

### **Deployment Lessons Learned**

**Clean Cities** 

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# Project Objectives

- Develop mature charge infrastructure "laboratories",
- Collect and analyze data characterizing vehicle and infrastructure utilization,
- Demonstrate measures to minimize impacts of charging on the grid,
- Conduct trials of payment systems,
- Develop a sustainable business model for non-residential charging infrastructure, and
- Document and disseminate the results of the Project.





# Deployment Objectives

- 8,000 Residential EVSE for plug-in vehicles (Nissan Leaf, Chevrolet Volt & Smart EV)
- 5,000 Non-residential EVSE (workplace, commercial, public, and street side)
- 200 DC Fast Chargers (publicly accessible)







### Infrastructure Deployment



Schedule Extended to Support Deployment Objectives



## **Residential Installation**









### **Current Residential Deployment**



**Project** 

NORTH AMERICA

### **Commercial Installation**



blink



### **Public Installation**







### **Commercial Street Side Installation**







# Workplace Installation







### Residential Street Side Installation



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### Current Commercial Deployment





## DC Fast Charge Installation









## Current DCFC Deployment



Project

NORTH AMERICA

### Lessons Learned – Website



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#### **EV Project Documents**

EV Project Quarterly Reports	
2 EV Project EVSE and Vehicle Usage Report: 2nd Quarter 2011	WEB LINKS
EV Project EVSE and Vehicle Usage Report: 3rd Quarter 2011	
D EV Project EVSE and Vehicle Usage Report: 4th Quarter 2011	EAOs 🔍
2 EV Project EVSE and Vehicle Usage Report: 1st Quarter 2012	TAQS

#### Lessons Learned Reports

- Syllabus (June 2012)
- DC Fast Charge-Demand Charge Reduction (May 2012)
- The EV Micro-Climate Planning Process (May 2012)
- Signage (April 2012)
- Greenhouse Gas (GHG) Avoidance and Fuel Cost Reduction (June 2012)
- Eirst Responder Training (March 2011)
- Accessibility at Public EV Charging Locations (October 2011)
- 12 Battery Electric Vehicle Driving and Charging Behavior Observed Early in The EV Project (April 2012)
- 1 A First Look at the Impact of Electric Vehicle Charging on the Electric Grid in The EV Project (May
- 2012)





## Lessons Learned – Currently Available

- **■** Syllabus (June 2012)
- DC Fast Charge-Demand Charge Reduction (May 2012)
- The EV Micro-Climate Planning Process (May 2012)
- Greenhouse Gas (GHG) Avoidance and Fuel Cost Reduction (June 2012)
- **▼** First Responder Training (March 2011)
- Accessibility at Public EV Charging Locations (October 2011)
- Battery Electric Vehicle Driving and Charging Behavior Observed Early in <u>The EV Project</u> (April 2012)
- A First Look at the Impact of Electric Vehicle Charging on the Electric Grid in The EV Project (May 2012)



### Lessons Learned - Coming

- Need for Commercial Charging
- Pricing of Commercial Charging
- Residential Installation Process
- Commercial Installation Process
- EV Energy Metering
- Permitting Cost (Residential & Commercial)



### **Residential Lessons Learned**

- Permit timeliness has not been a problem
- Majority are over-the-counter
- Permit fees vary significantly

Region	Count of Permits	Average Permit Fee	Minimum Permit Fee	Maximum Permit Fee
Arizona	66	\$96.11	\$26.25	\$280.80
Los Angeles	109	\$83.99	\$45.70	\$218.76
San Diego	496	\$213.30	\$12.00	\$409.23
San Francisco	401	\$147.57	\$29.00	\$500.00
Tennessee	322	\$47.15	\$7.50	\$108.00
Oregon	316	\$40.98	\$12.84	\$355.04
Washington	497	\$78.27	\$27.70	\$317.25





### **Residential Lessons Learned**

- Average residential installation cost ≈\$1,375
- Individual installations vary widely
- Some user bias to lower costs

Marlets In Ascending Order Of Residential Installation Cost	Number of Installations	/ Ins	Average stallation Cost	Variation From Project Average
Tennessee (entire State)	542	\$	1,113.07	-19.0%
Arizona (Phoenix & Tucson)	357	\$	1,148.88	-16.4%
Washington DC	3	\$	1,197.44	-12.9%
Oregon (Portland, Eugene, Coralvls & Salem)	465	\$	1,229.06	-10.6%
Washington (Seattle & Olympia)	730	\$	1,289.56	-6.2%
Maryland	39	\$	1,311.75	-4.5%
Washington	80	\$	1,321.36	-3.8%
Virginia	38	\$	1,341.01	-2.4%
San Fransisco	1254	\$	1,386.13	0.9%
Texas (metro Houston & Dallas)	128	\$	1,422.77	3.5%
San Diego	726	\$	1,593.91	16.0%
Los Angeles	415	\$	1,794.64	30.6%





- ADA significantly drives cost
  - Accessible charger
  - Van accessible parking
  - Accessible route to facility
- Permit fees and delays are significant
  - Load studies
  - Zoning reviews







Region	Count of Permits	Average Permit Fee	Minimum Permit Fee	Maximum Permit Fee
Arizona	72	\$228	\$35	\$542
Los Angeles	17	\$195	\$67	\$650
San Diego	17	\$361	\$44	\$821
Texas	47	\$150	\$37	\$775
Tennessee	159	\$71	\$19	\$216
Oregon	102	\$112	\$14	\$291
Washington	33	\$189	\$57	\$590



- Demand and energy costs are significant for some utilities
  - ↗ 25¢/kWh
  - オ \$25/kW
- Some utilities offer commercial rates without demand charges
- Others incorporate a 20 kW to 50 kW demand threshold
- Nissan Leaf is demand charge free in a few service territories

#### No Demand Charges - Nissan Leaf Pacific Gas & Electric CA City of Palo Alto Alameda Municipal Power Silicon Valley Power Tucson Electric Power AZ **Eugene Water & Electric Board** OR Lane Electric Co-op Middle Tennessee Electric TN **Duck River Electric** Harriman Utility Board Athens Utility Board **Cookeville Electric Department Cleveland Utilities** Nashville Electric Service **EPB** Chattanooga Lenoir City Utility Board Volunteer Electric Cooperative Murfreesboro Electric Sequachee Valley Electric Cooperative **Knoxville Utility Board** Maryville Fort Loudoun Electric Memphis Light Gas and Water Division

Recurring Nissan Leaf demand charges are significant in many utility service territories

Utility Demand Charges - Nissan Leaf		Cost/mo.	
CA	Glendale Water and Power	\$	16.00
	Hercules Municipal Utility:	\$	377.00
	Los Angeles Department of Water and Power	\$	700.00
	Burbank Water and Power	\$	1,052.00
	San Diego Gas and Electric	\$	1,061.00
	Southern California Edison	\$	1,460.00
AZ	TRICO Electric Cooperative	\$	180.00
	The Salt River Project	\$	210.50
	Arizona Public Service	\$	483.75
OR	Pacificorp	\$	213.00
WA	Seattle City Light	\$	61.00

### Much More to Come

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