



Advanced Vehicle Testing Activity – Background and EERE \ FEMP Sponsored Federal Fleet PEV Deployment Study

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InterFuels
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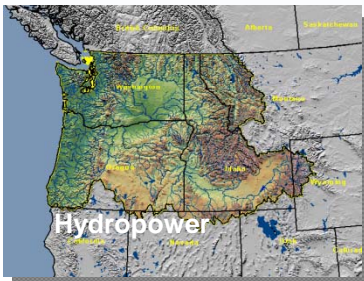
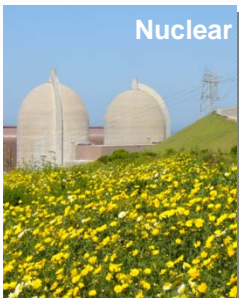
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Presentation Outline

- **Idaho National Laboratory (INL) / Advanced Vehicle Testing Activity (AVTA) backgrounds**
- **Historical and ongoing vehicle testing experience**
- **ARRA and TADA data collection**
- **EV Project and Micro-Climate process**
- **Federal Fleet Support Project Planning**
- **DOE-JBLM Micro Climate Study**
- **Federal Fleet Data Analysis**

Idaho National Laboratory

- Eastern Idaho based U.S. Department of Energy (DOE) Federal laboratory
- 890 square mile site with 4,000 staff
- Support DOE's strategic goal:
 - Increase U.S. energy security and reduce the nation's dependence on foreign oil
- Multi-program DOE laboratory
 - Nuclear Energy
 - Fossil, Biomass, Wind, Geothermal and Hydropower Energy
 - Advanced Vehicles and Battery Development
 - Energy Critical Infrastructure Protection



AVTA Description

- **Advanced Vehicle Testing Activity (AVTA) is conducted by the Idaho National Laboratory (INL) for DOE's Vehicle Technologies Program within EERE**
- **INL's AVTA tests light-duty vehicles, energy storage systems, and fueling infrastructures that support:**
 - **100% Electric and dual-fuel electric drive systems**
 - **Advanced energy storage systems**
 - **Advanced control systems (i.e., micro hybrid vehicles)**
 - **100% Hydrogen and HCNG blended ICE vehicles**
- **Provide benchmarked vehicle and infrastructure testing results to R&D programs, modelers, OEMs, battery manufacturers, and target/goal setters (DOE)**
- **Assist early adaptor fleet managers and the general public in making informed vehicle purchase, deployment and operating decisions**
- **Presentations to industry groups, including via Clean Cities' sponsored webinars and symposiums**

Vehicle Testing Experience

- **Plug-in hybrid electric vehicles: 14 models, 430 PHEVs, 5+ million (ml) miles**
- **Extended Range Electric Vehicles: 1 model, 150 EREVs, 400+ thousand (k) miles**
- **Hybrid electric vehicles: 19 models, 50 HEVs, 6+ ml miles**
- **Micro hybrid vehicles: 3 models, 7 MHVs, 200+ k miles**
- **Neighborhood electric vehicles: 24 models, 372 NEVs, 200k miles**
- **Hydrogen internal combustion engine vehicles, 7 models, 18 HICEVs, 500k miles**
- **Battery electric vehicles 47 models, 2,300 BEVs, 5+ million miles (includes 500+ USPS BEVs)**
- **Urban electric vehicles: 3 models, 460 UEVs, 1 million miles**
- **18+ million test miles accumulated on 2,300 electric drive vehicles representing 110 models**

INL ARRA / TADA Data Collection Support

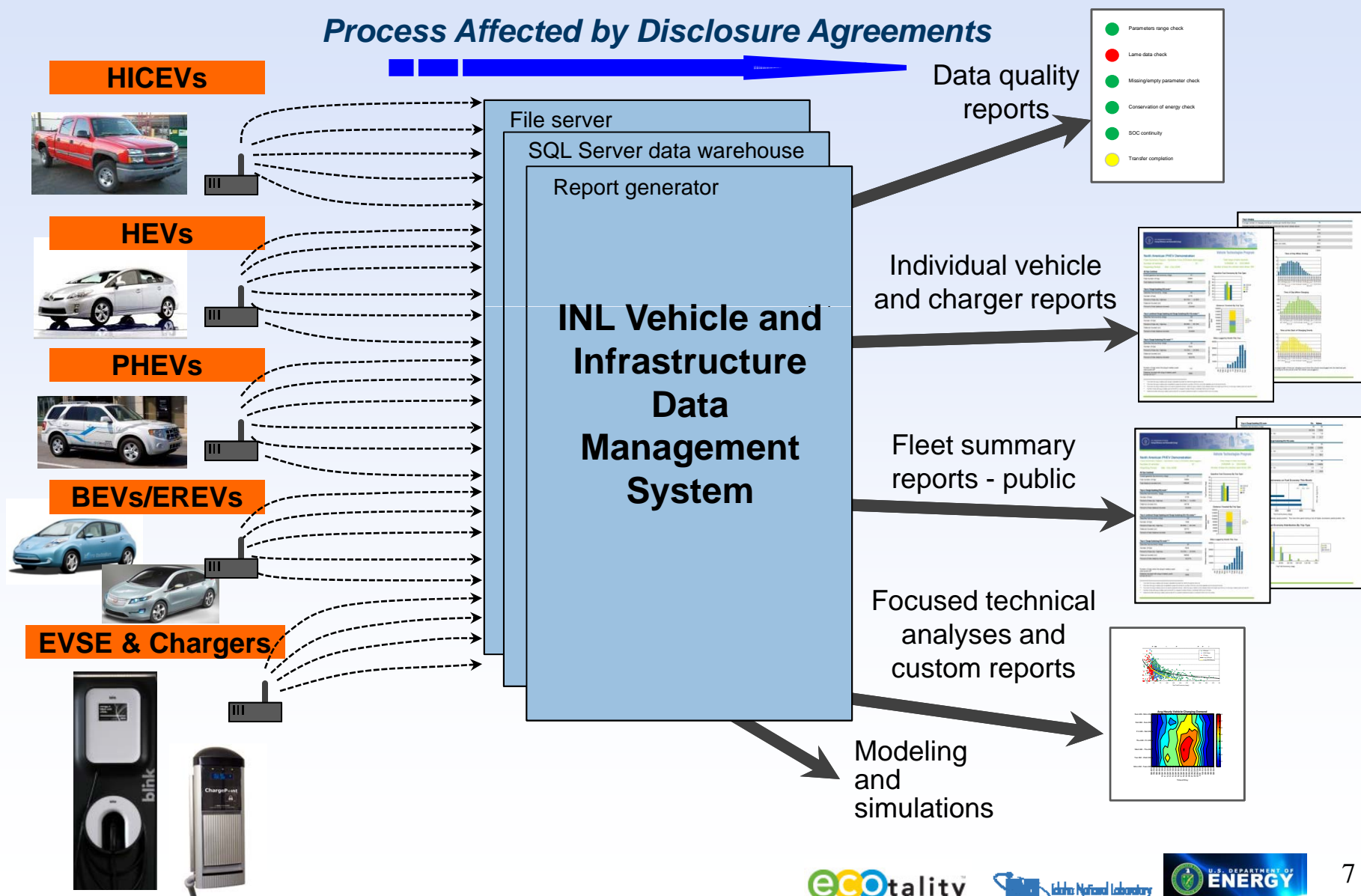
- INL tasked with data collection, analysis and reporting for charging infrastructure and light-duty vehicle ARRA and other DOE demonstrations:
 - EV Project: 8,300 Leaf EVs and Volt EREVs, and 15,300 ECOtality / Blink Level 2 EVSE and fast chargers. Data logging (DL) on all 23,600 pieces of equipment
 - 140 Chrysler Ram PHEV Pickups with DL
 - 150 General Motors EREV Volts with DL
 - 21 Ford Escape PHEV SUVs with DL
 - 4,000 Level 2 EVSE deployed by Coulomb with DL
- INL, and OEM and EVSE partners collecting real-time data
- Raw data and personal information protected by NDAs (Non Disclosure Agreements)



Data Management Process Accomplishments

INL has been collecting onboard-vehicle data since 1993

Process Affected by Disclosure Agreements



Vehicle and Infrastructure Data Sources

Vehicle time-history data (1 second interval)	HEV and Start/Stop: 15 vehicle models, 1 data logger
	HICE: 1 vehicle model, 1 data logger
	Conversion PHEVs: 9 vehicle models, 3 data loggers
	USPS eLLV conversions: 5 models, Gridpoint wireless logger
	Ford Escape PHEV, Ford wireless logger
	Chrysler Ram PHEV, Chrysler wireless logger
Vehicle event data (key-on, key-off)	Nissan Leaf, Nissan/ATX telematics
	Chevrolet Volt, OnStar telematics
Charger event and time-history data (15 min interval)	ECotality Blink networked level 2 EVSE and DC fast chargers
	Coulomb ChargePoint networked level 2 EVSE

Managing 29 different data models

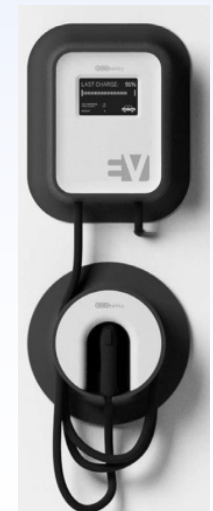
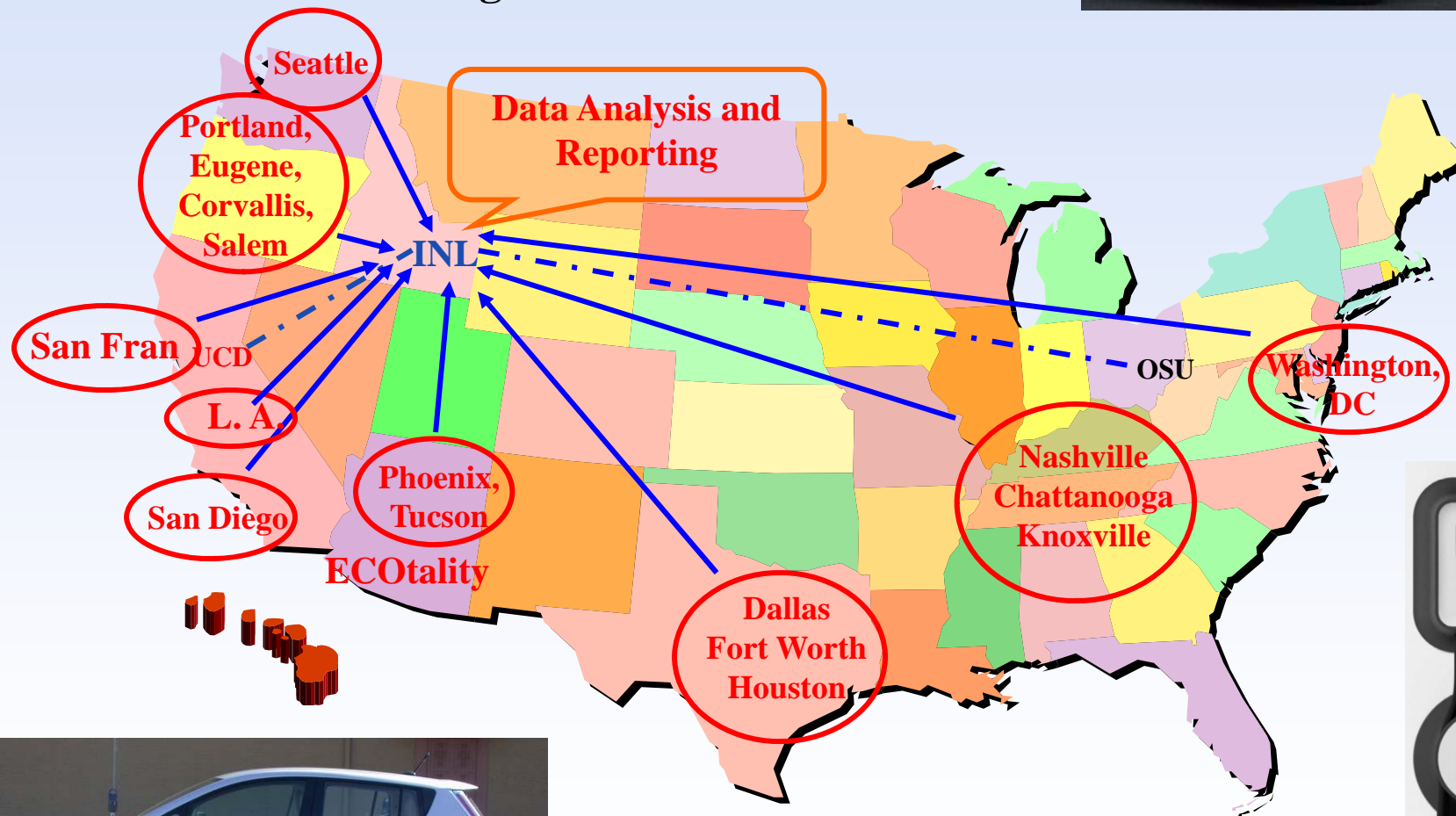
The EV Project



- **\$230 million project**
 - \$115 million grant from US Dept. of Energy
 - \$115 million match
- **Purpose: To plan, build, study, and evaluate mature electric vehicle charging infrastructure in six states plus D.C.**
- **Product: Lessons learned**

EV Project Partner Locations

Level II EVSE & Fast
Chargers



EV Micro-Climate Plan

Structured program to make regions “plug-in ready”

1) Community Planning

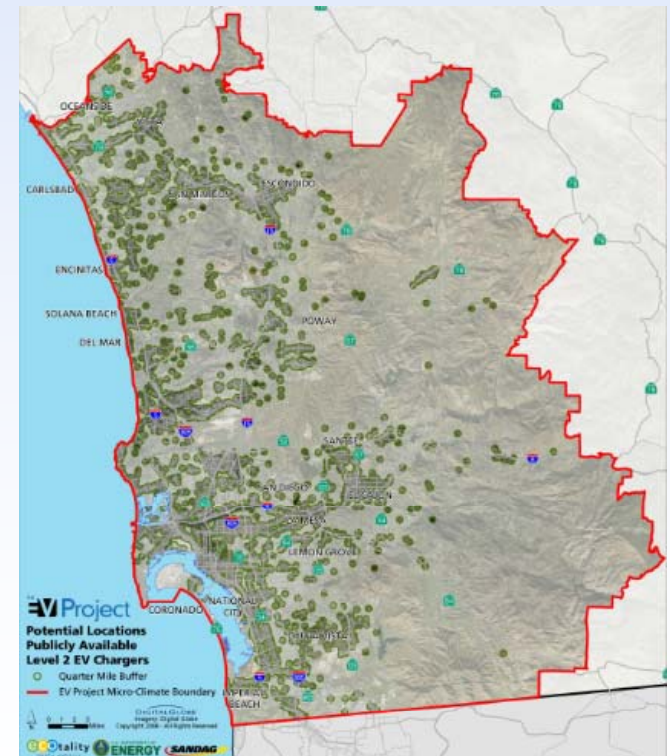
- Deployment Guidelines & Stakeholder Organization
- Long Range Plan (10 years)
- Micro-Climate Plan (1-3 years)

2) Road Mapping

- 1-3 year action plan
- Systematic GIS mapping

3) Infrastructure Implementation

- Deployment of EV charge stations
- Targets scalable national accounts
- Implement sustainable business models



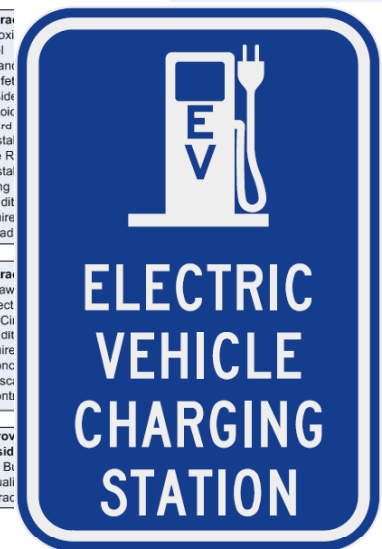
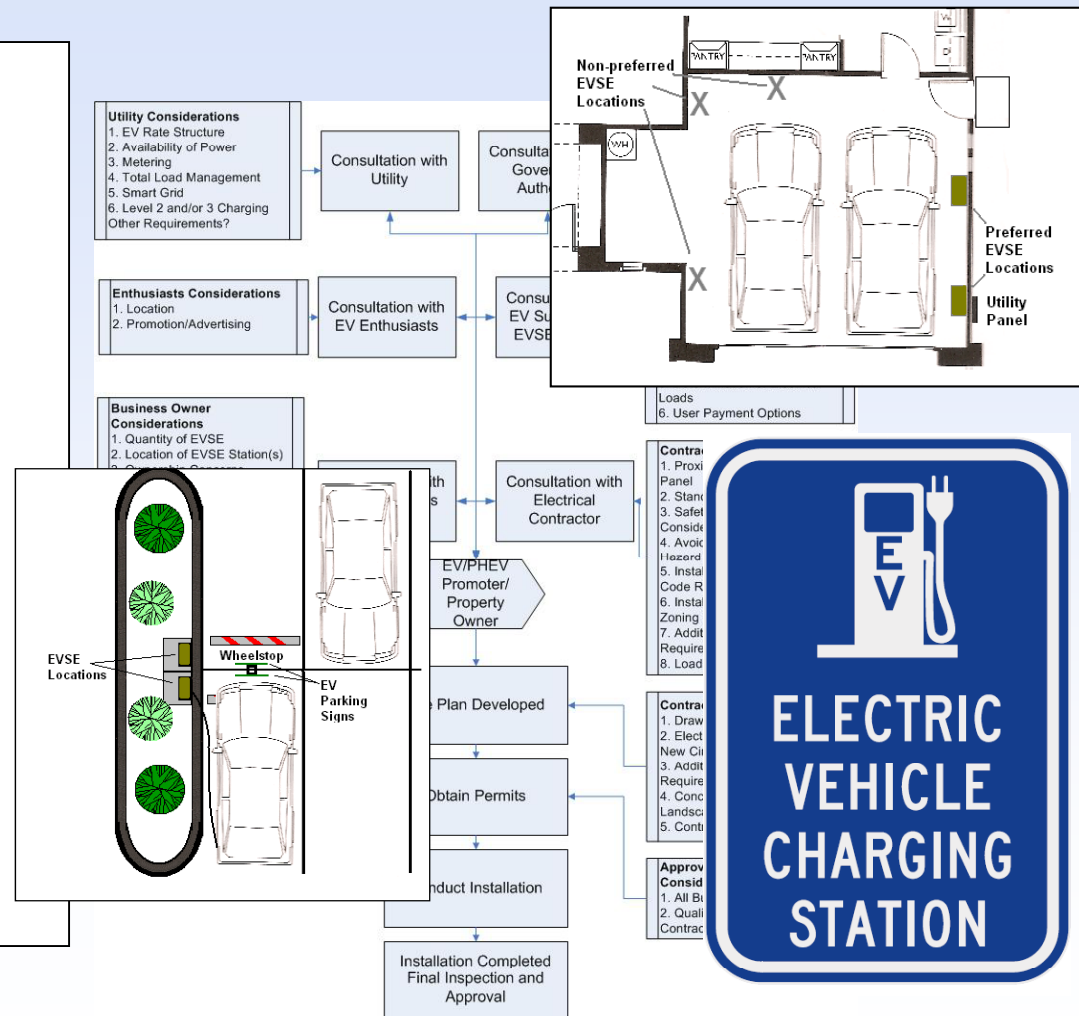
Infrastructure Planning

Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene



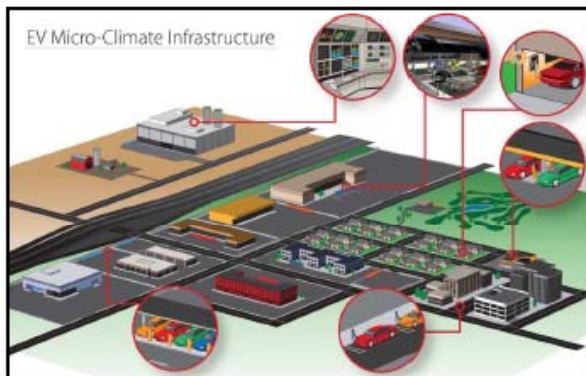
April 2010
Final Version 3.1

ecotality
ELECTRIC TRANSPORTATION ENGINEERING CORPORATION



Infrastructure Planning

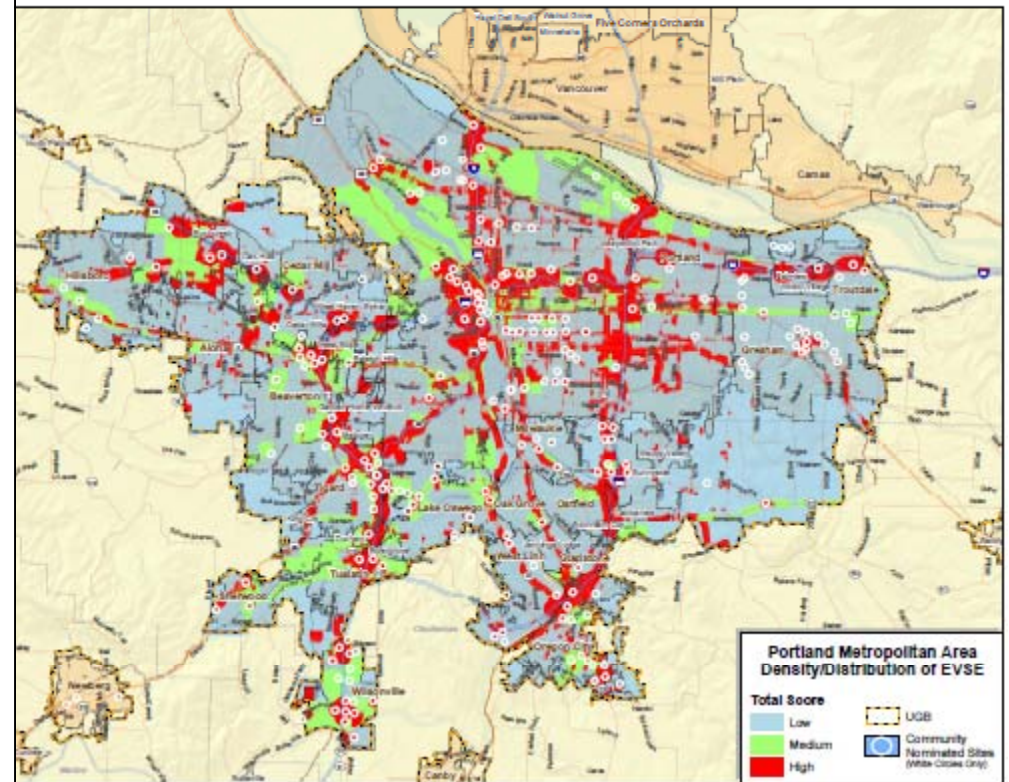
EV Micro-Climate™ Plan for Northwestern Oregon



November 2010

Version 4.0

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NORTH AMERICA



EV Location Analysis

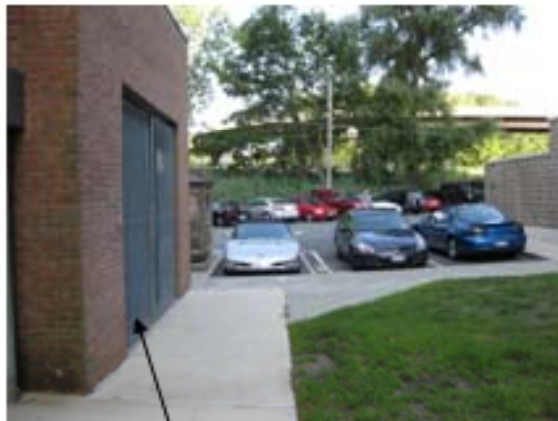
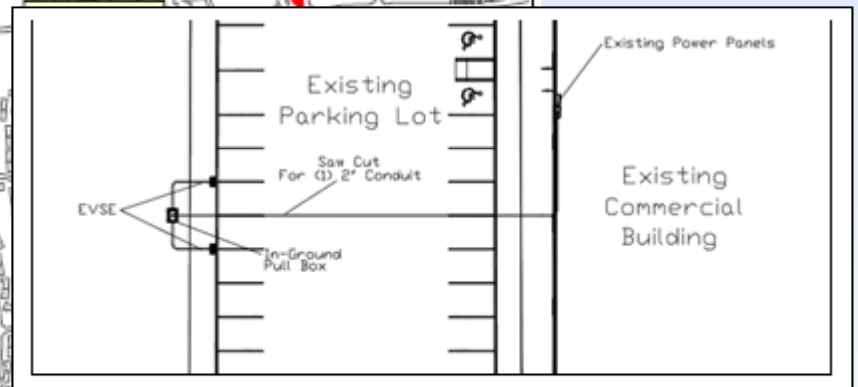
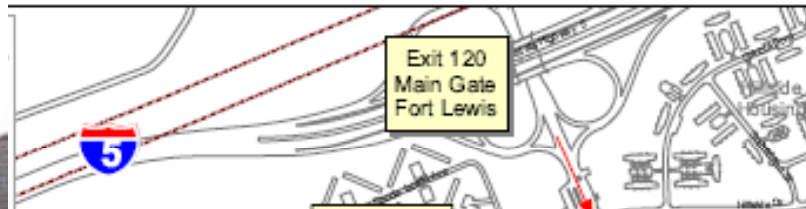


Figure 13 CJS Option 2

High Voltage Room



Federal Fleet PEV Support Needs

- Support president's directive that 100% of Federal vehicles should be fuel efficient or clean energy vehicles by 2015
- Due to the large number of vehicles in Federal fleets there is a substantial opportunity for introduction of plug-in electric vehicles (PEVs).
- Data is required to assess the opportunity magnitude
 - Trip distances
 - Total distance between based location returns
 - Time between base location returns during work shifts
 - Environmental conditions
 - Electrical capacity of the base location
 - Frequency of frequent intermediate stop locations
 - Electric capacity of intermediate stop locations
- Allows for the characterization and identification of the missions and fleet locations suitable for PEV use

Federal Fleet PEV Support Plan

- **Perform in-depth (Micro Climate) fleet / base electrical infrastructure analysis on 1 to 3 locations. We have initiated the first study**
- **Perform vehicle mission analysis with data loggers on 400 Federal fleet vehicles**
- **Support budgeting process based on Micro Climate fleet / base studies**
- **Provide training to six(?) Federal fleets to support the correct matching of PEVs and vehicle mission requirements**
- **Funding has been secured from both DOE's Federal Energy Management Program (FEMP) and Energy Efficiency and Renewable Energy (EERE)**

DOE / DOD-JBLM Micro Climate Study

- Supports DOE / DOD *MOU Concerning Cooperation in a Strategic Partnership to Enhance Energy Security*
- Perform in-depth Micro Climate study at Joint Base Lewis (Army) / McChord (Air Force)
- Task 1 – Facility fleet and infrastructure assessment
 - Inventory JBLM's vehicle fleet, including onroad, material handling and aircraft support vehicles. Identify vehicle “owner” and vehicle type. Generic vehicle mission descriptions will be developed and vehicles classified according to mission
- Task 2 – Development of target electrification vehicles
 - Based on Task 1 results report, identify a group of vehicles that can successfully be targeted for electrification in the short term based on electrical infrastructure, mission, visibility of vehicle mission, and availability of production PEVs. Solicit “owner” to assist with data collection, training and pilot demonstration

DOE-JBLM Micro Climate Study – cont'd

- **Task 3 – Detailed assessment of target electrification vehicles**
 - Based on Task 2 results report, gather detailed data on existing target vehicle use and install data loggers in target vehicles to quantify missions
 - Surveys of the vehicle mission will also be conducted of the vehicle “owners”
 - Requirements will be compared to PEV capabilities and a vehicle recommended
 - Using quantified mission requirements obtained from data logging and surveys, charge infrastructure requirements will be developed for the target vehicles, including charge hardware, location and electrical infrastructure requirements
 - Drawings suitable for permitting of electrical installations will be developed for each target vehicle infrastructure location

DOE-JBLM Micro Climate Study – cont'd

- **Task 4 – Economic analysis of target electrification**
 - The equipment, installation, training, and one-year monitoring costs to implement the target electrification detailed in the Task 3 report will be developed
 - The benefits, both economic and environmental, associated with the target electrification will also be quantified
 - Provide a cost-benefit analysis report of the target electrification

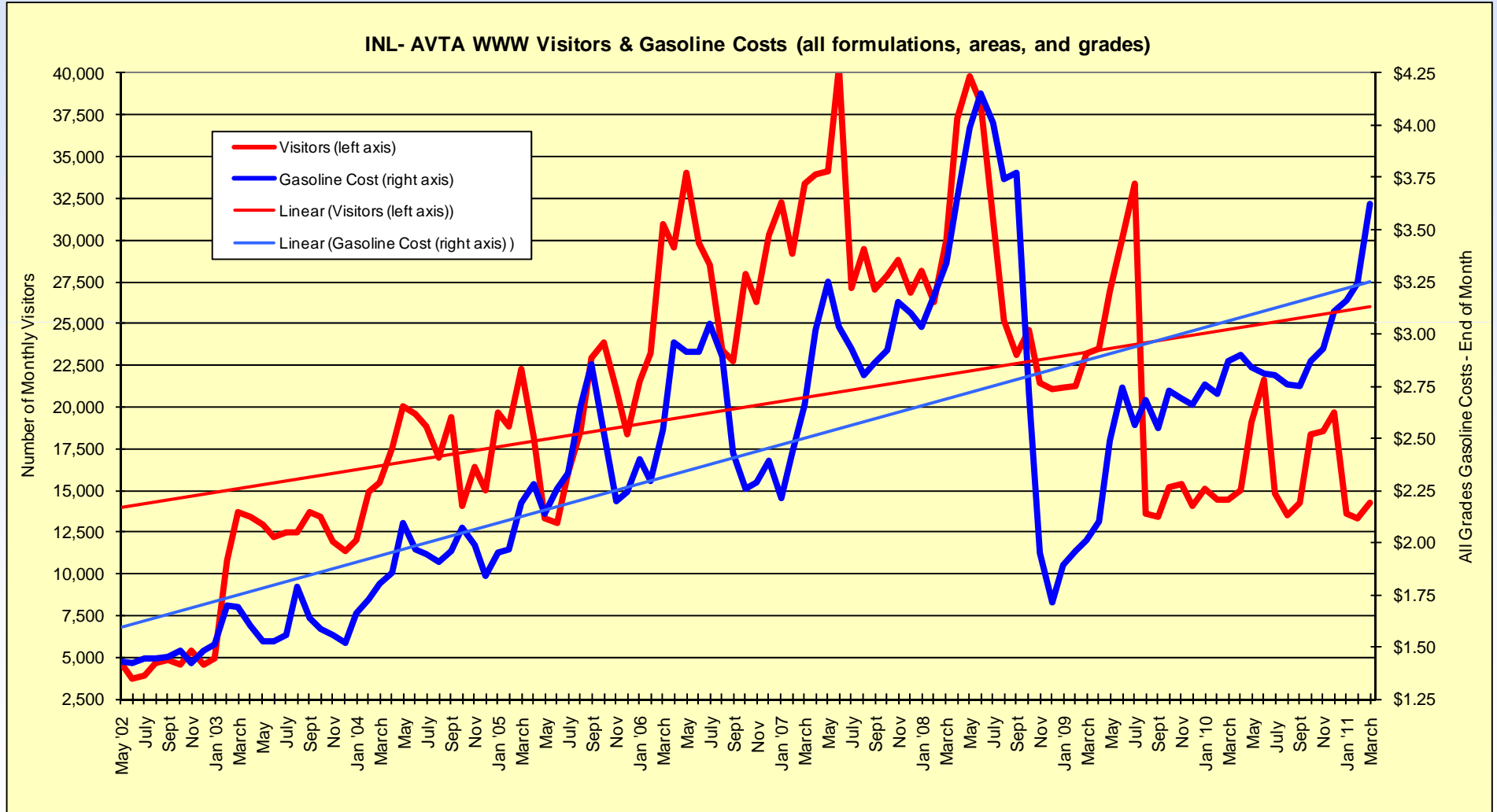
Federal Fleet Data Analysis

- **Use 80 data loggers 5 times to document vehicle:**
 - Trip distances
 - Total distance between based location returns
 - Time between base location returns during work shifts
 - Duration of frequent intermediate stop locations
- **Likely 40 vehicles at 5 fleets instrumented, with 10 high-idling candidates**
- **Likely some combination of 20 vehicles at 10 fleets**
- **Deliverables**
 - Electronic vehicle data set
 - Report characterizing data collected and vehicle missions suitable for PEV applications
 - A fleet training presentation prepared to train Fleet managers on the application of PEVs, presented to six(?) fleets

Project Status

- **Second meeting has been held with JBLM**
 - Preliminary data obtained to support first task and project scope definition
- **Final set of candidate data loggers selected**
 - Seems like every day a new product is introduced, but longevity of offering companies uncertain
 - Selection requires balance of cost, functionality, and likelihood of company endurance
- **Soliciting Federal fleets for participation hand-raisers (looking for guinea pigs)**
- **Subcontracts being defined and costed**

AVTA Summary – WWW Visitors



Acknowledgement and AVTA WWW Address

This work is supported by the U.S. Department of Energy's Vehicle Technologies Program (EERE) and FEMP

**AVTA Information, Reports, and Fact Sheets @
<http://avt.inl.gov>**

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