Washington State's West Coast Electric Highway DC Fast Charging Network

EVS27
November 19, 2013
Barcelona, Spain

Jeff Doyle
Director, Public/Private Partnerships
Washington State Department of Transportation

Pacific Northwest U.S.A.

Infrastructure Deployment

Washington's Electric Highways:

- **EV charging network:** 12 public DC fast-charging locations in critical recharge zones outside of The EV project to make DC fast charging available every 35 to 50 miles.
- **Charging equipment:** Both AeroVironment DC fast charger (CHAdeMO) and Level 2 EVSE (J1772) at each location.
- **Locations:** Private retail locations such as shopping malls, restaurants, and fueling stations. Plus, two "gateway" safety rest areas along I-5.
- **Funding:** $1.6 million grant through the Washington State Department of Commerce, State Energy Program, with U.S. Department of Energy Recovery Act funds.
- **Completed**: November, 2012.

Project Function vs. Purpose

Project Purpose: Support broad consumer adoption of EVs – *commercialization.*

Main Problem: Concerns about EV range limits are a significant factor in consumers' purchasing decision.

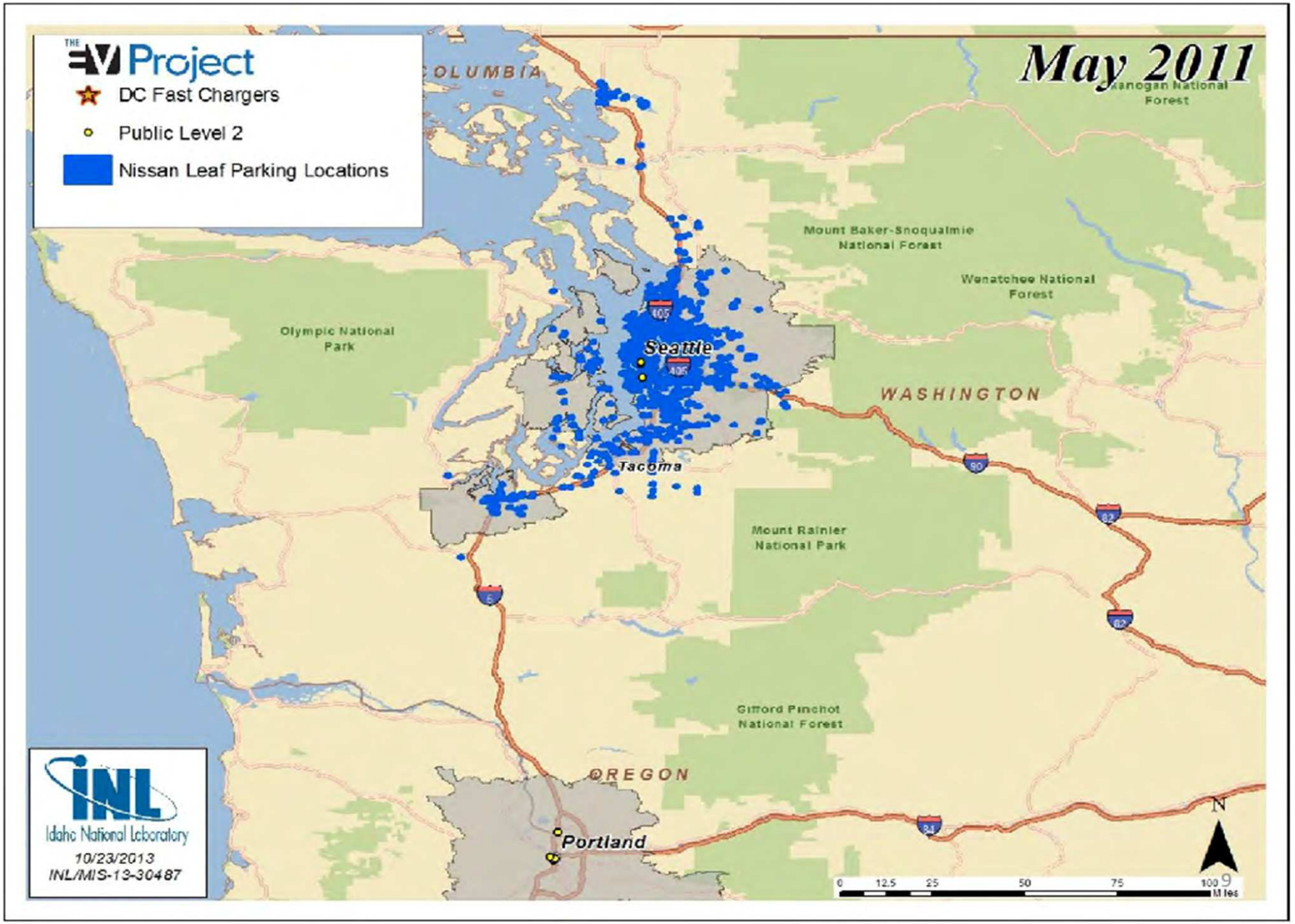
Strategy: Provide a basic network of DC Fast Chargers to increase both the *perceived* and *actual* utility of a battery-electric vehicle.

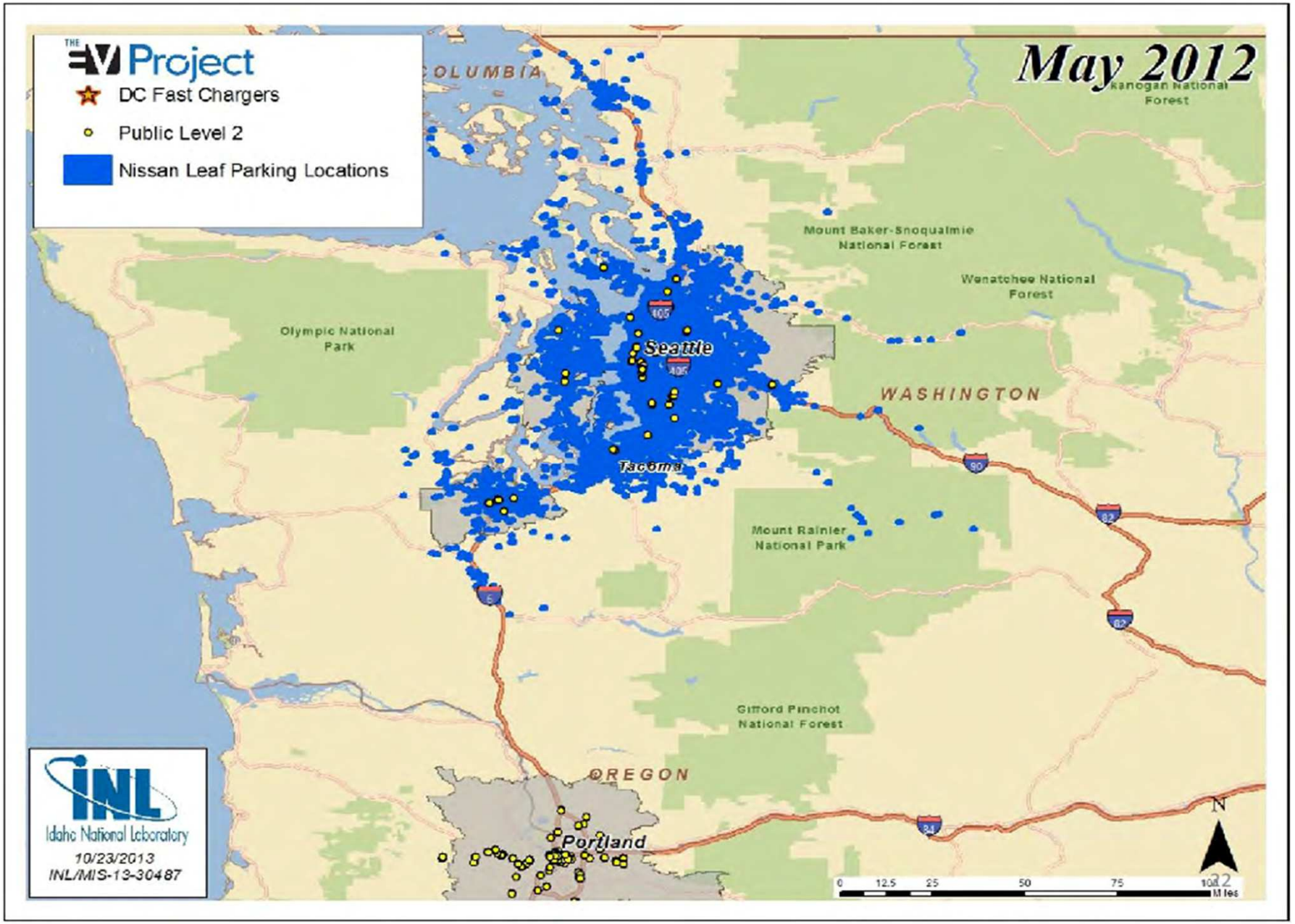
West Coast Electric Highway: Create and promote both the *functional* and *emotional benefits* of having a "safety net" of EV charging opportunities.

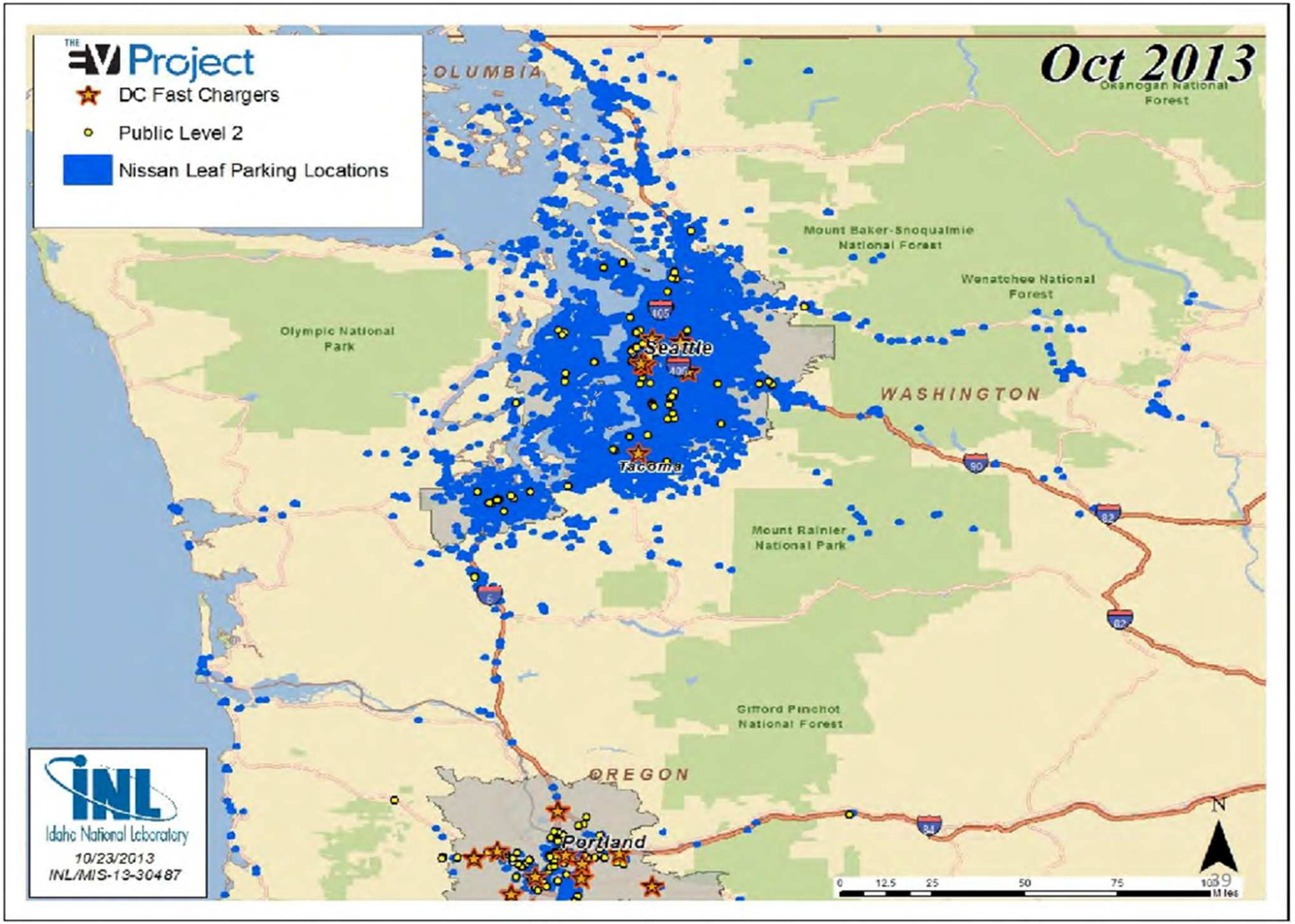
Success Indicators:

- ✓ Longer-distance/interregional trips made in EVs
- ✓ How often DC Fast-Charge stations are used
- ✓ ***Number of EVs sold in the state of Washington***

Success Indicator #1:
Longer-distance / Interregional Trips


THE EV Project
DC Fast Chargers
Public Level 2
Nissan Leaf Parking Locations
May 2011
Okanogan National Forest
Mount Baker-Snoqualmie National Forest
Wenatchee National Forest
Olympic National Park
Seattle
WASHINGTON
Tacoma
Mount Rainier National Park
Gifford Pinchot National Forest
OREGON
Portland
INL
Idaho National Laboratory
10/23/2013
INL/MIS-13-30487
N
0 12.5 25 50 75 100
Miles


THE EV Project
DC Fast Chargers
Public Level 2
Nissan Leaf Parking Locations
May 2012
COLUMBIA
Okanogan National Forest
Mount Baker-Snoqualmie National Forest
Wenatchee National Forest
Olympic National Park
Seattle
WASHINGTON
Tacoma
Mount Rainier National Park
Gifford Pinchot National Forest
OREGON
Portland
INL
Idaho National Laboratory
10/23/2013
INL/MIS-13-30487
N
0 12.5 25 50 75 100
Miles


THE EV Project
DC Fast Chargers
Public Level 2
Nissan Leaf Parking Locations
Oct 2013
COLUMBIA
Okanogan National Forest
Mount Baker-Snoqualmie National Forest
Wenatchee National Forest
Olympic National Park
Seattle
WASHINGTON
Tacoma
Mount Rainier National Park
Gifford Pinchot National Forest
OREGON
Portland
INL
Idaho National Laboratory
10/23/2013
INL/MIS-13-30487
N
0 12.5 25 50 75 100
Miles

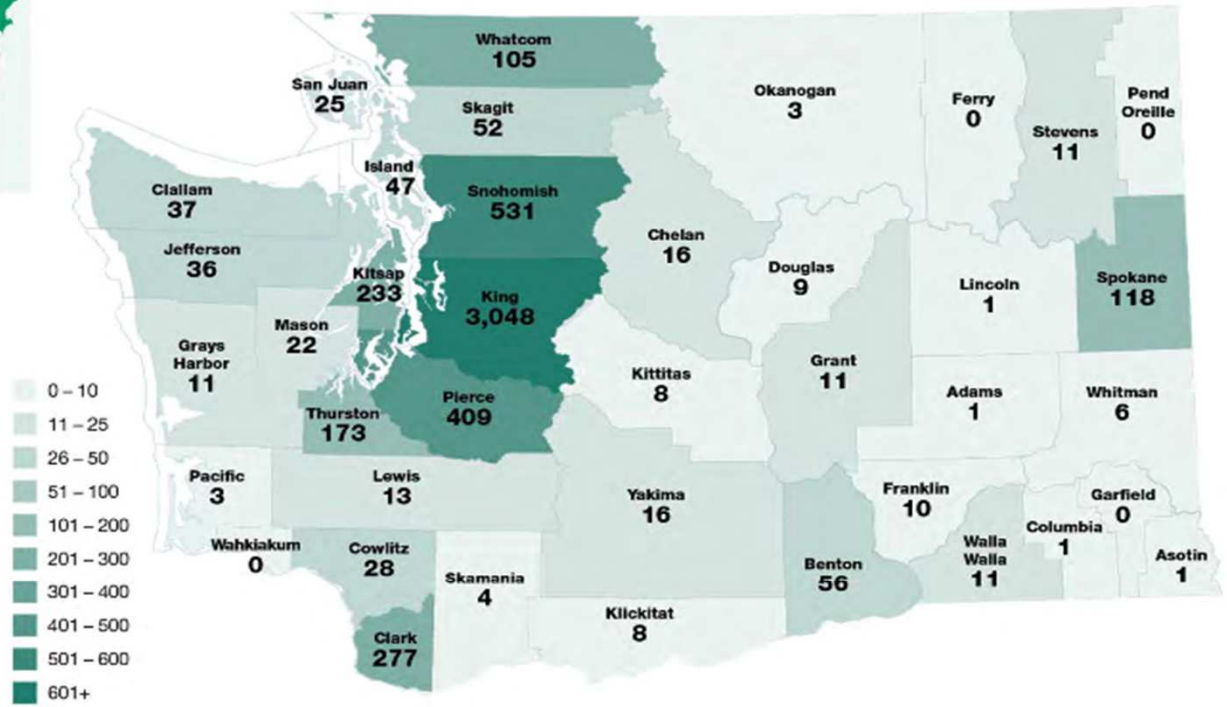
Success Indicator #2: Actual Station Usage

Use of the DC Fast Charge Stations Continues to Grow:

# of Sessions	Population	2012 Avg./Mo	2013 Avg./Mo	%
Bellingham	81,000	54	118.2	**46%**
Burlington	8,400	84.4	125.2	**67%**
Tumwater/Olympia	47,000	86.1	113.6	**76%**
Centralia	16,400	57	74.2	**77%**
Castle Rock	2,100	19.9	51.1	**39%**
Ridgefield	4,800	37.1	33.9	**-9%**
Total I-5 Locations		**67.7**	**103.2**	**66%**

Success Indicator #3: EV sales in Washington

5,000+ newly-registered EVs through July, 2013



New Challenges & Emerging Infrastructure Issues

- When – and how -- will the basic EV charging network be completed?
- What can be done to backfill the Seattle metro area with promised DC Fast-chargers?
- How will EVs with SAE's new Combo plug be supported?
- What is the business model to fund these network improvements?
- And many, many other issues.

Extending the Basic Network to Connect Mid-sized Cities and Regions

Public DC Fast Charger Average Cost: $109,500 - $122,000 USD

Electric utility upgrades & grid interconnection — to $25k (20%)

Construction and equipment installation — $26k (21%)

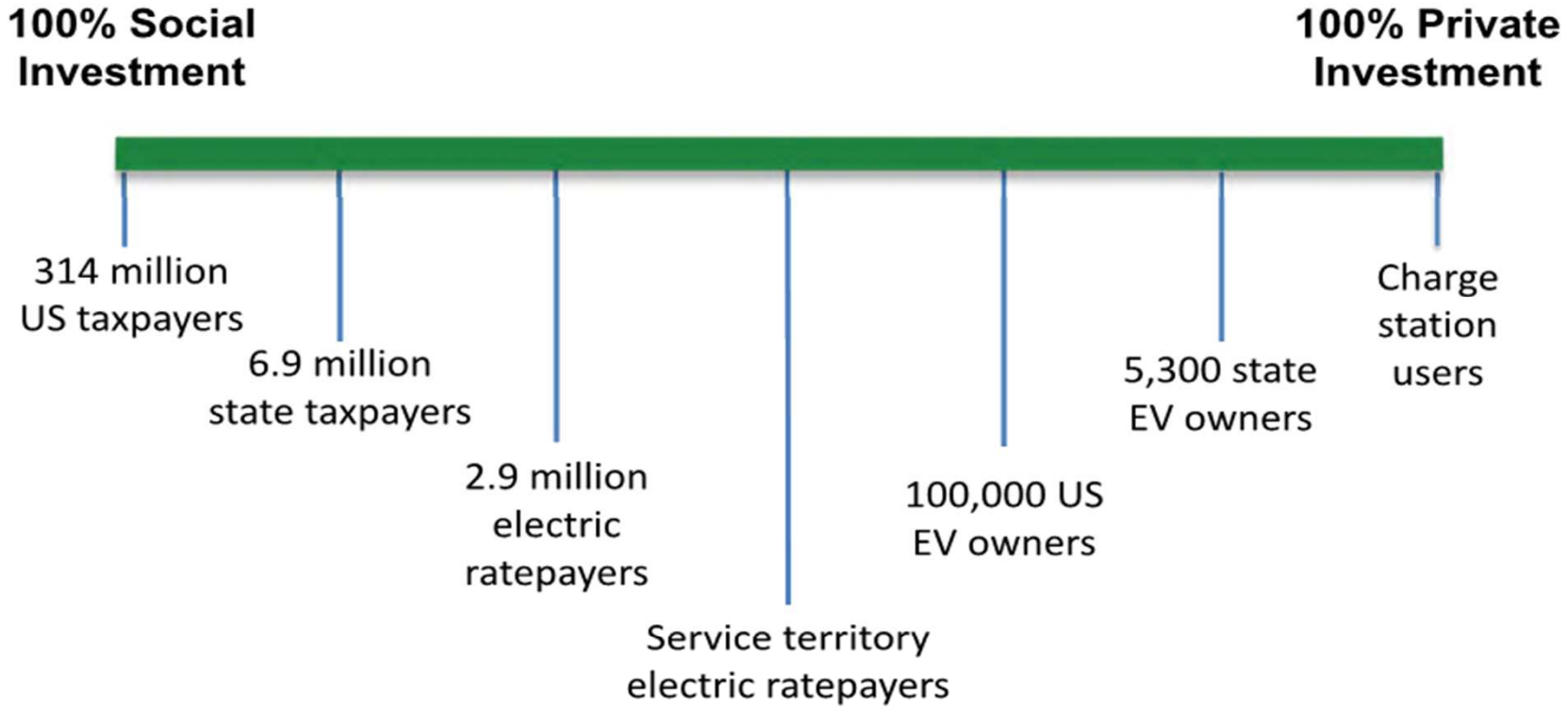
Level 2 Charger — $2.5k (2%)

$58k (47%) — Commercial-grade DC Fast-Charger, networking & safety equipment

$6k (5%) — Lease & property transaction costs

$5k (4%) — Host site identification & screening

Public Charging 2.0 - What is the Business Model?



Even under most optimistic scenarios, no business case for per-use financing approach

Waypoint charging demand is insufficient to be self-financing over 10 years, even assuming aggressive 30% compounded annual growth

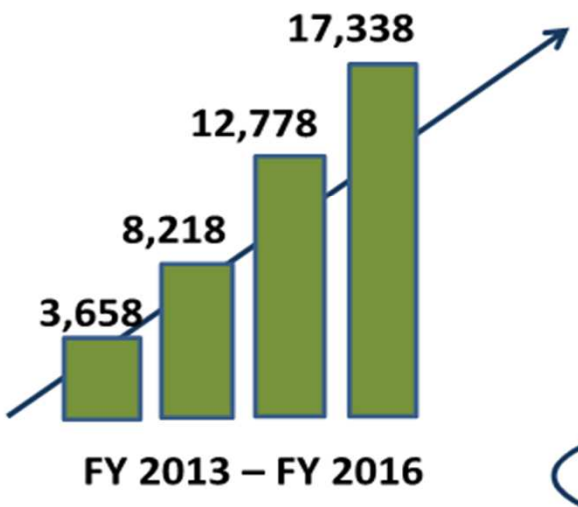
Forecast	Mo. Sessions (Use)	Years to reach capacity	10-Year Total Sessions	10-Year Revenue ($9 fee) less electricity cost	Expansion Locations	10-Year Total Revenue (not Net)
Low	15	10+	7,668	$49,842	13	647,946
Moderate	40	8	17,088	$111,072	4	444,288
Higher	100	5	24,708	$160,602	1	160,602
Total Revenue					18	$1,252,836

Estimated capital cost to install 18 stations to expand Washington's network: $2,196,000 (18 x $122k per station)

Funding shortfall: $943,164 (or 43%)

Strong Business Case for Public Network Expansion Funded by State EV Owners

$30 annual fee paid by *battery-electric* vehicles = $4.7 million over 10 years



35,578 BEVs
(10-year total)

x

$30 paid
annually
(156,944
renewals)

= $4.7 million

Potential Financing Providers:

- Public Sector
- Automakers
- EV Service Providers

Proposed limited-duration: 10 years or until BEVs reach 0.5% of state's passenger vehicle fleet

For more information, contact:

Jeff Doyle
Director
Public/Private Partnerships
Washington State Department of Transportation
(360) 705-7039
DoyleJ@wsdot.wa.gov

WEST COAST ELECTRIC HIGHWAY

www.westcoastelectrichighway.com