The EV Project Data Collection

U.S. Department of Energy's Advanced Vehicle Testing Activity

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This presentation does not contain any proprietary or sensitive information

The EV Project Overview

- **$230 million total project**
  - **US Department of Energy grant**
  - **Partner Cost share match**
  - **Lead by ECOtality North America (ECOtality NA)**

- **Purpose: To build and study mature electric vehicle charging infrastructure in eight regions – 16 cities**

- **Product: Take the lessons learned from the deployment of these first 8,300 EVs, and the charging infrastructure supporting them, to enable the streamlined deployment of the next 5,000,000 Evs**

Geographic Areas

- Arizona (Phoenix, Tucson)
- California (San Diego, Los Angeles)
- Oregon (Portland, Eugene, Corvallis, Salem)
- Tennessee (Chattanooga, Knoxville, Nashville)
- Texas (Dallas, Fort Worth, Houston)
- Washington, DC
- Washington State (greater Seattle area)
- Transportation Corridors
  - Including I-5, I-10, I-75, I-40 and I-24 between participant cities

Level 2 EVSE Deployment

- Where should they be installed?
  - ECOtality NA's Micro-Climate© process
    - Where people gather to shop and play
    - Target is 1 - 3 hours
- Expand effective EV operating range
  - Allows for unscheduled trips
  - Provides 'comfort' to new EV users: 'Range Anxiety'
- Businesses want to install EVSE
  - Draws EV customers - they stay longer
  - Advertising Advantages
  - Revenue Collection Systems

DC Fast Charger Deployment

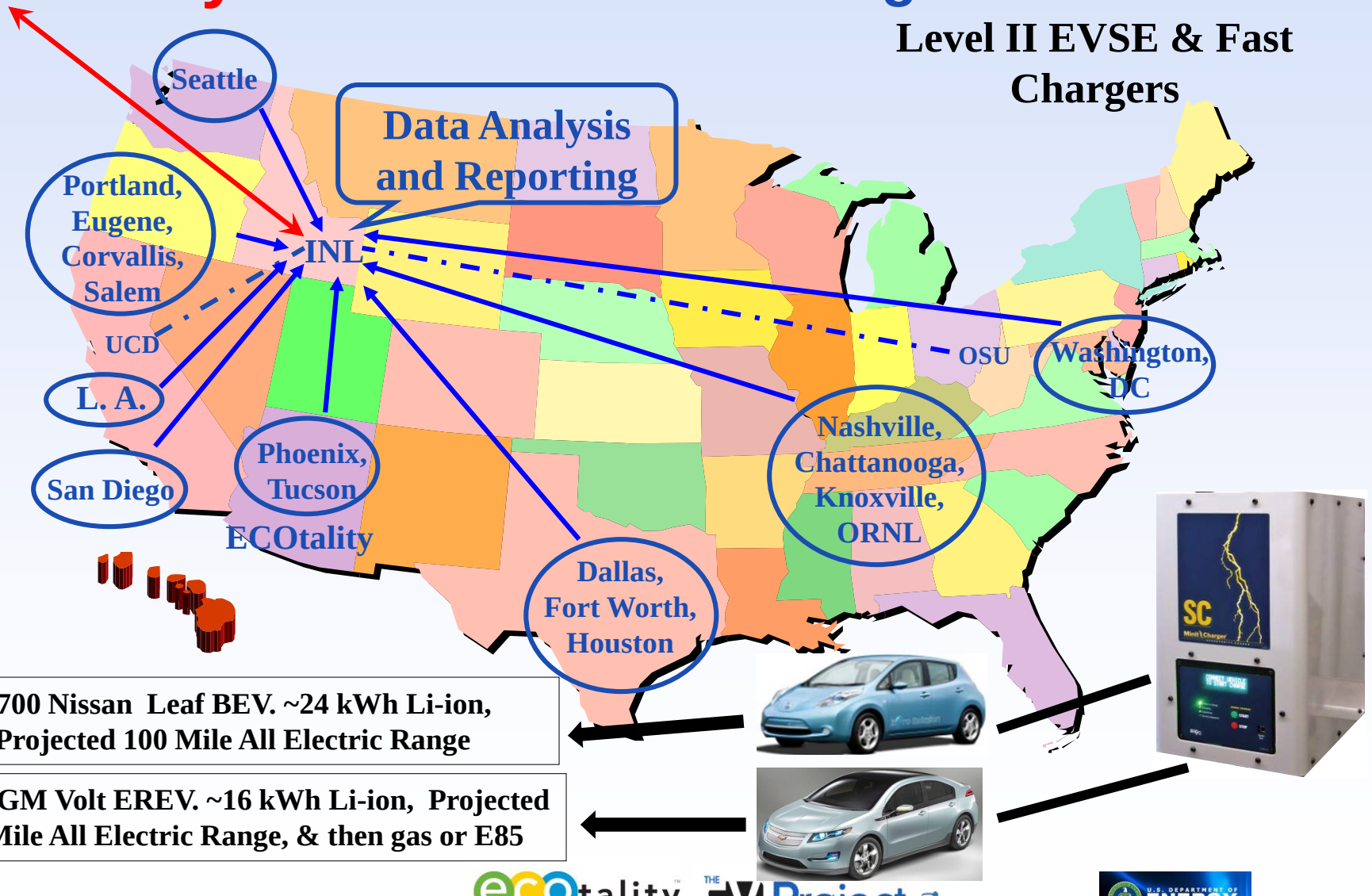
- Where do they go?
  - Where energy is needed fast
    - Near highways or cross-town roads
    - Highway corridors between towns
    - Busy fleet locations
  - Where people stay a short time
    - Gasoline stations
    - Convenience Stores
    - 10 – 15 minute charge
  - What will it do?
    - Fast energy return - 50% fill in 30 minutes

EV Project - Infrastructure Demonstration

- 14,650 Level 2 electric vehicle supply equipment (EVSE)
- 310 DC fast chargers
- Includes 5,700 battery electric Nissan Leaf EVs
- 2,600 General Motors Volt EREVs – 8,300 EVs
- Charging and vehicle data for the 23,260 EVSE, fast chargers and vehicles will be collected by the Idaho National Laboratory via data streams from ECOtality NA (charging infrastructure), and Nissan and General Motors (vehicle data)

EV Infrastructure Project

ECOtality NA/INL/Nissan/GM/Regional Partners



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INL Vehicle Data Management Process

Process Affected by Disclosure Agreements

HICEVs

HEVs

PHEVs

EVs & EREVs

EVSE & Chargers

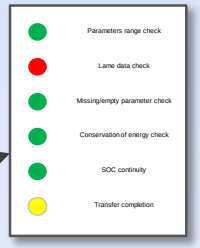
File server

SQL Server data warehouse

Report generator

INL Vehicle Data Management System

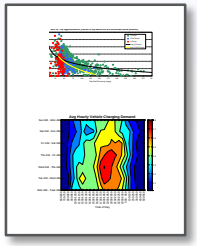
Data quality reports



Individual vehicle reports

Fleet summary Reports - Public

Focused technical analyses and custom reports



Modeling and simulations

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THE EV Project

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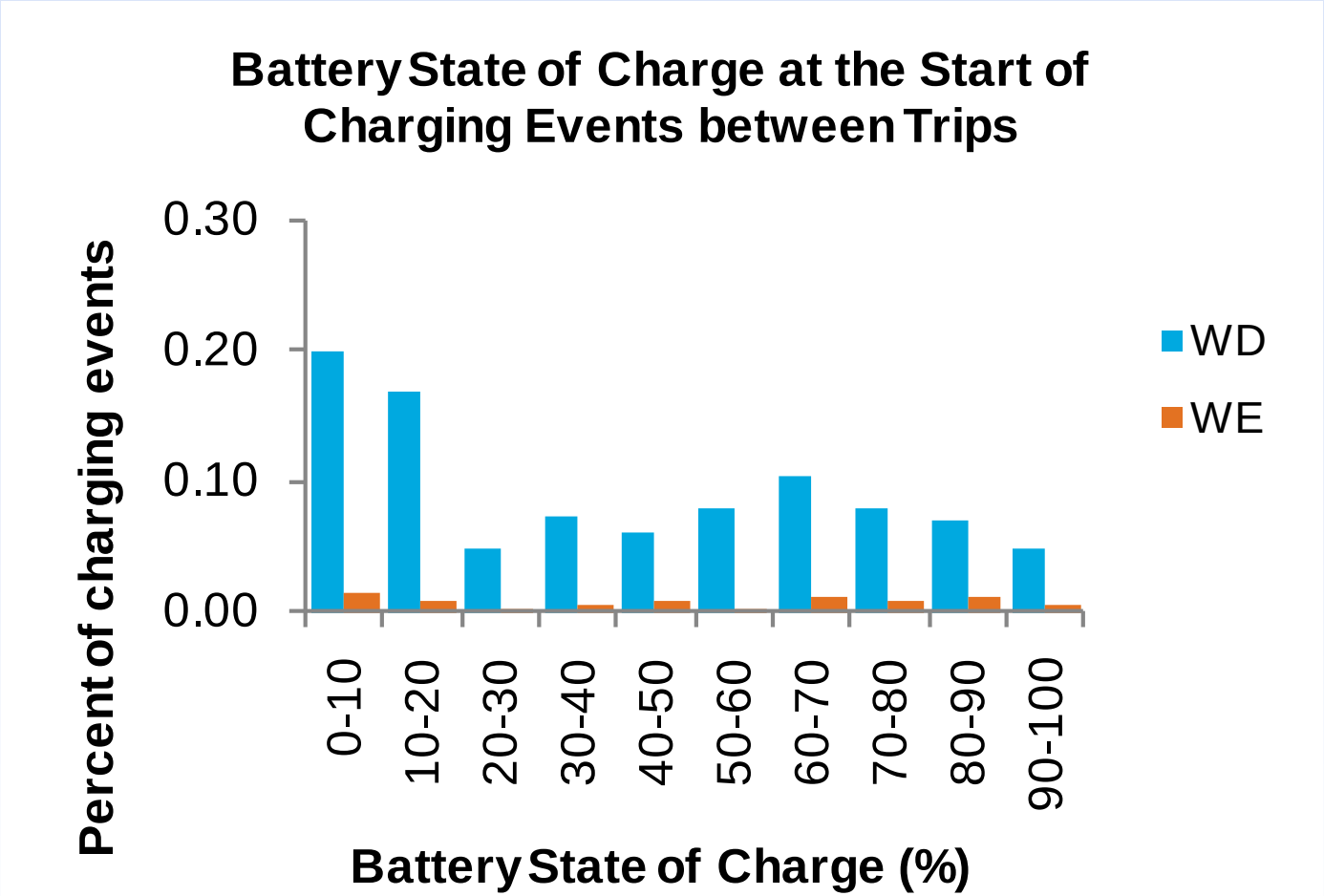
Overall Data Collection Rational

- **INL has collected data and published the testing results to date on:**
  - **1,600 electric drive vehicles**
  - **98 different electric drive vehicle models**
  - **BEVs, NEVs, HEVs, HICEVs and PHEVs,**
- **INL team has been collecting onboard data since 1994**
- **Historically provide testing results in usable formats to:**
  - **Target and goal setters, and others needing independent technology evaluations**
  - **Early adaptor fleet managers and the public**
  - **Modelers and OEMs**

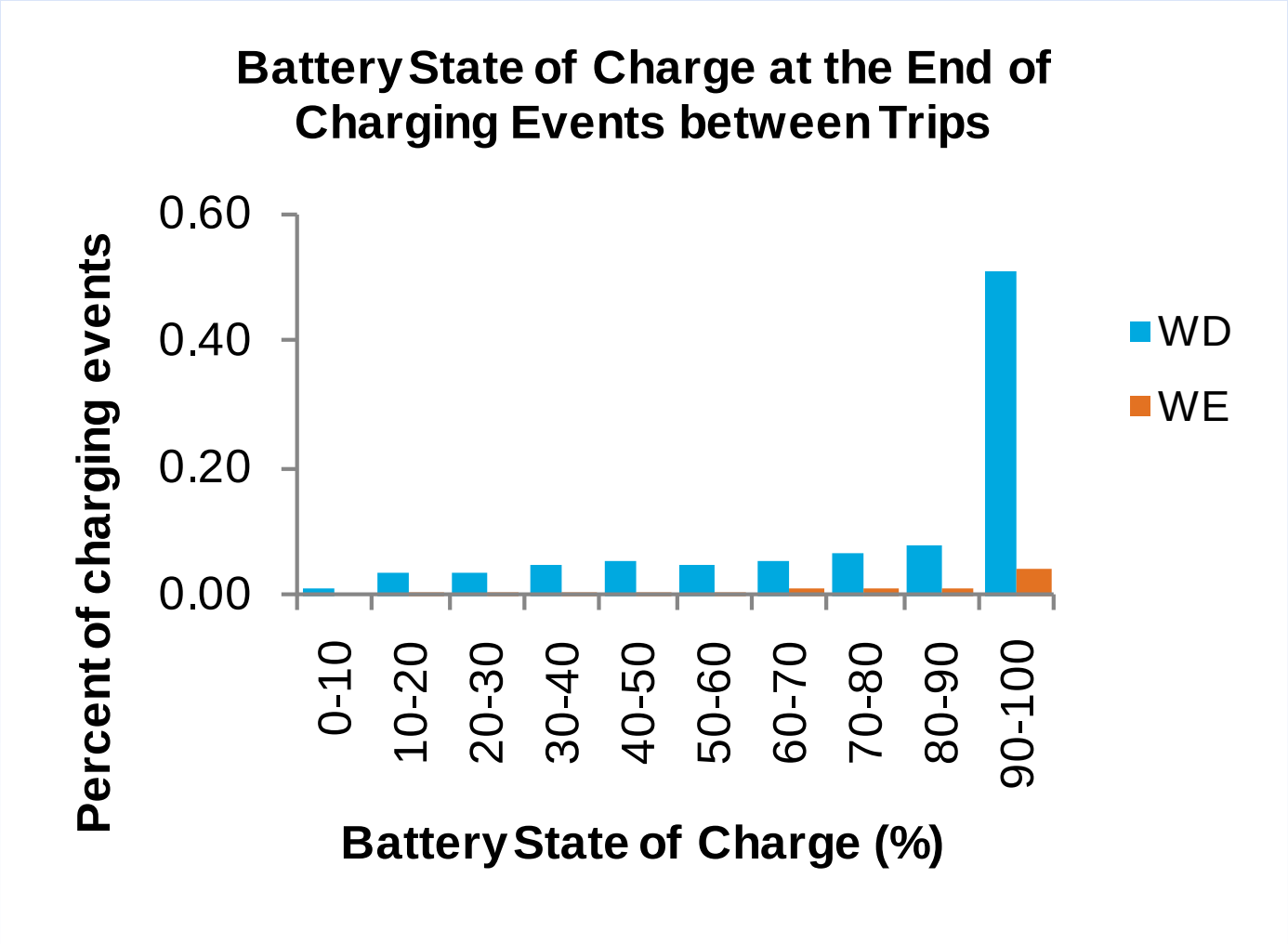
Overall Data Collection Rational

- **Document electric drive vehicle technologies' ability to reduce petroleum use by collecting data on:**
  - **Vehicle use and charging profiles**
- **Document fueling infrastructure technology, including:**
  - **Sitting**
  - **Use**
  - **Time-of-day pricing**
  - **Charging level (I, II, fast charging) utilization**
  - **Public vs. private (at home or base location) charging**
  - **Micro versus macro grid issues / impacts**

PHEV SOC Data Collection Example



PHEV SOC Data Collection Example



EV Project Reporting

- EV Project will analyze and report on the charging infrastructure utilization (Level II EVSE units and fast chargers) by the 8,300 Leaf and Volt drivers
- EV Project will report on driver/vehicle charging patterns, and charging infrastructure utilization patterns
- Many of the 42+ EV Project partners are electric utilities with high interest in demand / smart charging controls
  - Smart charging will include multitier time-of-day pricing
  - Micro grid analysis
- Fast charge / grid energy storage test component is also being developed

Infrastructure Data Collected per Charge Event

- Date/Time Stamp
- Unique ID for Charging Event
- Unique ID Identifying the EVSE – may not change
- Connect and Disconnect Times
- Start and End Charge Times
- Max Instantaneous Peak Power
- Average Power
- Total energy (kWh) per charging event
- Rolling 15 Minute Average Peak Power
- And other non-dynamic EVSE information (GPS, ID, type, contact info, etc.)

Vehicle Data Collected per Start/Stop Event

- Vehicle ID
- Date/Time Stamp
- Event type (key on / key off)
- Odometer
- Battery state of charge
- GPS (longitude and latitude)
- Liquid fuel consumption (some vehicles)
- Recorded for each key-on and key-off event

EV Project – Fact Sheet Reporting

- Driving (by reporting period)
  - Number of trips
  - Distance driven (miles)
  - Average number of trips between charging events
  - Average distance between charging events
- Charging
  - EV Project charging
    - Number of charging events
    - Percent of all charging events
    - Total time plugged in (hours)
    - Percent of all time plugged in
  - Non-EV Project charging events
    - Number of charging events
    - Percent of all charging events

Data Collection Summary

- Utilize a systematic process for planning and installing charging infrastructure
  - Document travel patterns
  - Document charging patterns
- Provide feedback on infrastructure deployment decisions
- Successful grid connected electric drive vehicle deployment is dependent on successful infrastructure deployment
- Future charging infrastructure deployments must be based on real-world travel and charging patters
- Replace internal combustion engine vehicles with grid connected, and infrastructure dependant, electric drive vehicles

Acknowledgement

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More Information

EV Project: www.theevproject.com

ECOtality North America: www.ecotalityna.com

Advanced Vehicle Testing Activity: http://avt.inl.gov

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