



Plug-in Electric Vehicle Readiness

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Manager, PEV Readiness Program – External Engagement

EV Workshop – Wildomar S/C

September 28, 2011

Today's Objectives

Familiarize you with....

- Purchase Decision Factors
 - BEV vs. PHEV
 - Electricity Rate Options
 - Charging at Home
 - Permitting and Electrical Work
- Distribution System
 - Notification
- Residential/Non-Residential Research
- Infrastructure Planning
- EVSE Funding Opportunities



Our Customer Learns About Electric Vehicles (EV)

Resources...

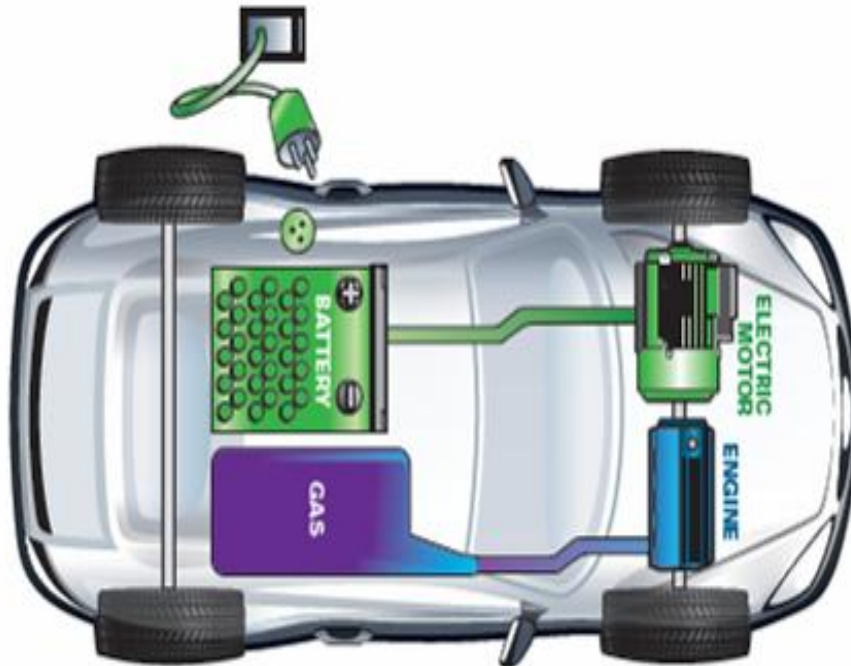
- Automaker websites
- Dealership visits
- Auto Shows or "Ride & Drive" events
- Utility websites

Considerations...

- Plug-in hybrid electric (PHEV) vs. battery electric vehicle (BEV)
- Daily driving distance
- Vehicle range and features
- Rate options
- Home electrical system



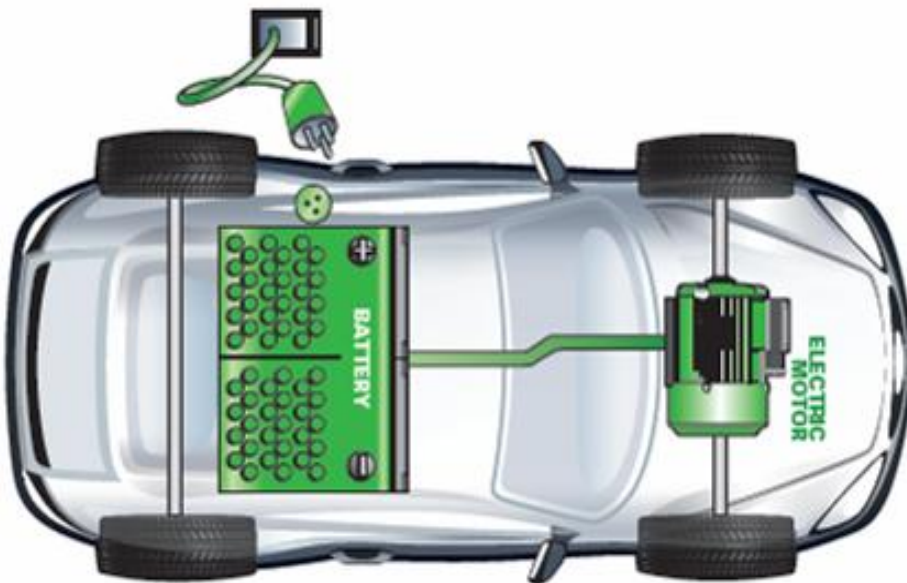
Plug-in Hybrid Electric Vehicle (PHEV)



CHEVROLET VOLT

- BATTERY SIZE: 16 kWh
- CHARGING LEVEL: L1, L2
- CHARGING RATE: 3.3kW
- RANGE: 40 mi electric + 300 gas
- US VOLUME: 10,000
- COST: \$41,000

Battery Electric Vehicle (BEV)



NISSAN LEAF

- BATTERY SIZE: 24 kWh
- CHARGING LEVEL: L1, L2, DCFC
- CHARGING RATE: 3.3 kW
- RANGE: 100 mi electric
- US VOLUME: 20,000
- COST: \$32,780

Our Customer Will Work With The Automaker To Begin The Process Of Purchasing An EV And Getting Their Home Ready

- Reserve their vehicle through automaker website or authorized dealer
- Pay a deposit for the vehicle
- Provide consent for automaker to share their information with SCE (opt-out)



Our Customer Contacts SCE

Customers are encouraged to use various contact options...


- **Visit SCE.COM/PEV...**
- **E-mail questions using "Contact Us", for example...**
- **Call 800-4EV-INFO and request rate analysis**



Your EV Rate Options



EV Customers Have Three Rate Options

Rate Options	Structure	Energy Charge (cents per kWh)																													
<p>Domestic Residential (D)</p>	<p>5 usage tiers House & EV on same meter</p> <hr/> <p>No hourly differentiation</p>	<p>Tier 1 Tier 2 Tier 3 Tier 4 Tier 5</p> 																													
<p>House & EV Time-of-Use (TOU-D-TEV)</p>	<p>2 usage tiers House & EV on same meter</p> <hr/> <p>On: 10 AM – 6 PM (weekdays) Super Off: Midnight – 6 AM Off: All other hours</p>	<table border="1"> <thead> <tr> <th>Season</th> <th colspan="2">Summer</th> <th colspan="2">Winter</th> </tr> <tr> <th>Tier</th> <th>1</th> <th>2</th> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>On-Peak</td> <td>19</td> <td>56</td> <td>13</td> <td>26</td> </tr> <tr> <td>Off-Peak</td> <td>13</td> <td>25</td> <td>12</td> <td>23</td> </tr> <tr> <td>Super Off</td> <td>10</td> <td>16</td> <td>10</td> <td>16</td> </tr> </tbody> </table>					Season	Summer		Winter		Tier	1	2	1	2	On-Peak	19	56	13	26	Off-Peak	13	25	12	23	Super Off	10	16	10	16
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<p>EV-Only Time-of-Use (TOU-EV-1)</p>	<p>No usage tiers EV metered separately</p> <p>On: Noon – 9 PM Off: 9 PM – Noon</p>	<table border="1"> <thead> <tr> <th></th> <th>Summer</th> <th>Winter</th> </tr> </thead> <tbody> <tr> <td>On-Peak</td> <td>28</td> <td>22</td> </tr> <tr> <td>Off-Peak</td> <td>11</td> <td>11</td> </tr> </tbody> </table>						Summer	Winter	On-Peak	28	22	Off-Peak	11	11																
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Note: Basic charges (fixed) not included, nor are potential up-front costs of setup

Rates current as of January 1, 2011

Customer Will Choose Rate To Charge Their EV And Then Choose The Panel Configuration That Meets Their Needs

CUSTOMER'S EV RATE & ELECTRIC SERVICE PANEL CHOICES

Rate Choices

- Customer decides to retain current Residential rate (Uses single meter for whole house)
- Customer selects TOU-D-TEV (Home & Electric Vehicle) rate (Uses single, TOU meter for whole house and EV charging)
- Customer selects TOU-EV-1 (Electric Vehicle) rate (Requires Dedicated TOU 2nd Meter for EV charging ONLY)

Electric Service Panel Choices

- Customer/Electrician determines that the existing panel is sufficient
- Customer/Electrician decides to add new second panel or meter socket box (TOU-EV-1 only)
- Customer/Electrician determines that the existing panel is insufficient and an upgrade to a larger single meter socket panel or larger two meter socket panel is necessary

Each combination of available rate and panel choice creates a unique EV process #1 - 6

Before Visiting Our Customer, The Electrician Needs To Understand SCE's Electrical Service Requirements (ESR)

- SCE's Electrical Service Requirements (ESR) provides SCE rules pertaining to electrical service connections and customer's installations of service wiring and equipment.
- ESR is updated quarterly and available online at: <http://www.sce.com/nrc/aboutsce/regulatory/distributionmanuals/esr.pdf>
- For EV specific information regarding installation, refer to SCE's ESR, Chapter ESR-1, Section 5
- Depending on our customer's specific situation, additional ESR chapters may be relevant
- ***Failure to comply with SCE's SCE may require rework and cause customer dissatisfaction.***

**SOUTHERN CALIFORNIA EDISON
TRANSMISSION AND DISTRIBUTION BUSINESS UNIT**

Electrical Service Requirements (ESR)

**2011 – FIRST QUARTER ISSUE
February 25, 2011**

This document is classified "Internal"
per EPPC Policy 04.001.001.

▶ SCE Public ◀

Electrician Visits Our Customer's Home To Conduct The Home Assessment

- Electrician encourages customer to contact SCE to discuss rates
- Electrician inspects our customer's ...
 - Panel
 - Garage
- Our customer shares their SCE rate analysis with electrician and requests quotes for single and dual-meter options
- Electrician asks our customer to contact SCE with their final rate, panel and charging level decisions



Our Customer Is Now Ready To Make Their Rate And Infrastructure Choices

Our customer...

- Reviews...
 - SCE's PEV rate analysis
 - Bids for single and two meter options
- Calls SCE to...
 - Select electric vehicle plan
 - Inform SCE of panel and charging level decisions
- Contacts electrician to...
 - Accept bid for electrical work and installation
 - Set date and time for installation



SCE Planner Visits Customers Site

- SCE Planner visits customer site to...
 - Evaluate SCE's transformer and power lines servicing customer
 - Examine customers/electrician's plan, e.g. location of the house electric panel and EV 2nd panel.
- SCE Planner explains...
 - SCE's electric equipment will be able to support EV charging or
 - Upgrades will be made, usually at SCE's expense
 - Customer's plan is approved or will be pending required changes to be compliant with SCE's ESR



Customer Obtains A Permit From Local Authority Having Jurisdiction (AHJ)

- Most AHJs in SCE's territory require you to visit the permit office
- Majority of permits are issued immediately
- Permit cost and requirements vary by locale but EV permits from some local authorities require...
 - Single Line drawing
 - Electric load calculation
 - Site plan



Electrician Installs Required Equipment; AHJ Inspects Installation And SCE Completes Process

- **Electrician...**

- Installs second electrical panel near existing panel as approved by Planner
- Wires dedicated, 240 volt circuit
- Mounts EVSE unit to the wall
- Connects EVSE unit to second panel
- Tests EVSE
- Familiarizes customer with EVSE
- Requests inspection from AHJ

- **AHJ Inspector** checks installation typically within 24 hours of request and notifies SCE of inspection approval

- **SCE** energizes 2nd panel and installs second meter

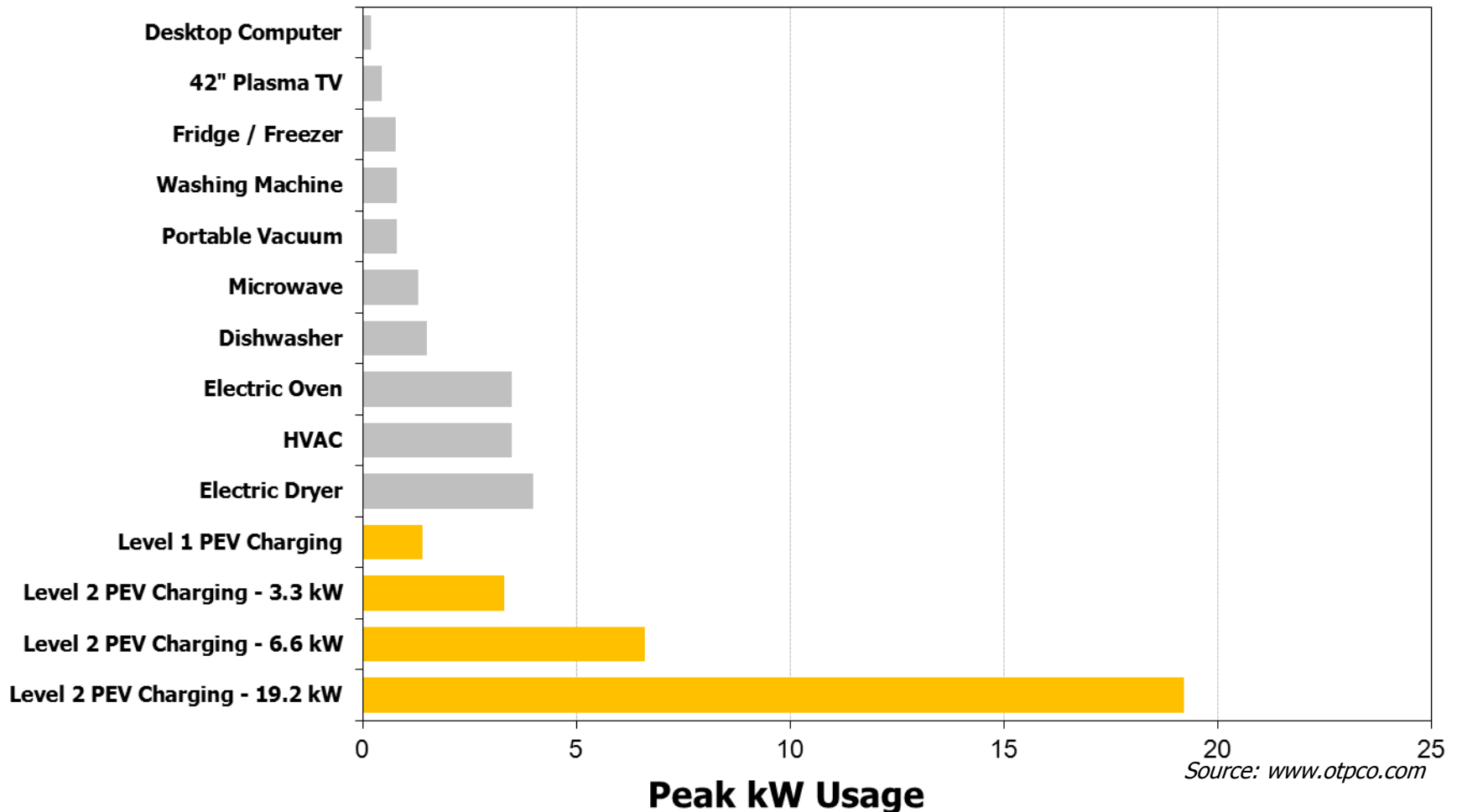
Home Wall Mounted
Charging
Station(240v)





Distribution System/Notification

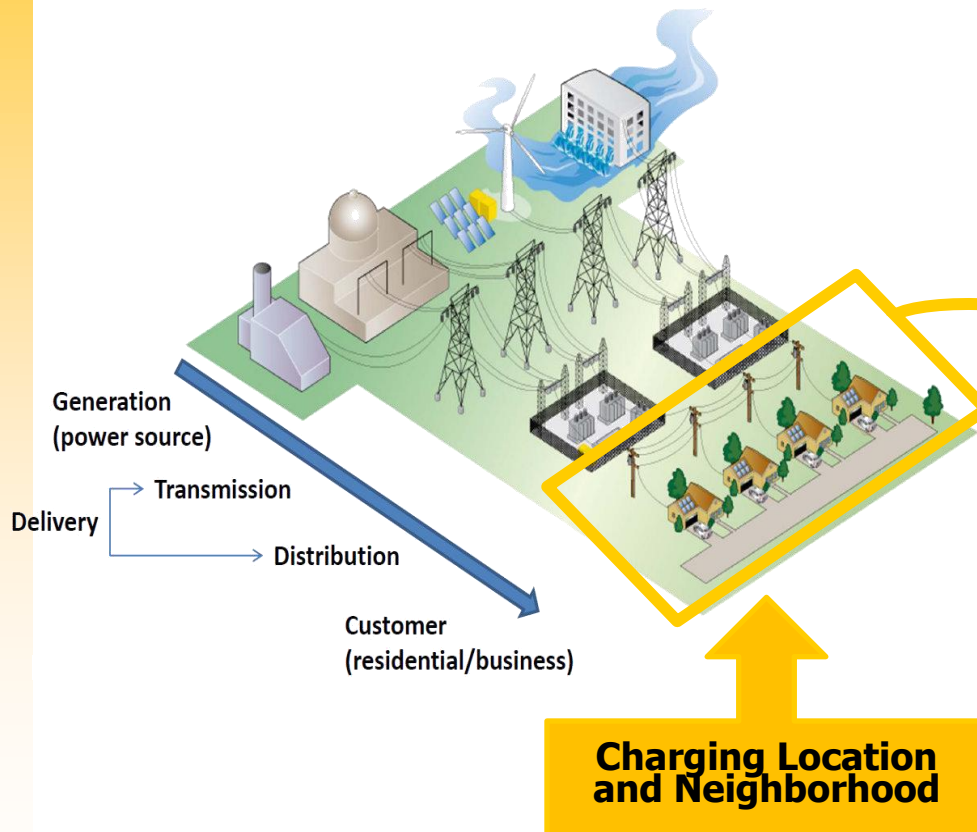
PEVs introduce significant household load...



Residential charging stations with input power greater than Level 1 may have significant implications

...Which may impact the grid

Despite our readiness efforts, PEV adopters may not timely notify their utility about new charging locations. This will delay necessary upgrades to the distribution infrastructure



Untimely notification of the utility...

Without timely notification of new PEV charging locations and appropriate grid upgrades, PEV charging could result in overloading or potential failure of:

- Transformers and secondaries
- Wires and conductors
- Service drops

...may cause grid instabilities

Depending on a variety of factors, PEV adopters and their neighborhood could experience:

- Power outages and voltage drops
- Damage to homes and equipment (customer- or SCE-owned)

Utilities and OEMs are joining forces

California utilities under the Public Utility Commission's jurisdiction are participating in the Notification program with major OEMs that have launched PEVs so far

Key Attributes

- **Data Sharing:** Implemented with major in-market OEMs. Ideal data set about confirmed adopters includes:
 - Customer street address
 - Vehicle type
 - Expected charging level (Level 1, Level 2)
 - Target vehicle delivery date
- **Grid Evaluation/Upgrades:** Utility assesses upstream infrastructure and orders necessary upgrades (even if PEV adopter does not contact SCE)
- **Load Management:** Program in development to reach out to customers identified through Notification to develop awareness of PEV rates
- **Results:** About 10% of SCE visits to customer premises triggers a work order to upgrade infrastructure; prevents any negative experience and expensive emergency work

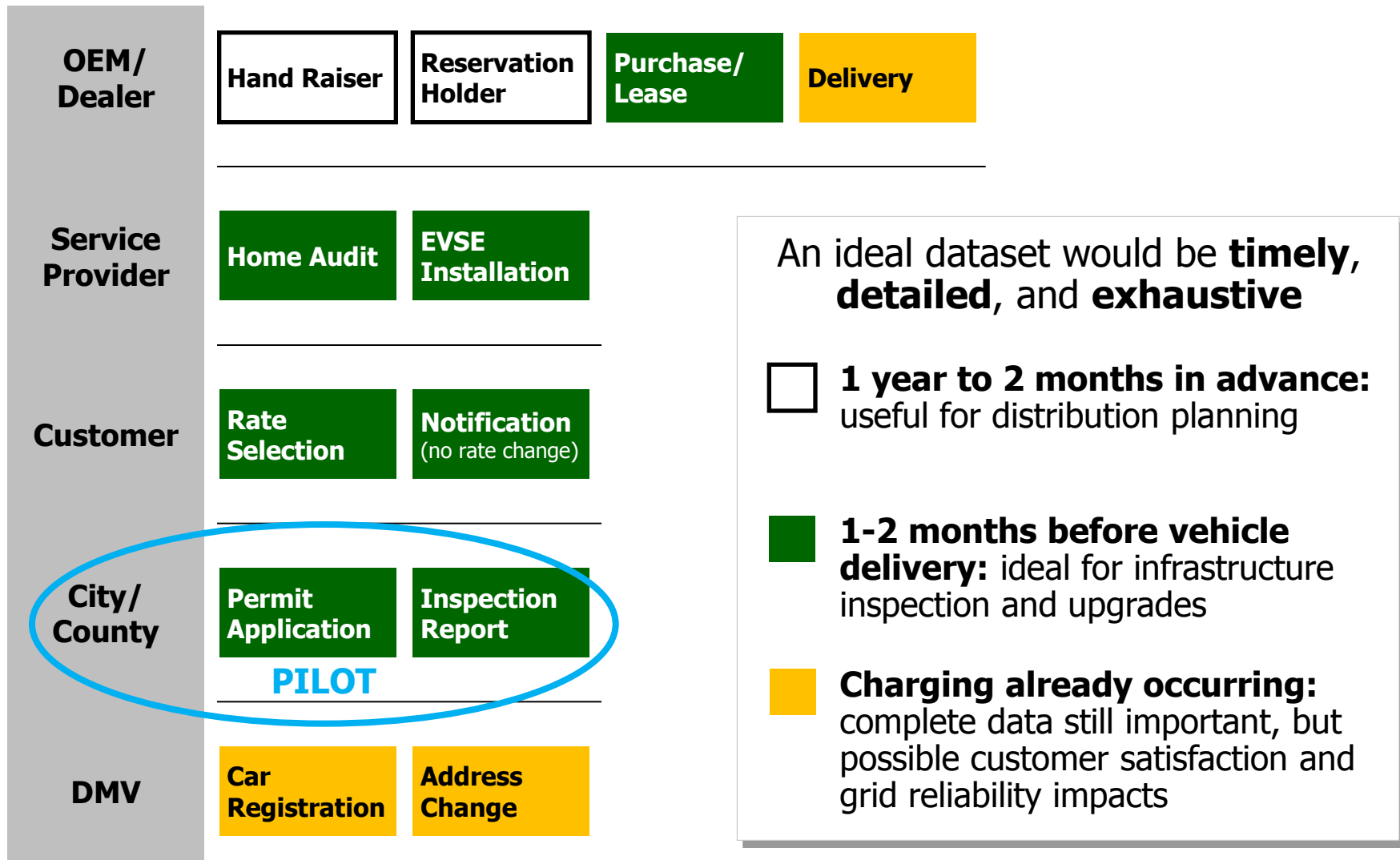


Enhanced Fueling Experience

- Provide positive installation and charging experience; minimize detrimental impact to PEV customers and neighborhoods
- Optimize customer's fueling costs with PEV-specific rates and programs
- Promote image of PEVs; avoid negative perception from visible impact on the grid

Enhanced Ownership Experience

Grid Stability Requires Timely Notification





Education, Research & Outreach

SCE Actions: LA County/ICC LA Basin Chapter

- **Focused, grass roots efforts in support of PEV Readiness**
- **Development of Permit & Inspection Checklist for residential home charging station (EVSE). Will be used by:**
 - **Cities in LA County jurisdiction**
 - **ICC LA Basin Chapter members (it will be shared with other ICC chapters too)**
 - **Training for Inspectors on Electric Vehicles through ICC**
- **Piloting use of EVSE Permit Notification data with LA County**

SCE Offers Linking to PEV Website

www.sce.com/pev

Comprehensive PEV readiness information

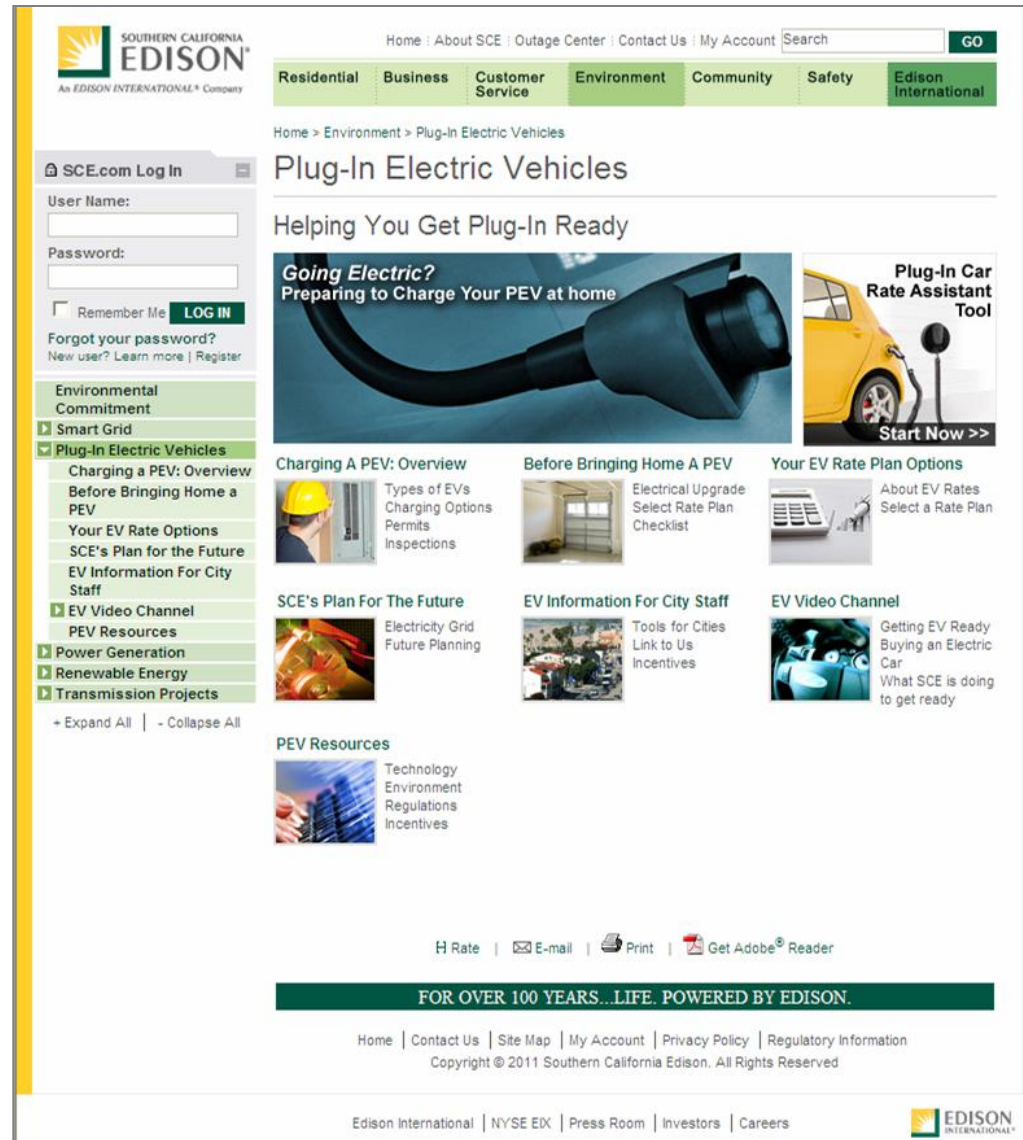
Interactive tools and videos

Links to EV-related sites

Customer survey

Online Rate Assistant for residential customers

SCE's plans for the future



The screenshot shows the SCE website's 'Plug-In Electric Vehicles' page. At the top, there is a navigation bar with links for Home, About SCE, Outage Center, Contact Us, My Account, and a search box. Below this is a secondary menu with categories: Residential, Business, Customer Service, Environment, Community, Safety, and Edison International. The main heading is 'Plug-In Electric Vehicles' with a sub-heading 'Helping You Get Plug-In Ready'. A large banner image shows a charging cable with the text 'Going Electric? Preparing to Charge Your PEV at home'. To the right is a 'Plug-In Car Rate Assistant Tool' with a 'Start Now >>' button. Below the banner are several resource boxes: 'Charging A PEV: Overview' (Types of EVs, Charging Options, Permits, Inspections), 'Before Bringing Home A PEV' (Electrical Upgrade, Select Rate Plan Checklist), 'Your EV Rate Plan Options' (About EV Rates, Select a Rate Plan), 'SCE's Plan For The Future' (Electricity Grid, Future Planning), 'EV Information For City Staff' (Tools for Cities, Link to Us, Incentives), 'EV Video Channel' (Getting EV Ready, Buying an Electric Car, What SCE is doing to get ready), and 'PEV Resources' (Technology, Environment, Regulations, Incentives). A sidebar on the left contains a login form and a menu of links including Smart Grid, Plug-In Electric Vehicles, Charging a PEV: Overview, Before Bringing Home a PEV, Your EV Rate Options, SCE's Plan for the Future, EV Information For City Staff, EV Video Channel, PEV Resources, Power Generation, Renewable Energy, and Transmission Projects. The footer includes links for H Rate, E-mail, Print, Get Adobe Reader, and the slogan 'FOR OVER 100 YEARS...LIFE. POWERED BY EDISON.' along with contact and copyright information.

Residential Research

Early Buyer Study – Objective is to establish early indicators of mass adoption charging (in-home and away from home) and driving behavior to improve education and outreach

The Early Buyer Study will focus on the following:

- Charging situations/scenarios (i.e. workplace)
- Residence Type (single family home vs. multi-family unit)
- Vehicle Type/Battery Range (PHEV vs. BEV)
- Availability of charging infrastructure
- Driving/Commute Patterns & Distances
- Early Buyer Motivations



Non-Residential Research

Non-Residential Charging Assessment - Comprehensive assessment of the future needs of public charging infrastructure

- Non-Residential Segments included in the research:

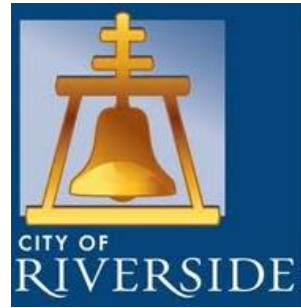
- Commercial
- Government & Institutions
- Industrial

- Charging Scenarios included in the research:

- Multi-Family
- Fleets
- Workplace
- Customer/Visitor



Public Charge Port Infrastructure (CPI)



Sub-region or City level:

- Identify existing electric charging stations and determine if they can be retrofitted to provide a good head start for driver support
- Identify travel destinations or new charging infrastructure placement for driver support
- Contact your Council of Government, SoCalEV Ready, SCAG or SCAQMD to participate in region-wide PEV infrastructure planning.
- Support future proposal efforts for funding opportunities

Public Charge Port Infrastructure (CPI)

Region level – Southern California:

- Analyze region-specific travel patterns in various sub-regions and from city inputs
- Develop region-specific guidelines and recommendations for PEV infrastructure deployment for Single and Multi-Family housing units, workplaces, fleets, commercial and public sites
- Leverage funding opportunities to support regional CPI planning
- Use lessons learned to develop education and outreach to support deployment of regional CPI
- Regional Building Codes

*Southern
California*



Sample EV Ready Building Code for New Construction



City of
ROLLING HILLS ESTATES California

Section 15.04.090 Miscellaneous building code requirements is hereby amended to add section 15.04.090 (d), which states:

*15.04.090 (d) Any new residential construction, including an addition to a residential structure of greater than 50% of the existing floor area, including the primary garage, and/or any demolition of greater than 50% of the lineal walls of a residential structure within a 12-month period, **shall require the installation of a 220 volt dedicated electrical outlet in the garage for the purposes of charging an electric vehicle.***

EVSE Funding Opportunities



Organizations that have received ARRA funding:

Coulomb - www.coulombtech.com
 Ecotality - www.ecotality.com



Organizations that have received CEC funding:

Clipper Creek - www.clippercreek.net
 Coulomb - www.coulombtech.com
 Ecotality - www.ecotality.com

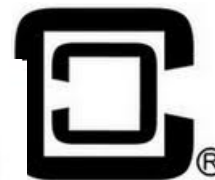


Coulomb
Technologies

Grant Money to install Charging Stations at Metro Stations

EV Connect – www.evconnect.com

AB2766 AQMD funding
CEC PON-10-602
US DOE DE-FOA-0000451



Questions

