

**Public
Utility
Focus**

Building “Good Load” to Reduce Carbon Emissions

Policy frameworks for utilities to drive Transportation Electrification (TE), with benefits to ratepayers, the environment, efficiency, and the grid

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NW Energy Coalition

for a clean and affordable energy future

Scope of TE (more than just sedans)

- Passenger sedans



Battery Electric Vehicle (BEV)



Plug-in Hybrid Electric Vehicle (PHEV)



- Light-duty trucks



BEV +
PHEV
= PEV

- Shuttles / delivery vans
- Industrial equipment (e.g. forklifts)
- Transit buses
- Lawn & garden equipment
- Off-road service vehicles
- Shore power
- Light and heavy rail



Benefit #1 - Grid Utilization & Flexibility

- Greater utilization of existing assets. PNNL study found the NW region could electrify 2.8 million light-duty vehicles without adding any generation or transmission assets, if charging is managed off peak.
- Flexible load. Most vehicles are parked >20 hours a day. Potential alignment with variable renewable generation (e.g. noontime solar, overnight wind), load management (TOU), demand response programs.

Possible vehicle-to-grid integration, storage, grid services.

- Downward pressure on rates – Net new rate revenue from TE benefits all ratepayers:

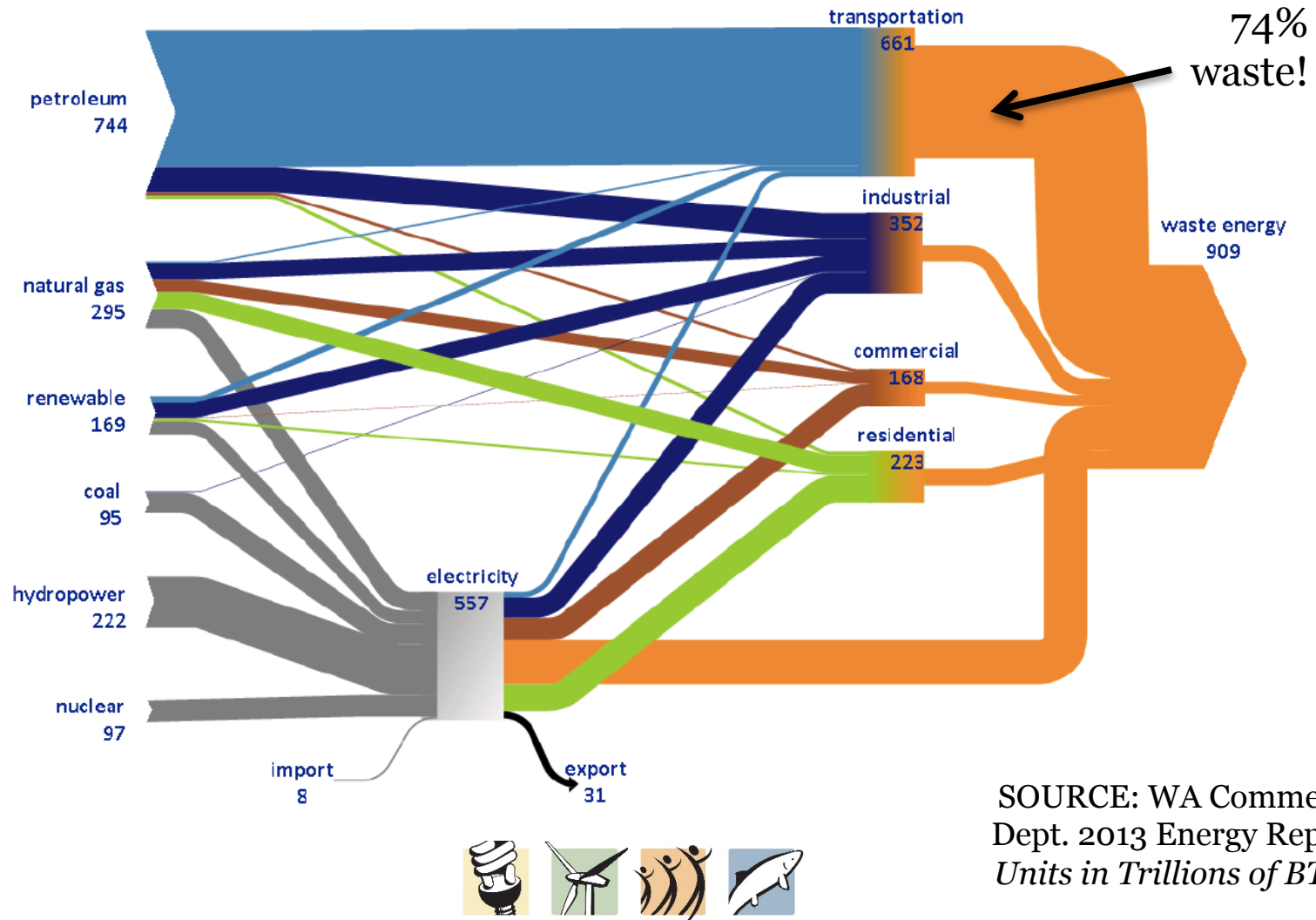
Vehicle Type	RIM Test NPV Benefits Per Vehicle (Lifetime)
Battery Electric Vehicle (BEV)	\$1,250
Transit Bus	\$120,505
Forklift	\$14,668



SOURCE: SCL/E3 "Transportation Electrification" Nov. 2015

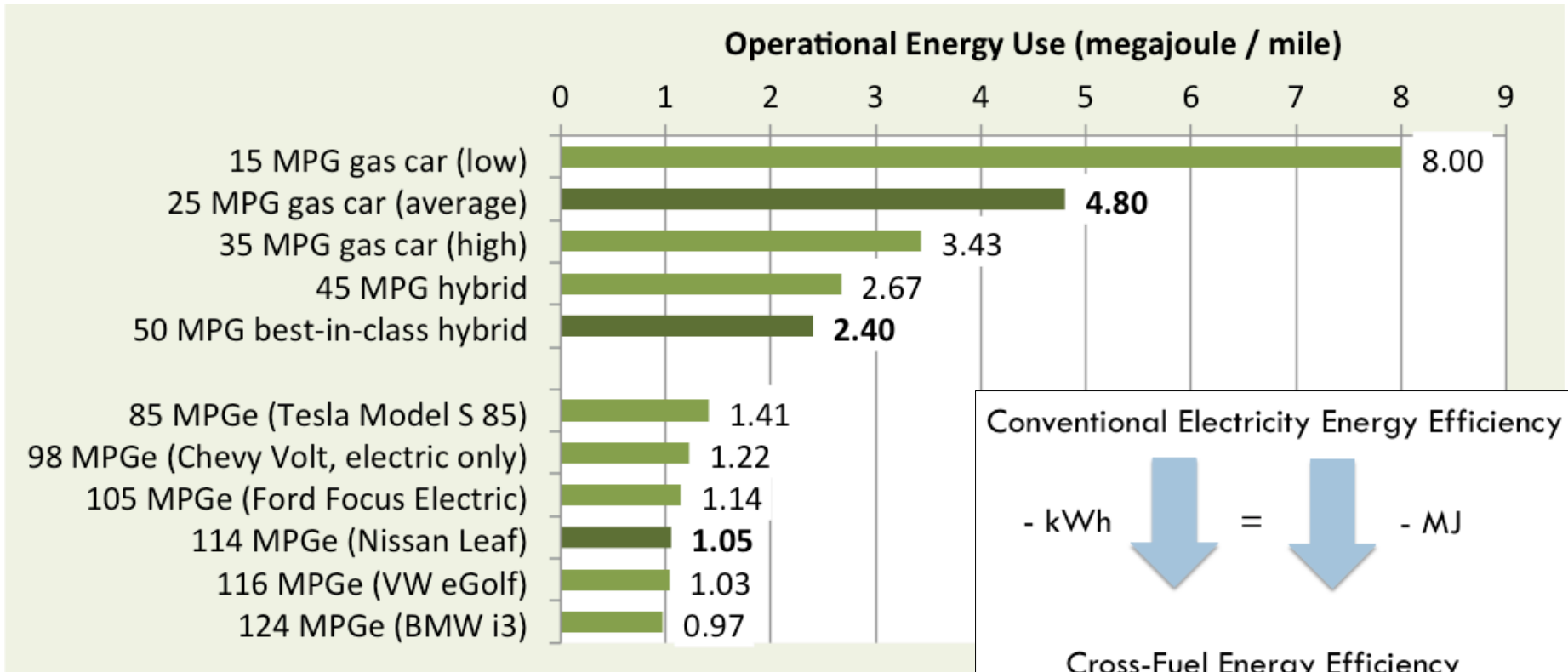
Benefit #2 - Energy Efficiency

Transportation is the most wasteful sector of our economy



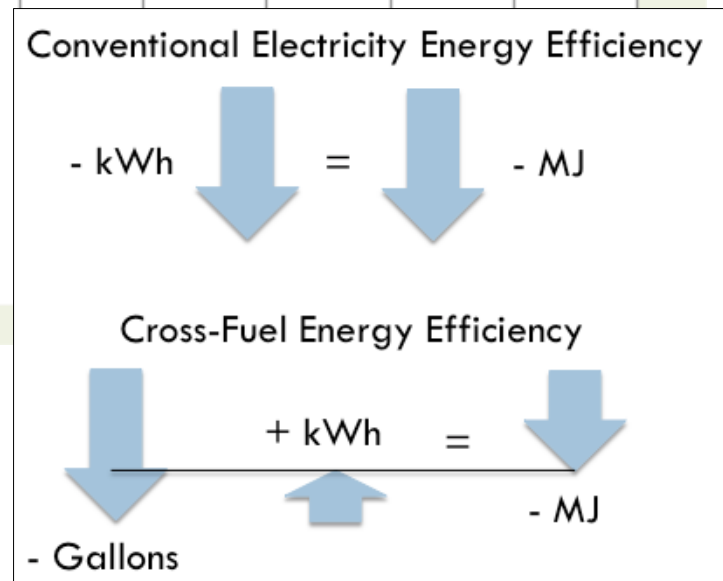
Cross-Fuel Efficiency

The electric motor lowers end-use energy consumption substantially



SOURCE: NWECC calculations using EPA fuel economy

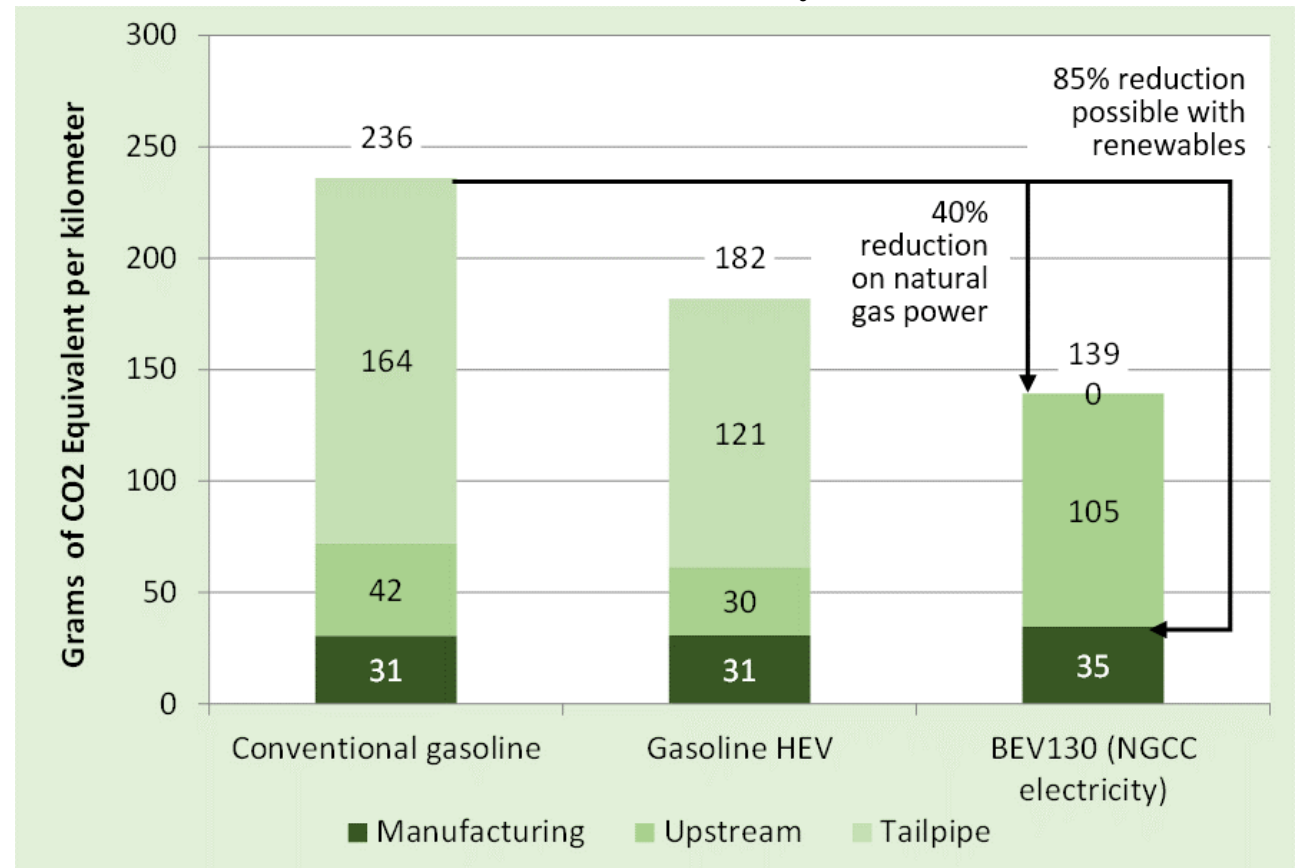
1 gallon \approx 120 megajoules \approx 33.33 kilowatt-hours



Benefit #3 - Much Lower Carbon Emissions

- NW utilities have some of the best emissions performance for transportation with abundant hydropower, wind, etc.
- EPRI/NRDC estimate that it would take a gas car with 251 mpg performance to equal a BEV on Washington and Oregon's grid mix.

Full Lifecycle Emissions (g CO₂e / km)
Conventional Gas Car vs. Hybrid vs. EV



SOURCE: Adapted from Tong *et al*, 2015



Other Benefits

- **Air Quality** – Emission reductions of nitrogen oxides, ozone, fine particulates, all of which impact air quality and human health.
(EPRI/NRDC 2015)
- **Economic Boost** – Macroeconomic studies show that money saved on fueling and spent in pretty much any sector of the economy other than petroleum creates more jobs and economic activity in the local economy. Cost savings and economic gains are similar to gains from EE.
(Berkeley 2012 / Keybridge 2015)
- **Fun!** – EVs have great torque, awesome acceleration, and operate very quietly. Most drivers who try electric never want to go back to a gasser.



IOU-specific legislation

In California and elsewhere, the legal focus has been on IOUs

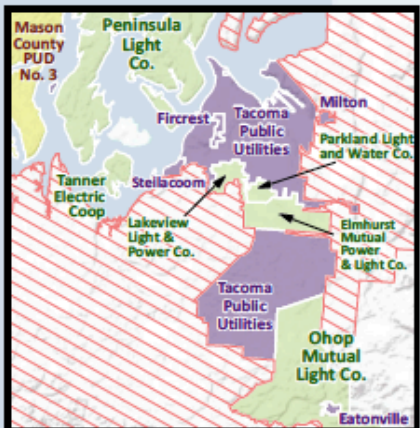
- **Washington HB 1853 (2015)**
 - Allows IOUs to install vehicle charging infrastructure behind the customer meter and earn an incentive rate of return.
 - 0.25% rate impact cap.
 - Avista pilot proposal recently approved by UTC. Many open policy questions remain.
 - Puget Sound Energy?
- **Oregon SB 1547 (2016)**
 - Directs IOUs to achieve advance TE and achieve ratepayer and environmental benefits.
 - Oregon PUC currently in rulemaking.
 - Utilities to file TE plans by 12/31/2016.



BPA PUBLIC, TRIBAL AND IOU CUSTOMERS WASHINGTON STATE



Map Inset





- | | | | |
|---------------------------|-------------------------------------------|----------------------------------|---------------------------------|
| Tribal Reservation | Investor-Owned Utilities
Avista Energy | Tribal Utilities
Yakama Power | Public Utilities
Cooperative |
| Direct Service Industries | PacifiCorp | | People's Utility District |
| Federal Dam | Puget Sound Energy | | Municipality |
| | | | Federal |



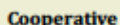
Updated: July 2015

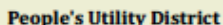
BPA PUBLIC, TRIBAL AND IOU CUSTOMERS OREGON STATE

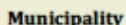
 Tribal Reservation

 Federal Dam

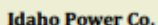
Public Utilities

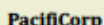
 Cooperative

 People's Utility District

 Municipality

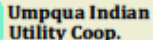
Investor-Owned Utilities

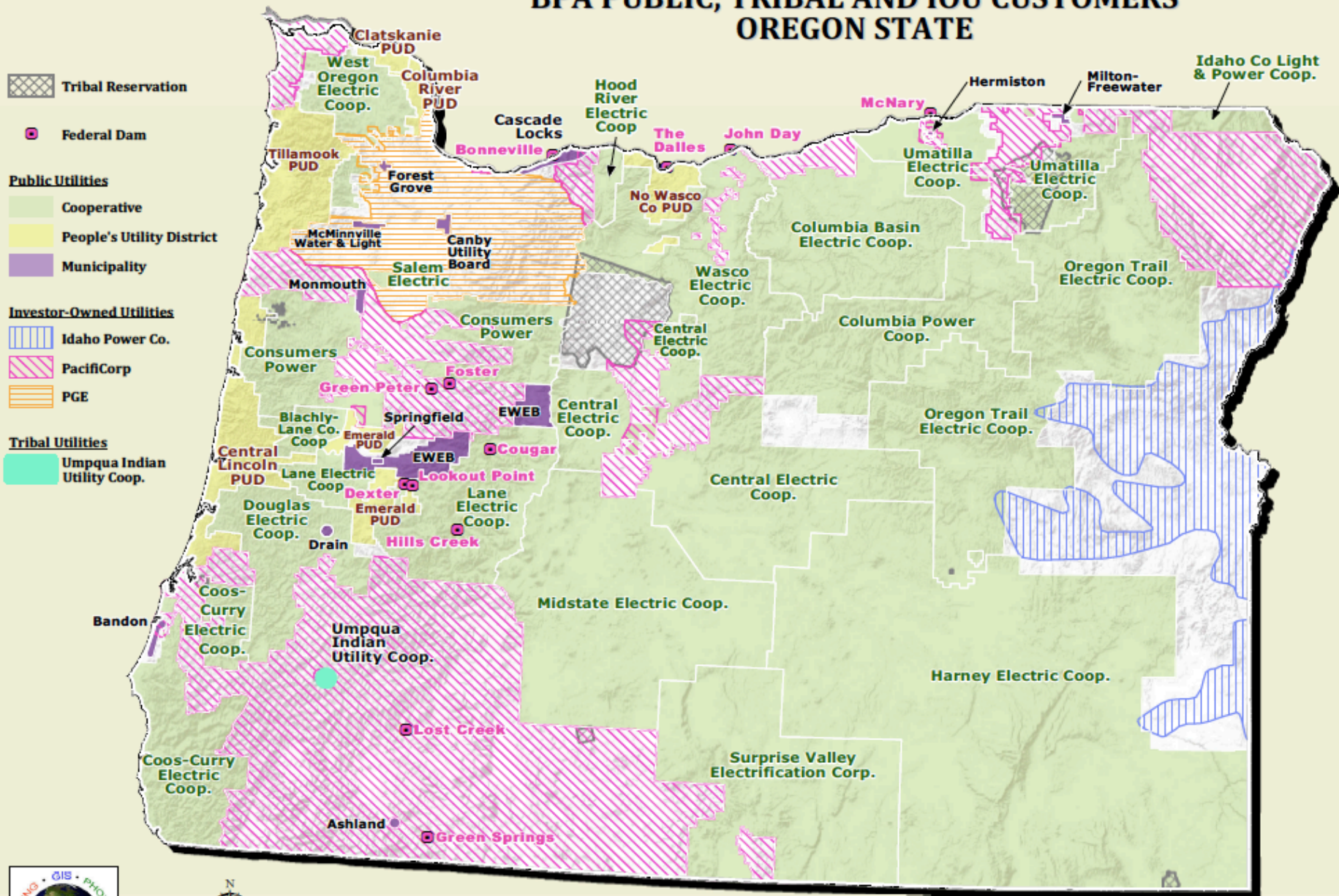
 Idaho Power Co.

 PacifiCorp

 PGE

Tribal Utilities

 Umpqua Indian Utility Coop.



Updated: July 2015

Current COU Program Effort (WA)

- **Informal collaboration group** with cost-benefit case studies underway. Includes Seattle City Light, Tacoma Power, Puget Sound Energy, Chelan PUD, Snohomish PUD.
- **Seattle City Light** – website, educational materials. How-to on installation and permitting. DC Fast installation forthcoming. Residential install program forthcoming (unsubsidized).
- **Benton-Franklin County PUDs** with City of Richland – Pursuing DC Fast charge installation.
- Growing Interest from others (Tacoma Power, Jefferson PUD).



Washington Const. Barriers for Munis

Gift of Public Funds / Lending of Credit

ARTICLE VIII – STATE, COUNTY, AND MUNICIPAL INDEBTEDNESS

SECTION 5 CREDIT NOT TO BE LOANED. The credit of the state shall not, in any manner be given or loaned to, or in aid of, any individual, association, company or corporation.

SECTION 7 CREDIT NOT TO BE LOANED. No county, city, town or other municipal corporation shall hereafter give any money, or property, or loan its money, or credit to or in aid of any individual, association, company or corporation, except for the necessary support of the poor and infirm, or become directly or indirectly the owner of any stock in or bonds of any association, company or corporation.

ARTICLE XI – COUNTY, CITY, AND TOWNSHIP ORGANIZATION. **SECTION 14 PRIVATE USE OF PUBLIC FUNDS PROHIBITED.** The making of profit out of county, city, town, or other public money, or using the same for any purpose not authorized by law, by any officer having the possession or control thereof, shall be a felony, and shall be prosecuted and punished as prescribed by law.



WA has amended its constitution 4 times already for conservation programs

Amendment 70 (1979) – Art. 8 Section 10 RESIDENTIAL ENERGY CONSERVATION – Notwithstanding the provisions of section 7 of this Article, until January 1, 1990 any ... city ... engaged in the sale or distribution of energy may ... use ... operating revenues from the sale of energy to assist the owners of residential structures in financing the acquisition and installation of materials and equipment for the conservation or more efficient use of energy in such structures ...”

Amendment 82 (1988) – Removed expiration date, expanded to all structures.

Amendment 86 (1989) – Added water conservation.

Amendment 91 (1997) – Added stormwater. **Prohibited fuel switching.** “Any financing for energy conservation authorized by this article shall only be used for conservation purposes in existing structures and ***shall not be used for any purpose which results in a conversion from one energy source to another.***”



To Do

- Clarify legal issues for municipals, co-ops and public utility districts.
- Address in law (e.g. [HB 2966](#)) or possibly another constitutional amendment.
- Continue to educate utility staff and leadership on TE benefits and program options.



Ancillary Material



More resources:

- NW Energy Coalition website <http://nwenergy.org>
- Coalition's resolution in support of a greater utility involvement in transportation electrification. <http://bit.ly/1RD4YOU>
- Coalition research paper with additional figures and citations <http://bit.ly/1WaJUkN>
- CalETC utility consortium research on TE approaches, benefits, grid impacts, and ratepayer impacts. <http://www.caletc.com/caletc-research/>
- Avista EV charging proposal docket at WA Utilities & Transportation Commission <http://1.usa.gov/23eXMfW>

Contact:

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206-295-0196



Charging Rates

Charging Mode	Power Rating	Range added	Pros	Cons
Level 1 AC	1.4 kW	4 miles in an hour	Cheap. Works for long dwell times.	Slow. Takes >1 day to fully charge a BEV.
Level 2 AC	3.3, 6.6, 10, or 19.2 kW	12, 20, 35, or 75 miles in an hour	Faster. Standardized.	Expense of charging station and electrical supply. Larger demand.
DC Fast <i>3-phase</i>	24, 50, 100, 150 kW	35, 65, or >100 miles in <30 minutes	Fast. Enables intercity trips.	Very expensive. Standards war (CHAdEMO, CCS, Tesla). Large demand.
Bus Transit on route overhead	Up to 500 kW	>20 mi in about 6 minutes	Enables quick re-fuel at start of route.	Expensive installation. Very large demand.

Key Term: Electric Vehicle Supply Equipment (EVSE)



Toward a policy framework for TE

Multiple states legislated TE policies for utilities in 2015 / 2016.

- **California SB 350**

- Tasks utilities with furthering TE. Writes environmental benefits and efficiency gains into ratepayer interest definition. Tasks utilities with planning for state carbon and air quality goals in their IRPs.

- **Vermont Act 56**

- Creates a rate-funded “energy transformation” program to reduce fossil fuel use by utility customers. Menu of approaches includes charging and vehicle incentives.

- **Washington HB 1853**

- Allows IOUs to install vehicle charging infrastructure behind the customer meter and earn an incentive rate of return, up to a 0.25% rate impact cap. Avista pilot proposal recently approved by UTC. Many open policy questions remain.

- **Oregon SB 1547**

- Directs utilities to achieve ratepayer and environmental benefits with TE programs. Oregon PUC currently in rulemaking. Utilities to file TE plans by 12/31/2016.

