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ELECTRIC VEHICLE DEMONSTRATION PROJECTS

IN THE

UNITED STATES

Prepared For

TEKES

The Finnish Funding Agency for Technology and Innovation

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## 1. BACKGROUND & OBJECTIVES

**Tekes Washington Office has commissioned NWW Market Discovery to carry out a study that will provide an insight into electric vehicle (EV) demonstration projects in the US currently under way or in the planning stages.**

**Tekes has already commissioned two previous studies, one of them about the future of EVs in Finland, the other dealing with the charging of EVs.**

**Tekes would now like to learn about demonstration projects that are aimed at implementing the use of EVs in residential areas and in cities.**

**For projects that are open to international collaboration, TEKES would like to find out more about the collaboration partners and the lead decision makers.**

**This report focuses on identifying demonstration projects that are under way or about to be implemented in areas such as demonstration projects and test beds, platforms and test environments.**

**For each project, sorted by the two categories above, you will find the following information:**

- **What are the main aims of the projects?**
- **What have been the results to date, and are any of them publicly available?**
- **Who are the main partners in these projects and what are their respective roles?**
- **Are any of the projects collaborating internationally and with whom?**
- **Contact details, names of project leaders.**

**In an interview chapter, you will find information about interviews with key decision makers involved in these projects and find out how eager they would be to collaborate with similar initiatives in Finland.**

**This study has been prepared in March – April 2011 by the NWV Team Niels Hauffe, Angelika Kirchmeyer, and Dr. Christian Uhrig.**

## 2. INTRODUCTION

### 2.1. POLITICAL CONTEXT

**The American Clean Energy and Security Act (ACES) from 2009, has extensive provisions for electric cars. The bill calls for all electric utilities to, "develop a plan to support the use of plug-in electric drive vehicles, including heavy-duty hybrid electric vehicles". The bill also provides for "smart grid integration," allowing for more efficient, effective delivery of electricity to accommodate the additional demands of plug-in electric vehicles (EVs). Finally, the bill allows for the Department of Energy to fund projects that support the development of electric vehicle and smart grid technology and infrastructure.**

**President Barack Obama has announced \$2.4 billion for electric vehicles; \$1.5 billion in grants to U.S. based manufacturers to produce highly efficient batteries and their components; up to \$500 million in grants to U.S. based manufacturers to produce other components needed for electric vehicles, such as electric motors and other components; and up to \$400 million to demonstrate and evaluate Plug-In Hybrids and other electric infrastructure concepts—like truck stop charging station, electric rail, and training for technicians to build and repair electric vehicles. In June 2009, the Department of Energy (DoE) awarded \$8 billion in loans to Ford, Nissan, and Tesla Motors to support the development of fuel-efficient vehicles.**

**In the United States, qualifying electric vehicles purchased new are eligible for a one-time federal tax credit that equals 10% of the cost of the vehicle up to \$4,000. A tax deduction of up to \$100,000 per location is available for qualified electric vehicle recharging property used in a trade or business.**

## 2.2. ELECTRICAL CAR MANUFACTURERS

**All major carmakers, such as Ford, Daimler, Toyota, General Motors, Renault-Nissan, Peugeot-Citroen, Volkswagen, BMW, Honda, or Mitsubishi, are developing new-generation electric vehicles. But also small and start-up companies such as Tesla Motors or Aptera Motors are developing EVs and EV components.**

**For car manufacturers, developing a prototype for test fleets which will participate in extensive field trials is a necessary first step toward developing a for-sale electric vehicle that meets customer expectations and needs. Thus, almost all EV manufacturers maintain or are part of EV demonstration projects, mostly in cooperation with cities or other fleet managers so that the cars can operate under real world conditions.**

## 2.3. MUNICIPALITIES

**Cities are the ideal test bed for electric vehicles: Cars are used for short journeys, urban infrastructure can be adapted and high emissions are a problem cities want to solve. The number of city pilots for EV demonstration projects runs into the hundreds worldwide. The Renault-Nissan Alliance alone is reported to be involved in more than 50 demonstration projects, with other manufacturers working on numerous initiatives from Beijing to Los Angeles.**

**The business models vary in their approaches, from using car-sharing pools to using governmental fleets. City-based projects not only allow testing the vehicles but also testing of infrastructure, environmental impact, and driver requirements. In addition, they promote EVs as an alternative to fuel cars to all citizens.**

## 2.4. INFRASTRUCTURE

**Sale of electric cars to consumers and fleets requires availability of electric car infrastructure, so car manufacturers have to team up with municipalities to find solutions for instance for how and where drivers will be able to recharge their lithium-ion batteries.**

While certain types of electric vehicles, such as GM's Chevrolet Volt, include range-extending gasoline engines that act as battery chargers, purely electric vehicles, such as Nissan's Leaf, are solely reliant on the driving range that their battery pack provides. The space required to place charging stations, coupled with a suitable means for consumers to pay for the electricity they use while charging their vehicles, are part of the problems to find solutions for. One of the main concerns is who will in the end pay the bill for the infrastructure – the customers, the general public, or the car manufacturers.

Many utilities such as Portland General Electric or California's Pacific Gas and Electric have announced their intentions to charge much less for off-peak charging to avoid maxing out the grid and allowing the power companies to only make minor changes to their electric grid.

AeroVironment, Inc., is creating infrastructures that includes kiosks that could produce 400 to 600 volts, enough electricity to recharge an electric vehicle battery pack in minutes, says Kristen Helsel, AeroVironment's director of electric vehicle chargers.

Palo Alto, California-based Better Place's approach is to create an electric car infrastructure by proposing to build drive-through battery exchange stations that use robots on an automated track that slide under the car to swap out weak batteries for newly charged ones within minutes. Better Place would own the batteries and be responsible for recharging them, says Sven Thesen, director of Better Place's utility operations and sustainability strategy.

The U.S. Department of Energy (DoE) Electric Vehicle (EV) project is one of the largest projects with a focus on infrastructure, supporting the installation of up to 12,750 charging stations across several major markets. The project also includes the deployment of up to 1,000 Nissan Leaf electric vehicles in each market.



## 2.5. TECHNOLOGY & COMPONENT SUPPLIERS

**Typically, the problems that EV industry has to solve in order to reach early-adopting consumers depend on the efforts of all segments of the EV value chain. Without for example major progress by battery makers, or stimulus money for green technology, the electric vehicle as a mass market product is unthinkable. Apart from machinery and cars, technology and component suppliers are also often part of demonstration projects. Major suppliers for EV industry include companies such as AC Propulsion or Altairano, AeroVironment, Chroma Systems Solutions, ECOtality, UQM Technologies, and many more. Key labs and companies in the area of test equipment and platform providers are the Advanced Vehicle Testing Activity (AVTA), the Argonne Lab, and Southern California Edison Technology Center (SCE)**

**In EV demonstration projects, the car manufacturer often takes the lead by being the only main project partner of the municipality and internally teaming up with suppliers and technology partners that are part of their business relationships and network.**

## 2.6. RETAIL, SALES & CONSUMER SERVICE

**EV industry also creates and needs the entire area of services, such as regional sales and service centers or finance. The availability of services and service centers is often part of the overall considerations when it comes to choosing an area for EV demonstration pilots.**

## 2.7. FUNDING

**Last but not least, demonstration projects need funding. Often, the demonstration project is a joint effort between the car manufacturer and the test fleet – mostly cities – that are their main project partner. Most projects have DoE grants that fund or co-fund EV projects, sometimes in connection with other go-green transportation projects a municipality maintains. The government also takes part by subsidizing purchases of EVs and giving tax exempts.**

**Mia Nielson, spokeswoman for Nissan, says demonstration projects are a "two-way thing". She says that there are "lots of cities that are calling us up", but in some cases it is the manufacturer that takes the lead. One of the reasons is that the commercial partners such as car manufacturers carry most of the costs is since they need the demonstration project as part of their product development cycle, a crucial step before the car can go on sale, and also, since it allows them to open up the market for future sales. However, almost always all partners have a financial commitment of their own; there are scarcely technological partners or suppliers who do not also enter into a financial commitment.**

## **2.8. INTERNATIONAL COLLABORATION**

**International collaborations mostly exist in the form of company collaborations and the involvement of global companies such as Toyota or Honda. There are a considerable number of international experts in the teams, but they are usually not integrated by means of an international cooperation but rather by a job offer from participating US companies or institutions, such as, for instance, in the case of a former German BMW engineer being the program manager for an EV demonstration project between Honda, Stanford University, Google, and the City of Torrance.**

## **2.9. GLOBAL INITIATIVES**

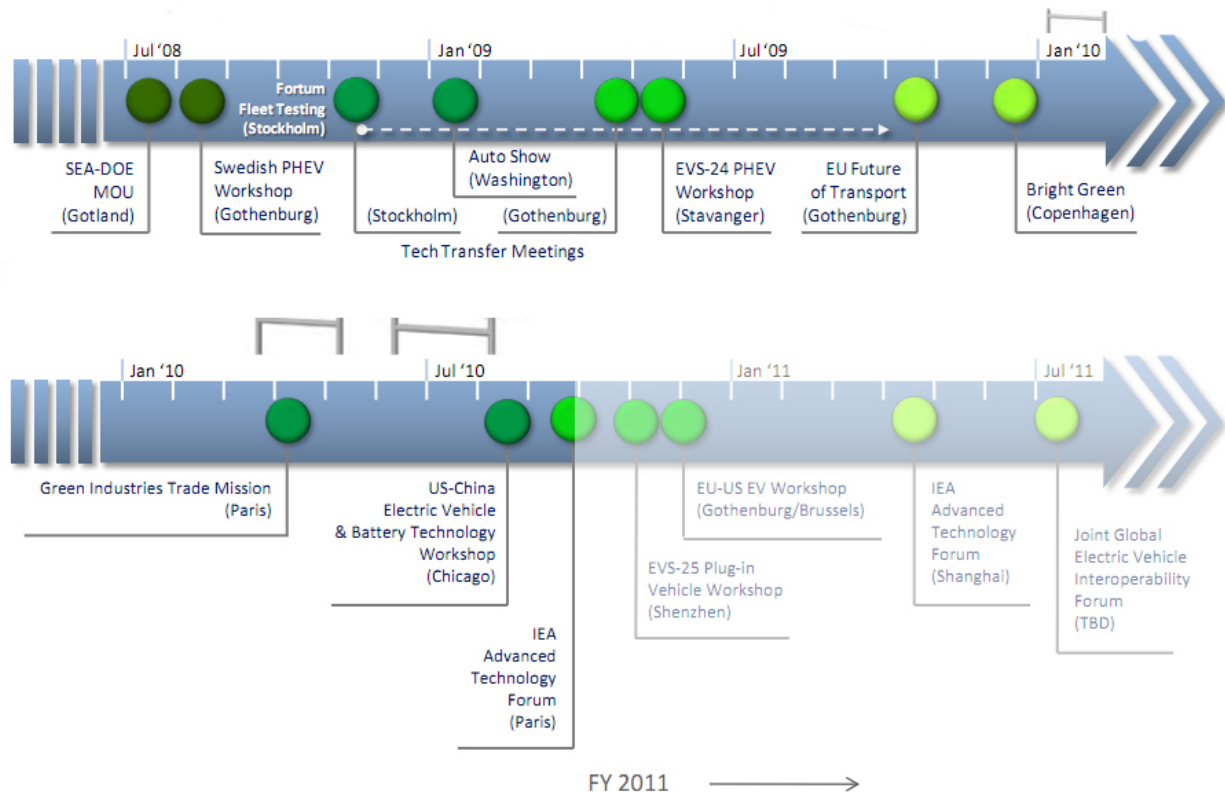
**In July 2008, the U.S. Department of Energy and Sweden signed a Memorandum of Understanding for a one year, \$1 million cost-sharing agreement to be equally funded by DoE and the Swedish Energy Agency. Starting in October of the same year, Argonne National Lab, Test Site Sweden and Swedish Hybrid Vehicle Center (includes Saab, Volvo Car, Volvo Group, Scania, BAE, and others) started the cooperation program with the project "Hydrogen Program and Vehicle Technologies" with a total project funding of 700K (450K from DoE).**

**In 2009, the Electric Vehicle Initiative (EVI) was created with the United States as one of the initial members. EVI is a forum for high-level government dialog on the development and deployment of vehicles that diversify the fuel mix in the transportation sector to improve energy security while reducing pollution. The initiative is being**

implemented and coordinated through an Advisory Group with representatives from each participating country, as well as from the International Energy Agency (IEA).

## DoE policy directive to promote international cooperation on plug-in vehicles

### Timeline and Outlook:



Source: Argonne National Laboratory

EVI commenced at the Clean Energy Ministerial in Washington, D.C., in 2009, and continued through high-level roundtables organized by the IEA during the Paris Motor Show in fall 2010 and in November 2010 during the 25th World Battery, Hybrid and Fuel Cell Electric Vehicle Symposium and Exhibition in Shenzhen, China. Next event will be the Shanghai Motor Show in spring 2011: First International Electric Vehicles Pilot Cities Forum and Third Electric Vehicles Initiative Advisory Group Meeting, 21–22 April 2011, Shanghai Auto Show, Shanghai, China. An EV indicators database to track national deployment targets and results from the first phase of data collection and sharing will be presented at CEM 2011 in Prague, Czech Republic.

**Initial partners include the United States, China, France, Germany, Japan, South Africa, Spain, Sweden, and the IEA. Denmark, Finland and Portugal became members in 2010. One goal of the initiative is to develop joint standards and a joint technological road map for the deployment of electric vehicles.**

**In 2009, the United States and China signed a Memorandum of Understanding and emphasized their countries' strong shared interest in accelerating the deployment of electric vehicles in order to reduce oil dependence, cut greenhouse gas emissions and promote economic growth.**

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### 3. DEMONSTRATION & TEST PROJECTS

#### 3.1. THE EV PROJECT

##### 3.1.1. Description

**The EV Project is part of The Advanced Vehicle Testing Activity (AVTA) which is part of the U.S. Department of Energy (DOE)'s Vehicle Technologies Program.**

**The EV Project is the largest deployment of electric vehicles (EVs) and charge infrastructure in history.**

**On August 5, 2009, ECOtality North America, formerly eTec<sup>1</sup> (Electric Transportation Engineering Corporation), a subsidiary of ECOtality, Inc., was awarded \$99.8M from the American Recovery and Reinvestment Act of 2009 by the United States Department of Energy (DOE) for The EV Project. The EV Project officially was launched on October 1, 2009 and will last approximately 36 months.**

**On June 16, 2010, ECOtality announced expansion of The EV Project to include the cities of Los Angeles, California and Washington, D.C. The project was granted an additional \$15 million by the DOE. With the partner match, the total value of the project is now approximately \$230 million.**

**ECOtality North America will deploy nearly 15,000 charging stations in 18 cities located in six states (Oregon, Washington, California, Arizona, Tennessee and Texas) and the District of Columbia. Nissan North American and General Motors/Chevrolet are partners in The EV Project. For drivers of the Nissan LEAF<sup>2</sup> zero-emissions electric car and the Chevrolet Volt<sup>3</sup> plug-in hybrid with extended range, who qualify to participate in**

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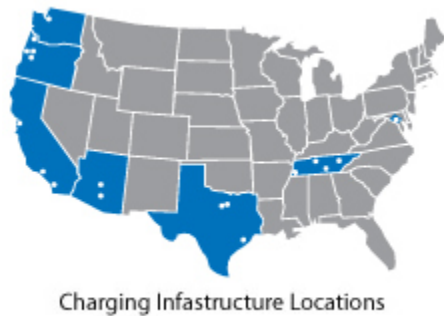
<sup>1</sup> ECOtality Inc. acquired eTec in 2007, and re-branded as ECOtality North America

<sup>2</sup> See <http://www.nissanusa.com/leaf-electric-car/index#/leaf-electric-car/index>

<sup>3</sup> See <http://www.chevrolet.com/volt/>

**The EV Project, a residential charger will be provided free, and most if not all of the costs of installation will be paid for by The EV Project.**

**The EV Project will collect and analyze data to characterize vehicle use in diverse topographic and climatic conditions, evaluate the effectiveness of charge infrastructure, and conduct trials of various revenue systems for commercial and public charge**



**infrastructure. In 2010, charging infrastructure was deployed in the following major population areas: Phoenix (AZ), Tucson (AZ), San Diego (CA), San Francisco (CA), Los Angeles (CA), Portland (OR), Eugene (OR), Salem (OR), Corvallis (OR), Seattle (WA), Nashville (TN), Knoxville (TN), Memphis (TN) and Chattanooga (TN), Washington D.C.,**

**Dallas (TX), Fort Worth (TX), and Houston (TX).**

**Overall, the project consists of 14,650 Level 2 (220V) Chargers, 310 DC Fast-Charger Ports, 50+ Project Partners, 5,700 Nissan LEAF Cars, 2,600 Chevrolet Volt Cars and will create 1,200 New Jobs by 2012 and about 5,500 New Jobs by 2017, in collaboration with 16 Major Cities.**

### 3.1.2. Aims

**Data will be collected and analyzed from the vehicles and charging systems to characterize vehicle performance and the effectiveness of local charging infrastructure under various use patterns and climate conditions. The program will also conduct trials of various revenue systems for commercial and public charge infrastructure.**

**According to the official agenda of The EV Project, the ultimate goal of The EV Project is to take the lessons learned from the deployment of these first 8,300 EVs, and the charging infrastructure supporting them, and apply them to streamlining the deployment of the next 5,000,000 EVs.**

### 3.1.3. Results & Availability

**The following is a rough picture of the roadmap for the project.**

Summer 2010:	Initial infrastructure deployment begins.
Winter 2010:	Nissan launches the Nissan LEAF, a zero emission pure electric vehicle.
Winter 2010:	GM launches the Chevrolet Volt, an electric vehicle with extended range.
Summer 2011:	Intended target for entire infrastructure deployment.

**So far, the project is on track.**

➡ All prior work can be retrieved from the projects' Web site, where several press releases a month are published: <http://www.theevproject.com/media.php>  
In addition the project website provides links to news coverage about the project: <http://www.theevproject.com/news-coverage.php>  
Finally, one can sign up for a free newsletter that keeps its subscribers informed about the progress: <http://www.theevproject.com/sign-up.php>

#### **Excerpt of The EV Projects' activities from February 2011:**

Feb 2<sup>nd</sup>

ECotality wins \$2.87 million in bay area contracts. The project is expanded into the Francisco bay area.

Feb 11<sup>th</sup>

Roush begins mass manufacturing of Blink EV Charging Stations.

Feb 22<sup>nd</sup>

The EV Project expands to Memphis.

Feb 22<sup>nd</sup> – present

Installation of Blink Residential Charging Stations in Oregon, Arizona, and Washington.

#### 3.1.4. Partners & Their Roles

- **Main Supporter: DOE through the American Recovery and Reinvestment Act of 2009**
- **Project Manager: ECOTality North America**
- **Car Manufacturers: Nissan North America; GM Chevrolet; Ford**
- **Research Partners: Idaho National Laboratory<sup>4</sup>**
- **Zero Emission Charging Stations: Roush Manufacturing, a department of Nissan**
- **Solar Technology Partner: Oak Ridge National Laboratory<sup>5</sup>**

**And more than 50 strategic and supporting partners, such as Best Buy, Qualcomm, and others.**

#### 3.1.5. International Collaborations

- **Japanese car manufacturer Nissan participates with its Nissan LEAF zero-emissions electric car.**
- **British Petroleum, represented by its American branch BP America, is a supporting partner in The EV Project.**

**All other main collaborators are Americans.**


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<sup>4</sup> INL for instance is monitoring the driving and charging behavior of drivers

<sup>5</sup> ORNL has installed a solar-covered parking area over 25 electric vehicle charging stations as part of the EV Project



### 3.1.6. Contact Details

	<p>General Inquiries::</p> <p>TheEVproject@ECotality.com</p> <p>Media Inquiries:</p> <p>Caitlin Cieslik-Miskimen Phone: 415-977-1922 Email: caitlin@antennagroup.com</p> <p>The EV Project Headquarters:</p> <p>ECotality North America 430 South 2nd Avenue Phoenix, AZ 85003</p> <p>Phone: 602-716-9576 Fax: 602-256-2606</p> <p>Steve Schey Director of Stakeholder Services sschey@ecotality.com</p> <p>James Vogt Global OEM Accounts Office: 602-345-9044 Cell: 480-543-9000 jvogt@ecotality.com</p> <p>Brian Koontz Stakeholder Services Business Development – North America bkoontz@ecotality.com</p> <p>Paul Heitmann Utilities Representative Cell: 973-906-1184 pheitmann@ecotality.com</p>
<p>The EV Project Web site further offers names, phone numbers and email addresses for representatives of regional offices at Washington State, Oregon, Tennessee, Los Angeles, Arizona, San Diego, and Texas and in addition offers an online form for submitting inquiries: <a href="http://www.theevproject.com/contact.php">www.theevproject.com/contact.php</a></p>	

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- Volunteer TV, "Want to Try the Leaf?", by Sarah Shookman, February 24, 2011
- Web sites of participating partners
- Wikipedia articles

## 3.2. PROJECT PLUG - IN

### 3.2.1. Description

**In February 2010, the Energy Systems Network (ESN), together with their project partners, launched the Plug-In Electric-Vehicle Demonstration Program in the Indianapolis area. The project is divided into three project phases aiming at a completion date of September 2013. See project milestones and project time table in subchapter Aims below.**

**ESN is an initiative of the Central Indiana Corporate Partnership (CICP) focusing on Indiana's clean technology opportunity. It is a catalyst for partnerships among private firms and research institutions to bring energy breakthroughs to market, leveraging Indiana's strong manufacturing sector, R&D capabilities, and heritage of engineering advanced power systems.**

Upon launch of Project Plug-In government officials started using plug-in hybrids made by several manufacturers, including Norwegian car maker Think Global, which plans to manufacture U.S. models in the northern Indiana city of Elkhart. Another EV is the Nissan Leaf, Nissan's first electric-only vehicle, and an electric version of the diminutive Smart car. For the latter, Indianapolis is the first launch market for all of North America.

About 50 to 100 plug-in vehicles are placed into city, state government and some corporate fleets. The public is given the opportunity to drive the vehicles at various events. ESN also put up a Web site where customers can learn more about the vehicles.

With this, Indianapolis was among the first U.S. cities to demonstrate the new technology prior to auto manufacturers bringing the cars to market as early as 2011.

In September 2010, the first charging stations were introduced; among the locations is also Indianapolis International Airport.

Besides the Think factory in Elkhart, a number of hybrid components are being designed and manufactured in central Indiana, including lithium-ion batteries by EnerDel, with facilities on the northeast side of Indianapolis and in Noblesville. EnerDel supplies batteries to Think and its parent company, New York-based Ener1, is a large investor in Think.

### 3.2.2. Aims

The demonstration seeks to expose and overcome practical challenges of electric cars, such as deploying electric charging stations at the workplace. Software to conduct billing also must be developed, as some drivers may live in the service territory of one utility but work in a territory served by a different utility. The demonstration will also test ways to encourage motorists to charge vehicles at home during off-peak hours.

## Project Milestones

Milestones – Phase 1 (1.5 years, 10/1/2009-3/30/2011)	Expected Completion Date
1. Comprehensive Project Plug-IN implementation plan completed by management teams and approved by leadership team	April 1, 2010
2. Comprehensive and ongoing Project Plug-IN public outreach and marketing campaign implemented	August 1, 2010
3. 200 charging infrastructure sites installed to support initial deployment vehicles for Plug-IN Commute and Plug-IN Fleet	October 1, 2010
4. 100 AEDVs and supporting charging infrastructure deployed and operational in Plug-IN Fleet and Plug-IN Commute	December 31, 2010
5. Project Plug-IN data hub operational & accessible to the broader community of science	March 1, 2011
Milestones – Phase II(1.5 years, 4-1/2011-9/30/2012)	
6. 200 Nissan EVs sold in Indianapolis area market with sales accelerated by Project Plug-IN and coordinated dealer network	June 1, 2011
7. 500 or more AEDVs sold in the Indianapolis market	September 1, 2012
Milestones – Phase III (1 year, 10/1/2012-9/30/2013)	
8. 100 Bright Automotive IDEA PHEV vans deployed for use in Plug-IN Fleet	October 1, 2012
9. 3 PHEV shuttle buses deployed for use at Indianapolis International Airport as part of Plug-IN Fleet	October 1, 2012
10. 500 fully integrated and operation AEDV charging infrastructure sites supported by and smart grid intelligent utility network and transaction settlement system	May 1, 2013
11. Complete final project report and evaluation including AEDVs and supporting infrastructure technologies to minimize petroleum consumption and reduce greenhouse gas emissions	July 1 2013
12. At least 1,000 AEDVs sold in the Project Plug-IN Indianapolis markets	September 1, 2013

Source: Project Get Ready, Paul Mitchell

### 3.2.3. Results & Availability

**The idea was to deliver cars as part of the governmental fleet, but also offer such cars for short term ride experiences by renting out the cars by the hour or by day for the interested driver.**

As of December 2010, one of the project partners, the Norwegian EV manufacturer Think, delivered its first U.S. built car as contribution to the project.

The project seems to be on track, but there is no condensed report available on the current project status. Also the data gained during the project is not published in a condensed way. On the other hand there are regular press releases available about the progress of the project, posted on the projects Web site at [www.projectplugin.com](http://www.projectplugin.com). The project also publishes messages on Twitter and sends a regular newsletter to subscribers of an email list accessible through the project Web site.

There is also a regular update about the progress of Project Plug-In on the Web site of Project Get Ready at [www.projectgetready.com/city/partner-city/indianapolis-region](http://www.projectgetready.com/city/partner-city/indianapolis-region).

#### 3.2.4. Partners & Their Roles


- **Smart: Manufacturer of the Smart EV**
- **Think Global: Manufacturer of the Think City EV**
- **Nissan: Manufacturer of the Nissan LEAF EV**
- **EnerDel: Manufacturer of advanced Lithium-Ion Batteries for Hybrid Cars**
- **Ener1: Investor**
- **Duke Energy: Renewable Energy and Smart Grid Technologies**
- **ipl (Indianapolis Power & Light): Alternative Power company**
- **IBM: IT Solutions to enhance smart grid and plug-in vehicle and connectivity and performance**
- **Delphi: Hybrid Power Converters, Controllers, and Battery Packs**
- **Bright Automotive: Plug-In Solution provider**

#### 3.2.5. International Collaborations

- **Nissan: A Japanese Car Manufacturer**
- **Smart: A German Car Manufacturer**
- **Think Global: A Norwegian Car Manufacturer**

**Many of the project partners maintain international collaborations: Ener1 for instance maintains various collaborations with international partners in China, Russia, India, South Korea, and Japan; IBM and Delphi are global suppliers.**

### 3.2.6. Contact Details

	<p>Project Manager Project Plug-In:</p> <p>Tim Pulliam tpulliam@cincorp.com</p> <p>Energy Systems Network:</p> <p>Paul J. Mitchell President &amp; CEO 111 Monument Circle, Suite 1800 Indianapolis IN 46204 Phone: 317-532-4774 pmitchell@cincorp.com</p> <p>Press Releases ESN:</p> <p>Chris Watts, CICP Phone: 317-464-2237 Mobile: 317-514-3184 cwatts@cincorp.com</p>
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- Interview with Paul Mitchell, CEO of Energy Systems Network, February, 2010
- Web site of project partners
- Web site of Project Get Ready

### 3.3. USPS PILOT PROGRAM "CONVERT LLVs TO EVs"

#### 3.3.1. Description

**The U.S. Postal Service (USPS) owns and operates the largest civilian vehicle fleet in the world including approximately 146,000 vehicles used for mail delivery.**

**Congressman Jose Serrano introduced a bill – called the American Electric Vehicle Manufacturing Act or "e-Drive" (H.R. 4399) in December 2009 for the USPS to use a fleet of 20,000 electric delivery vans and to establish a network of 24,000 charging stations (with more to come).**

**In December 2009, five companies were selected for a pilot program to convert USPS gasoline engine Long Life Vehicles (LLVs) to electric. The Postal Service is investing \$250,000 to assist these five electric vehicle technology companies in the research and development of an electric vehicle conversion solution for their LLVs. Testing of these vehicles started in the summer of 2010.**

#### 3.3.2. Aims

**USPS aims to test feasibility of an electric fleet for postal mail service, compatible with USPS' needs while reducing costs and environmental impact of the Postal Service's vehicle fleet. By working together with industry leaders, the information collected and other crucial data shall help form critical decisions about how best to green their vehicle fleet.**

#### 3.3.3. Results & Availability

**USPS publishes an annual report about the program. The 2010 report was released in February 2011 and is online at [www.usps.com/green/news/afv\\_program\\_2010\\_report.htm](http://www.usps.com/green/news/afv_program_2010_report.htm)**

**Below is a summary of some of the current and future activities related to USPS alternative fuel vehicles:**

- **Complete the testing of 3 electric vehicle prototypes at DOE's National Idaho Labs.**
- **Deploy up to 5 EV prototypes in Washington DC for field testing.**
- **Continue monthly DOE fuel economy reporting for 2 fuel cell vehicles.**
- **Continue monitoring fuel economy for Azure hybrid-electric step van.**
- **Test 2 Neighborhood Electric Vehicles (NEVs) in Washington, DC.**

#### 3.3.4. Partners & Their Roles

**Under the program, five companies are working with the postal service to create an electric version of the classic Grumman LLV. The traditional USPS Grumman long life vehicle (LLV) is the standard mail truck used around the United States. The companies will work with the USPS to test the feasibility of an electrified fleet.**

- **EDAG Inc. & Bright Automotive: Bright retrofits the LLV with an electric drive train. Detroit automotive supplier EDAG will complete the heavy metal fabrication for the conversion**
- **AC Propulsion and AutoPort Inc.: AC Propulsion and AutoPort partner in engineering, development and conversion to provide an Electric Vehicle conversion prototype and provide a report for the USPS. The test vehicle will use AC Propulsion's AC-150 drive system and have a range of up to 300 miles at 60 mph. The companies also teamed up with University of Delaware.**
- **AM General & Smith Electric Vehicles: AM General is building the chassis for the prototype and Smith is providing the electric powertrain.**
- **ZAP: ZAP partnered with Chinese company Remy Electric Motors for the development of the electric postal delivery vehicle. Zap will convert the truck in Santa Rosa, CA and then send it to Washington, D.C. for field tests.**
- **Quantum Corporation: Quantum will use its Quantum Quiet electric power train with a lithium ion battery pack.**



### 3.3.5. International Collaborations

**Most of the car manufacturers maintain international partnerships and collaborations.  
The USPS program itself is a national program.**

### 3.3.6. Contact Details

	<p>USPS Strategic Planning:</p> <p>Strategic Business Planning 475 L'Enfant Plaza SW RM 5127 Washington, DC 20260-5127</p> <p>USPS Vision 2013:</p> <p><a href="mailto:transformation@usps.gov">transformation@usps.gov</a></p> <p>Media Contact:</p> <p>Darlene Casey Public Relations Representative Sustainability, Diversity Office: 202-268-3440 Cell: 202-438-8886 <a href="mailto:Darlene.casey@usps.gov">Darlene.casey@usps.gov</a></p>
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- DOE's Energy Efficiency & Renewable Energy EERE Information Center, Vehicle Technologies Program Reports
- E-Drive Bill — HR 4399, "Electrification of the Postal Fleet", Serrano, Bill first introduced December 17, 2009

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- USPS Press Releases 2009 – 2011
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- Washington Post, "U.S. Postal Service to test a repurposed electric vehicle fleet", by Nicole Norfleet, March 4, 2010
- Wikipedia articles

### 3.4. PORT OF LOS ANGELES ELECTRIC TRUCK DEMONSTRATION PROJECTS

#### 3.4.1. Description

##### Project 1: Balqon Electric Truck Initiative

**In 2007, the Port of Los Angeles and SCAQMD (South Coast Air Quality Management District) partnered to fund the prototype of a short-range heavy-duty electric truck from Santa Ana-based Balqon Corporation. The agencies split the \$527,000 investment to demonstrate a heavy-duty truck capable of hauling a fully loaded 40-foot cargo container.**

**The heavy-duty, all-electric truck being tested at the Port of Los Angeles is a zero-emissions workhorse that could be a precursor to future short-range port and cargo terminal drayage operations worldwide. To advance this vision, the Port placed the first significant production order of these trucks with Balqon Corporation, to take delivery of 20 electric container terminal tractors, or "hostlers," and five on-road electric drayage trucks by 2009. The hostlers cost about \$190,000 per unit.**

**The third phase of this program is the production of five on-road electric trucks. The on-road heavy-duty electric truck costs approximately \$208,500 per unit and required the Port and manufacturer Balqon Corporation to work together with the Department of Transportation to obtain appropriate certification of the vehicle to be used on road.**

**In January 2011, Balqon received an order for 300 of its trucks from China.**

**The Balqon electric truck initiative augments the ongoing green technology efforts under the Technology Advancement Program, a component of the San Pedro Bay Ports Clean Air Action Plan (CAAP) approved by the ports of L.A. and Long Beach in November 2006. The ports are committing \$15 million over five years to fund the TAP. The mission of the TAP is to accelerate the verification or commercial availability of new, clean technologies through evaluation and demonstration to move towards an emissions-free port.**

Project 2: Vision Motor Corp. Truck Initiative

**In a different project that has not started yet, the Port of Los Angeles will – together with Long Beach – test new non-polluting trucks powered by zero-emission plug-in electric/hydrogen fuel as a demonstration of the cutting-edge green technology.**

**In an agreement with El Segundo-based Vision Motor Corp., one big-rig truck and one terminal tractor will be put to work for 18 months, with an anticipated start in early 2011. They will be tested under typical conditions for these short-haul vehicles. Each port has agreed to provide \$212,500 from their Technology Advancement Program funds toward the cost of the \$1 million project.**

#### 3.4.2. Aims

**All-electric drayage trucks will substantially reduce the emissions generated by an estimated two million or more very short-haul truck trips that occur each year between the port complex and local rail and warehouse facilities.**

#### 3.4.3. Results & Availability

**The initial testing of the truck began at the Port in January 2008. Daily testing was recorded electronically as the truck was tested for speed, range, payload and charging**

capabilities. Energy-management and operational characteristics of this vehicle are micro processor and software controlled using state-of-the-art technology applied from the hybrid and electric vehicle industry. During the testing, software changes were made to improve vehicle energy efficiency (conversion of electric energy to mechanical energy) by more than 20%. Before on-road testing, the truck will be tested at a Port of L.A. container terminal as an emissions-free “yard hostler.”

Information and data about the results are available from the Web sites of the partners Port of Los Angeles and Balqon: [www.portoflosangeles.org](http://www.portoflosangeles.org) and [www.balqon.com](http://www.balqon.com).

Port of Los Angeles also publishes regular project newsletters for the project.

The Port of Los Angeles - Long Beach project with Vision Motor Corp. has not started yet, and results are not to be expected before mid or end of 2011. Press releases and announcements are available online on the Web site of the partners, for example at [www.visionmotorcorp.com](http://www.visionmotorcorp.com).

#### 3.4.4. Partners & Their Roles

##### Project 1: Balqon Electric Truck Initiative

- **Port of Los Angeles: Investor and Project Management**
- **South Coast Air Quality Management District: Investor**
- **Balqon Corporation: Truck Manufacturer**
- **Vision Motor Corp.: Truck Manufacturer**


##### Project 2: Vision Motor Corp. Truck Initiative

- **Port of Los Angeles: Investor and Project Management**
- **Port of Long Beach: Investor**
- **Vision Motor Corp.: Truck Manufacturer**

### 3.4.5. International Collaborations

**None.**

### 3.4.6. Contact Details

	<p>Project 1: Balqon Electric Truck Initiative:</p> <p>Port of Los Angeles:</p> <p>425 S. Palos Verdes Street P.O. Box 151 San Pedro, CA 90733-0151 Phone/TDD: (310) SEA-PORT</p> <p>Media Contact:</p> <p>Theresa Adams Lopez Phone: 310-732-3507 tadams-lopez@portla.org</p> <p>Project 2: Vision Motor Corp. Electric Truck Initiative</p> <p>Port of Los Angeles:</p> <p>Environmental Management 425 S. Palos Verdes Street San Pedro, CA 90731 Phone: 310-732 -3675</p> <p>Port of Long Beach:</p> <p>Environmental Planning 925 Harbor Plaza Long Beach, CA 90802 Phone: 562-590-4160</p> <p>Media Contacts:</p> <p>Art Wong Assistant Director of Communications Phone: 562-590-4123 wong@polb.com</p> <p>Phillip Sanfield Director of Media Relations Phone 310-732-3568 psanfield@portla.org</p>
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### 3.4.7. Sources

- Publication “Electric Truck Demonstration Project Fact Sheet”, by Theresa Adams Lopez, January 4, 2009
- The Port of Los Angeles and Port of Long Beach, “Ports to Test Non-polluting Fuel Cell Trucks”, Press Release, December 16, 2010
- Way2Go, “It’s Electric: Two Promising Port Truck Innovation Projects”, by TransportationTeam, June 21, 2010
- Web sites of project partners

## 3.5. SDG&E CTP EV DEMONSTRATION PROJECTS

### 3.5.1. Description

**San Diego Gas & Electric’s (SDG&E) Clean Transportation Program (CTP) is part of SDG&E's commitment to developing energy solutions for the region. The program is offering information on and evaluating electric transportation alternatives for the future.**

**The CTP is involved in different types of demonstration or test projects. In one of them, the CTP is conducting a performance comparison study to examine the efficiency of standard hybrid electric vehicles (HEVs) vs. converted plug-in hybrid electric vehicles (PHEVs).**

In another test project the SDG&E partnered with the California Center for Sustainable Energy (CCSE), which is an independent nonprofit dedicated to facilitate the adoption of clean, reliable, sustainable and efficient energy technologies and practices.

In July 2010, the CCSE and SDG&E received a number of Toyota Prius EVs; for a detailed description of the Toyota Prius demonstration programs, see chapter 3.8 below. During the demonstration period, the cars will be in daily use as both personal and work vehicles by CCSE and SDG&E staff members.

### 3.5.2. Aims

**The comparison project intends to study**

- **Gas mileage comparison for HEVs vs. PHEVs**
- **Electricity usage and operating costs needed to run PHEVs**
- **Drivers' experiences and feedback comparing HEVs to PHEVs**
- **Safety and maintenance issues for PHEVs**

### 3.5.3. Results & Availability

**No results have been published yet, but information about the project will be made available on the CTP and Environment pages of the SDG&E Web site, [www.sdge.com/environment/cleantransportation/](http://www.sdge.com/environment/cleantransportation/) and [www.sdge.com/environment/](http://www.sdge.com/environment/).**


### 3.5.4. Partners & Their Roles

- **Juice Technologies of Columbus, Ohio: Evaluation of advanced smart charging capabilities for plug-in electric vehicles**
- **AeroVironment Inc.: Determine how used electric vehicle batteries can be given a second life in a variety of smart grid energy storage applications**
- **University of California at Davis: Funding/Investor**
- **ECOtality: Determine the best locations for electric vehicle charging stations**

### 3.5.5. International Collaborations

**None.**

### 3.5.6. Contact Details

	<p>CTP Program Manager:</p> <p>Joel Pointon 8306 Century Park Ct CP42K San Diego, CA 92123</p> <p>Jpointon@SempraUtilities.com 858- 654-8767</p> <p>CTP General Inquiries:</p> <p>ETProgram@sdge.com EVStudy@sdge.com</p>
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### 3.5.7. Sources

- Sign On San Diego, "Plug-in Prius to hit San Diego in summer", by Onell R. Soto, May 12, 2010
- Everything San Diego, "SDG&E receives Toyota Prius plug-in hybrid vehicles for worldwide demonstration program", by staff writers, July 6, 2010
- Web site and Press Releases of the project partners

## 3.6. FUEL CELL ELECTRIC VEHICLE LEARNING DEMONSTRATION PROJECT

### 3.6.1. Description

**The National Fuel Cell Electric Vehicle Learning Demonstration is a U.S. Department of Energy (DOE) project that started in 2004. Within a total of seven years, data provided by five different project teams running four car fleets is being collected and evaluated in the areas of San Francisco, Los Angeles, Detroit and New York / Washington DC.**



### 3.6.2. Aims

**Key objectives of the project are to evaluate fuel cell durability, vehicle driving range, and on-site hydrogen production cost.**

**The primary purpose of this project is to conduct an integrated field validation that simultaneously examines the performance of fuel cell vehicles and the supporting hydrogen infrastructure. In addition, the current status and evolution of the technology should be investigated.**

**Since two of the five project groups have concluded their involvement in 2010, the projects will now focus its analysis efforts on a smaller number of vehicles and stations, and enter into a new stage of learning for this project. The goal is to dig deeper into the data to provide additional technical value to the remaining teams as they improve their systems' technical performance in preparation for pre-commercial launch of larger fleets of vehicles in California and New York. The project will also gather data and analyze performance of improved vehicles compared to those that have been previously demonstrated, since these vehicles are one step closer to commercially available customer vehicles.**

### 3.6.3. Results & Availability

**As of November 2010, the DOE's National Renewable Energy Laboratory (NREL) had analyzed data from over five years of the seven-year project. During this time, over 144 fuel cell electric vehicles have been deployed, and 23 project refueling stations were placed in use. The project analyzed data from over 430,000 individual vehicle trips covering 2,500,000 miles traveled and over 130,000 kg hydrogen produced or dispensed. During 2010, two of the project teams concluded their involvement in the project, and the other two are continuing.**

A short result summary:

- ❖ Full Cell Stack Durability: The maximum number of hours a first-generation stack accumulated without repair is 2,375. For second-

generation fuel cell stacks (2005–2007 technology), the range of maximum hours accumulated from the teams is now approximately 800 to over 1,200 hours.

- ❖ **Vehicle Driving Range:** The results indicated a 431-mile on-road range was possible in southern California using Toyota's FCHV-adv fuel cell vehicle.
- ❖ **Onsite Hydrogen Production Cost:** Results indicate that on-site natural gas reformation could lead to a price range of \$8–\$10/kg, and on-site electrolysis could lead to a range of \$10–\$13/kg hydrogen cost.

**This project has met all of the 2003-established key targets being achieved except for on-site hydrogen production cost.**

**The raw data for this project is protected in NREL's Hydrogen Secure Data Center, but the public may access results through composite data products (CDPs): [www.nrel.gov/hydrogen/proj\\_learning\\_demo.html](http://www.nrel.gov/hydrogen/proj_learning_demo.html).**

**Detailed results (also technical information) are also published and available from the sources mentioned in the sources chapter below.**

#### 3.6.4. Partners & Their Roles


- **US Department of Energy: Carrier of the project**
- **National Renewable Energy Laboratory: Operating Department**
- **Ford Motor Company: Car manufacturer**
- **British Petroleum: Fuel cell infrastructure**
- **Hyundai-Kia: Car Manufacturer**
- **Chevron: Fuel cell infrastructure**
- **Daimler: Car Manufacturer**
- **General Motors: Car Manufacturer**
- **Air Products: Hydrogen Energy Fuel products**

### 3.6.5. International Collaborations

- **British Petroleum: BP is a global oil and gas company headquartered in London, United Kingdom**
- **Hyundai-Kia: South Korean Car Manufacturer**

**Most of the corporate partners market their products and technologies worldwide and maintain international partnerships and collaborations. The NREL program itself is a national program.**

### 3.6.6. Contact Details

	<p>Project Manager:</p> <p>Keith Wipke National Renewable Energy Laboratory 1617 Cole Blvd, Golden, CO 80401 Phone: 303-275-4451 keith.wipke@nrel.gov</p>
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### 3.6.7. Sources

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- Publications from the National Renewable Energy Laboratory, especially from the Hydrogen & Fuel Cell Research Center at [www.nrel.gov/hydrogen/](http://www.nrel.gov/hydrogen/)

## 3.7. HONDA FIT EV DEMO PROGRAM

### 3.7.1. Description

**Honda's Fit EV Demo Program was launched in December 2010. It conducted the first public test drive of a Fit EV prototype and an Accord Sedan test car outfitted with a new**

**two-motor plug-in hybrid system. The Fit will be available to the participants in the fall of 2011, and the plug-in hybrid some time after that, according to Elmer Hardy, American Honda's senior manager of alternative fuel vehicles.**

**Small fleets of the car will go into test programs at Stanford, Google and the City of Torrance, California.**

**The Honda Fit EV and Accord plug-in hybrid will be used by several Torrance city departments, including the Community Development department and Public Works office, along with the Economic Development office.**

### **3.7.2. Aims**

**Honda hopes to gather data about how people use and adapt to EVs: "The goal of the Honda Electric Vehicle Demonstration Program is to more fully understand the challenges and opportunities associated with such a fundamental shift in technology," says Tetsuo Iwamura, American Honda Motor Co, Inc., President and CEO. "The city of Torrance and the other participants will play a key role, by providing real-world feedback on their experience. They will help us tackle the important issues surrounding customer adoption of electric vehicles."**

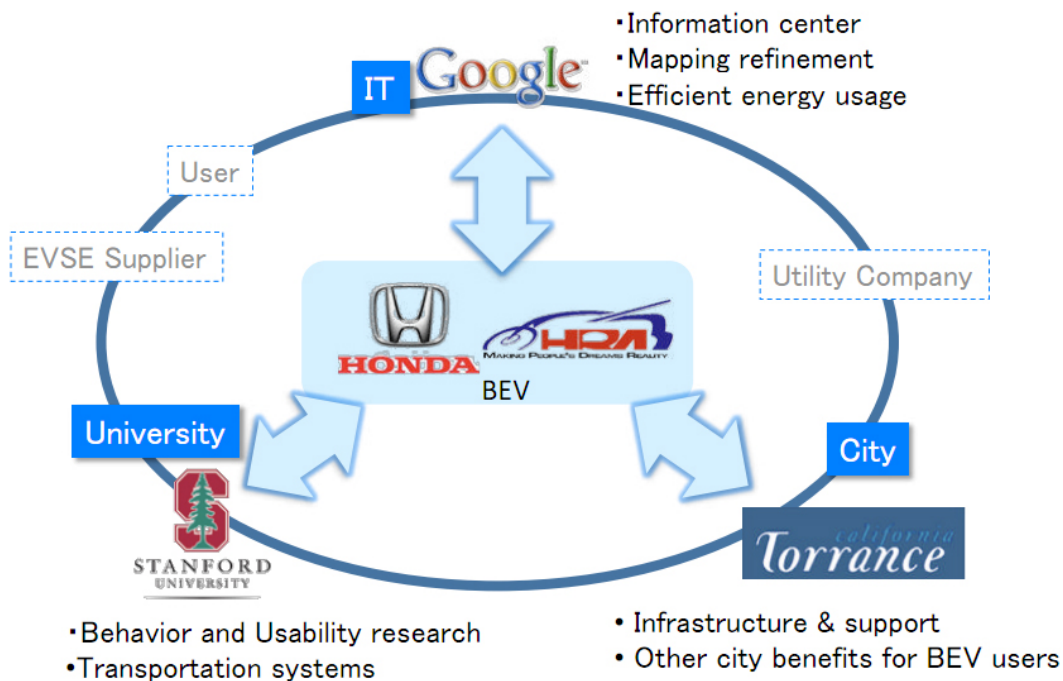
**Honda expects the program to allow Torrance to "learn the needs of the city in terms of the (municipal) code, charger infrastructure and whatever other needs they may discover," said Elmer Hardy, American Honda's senior manager of alternative fuel vehicles.**

**Honda does not comment on the scale of the demonstration program, production volumes targeted for 2012, and the anticipated timeline for delivering road-ready vehicles to the three demo partners.**

### **3.7.3. Results & Availability**

**The program has been launched but will not start before fall 2011.**

### 3.7.4. Partners & Their Roles




- **City of Torrance:** Car tester; focus of evaluation on charging infrastructure development, promotion of sustainable community initiatives and to building public awareness about electric cars.
- **Stanford University:** Car tester; focus on driver behavior and “usability,” while investigating ways to integrate electric vehicles into larger transportation systems.
- **Google Inc.:** Car tester; car will be part of Google’s car-share program, GFleet, a fleet of 30 hybrids and all-electric cars made available to the company’s employees at the company’s Mountain View, California campus since 2007 and managed by Enterprise Rent-A-Car. The car share program has about 2,600 members, Dave Dewitt, principal engineer for Honda R&D, said.

**Honda will analyze large amounts of data and seek to quantify “what kind of real CO2 reductions” can be expected with an electric vehicle like the Fit.**

### 3.7.5. International Collaborations

**Honda Motor Company, Ltd. is a Japanese multinational corporation. There are no international partners in the Honda electric car demonstration project at this time.**

### 3.7.6. Contact Details

	<p>General Inquiries:</p> <p>Honda R&amp;D Americas, Inc. 1900 Harpers Way Torrance, CA 90501-2746</p> <p>Principal Engineer: Dave DeWitt</p> <p>City of Torrance:</p> <p>City Hall 3031 Torrance Blvd. Torrance, CA 90503 Phone 310- 328-5310</p> <p>Community Development: Community_Development_Dept@TorranceCA.Gov</p> <p>Google Inc.:</p> <p>Media Inquiries: press@google.com</p> <p>Enterprise Rent-A-Car:</p> <p><a href="http://www.enterprise.com/car_rental/contactUs.do">www.enterprise.com/car_rental/contactUs.do</a></p> <p>Stanford University:</p> <p>Sven Armin Beiker Executive Director, Center for Automotive Research at Stanford Bldg 550 / Rm 131 Phone: 650-714-0536 beiker@stanford.edu</p>
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### 3.7.7. Sources

- CBS Business Network, "Honda Electrifies the Versatile Fit, Already a Hybrid", by Jim Motavalli, November 19, 2010
- Daily Breeze, "Torrance among sites for Honda's real-world alternative fuel vehicle tests", by Muhammed El-Hasan, December 15, 2010
- GIGAOM, "Google's GFleet To Provide Testing Ground for Electric Cars", by Josie Garthwaite, November 21, 2010
- Green Beat Interpreting Innovation, "On the GreenBeat: Honda looks to Google for electric car pilot, DOE awards \$19 million in smart grid grants", by Iris Kuo, November 22, 2010
- Honda Inc. Press Release, "Honda Launches Electric Vehicle Demonstration Program", December 15, 2010
- Lecture by Dave DeWitt, Honda R&D, " Advance Technology Demonstration Program (ATDP): First Market Releases to Test EVs and Consumer Response / Behavior", Stanford University, January 18, 2011

### 3.8. TOYOTA EV DEMONSTRATION PROGRAMS

#### 3.8.1. Description

Project 1: Prius Plug-In Hybrid Vehicle (PHV) Demonstration Program

**Beginning in 2010, 150 Toyota Plug-In Hybrid Vehicles (PHVs) were placed in regional clusters with select partners for market/consumer analysis and technical demonstration. Program partners – companies, institutions and government agencies – also share data amongst themselves and compare usage and performance of the vehicles.**

**All vehicles are equipped with data retrieval devices which will monitor activities such as how often the vehicle is charged and when; whether the batteries are depleted or being topped off during charging; trip duration, all-EV driving range, and combined mpg and similar more.**

**The Prius PHV will come to market in 2012. Program termination dates will vary and are being worked out with each partner individually.**

Project 2: FCHV-adv (Fuel Cell Hybrid Vehicle) - Advanced demonstration program

**In March 2010, Toyota Motor Sales, USA, Inc. and Toyota Motor Manufacturing and Engineering North America, Inc. announced that they will place more than 100 Toyota Fuel Cell Hybrid Vehicle – Advanced (FCHV-adv) vehicles with universities, private companies and government agencies in both California and New York as part of a nationwide demonstration program. During this period, additional regions and partners will be added as new hydrogen stations come online.**

**Toyota's demonstration program expansion, with the addition of the FCHV-adv vehicles, will create one of the largest fleets of active fuel cell vehicles in the country.**

Project 3: RAV4 Electric Vehicle (EV) Demonstration Program

**In November 2010, Toyota Motor Sales (TMS), USA, unveiled the second-generation Toyota RAV4 EV demonstrator vehicle at the Los Angeles Auto Show. The car is the result of the Toyota and Tesla Motors collaboration.**

**A total of 35 RAV4 EV's will be built for a demonstration and evaluation program running through 2011. These demonstration vehicles utilize the current RAV4 vehicle built in Canada and integrate the Tesla battery and additional components built in Palo Alto, California. A fully-engineered vehicle is targeted to launch in 2012. The fully-engineered vehicle will target a range of 100 miles in a wide range of climates and conditions.**

### 3.8.2. Aims

**On the consumer side, the U.S. Toyota programs will allow Toyota to gather real world vehicle-use feedback to better understand customer expectations for plug-in technology.**

**On the technical side, the program aims to confirm, in a wide variety of real world applications, the overall performance of first-generation lithium-ion battery technology, while spurring the development of public-access charging station infrastructure.**



**The key goals of the programs are to evaluate:**

- **Driving conditions such as commute length**
- **Access to charging**
- **Real-world performance of lithium-ion battery technology**

**The FCHV-adv demonstration program also will serve to demonstrate fuel cell technologies reliability and performance prior to Toyota's 2015 market introduction.**

### 3.8.3. Results & Availability

**Toyota Motor Sales, USA, Inc. environmental, safety and quality communications department (ESQ) serves as a primary source for information regarding Toyota's activities and initiatives, including information about all of their EV demonstration programs, updates and press releases. Most documents are online available at: [www.toyota.com/esq/](http://www.toyota.com/esq/)**

**In addition, the PHV program partners maintain a blog on the Toyota Web site where they publish and compare results: <http://ec2prdweb004.toyota.com/34/ca-center-for-sustainable-energy>**

**The California Center for Sustainability publishes their experience with the PHV demonstration program online at: <https://energycenter.org/index.php/technical-assistance/transportation/phv>**

### 3.8.4. Partners & Their Roles

Project 1: Prius Plug-In Hybrid Vehicle Demonstration Program

**Excerpt of partners in Toyota's Prius Plug-In Hybrid Vehicle Demonstration Program:**

- **California Center for Sustainable Energy**

- **Clean Communities of Central New York**
- **CuseCar**
- **Portland State University**
- **Qualcomm**
- **San Diego Gas & Electric**
- **Silicon Valley Leadership Group**
- **SmartGridCity**
- **South Coast Air Quality Management District**
- **University of California, Berkeley**
- **Syracuse University, Department of Energy and Computing Management**
- **Syracuse Center of Excellence**
- **Bay Area Air Quality Management District**
- **New York Department of Transportation**
- **Port Authority of New York and New Jersey**
- **University of California, Irvine**
- **University of California, San Diego**
- **U.S. Environmental Protection Agency**

**Additionally, other Toyota Prius PHV units can be seen and driven by consumers at consumer events and shows.**

**Here some examples of the partner roles in the Toyota Program:**

- **Xcel Energy's SmartGridCity program in Boulder, CO: Ten Prius PHVs placed with Boulder residents are now part of a joint venture between the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) and the University of Colorado at Boulder.**
- **CuseCar: Six Toyota Prius plug-in hybrids are placed at CuseCar to drive around Central New York testing them with a variety of drivers under real-world conditions.**
- **Zipcar: The Cambridge-based car-sharing service Zipcar is testing the model to see if it's a good fit for the Zipcar fleet in such markets as Boston/Cambridge,**

**San Francisco, and Portland, Oregon. One of the Zipcar Toyotas will be located on the campus of the Massachusetts Institute of Technology.**

Project 2: FCHV-adv Demonstration Program

- **University of California, Irvine, University of California, Berkeley and the University of California, Davis: Testing different aspects of consumer acceptance and market dynamics of fuel cell vehicles.**
- **California Fuel Cell Partnership, a public-private partnership organization to promote the adoption of hydrogen vehicles in California: Servicing Californian universities, corporations and government agencies with 20 Toyota FCHVs.**

Project 3: RAV4 Electric Vehicle (EV) Demonstration Program

- **Tesla: Manufacturer of batteries and other power components**


3.8.5. International Collaborations

**Toyota Motor Corporation is a multinational automaker headquartered in Toyota, Aichi, Japan.**

**The Toyota Prius PHV demonstration program is a global program preparing the market entry for the new PHV not only in the United States but also on different continents and markets; the FCHV-adv demonstration program runs in the United States and also in Japan.**

**RAV4 is the result of a partnership with Tesla, a Californian company; all other partners are also U.S. American companies or governmental / educational bodies.**

### 3.8.6. Contact Details

	<p>General Inquiries:</p> <p>Toyota Motor North America, Inc. Mira Sleilati Spokes Woman, Media Relations 212-715-7435 msleilati@tma.toyota.com</p> <p>Toyota Environmental Communications:</p> <p>Jana Hartline 310-468-7977 Amy K Taylor 310-468-6237 John Hanson 310-468-4718</p>
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### 3.8.7. Sources

- Boston Globe Business Updates, "Zipcar will test electric vehicles," by staff writers, January 27, 2011
- Green Car Congress, "Toyota unveils RAV4 EV demonstration vehicle; targeting fully-engineered version in 2012 for market", by staff writers, November 11, 2010
- The Press Enterprise, "Government agencies to test electric cars", by Dug Begley, February 23, 2011
- Toyota Press Releases from 2010 and 2011
- Web site of Toyota and Web sites of program partners

## 3.9. SMART ED TEST PROJECT

### 3.9.1. Description

**Starting January 2011, Smart USA, which distributes cars made by Daimler AG, started leasing out 250 electric cars in Portland, Oregon; San Jose, California; Orlando, Florida; Indianapolis and along the Washington D.C. to Massachusetts corridor of Interstate-95. Smart USA will lease 80 percent of the Smart Fortwo car to companies, while 20 percent will be offered to individuals, company officials said. The car will be under warranty during the full four-year period.**

**The trial program in the U.S. began in January 2011 with the first customer delivery in Washington, DC. A total of 250 units are available for leasing at a price of US\$599 per month for a period of 48 months and 60,000 kilometres (37,282 mi), plus US\$2,500 due at signing. This pricing is before taxes or any government tax credits or rebates available.**

**The 95-percent recyclable car is outfitted with a 16.5 kilowatt-hour lithium ion battery from Tesla Motors Inc.**

**According to Derek Kaufman, vice president of Smart USA, sales of Smart's electric car to the general public will begin in early 2012, first in countries in Europe and soon after in the United States.**

### 3.9.2. Aims

**Smart USA, a unit of dealer-operator Penske Automotive Group Inc, follows the performance of these cars over the time of the lease, with the owners' permission. The company tracks data on driving habits and sees how the vehicles handle certain speeds and weather conditions in real time.**

### 3.9.3. Results & Availability

**Results of this project are not yet published and it might happen that they are only used internally in order to improve the car or to change its specification towards the consumer requirements.**

**There is a smart user social network where users share their experiences:  
[www.smartusainsider.com](http://www.smartusainsider.com).**

### 3.9.4. Partners & Their Roles

- **Smart USA: Car manufacturer**
- **Smart Fortwo Drivers: Allow data retrieval**

### 3.9.5. International Collaboration

**Smarts are made by German Daimler AG. The same program runs in UK - the company has already placed 100 electric cars in London.**

### 3.9.6. Contact Details

	<p>Smart USA Headquarters:</p> <p>Smart USA 2555 South Telegraph Road Bloomfield Hills, MI 248 -648-2500 800-762-7887</p> <p>Media Inquiries:</p> <p>Rick Bourgoise Director of Communications 248-648-2582 rbourgoise@smartusa.com</p> <p>All other Inquiries:</p> <p>248-648-2442</p>
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### 3.9.7. Sources

- Car and Driver, "2011 Smart Fortwo Electric Drive - First Drive Review", by Michael Austin, June 2010
- PluginCars, "Smart USA Delivers First ForTwo Electric Car—Also Available as a Convertible", by Nick Chambers, January 27, 2011
- Reuters, "Smart to Test Electric Cars in Some U.S. Cities ", by Deepa Seetharaman, June 10, 2010
- Smart USA Web site
- Wikipedia articles

### 3.10. F3DM TEST PROJECT

#### 3.10.1.Description

**In December 2010, the Housing Authority of the City of Los Angeles (HACLA) and BYD Motors Inc. announced the launch of an electric vehicle fleet field test with the BYD F3DM sedan. The agreement was signed and ten BYD vehicles were put into service at the HACLA Offices in Los Angeles.**

**BYD is also in discussions with the HACLA to integrate solar power to charge an Energy Storage Station (ESS) during the day that could then discharge later during the EV fleet charging hours.**

**Sales of the F3DM to the general public began in Shenzhen in March 2010. The testing program with the HACLA is the first step for the U.S. market entry of the F3DM that is planned for 2012 at a price of US\$28,800 before any government incentives.**

#### 3.10.2.Aims

**The HACLA's goal is to test BYD's EV fleet technology with respect to the possible reduction of fuel costs and the additional reduction of direct-emissions (which is estimated to almost 37 lbs of CO<sub>2</sub> per car, traveling less than 40 miles per day). According to the HACLA's President and CEO, Rudolf C. Montiel, the HACLA would like to demonstrate the lowest-cost fleet program in the United States.**

#### 3.10.3.Results and Availability

**The project just started so no results have been published so far.**


#### 3.10.4.Partners & Their Roles

- **The HACLA: Project Executing Organization and Test Environment**
- **BYD Motors Inc.: Manufacturer of the BYD F3DM Sedan**

### 3.10.5. International Collaborations

**BYD Automobile Co Ltd is a Chinese automobile manufacturer based in Shenzhen, Guangdong Province, with U.S. headquarters in Los Angeles. In 2011, BYD started a joint venture with Daimler AG, with a focus on EV development and BYD-branded sedans.**

### 3.10.6. Contact Details

	<p>The HACLA:</p> <p>Annie Kim Public Information Officer Phone: 213-252-1864 annie.kim@hacla.org</p> <p>BYD:</p> <p>Micheal Austin Vice President BYD Los Angeles Phone: 877-585-6868 micheal.austin@byd.com</p>
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### 3.10.7. Sources

- Enhanced Online News, "BYD and the HACLA Launch Electric Vehicle Testing Program", by staff writers, December 14, 2010
- Web site of project partners
- Wikipedia articles

## 3.11. OTHER CAR MANUFACTURER PROJECTS

### 3.11.1. Introduction

**The above mentioned car manufacturer demonstration projects – field test of electric car to gather data and insight about real world behavior – are only representative for a number of comparable demonstration projects maintained by almost all Electric Vehicle manufacturers.**



**Mostly, the car manufacturers choose governmental bodies and their fleets for test and demonstration projects. Making their electric vehicles a viable option for consumers or companies requires teamwork across a variety of industries and government entities. Car manufacturers are dependent on cities' and counties' willingness to create the infrastructure – charging stations, building infrastructure, support - for the test bed in order for all to find out what needs EV drivers really have.**

### **3.11.2. Rolls Royce**

**On February 20, 2011, Rolls-Royce Motor Cars confirmed the development of 102EX, a one-off, fully electric powered Phantom, to debut at the Geneva Motor Show on March 1, 2011. The car will tour during 2011, serving as a test bed to gather a bank of research data on alternative drive-trains for Rolls-Royce Motor Cars.**

**The car is supposed to be the world's first battery electric vehicle for the ultra-luxury segment. According to CEO Torsten Müller-Ötvös, Rolls-Royce begins an exploration into "alternative drive-trains, seeking clarity on which alternative technologies may be suitable to drive Rolls-Royce motor cars of the future."**

**Rolls-Royce produces cars that represent the pinnacle in luxurious motoring for the world's most discerning customers. With 102EX, also known as the Phantom Experimental Electric (EE), it is the company's intention to carefully test the opinions and reactions to alternative drive-train options of a range of stakeholders including owners, enthusiasts, members of the public and the media.**

**102EX will serve as a working test bed for a global tour that also takes place in North America. Through test drives, owners will be given the opportunity to experience an alternative drive-train technology and to feedback their experiences, thoughts and concerns directly to Rolls-Royce.**

**While there are no plans to develop a production version, as one of the company's EX models it will serve to begin a dialogue with existing owners and stakeholders, posing as well as answering questions of its audience.**

**These include the car's ability to deliver an acceptable range between re-charges and to operate in extreme weather conditions. But also to benchmark reliability and quality against customer expectations of the world's pinnacle automotive brand.**

**In preparation for the car's debut, Rolls-Royce launched the website [www.electriclexury.com](http://www.electriclexury.com) as a portal to fuel a wider global debate seeking views on the question of electric luxury from media, VIPs and stakeholders. The site will also deliver regular updates of the car's progress while on tour.**

**As mentioned, the project will be a world-wide attempt. As of March 2011, most of the specifics beyond the content of Rolls-Royce's press release have not been published or decided yet.**

#### 3.11.3.Ford

**Yet another example for such car manufacturer projects is Ford with its Focus Electric: Ford will bring its Focus Electric to 19 U.S. cities and metropolitan areas including Atlanta, Houston and Austin, Texas, Boston, Chicago, Denver, Detroit, Los Angeles, San Francisco, San Diego, New York City, Orlando, Florida, Phoenix and Tucson, Arizona, Portland, Oregon, Raleigh-Durham, Richmond, Virginia, Seattle, and Washington, D.C – in late 2011.**

#### 3.11.4.Mazda

**Mazda will start testing their Mazda 3 Micro HEVs starting in November 2010. The cars will be operated in Arizona for 160,000 miles over about two years.**

#### 3.11.5.Volkswagen

**The Volkswagen Up and Golf Micro HEV will be tested in the same Arizona fleet as the Mazda, and thus will be under the same conditions. These cars are not on sale yet. According to Gerhard Kiewel, Vice President Finance, Corporate Controller for VW USA, the VW Jetta and VW Passat might be offered as Hybrid in the coming years, however, a complete global VW EV strategy has not yet been adopted.**

#### 3.11.6.Sources

- CNBC, "Rolls Royce Motor Cars Confirms Electric Test Vehicle Project", by staff writers, February 20, 2011
- Interview with Gerhard Kiewel, Washington DC, March 28, 2011
- Statepress, "Ford to Test Electric Car in Arizona", by Michael Reppenhagen, November 28, 2010
- USDoE, "Mazda 3 Micro Hybrid Vehicle Accelerated Testing", Test Result Sheet, January 2011
- USDoE, "Volkswagen Golf Micro Hybrid Vehicle Accelerated Testing", Test Result Sheet, January 2011
- Web sites and press releases of the car manufacturers
- Wikipedia articles

## 4. TEST BEDS, TEST ENVIRONMENTS AND PLATFORMS

### 4.1. ADVANCED VEHICLE TESTING ACTIVITY

#### 4.1.1. Description

**The Advanced Vehicle Testing Activity (AVTA) is an Idaho National Laboratory-managed DOE activity that tests advanced technology light-duty vehicles and the infrastructure necessary to support the vehicles. The AVTA is part of Department of Energy (DOE)'s Vehicle Technologies Program.**

**Among other things, the AVTA also is testing hybrid electric vehicles, with 1.2 million miles of maintenance, operations, and fuel economy data accumulated to date. Neighborhood and urban-electric vehicles also are included in the testing activity.**

**INL develops vehicle test procedures with input from industry, fleet operators, and other stakeholders to accurately measure real-world vehicle performance. These test procedures are then used to test production and pre-production advanced technology vehicles on dynamometers and closed test tracks and in government, commercial, and industrial fleets. By benchmarking the performance and capabilities of advanced technologies, INL directly supports development and validation of industry and DOE technical targets. Testing results also are leveraged to develop component, system, and vehicle models, and hardware-in-the-loop developmental laboratory testing.**

AVTA is conducted by:

- Idaho National Laboratory (INL): Program execution in support of DOE goals; Conducts engineering, data analysis, and reporting / presentations
- National Renewable Energy Laboratory (NREL): Research & Development
- ECOTALITY, formerly Electric Transportation Engineering Corporation – (eTec): Conducts vehicle operations and testing, engineering to numerous testing engineering; Access facilities / test tracks
- National Energy Technology Laboratory (NETL): Executes ECOTALITY / eTec contract

#### 4.1.2. Aims

**The primary goal of the AVTA is to benchmark and validate the performance of light-, medium-, and heavy-duty vehicles that feature one or more advanced technologies, including:**

- Internal combustion engines burning advanced fuels, such as 100% hydrogen and hydrogen/compressed natural gas-blended fuels;
- Hybrid electric, pure electric, and hydraulic drive systems;
- Advanced batteries and engines; and
- Advanced climate control, power electronic, and other ancillary systems.

**By benchmarking the performance and capabilities of advanced technologies, the AVTA supports the development of industry and DOE technology targets. The testing results are also leveraged as input to component, system, and vehicle models, as well as hardware-in-the-loop testing.**

#### 4.1.3. Results & Availability

**Most results are publicly available online:**

- Publications: [www1.eere.energy.gov/vehiclesandfuels/avta/publications/ld\\_library.html](http://www1.eere.energy.gov/vehiclesandfuels/avta/publications/ld_library.html)
- Additional Resources: [www1.eere.energy.gov/vehiclesandfuels/resources/index.html](http://www1.eere.energy.gov/vehiclesandfuels/resources/index.html)

**Test results are available for the following vehicle types:**

- Hydrogen-fueled internal combustion engine vehicles
- Hybrid-electric vehicles
- Neighborhood electric vehicles
- Urban electric vehicles
- Full-size electric vehicles
- Airport support equipment
- Oil bypass filters used on buses

#### 4.1.4. Partners & Their Roles

- **The AVTA is conducted jointly by Idaho National Laboratory (INL) and the National Renewable Energy Laboratory (NREL).**
- **AVTA's primary testing partner is ECOTality.**


- **Argonne National Laboratory (ANL) provides the AVTA with dynamometer testing support at its Advanced Powertrain Research Facility (APRF).**

**The AVTA also works with more than 75 fleet testing partners in North America to jointly conduct fleet testing of advanced technology vehicles in real-world applications.**

#### 4.1.5. International Collaborations

**The AVTA lists Environment Canada, an organization implementing the Government of Canada's environmental agenda, and Manitoba Hydro, a Canadian energy utility, among its partners. Both are data collection partners.**

#### 4.1.6. Contact Details

	<p>INL General Inquiries:</p> <p>INL Operator 208-526-0111</p> <p>INL Program Manager:</p> <p>James Francfort 208-526-6787 james.francfort@inl.gov</p> <p>NREL Principal Program Investigator:</p> <p>Kevin Walkowicz Principal Investigator 303-275-4492 kevin_walkowicz@nrel.gov</p> <p>NREL Program Manager:</p> <p>Terry Penney terry.penney@nrel.gov</p> <p>NREL Contact Collaborative Opportunities:</p> <p>Bob Rehn 303-275-4418</p>
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#### 4.1.7. Sources

- Press releases of participating partners
- Web sites of participating partners
- Wikipedia articles
- Workshop by Jim Francfort, Idaho National Laboratory, US Department of Energy's Advanced Vehicle Testing Activity, "US - China Electric Vehicle and Battery", August 2010

#### 4.2. AVRC and CYBERMETRIX ELECTRIC RESEARCH PLATFORM VEHICLE

##### 4.2.1. Description

**In December 2009, the Advanced Vehicle Research Center in Danville, Virginia (AVRC), along with CyberMetrix of Columbus, Indiana have been selected by the Department of Energy to design and construct a research platform vehicle for use in analysis and testing of multiple combinations of electric vehicle drive train components - a \$1.4 million Department of Energy contract. The vehicle will be used on closed test tracks and on research laboratory dynamometers to advance electric vehicle technologies. The platform will be constructed to allow for quick installation and replacement of vehicle battery packs, ultra-capacitors, electric motors and motor control units.**

**CyberMetrix creates and provides simulation, data acquisition and control technologies for engine and powertrain development and retains proprietary technologies that will be integrated into this vehicle.**

**The project began in earnest in July 2010.**

##### 4.2.2. Aims

**The test platform will incorporate multiple sensors to monitor and record power source voltage levels, state of charge, energy drain & recovery, charging load and motor performance utilizing various combinations of energy storage devices.**

#### 4.2.3. Results & Availability

**No results of the joined project have been published so far.**


#### 4.2.4. Partners & Their Roles

- **Department of Energy DOE: Funding**
- **AVRC: AVRC's primary purpose is research and development; generally, the center license out its patented technology to manufacturers or others. Within the CyberMetrix project, AVCR will be responsible for project design, fabrication, test development and component sourcing.**
- **CyberMetrix: Designs the software and testing systems / tools.**

#### 4.2.5. International Collaborations

**CyberMetrix maintains a subsidiary in China.**

#### 4.2.6. Contact Details

	<p>Program Manager:</p> <p>Dr. Yimin Gao Senior Scientist, AVRC 500 Stinson Drive, Danville, VA 24540</p> <p>General Inquiries AVRC:</p> <p><a href="mailto:avrc@avrc.com">avrc@avrc.com</a></p> <p>General Inquiries CyberMetrix:</p> <p>2860 N National Rd #A Columbus, IN 47201- 4746 800-713-1203</p>
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#### CyberMetrix Business Development:

Jack Riester  
VP Business Development  
812- 375-5874  
jriester@cybermetrix.com

#### 4.2.7. Sources

- GoDanRiver Danville News, "Advanced Vehicle Research Center drives change in electric vehicles", by Tara Bozick, December 25, 2010
- Web site and Press Releases of project partners
- Wikipedia articles

#### 4.3. SOUTHERN CALIFORNIA EDISON'S EV TECHNICAL CENTER

##### 4.3.1. Description

**Southern California Edison's (SCE) Electric Vehicle Technical Center provides a broad range of electric transportation services, focusing on solutions for automakers, battery manufacturers, government agencies, business and industrial fleet customers, residential customers and more. Together with AVTA, SCE is one of only two U.S. Department of Energy test sites approved to evaluate electric vehicle baseline performance, vehicle and fleet operation.**

**Established in 1993, the Center conducts work that serves several purposes:**

- To understand and help minimize potential impacts of increasing quantities of transportation connecting to the grid.
- To evaluate various electric-drive technologies for use in SCE's own fleet applications to meet federal and state regulations.
- To assist SCE's Transportation Services Department in overseeing and maintaining the nation's largest and most successful fleet of pure battery-electric vehicles. Since inception, our EV fleet has logged more than 17 million tailpipe-emission-free miles.
- To provide education and outreach to our customers on the safe, reliable and energy-efficient use of electric-drive technologies, and to help customers shift charging to off-peak (low-energy-use) periods.

## **The Center:**

- Tests battery-electric, hybrid-electric, plug-in hybrid, plug-in hybrid fuel cell and fuel cell propulsion systems for on- and non-road applications.
- Evaluates and tests advanced battery modules, battery packs, battery management systems and various types of chargers.
- Supports the development of more energy-efficient battery charging systems.
- Evaluates advanced batteries and other energy storage technologies for stationary applications, such as home energy storage, telecommunications and emergency backup power.
- Partners with government and industry to demonstrate hydrogen and fuel cells and understand the safety and electrical system impacts of hydrogen generation, compression, storage and delivery.
- Provides consulting services for industry.

## **The Center's equipment includes:**

- Fully equipped electric vehicle testing and maintenance facilities.
- A dedicated maintenance bay for hydrogen ICE and fuel cell EV prototypes.
- A test facility to safely assess and evaluate performance and electric load characteristics of fuel cell stacks.
- State-of-the-art battery testing laboratory.
- A "garage of the future" demonstration facility capable of simulating 120/240 volt charging, vehicle bi-directional energy flow, home energy storage, photovoltaic energy generation, and next-generation advanced meter control.
- Charging test equipment and environmental chambers.
- Fast charge testing facilities.
- A climate-controlled lab to test sensitive electronic equipment

### 4.3.2. Aims

**In October 2009, SCE joined other U.S. utilities in signing a plug-in electric vehicle readiness pledge, preparing for the arrival of plug-in electric vehicles in the US territory since 2010.**

## **Preparing for electric vehicles has several components which SCE aims to explore:**

- The customer experience
  - Impacts on electricity rates
  - Impacts on the electricity grid
- Customer Experience: SCE recently conducted an in-depth analysis of all the steps required for a customer to get "plug-in ready."

- **Impacts On Electricity Rates:** Any rate changes will first be reviewed and approved by the California Public Utilities Commission. The California Public Utilities Commission is conducting a series of plug-in electric vehicle readiness workshops to address rates, charging infrastructure and policies to prepare for the expected growth of plug-in electric vehicles in 2010 and beyond.
- **Impacts On The Electricity Grid:** One of the challenges of preparing for the arrival of plug-in electric vehicles is that no one yet knows how large the market will be, or how fast it will grow. SCE wants to evaluate and learn from experience for potential future impacts.

#### 4.3.3. Results & Availability

**SCE publishes press releases regularly and provide information on their Web site at [www.sce.com/pev](http://www.sce.com/pev). They also maintain a newsletter for PEV information at <https://survey.sce.com/perseus/se.ashx?s=0B87A62B1E391CFA>**

#### 4.3.4. Partners & Their Roles

- **Department of Energy: Funding**
- **South Coast Air Quality Management District: Air pollution control**
- **Provision of cars or equipment to be tested:**
  - **Ford Motor Company**
  - **Chrysler**
  - **Electric Power Research Institute**
  - **Toyota Motor Sales, USA**
  - **California Electric Transportation Coalition**
  - **Electricity Innovation Institute**
  - **Dynasty Electric Car Company**
  - **WaveCrest Laboratories**
  - **Electric Vehicle Technologies**
  - **Opal RT Technologies**
  - **Vectrix Corporation**
  - **Mitsubishi Motors Corporation**

**SCE partners with governmental bodies on each level.**

#### 4.3.5. International Collaborations

**International collaborations exist with car manufacturers only.**

#### 4.3.6. Contact Details

	<p>SCE Electric Transportation Center:</p> <p>Suzan Boyer Marketing &amp; Communication 2244 Walnut Grove Ave Rosemead, CA 91770</p> <p>626-302-8752 Suzan.Boyer@sce.com</p> <p>General Information:</p> <p>800-4EV-INFO or <a href="http://www.sec.com/electrodrive">www.sec.com/electrodrive</a></p> <p>Online Form:</p> <p><a href="https://www.sce.com/forms/ContactUs.aspx">https://www.sce.com/forms/ContactUs.aspx</a></p>
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#### 4.3.7. Sources

- Ali Allage, "Mitsubishi Motors Corporation to Provide i MiEV Electric Vehicles to Southern California Edison's Industry Leading EV Technical Center for Joint Testing and Evaluation", by staff writers, August 8, 2008
- Web sites and press releases of the partners
- Wikipedia

### 4.4. MODULAR AUTOMOTIVE TECHNOLOGY TESTBED BY ARGONNE LABS

#### 4.4.1. Description

**The Modular Automotive Technology Testbed (MATT) by Argonne National Laboratory has been developed in order to separately test and benchmark individual components as they work in a system.**

**MATT has a modular approach which enables the benchmarking of different engines, transmissions and other core powertrain components.**

**With this flexibility, Argonne automotive engineers can evaluate specific parts in a full vehicle instead of building an entire prototype vehicle, which can cost considerable time and money to build. MATT's test results shall help researchers understand which combination of components will result in a vehicle that best meets efficiency, emissions, and performance targets.**

**The test platform looks like a vehicle stripped down to its bare essentials. Its base is a frame with wheels, but the testbed is outfitted with the different component modules which make up the vehicle powertrain. The scalable, virtual hybrid module enables MATT to operate as a conventional vehicle, a hybrid or even a pure electric vehicle with a virtually infinitely large battery pack while using the exact same hardware.**

**When used with Argonne's Powertrain System Analysis Toolkit (PSAT and PSAT-PRO) along with component hardware-in-the loop (HIL) principals, MATT allows researchers to:**

- Add, rearrange and interconnect a variety of systems and components
- Emulate a different vehicle behaviors (conventional, hybrid and electric vehicle)
- Have complete flexibility of implementing any energy management and torque split strategies
- Measure physical energy consumption and emissions data over drive cycles
- Equip selected systems and components with instrumentation

#### 4.4.2. Aims

**MATTs main objective is to generate hardware based data for a wide range of very specific studies. It has been created to:**

- study physical components in a hybrid vehicle system environment on transient drive cycles
- validate simulation models
- evaluate torque split and energy management strategies including emissions and thermal related losses of components

#### 4.4.3. Results and Availability

**Detailed results of the investigations are published on the Web site of the Argonne National Laboratory Transportation Technology R&D Center at [www.transportation.anl.gov](http://www.transportation.anl.gov) as well as published in conferences such as the USDoE Annual Merit Review Meeting. Argonne also maintains a newsletter for news and information: [www.anl.gov/Media\\_Center/subscribe.html](http://www.anl.gov/Media_Center/subscribe.html)**



#### 4.4.4. Partners & Their Roles

- **Argonne National Laboratory: Project leader**
- **USDoE: Funding and support**
- **Ford Motor Company: Car manufacturer; hydrogen testing**
- **University of Tennessee: PHEV fuel economy and emissions trade-off studies**

#### 4.4.5. International Collaborations

**Apart from car manufacturers, there are no International Collaborations listed for the MATT project.**

#### 4.4.6. Contact Details

	<p>MATT Project Manager:</p> <p>Henning Lohse-Busch Argonne National Laboratory Energy Systems Division 9700 South Cass Avenue, Building 362 Argonne, IL 60439</p> <p>630-252- 9615 hlb@anl.gov</p> <p>Transport and Technology R&amp;D Center:</p> <p>ttrdc@anl.gov</p>
<p> Collaboration with Argonne:</p> <p>Argonne has many types of contractual agreements to meet the needs and interests of industry, state and local governments, federal agencies and other organizations. They have a comprehensive Web site listing collaboration vehicles and how to get in touch with them:</p> <p><a href="http://www.anl.gov/techtransfer/Information_for_Industry/index.html">www.anl.gov/techtransfer/Information_for_Industry/index.html</a></p> <p>You can contact Argonne's Technology Development and Commercialization at <a href="mailto:partners@anl.gov">partners@anl.gov</a></p>	

#### 4.4.7. Sources

- 2009 DOE Hydrogen Program and Vehicle Technologies Annual Merit Review, "PHEV development test platform Utilization", by Henning Lohse-Busch et al., May 19, 2009
- US Department of Energy, Hydrogen Program, Review Meeting Proceedings, 2009
- Web sites and press releases of project partners
- Wikipedia articles

## 5. OPPORTUNITIES FOR COLLABORATION

### 5.1. SUMMARY

**Interviews were conducted with project leaders and/or point persons of selected programs to determine the prospects for collaboration between EV demonstration projects in the US and those that are getting under way in Finland.**

**Most of the demonstration projects in the US are prepared to share their experiences and accumulated know-how with their Finnish equivalents. That is true even for the national projects that are led by federal laboratories. However, when it comes to individual automobile manufacturers, the interim results are kept confidential and only partly divulged. Provided the end result lives up to their expectations, the manufacturers ensure that the final report is made public and key results widely publicized.**

**Participation is a different matter, and would require funding in order to take an equity position in the project and become a partner, eligible to share in the results.**

**Below are highlights from selected interviews:**

### 5.2. THE EV PROJECT

**This is by far the largest project and it is moving forward as planned. The residential charging stations have all been installed and work has started on the commercial charging stations.**

**Since the project is funded by a DOE mandate, participation is restricted to US companies. Each of the partners, including Nissan, GM, and Ford, has invested significant matching funds.**



However, ECOtality, the firm that is managing the EV Project, has started an international program and is interested in working with international partners. According to Colin Read, their VP Business Development, the company is already collaborating with Ireland and the city of Vancouver, Canada, to help them develop their EV strategy.

ECOtality would be happy to talk to Tekes and those organizations undertaking EV demonstration projects in Finland.

### 5.3. PROJECT PLUG-IN

This is an initiative by the Central Indiana Corporate Partnership (CICP), launched over a year ago by Energy Systems Network (ESN), which is headed by Paul Mitchell. The partners are private firms and research institutions commercializing energy breakthroughs.

The program is already international, since one of the partners is a Norwegian car manufacturer, Think Global, whose electric vehicles are designed and the parts manufactured in Valmet. They are then shipped to Indiana for assembly. The first batch of cars was delivered at the end of 2010. Other international partners include car manufacturers Nissan and Smart, as well as Itoju (Science City) which is focusing on battery life. A similar venture is under way in London, England (Plugs in Places).

According to the project manager, Tim Pulliam, they would welcome other international collaborators and are prepared to share data and best practices. There is no formal Memorandum of Understanding.

Additional funding is always welcome, and would be used to add to the \$6.4 million grant from DOE in 2011. This injection of funds has permitted them to expand into the Mid-West.

#### 5.4. U.S. POSTAL SERVICE – CONVERTING LLVs TO EVs

**The USPS pilot program is a national effort that will end in 2013. According to Darlene Casey, the spokesperson for the project, Zap has been awarded the contract to convert the Grumman Long Life (LLV) mail trucks to electric power, while Quantum is supplying EVs.**

**Testing has only been underway for a few months and there are no results available to date. The likelihood of being invited to partner with the US Postal Service is remote.**

#### 5.5. PORT OF LOS ANGELES – ELECTRIC TRUCK DEMONSTRATION PROJECTS

**The first project, the Balqon Electric Truck Initiative, has been under way since 2007. Twenty electric container terminal tractors are already in use, and five on-road electric drayage trucks are awaiting certification to be used on road.**

**A second project is about to get under way with Vision Motor Corporation and consists of one big-rig truck and one terminal tractor. According to Theresa Lopez, the latest results will be available shortly.**

**There has been considerable international interest in the Balqon electric truck initiative. In January, the company received an order for 300 of its trucks from China.**

**The company is prepared to share their experience, especially if it leads to the sale of more of their all-electric drayage trucks.**

#### 5.6. SAN DIEGO GAS & ELECTRIC EV DEMONSTRATION PROJECTS

**The company's Clean Transportation Program is committed to developing energy solutions for the region.**

**Two demonstrations are under way:**

- **Performance study to compare the efficiency of standard hybrid vehicles to converted plug-in hybrid electric vehicles**
- **Demonstration project to test a number of Toyota Prius EVs**

**According to Joel Pointon, the manager of the Clean Transportation Program, the project has already caught the attention of Helsinki. The Deputy Mayor of Helsinki is visiting San Diego shortly and arrangements are being made for him to meet with the key players from the program, including regional government and the Smart Grid Institute.**

#### **5.7. FUEL CELL EV LEARNING DEMONSTRATION PROJECT**

**The National Renewable Energy Laboratory initiative is a national project that has been running since 2004. The project has met all its goals and will shortly be entering a pre-commercial launch of a larger fleet of vehicles in California and New York.**

**Keith Wipke, the project manager, would be interested to talk about a possible Finnish FCEV Learning Demonstration. He pointed out that details about the project and their experiences to date can be found online at:**

**[http://www.nrel.gov/hydrogen/proj\\_learning\\_demo.html](http://www.nrel.gov/hydrogen/proj_learning_demo.html)**

**He mentioned that the DOE Annual Merit Review (AMR), which is occurring the week of May 9-13, with Friday morning (5/19) being the session for the Technology Validation projects which includes the Learning Demonstration. See <http://www.annualmeritreview.energy.gov/index.cfm> for the overall page and page 20 of the agenda at [http://www.annualmeritreview.energy.gov/pdfs/2011\\_amr\\_schedule.pdf](http://www.annualmeritreview.energy.gov/pdfs/2011_amr_schedule.pdf) for the details of the technology validation session.**

**NWV will be attending the technology validation session and reporting on progress that has been made by the DOE-funded projects. A meeting has been set up with Keith after the technology validation session at the AMR.**

## 5.8. HONDA FIT ELECTRIC VEHICLE DEMONSTRATION PROGRAM

**The Honda FIT is already a hybrid vehicle that the company has now electrified. Google is one of the partners.**

**According to Sven Beiker, the Executive Director for automotive research at Stanford University, the project has been launched and the first phase of the program finalized.**

**September will mark the beginning of the new academic year, when the rest of the program will be worked out. Distribution of the EVs to the partners will take place before the end of the year.**

**A good time to talk to Sven about collaboration would therefore be September, during the program planning stage.**



## CONTACT

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## APPENDIX A: Demonstration Project Matrix

Project	Aims	Results	Partners	International
The EV Project	Characterize vehicle performance Effectiveness of local charging infrastructure under various use patterns and climate conditions	Published: Yes Press Releases Web sites	DoE Ecotality North America GM Chevrolet Nissan Ford INL Oakridge National Lab and others	Nissan British Petroleum  Short List: YES
Project Plug-In	Overcome practical challenges of EVs Develop billing system software Test acceptance management methods	Published: Yes Press Releases Web sites Twitter	Smart Think Global Nissan EnerDel IBM Delphi and others	Smart Think Global Nissan  Short List: YES
USPS Pilot Program	Test feasibility of EVs for mail service Reduce fleet costs Reduce environmental impact of fleet	Published: Yes Annual Report Web sites	EDAG Inc. Bright Automotive AC Propulsion Autoport Inc. AM General Smith Electric Vehicles ZAP Quantum Corp.	None

Port of L.A. E-Truck	Reduce emissions	Published: Yes Press Releases Web sites Regular Newsletter	Port of L.A. Balqon Corp. South Coast Air Quality Management District Vision Motor Corp. Port of Long Beach	None  <b>Short List: YES</b>
<b>SGD&amp;E</b>	Gas mileage comparison HEV vs. PHEV Usage and operating costs Drivers' experiences Safety and maintenance issues	Published: Not yet Planned: Result Web site	Juice Technologies Aerovironment Inc. UC Davis Ecotality North America	None  <b>Short List: YES</b>
<b>Nat. Fuel Cell Program</b>	Evaluate fuel cell durability Evaluate driving range Evalute hydrogene production costs	Published: in part. Composite data products Web sites Seminars Symposia /exhibitions	DoE NREL Ford British Petroleum Hyundai-Kia Chevron Daimler GM Air Products	British Petroleum Hyundai-Kia  <b>Short List: YES</b>
<b>Honda Fit</b>	Analyze use and adaptation of EVs	Published: Not yet. Starts fall 2011	Google Inc. Stanford University City of Torrence	Honda  <b>Short List: YES</b>
<b>Toyota EV Demos</b>	Gather real-world vehicle use feedback Understand customer expectation Confirm performance Lithium-Ion batteries Analyze driving conditions, access to charging	Published: Yes. Press Releases Web sites Blog	CCSI Clean Communities of Central New York CuCe Care Qualcomm Tessla SDG&E and others	Toyota

<b>Smart ED</b>	Analysis of performance over time Analysis of driving habits	Published: No.	Smart Drivers	Smart
<b>F3DM</b>	Reduction of fuel costs Reduction of direct emissions Demonstration lowest-cost fleet program in the U.S.	Published: No.	HACLA BYD Motors Inc.	BYD China
<b>Rolls Royce</b>	Deliver acceptable range between re-charges Operate in extreme weather conditions Benchmark reliability & quality against expectations	Published. Not yet. Starts fall 2011	None	Rolls Royce



## APPENDIX B: Test Beds, Test Environments & Platforms Matrix

<b>Project</b>	<b>Aims</b>	<b>Results</b>	<b>Partners</b>	<b>International</b>
AVTA Idaho	Benchmark and validate performance Benchmark and validate capabilities	Published: Yes Press Releases Web sites	DoE NREL INL Argonne National Lab	Car manufacturers Power companies
AVRC Virginia	Monitor and record voltage levels, state of charge, energy drain and recovery, charging load, and motor performance	Published: No	DoE CyberMetrix	None
SCE California	Explore customer experience Explore impacts on electricity grid	Published: Yes Press Releases Web sites Newsletter	DoE South Coast Air Quality Management District Ford Chrysler Electric Power Research Institute Toyota and many others	Car manufacturers
MATT Illinois	Study physical components Validate simulation models Evaluate torque split and energy management strategies	Published: Yes. Web sites Conferences Newsletter	ANL DoE Ford University of Tennessee	Car manufacturers