US Vehicle/Infrastructure Learning Demonstration Program

Overview and Data Collection … Opportunity for Sharing Information?

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Transportation Electrification Demonstration Activities

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

ECOtality North America — AWARD: $114.8M

- Deployment of **14,850 Level 2 Charging Stations, plus 320 DC "fast chargers",** in 8 major metropolitan areas (Phoenix/Tucson, Portland, Seattle, San Diego, Los Angeles, Houston/Dallas, Nashville/Chattanooga/Knoxville, Washington DC)
- Demonstration of **5,700 Nissan Leaf EVs and 2,600 Chevy Volt E-REVs**
- Full instrumentation of vehicles and infrastructure for comprehensive data-collection and analysis effort
- Charger / vehicle deployment begins mid-December 2010, scheduled to be complete in December 2011

Coulomb Technologies — AWARD: $15M

- Deployment of approximately **4,600 public and private charging stations** in 9 U.S. Cities (Bellevue/Redmond WA, San Francisco, Sacramento, Los Angeles, Austin, Orlando, New York, Detroit, Washington DC)
- Locations will be coordinated with deployment of 2,600 grid connected vehicles from GM (Chevrolet Volt), Ford (Transit Connect EV), and smart USA
- Approximately 30 EVSEs have been deployed, and full deployment is scheduled to complete in June 2011

Transportation Electrification Demonstration Activities

General Motors — AWARD: $30.5M

- Development, demonstration, and analysis of **125 Chevy Volt EREVs** through electric utility partner fleets
- Project includes the installation of approximately **650 EVSEs** in home, workplace, and public locations; Smart Charging and DC Fast Charging will also be demonstrated
- Data will collected through GM's OnStar network and transferred to Idaho National Lab for analysis
- As of October 21, 2010, 43 DOE program vehicles have been entered into GM's captured test fleet, as well as 105 charging stations
- Data collection will begin in November 2010, with vehicles delivered to customers in December

Chrysler, LLC — AWARD: $48M

- Development, validation, and deployment of **153 PHEV Dodge Ram pickups**
- Deployment of vehicles and charging infrastructure through 11 partner fleets across a wide range of geographic, climatic, and operating environments
- Chrysler has partnered with Electrovaya for the 12.9 kWh battery, which will be charged through an on-board 6.6 kW charger
- Results of study will be used by Chrysler to understand consumer needs and refine PHEV requirements to enable volume production
- Built off of the existing Dodge Ram Hybrid platform, deployment of the PHEV is scheduled to begin before May 2011

Transportation Electrification Demonstration Activities

South Coast Air Quality Management District AWARD: $45.4

- Development of a fully integrated, production PHEV system for Class 2-5 vehicles (8,501-19,500 lbs GVWR).
- Demonstration of **378 trucks and shuttle buses** through a nationwide network of 50 partner fleets
- Vehicles will include:
  - Electric utility "trouble trucks" based on Ford F-550, utilizing an Eaton-based PHEV system and 6.7L diesel engine
  - Shuttle busses based on Ford F-450, utilizing an Azure Dynamics PHEV system and 5.4L gasoline engine

Cascade Sierra Solutions AWARD: $22.2M

- Deployment of **truck stop electrification infrastructure** at 50 sites along major US interstate corridors
- Provision for 5,450 rebates of 25% of the cost for truck modification to incorporate idle reduction technologies

Transportation Electrification Demonstration Activities

Navistar, Inc. AWARD: $39.2M

- Develop, validate, **deploy 950 advanced Battery Electric delivery trucks** (12,100 lbs GVWR) with a 100-mile range
- Manufacturing in Elkhard Co., IN; Deployment in Portland, Chicago, and Sacramento
- Vehicles are currently being deployed, with full deployment scheduled for June 2011

Smith Electric Vehicles AWARD: $32M

- Develop and deploy up to **500 medium-duty electric trucks**.
- Manufacturing in Kansas City, MO; Deployment in conjunction with 20 launch partners representing a range of commercial and public sector markets, geographies, and climates
- Vehicles are currently being deployed, with full deployment scheduled for October 2011

Transportation Electrification: EVSE Demonstration Activities

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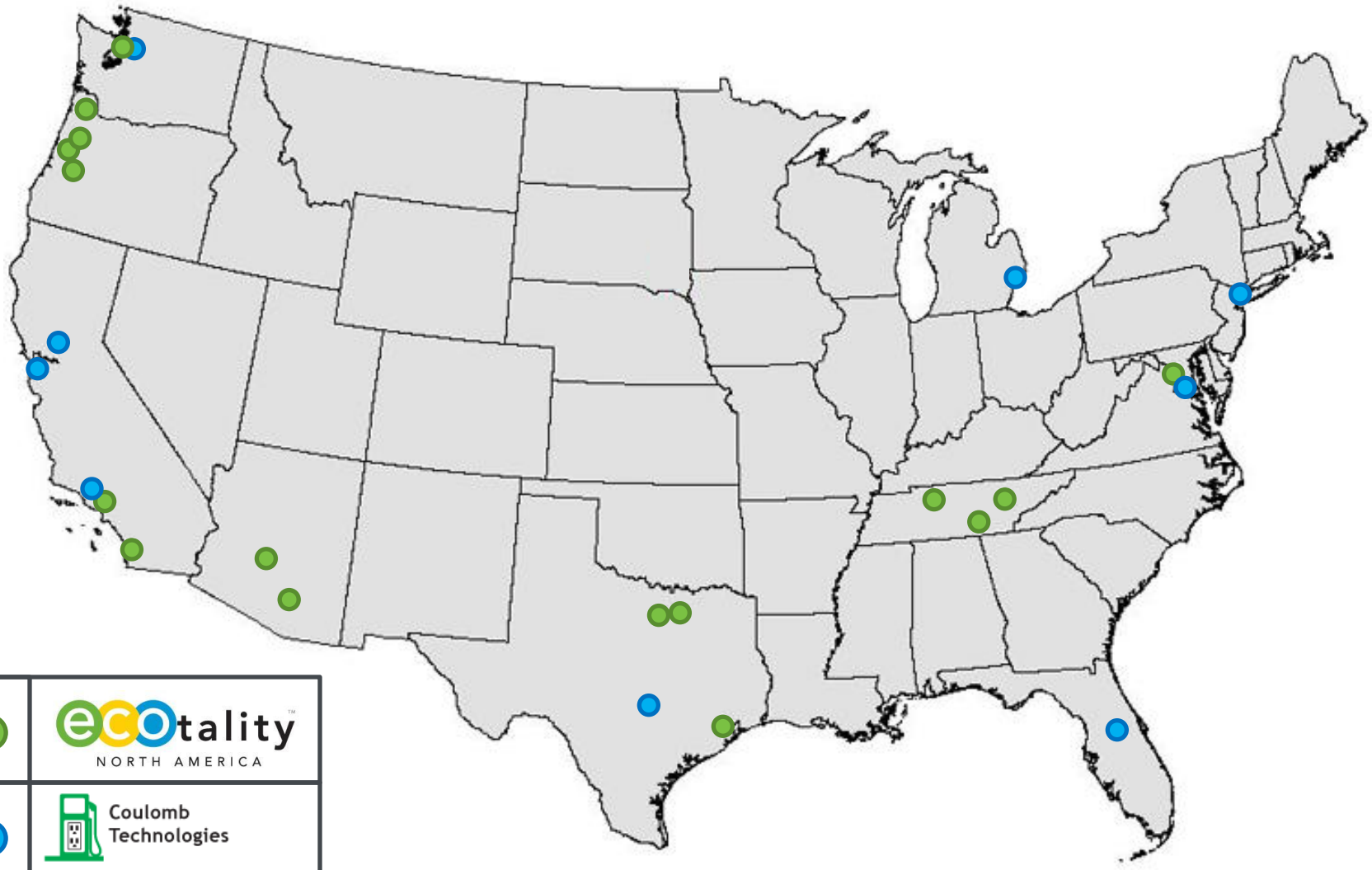

Transportation Electrification: EVSE/Vehicle Demonstration Activities

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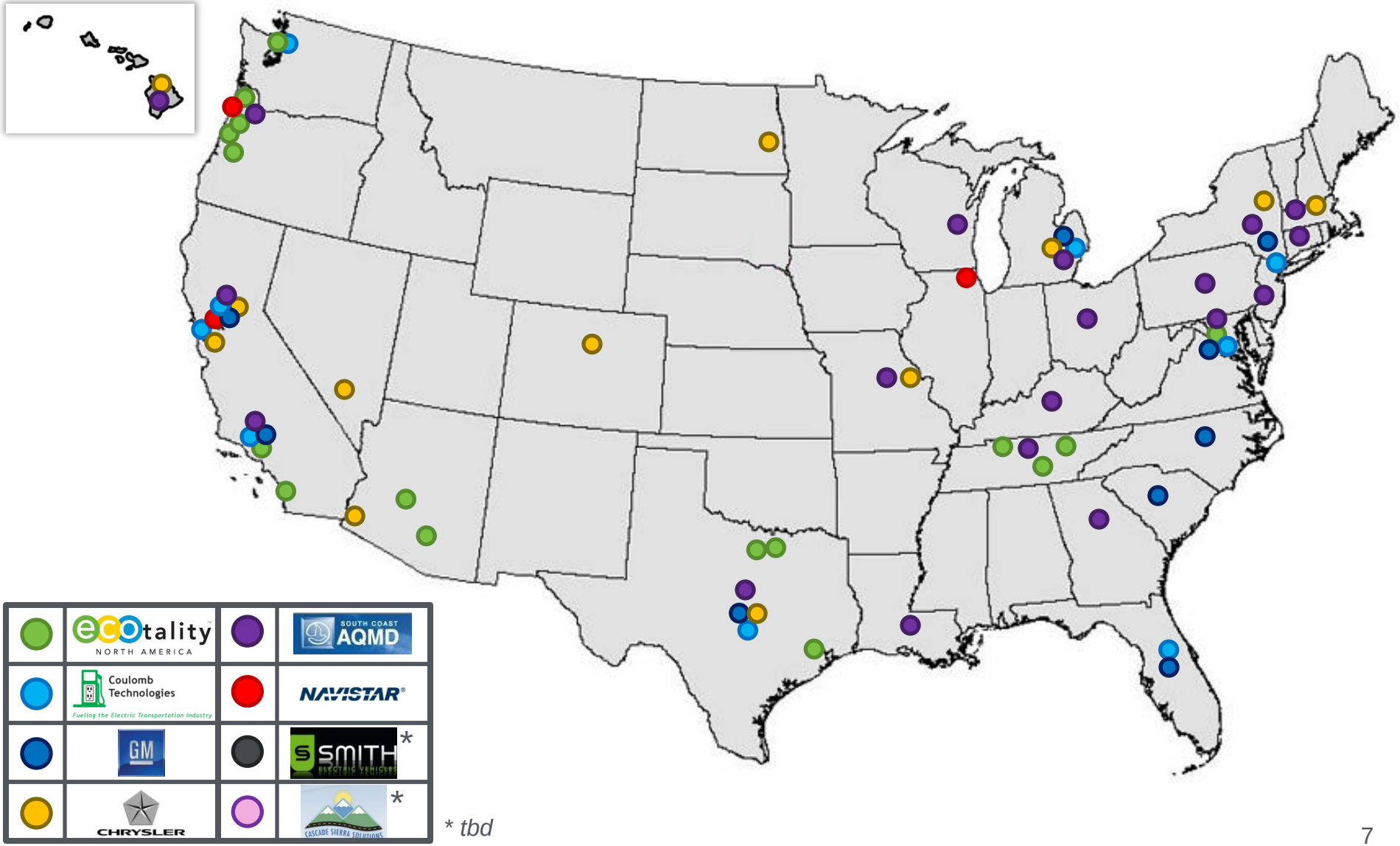

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Charging Data Collection

- **Data collected each charge event**:
  - Connect, start charge, end charge and disconnect times
  - Average power (kW), max peak power (kW), total energy (kWh) and rolling 15 minute average peak power (kW)
  - Charger ID, event ID and date/time stamp
- **Infrastructure providers submit data**:
  - ECOtality – weekly
    - 15,000 Level 2 chargers
    - 340 500VDC fast chargers
  - Coulomb – weekly
    - 4,000 Level 2 chargers
  - Partners in TE Vehicle Demonstrations will provide data on charge events from 3,000 Level 2 chargers

Vehicle Data Collection

- **Data collected each driving event**:
  - Data recorded for each key on/key off event
  - Event Type (key on/off), date/time stamp
  - Vehicle ID, Odometer, GPS location
  - Battery SOC, Liquid Fuel consumption
- **Demonstration data submitted for**:
  - ECOtality: 5,600 Nissan Leafs, 2,600 Chevy Volts
  - GM: 125 Chevy Volts
  - Chrysler: 153 PHEV Ram trucks
  - SCAQMD: 378 PHEV Bucket trucks
  - Smith: EV 500 BEV Delivery trucks
  - Navistar: 950 BEV Delivery trucks

Data Collection Plan

- **Data collection responsibility**:
  - INL will collect and manage light duty vehicle and charger data
  - NREL will collect and manage medium duty vehicle data
  - Data collection will begin in December 2010 with vehicle launches
  - PHEV conversion data collection underway since 2008
- **Data analysis and reporting will focus on**:
  - Vehicle and charger performance, efficiency, and utilization
  - Drivers' charging patterns and public charging use
  - Impact of various rate structures on charging habits
  - Impact of vehicle charging on electric grid
- **Report dissemination**:
  - Raw data will not be distributed
  - Web-based per NETL, DOE & ARRA requirements
  - Fact Sheet reporting will commence end Q2 FY 2011
  - Utilization and impacts reports will be published annually beginning in late 2011

INL Data Management System – Push
(ECOtality, Nissan, GM, Chrysler, Coulomb)

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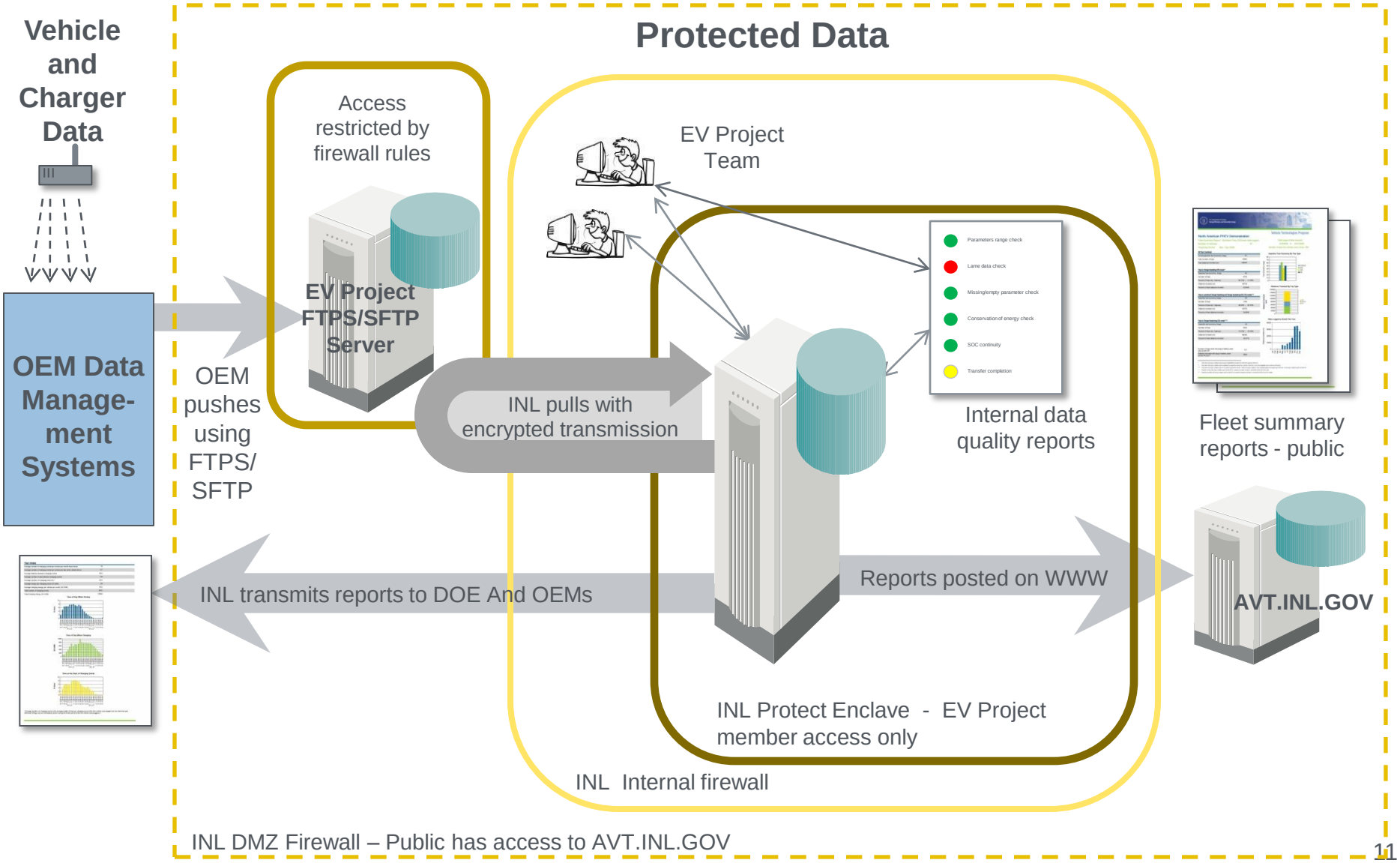
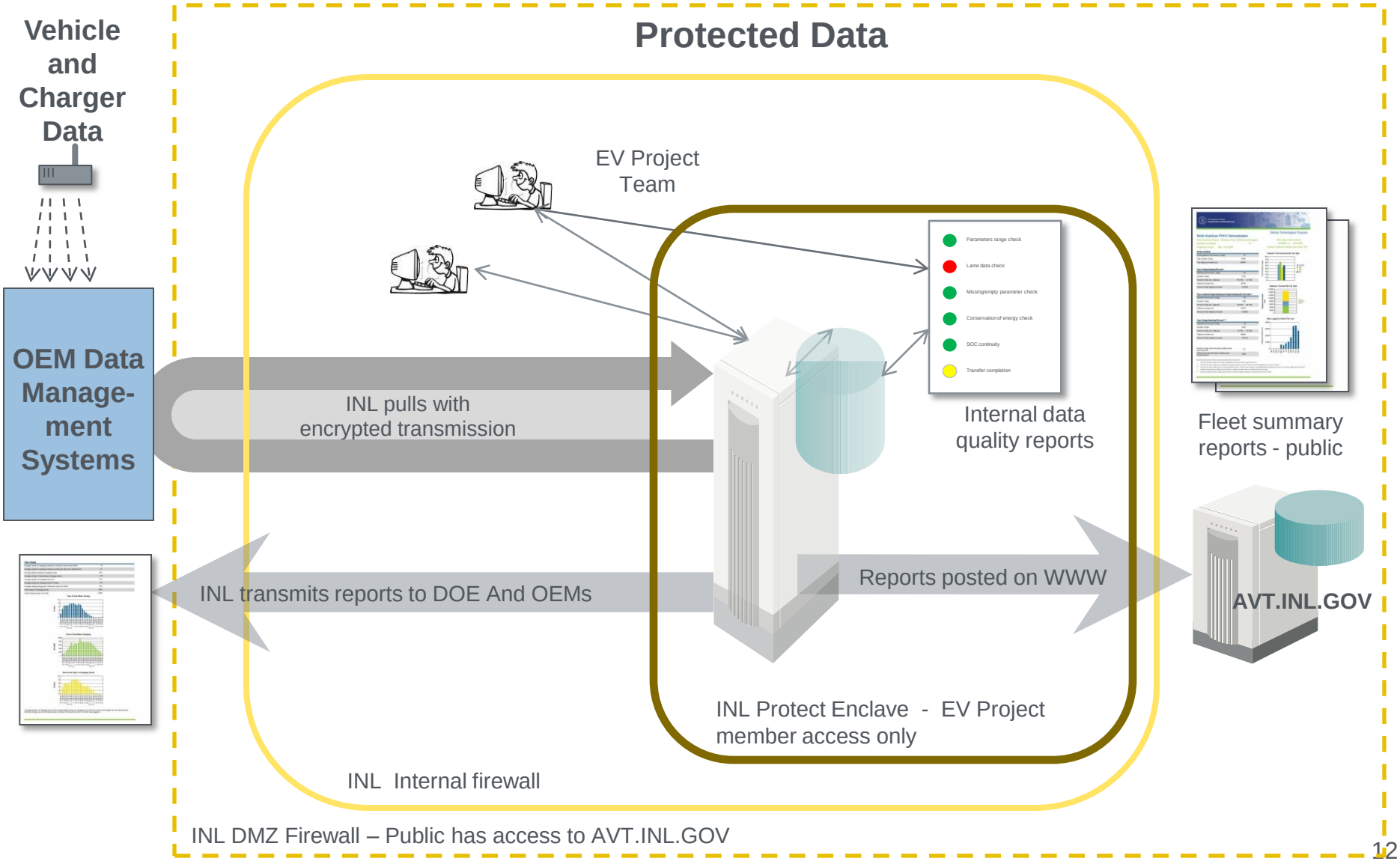


INL Data Management System – Pull
(Ford, conversion PHEVs, HEVs, HICEs)



Potential to Share Information?

- **Travel Patterns**
  - Compare/contrast vehicle use characteristics
  - Evaluate demand versus need for electric range
- **Driver Behavior**
  - Charging habits
  - Impact of incentives to influence charging behavior

Note that determination of global travel patterns is a proposed element of the IEA-coordinated, multi-lateral Electric Vehicles Initiative