Building "good load" to reduce carbon emissions: Getting Northwest utilities more involved in widespread transportation electrification

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NW Energy Coalition
for a clean and affordable energy future

Executive summary

Many of the earliest cars and trucks on U.S. roads ran on electricity, but petroleum fuel has dominated transportation for most of the 20th century. Within just the past five years, the re-introduction of production-volume battery-electric vehicles has connected the utility sector and the transportation sector in new ways. Opportunities for transportation electrification go beyond passenger vehicles and include city buses, short-haul trucks and vans, shore power for marine vessels, heavy rail, industrial equipment such as forklifts, plus lawn and garden equipment. The Northwest, with its relatively clean and low-cost electricity grid, is uniquely positioned to leverage its electrical assets for transportation. The convergence of the two presents a new opportunity for electric utilities to build "good load" that can deliver a host of societal and utility benefits. These include:

Reduced greenhouse gas emissions – Lifecycle analyses show that EVs have 40% lower emissions than conventional gas vehicles when powered by combined-cycle natural gas electricity, and up to 85% when powered by renewables. Further reductions are possible if the manufacturing phase is also powered with renewables, and Northwest states have some of the best emissions performance in the country from electricity applied to transportation.

Improved air quality – EVs powered by wind, water, solar, and natural gas decrease air toxics emissions by 50% or more compared with conventional gasoline and diesel vehicles. Major air toxics include ozone, fine particulates ($PM_{2.5}$), and nitrogen oxides. These are typically non-point sources of human health impacts near highways and industrial facilities that disproportionately affect low-income populations.

Greater end-use energy efficiency – An EV, powered by an electric motor, is about 60% efficient in translating stored electrical energy into forward motion on the wheels, which is three times as efficient as a car with an internal combustion engine and about twice as efficient as the best hybrid. As a result, EVs consume 70% to 80% less energy per mile traveled. The conservation potentials for this cross-fuel efficiency are easily as large as conservation potentials currently being sought in the electricity sector.

Low and stable operating costs – Driving electric at average Northwest utility prices is equivalent to paying $1.00 per gallon or less, and electricity prices have proven to be far less volatile than gasoline over the years. This can save drivers about $380 per year in fueling costs compared with a hybrid, and about $1,100 per year compared with an average gas car.

Greater energy security – Driving on domestically produced electricity reduces reliance on foreign oil and may reduce involvement in foreign conflicts.

State and regional economic gains – Multiple macroeconomic studies show that money saved on fuel costs gets spent in other sectors of the local economy, producing far more jobs and economic activity than the petroleum sector, which is a relatively poor job creator.

Greater utilization of the electricity grid – Electrical systems operate below maximum capacity for most of any year, so with optimal charging management, particularly in the overnight hours, more than two million vehicles could be electrified without adding new generation assets to the Northwest Power Pool. This has the benefit of spreading utilities' fixed costs over more units, putting downward pressure on rates.

Integration of renewable energy and other grid services – Highly manageable transportation loads may also enable new kinds of grid services and help integrate variable renewable generation resources, particularly overnight when wind generation may exceed current demand.

Transportation electrification will eventually drive new costs for the electric utility sector if plug-in vehicle adoption reaches the truly broad scale needed to meet our emissions reduction targets. New generation assets will be needed to support high levels of adoption, and local distribution systems may require upgrades to accommodate high levels of simultaneous charging. In addition, regulators and policymakers are turning their attention to questions of who pays for charging infrastructure, which can be costly and represents a significant barrier to transportation electrification, particularly in hard-to-serve locations like apartments and condominiums and in low-income areas. Here, retrofits can often run $10,000 - $15,000 to supply power to parking spaces not originally designed for it, or much more if additional power supply to the site is required. Key questions of whether these costs are paid by through private funds, through utility investment, or through other general government funds, including carbon pricing program revenue (e.g. cap & trade), will need to be confronted in each jurisdiction.

Along the way, attention must be paid to questions of equity for low-income consumers, who have generally not been among the early adopters of battery electric vehicles but who could benefit substantially from low-cost transportation options and improved air quality. Additional questions of ratepayer equity on any utility infrastructure investments will need to be addressed.

In 2015, various states, including Washington, California, and Vermont, took legislative action to address transportation electrification, directing their utilities to pursue reductions in fossil fuel use via rate-funded investments in charging infrastructure, among other approaches.

For all these reasons, transportation electrification represents a major new opportunity for the utility sector and a challenge to make good policy. The members of the NW Energy Coalition will play a key role in achieving maximum benefits for the environment (reducing greenhouse gas and air toxics emissions as quickly as possible), for ratepayers (ensuring that all ratepayers benefit from electrification investments), and for low-income communities (providing affordable energy rates and equitable access to low-cost transportation options).

Policy recommendations

To start seizing these opportunities, we recommend:

- Local, state, and federal programs to boost transportation electrification. This is to include charging infrastructure in multi-family and workplace settings, and public charging for "garage orphans" who lack off-street parking.
- Streamlined permitting procedures for charging installation and EV readiness in buildings through strong building codes.
- Clear legal authority for Northwest utilities to participate in the transportation electrification.
- Utility investment in the transportation sector for home, apartment, condominium, workplace, industrial, public, and highway fast charge settings, with attention paid to consumer choice and competitive provision of charging station equipment.
- Policies to ensure low-income access and equity, so that ratepayer benefits are shared broadly. This may include income-targeted vehicle incentives from state and local programs, as well as minimum performance standards for utilities to reach low-income households with charging infrastructure.
- Utility policies and programs that minimize system costs, which may include time-of-use rates or other charge management programs that shift transportation loads to off-peak hours.
- Fair charges and rates for transportation uses that reflect utility system costs but do not present unnecessary hurdles or burdens on users.
- Guarantees that transportation electrification programs will be additional to existing investments in energy efficiency and renewable energy under current law.
- Exploration of potential business cases for utility system benefits from transportation loads, including demand management, vehicle to grid (V2G) integration for grid services, energy storage, and integration of variable renewable energy generation.

Contact information:
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Resolution endorsing a greater utility role in transportation electrification
available at http://www.nwenergy.org/data/EV-Resolution-Adopted-12_4_15.pdf

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