	Cost Per Mile	Annual Emissions (lbs CO2)
2011 Nissan LEAF Electric	0 gal	3,578 KWh	\$450	\$2,555	\$0.21	3,015
2011 Chevrolet Volt Plug-in Hybrid	78 gal	3,620 KWh	\$660	\$2,918	\$0.24	4,916
2011 Ford F-150 Flex Fuel	831 gal	0 KWh	\$2,041	\$4,299	\$0.36	15,922

Electricity Sources - Los Angeles County, California

- 42.28% Gas
- 17.65% Hydro
- 16.46% Nuclear
- 11.90% Coal
- 4.62% Geothermal
- 2.61% Biomass
- 1.94% Wind
- 1.17% Oil
- 1.03% Other Fossil
- Others

Electricity Sources - National Averages


- 49.61% Coal
- 19.28% Nuclear
- 18.77% Gas
- 6.50% Hydro
- 3.03% Oil
- 1.30% Biomass
- 0.60% Other Fossil
- 0.44% Wind
- Others

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## Electric Drive Cost Calculator

Compare costs and emissions of electric drive vehicles with a gasoline vehicle.

Select Fuel/Technology ▾



Next ►

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## Weekday Driving

Total miles/week

City  Hwy

## Other Trips

Total miles/year

City  Hwy

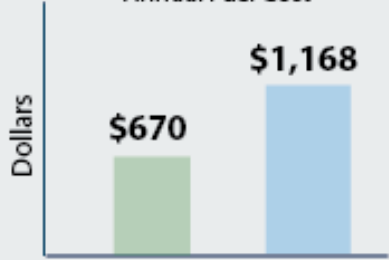
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Fuel Cost  Emissions

## Annual Fuel Cost



Vehicle Type	Annual Fuel Cost (Dollars)	Fuel Price
Plug-in Hybrid	\$670	\$2.06/gal, \$0.11/kWh
Gas	\$1,168	\$3.69/gal

◀ Back Next ►

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## Alternative Fuels & Advanced Vehicles Data Center

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### Federal & State Incentives & Laws

Search [ ] Search Help > More Search Options >

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**Federal**

**State**

**Advanced Search**

**All Incentives & Laws Sorted by Type**

- Technology or Fuel
- Incentive
- Regulation
- User

This section allows you to browse and search a database of federal and state laws and incentives related to alternative fuels and vehicles, air quality, fuel efficiency, and other transportation-related topics.

**Federal Incentives and Laws** | **State Incentives and Laws**

**Search All Incentives and Laws >**  
Use an advanced search to find a specific federal or state incentive or law.

**View Tables of Incentives and Laws >**  
View tables of incentives and laws sorted by [technology/fuel](#), [incentive](#), [regulation](#), or [user](#).

**Read Key Legislation >**  
Read selected federal legislation summaries related to alternative fuels and transportation technologies.

**Find Local Incentives and Laws >**  
Find examples of incentives and laws from local governments.

### State Incentives and Laws

To view a state's incentives and laws related to alternative fuels and advanced vehicles, select a state from the map or menu below. For examples of incentives and laws developed on a local level and that apply to cities and counties instead of an entire state, learn about [local incentives and laws](#).

Select a State [ ] Go [ ] Advanced Search



The map shows the following state abbreviations: WA, OR, CA, NV, UT, AZ, NM, TX, MT, WY, CO, ND, SD, NE, KS, OK, AR, LA, MN, IA, MO, WI, IL, IN, OH, MI, KY, TN, MS, AL, GA, FL, VT, NH, ME, MA, RI, CT, NJ, DE, MD, VA, WV, PA, NY, NC, SC, and DC.

## Residential EVSE permitting template

- Designed for permitting and inspecting jurisdictions
- Jurisdictions can modify for specific, unique requirements

## Code material

- NEC Article 625
- Sets safety requirements for EVSE installation

### Permit for Charging Equipment Installation Electric Vehicle Supply Equipment (EVSE)

Jurisdiction: **City, State**

Compliance with the following permit will allow the construction and operation of electric vehicle charging equipment at a residence in the **City, State** jurisdiction. This permit addresses one of the following situations:

- Only a branch circuit and meter would be constructed at the residence
- A hard-wired charging station would be constructed at the residence. The requirements for the charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System

This permit contains a general reference to the NEC or electrical code used in the jurisdiction. All work and installed equipment will comply with the requirements of the NEC or the electrical code used in the jurisdiction. The jurisdiction maintains the authority/responsibility to conduct any inspections deemed necessary to protect public safety; however, due to the projected plug-in hybrid electric vehicle (PHEV) volume, it is suggested for consideration that a qualified electrician be approved to self-inspect the system enabling system operation in advance of jurisdiction inspection. The charging station installer shall also be responsible for notifying or coordinating any work with the utility company where needed.]

**Section 1** of the permit application requires basic identifying information be submitted. Note that there is a separate portion of the form requesting information on the property owner who may not be the individual requesting the installation.

**Section 2** of the permit application identifies which code needs to be complied with depending on whether a branch circuit and meter or a hard-wired charging station is being installed.

The technical installation requirements address the following specific elements of electric vehicle charging station safety:

- Listing and labeling requirements
- Wiring methods
- Breakaway requirements
- Overcurrent protection
- Indoor siting
- Outdoor siting

**Section 3** consists of standard certification statement that could be modified as needed by the jurisdiction. By signing the certification statement, the applicant agrees to comply with the standard permit conditions and other applicable requirements. This consent would give the jurisdiction the option of allowing the applicant to proceed with installation and operation of the charging equipment.

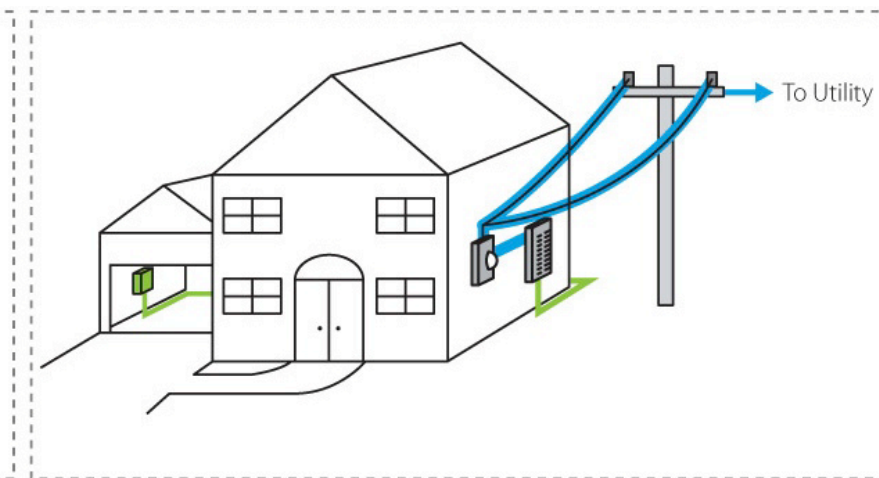
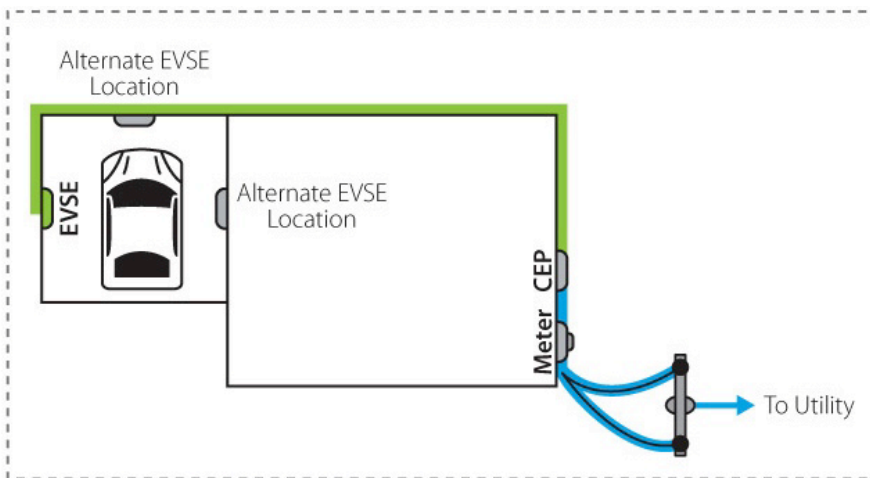
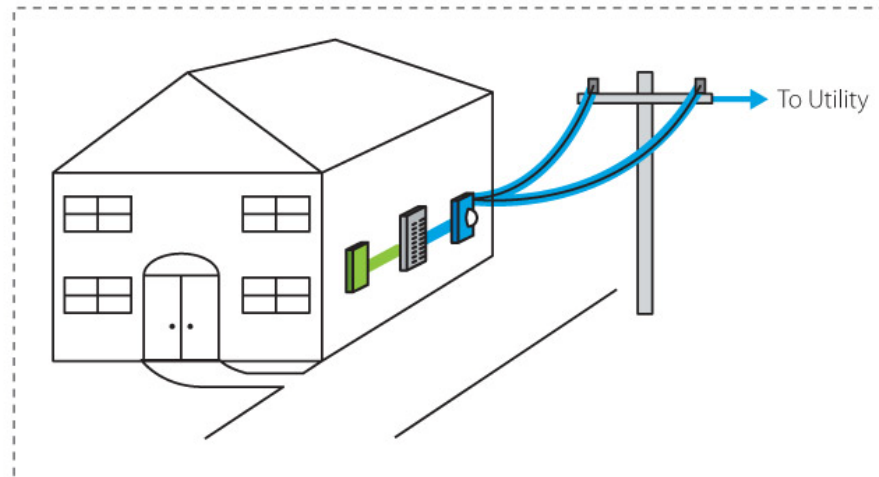
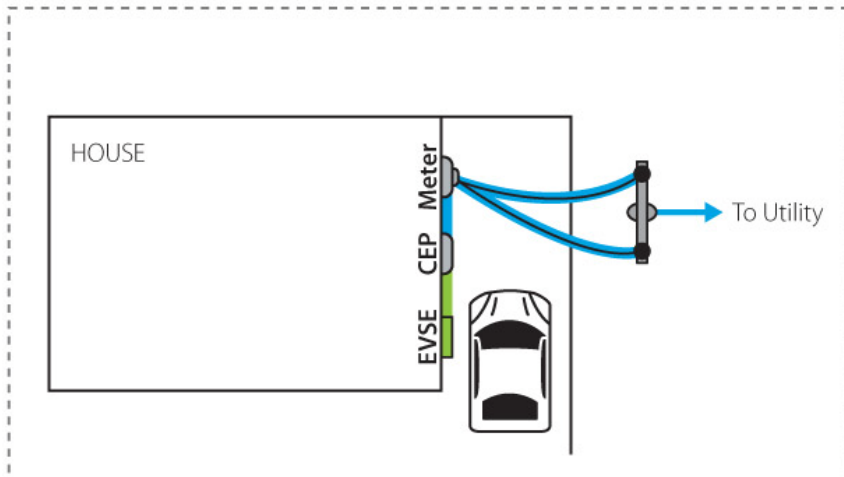
**Section 4** of the document gives an example of a checklist the jurisdiction could develop to track key information on the application. The example under section 4 contains only a few items of the many that the jurisdiction might wish to track.

This permit package also includes a schematic drawing depicting a typical indoor installation. In this installation the wiring path follows the exterior of the structure, and the charging station is located indoors. The NEC® allows for



# Permit diagrams provided: (options for installer to use in plans)

## Typical Electric Vehicle Charging Equipment Installation

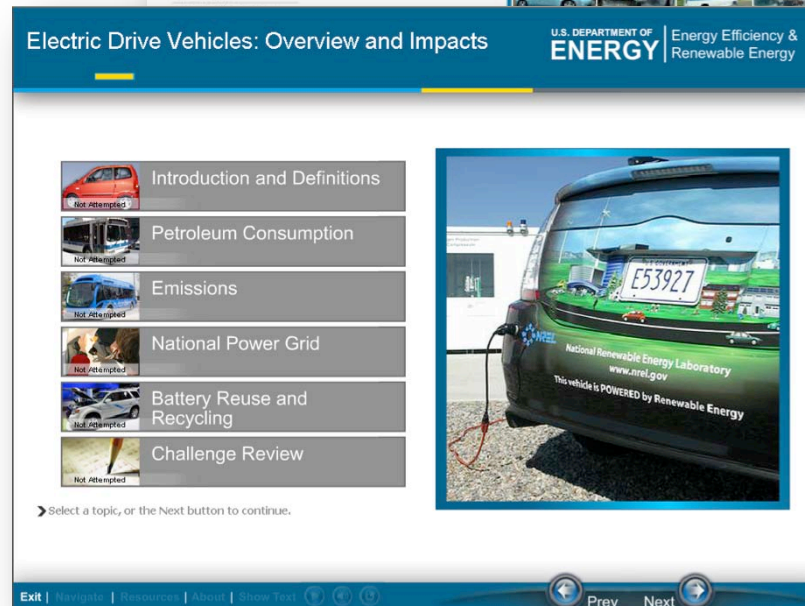
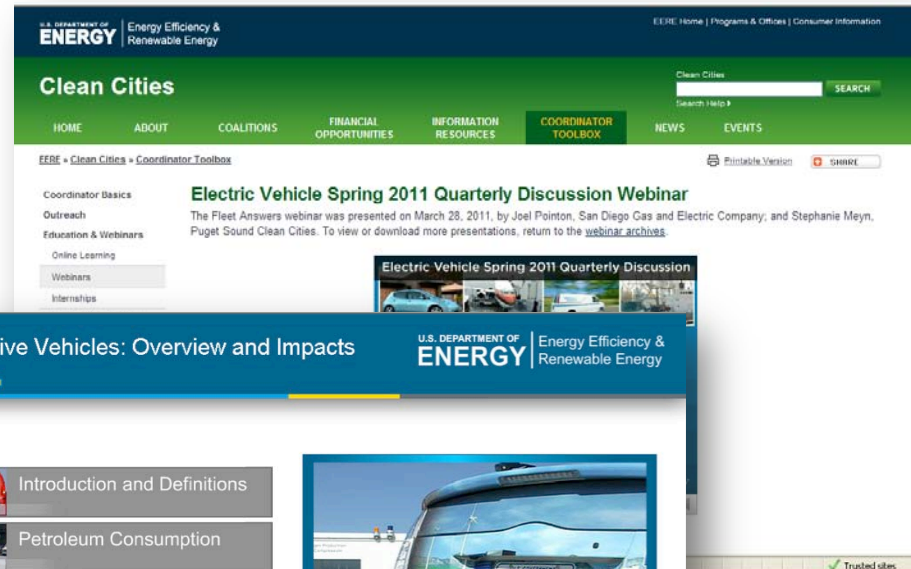


## Clean Cities University Courses

- Electric Drive Vehicles: Overview and Impacts

## Quarterly EV Webinars

- Lessons learned
- Best practices for deployment
- Training opportunities

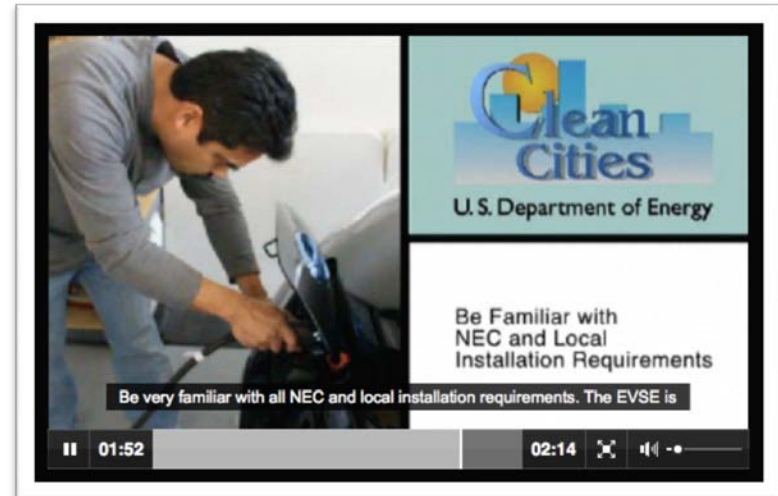


## Residential Charging Installation Video

- Electrical contractors and installers
- Permitting officials and inspectors
- Collaborative effort between Clean Cities, OEMs, Utilities, EVSE suppliers

## Community Readiness Workshop

- Clean Cities Coalitions are developing community EV readiness plans
- Videos of presentations available for local workshops



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- EVSE Residential Charging Installation
- Electric Drive Community Readiness Workshop
- Vehicle Safety

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Enter Title

### EVSE Residential Charging Installation



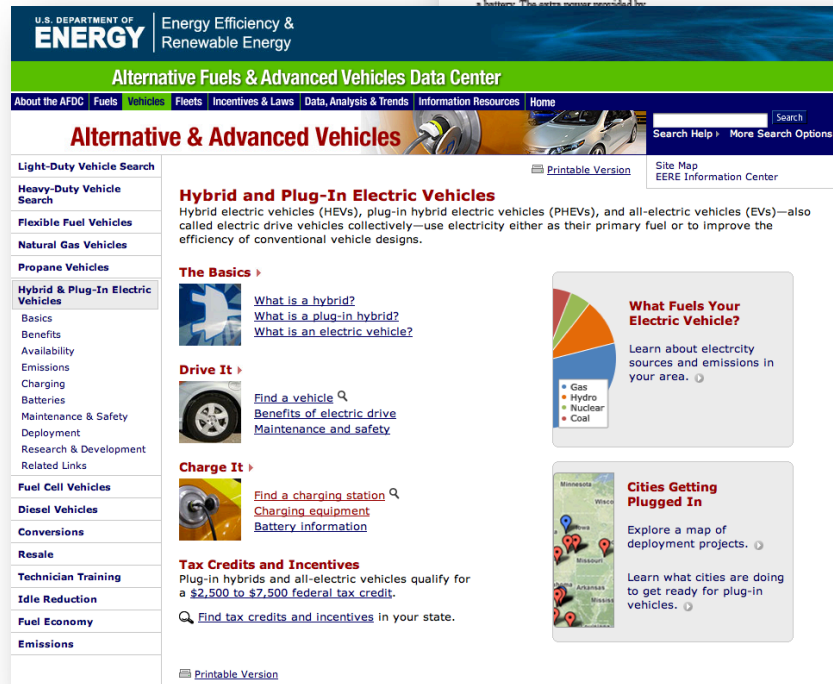
00:05 05:37

# WWW.CLEANCITIES.TV

## Hybrid and Plug-In Electric Vehicles fact sheet

## Plug-In Electric Vehicle Handbooks (coming soon)

- Consumers
- Fleet Managers
- Station Owners
- Electrical Contractors



The energy from the battery provides extra power during acceleration and auxiliary power when idling.

PHEV batteries can be charged several ways: by an outside electric power source, by the internal combustion engine, or through regenerative braking. If a PHEV is never plugged in to charge, its fuel economy will be about the same as that of a similarly sized HEV. If the vehicle is fully charged and then driven a shorter distance than its all-electric range, it is possible to use electric power only.

**All-Electric Vehicles**  
EVs use a battery to store the electrical energy that powers the motor. EV batteries are charged by plugging the vehicle into an electric power source. Although electricity production may contribute to air pollution, the U.S. Environmental Protection Agency (EPA) considers EVs



# Thank you!



*NREL's Advanced Technology Vehicle Fleet at Bandimere Speedway*

## Mike Simpson

Mike.Simpson@NREL.gov

**For more information please visit the AFDC:**

<http://www.afdc.energy.gov/afdc/>

- [AFDC Home](#)
- [Alternative Fuel Station Locator](#)
- [Emissions Calculator](#)
- [Cost Estimations\\*](#)
- [State and Federal Incentives](#)
- [EVSE Permitting Template](#)
- Training and Education
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- Publications/Outreach
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