ELECTRIC DRIVE VEHICLE DEMONSTRATION AND VEHICLE INFRASTRUCTURE EVALUATION

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ARRAVT066

OVERVIEW

TIMELINE

Project Start; 10/1/09
Project End; 3/31/13
Percent Complete; 1%

BARRIERS

Infrastructure Deployment
Vehicle Deployment
Standards Development

BUDGET

Total Project; $199,600,000
DOE Share; $99,800,000
Contractor; $86,396,560
ORNL FWP; $6,800,000
INL FWP; $6,603,440

PARTNERS

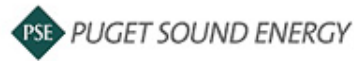Nissan North America
11 Cities
10 Electric Utilities
2 National Laboratories
2 Universities
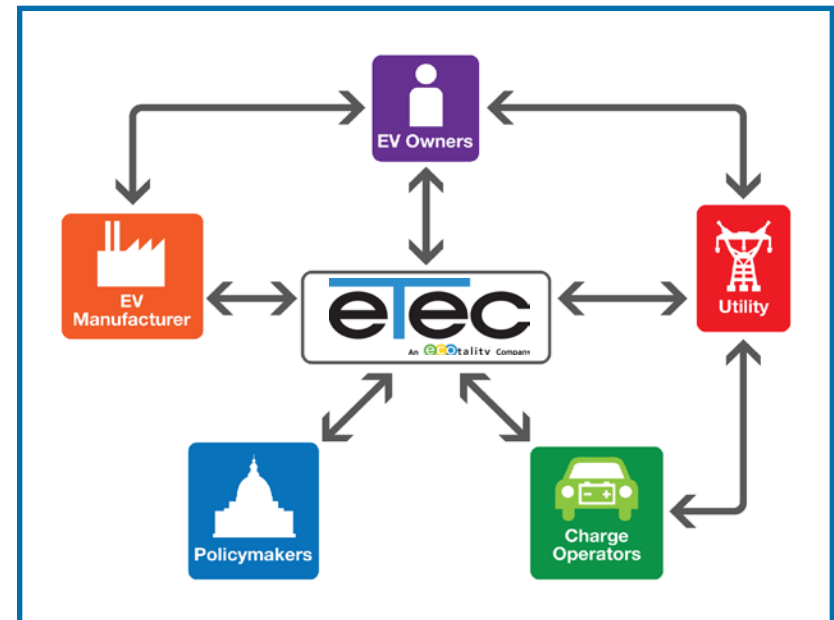
SOME EV PROJECT PARTNERS

BUILDING CONSENSUS

OBJECTIVES

Deploy 4,700 Nissan Leaf Battery Electric Vehicles In 5 Regions

Establish Mature Charge Infrastructures To Support Leaf Vehicles

Identify And Resolve Barriers To Infrastructure Deployment

Develop An Infrastructure Utilization Data Base

Evaluate Infrastructure Effectiveness

Develop Models For Future Infrastructure Deployments

Model Infrastructure For The Next 5 Million Vehicles

MILESTONES

◆ Project Initiation   10/01/09 (complete)

◆ Complete 10-Year Plans   04/30/10 (complete)

◆ Complete EV Micro-Climates   08/30/10

◆ Initial Infrastructure Installation   11/01/10

◆ Initial Vehicles Deployed   12/01/10

◆ Deployment Complete   09/30/11

◆ Initial Lessons Learned   06/30/12

◆ Data Collection Complete   12/31/12

◆ Final Reports   03/31/13

INFRASTRUCTURE PLANNING

◆ Organize Regional Stakeholders

- ◆ Government
- ◆ Utilities
- ◆ Employers

◆ Develop 10-Year Plan

- ◆ Deployment Area
- ◆ Vehicle Penetration
- ◆ Infrastructure Requirements

◆ Develop EV Micro-Climate

- ◆ Initial Deployment

Approach

VEHICLE DEPLOYMENT

- ◆ ≈ 1,000 Nissan Leaf Battery EVs In Each Region

- ◆ Residential EVSE Provided By EV Project At Vehicle Purchase

- ◆ ETEC Customer Relations Management System Coordinated With Nissan Customer Purchase Journey

- ◆ Residential EVSE Installed By EV Project

- ◆ ETEC Certified Contractor Network Used For Installation

- ◆ Vehicle Data Collection Via Telematics Over 18 Month Operating Period

- ◆ Vehicle Data Base Maintained And Analyzed At INL

INFRASTRUCTURE DEPLOYMENT

◆ EVSE Designed And Manufactured To Allow Power And Energy Data Collection And Demand Response Control

◆ Residential EVSE Installed For All Vehicles

◆ 1,300 Commercial EVSE Deployed In Each Region

◆ 150 Public EVSE Deployed In Each Region

◆ ≈ 50 DC Fast Chargers Deployed In Each Region

◆ Data Collected From All Chargers Via Internet

◆ Infrastructure Data Base Maintained And Analyzed At INL

VEHICLE DATA COLLECTION

- ◆ Vehicle Data Collected Using Navigation System Telematics

- ◆ Vehicle Data Set On Key On/Key Off Event
  - ◆ Vehicle Identification Number
  - ◆ Time & Date
  - ◆ Location (GPS Coordinates)
  - ◆ Battery Indicated State-of-Charge

- ◆ Raw Data Transmitted From Nissan Global Data Center

- ◆ Vehicle Data Merged With Charger Data At INL

CHARGER DATA COLLECTION

◆ Charger Data Collected Using GPRS Cellular Modem

◆ Charger Data Set Based On Metered Output
  ◆ Power vs. Time
  ◆ Total Energy per Charge
  ◆ Numerous Event Based Times

◆ Access Controlled For Commercial, Public And Fast Chargers
  ◆ Identifies User Of Charger
  ◆ Allows Development Of Revenue Models

◆ Web Portals And Mobile Applications Established For Chargers Users

PROJECT MANAGEMENT

◆ Project Staffing Complete (50 New Personnel)

◆ Project Offices Established
- ◆ Home Office
- ◆ 4 Regional Offices

◆ Project Management System Installed
- ◆ Project Cost And Schedule
- ◆ Project Reporting And Earned Value

◆ Customer Relations Management System Established
- ◆ Charger Installation Management
- ◆ Operational System Management

TEN-YEAR PLANS

◆ Infrastructure Guidelines Issued
  ◆ Phoenix/Tucson
  ◆ Seattle
  ◆ Portland
  ◆ San Diego
  ◆ Tennessee

◆ Ten-Year Plans Complete
  ◆ Phoenix/Tucson
  ◆ Seattle
  ◆ Portland

Electric Vehicle Charging Infrastructure Deployment Guidelines for The Greater Seattle Area

January 2010
Version 1.1
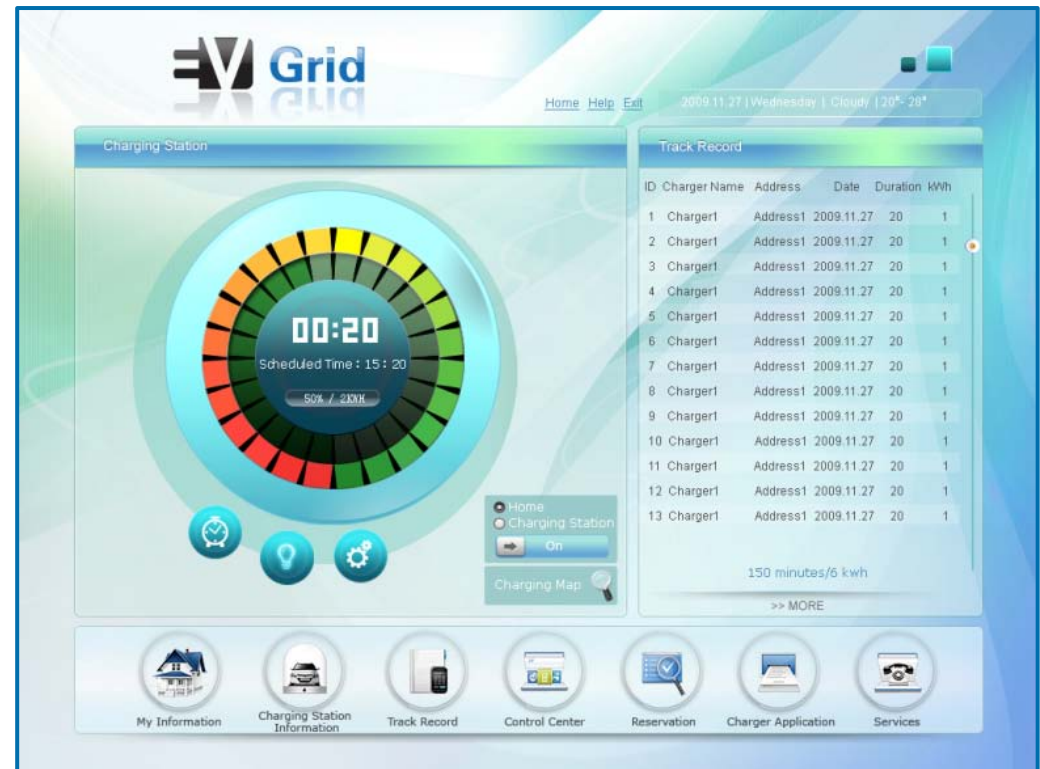
ELECTRIC TRANSPORTATION ENGINEERING CORPORATION

HARDWARE MANUFACTURING

◆ Industrial design Complete

◆ Meter Selected (Sagem)

◆ Connector Selected (REMA USA)

◆ GPRS Modem Selected Quallcom

◆ Manufacturing Engineering By Roush Industries

◆ Manufacturing Partners Under Negotiation

◆ Certification Established With UL

◆ Validation Plan Established With Nissan

NETWORK DEVELOPMENT

◆ Software Developer Contracted

◆ Software Architecture Developed

◆ INL Servers Purchased And Setup

◆ User Interfaces Under Development

◆ Nissan Global Data Center Link Under Development

MOBILE APPLICATIONS

Charge Status

UL CERTIFICATION

◆ UL Joined EV Project As Partner

◆ UL Certification To New Standard 2594

   ◆ Level 2 EVSE

   ◆ DC Fast Charger

◆ Collaboration On Installer Standards

◆ Collaboration On Certification Issues

   ◆ Plug-Connected EVSE

   ◆ Meter Certification

DC FAST CHARGE CONNECTOR

◆ Adopted Chademo (Japanese) Standard

    ◆ Physical And Communication Interface

    ◆ Compatible With Nissan, Mitsubishi And Subaru

◆ Obtained Proprietary Release From Chademo

    ◆ Level 2 EVSE

    ◆ DC Fast Charger

◆ Presented Technical Description To SAE J1772 Committee

    ◆ Agreement Obtained From Other Charger Suppliers

    ◆ Initial Deployment In United States (260 Chargers)

◆ SAE Committee Delaying Adoption

SPECIAL EV RATES

- ◆ Collaboration With San Diego Gas & Electric
  - ◆ Test Four Different Time-of-Use Rates
  - ◆ Peak To Off Peak Ratios Vary From 2:1 To 6:1
- ◆ California Public Utilities Commission Approval
  - ◆ Implement With EV Project
  - ◆ Provide Rate Design Data For All California Utilities
- ◆ Billing Calculated Using EVSE Meter
  - ◆ Eliminates Separate Meter Installation Cost
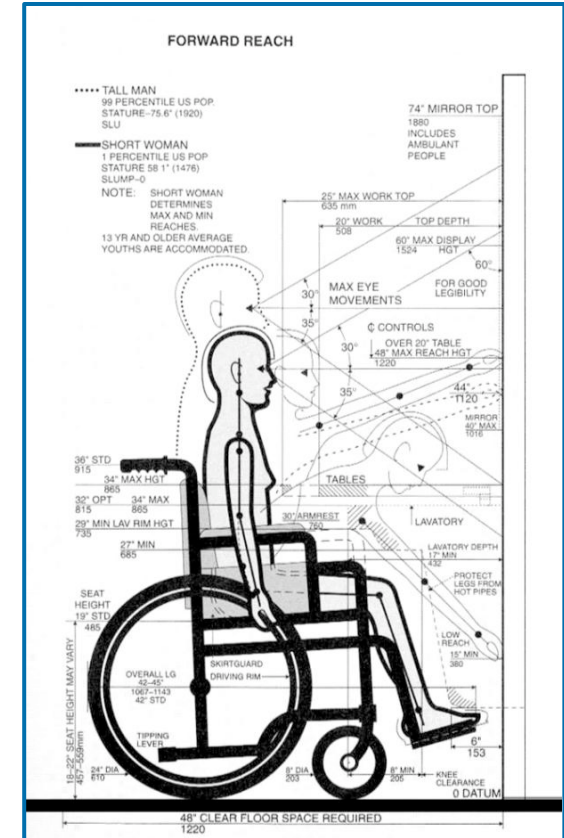 - ◆ Minimizes Energy Diversion Potential

FIRST RESPONDER TRAINING

◆ Input From California First Responder Training

◆ Coordination With National Fire Protection Association

◆ Safe Response Practices

◆ Hazardous Material Inventories

◆ Site Cleanup

◆ Vehicle Storage

ADA REQUIREMENTS

◆ Coordinate Requirements With States

◆ Working Towards Consensus
  ◆ First EV Charger Handicap Accessible
  ◆ First EV Charger Van Accessible
  ◆ Building Accessibility Not Required

◆ Developing Parking Lot Designs

EVSE DEPLOYMENT

◆ Deploy 12,000 Level 2 EVSE

◆ Deploy 260 DC Fast Chargers

◆ Chargers Assembled In United States

◆ Chargers Installed Using Local Contractors
- ◆ Certified To Pay Prevailing Wages (Davis Bacon)
- ◆ Certified To Safety Requirements
- ◆ Trained On Installation Requirements
- ◆ Equipped To Interface With ETEC Network Scheduling

SOFT INFRASTRUCTURE

◆ Establish Consistent EV Charger Signage
  ◆ Highway
  ◆ Parking Lot

◆ Train First Responders And Roadside Service Providers

◆ Resolve Issues Concerning Electricity Resale

◆ Develop Methods For Utility Notification When EVSE Installed

◆ Streamline Permitting In Each Region
  ◆ Online Permit Initiation
  ◆ Credit Card And Account Payment
  ◆ Self inspection And Energization

REPORT PREPARATION

◆ Vehicle Report
  ◆ Characterize Vehicle Utilization
  ◆ Establish Owner used Range

◆ Charger Report
  ◆ Characterize Charger Utilization
  ◆ Time of Day Use
  ◆ Energy Transfer
  ◆ Power Demand

EV Report

DEMAND RESPONSE

- ◆ Utility Data Generation
  - ◆ Load Duration
  - ◆ Energy Use
  - ◆ EV Project Data
  - ◆ 10-Year Projections

- ◆ Demand Response Demonstration
  - ◆ EVSE Control
  - ◆ User Transparency Evaluation

- ◆ GIS Based Data
  - ◆ Distribution Effects
  - ◆ Clustering

BUSINESS MODEL DEVELOPMENT

◆ Development of EVSE Cost Models
  - ◆ Cost Of Commercial Charging
  - ◆ Cost Of Residential Charging

◆ Development of EVSE Revenue Models
  - ◆ Commercial Charging Price Testing
  - ◆ Quantification Of Non-Revenue Benefits

◆ Development Of Business Models
  - ◆ Allow Viral Deployment of Commercial EVSE
  - ◆ Models For Infrastructure Deployment In The Next 500 Cities