Transportation Electrification Plan

2020

AVISTA

About Avista

Huntington Park, Spokane, Washington

Avista Corporation is an energy company involved in the production, transmission and distribution of energy as well as other energy-related businesses. Its largest subsidiary, Avista Utilities, serves more than 600,000 electric and natural gas customers across 30,000 square miles in eastern Washington, northern Idaho and parts of southern and eastern Oregon.

Avista's legacy begins with the renewable energy we've generated since our founding in 1889, and grows with our mission to improve customers' lives through innovative energy solutions.

Avista – Better Energy for Life!

Front Cover – Avista's first DC fast charging site installation in partnership with the Town of Rosalia, Washington

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Spokane Transit Authority
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Town of Rosalia
Transitions for Women
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Washington Trust Bank
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Whitworth University

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Our vision: better energy for life!

Imagine an electrifying future . . .

By the year 2045, renewable and clean energy sources power the electric grid and a vibrant modern economy, including the transportation sector. Whether moving people or goods on the road, off the road, by rail, in the air, or over water, clean electricity makes it happen. The majority of transportation is electrified and the use of fossil fuels is no longer dominant. Customers have new and exciting transportation choices. Major economic benefits of over $1 billion per year in fuel and maintenance cost savings are realized in the local economies served by Avista. This is accomplished while eliminating more than 80% of harmful air pollution and greenhouse gas emissions from transportation—formerly the largest source of emissions in the region.

Avista's Noxon Rapids Hydroelectric Generation Plant
– 562 MW of Clean Hydropower –

In this exciting future, transportation accounts for over 20% of utility electric load and revenue, helping to pay for fixed grid costs and keeping rates low for all customers. A combination of cost-effective load management and transfer technologies, energy storage, and price signals act to optimally integrate flexible transportation loads with the grid—including a wide array of new distributed energy resources. This reduces peak loads on the system, provides for better grid resiliency, and maximizes the use of renewable energy sources.

EVs Fueling Up with Clean Energy – The Future is Electric !

Autonomous electric transportation has also revolutionized the way we move people and goods, dramatically increasing vehicle and equipment utilization, driving down transportation costs, freeing up people's time, and saving thousands of human lives and serious injuries every year.

The vehicles themselves are integral parts of a new age in communications and connection, opening the door to a wide variety of new products and services that improve people's lives.

In just 25 years, an amazing transformation has occurred—the transportation sector has converged with the energy and information technology sectors—fundamentally changing the way we live our lives and making the world a better place. Avista has played a key role in this transformation, working over several decades with industry partners, policymakers and regulators, community leaders, and customers to innovate and create a better energy future for all.

Executive Summary

Guided by our vision of a better energy future, Avista's Transportation Electrification Plan (TEP) details strategy and planned activities in the service areas of Washington and Idaho, with an emphasis on near-term actions from 2021 through 2025. Avista's strategic approach is informed by industry and customer research; the current landscape of policy, technology and market forces; projected impacts on the economy, the environment and the grid; and the valuable experience gained through the Electric Vehicle Supply Equipment (EVSE) pilot launched in 2016.

Today, driving a passenger EV fueled by Avista's electricity results in zero tailpipe emissions, causes total CO_2 emissions reductions of 80%, costs less than an equivalent $1 per gallon of gasoline to fuel, and saves $300 per year in maintenance expenses.[1]

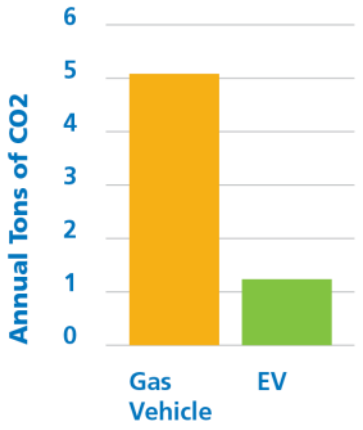
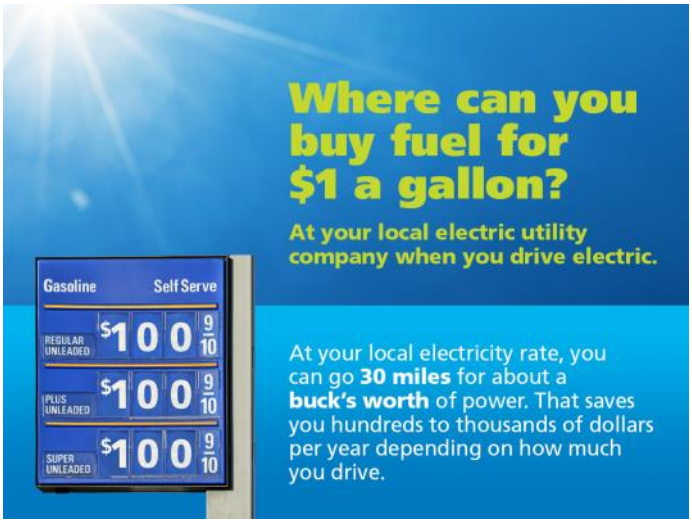


Figure 1: EVs using Avista's electricity reduce emissions by 80%

If all light-duty vehicles were electric, this would result in regional savings of over $1 billion per year—creating a powerful ripple effect for the economy—and avoiding annual emissions of 2.5 million tons of CO_2. Other electrified transportation beyond light-duty passenger vehicles would result in even greater reduced emissions and operational savings.

In addition, electric transportation provides grid benefits for all utility customers, in the form of net revenue that helps pay for fixed system costs. In 2025, over 6,800 EVs in Washington and Idaho service territories are expected to provide Avista with gross revenue of $2.1 million from EV charging. Subtracting an estimated $0.5 million in marginal utility costs to generate and deliver this energy results in $1.6 million in net revenue—savings which may be passed along to all utility customers in the form of decreased rate pressure. This is just the beginning. With over one million registered vehicles in the region, consider the enormous customer savings and grid benefits that a high percentage of EVs would provide, especially when charging is optimally done during off-peak times of the day and night.



[1] Estimates assume Avista's current mix of electric generation sources, 3.3 miles/kWh and $0.11/kWh for EVs, and $3/gallon, 26 mpg for conventional vehicles.

EV charging loads are very flexible, as 80% or more of EV charging may occur while the vehicle is parked at work during the day and at home overnight. In the future, the greatest benefits may be realized by capitalizing on this flexibility, charging EVs when renewable energy resources such as solar and wind are abundant. For example, EVs could utilize more solar power on the system during the day and in the summer, as well as more wind power when it is typically more available at night and during the winter. In this way, EVs could help maximize the integration and use of an increasing amount of renewable resources on the grid.

In other words, electric transportation can benefit all customers and society as a whole—not just those using EVs and other forms of electrified transportation equipment—by using a cheaper and cleaner fuel, more efficiently utilizing grid infrastructure, and integrating renewable power resources that energize a healthy and more sustainable economy.

Policy, Technology and Market Landscape

Given these realities, policy support for electric transportation is strong and expected to grow with increasing climate concerns caused by greenhouse gas emissions, the recognition that transportation accounts for nearly half of all emissions in the Pacific Northwest, and that major economic benefits may be realized over the long term as the transportation sector is electrified.

While adoption forecasts are subject to uncertainty, it is clear that a major transition from fossil fuels to electrically powered transportation is underway on a broad, global scale. This is currently led by China, followed by Europe as shown in the charts below.

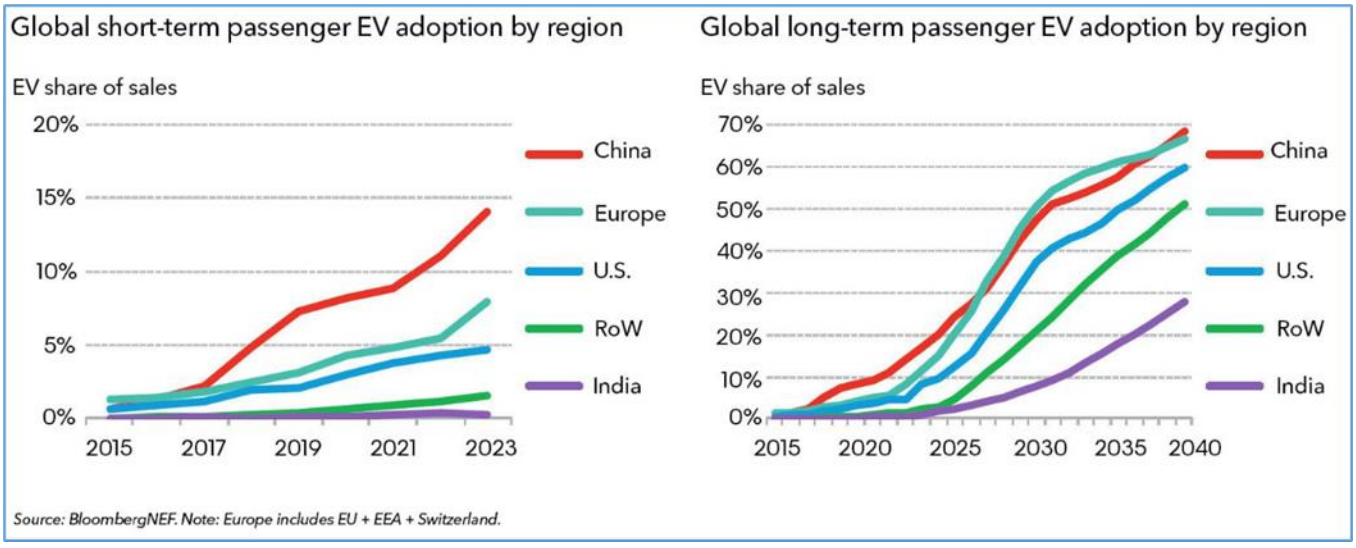


Figure 2: Global EV adoption forecasts (Bloomberg New Energy Finance, EV Outlook, 2019)

Technical advances and industry investments of over $362 billion annually[2] indicate that EV performance, features and costs will continue to improve, perhaps reaching purchase cost parity with conventional vehicles by 2025 without subsidies.[3]

In the U.S., EV sales have grown considerably for many years but contracted by 9% in 2019, compared to an overall decline in light-duty vehicle sales of 2%. Most recently, the COVID-19 pandemic has dramatically reduced overall auto sales in 2020 and may continue to reduce EV demand well into 2021. While this presents considerable uncertainty in the near term, sales are likely to rebound as new EVs are introduced in the 2021—2022 timeframe and the used market provides more affordable EVs to a growing number of people. Tesla continues to dominate new EV sales in the U.S., and its announcement of the Model Y production ahead of schedule in 2020 is likely to further boost EV sales.

Annual EV registrations in Avista's eastern Washington service area grew by 23% in 2015, improving each year since then and reaching 50% in 2019, surpassing the state average, and correlating with support from the EVSE Pilot. However, EVs represent less than 2% of annual fleet turnover in the region and are still in the very early stages of market growth.

Product and investment commitments announced by major automakers including Ford, GM and VW, as well as the rise of Tesla and startups such as Rivian, indicate that we can expect a growing number of electrified truck, SUV and crossover model introductions over the next several years. Trucks and SUVs accounted for a record 69% of light-duty U.S. sales in 2019, and these vehicle types dominate sales in Avista's service territory; they are key to making serious inroads into the mass market.

Even with major commitments and deliveries made good by the automotive industry, it will most likely take several years to significantly raise vehicle availability and inventory levels at price points needed to achieve substantial momentum and market transformation. Furthermore, Avista serves a customer base with relatively lower personal incomes and more rural geographies with smaller population densities. This may continue to dampen EV adoption in the Company's service territories.

In consideration of all these factors, we expect light-duty EV growth in our region to continue, with steady but gradual improvement for three to four years, followed by relatively strong growth starting in the 2023–2024 timeframe. This presents a limited window of just a few years to solidify a foundation of supporting infrastructure and programs which will need to be in place to enable accelerated growth starting as early as 2023.

Beyond light-duty passenger EVs used for household and commercial fleets, the first deployments of mass transit buses powered by electric batteries are scheduled in 2021 by two transit agencies served by Avista. An excellent opportunity also exists today to support the local adoption of electrified lift truck (forklift) equipment, resulting in swift paybacks on investment in terms of emissions reductions, customer transportation savings and beneficial utility revenue.

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[2] Atlas EV Hub, see www.atlasevhub.com

[3] "When Will Electric Vehicles Be Cheaper than Conventional Vehicles?" Bloomberg New Energy Finance (2018).

Table 1: Overall light-duty fleet and EVs in Avista's electric service area (2019)[4]

	Population in Electric Service Area	Registered Light-Duty Vehicle Fleet	Annual Fleet Growth (2%)	Annual Fleet Turnover (7%)	Total EV Registrations in Service Area	% of Fleet on Road	Estimated New EV Registrations (2020)	% of Fleet Turnover/ Sales
Washington	676,746	512,297	13,535	35,861	1,331	0.3%	481	1.3%
Idaho	321,415	243,311	6,428	17,032	409	0.2%	143	0.8%
Total	998,161	755,608	19,963	52,893	1,740	0.2%	624	1.2%

Other commercial opportunities are expected to become more viable over time, such as commercial delivery vehicles, school buses, airport ground support equipment, truck stop and refrigerated freight electrification, and electrified agricultural equipment. Over the longer term, advanced technologies such as vehicles connected to homes, buildings and the grid (V2X); transactive energy systems; rail, marine and aircraft electrification; “last mile” or micro-mobility innovations; hydrogen powered EVs and electrified autonomous vehicles (AVs) could further and dramatically alter both utility grid management and the transportation sector.

Avista’s Electric Vehicle Supply Equipment (EVSE) Pilot

At a minimum, the electric utility has an obligation to prepare for the future of electric transportation, ensuring good stewardship of grid assets, public service and safety levels. It also has a historic opportunity to serve its customers in new and better ways for the long term, realizing major economic and environmental benefits. In this context, the Company carried out its Electric Vehicle Supply Equipment (EVSE) pilot from 2016 through 2019, seeking to understand costs, benefits and impacts of EVs; explore customer needs; test utility program models; and begin supporting beneficial EV adoption. This direct experience along with ongoing research and customer feedback has positioned the Company to propose informed strategies and programs as outlined in this Plan.

Among many things, the EVSE pilot demonstrated cost-effective utility programs that were well received by customers and correlated with significantly increased adoption rates. It also highlighted the value of workplace charging, a need for more public charging infrastructure, and industry improvements in networked charger costs and reliability.

Public charger in partnership with the City of Liberty Lake (2017)

Modeling and analysis showed that load growth from EVs provides net benefits to all grid customers, and that new electric loads from transportation should be manageable over the next decade. It also showed the importance of developing cost-effective load management capabilities over the longer term, as this can provide additional net benefits and will become increasingly important at higher adoption levels beyond 2030.

Given that 70% or more of EV charging is expected to occur at residential locations, one key to maximizing benefits at scale is to shift this peak load as much as possible to off-peak times of the day and night—when energy is more abundant and less expensive to acquire. Eventually at high adoption levels above 30%, coincidence factors could also play a role in driving up distribution costs associated with local transformers, feeders, and perhaps even substations unless this peak load is shifted to off-peak.

The following chart shows a detailed load profile from residential charging data collected over the course of the pilot. Demonstrating charging for the average EV on the system, it illustrates how peak loads are much

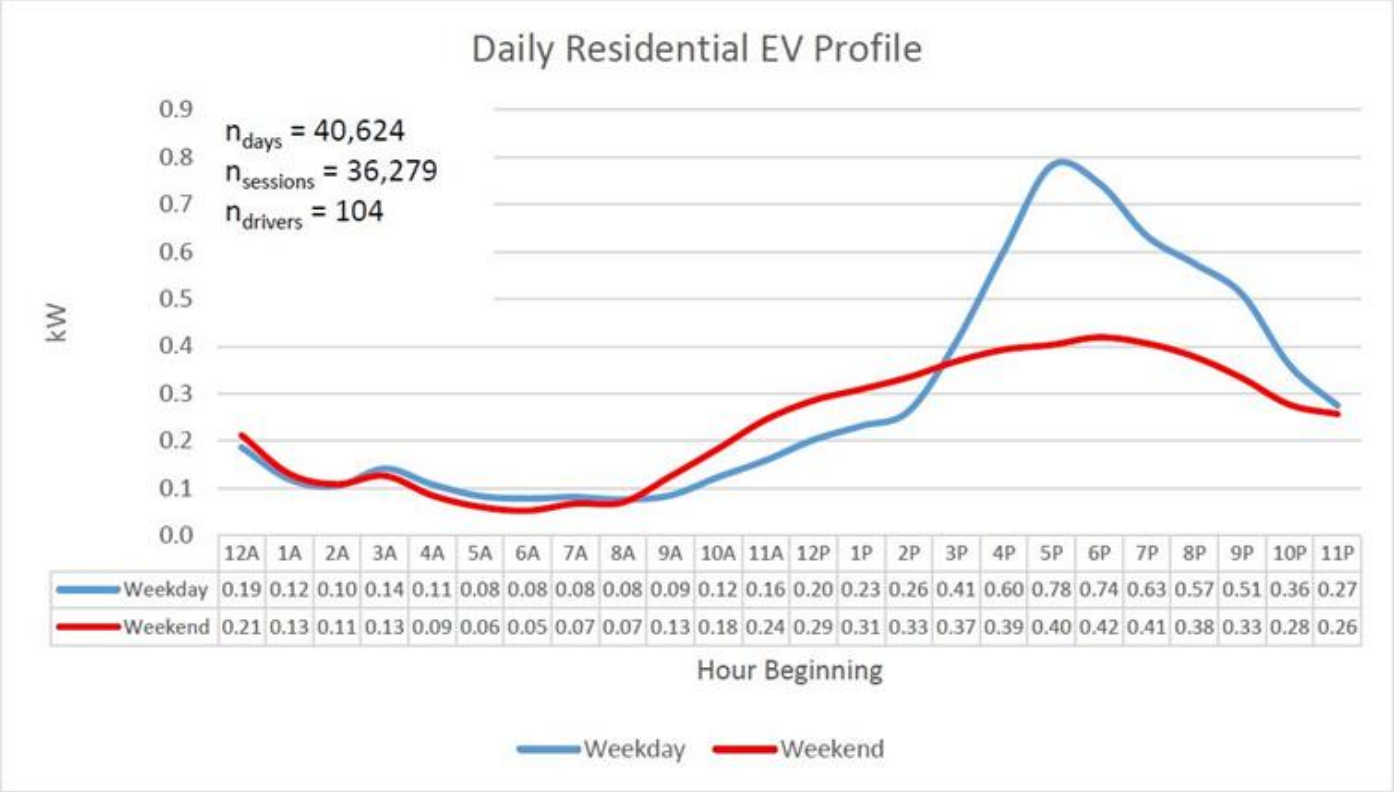


Figure 3: Average daily load profile for residential charging (EVSE Pilot data, 2016—2019)

higher on weekdays and typically occur between 5 pm and 6 pm throughout the week, coinciding with peak loads on the grid year-round.

Utility Role, Strategy and Objectives

Strategically, Avista will adopt a flexible and adaptive approach, align with policy guidance,[5] partner with industry experts and other key stakeholders, facilitate healthy market competition, improvements, interoperable industry standards, and enable direct benefits for disadvantaged communities and customers. Efforts will focus on supporting cost-effective new customer choices in a variety of transportation market segments over the next several decades.

This begins with appropriate utility support that enables and accelerates sustained entry into the mass market for light-duty EVs by 2030 or earlier, depending on the strength of products and other factors enabling mass adoption. While staying abreast of changing technologies and market conditions, utility programs will focus on overcoming critical barriers of adequate charging infrastructure and customer awareness, which Avista is uniquely positioned to address. In addition, these programs are intended to establish a foundation for load management and maximum off-peak charging at scale, which optimally integrates with the grid over the long term.

Activities and funding levels are flexibly designed in the TEP to match technology and market conditions, transitioning from moderate to strong levels of utility support in earlier phases, to more regular and enabling programs as different market segments sustainably enter the mass market and the industry matures and scales in later phases.

[5] Policy and Interpretive Statement Concerning Commission Regulation of Electric Vehicle Charging Services." Washington Utilities and Transportation Commission, Docket UE-160799 (2017).

Guiding Principles

- Flexible, adaptive approach to changing market conditions and different market segments
- Early utility role supports healthy market growth and grid integration, ensuring net benefits for all utility customers over the long term
- Plan and programs align with legislative and regulatory policy
- Program focus areas: EVSE infrastructure, customer education and outreach, community and low-income support, fleet support, and grid integration/ load management
- Utility programs support healthy market competition, innovation and interoperable industry standards
- Customer-centric, high-satisfaction program results; provide objective information and choices that enable informed customer decisions
- Cost-effective, integrated management across all programs and activities
- Regular updates to load profiles and forecasts for utility Systems Planning and the Integrated Resource Plan (IRP)
- “Walk the talk” with effective utility fleet electrification, facility EVSE and employee engagement programs
- Partner and collaborate with key stakeholders

Much is dependent on the vehicles provided by original equipment manufacturers (OEMs) in terms of price, functionality, variety and availability, of which the utility has little influence. Given this reality, Avista's programs and activity levels will scale up from baseline support levels starting in 2021 to stronger support coinciding with improved market conditions expected in the 2023-2024 timeframe when more competitive products are widely available, including light-duty trucks and SUVs. In the near term, Avista will consider ways to effectively raise awareness levels, improve the availability of EVs in the area, and work with stakeholders to build out the EVSE infrastructure that will be needed by 2025.

In other words, a solid foundation must be set in place starting today, in order to enable strong growth in the future.

Eventually, as EVs begin to make sustained entry in the mass market (at roughly 15% of total vehicle sales each year), certain education and outreach programs may no longer be necessary. Beyond this point, utility infrastructure and load management programs could play an ongoing, enabling function that is fully integrated with day-to-day utility operations. To illustrate, three plausible adoption scenarios for light-duty EVs are shown in the chart below, corresponding to OEM product levels matched with appropriate utility support programs. Note the anticipated points of sustained entry in the mass market by 2030 for the"Baseline" adoption scenario, and in 2027 for the "High" adoption scenario.

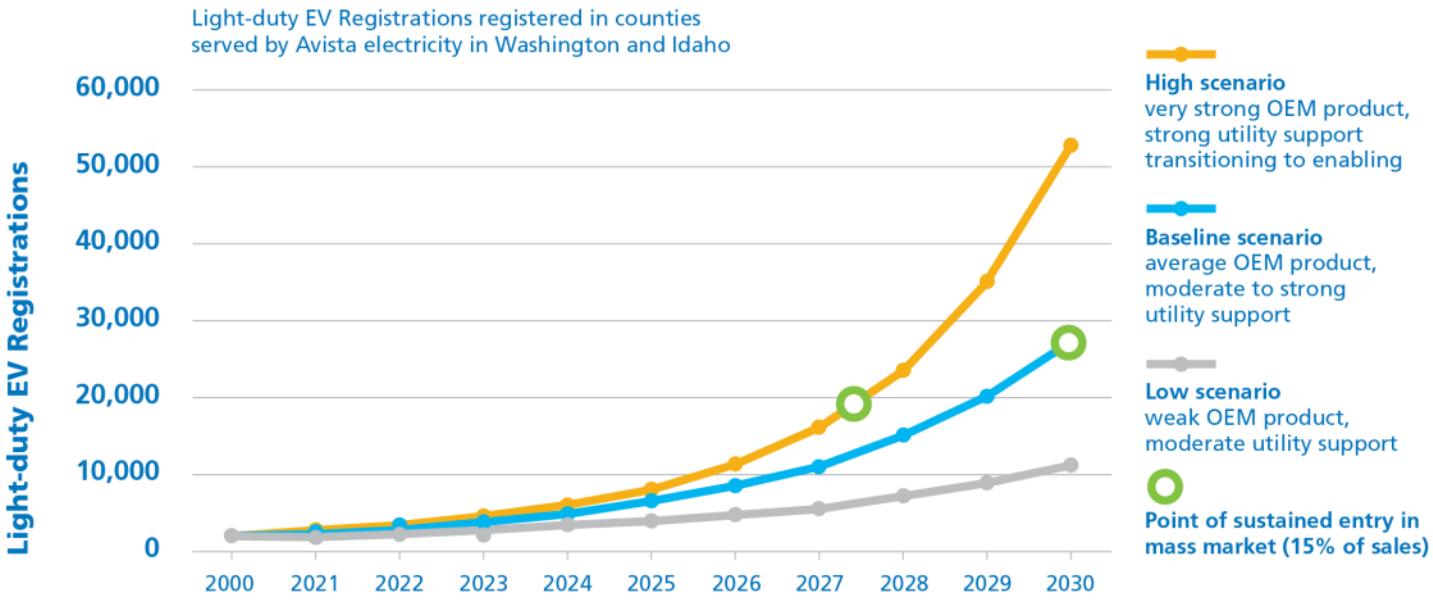


Figure 4: Light duty EV adoption forecasts for registered light-duty vehicles in Avista's service territory; sources include Washington and Idaho registration data; Bloomberg New Energy Finance Electric Vehicle Outlook, 2019; "Economic & Grid Impacts of Electric Vehicle Adoption in Washington & Oregon." Energy and Environmental Economics (2017).

Strategic Objectives and Goals

1. **Achieve sustained entry in the mass market for light-duty EVs**
   - **> 15% of annual vehicle sales by 2030 or earlier**
   - **Install EVSE needed by 2025 for rapid market growth, owned and maintained by Avista and third parties**
   - **Maintain EVSE uptime > 99%**
   - **By 2025, raise positive awareness of EVs by 500%**
2. **Support electrification of commercial and public fleets**
   - **Implement a commercial EV time-of-use (TOU) rate starting in 2021**
   - **Invest in "make-ready" utility upgrades**
   - **Deploy and expand fleet support programs, starting with lift trucks and light-duty passenger vehicles in 2021**
3. **Meet aspirational goal of 30% overall spending on programs benefiting disadvantaged communities and low-income customers**
4. **By 2025, achieve net benefits from load management and EV TOU rates with > 50% reduction of EV peak load**
5. **Monitor new technologies and markets; implement pilot projects starting with mass transit and school buses in 2022-2023**
6. **Expand utility fleet electrification with 5% or more of annual fleet budgets, install EVSE at Avista facilities and by 2025 raise employee EV adoption 300%**

A flexible, adaptive utility approach is replicated in other emerging market segments, such as initiating a fleet support program for lift trucks in the near term, followed by anticipated opportunities that arise with freight delivery vehicles, school buses and other applications in ensuing years. In the early stages of each market segment, pilot programs may be explored. For example, the value of greater community resiliency in the event of severe weather events could be tested in a pilot project, using schools with on-site renewable power generation and electrified buses providing emergency energy storage.

The utility must also monitor technology and market developments, and over the longer term investigate and support emerging opportunities including electric micro-mobility innovations, vehicle-to-home or vehicle-to-building (V2H/V2B) as backup power, vehicle-to-grid (V2G) bi-directional power transfer, open software platforms enabling broad energy transactions, rail and aircraft applications, marine transport, hydrogen-powered EVs, and electrified autonomous vehicles.

In summary, the Plan's strategic objectives and goals follow from the Company's aspiring vision, direct experience through the EVSE pilot, and a realistic assessment of technology and market trajectories. Programs and activities planned for the 2021–2025 timeframe are briefly described below, designed to meet these strategic objectives and set the foundation for beneficial electric transportation growth for the long term. More details are provided in respective sections of this Plan, supplemented by information in Appendices.

EVSE Infrastructure and Maintenance

The utility is in a unique position to install EVSE infrastructure that will be needed by a growing EV market, in a way that is most cost effective for the public interest and supports off-peak charging over the long term. Charging infrastructure for public DC fast charging (DCFC), workplace charging and fleets is a top priority, followed by public AC Level 2. Workplace, fleet, MUD and residential charging programs are essential to support early EV adoption and may be leveraged to enable load management and reduced on-peak loads from EVs.

A portfolio of proposed programs support both Avista and third-party EVSE ownership, off-peak charging and customer choice through proven cost-effective methods, "make-ready" options, load management and a pilot EV TOU rate for commercial customers. Ideally, third-party EVSE ownership makes up 50% or more of all EVSE in the marketplace through 2025. The coordinated buildout of EVSE is also intended to foster healthy market competition and growth among EVSE and electric vehicle service providers (EVSPs).

DCFC site in partnership with Gonzaga University, in the Spokane U-District (2019)

Based on anticipated market needs, a coordinated public DCFC buildout of 60 DCFC sites in the region by 2025 will be prioritized through a deliberate process involving key stakeholders. This includes DCFC sites within 40 miles along all major travel corridors, as well as high-traffic and key destination locations within more populated areas. Avista will endeavor to install, own and maintain up to 50% of the anticipated market need, or 30 DCFC sites, by 2025. A "make-ready" utility extension policy and pilot EV TOU rate schedule will be applied at DCFC sites to encourage off-peak charging and third-party ownership to the greatest extent possible, ideally meeting or exceeding 30 DCFC sites by 2025.

Public AC Level 2 sites will be built out per stakeholder review and selection at up to 10 sites per year in the region.[6] AC Level 2 EVSE for workplace, fleet, MUD and residential use will be completed on a first-come, first-serve basis subject to eligibility requirements and program limitations. Avista will own and maintain EVSE

[6] Additional public AC Level 2 sites may be installed under Community and Low-Income programs.

assets, covering direct installation costs and 50% of premises wiring installation costs up to $2,000 per port for commercial installations and $1,000 for residential installations. In the future, equipment lease and/or rebate programs may also be considered for customer-owned EVSE, and coverage of premises wiring costs may be reduced as the market improves and effective load management programs are well established. Customer site agreements will include enrollment in load management programs and future TOU rates, so that off-peak charging and net benefits for all customers may be maximized over the long term.

EVSE maintenance and uptime at 99% or greater is an important priority—a high performance level that Avista will work to achieve and maintain in collaboration with industry partners.

Education and Outreach

Raising awareness through effective Education and Outreach activities is also of great importance to accelerate market adoption. Avista will engage with stakeholders in a number of activities, by 2025 raising customers' positive EV awareness by 500%. This includes a $250 dealer referral, EV education and awareness campaigns, and support for peer-to-peer interest groups and transportation network companies (TNCs). The Company will also maintain online information and tools, customer call center assistance, and support for local ride-and-drive events.

In addition, Avista will consider new and innovative ways to raise positive awareness and EV availability, such as with informational kiosks, training and certification programs at auto dealerships, and partnering to establish an innovative EV Experience Center delivering effective information and education, charging availability, and EV rental and purchase services.

Community and Low-Income Support

Avista is committed to help provide benefits from electric transportation to disadvantaged communities and low-income customers, in collaboration with other service organizations and community leaders. An aspirational goal of up to 30% of overall electric transportation funding will be applied to this program category, subject to practical limitations of the market and viable, cost-effective technologies.[7] The EVSE pilot demonstrated a successful model that will be expanded upon, providing EV and EVSE assistance for community organizations that serve the disadvantaged, through a collaborative process and competitive proposal selections. In addition, Avista will provide additional EVSE installation assistance for low-income rural towns, multi-unit dwellings, and residential customers receiving low-income bill assistance.

New pilot programs may be developed with public transit agencies and TNC platforms, as well as partnerships with organizations such as Envoy to pilot ride-sharing and car-sharing services for disadvantaged groups.

Commercial and Public Fleets

Opportunities to support electric transportation in commercial and public fleets exist today and will grow in the future. Avista can begin to effectively support this growth. This starts with information, tools and consulting services for light-duty passenger EVs and electric lift trucks (forklifts) in 2021, followed by commercial delivery vehicles, airport ground-support equipment, and refrigerated trailer units in subsequent years. A pilot EV TOU rate for commercial customers and "make-ready" utility investments will further support electric fleet expansion.

Electric forklifts — transportation electrification includes the movement of both people and goods

[7] See UTC docket UE-190334, et. al, Partial Multiparty Settlement Stipulation, pp. 11-12.

A new program supporting lift trucks is modeled after other successful utility programs in the U.S. The program provides information resources, incentives of $2,000 to buyers, $250 to dealers, and an additional incentive of $1,000 for lithium-ion batteries, for purchases of Class 1 electrically powered lift trucks. Annually per lift truck, this will result in avoiding 16 metric tons of CO_2 tailpipe emissions, customer fuel savings of 76%, and $1,500 per year in beneficial utility revenue. EVSE consultation and load management services will also be provided.

By 2022, Avista may consider a pilot program with a transit agency and/or school district to electrify buses, in conjunction with services benefiting disadvantaged and low-income groups, as well as testing technologies and models for load management and emergency backup power.

Avista will deploy cost-effective load management services leveraged with EVSE installation programs. This will initially be accomplished through vehicle programming and the utilization of programmable non-networked EVSE. Experimentation with new technologies and industry innovations will also be considered, such as the utilization of advanced metering infrastructure (AMI).

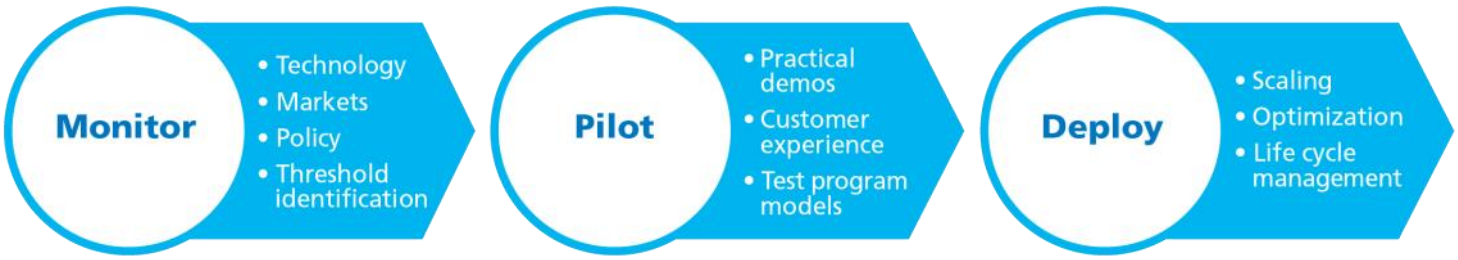
Load Management, Planning and Grid Integration

Avista will continue to monitor and document EV load profiles, using a smaller test pool of customers with vehicle telematics connectivity starting in 2021. Updated annual load profiles and forecasts for EVs will be integrated with System Planning and the Integrated Resource Plan (IRP). This will be used in conjunction with updated modeling of grid assets and conditions, other load forecasts, and the effects of distributed energy resources (DERs), providing a sound assessment of system generation capacity, localized distribution system impacts, and optimized asset management.

Avista will deploy cost-effective load management services leveraged with EVSE installation programs. This will initially be accomplished through vehicle programming and the utilization of programmable non-networked EVSE. Experimentation with new technologies and industry innovations will also be considered, such as the utilization of advanced metering infrastructure (AMI) and other technologies that communicate with EVs and other distributed energy resources, given the potential to optimally manage loads and integrate with the grid at scale. Residential TOU rates may also be considered and piloted with groups of customers participating in the EVSE program, starting in 2023. By 2025, the goal is to demonstrate greater than 50% peak load reduction from EVs, achieving grid benefits larger than expenses required to perform load management.

Technology and Market Awareness

Avista will utilize a deliberate process of innovation and testing of emerging opportunities in electric transportation. During the initial monitoring phase, thresholds may be identified based on total cost of ownership (TCO) assessments and other promising technology and market developments, triggering pilot programs that test technical feasibility, costs and customer experience on a small scale and at low risk. Pilots may lead to informed deployments that can scale up over the long term, achieving sustained benefits for all utility customers.



In the light-duty sector, installed battery pack price and energy density of batteries are key metrics to track, along with the number of models, charging speeds, prices and

sales penetration levels. In other sectors, various technologies and the state of the market will be monitored in medium and heavy duty applications, micro-mobility innovations, V2X and networking/control systems, autonomous EVs, aircraft, rail and marine applications, and hydrogen-powered EVs.

Rate Design

A new pilot rate schedule as proposed in this Plan is essential to support sustainable growth in fleet electrification and public DC fast charging. The proposed rate provides for reasonable recovery of utility costs based on additional time-of-use (TOU) energy charges, while eliminating demand charges that currently inhibit market growth. In this way, it establishes sensible electric billing rates for businesses that invest in electric fleets and public charging, encouraging early and sustained fleet adoption, larger workplace charging facilities, and third-party ownership of public DC fast charging. Through higher on-peak price signaling, it also encourages more off-peak charging which is beneficial to all customers.

The new EV rate schedules will be made available to commercial customers, provided that EV charging loads are metered separately from other loads and peak demand does not exceed 1 MW. Above this threshold, verified load management systems may be required and it must be demonstrated that all reasonable measures are being taken to mitigate impacts to the local distribution grid as a condition of utilizing the pilot rate. The EV TOU energy charge on the order of $0.05 per kWh is applied, in addition to regular energy charges on a seasonal basis, during the hours of 7am to 10am and 5pm to 8pm from November through March, and 3pm to 7pm from April through October. Provisions of existing commercial rate schedules apply other than the removal of demand charges and the addition of on-peak energy charges, and the EV TOU rate will adjust commensurate with other normal adjustments to respective commercial rates.

Eligible customers may choose to adopt the pilot EV TOU rate starting in 2021, with open availability through 2025. At that time, the Company intends to propose a more permanent commercial EV TOU rate based on collected data and analysis completed during the 2021-2025 pilot period. Customers initially participating in the pilot rate may then choose between the new EV TOU rate or elect to continue with the pilot rate for another five years through 2030. Early adopters are thereby given reassurance that the pilot rate may be applied through 2030 when they consider making sizable capital investments in new electric fleets and charging infrastructure with long service lives.

A relatively small number of customers is expected to participate in the pilot EV TOU rate, so that the general body of customers is not materially affected. In addition to encouraging early adoption, the pilot TOU rate is intended to provide valuable data, including local coincident loading patterns and impacts on the distribution system, enabling development of a more permanent EV TOU rate schedule.

Experience with a limited number of commercial participants will also be valuable in consideration of a pilot EV TOU rate for residential customers starting in 2023, potentially on a larger scale with the deployment of Advanced Metering Infrastructure (AMI).

Testing Battery Electric Buses—Spokane Transit Authority (2019)

Utility Fleets, Facilities and Employee Engagement

Utilities must set a good example for customers in electrifying their own fleets and facilities, as well as encouraging employee engagement around electric transportation. In addition to realizing fleet and employee benefits, through direct experience in these areas the Company is better able to advise customers, and

employees who drive EVs act as credible ambassadors in the community, raising positive awareness and long-term adoption of EVs in the region.

Avista has successfully electrified its small pool of passenger vehicles and plans to continue evaluating and piloting fleet electrification, including medium- and heavy-duty utility vehicles and auxiliary equipment. These initiatives will be carefully considered and deployed in operational fleets, as reliable operations must be ensured. Adequate workplace charging at Avista facilities coupled with effective employee engagement around electric transportation options, can make a big difference in employee adoption—which translates to higher awareness and long-term EV adoption in the community. The Company will look to partner with OEMs to offer purchase discounts to employees and at some point may consider supplementing this with incentives funded by shareholders when EV availability and choices in the market would yield the greatest positive effects.

Programs and Activities with Budget Targets

45%	EVSE Installations and Maintenance
30%	Community and Low-Income Support
10%	Education and Outreach
5%	Commercial and Public Fleets
5%	Load Management, Planning and Grid Integration
3%	Market and Technology Monitoring & Testing
2%	Data Management, Analysis and Reporting

Programs and Activities Summary

Programs and activities for 2021–2025 are summarized below, with budget targets to overall program funding. These are initial budget targets subject to uncertainties in customer participation levels, partner capacities, and diligent adjustments based on regular assessments of program costs and benefits. Activity and spending levels will also change over time with new learning and changes in technology, policy and market conditions. For example, changes in actual EV adoption trajectories would effect EVSE buildout plans; or similarly, as viable markets develop for fleets, supportive utility programs addressing those opportunities would grow as appropriate. Different program elements are related and support each other, requiring integrated management and regular adjustments in order to be most effective.

Avista proposes to fund these programs and activities over the next five years with an overall capital and expense budget of $2 million to $6 million per year in Washington, and $0.5 million to $1.5 million per year in Idaho. This is the estimated level of activity required to achieve strategic objectives, adjusting to changing market conditions as appropriate.

Utility capital investments will result in an increase of less than 0.25% annual revenue requirement in Washington for electric customers, net of benefits from electric billing revenue, load management and any monetized environmental benefits that may become available.[8] Programs and activities in Idaho are in the early stages of consideration, tailored to its market condition and focusing on early learning and more limited programs that demonstrate the value of beneficial electric load growth in transportation; including mitigation of peak loads, leveraging lessons learned and integrating with respective programs in Washington.

Over the longer term, the benefits from electric transportation are expected to outweigh utility costs, thereby providing direct and recurring net benefits to all utility customers. This outcome and the realization of major economic and environmental benefits for the region are the ultimate goals of the TEP.

[8]As directed by legislation, see Revised Code of Washington (RCW) 80.28.360 (1), https://app.leg.wa.gov/RCW/default.aspx?cite=80.28.360, Washington State HB1853 (2015), HB2042 (2019), and SB5116 (2019). https://app.leg.wa.gov/billinfo/

The TEP will be updated and reissued in five-year intervals starting in 2025. Summary year-end updates will be provided for 2021 and 2023 focusing on expenses, revenues and high-level program results. A more comprehensive mid-period report will be provided in early 2023 including updates on EV adoption and forecasts; program activities; lessons learned; and adjustments.

Detailed reporting will also be included with the updated TEP submitted by year-end 2025, along with modeled impacts on the environment, the economy and the grid.

New program filings may be submitted for regulatory review on an ongoing basis and later incorporated in regular revisions to the TEP.

Table 2: Program and activity timeline (2020-2025)

Program/Activity	2020	2021	2022	2023	2024	2025
Develop public EVSE buildout plan with stakeholders	X					
Initiate DCFC site acquisitions	X					
Solicit public AC Level 2 applications		X	X	X	X	X
Launch EVSE installation programs — all categories including low-income assistance		X	X	X	X	X
Design and launch education and outreach campaigns	X	X	X	X	X	X
Solicit proposals and award EV and EVSE to community service organizations	X	X	X	X	X	X
Launch and sustain fleet support program — lift trucks and light-duty passenger EVs		X	X	X	X	X
Extend fleet support program — airport GSE, refrigerated trailers, other commercial vehicles			X	X	X	X
Design and pilot an EV Experience Center	X	X	X	X	X	X
Design and pilot a TNC program		X	X	X	X	X
Design and pilot mass transit and school bus pilots			X	X	X	
Collect telematics and meter data; update load profiles for System Planning and IRP		X	X	X	X	X
Perform load management experiments including telematics and programmable EV/EVSE		X	X	X	X	X
Update grid impacts, costs and benefits		X	X	X	X	X
Expand utility fleet electrification, facility EVSE and employee engagement programs	X	X	X	X	X	X
Pilot commercial EV TOU rate		X	X	X	X	X
Post-pilot commercial EV TOU rate						X
Pilot residential EV TOU rate				X	X	X
Submit annual updates and mid-period report		X	X	X	X	
Submit revised TEP						X

Background

On April 28, 2016, the Washington Utility and Transportation Commission (UTC) issued Order 01 in Docket UE-160882 approving Avista's tariff Schedule 77 for its EVSE Pilot Program. The initial two-year installation term of the program began with the first EVSE installation on July 20, 2016.

On June 14, 2017, the UTC issued a Policy and Interpretive Statement Concerning Commission Regulation of Electric Vehicle Charging Stations in Docket UE-160799. It provides background and guidance principles for utility EV charging as a regulated service, and notes that the purpose of Avista's pilot program is to obtain data and experience that will inform future programs and rate designs.

On February 8, 2018 the UTC issued Order 02 in Docket UE-160882 approving Avista's proposed revisions to tariff Schedule 77. This included extending the installation period of the program with additional EVSE installations through June 30, 2019, as well as adding a program benefiting low-income customers and a few other minor adjustments. The pilot's EVSE installations were concluded in June, 2019, and a final report was completed in October, 2019. Ongoing program management includes EVSE maintenance and data

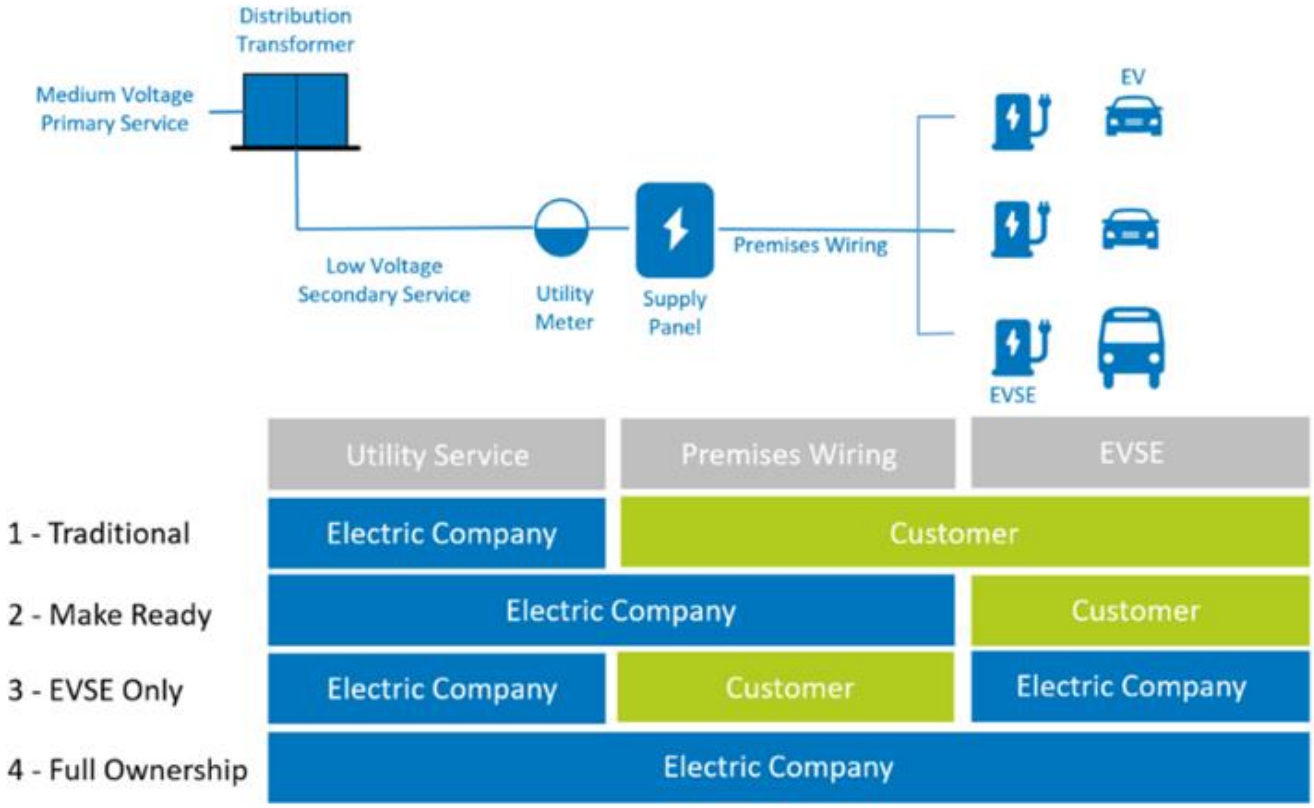


Figure 5: Ownership models for utility and customer EVSE infrastructure

Avista's AC Level 2 installations followed the "EVSE only" model in both residential and commercial locations, and DC fast charging sites followed the "full ownership" model.

A simple EVSE rebate program is an example of the "traditional" business model, where nothing is owned by the utility beyond the meter and conditional rebates from the utility are provided for EVSE purchased and installed by the customer. A "make ready" program typically involves new utility commercial service, including dedicated meters and in many cases premises wiring or supply infrastructure that is owned and maintained by the utility, stubbed out to the EVSE location. In "make ready" models, the EVSE itself is owned and maintained by the customer, and in some cases the utility may provide subsidies to the customer for EVSE purchase, installation and/or maintenance. Full ownership involves a dedicated transformer, meter, supply infrastructure and the EVSE itself, all owned and maintained by the utility. AC Level 2 or DC fast charging sites can fall in this category, with EVSE user fees applied and subject to regulatory oversight.

Avista chose the "EVSE only" and "full ownership" models for the EVSE pilot as an alternative to other, more common utility EVSE rebate and "make-ready" programs. It was felt that by utilizing existing supply panels and other supply infrastructure owned by the customer in residential and commercial locations in the "EVSE only" model, costs could be much lower than comparable "make ready" installations with new dedicated services and infrastructure. Further, it seemed possible that utility EVSE ownership and maintenance might be an effective way to provide the most value and satisfaction for customers in terms of reducing the costs, risks and difficulties of installing EVSE, while providing a means for effective load management, without the need for further incentives or a time-of-use (TOU) rate to shift peak loads. Due to the more substantial investments and effort to implement DCFC sites and maintain them, the full utility ownership model was chosen to ensure long-term DCFC operability and public access.

In order to comprehensively understand EV charging behavior and electrical loads from different locations, it was necessary to build an EVSE "ecosystem" integrated by a single network, thereby capturing the charging data for individual EV drivers wherever they might charge – at home, at work or in the public — for both AC Level 2 and DC fast charging. It was important to incorporate hardware and software that was "interoperable," using industry-standard communication protocols (such as the OCPP standard), so that risks and operational flexibility could be well managed. This enables "plug and play" deployment of alternative EVSE or EVSP providers in the future as the competitive market and products mature. The overall design is depicted below, with the maximum allowed number of ports in each major category.

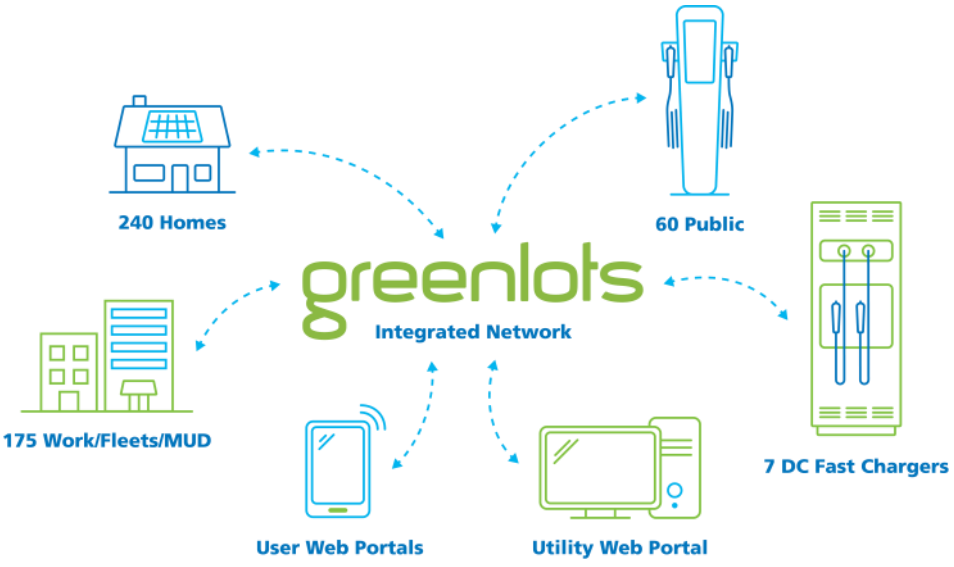


Figure 6: Integrated EVSE network design for the EVSE pilot (2016—2019)

The numbers and proportions of EVSE in each category were carefully chosen to accomplish learning objectives and begin to support EV adoption in Avista's service territory, while containing costs to a modest level. Uninfluenced load profiles for different EV driver types and in different locations could be reasonably established in the first phase of the pilot, followed by direct load management of networked AC Level 2 EVSE at residential, workplace, fleet and MUD locations.[9]

These comparisons allow for a better understanding of customer behaviors and more robust grid impact and economic modeling, influencing future program designs. The proportional targets were also informed by the literature, showing different volumes and supporting roles that EV charging plays in each segment. As shown by the "Charging Pyramid," all types of charging are important in the overall light-duty EV "ecosystem," but as much as 90% or more of all charging occurs at residences, fleet locations and the workplace, where EVs are parked for long periods of time and may charge at lower power levels and at reduced costs. This is especially so if the charging may be reliably and economically shifted to off-peak times, maximizing benefits for all utility customers.

Program design also incorporated the objective of providing support for early EV adoption. This could be accomplished by addressing the barriers of low awareness and lack of EVSE infrastructure, through initial education and outreach efforts, dealer engagement including a referral program, and residential EVSE offerings, as well as commercial EVSE buildout at workplace, fleet and public locations—all intended to help form the first substantial backbone of EVSE infrastructure in eastern Washington.

Finally, with the backdrop of legislation passed in Washington State in 2015 and 2019[10] and growing consensus and support on a global scale, a societal purpose has been established for the reduction of greenhouse gas emissions (GGEs). It is recognized that the transportation sector is the largest contributor of GGEs and other hazardous air pollutants, that electrification of the transportation sector can provide a high return on investment in reducing emissions, and that utilities must be fully engaged to play a key role in this transformation. The EVSE pilot was therefore launched as a starting point to explore how the Company may better serve all customers, achieving major economic and environmental benefits in the long-term effort to electrify transportation, partnering with industry, customers, local governments and policymakers.

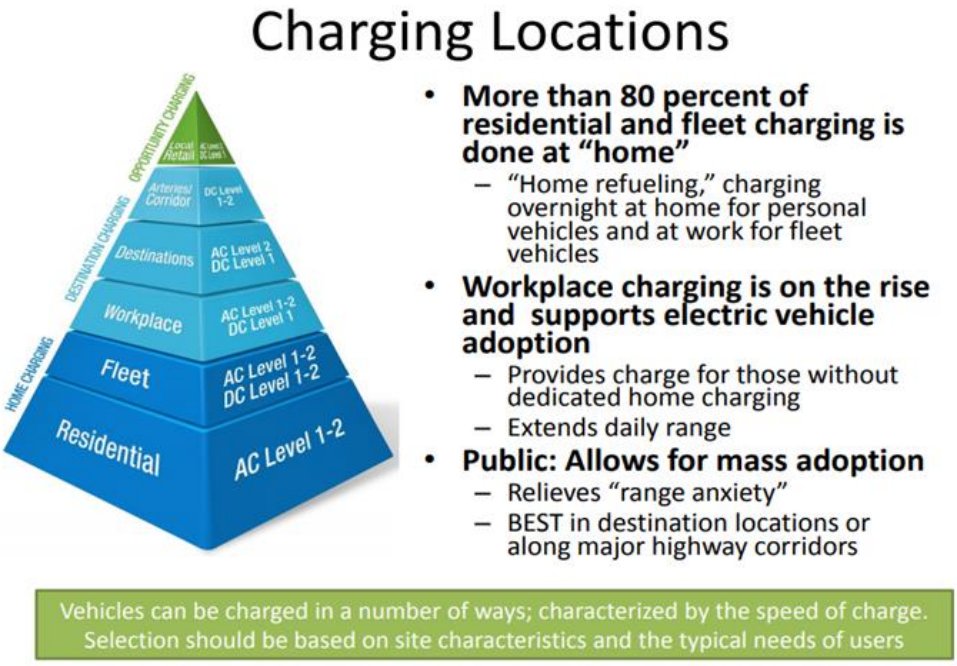


Figure 7: The Charging Pyramid (courtesy EPRI)

[9] Load management of public AC Level 2 and DC fast chargers is not feasible as EV drivers need maximum charge for limited periods of time at public locations.

[10] See Washington State HB1853 (2015), HB2042 (2019), and SB5116 (2019). https://app.leg.wa.gov/billinfo/

In summary, key takeaways from the EVSE pilot included the following:

1. Data and analysis show that grid impacts from light-duty EVs are very manageable over at least the next decade, net economic benefits can extend to all customers, and significant reductions of greenhouse gas emissions (GGE) and other harmful air pollutants may be achieved with EVs. However, grid impacts and costs resulting from EV peak loads could become significant over longer time horizons, with higher EV adoption, and as other loads and the grid change. The EVSE pilot represents a good start in the Company's ongoing effort to understand how EV loads may be optimally integrated and managed, in an evolving system that brings the most benefit to all customers.

2. Avista was able to cost-effectively install EVSE, resulting in high customer satisfaction, and the pilot correlated with a significant increase in the rate of EV adoption in the area. This demonstrated that utility programs can be effective in supporting and enabling beneficial EV growth. Partnerships with industry providers, a focus on providing value for the customer, and contractor performance were keys to success.

3. Workplace charging stands out as a powerful catalyst for EV adoption, while simultaneously providing grid benefits from reduced EV charging at home during the evening peak hours.

4. Low dealer engagement, a lack of EV inventories, and persistent customer awareness and perception issues continue to be a major barrier to mainstream EV adoption in the region. The utility can help overcome these issues with robust education and outreach programs, including dealer engagement.

5. Avista successfully demonstrated the use of EVs to reduce operating costs for a local non-profit and government agency serving disadvantaged customers. The Company expects local stakeholder engagement to continue in the development and expansion of similar programs, as well as other innovative ways to serve communities and low-income customers.

6. Surveys showed a widespread desire for more public AC Level 2 and DC fast charging sites, which may be supported in future utility programs and rate designs. A new rate should be developed to address operational cost barriers resulting from traditional demand charges, while reasonably recovering utility costs.

7. Networked EVSE reliability, uptime, costs and customer experience are all important opportunities for improvement, reinforcing the importance of utilizing interoperable networked EVSE. Non-networked EVSE are very reliable and cost effective, and should be utilized wherever possible unless data collection, user-fee transactions, remote monitoring or other requirements necessitate the use of networked EVSE.

8. Load management experiments showed that the utility may remotely curtail residential peak EV loads by 75%, while maintaining customer satisfaction and without a TOU rate or additional incentives other than the installation of the EVSE owned and operated by the utility. More DR experimentation may show the feasibility to shift an even higher percentage of peak loads. While EVSE load management utilizing DR and V1G technology appears acceptable from a customer perspective, reliability and costs must be significantly improved to attain net grid benefits and enable practical application at scale.

9. Data and analysis were somewhat limited by the available pool of participants and EVSE sites. However, results compared well with other studies using larger population samples, and EVSE data was satisfactorily replicated and verified by telematics data. As the industry evolves, light-duty EVs with larger battery packs may become the norm. In this respect, the EV load profiles developed and examined in this study may under-predict electric consumption and peak loads to some degree.

Technology and Markets

Transportation electrification is affected by a variety of technology and market forces, which Avista will closely monitor to inform the TEP. There are factual trends as noted below, but it is uncertain how these forces will shape vehicle and equipment design, production and timing decisions, and how this in turn will interact with evolving market and customer preferences. One thing is clear—the Company must keep abreast of the changing landscape and adjust its plans accordingly on a regular basis.

Given these changes and historical examples of technology adoption, it seems likely that the transportation sector is on the cusp of a major transition toward electrification. To illustrate, the following chart shows the rate of new technology and product adoption in U.S. households over the last century.[11]

Note that adoption rates for new technologies typically follow an S-curved shape. A period of initial slow growth is followed by rapid acceleration, before flattening out with market saturation and in some cases eventually declining, such as that for landline telephones. While these examples cannot be used to reliably predict the adoption curves for various forms of electrified transportation, they do provide insight and highlight the importance of monitoring technology and market trends in a rapidly changing environment. Due to a number of complex and interactive factors, adoption of a given set of technologies and products may suddenly surge unexpectedly, such as the case for cellular phones. To help explain this, as the market and technologies developed for cellular phones, they could increasingly be used for more than just telephone conversations—they could be used to send text messages; take pictures; store, play and share music and other media; and connect with the internet and its myriad of

[11] "Electrification Futures Study", NREL 2018 (p. 16).

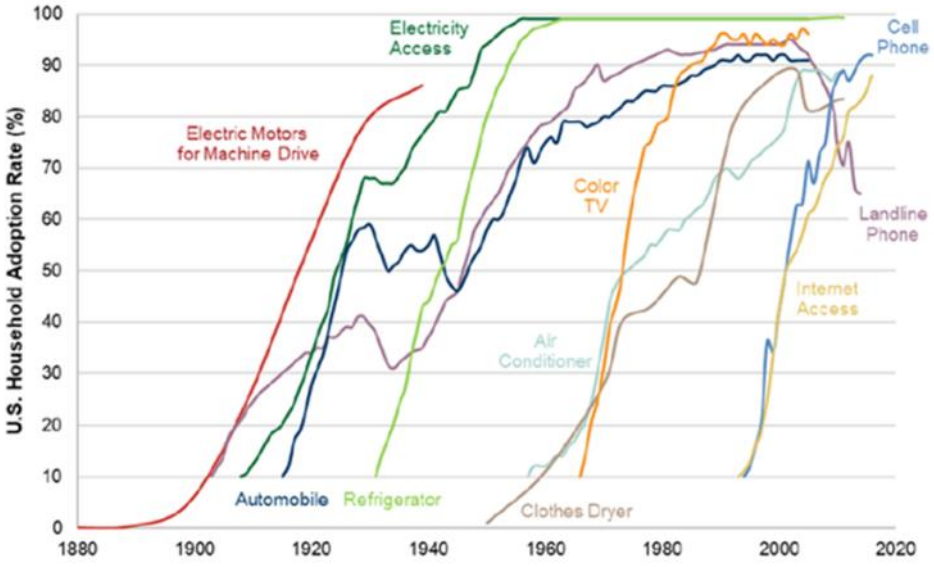


Figure 8: Diffusion of various technologies in U.S. households

expanding, derivative services.

Beyond the advantage of mobility, cellular phones opened up a whole new platform for greater connectivity, functionality, and access to other services and benefits that land-line phones could not offer. Similarly, EVs may open doors to a variety of benefits and services that traditional vehicles cannot, in addition to tremendous operational savings and a superior driving experience. Together with supportive policy and societal factors, this could strongly influence customer preferences and adoption rates beyond first-order economics. On the other hand, considerable technological and market hurdles remain, and transportation electrification could be dampened by existing fleets and infrastructure with long service lives, as well as powerful influence by incumbent interests and the inertia of the status quo.

Another useful framework to consider is the Technology Adoption Lifecycle for disruptive products as originally described by Everett Rogers and later expanded upon by Geoffrey Moore in his classic work, "Crossing the Chasm." [12,13,14] As explained by Moore, when a new disruptive technology enters the market, first adopters known as "innovators" and "early adopters" are most interested in new technology and performance. These two groups represent about 15% of the total market assuming a bell-curve distribution, and they are willing to deal with some inconvenience and price premiums as a trade-off to using a new and exciting innovation. 2019 saw U.S. sales of plug-in EVs at 325,000 vehicles, about 2% market share in a new-car market of 17 million vehicles—clearly still in the early stage of market adoption. In order to sustainably gain entry into the mass market beyond this level, a "chasm" must be crossed whereby the product appeals to the "early majority", typically when it is able to be sold on a more practical basis to non-technologists less willing to tolerate inconvenience and higher prices.

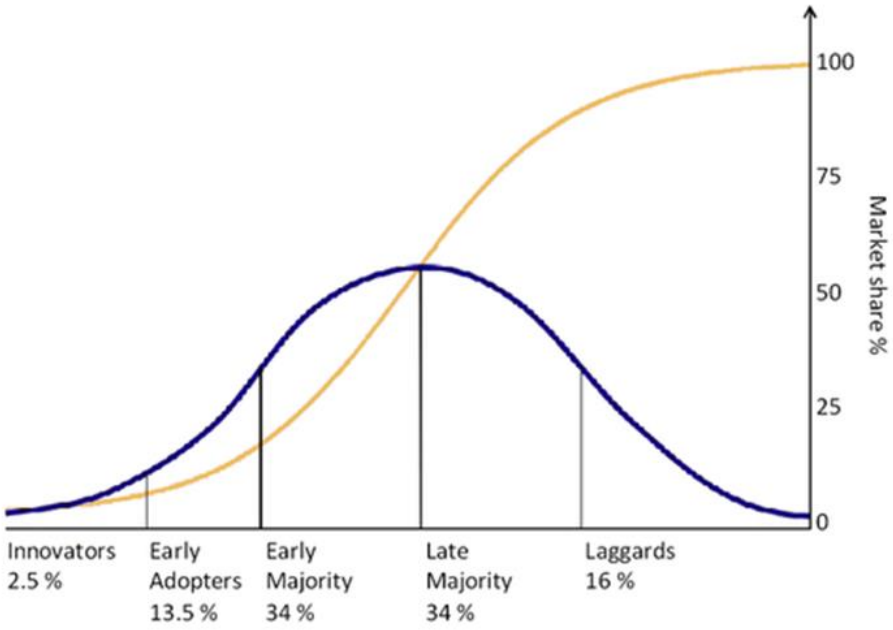


Figure 9: The Diffusion of Innovations (Rogers)

[12] Everett, Rogers. "Diffusion of Innovations." 1st Ed. (1962).

[13] Moore, Geoffrey A. "Crossing the Chasm: Marketing and Selling Disruptive Products to Mainstream Customers." Harper Business, 3rd Ed. (2014).

[14] UTC (p. 29).

The challenges of crossing the chasm are often considerable—many disruptive innovations never cross it and remain confined to a small segment of the market, or decline into obscurity. However, based on the level of global investment, the march of technology advances and cost reductions, and supportive policy based on rising concerns of climate change, we can reasonably expect an inflection point in the light-duty EV market in the 2023-2024 timeframe, and possibly some other market segments as well, such as battery electric transit buses. Assuming OEMs deliver strong product and critical market barriers such as charging infrastructure and awareness issues are addressed, EVs appear likely to cross the "chasm" soon thereafter, and sustainably make inroads into the early mass market at the 15% penetration level sometime between 2026 and 2030.

In this timeframe, Avista can play a strong role in addressing a number of market barriers – particularly EVSE infrastructure and customer awareness – while paying close attention to key technologies and changing conditions as noted below.

Battery Technology

Falling battery costs and improved performance are key trends to monitor as they represent a significant cost item in electrified vehicles. Average market prices for battery packs fell from $1,100/kWh in 2010 to $156/kWh in 2019, and may further decrease to $100/kWh by 2023, according to Bloomberg New Energy Finance (BNEF). Ongoing price reductions will be driven by battery production at scale and the utilization of high-energy density cathodes that store energy more efficiently. Further price reductions are not "impossible," but will be more complicated because "there are a variety of options and paths that can be taken," such as standardizing battery pack designs across different EV models or introducing new technologies to improve the batteries themselves, like new cathode materials.[15]

Changing battery chemistries and thermal management are two areas where the most cutting-edge R&D work is happening. While lithium-ion (Li-ion) batteries are expected to continue as the predominant EV battery technology in the near term, various other chemistry combinations with Li-ion are advancing, and solid-state batteries are also expected to emerge as cost-viable options. Newer cell chemistry, and different materials in battery cathodes and anodes, are expected to result in higher energy densities and lower reliance on rare materials such as cobalt.

Rising battery voltages. Current vehicles powered by internal combustion engines (ICE) use a 12V battery for starting the engine and supplying auxiliary loads. By comparison, early EV models such as the Nissan Leaf, GM Bolt, Tesla Model S and Audi e-Tron all have battery voltages at the pack level between 300 to 400 volts. Next-generation EV models such as the Porsche Taycan have pack voltages at 800 volts and as high as 1200 volts, which will allow for much faster charging times as EVSE power capacities rise from 50kW to 350kW and possibly higher without increasing electric current.[16] This is necessary to minimize heat and maintain conductor size and weight within limits for human use. In addition to overcoming the issue of charging infrastructure availability, these higher power levels will reduce refueling time by 67% to 86%, making it much more convenient to charge an EV in public.

Battery management systems, impacts on battery life and OEM warranties. Automakers typically cover the lithium-ion battery pack under warranty for an extended period. In recent years the standard offer has been at least eight years or 100,000 miles, whichever comes first. Some manufacturers will cover the battery pack against total failure, while others will replace it if the battery's capabilities fall below a certain level, such as 60-70% of the battery's original capacity. More recently, the state of California mandated automakers to extend the battery coverage for EVs sold within that state to 10 years or 150,000 miles. Other OEMs have gone further; for example Hyundai, has increased its battery warranty to lifetime coverage on the Kona Electric. Battery performance and warranty concerns were a significant unknown when the first EVs began to be sold in the 2011-2016 timeframe. Batteries lose capacity over time due to

[15] 2019 Battery Price Survey, Bloomberg New Energy Finance.

[16] Batteries and Electrification R&D Overview. Steven Boyd, Program Manager, US Department of Energy, June 18, 2018.

factors including the number of discharge/recharge cycles, depth of discharge, and ambient operating and storage temperature, all of which can exacerbate degradation depending on cathode and anode chemistry.[17] Through improvements in chemistries and robust battery thermal management systems, significant long-term degradation can be minimized while operating applications can expand.[18] A GM battery engineer recently noted that they had conservatively treated the battery's capabilities in the Volt and Bolt vehicles.[19] We are now seeing EVs sold in the last four to five years driven well over 100,000 miles, and it is becoming clear that battery management systems will enable EVs to travel at least this far and possibly much further before there is a significant reduction in battery performance and driving range.

Battery degradation and second-life use. EV battery packs tend to degrade slightly with each charge and discharge cycle, eventually losing their ability to fully charge. Draining most or all of a battery's charge on a regular basis tends to cut into its capacity more quickly over time. For this reason, older EVs with shorter operating ranges can suffer incrementally faster deterioration than newer EVs with 200+ miles of range, as they can be drained more deeply and frequently to meet driving range requirements. Until recently, EV batteries were best maintained by avoiding deep discharges and frequent DC fast charging. Today, thanks to more advanced battery management systems, these concerns are gradually being eliminated. The inherent chemistry and design of an EV battery varies from one make and model to another. EV battery packs generally contain a series of connected individual cells, perhaps several hundred of them depending on the model, instead of a single massive unit. It is often difficult, if not impossible, to combine cells from different manufacturers and different chemistries in second-life applications.

As long as detailed battery charging history at the cell level is available, battery remanufacturers (such as 4R Energy, Spiers New Technologies and others) have expressed a willingness to take less degraded cells from an EV battery pack and "repackage" them for other applications, including use in another vehicle and for stationary storage applications. One such application is the secondary use of batteries originally in Class 8 heavy-duty trucks, deployed for second-life use in smaller, lighter-duty vehicles for local deliveries where required travel distances are not as long. This use case is facilitated when both the first and second vehicles are from the same manufacturer. However, it is possible that advanced new-battery costs may approach "refurbished" battery costs when this market materializes, probably in the 2030 timeframe. Other stationary applications may someday extend the use of batteries beyond their first applications, such as for traffic lights, streetlights, and home energy storage. American Electric Power is currently testing this application using batteries from older -model Nissan LEAFs.

Today, the market is hesitant to commit to acquisitions of second-life batteries at some future date, mainly due to rapidly falling battery prices and the challenges involved with "mixing-and-matching" batteries from different manufacturers. Second-life battery uses may become more feasible when a change in battery ownership does not occur— i.e., the battery continues to be owned by the same party that bought the original vehicle. In this case, the owner can confidently know the battery history and condition, and its suitability for future use. Owners and operators of future electric fleets in the tens or hundreds of thousands of vehicles are a natural market for refurbished batteries, as their vehicles and business-use cases have varying performance and range requirements. Fleet owners at some point will also likely need to add local energy storage at their depots in order to reduce demand on the local distribution grid, and to acquire and store energy when utility TOU rates are lowest. In this respect, second-life use of fleet batteries may become a viable option.

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[17] https://www.researchgate.net/publication/335672438_A_Wide_Range_of_Testing_Results_on_an_Excellent_Lithium-Ion_Cell_Chemistry_to_be_used_as_Benchmarks_for_New_Battery_Technologies

[18] https://www.energy.gov/sites/prod/files/2017/10/f38/XFC%20Technology%20Gap%20Assessment%20Report_FINAL_10202017.pdf

[19] https://electrek.co/2020/02/10/gms-director-of-battery-cell-engineering-were-nowhere-near-the-bottom-of-the-price-curves/

Much has been written in the industry media about the possibilities of utility purchases of second-life batteries for smart grid deployments. Recent utility RFPs for energy storage applications at generation and substation sites require large volumes of identical cell technologies which the current "refurbished" battery supply chain cannot meet. This is because battery chemistries are unique to each OEM and in many cases, to each vehicle model and model year. In general, the financial viability of second-life battery use in utility applications remains elusive today, but this could eventually change and therefore progress in this area should be monitored.

Battery recycling. Once the primary (in an electric vehicle) and secondary (stationary storage applications) uses have expired, the battery can be recycled to obtain reusable materials such as lithium, cobalt, nickel and other metals. Advanced processes are still in development to make recycling these materials more economical, with several companies currently working on the technology. However, if the electric vehicle market grows as expected, significantly increased demand for battery materials may become a major challenge. Avista plans to monitor battery recycling developments, but the current assumption is that the market will be able to successfully recycle large numbers of EV batteries when they reach end-of-life, estimated to be at least a decade away. New chemistries that are currently in development may further mitigate the issue, for example, reducing the need for rare materials such as cobalt.

EVSE Technology

Smaller footprint and higher power output. 50kW is the current baseline for DCFC connected to light-duty (Class 1) passenger EVs, using both the CHAdeMO and CCS-1 charging protocols. While still an industry mainstay, the 50kW platform is quickly being overtaken by fast charging at the 100kW to 175kW level. Many Tesla Supercharger sites, for example, currently offer fast charging at 120kW and higher. Within the next few years, the 50kW "standard" will be superseded by 175kW as the de facto standard, and the subsequent "standard" after that will be 350kW. Electrify America is already installing 350kW DCFC at some of its locations, such as the current site in the Spokane Valley near I-90. In the heavy-duty vehicle space (Class 6 and above), a number of vehicle and EVSE manufacturers are working through a CharIN committee to develop an industry-wide set of specifications for charging at the 1MW to 2MW level and above.[20] According to CharIN, the High Power Charging for Commercial Vehicles (HPCCV) standard will be used for charging in the range of 200 to 1500 volts and up to 3000 amps. That should be enough to address the needs of heavy-duty electric vehicles with very large battery packs of 1 MWh.[21]

Communications interoperability. There is a clear global movement among EV charger manufacturers and software providers to make their equipment and capabilities comply with the Open Charge Point Protocol (OCPP).[22] Current compliance is at the entry 1.6 level, with the industry moving toward the more complex and sophisticated 2.0 level that provides additional security, functionality, transactions handling and smart charging capabilities. Innovative Charging Protocol ISO/IEC 15118 is mostly about communications standards between the EV, EVSE and the cloud. It's important to stay aware of developments in this area and ensure compatibility with other smart grid initiatives that Avista may undertake in the future.

EVSE interchangeability is an important capability when owning and operating a portfolio of EV chargers from different manufacturers and vintages. To manage this diverse portfolio, it will be important to adopt open standards such as OCPP as much as possible for several reasons, including minimizing operational and financial risks associated with adopting proprietary products and services. In other words, EVSE that are fully compliant with OCPP may be more readily swapped out with other EVSE or switched to another EVSP in the event of performance issues or business failure with either EVSE or the EVSP. This also has the added benefit of supporting healthy competition in the marketplace.

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[20] https://insideevs.com/news/372749/charin-hpccv-over-2-mw-power/

[21] https://www.charinev.org/fileadmin/HPCCV/High_Power_Commercial_Vehicle_Charging_Requirements_v2.0.pdf

[22] https://insideevs.com/news/372749/charin-hpccv-over-2-mw-power/

Connector standards are another aspect of interoperability that must be monitored. While the EV industry was able to broadly adopt a common plug configuration for AC Level 1 and Level 2 charging using the J1772 standard, there are now de facto three-plug configurations for DCFC in North America: CHAdeMO, CCS-1 and Tesla. CHAdeMO and CCS-1 are not compatible. Tesla vehicles cannot be fast charged using the CCS-1 connector in North America. It is possible to purchase a special cord/adapter[23] to enable a Tesla driver to use a CHAdeMO charger, but this adapter is often out of stock, and CHAdeMO currently limits power output to 50kW, well below the 120kW or higher capability of the Tesla Supercharger network. Given the three different DCFC connector standards, two developments have occurred which merit attention. One is the co-location of CHAdeMO, CCS and Tesla chargers in the same location. The Marengo Charging Plaza in Pasadena, CA is an example.[24] EVGo and Tesla have entered into an agreement offering Tesla's proprietary connectors at EVGo DCFC sites, which previously offered only CHAdeMO and CCS connectors. Similarly, Avista should consider partnering with Tesla to allow for additional investment by Tesla to install their chargers at DCFC sites, providing for greater utilization and beneficial utility revenue while avoiding additional utility investment.

Inductive charging. Much of recent charging technology development has involved conductive charging for both passenger and heavier-duty vehicles, with less attention to inductive charging despite the early lead it enjoyed with inductive "paddle" chargers in the late 1990s. A number of wireless charging companies and auto OEMs have worked on making inductive charging more viable over the last decade, but aside from a few demonstration projects, commercial scale projects have been limited. Most recently, however, the Antelope Valley Transit Authority (AVTA) in California installed inductive chargers for in-route charging of its electric fleet of 50 buses, including both 40-foot and 60-foot articulated buses, in daily operations. Many inductive chargers have been installed, with a total of fifteen (15) 250kW wireless charger installations expected by April, 2020. Clearly, if this technology works well at 250kW, it will become a viable option for charging smaller vehicles as well, but requires the inductive charging mechanisms to match on both the vehicle and the charger embedded in the ground. As such, the initial applications for inductive charging are likely to occur where both decisions are made by a single decision maker (such as public and private fleets). Initial concerns include higher power losses when compared to conductive charging, and its uncertain durability and performance in harsher weather climates, including colder temperatures and snow/ice. Avista will monitor the progress of inductive charging closely, as it could affect EVSE deployments needed in the marketplace, as well as inform and assist potential commercial customers as appropriate where opportunities emerge.

Light-duty EV Market and Consumer Preferences.

Key considerations for passenger vehicle buyers include the items listed below. Each of these considerations is probably a "gating" factor – if each item can't be met satisfactorily, car buyers in the mass-market segments are not likely to proceed with an EV purchase.

- No range anxiety. Over 300 miles of range on a full charge probably eliminates most concerns over range
- Charging locations — at home, at work, in the community near home, and in other destinations in the area as well as along longer trip routes
- Style of vehicle – sedan, crossover, SUV, truck, etc.
- First cost (purchase price) of an EV compared to an equivalently sized and featured ICE vehicle
- Fuel and maintenance costs for electricity compared to gasoline/diesel

There are currently over 40 passenger EV models available in US markets (including both PHEV and BEV). Another 20 models are expected in the next two years, including more light-duty passenger vehicles and pickup trucks.[25] More delivery vans, transit and school buses, and heavier duty (Class 6-8) vehicles are in the process of prototyping or commercial service deployment.

[23] https://shop.tesla.com/product/chademo-adapter

[24] https://cleantechnica.com/2020/02/17/largest-ev-fast-charging-station-in-the-us-opens-in-pasadena-california/

[25] https://www.latimes.com/business/story/2020-01-17/ev-sales-fizzle

In the passenger market, almost all traditional OEMs have limited EV production runs and have not made great strides in increasing EV sales. Tesla, coming from a technology background, is a noticeable exception. They successfully captured the "EV lifestyle" attractive to key early adopter customer segments with a product line that fundamentally started fresh, as opposed to electric versions of ICE models offered by legacy auto OEMs. About half of the 325,000 U.S. EV sales in 2019 occurred in California. Out of total U.S. sales, Tesla's three models accounted for 192,500, dominated by Model 3 sales of 158,925.[26] While not a traditional OEM, Tesla is clearly the market leader with a 59% market share of all new EVs sold in 2019. Utilities cannot ignore the fact that among their customers choosing to buy an EV, a large majority are buying Tesla products. In the case of Spokane County, 70% of new EVs were Tesla models, with customers buying these vehicles online, accepting delivery outside the Spokane area, and driving them back home.

Announced investments by auto OEMs in electric vehicles. Many auto OEMs have announced a significant increase in the number of electrified models made available over the next 5 years, such as the Tesla Model Y compact SUV, Ford's new Mustang Mach E, the Volvo XC40 compact SUV, a plug-in version of Toyota's best-selling RAV -4 compact SUV, and an electric SUV from Rivian, a U.S. startup that is also working on custom-designed delivery vans for Amazon. Of particular interest to Avista's customers more interested in pickup trucks are Ford's plans for an electric version of its F-150 pickup truck on sale starting in 2021, GM's plans to offer a Hummer electric pickup truck starting in 2022, and Tesla's Cybertruck with orders being taken now for deliveries starting in late 2021.

First cost. A variety of studies have been published over the years speculating on when EVs will be sold at the same initial cost as their ICE counterparts. In a March 2019 study, McKinsey estimated a $12,000 cost difference between an average EV and comparable vehicles powered by internal combustion engines in the small- to midsize-car segment.[27]

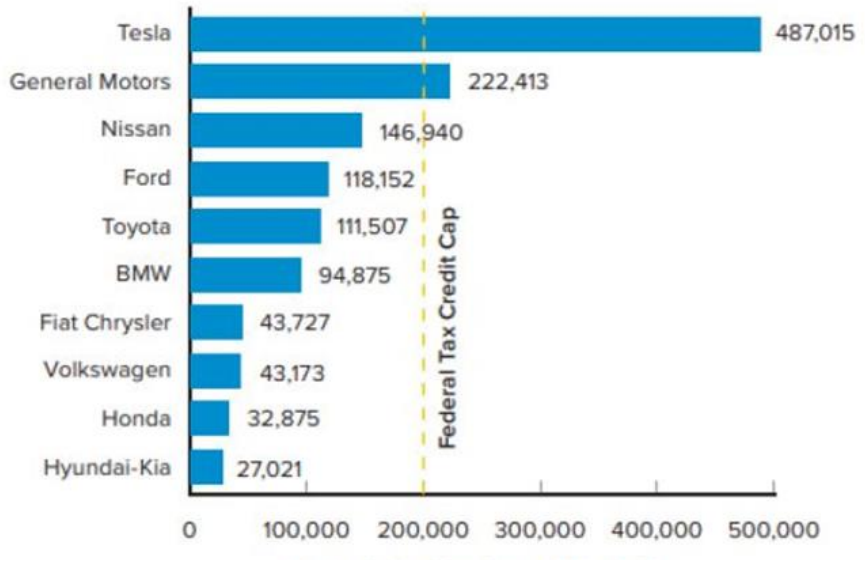

Figure 10: Cumulative EVs sold in the U.S. (EEI, 2019)

[26] https://insideevs.com/news/392372/us-tesla-sales-graphed-through-q4-2019/

[27] "Making electric vehicles profitable", McKinsey & Company, March 2019.

McKinsey further identifies cost-reduction measures that could achieve purchase cost parity in 2025. ICCT, in a 2019 study, estimated electric vehicle initial cost parity coming within 5-10 years, in 2024-25 for shorter-range vehicles and 2026-28 for longer-range EVs in sedan, crossover and SUV models.

While most consumers consider initial cost as the key factor when acquiring a personal vehicle, the full economic comparison between an EV and its ICE counterpart is clearer when the total cost of ownership (TCO) is considered. There is close to total cost parity now for drivers covering over 30,000 miles annually, likely will be in the 2022-24 timeframe for drivers averaging 20,000 high-mileage miles per year, and almost certainly will be by 2025 for almost all other drivers. Avista customers who drive for transportation network companies (TNCs) such as Lyft and Uber typically travel more than the average customer, and may become a strong initial market segment for EVs if they see robust and reliable charging infrastructure in place.

New vehicles, particularly EVs, have significant **communications and computational technology** built-in, allowing for more connectivity with consumers' other electronic devices such as mobile phones, home energy management and security systems, electronic calendars, etc. In some ways EVs are like a powerful new mobile communications platform with a motor and wheels.

More vehicle OEMs are expected to offer information on their EVs and market **directly to consumers via web and social media**. Tesla only offers direct sales to consumers, and Ford recently took the same approach to accept online reservations for the upcoming Ford Mustang Mach-E. Consumers appear to be more willing to order or place a deposit for new EVs online. If this trend continues, the primary consumer engagement and education touchpoint will shift away from the dealership. Avista will be monitoring this trend along with EV inventory and sales at area dealerships to help identify the most cost-effective methods to share information on electric vehicles with its customers, including the traditional dealer channel and emerging web and social media conduits.

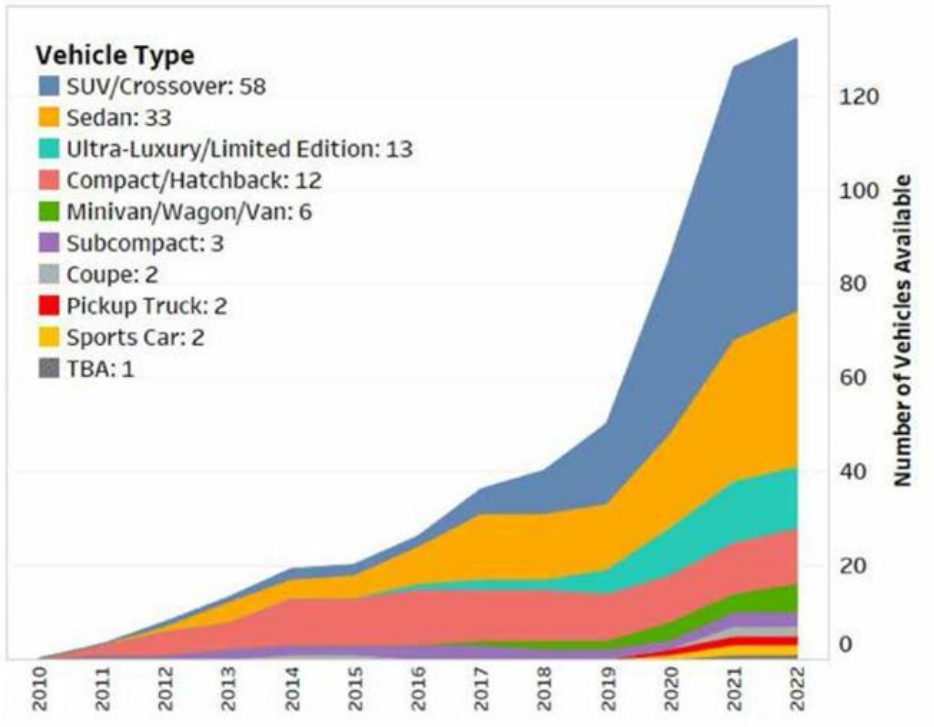

Figure 11: EV model availability (2019 EPRI consumer guide to EVs)

Other consumer and market trends of interest include the rate of driver licenses among younger generations (which has been declining in recent years), car-sharing services such as ReachNow and car2go, and TNC ride-sharing growth on software platforms such as Uber and Lyft.

[28] International Council on Clean Transportation. International Council on Clean Transportation.

[29] Recent Decreases in the Proportion of Persons with a Driver's License across All Age Groups, Michael Sivak and Brandon Schoettle. University of Michigan Transportation Research Institute, January 2016.

[30] Cracks in the ridesharing market—and how to fill them." McKinsey & Company, July 2017. Available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/cracks-in-the-ridesharing-market-and-how- to-fill-them

Medium- and Heavy-duty Vehicle Electrification

Avista intends to monitor industry adoption of medium- and heavy-duty electric vehicles, learn from other utilities serving these applications, build on this information with pilots when appropriate, and adopt best practices as they become known and feasible. A good example of public corporate commitments to fleet electrification is Amazon, which recently pledged to purchase 100,000 electric delivery vans by 2030.[31] Amazon's initiative is part of a plan to convert its entire delivery fleet to using 100% renewable energy by 2030. Upfront costs associated with electric trucks and buses are expected to decline significantly through 2030 as battery prices fall, making them competitive on a TCO basis.[32] According to Atlas Public Policy, estimated TCO parity timelines are imminent for electric transit buses, in the 2025-30 timeframe for electric school buses, and after 2025 for electric medium-duty trucks. Key factors influencing these timelines include battery costs, availability of public incentives, and operational fuel and maintenance cost savings.

Mass-transit battery electric buses (BEBs). A number of transit agencies have adopted plans to switch to a zero -emission vehicle fleet by the 2030-40 timeframe. In addition to "brand-new" buses, several mass transit districts are converting used buses from diesel to electric, leveraging existing bus chassis, and reducing the cost of electric buses. In Avista's service territory, STA and Pullman Transit have initiated the deployment of BEBs. Avista will work closely with these and other transit agencies to understand the realities of technology and operational limitations, trends and market barriers that the Company can help address. This includes load-management technologies, optimal rate design, and charging technologies including overhead conductor and underground inductive power transfer.

Electric school buses. Dominion Energy is currently implementing a program to bring 50 electric school buses to 16 localities within Dominion's Virginia service area.[33] Locations were selected on the basis of benefits the batteries in the buses could bring to Dominion's distribution grid. Thomas Built Buses were chosen as the supplier in phase one of the project. These 50 buses will be configured with 220 kWh of battery energy capacity each with an operating range of up to 134 miles, charged overnight using a 60kW DC fast charging system.[34] The buses are expected to provide environmental and health benefits through reduced emissions and reduce operation and maintenance costs for schools by up to 60%. In subsequent phases, Dominion plans to expand the program to bring at least 1,000 additional electric school buses online by 2025. Once phase two is fully implemented, the buses' batteries could provide enough energy to power more than 10,000 homes. Phase three would set the goal to have 50% of all diesel bus replacements in Dominion Energy's footprint be electric by 2025 and 100% by 2030.

Electrification of **other medium- and heavy-duty vehicles** is increasing in the United States, particularly in California. High upfront costs and lower levels of commercialization for all vehicle categories other than transit buses have limited deployment to date. Increasing investment in the sector from public and private sources, however, is expected to generate growth and significantly increase the number of commercial electric vehicles of these higher classes in the near term. Initial deployments of heavy-duty electric trucks (Class 6-8) will have a 150 to 250 mile range, with use cases characterized by dedicated, known routes, consistent charger locations, and relatively predictable environments. It is unlikely the first round of heavy-duty electric trucks will be used in long-haul (cross-country) applications. Class 3-5 markets may be well suited for electrification, as these vehicles are used primarily for deliveries with a larger number of stop-and-go events.

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[31] https://sustainability.aboutamazon.com/sustainable-transportation

[32] Electric Trucks and Buses Overview - The State of Electrification in the Medium- and Heavy-Duty Vehicle Industry. Conner Smith. Atlas Public Policy. July 2019.

[33] https://news.dominionenergy.com/2020-01-16-Dominion-Energy-Moves-Forward-with-Electric-School-Bus-Program?printable

[34] https://thomasbuiltbuses.com/bus-news-and-events/news/thomasbuilt-buses-jouley-selected-for-2019-12-17/

Also, the elimination of idling (less exhaust and noise) may be desirable benefits for certain applications. For similar reasons, truck stop and refrigerated trailer electrification may grow substantially over the next decade, and may be appropriate areas for extending utility fleet support programs in the future.

Other Technologies and Market Opportunities

Vehicle-Grid integration. Eventually, OEMs may deliver viable electrified vehicles and systems that go beyond basic transport needs, such as providing grid benefits in the form of emergency back-up power to homes (V2H) or commercial buildlings (V2B), and possibly even bi-directional power transfer known as full vehicle-to-grid (V2G) capability, economically deployed at scale. Combined with advanced software platforms, hardware and standards enabling efficient transactions and holistic management of local distributed energy resources (DERs), energy storage, and other flexible power demands, a much more resilient and integrated grid of the future could be realized.

Micro-mobility or "last mile" innovations such as the Lime electric scooters and bicycles could continue to grow, providing a good opportunity to partner with local government in reducing traffic congestion and local air pollution.

R&D associated with aircraft, rail and marine electrification is also on the rise, with longer timeframes anticipated for commercial deployments. However, these areas may also present a good opportunity for a pilot test in the 2025 –2030 timeframe. For example, smaller electrified passenger aircraft may help expand regional air transportation, relieve traffic congestion at larger hub airports, improve travel times and costs, and reduce pollution from air transportation before the end of the decade.[35] In this area, Avista has been involved with the Washington State Electric Aircraft Working Group and will continue to monitor developments and provide support as requested.

Although significant technical and economic hurdles remain, **hydrogen** could eventually be used as a viable fuel alternative for EVs such that overall emission reductions are feasible, particularly for fleets and medium - to heavy-duty applications such as long-haul freight transport, as advocated by the Renewable Hydrogen Alliance (see www.renewableh2.org/resources). Similar to other technical areas of interest, Avista will monitor developments in this area and develop pilot demonstrations when appropriate, primarily on the basis of technical and TCO feasibility.

[35] "Washington State Electric Aircraft Working Group Report." Washington State Department of Transportation (2019).

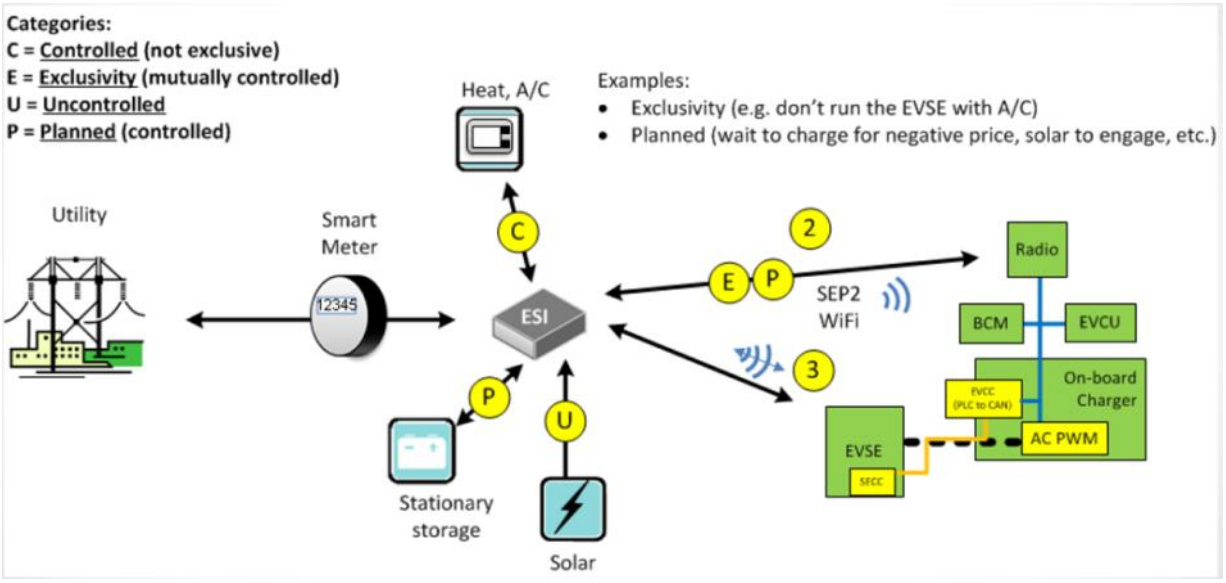

Figure 12: Home or building area network integrated with the grid (Society of Automotive Engineers, SAE J2836/1)

Finally, large global investments in **autonomous electric vehicles** (A-EVs) may eventually result in profound disruptions in the transportation sector. AVs are present today in limited applications. However, a number of major challenges remain to achieve fully autonomous (Level IV and V) vehicles, including advanced sensors, communications and artificial intelligence capabilities, which can reliably perform in the full spectrum of operational conditions. If successful, fully autonomous A-EVs could dramatically change the way we carry out our daily lives—reducing vehicle ownership, freeing up personal time, conserving energy, and avoiding major human injuries and fatalities, all while significantly reducing transportation costs.[36,37] In this area, Avista will continue to monitor developments, including participation in the Autonomous Vehicle Workgroup in Washington State, and providing support as requested.

[36] Arbib, J. and Seba, T. "Rethinking Transportation 2020 – 2030: The Disruption of Transportation and the Collapse of the Internal-Combustion Vehicle and Oil Industries." Rethink X (2017).

[37] "Autonomous Vehicle Work Group 2019 Annual Report." Washington State Transportation Commission (2019).

Environmental, Economic and Grid Impacts

The transportation sector distinguishes itself in that it uses petroleum as a nearly exclusive source of energy, and has the highest rejected energy to useful energy ratio of all major sectors of the economy. As a result, a very high percentage of overall air pollution and greenhouse gas emissions (GGEs) originate from transportation. This is depicted in the following illustration, showing overall energy sources and consumption in the U.S. economy.

In the Pacific Northwest, hydropower is readily abundant and used to a large extent for electric generation. Avista's generation mix comes from a number of resources, mostly hydropower for base load and natural gas during times of peak demand. These relatively clean sources of energy result in 565 lbs CO_2 emissions per MWh and about an 80% reduction in air pollution and GGEs for electrically powered transportation in our area compared to petroleum-fueled transportation. As coal is phased out and more renewables are added to the generation mix, emissions from electricity generation may be reduced even further.

Overall, given that close to 50% of CO_2 emissions originate from the transportation sector in the Pacific Northwest, transportation electrification may be the most impactful of all efforts in reducing GGEs in the region.

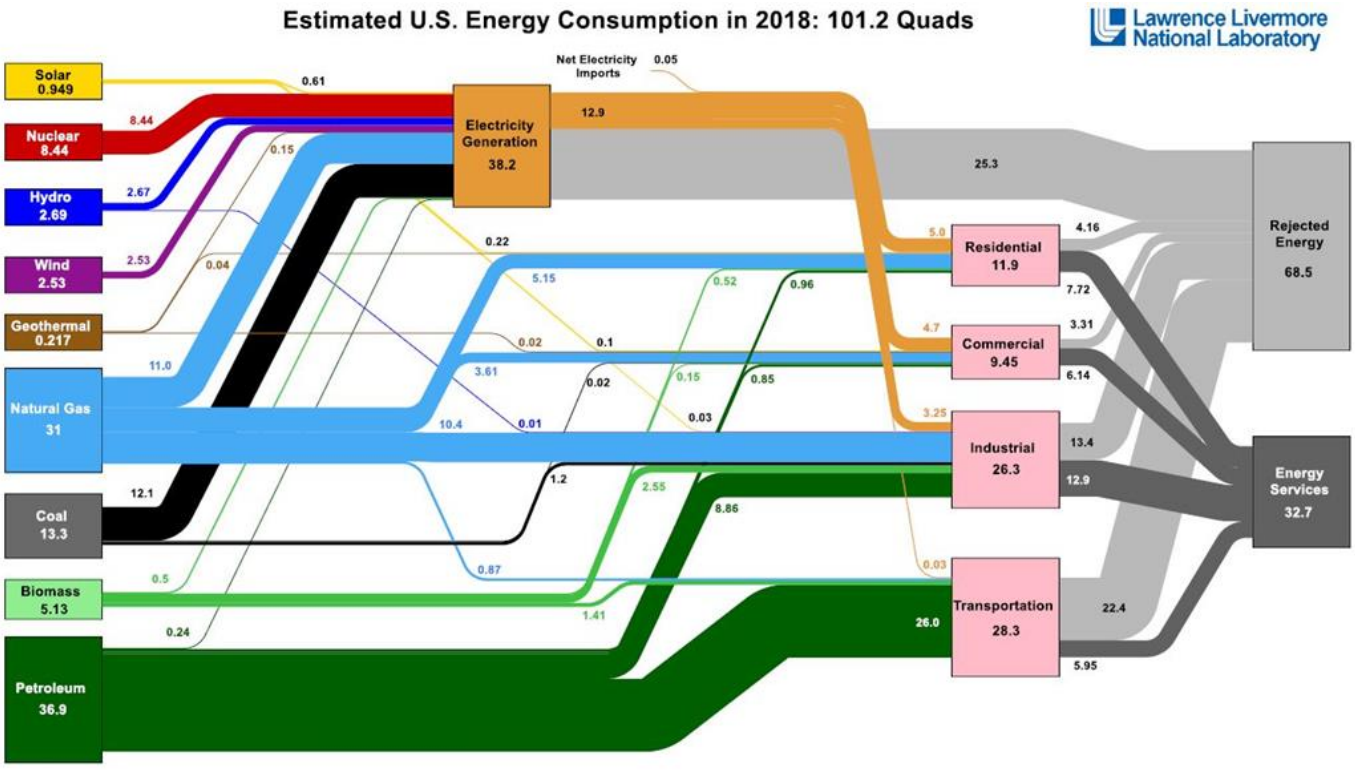

Figure 13: U.S. energy consumption - the transportation sector is powered almost exclusively by petroleum, with a high percentage of rejected energy (source: Lawrence Livermore National Laboratory)

But how might transportation electrification affect the utility grid? Can the utility keep pace with this new demand and extend benefits to all customers? These questions are explored below, starting with a basic introduction to the electric utility grid.

Figure 14: Utility grid generation, transmission, and distribution systems (source: USDOE)

The grid is delineated by three major systems – generation, transmission, and distribution. On Avista's grid, generation power is stepped up to high AC voltages of 115kV or more, traveling long distances on the transmission system before the voltage is stepped down in distribution substations, typically to 13.5kV using 30MVA transformers. Each substation commonly has one to three feeder distribution lines that each usually run 3 to 5 miles in urban areas and 15 to 20 miles in rural areas. Power is distributed on these feeders from the substation to service transformers that step down voltage again and supply one or more service points, which are defined as the connection point at the customer meter. Most service transformers on Avista's system serve one to ten service points in residential neighborhoods, with an average of four.

Peak Native Load	1,716 MW
Total Generation Capability	1,858 MW
Circuit miles of Transmission Lines	2,770
# of Distribution Substations	170
Circuit Miles of Distribution Feeders	5,429
# of Service Transformers	88,783
# of Retail Electric Meters	384,838
Annual kWh per Residential Customer	10,658

Table 3: Quick facts about Avista's electric grid

Modeling by E3 for the Pacific Northwest region and independently by Avista for its service territory indicates that light-duty EV adoption at baseline or higher levels over the next 20 years will provide net benefits over costs, in terms of both regional economic and utility customer perspectives. Regional economic benefits are mostly due to the major fuel savings of EVs. Both regional and utility customer costs are dominated by the additional generation capacity required to serve new EV loads, compared to very small distribution costs. No impact is expected on the transmission system due to EVs in the foreseeable future. The analysis that follows includes details of distribution grid impacts, the results of E3's Pacific Northwest economic modeling, and Avista's economic modeling.

Distribution Grid Impacts

A first-order analysis of light-duty EV loads on distribution transformers was conducted for three different scenarios. The first scenario assumed a single EV load of 6.6kW serviced by each transformer in addition to existing loads, which equates to a roughly 25% EV adoption rate. The second scenario assumed 50% of service points with an added EV load of 6.6kW, and the third with 100%.

The electrical power demand on a service transformer from EVs is modeled as:

$$P_{EV\_aggregate} = n_{EV} * EV_{SE} * CF$$

Where:

$P_{EV\_aggregate}$ = Additional power demand created by simultaneous EV charging

n_{EV} = Number of EVs downstream of a given service transformer

EV_{SE} = Power required to charge a single EV = 6.6 kW

CF = Coincidence factor = 0 to 1

The CF is the percentage of simultaneous EV loads on a given transformer compared to the sum of all potential loads. As more EVs are served by a single transformer, the maximum load on the transformer increases up to a limit governed by the CF. The CF curves used for transformer loading are based on industry and utility

standards, and are directly related to the number of service points with EVs served by the transformer.

Estimated transformer replacement costs of $3,516 for underground transformers and $2,318 for overhead transformers include material and labor costs but do not include additional costs such as replacing or installing new pole arms, cutouts, arrestors, brackets or upsized distribution poles which may occur depending on the situation.

In the first scenario, a single EV load of 6.6 kW during peak hours was appended to each transformer's existing peak load, for 88,783 transformers sized between 15 to 100 kVA, each with 10 or fewer service points. A single EV served by each transformer is equivalent to an overall EV adoption rate of 23% of vehicles in service (as distinguished from the percentage of sales). As a result of this load, which represents a high adoption level forecasted to occur many years after 2030 even in a high-adoption scenario, only 5.9% (5,280 of 88,783) of residential transformers exceeded their overloading limits as determined by IEEE Std C57.91.[38]

In the second and third scenarios, applying EV loads to 50% of service points on all transformers caused the peak load to exceed the failure threshold on 19.7% of transformers, compared to a 30% failure rate for the scenario with 100% EV service points. Upgrade costs for the 50% and 100% adoption scenarios were $46.9 million and $72.6 million, respectively.

Note that unusual situations that could alter charging behavior were not modeled. For example, a higher level

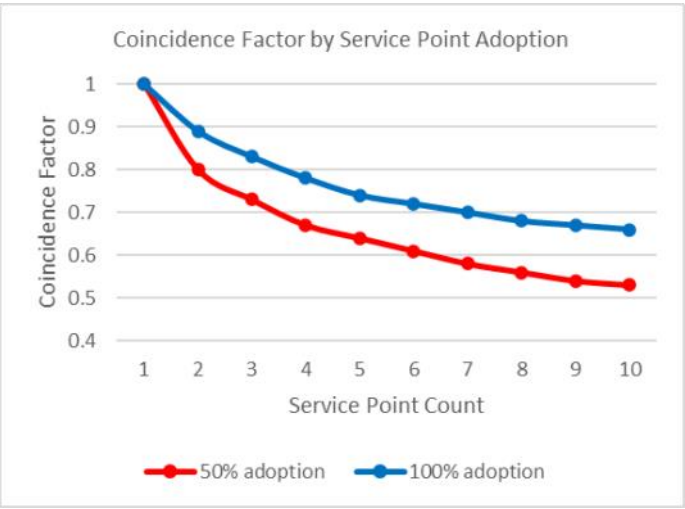

Figure 15: EV charging coincidence factor used in economic modeling

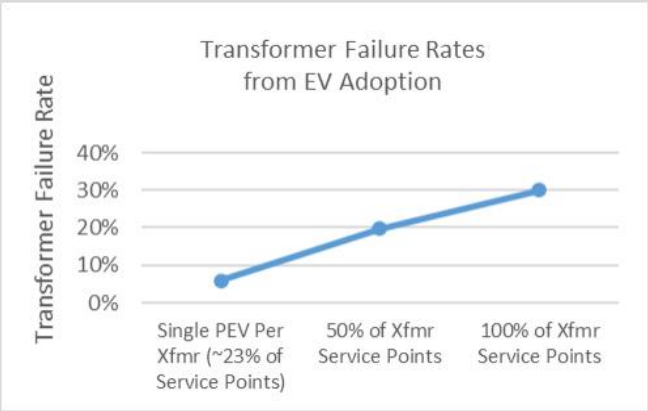

Figure 16: Failure rate *of residential transformers from EV loads*

of EV charging might occur before a major storm if customers felt there was a risk of pending power outages, which could cause additional transformer overloads and failures. Also, it was assumed that only one EV will charge at a time at a given residence, even though at high EV adoption rates many households would have more than one EV, and some of them may choose to install multiple EVSE so that both EVs could charge simultaneously.

Feeders are typically designed and built with 10 MVA capacity, ideally operating at 6 MVA with overload concerns at 8 MVA. Assuming uninfluenced EV load profiles, first-order analysis of a sample of Avista's

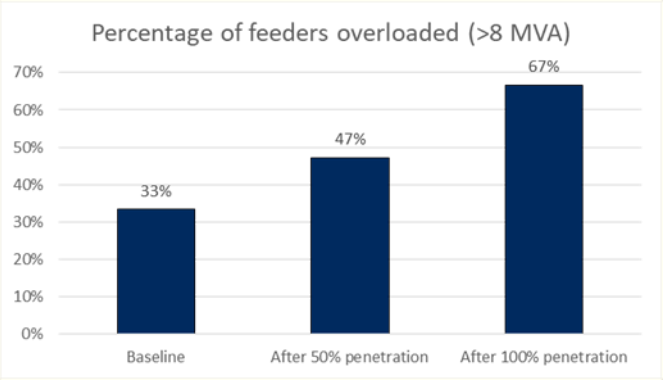

Figure 17: Distribution feeder overloads from EV loads, assuming all other loads held constant

[38] IEEE C57.91-2011 – Guide for Loading Transformers and Step-Voltage Regulators. https://standards.ieee.org/standard/C57_91-2011.html

feeders showed 33% were overloaded, assuming baseline EV adoption and all other existing loads held constant, rising to 47% overloaded with 50% EV adoption, and 67% with 100% adoption. Reconductor costs for urban feeders average $400k per mile, compared to $300k per mile for rural feeders. In turn, impacts to feeders can result in impacts to substations, with the need to increase the number of feeders, or in some cases, build a new substation at an average cost of $2.5 million per substation.

Note that second-order effects arising from the system's ability to "backfeed" distribution feeders in the event of issues and repairs is very important in determining actual overloads and projected costs, which requires a more sophisticated level of modeling. In addition, detailed information at many points in the distribution system for existing loads and forecasts are needed to project feeder and substation impacts from EVs with more certainty.

Based on analysis of detailed feeder -level data for four utilities in the Pacific Northwest, E3's study showed an average distribution cost of $27 net present value (NPV) per EV over the 20-year timeframe from 2017 to 2036. In other words, an NPV of $27 represents the total additional costs to the distribution system over the 20-year time-frame of the study for each EV during that time. Avista's independent analysis indicates an average distribution cost of $38 NPV per EV over a similar 2019-2038 time period. In both studies, similar assumptions were used for baseline EV adoption, EV purchase costs, fuel costs, etc. However, the model's calculation methods and algorithms were developed independently. Please see the EVSE pilot final report for more details on modeling assumptions.

The relatively low EV impacts on the distribution grid as predicted by both models reflect the assumptions of modest baseline EV adoption and reduced distribution peak loads as a result of ongoing energy efficiency and conservation of other loads on the system.[39,40] Higher levels of EV adoption and the sensitivity to energy conservation assumptions could be further explored, as well as important second-order effects on the distribution system beyond a first -order analysis.

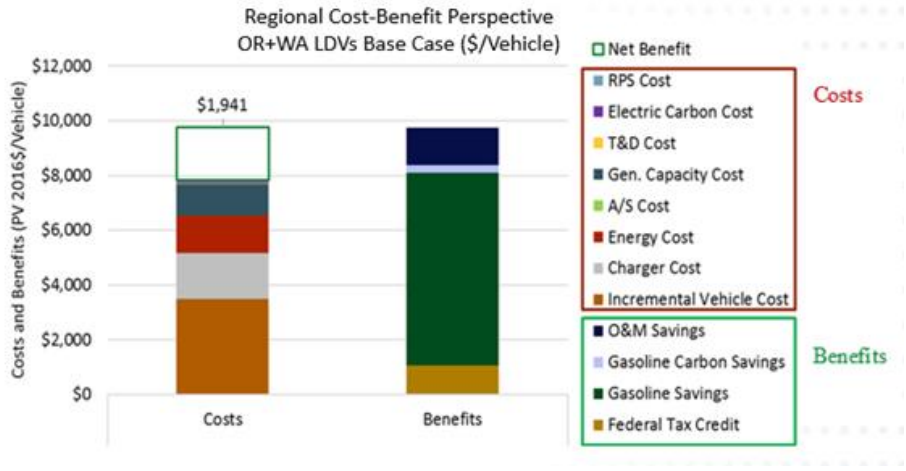

Figure 18: E3 Regional Cost-Benefit

E3's Pacific Northwest EV Study (2017 – 2036)

In 2017, E3 completed a detailed study of EV grid and economic impacts in the Pacific Northwest, sponsored by six regional utilities. The study's objectives were to support an understanding of how EV adoption could result in costs and benefits from both a "regional" and a "utility customer" perspective, sensitivity to assumptions, the value of managed charging, CO_2 reductions, and implications for utility planning. In the "regional" perspective, monetized EV costs and benefits that flow in and out of the region are considered, while in the "utility customer" perspective the marginal EV costs and benefits are isolated to the effects on customer utility rates. Over the study's 20-year time horizon, calculated cash flows for each year are translated to an equivalent net present value (NPV) in 2017, using a discount rate of 4.9%. When the NPV of total costs is less than the NPV of total benefits for a given scenario, a net benefit results, and vice versa.

[39] E3 (p.54).

[40] Avista Electric Integrated Resource Plan (2017).

Utility costs associated with investments in transportation electrification and load management are not included in these analyses. For more detail including the analytical approach, input variables, and how they are applied in the regional and ratepayer perspectives, please see the E3 report and the EVSE pilot final report.

From a regional perspective, E3 concluded that all regions in the Pacific Northwest showed a net benefit from EV adoption, calculated at $1,941 NPV per EV for the regional base case scenario. These net benefits were also shown to be most strongly influenced by assumptions of EV adoption, EV purchase costs relative to gasoline vehicles, and gasoline prices. These assumptions result in the largest cost component of incremental vehicle cost, and the largest benefit component of gasoline fuel savings. The analysis further showed that generation capacity cost was nearly equal to energy cost, and distribution costs were insignificant. When examining the benefits of managed charging, E3 estimated an additional $500 to $1,700 regional net benefit per EV, with 70% to 90% of the added value from reduced generation capacity costs and the smaller remainder from energy cost savings. Note that the E3 model is linear and therefore does not include important "interactive" or dynamic second-order effects between input variables (i.e. feedback loops). For example, lower EV purchase costs and higher gas prices would result in higher EV adoption, and vice versa, which greatly affects the cost-benefit result. In reality, these feedback loops are asymmetric in that negative effects such as utility energy and generation capacity costs are mitigated by lower EV adoption, while positive effects such as the benefits of gasoline fuel savings are amplified by higher adoption.

In the "utility customer" perspective, E3 showed that EV adoption would create net benefits for the Pacific Northwest overall, but that results could vary in sub-regions depending mostly on the particular utility's reserve generation capacity. Wholesale electricity prices were also found to have a significant influence on net results, as they impact generation capacity cost. Utility revenue from the additional metered billing of EVs results in a net benefit over total costs of $387 NPV per EV. When considering the potential value of managed charging, E3 calculated an additional NPV of $400 to $1,600 per EV as a result of reducing EV loads that occur during "peak" hours, causing increased generation capacity costs. Distribution costs were insignificant in both cases, as modeled in the base case adoption scenario from 2017 through 2036.

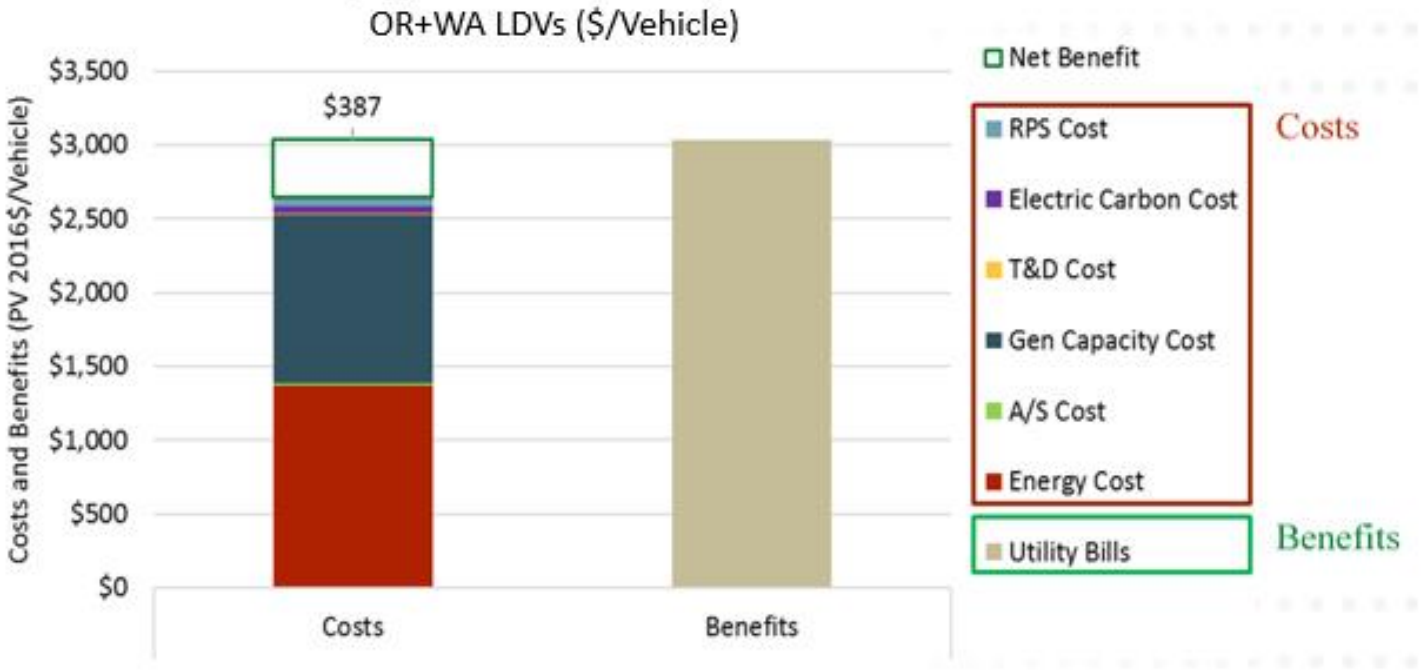

Figure 19: E3 Utility Customer Cost-Benefit

Avista's Study (2019 – 2038)

Following E3's study for the Pacific Northwest, Avista independently developed an economic model that would also calculate EV costs and benefits for the regional and utility customer perspectives, but specific to Avista's grid and service territories, and with the flexibility to alter inputs such as the EV load profiles gathered from the EVSE pilot.

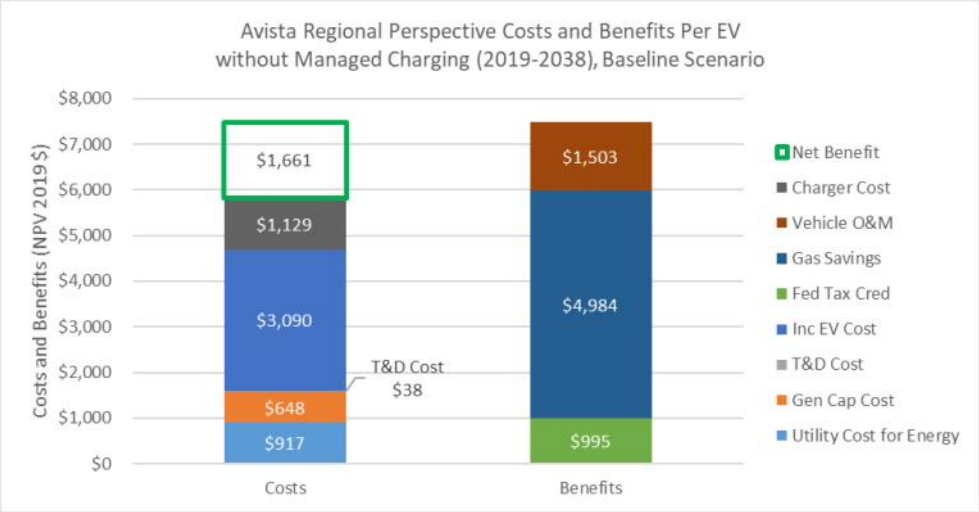

Figure 20: Regional perspective costs and benefits per EV without managed charging 2019-2038

E3 was consulted to confirm input variables over a 20-year time horizon for the Avista model, analogous with the baseline input variables used in E3's Pacific Northwest EV study where EVs reach 15% of light-duty vehicle sales in 2030. A financial discount rate of 6.58% was used to model Avista's weighted cost of capital.

In this way, Avista's results may be compared to E3's using similar inputs and independent modeling methods. If the model outputs are reasonably matched, then a form of independent replication is achieved, establishing additional confidence in both E3's and Avista's modeling and results.

In the regional perspective, Avista's model results in a net benefit of $1,661 per EV without managed charging, comparable to the E3 result of $1,941 per EV for the Pacific Northwest region. Note that in Avista's model, costs for renewable portfolio standards (RPS) and electric carbon cost and ancillary services (A/S) are not considered, as they were shown to be negligible in E3s results. Similar to the E3 study, Avista's regional results are dominated by incremental EV costs and fuel savings benefits. In addition to the embedded utility energy costs consistent with Avista's IRP assumptions, additional utility costs to serve the new EV loads come primarily from generation capacity costs at $648 per EV, with only $38 per EV from distribution costs. Note that while they are tangible and important benefits to the region, this study does not include a monetized value for societal and health benefits resulting from reduced GGE emissions and local air pollutants.

When managed charging is included, regional net benefits increase $464 per EV to a total benefit of $2,125 per EV. This assumed 75% of the residential peak load was shifted to off-peak from the hours of 4pm to 8pm year round, as was demonstrated in the EVSE pilot. Most of the additional benefit comes from reduced generation capacity costs. This is comparable but slightly below the range of E3's regional net benefit from managed charging at $500 to $1,700 additional benefit per EV. Additional benefits in the Avista model could be realized with more peak load shifting, as may be possible. Nominally divided by an assumed 10-year life of an EV, these results mean that the cost to implement load management per EV over the model's 20-year timeframe must be less than $46 per year using Avista's result, or between $50 and $170 per year using E3's results, in order to achieve additional regional net benefits from managed charging.

Using Avista's model for the utility customer perspective baseline scenario without managed charging, a net benefit of $1,206 per vehicle is realized, significantly higher than E3's result of $387 per vehicle. This is due mostly to the lower generation capacity costs in Avista's model, where Avista is long on generation capacity until 2027.

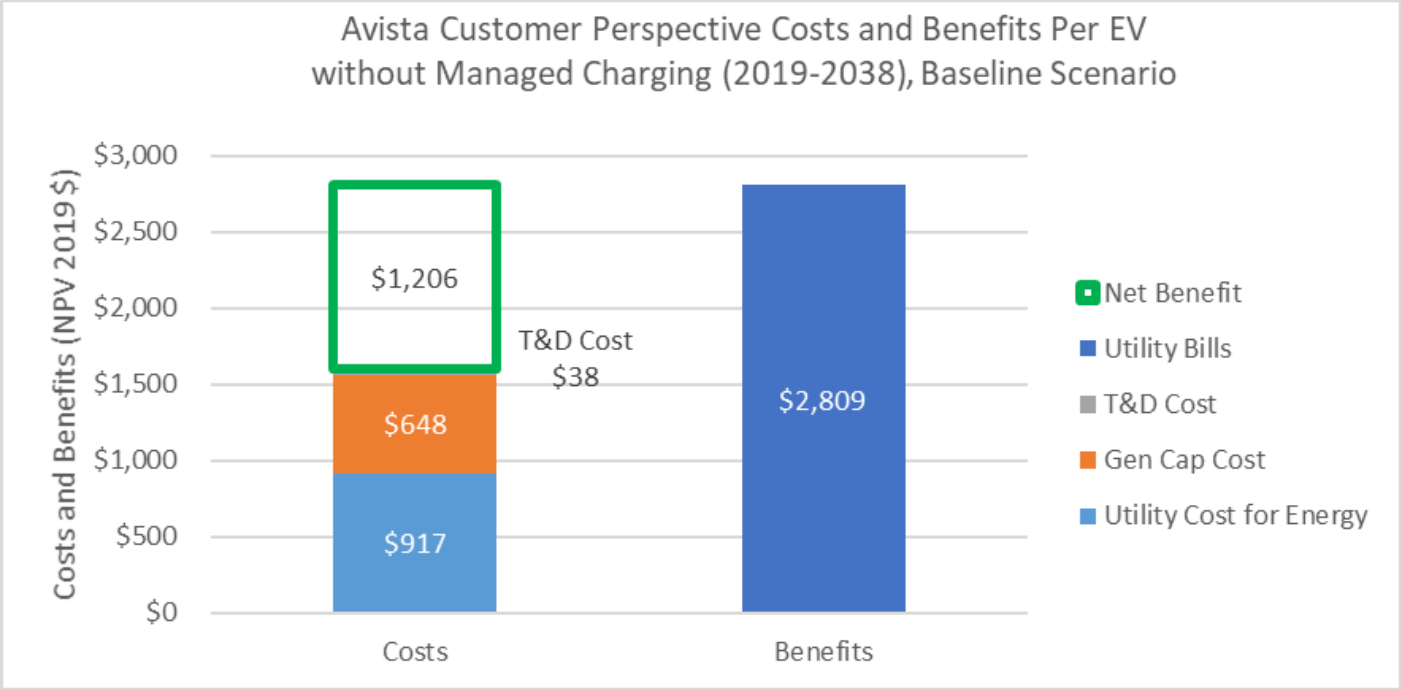

Figure 21: Utility customer perspective costs and benefits per EV without managed charging 2019-2038

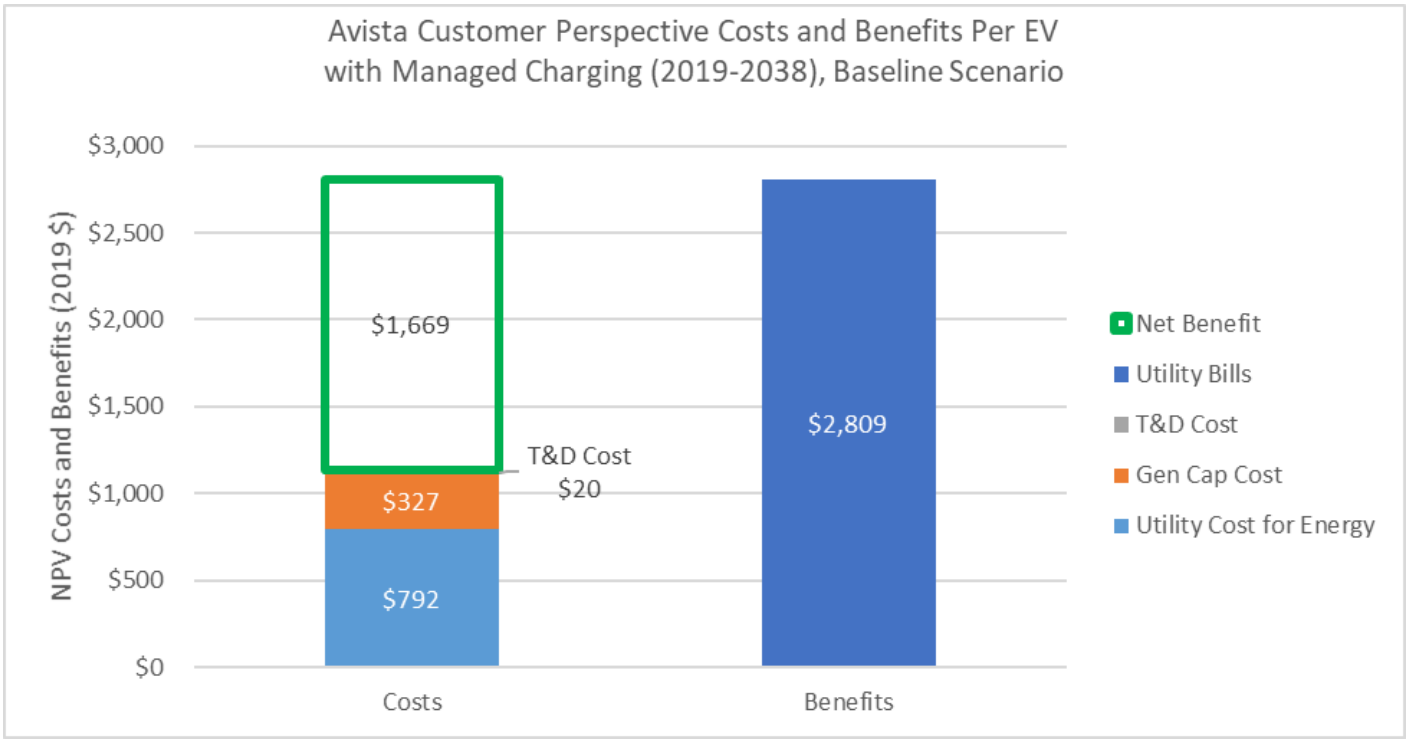

Figure 22: Utility customer pers[ective costs and benefits per EV with managed charging 2019-2038

Considering the utility customer perspective with managed charging, Avista's model results in additional net benefits of $463 per EV. Again, this is mostly due to reduced costs of generation capacity, assuming 75% reduction of residential peak loads from 4pm to 8pm. Given the assumed 10-year service life of EVs, actual costs to implement load management would reduce the net benefit, and would need to be less than $46 per EV per year to result in a net benefit increase. Note that similar cost reductions from shifting on– to off-peak loads by using a TOU rate, must also incorporate reductions in beneficial utility revenue to arrive at net cost-benefits.

In summary, this analysis indicates that grid impacts from light-duty EVs are very manageable over at least the next decade, net economic benefits can extend to all customers (not just to those driving EVs), and significant reductions of greenhouse gas emissions (GGE) and other harmful air pollutants may be achieved with electric transportation. Significant additional benefits may be realized by shifting peak loads in the longer term with higher EV adoption, probably through a combination of TOU rate design and effective load-management programs. However, results also show that the costs to implement load management must be on the order of $50 to $150 per EV, per year, in order to result in additional net benefits over at least the next decade. Beyond this timeframe as EVs represent 30% or more of vehicles on the road, the impacts of peak load could become more significant, making effective load management more important. Therefore, it is prudent for the utility to continue developing load-management capabilities in order to cost-effectively mitigate EV peak loads and resultant costs in the future.

This analysis represents a good start in the evaluation of long-term environmental, economic and grid impacts. Further monitoring, data collection and analysis will refine and adjust estimates as the market, technologies and the grid evolve, including utility costs to utilize more renewables and more detailed modeling of distribution impacts resulting from localized clustering effects.

Please note that the economic models presented in this section of the TEP are intended for informational purposes only (not as a litmus test for utility programs), and do not include environmental benefits or utility expenses supporting transportation electrification. The next section on Costs and Benefits more closely evaluates utility expenses and revenues over the 2020–2030 timeframe including utility investments according to the TEP, and the estimated impacts on annual revenue requirements.

Costs and Benefits

This section provides estimates of Avista's costs to implement the TEP, and benefits in the form of utility revenues from EV charging, net of expenses to generate and deliver electricity. Benefits are also summarized for customer transportation cost savings and avoided CO_2 emissions.

Table 4 below lists the estimated cost of capital investments, allowed capital return, and O&M expenses to implement the TEP over the next ten years. This follows from the strategy and approach explained in previous sections, where a baseline level of supporting programs ramp up initially to match an expected market transition in the 2023-2024 timeframe, leading to stronger EV adoption thereafter and supporting program growth of approximately 15% per year from 2023 through 2030.

Please note that these figures are estimates and will vary from actuals depending on a number of factors including regular program adjustments to market conditions such as EV adoption, customer participation rates and 3rd party private investments; with higher uncertainty as estimates are projected further in the future.

Calculations assume an 8.18% rate of return on capital investments based on a weighted cost of capital that includes the allowed 2% incentive rate of return on equity, and cost recovery of capital investments amortized over the 10-year depreciable life of EVSE.

This is further detailed in the analysis that follows, along with costs to generate and deliver energy, revenues from EV charging, and the resulting net revenue requirement which may not exceed 0.25% of annual revenue requirement for electric customers in Washington State.

Table 4: Estimated TEP costs from Avista capital investments and O&M expenses in Washington State (2021-2030)

Year	Capital Investments	Allowed Capital Investment Return	O&M Expenses
2021	$2,250,000	$245,400	$650,000
2022	$2,887,500	$535,790	$747,500
2023	$3,620,625	$874,647	$859,625
2024	$4,163,719	$1,233,247	$988,569
2025	$4,788,277	$1,614,555	$1,136,854
2026	$5,506,518	$2,126,422	$1,307,382
2027	$6,332,496	$2,788,434	$1,503,489
2028	$6,332,496	$3,519,512	$1,653,838
2029	$7,282,370	$4,423,257	$1,819,222
2030	$8,374,726	$5,525,567	$2,001,145
Totals	**$51,538,726**	**$22,886,830**	**$12,667,625**

Table 5 shows the avoided cost of new resources according to the 2020 Integrated Resource Plan (IRP). These costs represent the average incremental energy and capacity cost to serve Avista customers. The costs include energy and capacity for serving load at time of peak. This shows that starting in 2026, projected capacity will be short of demand and will at that point incur additional costs starting at $108/kW-year. In addition, the "clean premium" is the estimated incremental cost to comply with the Clean Energy Transformation Act (CETA) in Washington, starting in 2022. A full description of these costs is found in the 2020 IRP, pages 11-20 to 11-24.[41] This table is included in the IRP to estimate avoided cost for analysis of resources between IRPs and provide guidance for pricing power contracts under the Public Utility Regulatory Policy Act (PURPA). The assumptions used to estimate these costs are described in the IRP document, and are largely driven by the wholesale electric market forecast, the cost of new generation, and the timing of Avista resource needs.

From these values, utility costs to generate and deliver electricity used for EV charging may be derived, given EV load profile data obtained from the EVSE pilot. In addition, benefits in the form of net utility revenues may be calculated based on the estimated number of EV customers each year, as well as customer fuel and maintenance savings and avoided CO_2 emissions.

These calculations are shown in the tables that follow, assuming separate baseline and high adoption scenarios in Washington for light-duty passenger EVs only. Values are shown for the estimated number of registered EVs owned and operated by Avista's electric customers in Washington. In the future, additional benefits from load management, any monetized environmental benefits that may become available, and separate treatment for EV customers in Idaho will also be included.

Over time as more information is gathered, this analysis may be supplemented by additional cost and benefit estimates from other transportation electrification loads such as transit buses, lift trucks and other market segments.

Table 5: 2020 IRP energy costs

Year	Energy Flat (MWh)	Energy On-Peak (MWh)	Energy Off-Peak (MWh)	Clean Premium (MWh)	Capacity ($/kW-Yr)
2021	19.67	22.64	15.71	0.00	0.0
2022	19.98	22.75	16.28	11.75	0.0
2023	20.44	23.05	16.98	11.99	0.0
2024	21.61	24.09	18.28	12.23	0.0
2025	22.76	25.19	19.50	12.47	0.0
2026	24.27	26.40	21.43	12.72	107.7
2027	23.57	25.27	21.30	12.97	109.9
2028	25.02	26.26	23.35	13.23	112.1
2029	25.92	26.80	24.73	13.50	114.3
2030	26.72	27.08	26.25	13.77	116.6

[41] see www.myavista.com/IRP

Note that coincident peak demand at 6pm in January is the governing peak for the year, which drives system generation capacity and delivery costs to meet maximum peak demand. Please also note that these calculations are derived from the uninfluenced average load profile obtained from EVSE pilot data from 2017–2019. In the future, EV load profiles may increase both in total energy consumed and in peak demand per EV as the market trends toward a larger proportion of EVs with larger battery packs. On the other hand, peak loads may be mitigated by a combination of residential TOU rates, as well as effective load management programs. Avoided emissions per EV currently stands at 4 tons CO_2 per year, given an electricity generation mix producing 565 lbs of CO_2 per MWh. This should improve over time beyond what is stated below as coal generation is eliminated and more renewables are used to generate electricity.

Table 6: Key characteristics per light-duty EV (average annual figures)

3,153 kWh	electric energy consumption
0.78 kW	coincident peak demand at 6 pm in January
$304	utility billing revenue
$1,183	customer fuel cost savings
$300	customer maintenance cost savings
4 tons	avoided CO_2 emissions

Table 7: Baseline EV adoption— annual costs and benefits for Avista Washington customers

Year	# EVs (WA)	Utility Billing Revenue	kWh	coincident kW (January 6pm)	Utility Generation and Delivery Cost	Net Revenue (Offsetting Benefit)	Avoided CO_2 Emis-sions (Tons)	Customer Transportation Fuel and Maintenance Savings
2021	1,605	$487,814	5,059,470	1,252	$99,534	$388,281	6,419	$2,379,700
2022	2,104	$639,530	6,633,019	1,641	$132,530	$507,000	8,415	$3,119,812
2023	2,737	$831,997	8,629,227	2,135	$176,384	$655,613	10,947	$4,058,720
2024	3,604	$1,095,637	11,363,632	2,811	$245,540	$850,097	14,416	$5,344,835
2025	4,811	$1,462,652	15,170,208	3,753	$345,272	$1,117,380	19,245	$7,135,242
2026	6,504	$1,977,097	20,505,880	5,073	$1,044,235	$932,862	26,014	$9,644,853
2027	8,868	$2,695,754	27,959,585	6,917	$1,418,903	$1,276,851	35,470	$13,150,670
2028	12,135	$3,689,051	38,261,765	9,465	$2,017,956	$1,671,094	48,540	$17,996,257
2029	16,411	$4,988,922	51,743,650	12,801	$2,804,287	$2,184,634	65,644	$24,337,404
2030	21,760	$6,615,031	68,609,191	16,973	$3,812,173	$2,802,859	87,040	$32,270,038

Table 8: High EV adoption— annual costs and benefits for Avista Washington customers

Year	# EVs (WA)	Utility Billing Revenue	kWh	Coinci-dent kW (January 6pm)	Utility Generation and Delivery Cost	Net Revenue Offsetting Benefit	Avoided CO_2 Emis-sions (Tons)	Customer Transporta-tion Fuel and Maintenance Savings
2021	1,678	$510,178	5,291,422	1,309	$104,097	$406,081	6,713	$2,488,798
2022	2,311	$702,678	7,287,975	1,803	$145,615	$557,063	9,246	$3,427,868
2023	3,115	$946,884	9,820,809	2,430	$200,738	$746,146	12,459	$4,619,175
2024	4,262	$1,295,610	13,437,696	3,324	$290,353	$1,005,257	17,048	$6,320,363
2025	5,958	$1,811,376	18,787,072	4,648	$427,589	$1,383,788	23,834	$8,836,419
2026	8,468	$2,574,194	26,698,798	6,605	$1,359,597	$1,214,597	33,871	$12,557,665
2027	12,179	$3,702,402	38,400,242	9,500	$1,948,744	$1,753,658	48,716	$18,061,389
2028	17,857	$5,428,560	56,303,451	13,929	$2,969,483	$2,459,077	71,428	$26,482,086
2029	26,545	$8,069,581	83,695,360	20,705	$4,535,926	$3,533,655	106,179	$39,365,753
2030	40,454	$12,298,165	127,553,008	31,555	$7,087,290	$5,210,875	161,818	$59,994,009

From these values and estimates for utility capital investments in transportation electrification (TE), revenue requirements may be calculated and compared against the 0.25% annual revenue requirement limit. These calculations assume an 8.18% rate of return based on a weighted cost of capital including the 2% incentive rate of return on equity authorized in Washington for capital investments in Transportation Electrification. For purposes of meeting the 0.25% limit as defined by law, capital investment depreciation and allowed return on capital investment, including the incentive rate of return on equity, are included in the revenue requirement calculation for each year, but O&M expenses are not.[42] The Company recognizes that additional TE capital investments that do not receive the incentive rate of return could be pursued; however, such additional investments are not proposed at this time.

Assuming that strong utility support and OEM product results in a transition from baseline to high adoption starting in 2023, corresponding net revenue requirements (RevReq) from TE investments remain under the 0.25% limit for all years in the 10-year timeframe, as shown in the Table 9 below. Actual adoption levels will be regularly monitored with spending adjustments as required to remain under the 0.25% limit.

[42] Revised Code of Washington (RCW) 80.28.360 (1)

Table 9: Net revenue requirement from capital investments in transportation electrification compared to the 0.25% annual limit

Year	Capital Investments	TE RevReq without Offsetting Benefits	Offsetting Utility Customer Benefits	TE RevReq after Offsetting Benefits	TE Incremental % RevReq with Offsetting Benefits	0.25% WA Electric Revenue Requirement Limit
2021	$2,250,000	$482,400	$388,281	$94,119	0.02%	$1,373,963
2022	$2,887,500	$839,940	$507,000	$332,940	0.06%	$1,422,051
2023	$3,620,625	$1,256,019	$655,613	$600,406	0.10%	$1,471,823
2024	$4,163,719	$1,671,826	$927,677	$744,149	0.12%	$1,523,337
2025	$4,788,277	$2,118,920	$1,250,584	$868,336	0.14%	$1,576,654
2026	$5,506,518	$2,706,442	$1,214,597	$1,491,845	0.23%	$1,631,836
2027	$6,332,496	$3,455,457	$1,753,658	$1,701,799	0.25%	$1,688,951
2028	$6,332,496	$4,186,535	$2,459,077	$1,727,458	0.25%	$1,748,064
2029	$7,282,370	$5,190,333	$3,533,655	$1,656,678	0.23%	$1,809,246
2030	$8,374,726	$6,407,705	$5,210,875	$1,196,830	0.16%	$1,872,570

At higher adoption levels beyond 2030, additional distribution costs in the form of service transformer and feeder upgrades may also become more apparent, at a level of significance to include with the figures indicated above. If updated modeling in future TEP revisions indicates material distribution costs prior to 2013, these will be included in updated cost projections.

Again, these estimates represent only light-duty EVs, with cost estimates and assumptions that are subject to uncertainty. Actual costs and benefits will vary depending on market conditions and commensurate adjustments to program spending. Costs and benefits from other market segments beyond light-duty EVs (e.g. commercial delivery vehicles and transit buses) are also expected and will be included in future updates to the TEP as more information and experience is gained in these areas.

Analysis and Reporting

This Plan will be updated and reissued in five-year increments, starting in 2025. New program filings may be submitted for regulatory review on an on-going basis and later incorporated in regular revisions of the TEP.

Summary year-end updates will be provided for 2021 and 2023 focusing on expenses, revenues and high-level program results. A more comprehensive mid-period report will be provided in early 2023 including updates on EV adoption and forecasts; program activities; lessons learned; and adjustments. Detailed reporting will also be included with the updated TEP submitted by year-end 2025, along with modeled impacts on the environment, the economy and the grid, incorporating detailed assessment of energy, capacity, and distribution system impacts.

Key metrics and other information will be monitored and reported, including:

1. Customer satisfaction
2. Number of EVs by type (light passenger, forklifts, buses, etc.) in Washington and Idaho service territories
3. Adoption projections
4. Customer operating cost savings and avoided CO_2 emissions
5. EV load profiles for cases of uninfluenced, load management and TOU rates
6. Electric consumption (kWh) and peak load (kW)
7. Grid impacts integrated with System Planning including Distribution systems and the Integrated Resource Plan
8. EVSE installations, costs and % uptime
9. EV TOU rate participation and results
10. Utility spending, revenue and net benefits, including any monetized environmental benefits and grid benefits from load management

Programs and Activities

EVSE Installations and Maintenance

In support of light-duty EV adoption, the measured buildout of EVSE infrastructure is a top priority, especially in workplace, fleet and public DC fast charging (DCFC) sites. This is because of the powerful support for adoption and inherent grid benefits that workplace and fleet charging provide, and the increasing need for public DCFC as the light-duty market develops.

In addition to public DCFC and AC Level 2, workplace and fleet, Avista's EVSE portfolio is rounded out by residential and MUD programs that support adoption, dealer engagement and equitable access to EVSE. Residential programs lay a critical foundation for effective load management and grid benefits in locations where the large majority of EV charging is expected to occur in the future.

Avista can play an essential role to ensure that the right type and amount of charging infrastructure is in good working order, in the right place and at the right time, relative to market needs. This is absolutely critical to enable unimpeded, beneficial market growth. EVSE buildout must be accomplished with a cost-effective portfolio approach, utilizing low-cost and reliable non-networked EVSE where possible, and scaling with market conditions over time so that adequate supporting infrastructure is in place as the market grows, while avoiding over-investment.

In addition to Avista ownership of EVSE, third-party ownership is encouraged with supportive utility policies, including "make-ready" options and a pilot commercial EV rate applying time-of-use (TOU) energy charges. Ideally, third-party ownership will make up 50% or more of all EVSE installations. "Make-ready" options are available to commercial customers that wish to own and operate EVSE themselves, or act as a site host for other third-party ownership. Avista will install required infrastructure to an agreed location for the meter connection, with the utility investment limited to $20,000 per public DCFC site, and $2,500 per commercial AC Level 2 port connection intended for fleet, workplace, public or MUD primary utilization, in addition to the servicing transformer. This should cover the utility costs for most installations sited reasonably close to required utility power, thereby encouraging cost-effective installs. In these cases, the customer agrees to maintain access and operability of the EVSE for at least 10 years, and may charge a user fee at their discretion. Avista will offer consultation on the user fee to balance owner cost recovery and user acceptance. Until conditions change to warrant reconsideration, Avista will recommend applying the rate of $0.35/kWh as set by the Washington UTC for DCFC owned by Avista.

For details on the commercial EV TOU rate that also supports third-party ownership of EVSE, please see the Rate Design section.

EVSE uptime is of major importance to customer satisfaction and mass adoption at > 99% per charging site. Avista will work with industry partners and contractors to achieve and maintain this performance benchmark.

Public DCFC

Public DCFC will play an increasingly important role for reliable and fast public charging of light duty vehicles, for both longer distance and intra-city travel. Building upon the success of the EVSE pilot, Avista will continue to build out DCFC sites along major travel corridors and in urban areas for public charging. This will be accomplished in partnership with local stakeholders and in alignment with state agency guidance and the degree to which EV adoption requires support, reviewed on an annual basis. DCFC owned and maintained by Avista will complement DCFC installed outside of Avista's network, in a coordinated way that avoids overlapping coverage and appropriately supports EV adoption, while mitigating the costs and risks of overbuilding too far ahead of market needs and/or technology obsolescence and stranded assets.

Prioritized locations for public DCFC sites will be made through a deliberate process involving the WSDOT, regional transportation planners, community leaders, customer feedback, and other key stakeholder collaboration. Siting identification and selections for public EVSE will be prioritized according to assessed criteria including cost, accessibility, low-income support, nearby amenities, site host commitment, and utilization. Reputable evaluation methods and tools for DCFC siting prioritization will be considered and tailored for use as appropriate, with stakeholder engagement.[43]

Benchmarks for adequate EVSE infrastructure by 2025 include DCFC sites along travel corridors every 40 miles, and in prioritized urban locations for intra-city use at 1 DCFC port per 150 BEVs.[44] Longer term, as markets mature, this ratio may be increased to 1 DCFC port per 200 BEVs or more. Based on these benchmarks and baseline EV adoption forecasts, Table 10 shows the estimated DCFC infrastructure needed by 2025, when the EV market is expected to have reached an inflection point and a lack of public DC infrastructure would seriously impede market growth. This is on the order of 60 new DCFC sites, or 12 DCFC sites per year on average for the five-year period from 2021 through 2025.

At an estimated total cost of $150,000 per DCFC site, this equates to an investment of $1.8 million per year and a total of $9 million over five years for 30 DCFC sites. In comparison, Avista installed seven DCFC sites at an average cost of $128,000 during the three-year EVSE pilot from 2016 to 2019.

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[43] For example, see "Electric Program Investment Charge (EPIC) Final Report." Pacific Gas and Electric Company (2016).

[44] See Nicholas, et all (p. 13), Wood, et al (p. xi), and "Considerations for Corridor DCFC Infrastructure in California", (p. 11).

Table 10: Projections for light-duty EVs in Avista's service territory and required DCFC in 2025

	BEV	PHEV	Total EVs	EVs Owned by Avista Electric Customers	Corridor DCFC Sites	IntraCity DCFC Sites	Total DCFC Sites Needed by 2025	DCFC Installed as of 2019	New DCFC Required by 2025
Washington	3,764	2,509	6,273	5,521	25	25	50	9	41
Idaho	1,129	923	2,052	1,313	13	8	21	1	20
Total	4,893	3,433	8,326	6,834	38	33	71	11	60

Avista will plan to install 5 new DCFC sites in 2021 owned and maintained by the Company, ramping to 7 DCFC sites in 2022 and 9 sites in 2023 and 2024—a total of 30 out of an estimated 60 required sites, or 50% of the estimated market requirement by 2025. Plan adjustments to the number of new sites and expansion of existing sites will be made with stakeholder involvement, based on annual evaluations of EV adoption, respective EVSE market needs, and the number of DCFC installations owned by third-parties. Ideally, third-party ownership makes up 50% or more of the regional installations, with the support of the "make-ready" policy and the pilot EV TOU rate schedule used for public DCFC.

Effective buildout along major travel corridors including I-90, I-95, US 395/195, US 2 and US 12 in Avista's service territory requires extending the initial DCFC network in eastern Washington to target sites in Sprague, Clarkston, Chewelah, Colville, Deer Park, Davenport, Airway Heights, Cheney, south Spokane and Newport in Washington, as well as Post Falls, Coeur d'Alene, Sandpoint, Bonners Ferry, Spirit Lake, Hayden, Rathdrum, Orofino and Grangeville in Idaho. Some of these strategic locations are not served by Avista electricity and will require investment by other organizations and/or grant funding. The maps below show existing DCFC and a preliminary DCFC buildout plan along major travel corridors in the region and in the Spokane metro area. Note that this is relative to higher traffic patterns shown by red "heat" marks correlating with greater than 25,000 average daily vehicle traffic, and does not include DCFC sites available only to Tesla vehicles.

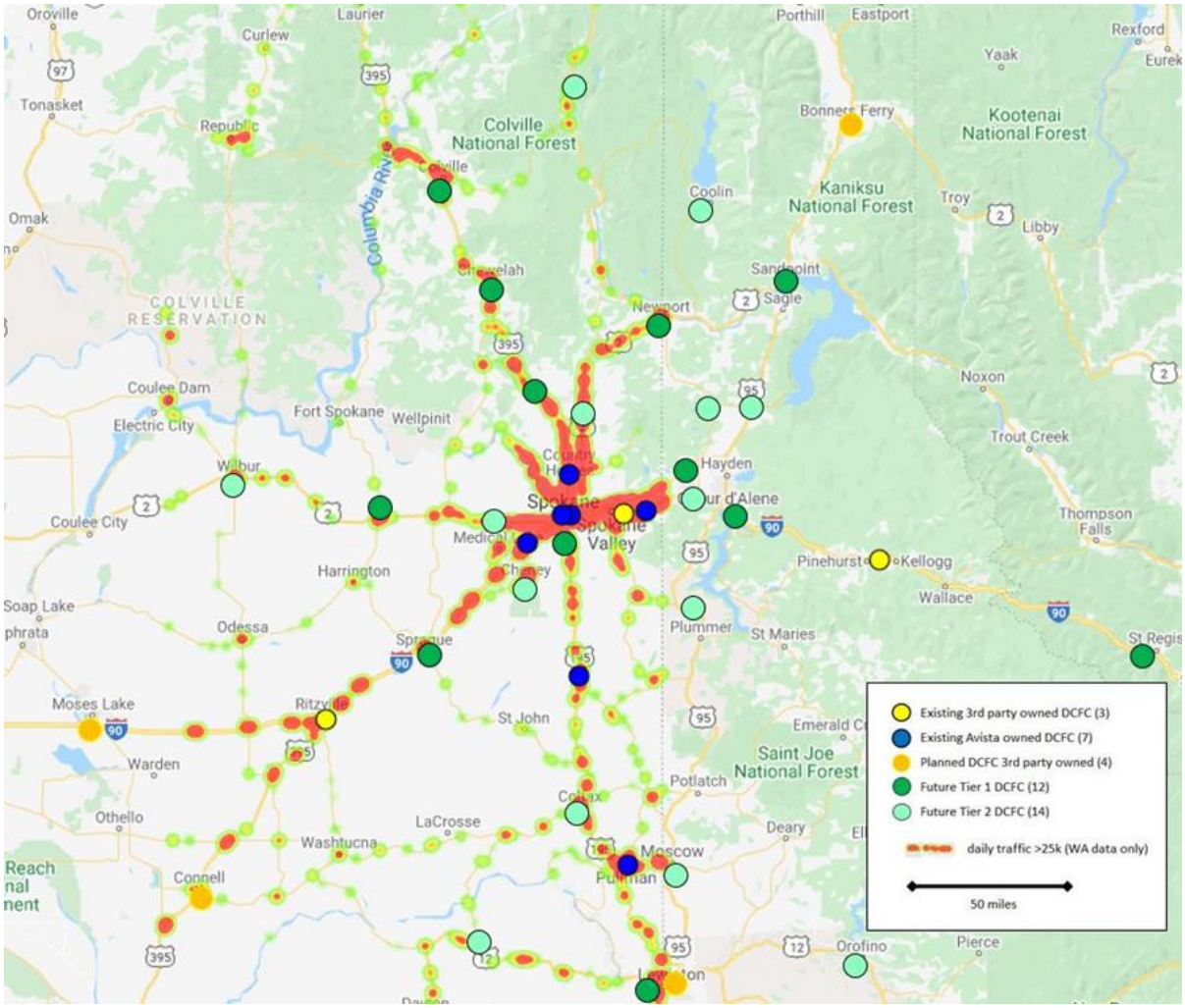


Figure 23: Preliminary DCFC buildout plan for regional travel corridors (2020-2024)

In more populated areas, DCFC buildout is targeted at 1 DCFC site per 150 BEVs registered in each zip code, including DCFC sited at locations supporting TNCs and high-traffic locations, such as the Spokane International airport and major shopping centers. The map below shows the EVSE buildout plan for the Spokane metro area, as developed with local leaders including the Spokane Regional Transportation Council, the City of Spokane, Urbanova, and other local leadership as part of the recent grant application for the Clean Energy Fund—Electrification of Transportation Systems, administered by the Washington State Department of Commerce.

DCFC site under construction at Wandermere shopping center, in partnership with Washington Trust Bank (2018)

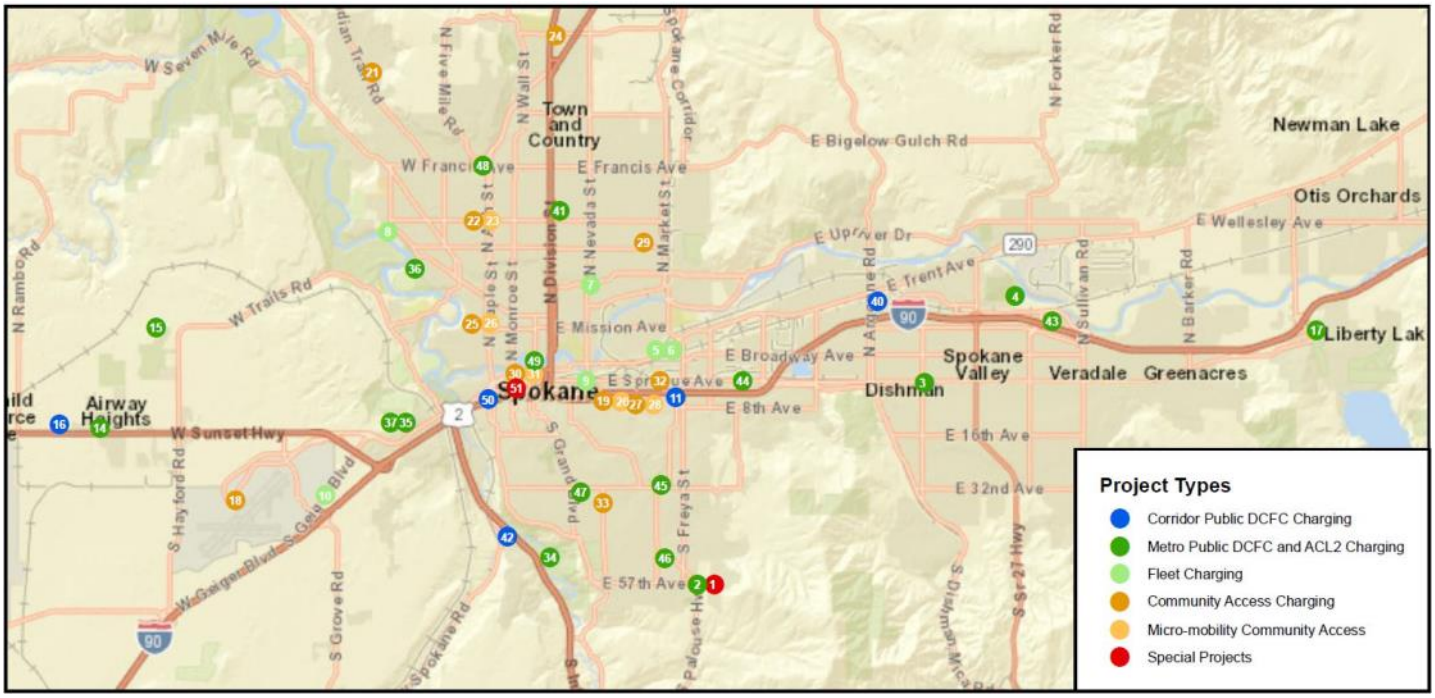


Figure 24: Preliminary EVSE buildout plan for the Spokane Metro area (2021– 2024)

DCFC sites should be “future proofed” where practical, with additional capacity allowing for low-cost expansion as EV demand grows. The illustration below shows standard plans for the DCFC sites installed in the EVSE pilot, allowing for low-cost expansion from 50 kW DCFC to 150 kW DCFC and additional dispenser units and parking stalls in two construction phases.

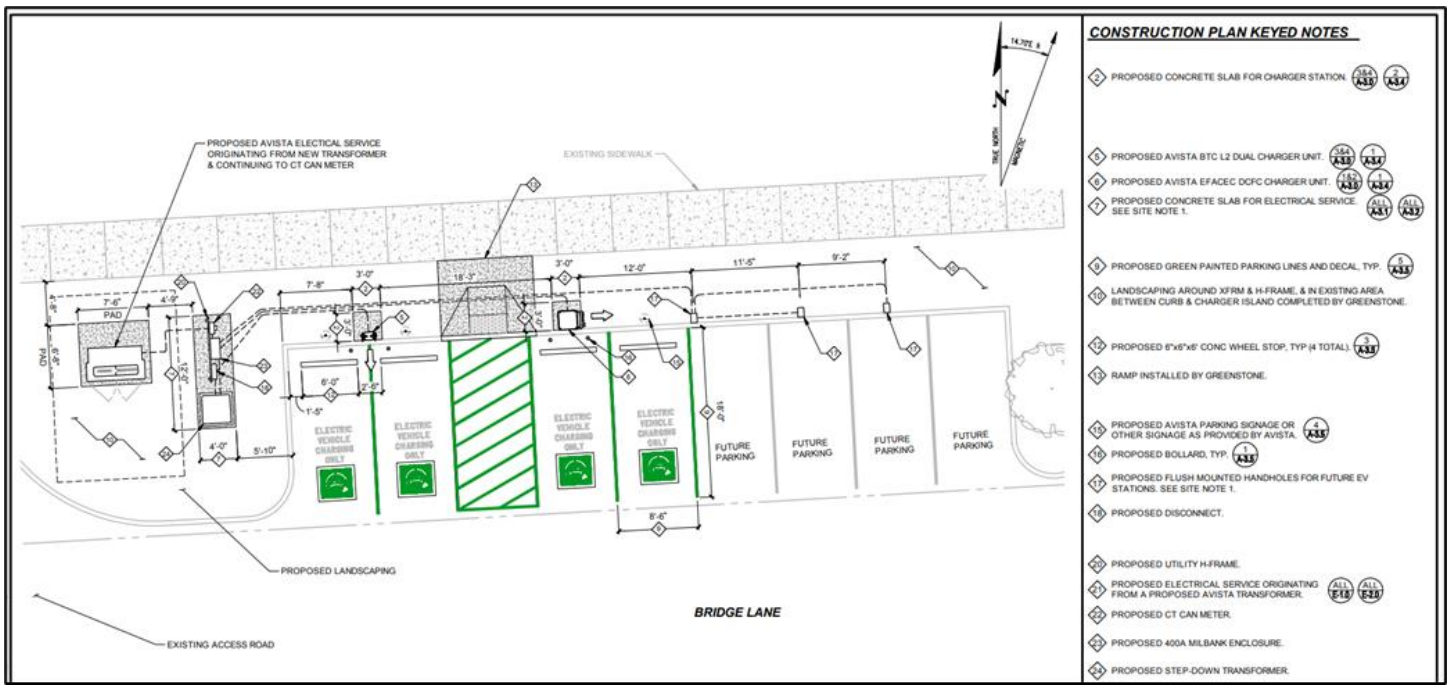


Figure 25: Standard DCFC site design for the EVSE pilot (2016—2019)

Standard DCFC installations in the EVSE pilot included a dedicated 225kVA transformer, 50 kW DCFC and a dual-port AC Level 2 backup EVSE in the first phase of construction, serving four parking stalls. Additional infrastructure capacity allows for low-cost expansion in the second phase of construction with an additional 150 kW DCFC, up to three dispenser units, and four additional parking stalls.

DCFC sites require both CHAdeMO and CCS-1 port connections, allowing for all drivers with different DC port connection standards to use the EVSE (Tesla drivers can use the DCFC with a purchased adapter for the CHAdeMO connector only in North America). DCFC owned and maintained by Avista require a user fee, currently set at $0.35/kWh in Washington State and regulated by the Washington UTC. A property easement or access agreement with the property owner is necessary for DCFC sites for a period of at least 10 years correlating with the estimated service life of the DCFC equipment.

New standard DCFC site designs are in process, incorporating the latest proven technologies and industry best practices. A standard 1MW site plan is envisioned, with two 175kW power dispensers installed in phase 1, and expansion capacity to add two additional 350kW power dispensers in Phase 2. Options beyond the standard design include on-site solar power, energy storage and micro-mobility charging. These options may be pursued as a technology demonstration project with local and industry partners.

All DCFC will meet network interoperability requirements to help mitigate long-term operational risks, and will include payment capability through credit-card readers so that customers may easily and seamlessly access all DCFC in the network without mandatory network memberships or subscriptions.

For planning purposes through 2025, average cost for standard DCFC site designs is estimated at $150,000 per site, assuming DCFC power delivery at 150 kW or higher, and 225 kVA to 1500 kVA transformer capacity depending on site conditions.

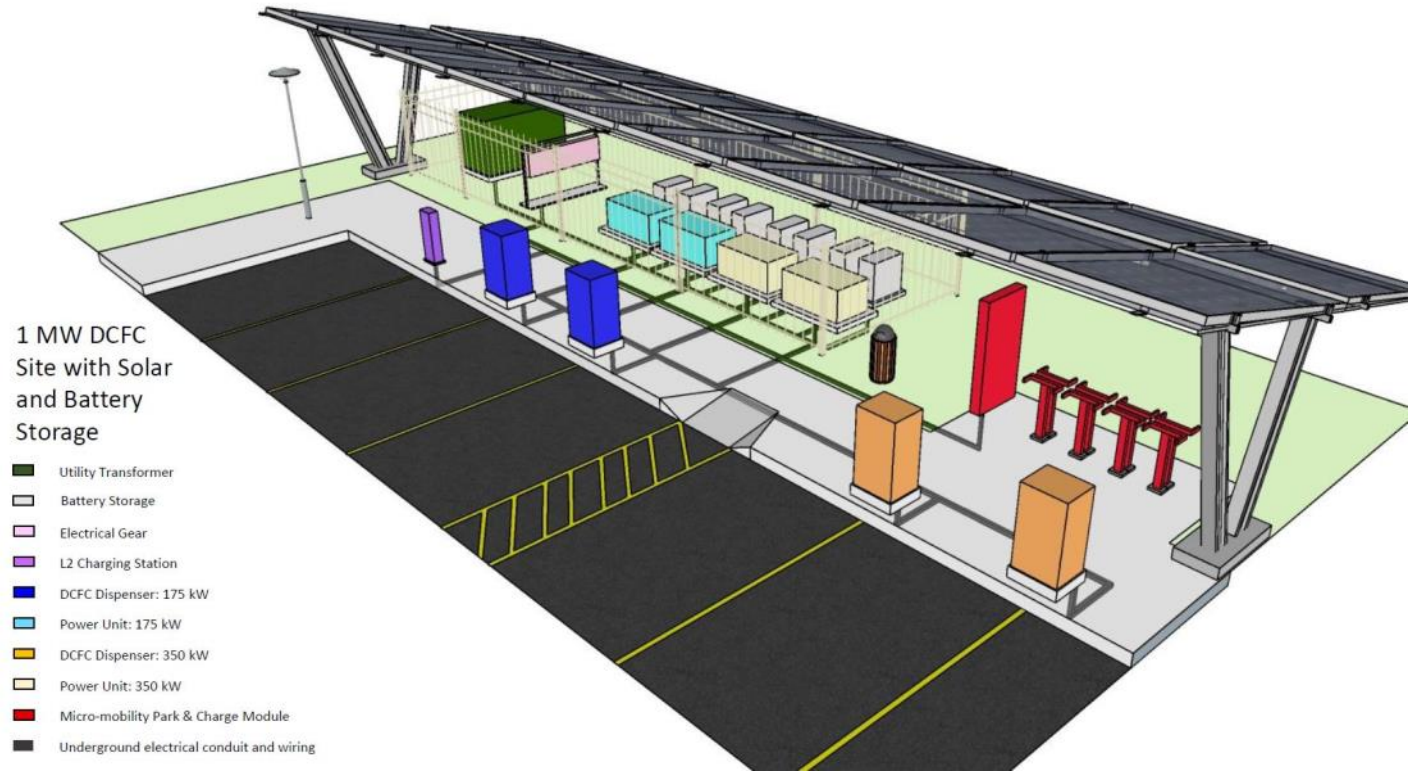


Figure 26: Concept layout for 1 MW DCFC site with solar, energy storage, and micro-mobility options

Public AC Level 2

AC Level 2 EVSE are very different from DCFC. They typically deliver less than 7.2 kW of power per port compared to 50kW or more for DCFC, and as a result, charging sessions are often much longer than the 30-minute average charging sessions for DCFC. Installation costs are also much lower, at an average of $12,000 per public ACL2 site compared to $128,000 for DCFC in the EVSE pilot.

The appropriate quantity of public AC Level 2 EVSE to support the market over the next five years is approximately one port per 25 EVs.[45] Given an estimated 8,326 EVs in the region in 2025, this equates to 333 AC Level 2 ports. Subtracting the 78 public ports currently installed in the area yields 255 ports for buildout, or 51 ports per year on average over the five-year period from 2021–2025. Assuming an average of 2 ports per AC Level 2 installation gives an estimate of roughly 25 new public AC Level 2 sites needed per year.

Another helpful guideline for public AC Level 2 buildout is related to the geographic distribution and coverage of high-traffic site locations with available EVSE. Customer feedback indicates that public AC Level 2 at all major shopping centers and large grocery stores, as well as major parks and other destinations, would be beneficial. Public AC Level 2 EVSE spread throughout the area in smaller rural towns could also provide a beneficial charging network that enables regional EV trips where the user intends to stop for several hours at a given location. This may be accomplished at relatively low installation cost compared to DCFC, and provides more equitable access to EV charging for early adoption in these areas.

Public and workplace EVSE installed at a neighborhood shopping center (2018)

Avista will plan to support up to 12 sites per year for public AC Level 2 buildout in the region from 2021 through 2025 – roughly 50% of the estimated market need. Application and selection rounds will be made each year, involving local stakeholders including regional transportation planners and community leaders. Selection criteria will be based on factors including cost, access, low-income support, geographic diversity, nearby driver amenities, projected utilization and site-host commitment. Avista will coordinate installations, covering 50% of premises wiring installation costs up to a maximum of $2,000 per port, similar to the installations completed in the EVSE pilot. This amount may be reduced in the future as market conditions change. Additional conduit allowing for low-cost future expansion will be included where practical.

Non-networked EVSE will be encouraged due to their proven higher reliability and lower costs. However, some site hosts may require the EVSE to transact a user fee or collect data. In these cases, site hosts may choose from networked EVSE certified as meeting interoperability standards, but will be responsible for fees and maintenance associated with the network service provider (EVSP). Site hosts may also set the user fee at their discretion, with consultation available from Avista and the EVSP to set an appropriate fee in-line with other fee-based EVSE in the market. Public EVSE applying user fees should have credit card readers installed to ensure convenient access by all users.

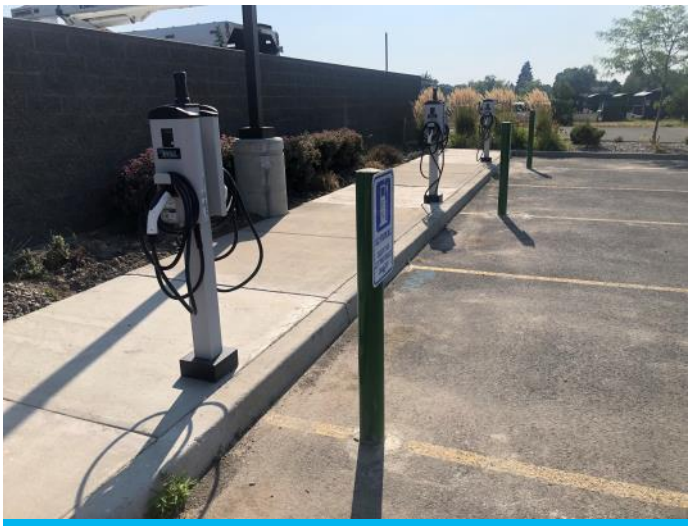
In the future, Avista may consider an EVSE lease and/or rebate program, maintenance fees, and modifications to “make-ready” offerings for commercial customers, provided assurance that effective load management development, EVSE access, reliability, and cost controls may be achieved.

[45] See Nicholas, et all (p. 13), and Wood, et al (p. xi)

Workplace, Fleet and MUD AC Level 2

Workplace, fleet and multiple-unit dwelling (MUD) EVSE installations are critical to support adoption and provide net grid benefits. Workplace charging in particular is of major importance, as it has been shown to be a cost-effective, powerful catalyst for EV adoption while reducing amount of charging that would otherwise occur during evening on-peak periods.

Avista will support EVSE installations in this category owned and maintained by the utility, accepting customer applications on a first-come, first-served basis subject to eligibility requirements. Avista will cover 50% of premises



Workplace and Fleet EVSE installed for the City of Spokane (2019)

wiring costs up to a maximum of $2,000 per port, similar to the installations completed in the EVSE pilot. This amount may be reduced in the future as market conditions change. The number of ports and configurations are dependent on site-specific conditions, limited according to the number of existing EVs that will utilize the EVSE and assessments of near-term and long-term adoption potential according to the size of the organization and facility. Where feasible, additional conduit will be installed enabling low-cost future expansion.

Avista will offer a reliable and low-cost non-networked EVSE, typically delivering between 3.3 kW and 7.2 kW per port. In most cases, EVs in these locations may be expected to charge for longer periods of time at lower power levels. Off-peak charging will be maximized by enrollment in load-management programs including vehicle programming, non-networked programmable EVSE and vehicle telematics. In all cases, the customer agreement allows the utility to perform load management where practical for workplace, fleet and MUD sites, and the customer agrees to future application of TOU rates to encourage off-peak charging. In most cases it is expected that lower costs will result from utilizing available capacity in existing supply panels; however, those sites with segregated meter service to EV charging loads will be eligible for the pilot EV TOU rate.

In the case of workplace, fleet or public installations, if the customer desires a networked AC Level 2 EVSE that enables user payments, they may choose from certified EVSE that have passed interoperability and reliability testing. The customer will be responsible for any EVSP fees and maintenance, and may set the user fee at their discretion with consultation available from Avista and the EVSP, similar to public EVSE.

Alternatively, customers in these locations may choose to own and operate their own AC Level 2 EVSE, or act as site host for other third-party ownership. “Make-ready” utility investments as previously described and a commercial EV TOU rate are intended to help support and encourage third-party ownership.

In the future, Avista may consider an EVSE lease and/or rebate program, maintenance fees, and modifications to “make-ready” offerings for commercial customers, provided assurance that effective load management development, EVSE access, reliability, and cost controls may be achieved.

Residential AC Level 2

The residential EVSE program supports adoption and dealer engagement, and provides a pathway to develop cost-effective load management where the large majority of charging will occur. Avista will support EVSE installations in this category owned and maintained by the utility, accepting customer applications on a first-come, first-served basis subject to eligibility requirements. Avista will cover 50% of premises wiring costs up to a maximum of $1,000 per port, similar to the installations completed in the EVSE pilot. This amount may be reduced in the future as market conditions change.

For residential installations, a reliable and low-cost non-networked EVSE is installed, with load management achieved by programming the vehicle or the EVSE to charge during off-peak hours. A smaller subset of customers will be enrolled in telematics data collection and load-management tests, which will allow for ongoing load profile monitoring and new load-management experiments communicating directly with the EV, rather than through a networked EVSE.

Customers may select a certified EVSE of their choice but will be responsible for any additional costs, including EVSP fees that may apply. In all cases, customers agree to participate in future TOU rates and replacement of the EVSE at Avista's discretion with new products enabling robust load-management experimentation.

In the future, Avista may consider a lease and/or rebate program offering, maintenance fees, and/or networked EVSE utilizing AMI equipment for residential customers, provided assurance that effective load management development, reliability and cost controls may be achieved. For at least the near term, the proposed residential program achieves desired outcomes of greater EV adoption, EVSE reliability, dealer engagement and development of load-management capabilities and benefits at least cost.

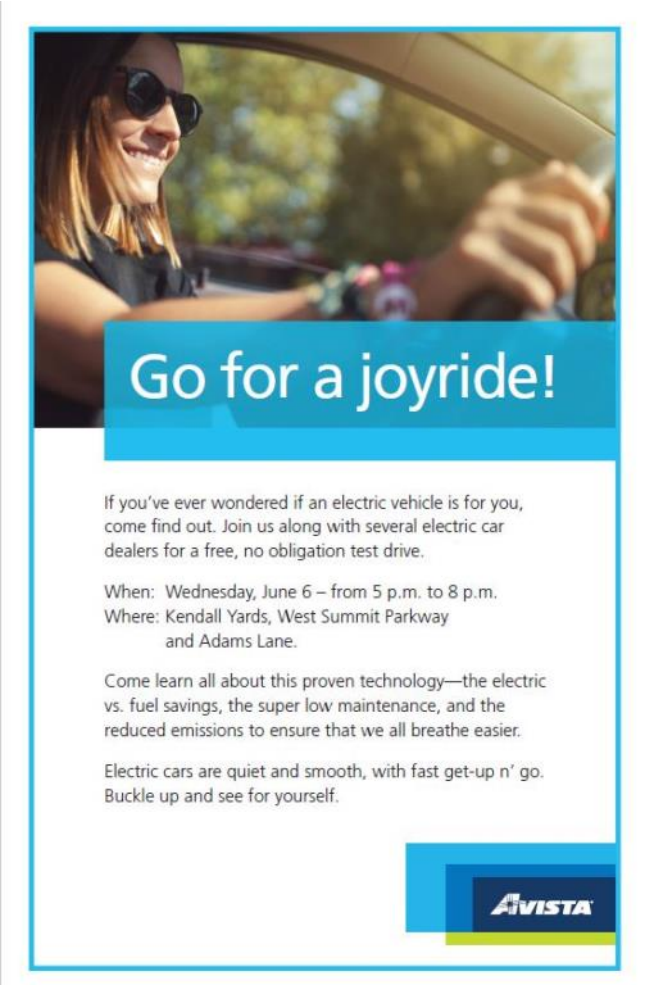
Residential EVSE installation with direct load management capability via homeowner WiFi and the Greenlots network (2017)

Summary – EVSE Installations and Maintenance

- 45% budget target
- > 99% EVSE uptime goal
- Programs support both Avista and third-party EVSE ownership, off-peak charging, and customer choice through “make-ready” options, load management and a pilot EV TOU rate.
- Coordinated public DCFC buildout, prioritized and selected with stake-holder engagement. Goal is to install 30 new sites owned by Avista by 2025, with another 30 owned by third-parties. Pilot EV TOU rate schedule applied in all cases.
- Public AC Level 2 selected with stakeholder engagement at up to 12 sites per year. Avista covers 50% of premises wiring costs up to $2,000 per port, with EV TOU rate applicability.
- Workplace, fleet and MUD installations on a first-come, first served basis. Avista covers 50% of premises wiring costs up to $2,000 per port, with load-management requirements and EV TOU rate applicability.
- Residential installations on a first-come, first served basis. Avista covers 50% of premises wiring costs up to $1,000 per port, with load-management requirements and future EV TOU rate applicability.

Education and Outreach

With respect to light-duty passenger vehicles, low awareness of EVs continues to pose significant market barriers for both residential and commercial customers. This is exacerbated by a persistent lack of new and used EV inventory, and generally low (although improving) interest and engagement of auto dealerships. In 2019, while most area dealerships carried minimal to zero EV inventory, over 50% of EV sales in the region occurred outside traditional dealer channels, through online sales dominated by Tesla and other used EV sales between private parties. While regional EV adoption rates have increased considerably in recent years, EVs are still less than 2% of new vehicle registrations – far short of entering the mass market at the 15% level.



Communications flyer for an EV Ride & Drive event — in partnership with Kendall Yards and Forth (2018)

Customer surveys and interviews showed that Avista's efforts to provide objective information about EVs and charging during the pilot were appreciated, with many suggestions and encouragement to increase these efforts in the future. Consultation with Plug-In America and interviews with area dealerships showed that Avista's dealer referral and EVSE installation pilot programs were well regarded and gaining traction in the dealer community by the time these programs were concluded in June of 2019. New and similar programs were universally requested among interviewed dealers, along with a strong desire to partner with Avista in the future to increase customer awareness and EV adoption.

The customer purchase journey starts with awareness, proceeding to the critical consideration stage, and closing with the purchase decision. Beyond awareness, customers often need trusted referrals and direct experience with riding, driving and charging an EV to overcome perception issues at the consideration stage and make a good purchase decision. It is clear that as a trusted energy advisor with strong customer relationships, Avista is in a unique position to address awareness issues—and to some degree, EV availability and experiential opportunities—to help customers make well informed transportation choices. This may be accomplished in a variety of ways, including continued customer support functions, new programs based on proven pilot successes, strengthened partnerships with dealerships, and exploration of new education and outreach efforts as follows:

1. Provide supportive customer programs and engage with automotive dealers, original equipment manufacturers (OEMs), and local interest groups to improve vehicle inventory levels, EV awareness and demand, and the customer purchase experience. This will include a $250 dealer referral per customer (limited to 100 referrals per year); a program offering installation of residential, fleet and workplace charging subject to load-management requirements; and periodic visits with area dealership management and sales staff. Within budget constraints, the Company plans to pursue EV education campaigns in partnership with area dealers and local media channels. Support and engagement of local peer-to-peer interest groups leveraging social media may provide the most effective results in terms of raising

public awareness and local demand for EVs. Depending on the results of further research, Avista may support informational kiosks, such as the Chargeway Beacon at area dealerships, as well as dealer EV training and certification programs.

2. Continue installs of public AC Level 2 EVSE across Avista's service territory, in partnership with local government and businesses. This will help provide a backbone of regional public charging infrastructure at low cost, and at the same time increase education and awareness due to public visibility and promotion, as well as provide benefits to disadvantaged individuals and communities in these areas.

3. Consider establishing an EV Experience Center in the Spokane metro area, where the public could learn in a hands-on environment about EVs, charging, incentives and utility programs—similar in some respects to the Forth showcase in Portland, Oregon. This could conceivably be combined with a check-in and check-out service for EVs available for rent through Turo, a charging hub for EV drivers using transportation network company (TNC) platforms such as Uber and Lyft, and purchase of used and new EVs in partnership with an experienced auto broker and/or dealers. If successful, this could provide substantially greater visibility and access to local and more remote EV inventories, as well as direct ordering channels, and effectively raise public awareness on a larger scale. Collaboration, partnerships and support from local organizations and individuals is important to success.

4. Support EV drivers using transportation network company (TNC) platforms such as Uber and Lyft. This may include installation of DC fast charging stations at key locations, reduced charging fees, and possibly assistance with vehicle leases and/or financing, in partnership with TNCs. This program could also be leveraged to benefit disadvantaged communities and individuals.

5. Continue customer support functions and activities in the following areas:

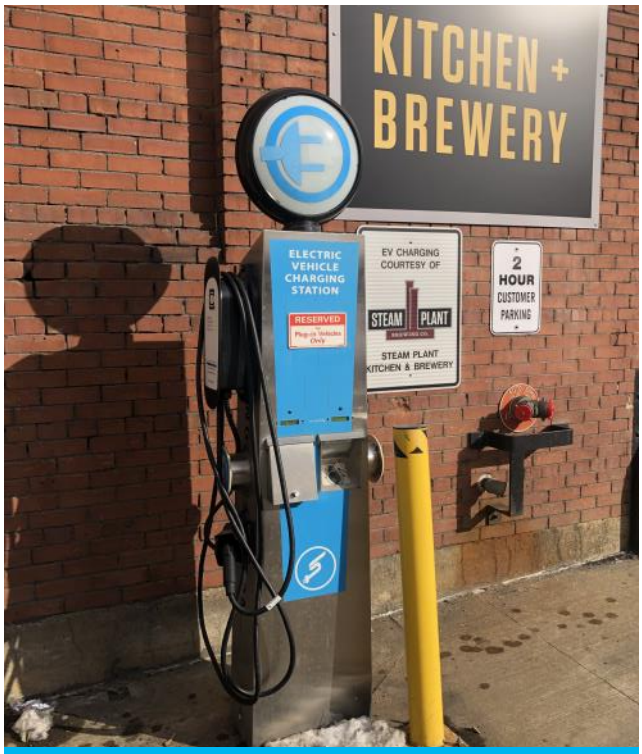
    a. Maintain Avista's electric transportation webpage with the latest information and tools, including state and federal incentives, utility programs, cost calculators, program information and application links, and FAQs.

    b. Promptly respond to customer inquiries via phone calls and email through the call center, with more experienced staff as needed for more detailed questions involving vehicles and equipment, charging options and requirements, utility infrastructure, etc. Increasingly, this may involve inquiries about commercial fleet opportunities.

    c. Support community events such as locally sponsored EV ride and drives during National Drive Electric Week.

    d. Provide informative presentations in a variety of forums, including community events and meetings with local government, industry groups and non-profit organizations, and public webinars.

    e. Promulgate important information about the benefits of electric transportation through various media channels, including earned news and trade media interviews, social media, bill inserts, newsletters and public signage.



Avista's first public EVSE at the Steam Plant in Spokane, WA — in operation since 2010

Summary – Education and Outreach

- 10% budget target
- By 2023, raise positive customer EV awareness by 500%
- $250 dealer referrals, limited to 100 per year
- EV education and awareness campaigns
- Peer-to-peer interest group and TNC support
- Consider informational kiosks, training and certification programs at auto dealerships
- Consider partnering to establish an EV Experience Center, providing education, charging, rental and purchase support
- Continue customer support functions, including online information and tools, call center support, and sponsorship

Community and Low-Income Support

Electric transportation has the potential to deliver improved transportation services to communities and individuals most in need with economic cost savings as well as environmental benefits. Avista is committed to help provide these benefits for the disadvantaged communities and individuals it serves.

According to a United Way report, 47% of Avista's residential customers in Washington are living in poverty or struggling with basic living costs.[46] In 2019, the Spokane Transportation Collaborative was formed, convening area service organizations around the issue of access to mobility resources—recognized as the most serious issue following the lack of adequate housing. Electric transportation can make a difference in alleviating this problem.

The Company believes that programs and strategies benefiting low-income customers are best designed in collaboration with stakeholders, as accomplished both in the EVSE pilot and the development of proposed activities in this TEP. Through traditional low-income assistance and outreach programs over many years, Avista has established strong partnerships with community service organizations throughout its service territory. These partnerships proved to be very valuable in swiftly designing and implementing new and effective programs in the EVSE pilot. The Company will continue to work with established community partners as well as others that may provide access to broader networks as appropriate. In particular, Avista intends to partner with the Spokane Transportation Collaborative, the City of Spokane, and Urbanova to most effectively understand transportation issues and how they may be addressed with future electric transportation and mobility programs supported by Avista in the Spokane area. Recent efforts with these groups helped form a consensus around prioritizing a network of EVSE at public libraries and community centers which may be used to benefit low-income customers, as well as creatively leverage service organization resources—opening the door to increased, low-cost access to electric transportation services and public transportation. Additionally, Avista will work with local government, tribal governments, and other non-profit organizations throughout the region, tailoring programs to their specific needs and opportunities.

Internally, administrative support will be provided by the Consumer Affairs Program Manager who regularly oversees traditional low-income assistance, education and outreach programs, however transportation programs will not compete with resources for established low-income conservation and rate assistance programs.

In the EVSE pilot, Avista successfully collaborated with over 15 local service organizations to educate and discuss electric transportation opportunities in a series of workshops, culminating in selection of two pilot proposals from different community service organizations in Spokane, providing EVs and EVSE utilized for a variety of beneficial purposes including transport to critical medical services, job skills training, shuttle services for overnight shelter and food deliveries. Each organization secured insurance and accepted responsibility for vehicle maintenance and operational costs. In both cases, the volume of transportation services was substantially increased while realizing transportation cost savings of 57% and 82%. Educational and awareness benefits for staff and management may further result in expanded EV adoption for personal and organizational use. Building on the success of the EVSE pilot, a similar approach will be used in partnership with the Spokane Transportation Collaborative and other local government and service organizations in the region.

[46] 2016 United Way Asset Limited, Income Constrained and Employed Report

As the used EV market develops, lower-cost options for reliable and inexpensive electric transportation will grow. The EVSE pilot showed that public EVSE installed in smaller rural towns may be broadly supported by the local community and are felt to provide benefits in terms of public visibility, community access and business development as part of the regional public EVSE infrastructure buildout. In many cases, these EVSE represent the lone public EVSE available for early EV adopters in those municipalities, making electric transportation viable for the first time. Leveraging EVSE infrastructure programs available to all customers, Avista will provide additional installation assistance to low-income communities and service organizations for public, fleet and workplace AC Level 2 EVSE, multiple-unit dwelling installations, and residential customers receiving low-income bill assistance. This can take the form of the utility covering EVSE installation costs that would normally fall under the customer's responsibility in these programs.

Research shows that transportation provided by TNC platforms such as Uber and Lyft are widely used by customers with limited transportation resources.[47] Exploring this opportunity, Avista will deploy a pilot program supporting TNC drivers serving disadvantaged communities through partnerships providing a combination of public EVSE utilized by TNC drivers, EV purchase or leasing, and discounted rides. This effort may also be used to provide easier "last-mile" access to public transportation.

Additional pilots may be designed and implemented with public transportation agencies and school districts that work in coordination with the TNC pilot or in a stand-alone capacity, provide "make-ready" utility investments, and/or maintain EVSE installations for transit fleets serving low-income customers.

Ride-sharing and car-sharing services appear to have some potential but can pose significant administrative burdens that reduce effectiveness.[48] In this area, Avista will consider partnering with an experienced organization such as Envoy to pilot ride-sharing and/or car-sharing services, for example, in a housing development serving customers with limited incomes.

[47] Brenneis, M. "TNC revolution may improve access for low-income communities." SSTI (2020). https://www.ssti.us/2018/07/tnc-revolution-may-improve-access-for-low-income-communities/

[48] Diaz, A. and Teebay, C. "The Future of Car Sharing: Electric, Affordable, and Community-Centered." Forth (2018).

Summary – Community and Low-Income Support

- 30% budget target
- Collaborate and partner with community stakeholders, local governments and service organizations in the development and implementation of creative programs. Leverage resources together to achieve effective results
- Provide EV and EVSE for community service organizations through collaborative and competitive proposals
- Provide EVSE to disadvantaged communities including rural towns and low-income multi-unit dwellings, and to residential customers receiving low-income bill assistance
- Develop and implement pilot programs with public transit agencies, school districts and/or TNC platforms as early as 2022
- Consider partnering with Envoy and/or other organizations, piloting ride-sharing and car-sharing services

Commercial and Public Fleets

Opportunities to support beneficial electric transportation in commercial and public fleets exist today and will grow in the future. Avista can begin to support this growth with information, tools and consulting services for commercial customers in their consideration of fleet electrification, including vehicle and charging information, utility rates and load management options, total cost of ownership (TCO) comparisons, referrals, and available purchase incentives and tax rebates. This may be provided now for light duty passenger vehicles and lift trucks (forklifts), followed by commercial delivery vehicles, airport ground support equipment and refrigerated trailer units in the future as markets further develop and more knowledge is gathered in these areas. The Company also intends to develop pilot programs working with transit agencies and school districts, in order to better understand the costs, benefits, grid impacts and support that Avista may best provide to help electrify these fleets. This may be accomplished in conjunction with beneficial services to low-income customers.

In addition to fuel and maintenance savings, zero tailpipe emissions, quiet operations, and beneficial utility revenues, commercial and public fleet electrification results in significant reductions in greenhouse gas emissions, as shown in Table 11 below.

According to local distributors and the 2019 Industrial Trucking Association (ITA) annual sales report, despite electric lift truck sales of over 60% of total sales in the U.S., local electric sales are on the order of 36% in Avista's service territory. This presents an opportunity to support increased electric lift truck sales, with resulting benefits for all utility customers. A new program supporting lift trucks is modeled after other successful utility programs in the U.S. The program provides information resources and lift truck (class 1) purchase incentives of $2,000 for buyers, and $250 for dealers. Per lift truck purchase, this will result in avoiding 16 metric tons of CO_2 tailpipe emissions, customer fuel savings of 76%, and $1,500 per year in beneficial utility revenue. Load-management services and consultation on EVSE installations will also be provided. An additional $1,000 purchase incentive is proposed for purchase of

Table 11: Avoided CO_2 reductions from electric transportation, net of grid emissions in the Pacific Northwest (McKenzie, p. 18)

	Avoided Emissions (metric tons CO_2)	
	High grid emissions at 0.5 lbs CO_2/ kWh	Zero grid emissions (100% renewable sources)
Personal Light-duty EV	13	21
Taxi and TNC EV	34	44
Electric Lift Truck (Forklifts)	42	52
Electric Parcel Delivery Truck	62	88
Electric Transit Bus	650	910

Table 12. Proposed incentives for lift truck, ground support equipment, and truck refrigeration unit electrification

Electric equipment type	Additional annual utility revenue per vehicle	Customer purchase cost premium	Customer purchase incentive	Dealer referral incen-tive	Annual fuel savings from electric	Potential for load shifting
Lift truck (class 1)	$1,500	$5,000	$2,000	$250	$2,600	Moderate to High
Lithium-ion batteries	-	$3,000	$1,000	-	-	Moderate to High
Ground support equipment	$2,250	varies	TBD	TBD	varies	Moderate
Truck refrigeration unit	$1,100	$3,000	TBD	TBD	$1,600	Low

Class 1 lift trucks utilizing lithium-ion batteries as opposed to lead-acid. This is based on customer interviews and market research showing that lithium-ion is often needed to make electric lifts feasible for outdoor applications or multi-shift operations, but presents additional upfront cost premiums.[49] Purchase incentives apply to new as well as "first time sales" of lease-return units, as many dealers lease the lifts and then sell them after a few years depreciation.

Fleet managers often choose to convert to electric for economic reasons, since operating an electric lift typically saves over 76% in fuel costs and roughly 40% in annual maintenance costs compared to a gas lift. However, electric lifts have an upfront premium cost of 30% to 40% compared to gas lifts. This premium imposes a market barrier for many organizations that would otherwise benefit from the residual cash flow and employee health benefits of switching to electric over the equipment's lifetime. Purchase incentives and information resources provided by the program are designed to effectively overcome these barriers.

For example, a local foundry served by Avista uses 60 forklifts around the clock on three shifts, all powered by propane. According to this customer, propane-powered forklifts are what they are accustomed to and there is uncertainty as to whether a switch to electric forklifts would be worth the effort and expense. The primary concern in this case is not the additional electricity expense, but rather the upfront cost of the equipment and the operational feasibility and risk associated with making the change. According to a local dealer, an average forklift rated at 5,000 lbs costs between $26,000 and $35,000, compared to an electric forklift that costs between $32,000 and $39,000, plus the cost of the EVSE at close to $3,000 prior to any rebates or incentives. Fuel cost savings vary but can often provide a payback period in a few years; however, many businesses require paybacks in fewer than two years in order to justify capital investments.

From a TCO perspective, an electric lift would have a payback period of approximately two years and over the course of seven years would cost 32% less than a gas lift, and 38% less than a diesel lift, as shown by the TCO comparison tool developed by the Electric Power Research Institute (EPRI).[50] There is also a variety of applications where electric lifts are superior to gas lifts, such as in operating environments that are indoors or have poor ventilation, and where the risk of exhaust contaminants prevents the use of gas lifts. Under regular-use conditions, a gas lift will emit over 16 metric tons of CO2 tailpipe emissions annually. An electric lift produces no tailpipe emissions, resulting in zero local emissions of air pollutants. Even after factoring in Avista's combined emissions from its mix of electric generation sources, an electric lift produces only four metric tons of CO2 annually, a 74% decrease of emissions compared to a gas lift.

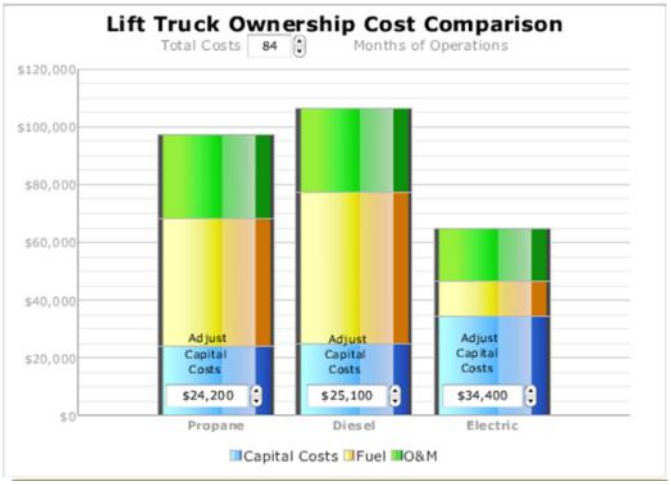


Figure 27: Total Cost of Ownership (TCO) for propane, diesel, and electric lift trucks (courtesy EPRI)

Due to flexible battery capacities, lifts are capable of operating multiple shifts back to back without recharging or swapping their batteries. Fully charged batteries can be swapped into lifts in a process that takes about 15 minutes when downtime needs to be minimized. Batteries can be fast or slow charged using single or three-phase power up to 10 kW, although usually charging is done between shifts at consistent intervals. As a result of this beneficial and often flexible load, the consistency of charging between shifts, reduced carbon emissions, and the ability to model other proven utility programs, electric lift trucks are an ideal candidate for Avista's first fleet electrification program utilizing equipment purchase incentives.

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[49] https://www.refrigeratedfrozenfood.com/articles/98521-allan-brothers-boosts-operation-effectiveness-with-lithium-ion-technology

[50] https://et.epri.com/LiftTruckCalculator.html

One model example is provided by the electric utility JEA serving Jacksonville, Florida. Prompted by the financial crisis of 2009, JEA began searching for new ways to support beneficial load growth, with a forklift electrification rebate as one of the pillars of their industrial electrification program.[51] Since 2015, JEA has helped customers purchase over 3,500 electric lifts through the program, adding over 64,090 MWh of load annually. JEA estimates that 72% of that usage is during off-peak hours. Customer representation is spread proportionally among small, medium and large businesses, with customers reporting benefits including improvements to their working environments and the removal of misconceptions of electric lifts as a result of converting from propane or diesel lifts to electric.

In a second example, the utility CenterPoint Energy headquartered in Houston, Texas has a long-standing industrial electrification program that includes electric forklift rebates.[52,53] The program has been operating since 2008 and has added 17.5 MW of primarily off-peak demand during the five years ending 2019. Key benefits of this program have been the ability to support beneficial electrification while also facilitating an avenue for positive interactions with the utility, increasing familiarity with the benefits of electrification among many customers and stakeholders. Sacramento Municipal Utility District (SMUD) provides another example, with forklift purchase incentives of $2,000 per lift to customers and $1,000 to vendors.[54]

Light-duty passenger vehicles will also be included for fleet electrification support, leveraging available EVSE installation programs as applicable. Similar programs may be proposed for other vehicle types in the future as the market continues to mature and attractive opportunities present themselves. This may include proposals for purchase incentives and EVSE programs as deemed most appropriate and cost-effective.

For both lift trucks and light-duty fleet EVSE installations, the commercial EV TOU rate may be applied with dedicated meter service. Load management consultation services will also be provided as part of the fleet support program.

Table 13: Lift truck market estimates for eastern Washington and Northern Idaho [55]

annual new lift truck sales, not including leases (all classes)	400
average service life (years)	10
total new and used lift trucks in service, not including leased units	4000
additional leased lift trucks in service	1000
total lift trucks in service, including leased units	5000
total lift trucks in service in Eastern Washington	3250
total lift trucks in service in Northern Idaho	1750
electric rider (Class 1) lift truck new sales	105
ICE rider lift trucks new sales	185
electric percent of total rider lift truck new sales	36%

[51] https://www.jea.com/Business_Resources/Rebates_for_Businesses/Electric_Forklifts/

[52] https://www.utilitydive.com/news/enhancing-customer-engagement-a-utility-roadmap-for-the-amazon-era/513195/

[53] https://www.power-grid.com/2016/11/22/utilities-offset-slow-load-growth-with-new-business-ventures/

[54] https://www.smud.org/en/Going-Green/Electric-Vehicles/Business

[55] see the following OSHA website for full descriptions of all forklift classes: https://www.osha.gov/SLTC/etools/pit/forklift/types/classes.html

Summary – Commercial and Public Fleets

- 5% budget target
- Initiate a fleet support program starting with light-duty passenger vehicles and forklifts
- Provide information and consulting services including vehicle and charging information, utility rates and load-management options, total cost of ownership (TCO) comparisons, available incentives, and referrals
- Provide dealer and customer purchase incentives for electric lift trucks to help boost sales, rapidly "paid back" by additional utility revenue
- Enroll participants in the pilot EV TOU rate to encourage off-peak charging
- Consider expanded fleet support services to other vehicle types in the future, including purchase incentives for airport ground support equipment and truck refrigeration units as early as 2022
- Support and possible purchase incentives for emerging medium duty and heavy-duty vehicles may be considered and proposed as the market and technologies develop
- Develop fleet support pilots with mass transit bus and school bus agencies in 2022—2023

Planning, Load Management and Grid Integration

Avista will continue to monitor and document EV load profiles, using a smaller test pool of customers with vehicle telematics connectivity starting in 2021. Updated EV load profiles and adoption forecasts will be integrated on a regular basis with System Planning and the Integrated Resource Plan (IRP). This will be used in conjunction with updated modeling of grid assets and conditions, other load forecasts, and the effects of distributed energy resources (DERs), providing a sound assessment of generation capacity and distribution systems for optimized asset management. More detailed analysis of EV clustering effects on the distribution system may also be performed, as sufficient data and modeling capabilities are developed.

Avista will deploy cost-effective load-management services leveraged with EVSE installation programs. This will initially be accomplished through EV programming and the utilization of low-cost, programmable, non-networked EVSE. Experimentation with new technologies and industry innovations will also be considered, such as the utilization of advanced metering infrastructure (AMI) and other technologies that communicate with EVs and other distributed energy resources, given the potential to optimally manage loads and integrate with the grid at scale. After careful consideration, Avista may elect to support EVSE hardware and software development if the market is slow or unable to deliver needed products and services that are cost effective. Residential TOU rates may also be considered and piloted with groups of customers participating in the EVSE program, starting in 2023. By 2025, the goal is to demonstrate greater than 50% peak load reduction from light-duty EVs than would otherwise occur with uninfluenced charging, thereby achieving grid benefits greater than expenses required to perform load management.

Developing scalable and cost-effective load-management solutions for a large number of light-duty EVs is important over the longer term—particularly as adoption levels reach approximately 30% of vehicles on the road—at which point the distribution system may begin to see material impacts. In the nearer term, the adoption of medium- and heavy-duty EVs for mass transit and other commercial fleet applications could impact local distribution grids much sooner, given power demands greater than 1 MW. As such, Avista will monitor developments closely and work with customers such as STA to better understand operational needs and limitations, as well as opportunities to optimally integrate with local grid conditions in terms of minimizing infrastructure costs.

AC level 2 EVSE site construction in partnership with WSU (Riverpoint Campus, 2017)

Other topics of interest include how expected adoption in each market segment may influence transformer and feeder conductor sizing, as well as feeder dynamics and voltage control requirements. The Company intends to study potential impacts via experimental pilots and solutions on a small scale in order to develop scalable, cost-effective deployments on a larger scale.

Summary – Planning, Load Management and Grid Integration

- 5% budget target
- Collect telematics data and analysis to provide updated light-duty EV profiles
- Leverage EVSE installation programs to continue development of load-management capabilities
- Achieve 50% peak load reduction from light-duty EVs, with net grid benefits by 2025
- Support load management for medium and heavy-duty electrified fleets, such as with mass transit agencies

Technology and Market Awareness

Avista will utilize a deliberate process of monitoring and validation of emerging technologies and market opportunities in electric transportation. During the initial monitoring phase, thresholds may be identified such as when TCO advantages appear feasible, emerging technical innovations, etc, that trigger the development of pilot programs testing technical feasibility, costs and customer experience. Pilots may lead to informed deployments that can scale up over the long term, achieving sustained benefits for all utility customers.

- EV vs. ICE vehicle costs
  - ◊ Up-front purchase
  - ◊ Fuel and maintenance
  - ◊ Total cost of ownership (TCO)
- Model availability and OEM announcements
- Auto dealer lot inventory
- Used market, private-party inventory

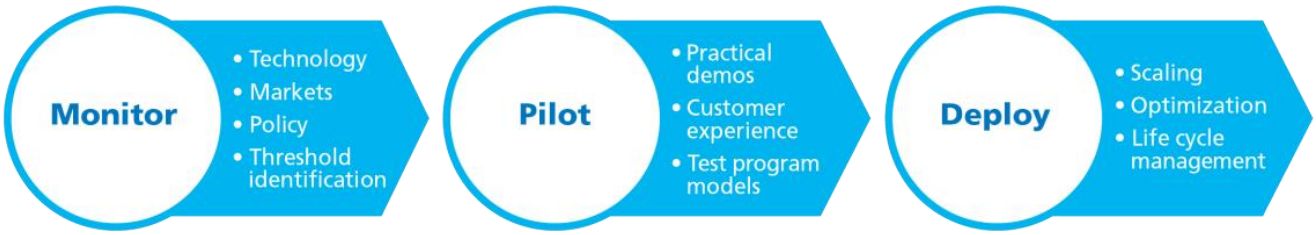

Figure 28: Technology and Market Monitoring and Testing Process

Rapid changes in a number of key areas are expected, as described in the previous Technology and Markets section, which Avista will continue to monitor. These areas include the following:

Batteries

- $/kWh
- Chemistry and thermal management
- Voltages
- Battery life and OEM warranties
- Recycling and second use for grid storage

EVSE

- Power output
- Communications interoperability
- Connector standards
- Inductive charging

Light-duty EV Market and Consumer Preferences

- Light-duty EV % of total vehicle sales
- % online sales

Medium- and Heavy-duty Vehicle Electrification

- Mass transit BEB adoption and TCO
- Electric lift truck % of sales
- Electric school bus TCO and pilot opportunities
- Electric commercial delivery vehicle availability and TCO
- Other electric heavy-duty vehicle availability and TCO
- Electrified truck-stop deployments and results
- Electric refrigerated-trailer deployments and results

Other Technologies and Market Opportunities

- Vehicle-to-home (V2H), -to-building (V2B), and -to-grid (V2G) deployments
- Micro-mobility deployments
- Load-management software platforms and interoperability testing
- Hydrogen-powered fuel cell EVs

Summary – Technology and Market Awareness

- 2% to 5% budget range
- Follow deliberate process of monitoring and pilots to validate and design scalable deployments
- Key monitoring areas include:
  - Battery technology
  - EVSE
  - Light-duty market and consumer preferences
  - Medium- and heavy-duty vehicle electrification
  - Other technologies and market opportunities

Rate Design

Residential EV Time-of-Use (TOU) Pilot Rate

In the long term, an EV TOU rate for residential customers may be one of the more effective ways to shift peak loads from light-duty EVs, maximizing net benefits for all customers. In this regard, experience with participants in the commercial EV TOU rate as explained below should be helpful in implementing a pilot EV TOU rate for residential customers. This rate may be proposed in 2023 and eventually applied on a larger scale utilizing Advanced Metering Infrastructure (AMI) that is now being deployed in Washington State.

Commercial EV Time-of-Use (TOU) Pilot Rate

Major barriers to increasing commercial electric transportation include high purchase costs of vehicles and charging infrastructure, limited vehicle models and availability, low consumer awareness, and high utility bills driven primarily by demand charges. Although the utility has little influence on vehicle models and availability, it can help address charging infrastructure and low awareness, as detailed in other sections of this Plan. Through new rate designs, it may also address the issue of high demand charges for commercial fleets and DC fast charging sites, while encouraging more off-peak charging.[56]

As an example, consider the case of the Spokane Transit Agency (STA), the main provider of public transit in the greater Spokane metro area. STA is in the process of purchasing four battery-electric buses (BEBs) for a new route serving the Moran Prairie and Monroe Street areas, to be placed in service in 2021 and, if successful, followed by another five to seven BEBs on this route. In addition, another ten BEBs will be purchased and operational beginning in 2022, serving a new central "City Line" connecting the urban core with rapid, zero-emission mass transit. All of these BEBs will be housed in a new depot facility near downtown Spokane. Given the state of current technology, plans are to charge the BEBs for up to ten minutes at one end of the route using a high powered 450 kW overhead charger, and staggered charging at the depot overnight, with additional DC fast chargers each providing 450 kW. Purchase premiums are still very high for electric buses, typically $250,000 or more than the base cost of $500,000 for a diesel bus which may serve most routes in the Spokane area, plus additional EVSE costs, utility service upgrades, and backup generation facilities. STA has estimated these additional costs to serve up to 20 buses at over $2 million, or approximately $100,000 per bus. With lower projected costs for diesel fuel at $2.37 per gallon, STA projects monthly diesel fuel expenses for nine BEBs on the new Moran-Prairie-to-Monroe-St. route at $18,100. This compares to $15,300 monthly electricity bills for BEBs, approximately 45% of which comes from demand charges. With savings of nearly $3,000 per month in fuel costs, payback for the large upfront cost premiums does not occur under current electric rate schedules. Federal and state grants have mostly enabled early electrification plans at STA; however, the business case must be dramatically improved in order to fully electrify the entire fleet of over 140 coaches and many other smaller passenger vehicles.

DCFC site construction at the West Plains Transit Center and Park & Ride—in partnership with Spokane Transit Authority (2018)

The path to full electrification at STA will depend on technology and cost improvements that eventually allow for greatly reduced purchase costs and batteries with sufficient energy to operate a full day without in-route charging. At that point, economical depot charging may occur mostly overnight, without the need for in-route

[56] "Peak Demand Charges and Electric Transit Buses." CALSTART. US Dept of Transportation, Federal Transit Administration (2014).

charging that adds significantly to overall expenses. Additionally, more substantial operational cost savings could be realized by STA if a new rate schedule provides relief from demand charges, while encouraging off-peak charging. This is in fact a necessity to enable an expanded and sustained electrification of STA's fleet.

In another example, the important buildout of DC fast charging infrastructure and investment by third-parties is inhibited by high operating costs, particularly in the early stages of market growth where utilization is low. A DC fast charger with only 2% load factor is effectively billed $0.41/kWh under current rate schedules, making it impossible to recover these costs from competitive user fees of $0.35/kWh, which are roughly equivalent to the alternative of gasoline at $3 per gallon. In addition, as discovered in the EVSE pilot, DCFC typically require $1,500 per year in other operational expenses including site inspections and maintenance, EVSP networking fees, communication fees, and unplanned EVSE repairs.

In a recent study of 51 EV rate options from 21 electric utilities in the U.S., it was found that relatively few rate options were available to commercial customers, and that TOU energy charges without demand charges, combined with monthly fixed charges and seasonal differences were most common.[52] In Washington State, Pacific Power was approved for an optional TOU rate applicable to public DCFC sites with less than 1 MW maximum demand. Pacific Power's Schedule 45 includes a TOU energy charge between 6am and 12pm and 5pm and 9pm in winter, and between 1pm and 8pm in summer. TOU energy charges are gradually reduced and demand charges reinstated over a 13-year period in this optional rate schedule.

Based on these assessments, Avista proposes a pilot EV TOU rate for commercial customers that is essential to support sustainable growth in fleet electrification and public DC fast charging. The proposed rate provides for reasonable recovery of utility costs based on additional time-of-use (TOU) energy charges, while eliminating demand charges that currently inhibit market growth. In this way, it establishes sensible electric billing rates for businesses that invest in electric fleets and public charging, encouraging early and sustained fleet adoption, larger workplace charging facilities, and third-party ownership of public DC fast charging. Through higher on-peak price signaling, it also encourages more off-peak charging, which is beneficial to all customers. The intent is to encourage early commercial EV adoption in the Company's service territory while providing a means to acquire usage and cost data that may be used to conduct more comprehensive analysis and a more permanent EV TOU rate in 2025.

The new EV rate schedules will be made available to commercial customers, provided that EV charging loads are metered separately from other facility loads and peak demand does not exceed 1 MW. Above this threshold, load management may be required, and it must be demonstrated that all reasonable measures are being taken to mitigate impacts and required upgrades to the local distribution grid as a condition of utilizing the pilot rate. The TOU energy charge on the order of $0.05 per kWh is applied in addition to regular energy charges on a seasonal basis, during the hours of 7am to 10am and 5pm to 8pm from November through March, and 3pm to 7pm from April through October. Provisions of existing commercial rate schedules apply other than the removal of demand charges and the addition of on-peak energy charges, and rates will occasionally change slightly in accordance with regular system-wide adjustments.

For DC fast charging sites, assuming 2% load factor, this will result in an all-in rate per kWh of approximately $0.16, in contrast with $0.41 under current rate schedules. Compared to the competitive market-based user fee of $0.35/kWh which approximates $3/gallon of gasoline, the owner of a DCFC may then begin to recover operational costs for electric billing and maintenance costs. In the case of a transit agency such as STA operating 10 BEBs, assuming 19% load factor results in an all-in rate per kWh of $0.09 compared to $0.12 under current rate schedules. This provides for approximately 26% fuel cost savings on an order necessary to initiate pilot deployments of electric buses and the viability of more widespread fleet electrification.

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[57] "Review and Assessment of Electric Vehicle Rate Options in the United States." EPRI Report 3002012263 (2018).

Eligible commercial customers may choose to adopt the pilot TOU rate starting in 2021, with open availability through 2025. At that time, the Company intends to propose a more permanent EV TOU rate based on collected data and analysis completed during the 2021-2025 pilot period. Customers that initially participate in the pilot rate may then choose between the new EV rate, or elect to continue with the pilot EV rate for another five years through 2030. Early adopters are thereby given reassurance that the pilot rate may be applied through 2030 when they consider making sizable capital investments in new electric fleet and charging infrastructure with service lives of ten years or more.

A relatively small number of customers is expected to participate in the pilot TOU rate, minimizing risks while providing valuable data to study effects on local coincident loading patterns and impacts on the distribution system, enabling development of a more permanent EV TOU rate schedule.

Utility Fleet Electrification, Facilities and Employee Engagement

Utilities must set a good example for customers in electrifying their own fleets and facilities, as well as encouraging employee engagement around electric transportation. Long term, the utility can greatly benefit from transportation electrification in terms of reduced costs and greater reliability. By 2025, the Company's goal is to expand utility fleet, facility and employee engagement levels by 300%. In addition to realizing fleet and employee benefits, through direct experience in these areas the Company is better able to advise customers. Also, employees who drive electric act as respected ambassadors in the community, raising positive awareness and adoption of EVs in the region.

Avista fleet EV and facility EVSE for fleet, public, and workplace charging — Deer Park, Washington (2018)

Utility Fleets

Every year Avista's fleet of over 700 vehicles drives more than 7 million miles, fulfilling the mission of delivering safe and reliable energy. The mix of vehicles includes Class-1 light-duty passenger vehicles through Class-8 heavy tractors weighing in at over 105,000 pounds.

In 2010 Avista's fleet began the journey of transportation electrification with the purchase of two Toyota Prius PHEV conversions. That effort expanded to bring a Nissan LEAF into the fold when it arrived on the market in 2011. In 2011 we also began to invest in an electric Power Take-Off (ePTO) system. In 2014 Avista joined other utility fleet leaders in the development of Edison Electric Institute's (EEI) Transportation Electrification Initiative. That initiative won the commitment of over 77 investor-owned utility fleets to invest five percent or more of annual fleet spending on electrified transportation alternatives. To date that effort has doubled the goal of five percent with an average investment of over $95 million per year over the last four years.

Since making that commitment in 2014, Avista has invested in an expanding range of technologies aimed at demonstrating and proving out the best possible business cases for electrification in the fleet. These efforts include the expansion of EV, PHEV and range extending PHEV technology in passenger vehicles. Next the Company has looked to the significantly larger fleet of work trucks to identify vehicles where proven technology can meet required duty cycles.

Avista's testing and use of work platform systems has taken a number of forms. On large construction aerials a full ePTO system was used with great success, eliminating over 90% of the vehicle's monthly idle time. However, this system is expensive and packs a significant amount of weight on a unit that has very stringent state weight limits. With this in mind, Avista initiated trials using electrified idle-mitigation technology on small service body trucks and large aerials. Results with this technology have been less than what was modeled by initial analysis, as user adoption and technology gaps have created the most challenges in operating such systems in the fleet. This included issues with getting operators to consistently charge at home even when compensated for the electricity consumption, and to avoid system over-rides when it should have been engaged.

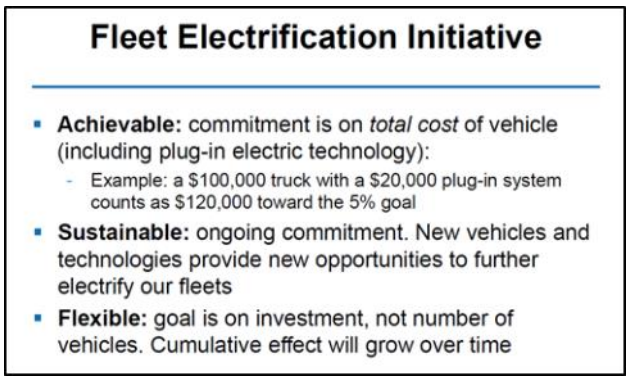

Figure 29: EEI 5% utility fleet electrification pledge

On the positive side, the systems eliminated battery issues on single-battery service trucks. Another lesson learned was the technical difficulty in integrating an idle-mitigation system with a complex cab chassis that already has many other chassis integrations, foremost among these being the starting and stopping of a chassis, and secondary cooling and heat.

The future of fleet electrification is dependent on the development and availability of cost-effective electrified Class-1, -2 and –3 pickup trucks that meet emergency response requirements. Passenger vehicles are the most widely available EV type but make up a small fraction of the company's fleet. At this time there is no cost-effective electric solution available from any of the three domestic truck manufacturers and conversion solutions have many issues. Looking ahead, for large trucks that have mounted equipment such as bucket trucks, the duty cycle of most of that fleet makes sense for electrification. These units, location dependent, tend to have a significant amount of idle time which can be reduced or eliminated. However, cost and weight as well as form factor impact that deployment today.

The good news is that multiple technology advances appear to be near or ready for market. The rollout of both light- and heavy-duty EVs has a future in the market place. However, as a utility fleet our requirements are different from that of a typical fleet operator. We can never forget that our trucks and crews respond to emergencies across our service territory, and in some cases across the nation when assisting other utilities in remote locations. With crews working 16 hours a day during these instances and up to 36 hours initially, we must have power systems that can reliably meet that demand. Our efforts will be focused on enabling our workers to respond day-in and day out-in support of Avista's core mission.

EVSE Facilities

Adequate workplace charging at Avista facilities coupled with effective employee engagement on electric transportation options can make a big difference in employee adoption, which translates to higher awareness and long-term EV adoption in the community.

EVSE installed at Avista facilities throughout the region can provide charging availability for visiting members of the public, as well as for utility fleet vehicles and employees commuting with an EV. This has been successfully demonstrated by EVSE installed at the Company's headquarters in Spokane, Washington, as well as a few other outlying offices. Avista will continue to install EVSE at facilities throughout its service areas at an appropriate level that allows employees commuting with an EV to charge at work, as well as for use by an expanded EV passenger fleet and the public at Company facilities.

Avista EVSE for fleet, public, and workplace charging — Spokane Project Center (2017)

Employee Engagement

In addition, Avista will provide information and resources for employees to better understand the benefits of EVs and to help make informed transportation choices, similar to education and outreach resources available to customers. EEI provides a wealth of knowledge and resources around the topics of electrification to help utilities in engaging their employees.

Finally, the Company will look to partner with OEMs offering EV purchase discounts to employees. At some point Avista may consider supplementing this with additional purchase incentives funded by shareholders, when EV availability and choices in the market would yield the greatest positive effects.

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Appendix A: Glossary of Terms

Sources: Altas HUB, Alliance for Transportation Electrification, Wikipedia, and from SEPA as adapted from the California Public Utilities Commission (CPUC) Vehicle Grid Integration Communications Protocol Working Group Glossary of Terms (http://www.cpuc.ca.gov/vgi/), 2017. These definitions are "working definitions" and are not meant to be formal or conclusive, with some editing by the authors.

AC, DC: alternating current, direct current. The U.S. electricity grid generally operates on AC. A typical household outlet is 110–120 VAC (volts alternating current). Larger home appliances use 240 VAC. Electric car batteries operate on DC.

AC Level 2 Charger: AC Level 2 (L2) chargers can be found in both commercial and residential locations. They provide power at 220V-240V and various amperages resulting in power output ranging from 3.3kW to 19.2kW.

AFDC: U.S. DOE Alternative Fuel Data Center website containing a wealth of information on alternative fuels and vehicles.

Aggregator: An aggregator is a third-party intermediary linking electric vehicles to grid operators. Increasingly, aggregators are stepping into a role of facilitating interconnections to entities that provide electricity service. Broadly, aggregators serve two roles: downstream, they expand the size of charging networks that electric vehicle (EV) customers can access seamlessly, facilitating back-office transactions and billing across networks; upstream, they aggregate a number of EVs and charging station operators (CSO) to provide useful grid services to distribution network operators (DNO) and transmission system operators (TSO).

AV: Autonomous vehicle is a vehicle that can guide itself without human input. There are various levels of autonomous technology as defined by SAE, from level 0 (no driving automation) to level 5 (full driving automation).

BEV (Battery Electric Vehicle): Battery Electric Vehicle is a vehicle with a drivetrain that is only powered by an onboard battery and electric motor(s).

CAV: Connected autonomous vehicle is an autonomous vehicle that has vehicle-to-vehicle or vehicle -to-infrastructure capabilities.

C2 Device: A telematics hardware device, from FleetCarma, that is capable of logging driving and charging data from electric vehicles.

CCS: The Combined Charging System is a charging method for electric vehicles from the SAE J1772 connector. The plug contains DC and AC options and is also referred to as a combo connector. The automobile manufacturers supporting this standard include BMW, Daimler, FCA, Ford, General Motors, Hyundai, Jaguar, Tesla and Volkswagen.

Charger: A layperson's term for the on-board or off-board device that interconnects the EV battery with the electricity grid and manages the flow of electrons to recharge the battery. Also known as electric vehicle supply equipment (EVSE).

Charge Session: A charge session is the period of time an electric vehicle (EV) is actively charging its battery through the connection with a charger (EVSE).

Charging: Charging is the process of recharging the onboard battery of an electric vehicle.

Charging Level: The terms "AC Level 1", "AC Level 2" and "DC fast" describe how energy is transferred from the electrical supply to the car's battery. Level 1 is the slowest charging speed. DC fast is the fastest. Charging rate varies within each charging level, depending on a variety of factors including the electrical supply and the car's capability.

Charging Station: The physical site where the electric vehicle supply equipment (EVSE) (also known as the charger) or inductive charging equipment is located. A charging station typically includes parking, one or more chargers, and any necessary "make-ready equipment" (i.e., conduit, wiring to the electrical panel, etc.) to

connect the chargers to the electricity grid, and can include ancillary equipment such as a payment kiosk, battery storage or onsite generation.

CHAdeMO: "CHArge de MOve" is the trade name of a quick charging method formed by Tokyo Electric Power Company, Nissan, Mitsubishi and Fuji Heavy Industries, and later joined by Toyota.

Connector: The plug that connects the electricity supply to charge the car's battery. J-1772 is the standard connector used for Level 1 and Level 2 charging. CCS or "combo" connectors are used for DC Fast charging on most American and European cars. CHAde-MO is the connector used to DC fast charge some Japanese model cars.

Demand Response (V1G, direct load management, controlled charging, intelligent charging, adaptive charging or smart charging): Central or customer control of EV charging to provide vehicle grid integration (VGI) offerings, including wholesale market services. Includes ramping up and ramping down of charging for individual EVs or multiple EVs, whether the control is done at the EVSE, the EV, the EV-management system, the parking lot EV energy-management system or the building-management system, or elsewhere.

DER: Distributed energy resource

DERMS: Distributed energy resource management system

Direct Current Fast Charger (DCFC): Direct current fast charging equipment is designed to rapidly deliver direct current to a vehicle's onboard battery. DCFCs commonly have power ratings of 50kW or higher.

Direct Install Costs: Corresponding to the direct costs associated with the installation of an EVSE. These costs include labor and materials for mounting the EVSE, wiring connections, network connections, signage, EVSE testing, and work to complete required permitting and inspections.

DOE: "Department of Energy" is commonly used to refer to the U.S. energy agency or a state energy agency.

DOT: "Department of Transportation" is commonly used to refer to the U.S. Dept of Transportation or a state transportation agency.

DR: Demand response (see "Demand Response")

DRMS: Demand response management system

E&O: Education and outreach

Electric Vehicle Service Provider (EVSP): An electric vehicle service provider also known as a network service provider (NSP), provides services related to chargers, such as data communications, billing, maintenance, reservations and other non-grid information. The EVSP sends grid commands or messages to the EV or EVSE (e.g., rates information or grid information based on energy, capacity or ancillary services markets; this is sometimes called an electricity grid network services provider). The EVSP may send non-grid commands (e.g., reservations, billing, maintenance checks), and may receive data or grid commands from other entities, as well as send data back to other entities.

Electric Vehicle Supply Equipment (EVSE): Electric vehicle supply equipment, also often called an EV charger, is stand-alone equipment used to deliver power to the input port connection on an EV. This device includes the ungrounded, grounded and equipment-grounding conductors and the electric vehicle connectors, attachment plugs and all other fittings, devices, power outlets or apparatus associated with the device, but does not include premises wiring.

ENERGY STAR for EVSE: Compliance standards for electric vehicle supply equipment to receive ENERGY STAR certification.

EPA: "Environmental Protection Agency" is commonly used to refer to the U.S. environmental protection agency or a state environmental protection agency

EPRI: Electric Power Research Institute conducts research, development and demonstration projects to benefit the public in the United States and internationally.

EV: "Electric vehicle" is the commonly used name for vehicles with the capability to propel the vehicle fully or partially with onboard battery power and contains a mechanism to recharge the battery from an external power source. EVs can include full battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs).

EVSE: See Electric Vehicle Supply Equipment.

EVSP: See Electric Vehicle Service Provider.

Fleet EVSE: EVSE for use by business owned vehicles.

GGE: Greenhouse gas emissions

GHG: Greenhouse gas

GMS: Grid Management System is based on an

architecture and guiding principles to proactively support changing requirements while minimizing disruption to existing operations, consumer commitments and regulatory requirements.

GSE: Ground support equipment is equipment used in airports, such as belt loaders, luggage tags and water trucks.

HDV: Heavy-duty vehicles have a gross vehicle weight above 26,000 pounds.

ICE (Internal Combustion Engine): ICE is an acronym for “Internal combustion engine.” ICE vehicles typify the majority of gasoline/diesel/natural gas vehicles that make up the majority of automotive fleet.

ICCT: International Council on Clean Transportation. ICCT is a research group and has published several reports transportation electrification

IEEE: Institute of Electrical and Electronics Engineers is a professional association whose objectives are the educational and technical advancement of electrical and electronic engineering, telecommunications, computer engineering and allied disciplines.

IEEE 2030.5: IEEE 2030.5 is a standard for communications between the smart grid and consumers. The standard is built using Internet of Things (IoT) concepts and gives consumers a variety of means to manage their energy usage and generation.

IEEE P2690: This standard defines communications between electric vehicle charging systems and a device, network and services-management system, which is typically based "in the cloud" but could also include interfaces to site-specific components or systems (e.g., building energy management systems).

IGP: Integrated grid planning

Interoperability: The ability of devices, systems or software provided by one vendor or service provider to exchange and make use of information, including payment information, between devices, systems or software provided by a different vendor or service provider.

IOU: Investor-owned utility

I**SO** 15118-1:2013: ISO 15118 specifies the communication between EV and the EVSE.

J1772: also known as a "J plug", is a North American standard for electrical connectors for electric vehicles maintained by the Society of Automotive Engineers (SAE) International, and has the formal title "SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler." It covers the general physical, electrical, communication protocol and performance requirements for the electric vehicle conductive charge system and coupler.

L2 Station: See AC Level 2 Charger.

LBEV (Long-Range Battery Electric Vehicles): LBEVs are BEVs (see BEV) that have an average driving range greater than 200 miles for a full battery charge.

LDV: Light-duty Vehicles have a gross vehicle weight at or below 14,000 pounds.

Level 1: Level 1 is part of the charging standard defined by the SAE for charging equipment using standard 120V household electricity.

Level 2: Level 2 is part of the charging standard defined by the SAE for charging equipment using 208V or 240V electricity, similar to the power level used for ovens and clothes dryers.

Load Curve: A load curve or load profile is a graph of electrical load over time. This is useful for utilities to determine how much electricity will need to be available at a given time for efficiency and reliability of power transmission.

Make-ready: Make-ready describes the installation and supply infrastructure up to, but not including, the charging equipment. The customer procures and pays for the charging equipment, which could be funded by a separate rebate or other incentive by the electric company or other entity.

Managed Charging: Managed charging allows an electric utility or a third party to control the charging of an EV remotely. This entity could enable or disable charging, or could control the power level for charging.

MDV: Medium-duty vehicles have a gross vehicle weight more than 14,000 and less than 26,001 pounds.

MUD: Multi-unit dwellings are a type of residence in which multiple housing units are located within a single building or building complex (e.g., an apartment complex, duplex, condos, etc). This is synonymous with a multi dwelling unit (MDU). EVSE at MUDs are intended for use by MUD residents. EVSE located on hotel or motel properties are also included within MUD session data in this report.

NEMA: National Electric Manufacturers Association

Networked EVSE: These devices are connected to the Internet via a cable or wireless technology and can communicate with the computer system that manages a charging network or other software systems, such as a utility demand response management system (DRMS) or system that provides charging data to EV drivers on smartphones. This connection to a network allows EVSE owners or site hosts to manage who can access EVSE and how much it costs drivers to charge.

NGO: Non-governmental organization

Non-networked EVSE: These devices are not connected to the Internet and provide basic charging functionality without remote communications capabilities. For example, most Level 1 EVSE are designed to simply charge a vehicle; they are not networked and do not have additional software features that track energy use, process payment for a charging session, or determine which drivers are authorized to use the EVSE. Secondary systems that provide these features can be installed to supplement non-networked EVSE.

NREL: National Renewable Energy Laboratory

NPV: Net present value is the sum of future cash flows using a discount rate, such that it takes into the account of the time value of money.

OATI: Open Access Technology International, Inc.

OEM: Original equipment manufacturer, commonly used to refer to automobile manufacturers.

OpenADR 2.0b: Open Automated Demand Response (OpenADR) is an open and standardized way for electricity providers and system operators to communicate DR signals with each other and with their customers using a common language over any existing IP-based communications network, such as the Internet.

OCPP: The goal for the Open Charge Point Protocol (OCPP) is to offer a uniform solution for the method of communication between charge point and central system.

PEV (Plug-in Electric Vehicle or PEV): see EV

PHEV (Plug-in Hybrid Electric Vehicle): Plug-in hybrid electric vehicle is a plug-in electric vehicle that can be powered by either or both a gasoline/diesel engine and/or an onboard battery.

Platform: The base hardware and software upon which software applications run.

Port: See Connector.

Premises Wiring: electrical supply panel and dedicated 208/240VAC circuits that suppy electricity directly to EVSE. This includes the protective breaker at the supply panel, wiring, final junction box, receptacle and all attachments and connections.

Proprietary Protocol: A protocol that is owned and used by a single organization or individual company.

Protocol: Set of rules and requirements that specify the business process and data interactions between communicating entities, devices or systems. Most protocols are voluntary in the sense that they are offered for adoption by people or industry without being mandated by law. Some protocols become mandatory when they are adopted by regulators as legal requirements. A standard method of exchanging data that is used between two communicating layers.

Public EVSE: Public EVSE can be found in multiple types of locations including but not limited to business parking lots, public buildings and adjacent to public right-of-way. Public AC Level 2 EVSE have a standard J1772 connector, while DCFC have a CHAdeMO and/or CCS connectors. Tesla vehicles may utilize public EVSE with an adapter; however, other EVs cannot use Tesla EVSE, as no adapters are available.

Residential EVSE: Located within a person's home, most often in a garage, residential EVSE are usually used by one or two EVs intended only for use by the homeowner.

Ride and Drive: Event where individuals are given the opportunity to look at EVs, talk with EV drivers, and ride in or drive an EV.

RPS: Renewable portfolio standard

OCPP (Open Charge Point Protocol): An application protocol for communication between EVSEs and EVSP servers.

Standard: An agreed-upon method or approach of implementing a technology that is developed in an open and transparent process by a neutral, non-profit party. Standards can apply to many types of equipment (e.g., charging connectors, charging equipment, batteries, communications, signage), data formats, communications protocols, technical or business processes (e.g., measurement, charging access), cybersecurity requirements, and so on. Most standards are voluntary in the sense that they are offered for adoption by people or industry without being mandated in law. Some standards

become mandatory when they are adopted by regulators as legal requirements.

Standardization: Process where a standard achieves a dominant position in the market due to public acceptance, market forces or a regulatory mandate.

State of Charge (SOC): The level of charge of an electric battery relative to its capacity.

TCO: Total cost of ownership is a financial estimate that accounts for both purchase price and continued, variable operating costs of an asset.

TE: Transportation electrification

Telematics: In the context of EV charging, including managed charging, telematics refers to the communication of data between a data center (or "cloud") and an EV, including sending control commands and retrieving charging session data.

TNC: Transportation network company is a company that connects passengers with drivers via a mobile app or website. Example companies include Uber and Lyft.

TOU (Time of Use) Rate: "Time of use" often refers to electricity rates that can vary by the time of day. TOU rates can also be structured to vary by season.

TRU: Truck refrigeration unit is a device that is installed in a truck to refrigerate a truck's storage compartment.

Use Case: Defines a problem or need that can be resolved with one or more solutions (technical and/or non -technical) and describes the solutions. The use case is a characterization of a list of actions or event steps, typically defining the interactions, describing the value provided and identifying the cost.

Uptime: Defines the amount of time an EVSE is functionally able to provide a charge when requested, as opposed to a faulted state where no charge may occur. Depending on configuration settings, networked EVSE may still be able to provide a charge and maintain uptime status when offline from the network connection.

Workplace EVSE: Workplace EVSE are located on business property, primarily intended for use by employees. However, often the business owner will allow use by visitors or the public if it is located in an accessible location.

V1G: V1G refers to vehicles only capable of receiving power from the electrical grid to the onboard battery. This can also commonly be referred to as demand response for EVs

V2B: "Vehicle-to-building" refers to vehicles capable of sending power from the onboard battery to a building.

V2G: "Vehicle-to-grid" refers to vehicles capable of receiving power to the onboard battery from the electrical grid and vice-versa.

V2H: "Vehicle-to-home" refers to vehicles capable of sending power from the onboard battery to a home.

VMT: Vehicle miles traveled

VPP: Virtual power plant (VPP) is a cloud-based distributed power plant that aggregates the capacities of heterogeneous energy resources for the purposes of enhancing power generation, as well as trading or selling power on the open market.

ZEV: Zero emission eehicle is a vehicle with no tailpipe emissions. The term includes battery electric vehicles and hydrogen fuel cell electric vehicles.

Appendix B: Light-Duty EV Adoption Forecasts

Based on estimates of population and vehicle statistics, the tables below show underlying assumptions and the total number of light-duty registered vehicles (not including motorcycles) as they grow over time in the counties served by Avista electricity in Washington and Idaho.

Table 14: Statistical assumptions for light-duty vehicles

0.757	estimated light-duty highway vehicles per person, excluding motorcycles
2%	annual growth rate of light-duty vehicle registrations
15	average vehicle age (years)
6.7%	annual vehicle stock turnover rate

Table 15: Total light-duty highway registered vehicles in counties served by Avista (not including motorcycles)

Year Ending	Washington	Idaho	Total	Annual Vehicle Stock Turnover
2019	512,297	243,311	755,608	50,374
2020	522,543	248,177	770,720	51,381
2021	532,994	253,141	786,135	52,409
2022	543,654	258,204	801,857	53,457
2023	554,527	263,368	817,894	54,526
2024	565,617	268,635	834,252	55,617
2025	576,930	274,008	850,937	56,729
2026	588,468	279,488	867,956	57,864
2027	600,238	285,078	885,315	59,021
2028	612,242	290,779	903,022	60,201
2029	624,487	296,595	921,082	61,405

Based on state registration data for 2019, total vehicle stock turnover each year, and assumed sales rates through year-end 2029, the following tables show the estimated number of EVs in the counties served by Avista electricity in Washington and Idaho for baseline, high and low adoption scenarios.

In the baseline adoption scenario, average OEM product and strong utility support programs result in a sales rate of 15% by 2030 in Washington, at this level sustainably reaching the early mass market. A damper of 25% is assumed for Idaho in the baseline scenario, given the current state of lower support levels and a more rural, less populated service territory.

Table 16: Baseline EV Adoption Scenario - EVs registered in counties served by Avista electricity

Year Ending	Washington	Idaho	Total
2019	1,331	409	1,740
2020	1,812	569	2,381
2021	2,339	744	3,083
2022	2,951	948	3,899
2023	3,728	1,206	4,934
2024	4,792	1,560	6,352
2025	6,273	2,052	8,326
2026	8,350	2,742	11,092
2027	11,250	3,707	14,957
2028	15,259	5,040	20,299
2029	20,505	6,784	27,289

In the high adoption scenario, strong OEM product is matched with strong utility support programs that result in a sales rate of 15% in 2027, at this level sustainably reaching the early mass market several years earlier than the baseline scenario, and reaching a sales rate of 40% by 2030.

Table 17: High EV Adoption Scenario - EVs registered in counties served by Avista electricity

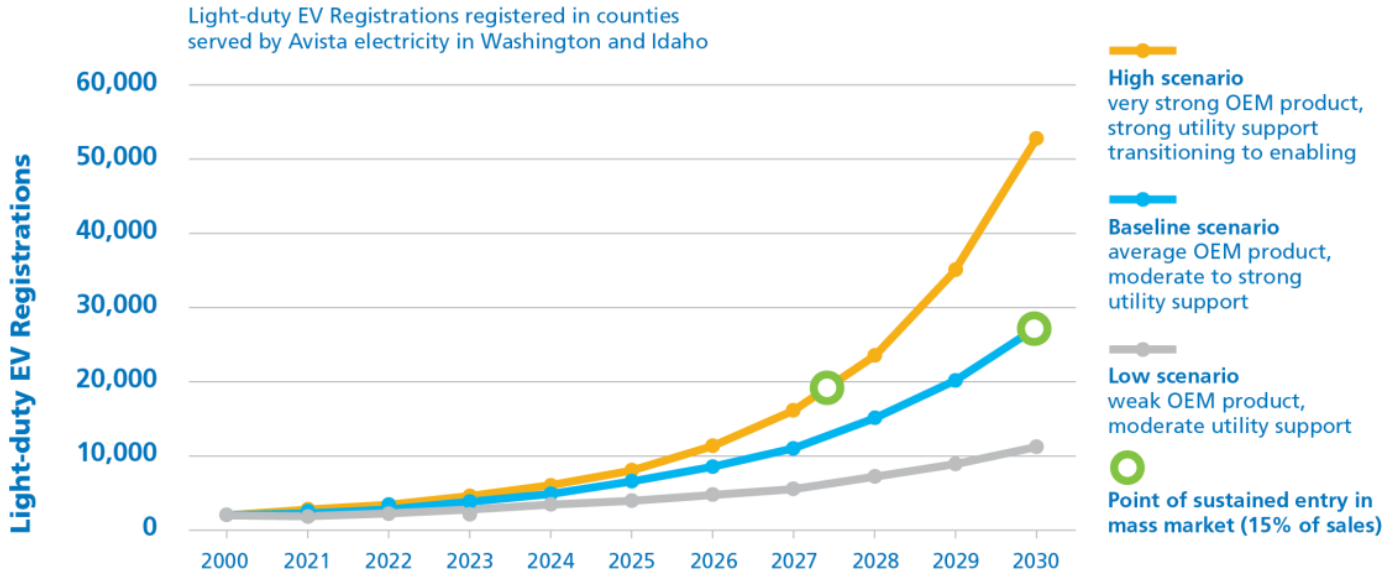
Year Ending	Washington	Idaho	Total
2019	1,331	409	1,740
2020	1,834	564	2,398
2021	2,467	758	3,226
2022	3,271	1,005	4,276
2023	4,418	1,358	5,775
2024	6,114	1,879	7,993
2025	8,624	2,650	11,274
2026	12,335	3,790	16,125
2027	18,013	5,535	23,548
2028	26,701	8,205	34,905
2029	40,610	12,479	53,090

In the low EV adoption scenario, relatively weak OEM product is appropriately supported by scaled-back utility programs, only reaching a 5% sales rate by 2030.

Table 18: Low EV Adoption Scenario - EVs registered in counties served by Avista electricity

Year Ending	Washington	Idaho	Total
2019	1,331	409	1,740
2020	1,455	447	1,902
2021	1,695	521	2,216
2022	2,002	615	2,618
2023	2,396	736	3,132
2024	2,899	891	3,790
2025	3,543	1,089	4,632
2026	4,368	1,342	5,710
2027	5,424	1,667	7,091
2028	6,776	2,082	8,858
2029	8,506	2,614	11,120

These tables are summarized in the chart below for total EVs registered in Washington and Idaho counties served by Avista electricity. An estimate of the number of EVs registered by Avista electric customers may be made by applying an approximate percentage of households served in each county to the total EVs registered. This percentage is currently



Sources: Washington and Idaho registration data; Bloomberg New Energy Finance Electric Vehicle Outlook, 2019 and 2020; "Economic & Grid Impacts of Electric Vehicle Adoption in Washington & Oregon." Energy and Environmental Economics (2017).

Appendix C: Stakeholder Engagement, Comments and Support

Development of the TEP followed from lessons learned during the EVSE Pilot, including insights gained through interviews and online surveys with customers, local stakeholder engagement, and best practices identified through networking at the state and national levels with organizations such as EEI, EPRI, ATE, Forth, leading industry representatives, and other peer utilities. As part of ongoing education and outreach efforts, the Company presents information to local organizations and solicits feedback regarding electric transportation programs in a number of forums and methods including webinars, in-person presentations, newsletters and bill-inserts, and will continue to do so as electric transportation markets and technologies evolve.

Following submission of the EVSE Pilot Final Report in October, 2019, the Company discussed lessons learned and high-level designs for the TEP with members of the joint TE stakeholder group in Washington State, including the Department of Transportation, Department of Commerce, and peer utilities, and presented to the group on November 14, 2019, at an in-person meeting in Olympia. Following submission of the draft TEP on March 10, 2020, a presentation to this group was made on April 1, 2020, soliciting helpful comments and suggestions.

On December 19, 2019, a telephone Townhall was held with local Washington stakeholders including 36 commercial customers and local government representatives. Key points about electric transportation and findings from the EVSE pilot were presented as well as ideas and feedback for the TEP.

Following several meetings with local service organizations in 2018 and 2019, the draft TEP was discussed at a meeting with the Spokane Transportation Collaborative held on April 3, 2020. Next steps with this group include reconvening in the fall of 2020 to solicit specific proposals for electric transportation projects benefiting low-income customers in 2021, in partnership with local service organizations and resources.

In early 2020, several meetings were held with the Spokane Regional Transportation Council (SRTC), the City of Spokane, Urbanova, STA, and other local government representatives in discussions regarding the TEP and the grant opportunity through Washington State's Clean Energy Fund, administered by the Department of Commerce. A workgroup was formed and workshops were held with local stakeholders led by SRTC, receiving strong support from stakeholders including the Spokane Tribe, Spokane International Airport, and the cities of Spokane, Spokane Valley, Cheney, Liberty Lake, and Airway Heights. This culminated in a grant application with a multi-year, regional EVSE buildout plan for Spokane County, including emphasis of innovation, education and outreach, and community and low-income benefits. The grant application proposals are in close alignment with the TEP, utilizing Avista EVSE investments as well as STA electrification investments as matching funds. If awarded, grant funding would provide a significant boost for beneficial EV adoption growth, electrified transit, benefits for low-income customers and learning in the region, and strong working partnerships and collaboration.

Regarding understanding and support for transit bus fleets, Avista and STA have held frequent meetings discussing electric transportation for several years, and Pullman Transit has been consulted as well to ensure the TEP effectively supports electrification of transit buses.

Following the draft TEP submitted March 10, the Company received questions, comments and support letters from a number of stakeholders (attached below). Followup discussions were held regarding these questions and comments with WSU, Climate Solutions, Renewable Hydrogen Alliance, NW Energy Coalition, Public Counsel, and UTC staff. A number of concerns and clarifications were discussed and addressed, including:

- consideration for a residential EVSE lease or rebate program in the future
- integrated management across TEP programs
- more detailed modeling of distribution system impacts as more data and forecasts are gathered, including "clustering" effects

- close ties to the Company's IRP and System Planning
- ensuring continued development of effective load management methods, particularly for residential charging
- more robust reporting requirements
- clarification of costs and benefits, especially as related to the IRP calculations
- consideration of hydrogen-powered EV technology developments
- encouragement to pursue school bus electrification
- strong support for education and outreach
- very strong support for programs benefiting disadvantaged communities and low-income customers, working with public transit in this regard, and the need to actively engage affected communities and groups in development and implementation of programs

In addition to stakeholder engagement in Washington, Avista has received many inquiries and requests from customers and stakeholders in Idaho regarding electric transportation issues and possible supporting programs in the State of Idaho for Avista electric customers. The Company is in the early stages of discussion with policy and regulatory staff in Idaho, in support of the TEP which must have a regional impact including programs appropriately tailored to Washington as well as Idaho territories, in order to be most effective.

SPOKANE REGIONAL HEALTH DISTRICT

1101 W. College Ave.
Spokane, WA 99201-2095

509.324.1500 | TEL
509.324.1464 | TDD
SRHD.org

May 14, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

Spokane Regional Health District (SRHD) is one of 34 local public health agencies serving Washington state. We have approximately 260 employees and serve a population of more than 500,000 in Spokane County. As a leader and partner in public health, we protect, improve, and promote the health and well-being of all people through evidence-based practices. In 2018, we were granted an electric vehicle (EV) by Avista through their Transportation Electrification program to help serve our clientele. We found that this grant was a great asset in transporting our clientele as well as brought transportation savings to our agency.

SRHD provides services to the people in Spokane County with some regional responsibilities, such as the Breast, Cervical, and Colon Health (BCCH) program and HIV Medical Case Management (MCM) serving 10 counties. We serve low income clients on Medicaid in our Women, Infant, and Children program; Opioid Treatment Services; Nurse Family Partnership; BCCH; MCM; HIV/STD Prevention services; and more. The number of clients served in each of these programs range from 180 up to 8,000 low income individuals.

The primary program using the EV is our HIV Medical Case Management (MCM). This program serves about 400 persons living with HIV/AIDS (PLWHA). The EV makes it possible to transport our clients to their medical and community support appointments, which staff were not allowed to do in their personal vehicles. Clients have household incomes at or below 400% Federal Poverty Level (FPL) with half at or below 138% FPL, who without medical transportation would miss or delay important medical, mental health, and other support service appointments resulting in poorer health outcomes. About 13% of these individuals are unstably housed or homeless. We use the vehicle to transport the clients to search for housing, which has been very successful in assisting clients in a low vacancy market. We also utilize the vehicle to deliver food to homebound individuals. When transporting clients, staff heard from them that this was the first experience they had with an EV.

The EV has produced cost savings for our case management program. The employee mileage reimbursement costs have been reduced by 60%, because staff are not driving their own vehicles for work purposes. Our client Lyft transportation program has a cost savings of over $1,000 a year as we are not having to utilize this program.

In addition, the staff found that charging the EV at SRHD is very convenient and easy to do. Throughout our EVSE grant program, we meet with Avista and other stakeholders quarterly to discuss our findings and the benefits to our agency with having access to the EV. The following year our agency discussed plans on purchasing a second EV because of the great successes we encountered through this grant.

SRHD highly supports Avista's Transportation Electrification Plan. We can successfully support the transportation needs of our low-income clientele, introducing many to an EV for the first time. We found the use of the EV very cost effective, reducing the overall program transportation costs significantly. In addition, SRHD is considering purchasing a second EV, because of the successes we experienced through the Avista grant.

Sincerely,

Amelia E Clark

Amelia Clark,
Administrator

SRTC SPOKANE REGIONAL TRANSPORTATION COUNCIL
421 W. RIVERSIDE AVE. SUITE 500 • SPOKANE WA 99201 • 509.343.6370 • WWW.SRTC.ORG

May 20, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey WA 98503

RE: Avista Corp. Transportation Electrification Plan

Dear Commissioners:

The Spokane Regional Transportation Council (SRTC) serves all jurisdictions within Spokane County for transportation planning services. SRTC has a federal designation as the Metropolitan Planning Organization and the state designation as the Regional Transportation Planning Organization. Our mission is to coordinate and collaborate across the region on various transportation plans, programs and policies. We strive to bring regional leadership, innovation and inclusiveness in the movement of people and goods in our region.

SRTC believes in a collaborative approach to transportation electrification to aid in market transformation and adoption. The SRTC Board of Directors will consider the goals and objectives outlined in the Transportation Electrification Plan to be adopted into the long-range Metropolitan Transportation Plan for Spokane County.

SRTC is currently working with Avista on a multi-jurisdictional grant application to leverage efforts and bring additional funding for electric vehicle supply equipment to the region. Avista has shown exemplary leadership and innovation in electrification and we look forward to a cooperative and supportive partnership.

Sincerely,

Sabrina C. Minshall, AICP
SRTC Executive Director
sminshall@srtc.org

PO Box 218, W 405 California St. | Garfield, WA 99130 | Phone: 509.635.1604
Fax: 509.635.1201 | garfield-town@completebbs.com | www.garfieldwa.com

May 7, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

Re: Avista's Transportation Electrification Plan

Dear Commissioners:

We are submitting this letter on behalf of the Town of Garfield in Whitman County. In Garfield we aspire to provide a friendly and peaceful place to reside with a housing market that is economical and diverse. Many of our adult residents who live in Garfield, drive between 20 and 40 miles each way for their daily commute.

Many of Garfield's residents are price sensitive when it comes to commuting to and from work and the cost of fuel in Garfield is typically 10% to 20% higher than fuel purchased in larger towns due to no competition. Once the price of electric cars decreases, there is a good chance that many residents will utilize the cost savings of an electric powered vehicle to get to their in-town destinations and employment. Currently there are 5 electric powered vehicles in this community of 600 people.

Avista has placed a fast charging vehicle electric charging station within the Town of Garfield. We were extremely excited they chose our park location to put this charging station and many residents and visitors express how happy they are to have this service within the town. When Washington State University is having their football games and other sporting events, many out of town tourist come through Garfield and this is a great service to provide them on their back routes to game day.

Avista does a wonderful job of fact finding and seeking out the services their clients need and want, and they put the time and energy into making their research become reality, even for small towns like Garfield. We fully support Avista in moving forward with this Transportation Electrification Plan and recommend approving the plan as presented.

Sincerely,

Jarrod Pfaff
Mayor, Town of Garfield
405 W California Street
Garfield, WA 99130

SPOKANE CITY COUNCIL
808 W. Spokane Falls Blvd.
Spokane, WA 99201-3335
(509) 625-6255

Breean Beggs
City Council President

April 20, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners,

We are writing to you today to formally state our support for Avista's Transportation Electrification (TE) Plan. The City of Spokane and Avista Utilities have had many partnerships over the years and always with the intent to make our community stronger and more resilient. We see this TE plan more as a regional transportation plan rather than simply belonging to one party, and we hope that the UTC will lend its support as well.

Electrifying the transportation sector is a vital step for Spokane in accomplishing both our greenhouse gas reduction targets as well as our 100% renewable energy goals. By partnering with Avista in this endeavor, we will be able to leverage City resources to make important infrastructure investments that are required to promote the adoption of electric transportation.

In light of the COVID-19 emergency response, it may not feel like the ideal time to consider transportation and energy policy. However, if this pandemic has taught us anything, it is the importance of being prepared for a future than looks different than what we are experiencing today. The decisions we make today, will impact the success of our community's collective health and wellbeing into the future. By partnering with Avista and supporting their Transportation Electrification plan, we ensure innovative new technology and renewable energy plays an important part of our economic development in Spokane, and a clean, safe, healthy world exists for future generations.

Sincerely,

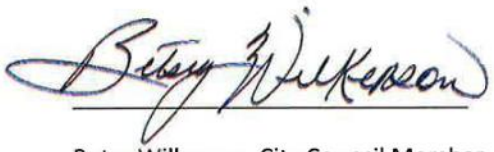
Breean Beggs, City Council President

Candace Mumm, City Council Member

Lori Kinnear, City Council Member

Karen Stratton, City Council Member

Kate Burke, City Council Member



Betsy Wilkerson, City Council Member

May 8, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

I am writing to express my support for Avista's Transportation Electrification Plan. I represent Transitions, a Spokane based non-profit that works to end poverty and homelessness for women and children in Spokane through the operation of transitional housing sites, childcare facilities, and job training programs. Our actions as an organization are motivated by our four key values of Respect for Human Dignity, Community, Growth and Wellness, and Justice.

New Leaf is a program within Transitions that provides job training in the food service industry for women with barriers to traditional employment. The New Leaf Kitchen & Café programs blend education, hands-on work experience, and supportive services designed to help women gain the self-confidence and professional skills necessary for self-sufficiency. New Leaf has greatly benefited from Avista's transportation electrification program through the acquisition of a Mitsubishi Outlander hybrid vehicle and a vehicle charging station. As a food service enterprise, we are delivering wholesale and catering orders throughout the Spokane metropolitan area on a daily basis, and are making frequent trips to food distribution warehouses and restaurant supply stores to purchase supplies. Having an electric vehicle has reduced our fuel expenses, which allows us to redirect these funds toward our mission of ending poverty and homelessness. Further, we have used the vehicle to provide daily transportation between Hope House (an overnight shelter for women) and Women's Hearth, a day center for women experiencing homelessness. Many of these women are mobility challenged and face safety issues walking to and from these two facilities. The addition of this vehicle has allowed us the capacity to make this daily journey safer and more secure for women experiencing homelessness.

Furthermore, studies have shown that low-income communities disproportionately experience ill-health effects of vehicle emissions, such as asthma, cardio vascular problems and cancer due to living in proximity to busy transportation corridors and/or industrial sites. The transportation electrificaton plan supports the widespread adoption of electric vehicles through investment in infrastructure, encourages the adoption of electric fleet vehicles and lift trucks, and the use of electric buses along transit corridors. All of these steps will benefit the health and wellness of our participants and other low-income individuals throughout the region, in addition to the benefits we have enjoyed at Transitions.

Transitions has been fortunate enough to experience the benefits of vehicle electrification, and can attest to the cost savings that come with a reduced dependence on gasoline. Widespread vehicle electrification will also have immediate and tangible benefits to the health and wellness of the low-income communities we serve, and for these reasons we fully recommend the approval of Avista's transportation electrification plan

Sincerely,

Jamie Borgan

Program Director, Transitions New Leaf
3128 N. Hemlock
Spokane, WA 99205
jborgan@help4women.org
509-496-0396

CITY OF PULLMAN

Pullman Transit and Dial-A-Ride

775 N.W. Guy Street, Pullman, WA 99163
Transit (509) 332-6535 Dial-A-Ride (509) 332-5471
Fax (509) 332-6590 www.pullmantransit.com

May 5, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

Pullman Transit serves the public transportation needs of the City of Pullman, providing nearly 1.5 million rides each year. These services range from quick WSU student campus shuttles to a longer neighborhood commuter service, as well as carrying public school students to our local middle and high schools and a paratransit van service for the elderly and those with disabilities in the community. Until 2011, that service was provided entirely with carbon fueled emission vehicles.

Avista Corporation's Transportation Electrification Plan reflects our shared value of regional resources and in cautious future investments. Their guidance during our lengthy transition from diesel to electric hybrid vehicles has emphasized the benefits of reduced air pollution and greenhouse gas emissions, with lower fuel and maintenance costs as only a perk.

Now, with the administrative and field support of Avista personnel, we are beginning our facility electrical upgrade this summer to accommodate electric bus charging stations. While Pullman hasn't taken the autonomous electric vehicle leap, we did place the order for our first two fully electric buses this spring. This would not have been possible without the support and shared vision of Avista.

Beyond just transit interests, Avista also recently partnered with the City of Pullman for our new electric vehicle charging station/parking lot, strategically located at the WSU Visitor Center. Their major share in the funding of this project was key to its success.

We look forward to our continued work with Avista, and respectfully request approval of their Transportation Electrification Plan.

Sincerely,

Wayne Thompson
Transit Manager

Serving Community Transportation Needs Since 1979

GONZAGA UNIVERSITY | Office of Sustainability

May 22, 2020

Washington Utilities and Transportation Commission

621 Woodland Square Loop SE

Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

Gonzaga University, a Jesuit, Catholic, humanistic University located in Spokane, Washington is a leader in higher education sustainability. Sustainability and care for the planet is infused into our organizational mission, and since 2009, have been working to reduce our greenhouse gas emissions, achieving a 20% reduction in emissions over our baseline. Gonzaga University currently has four electric vehicle charging stations on our campus.

Providing robust electric transportation options for our employees and fleet vehicles is consistent with our missioned call to care for the planet. By encouraging employees to invest in vehicles that do not consume fossil fuels and developing the infrastructure for a future electrified University fleet, we are setting the stage for reduced greenhouse gas emissions and cleaner air for our community. Avista is a leader in transportation electrification, and Gonzaga University has already worked with their team on the installation of a rapid EV charger on our campus.

Avista's transportation electrification plan will help continue to catalyze a sustainable future for Spokane and the Inland Northwest. We recommend that the Commission approve the plan without reservation.

Sincerely,

Jim Simon

Director of Sustainability
simonj@gonzaga.edu
509-313-5571
Gonzaga University
528 E. Boone Ave
AD Box 81
Spokane, WA 99201

OFFICE OF THE MAYOR

May 4, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

The City of Liberty Lake, is a small but rapidly growing City in eastern Washington, with a current population of 11,000. "Sustainable Resources" is one of the four pillars of the City's Strategic Plan, and an integral part of our community vision. We recognize the importance of a shift from fossil fuel-based transportation to cleaner, more sustainable transportation infrastructure, from both an environmental and a fiscal sustainability perspective. In 2017, the City of Liberty Lake partnered with Avista to install our first electric charging station in Town Square Park, and the City is currently part of a consortium seeking grant funding to expand the availability of charging infrastructure in the region. Over time, as a City, we anticipate investing in electric vehicle technology to meet our fleet needs.

A critical path to realizing the expansion of electrified transportation in our region is the expansion of Electric Vehicle Supply Equipment (EVSE). The City of Liberty Lake is very supportive of Avista's proactive plans to expand EVSE, and we recommend the approval the draft 2020 Transportation Electrification Plan as a blue print for achieving this outcome.

Please feel free to contact me by phone at (509) 964-1166, or by e-mail at sbrickner@libertylakewa.gov, should you have any questions or require additional information.

Thank you for your consideration.

Sincerely,

Shane Brickner,
Mayor

22710 E. COUNTRY VISTA DR., LIBERTY LAKE WA 99019
TELEPHONE (509) 755-6700 FAX: (509) 755-6713
WWW.LIBERTYLAKEWA.GOV

City of Colville
Office of the Mayor
Ralph K. Lane, Jr.
Mayor

May 6, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

The City of Colville was involved in Avista's pilot program to have EV chargers installed in the City. We have two electric vehicle charging stations installed in two of our public parking lots. We have found that the electric charging stations are being used on a regular basis and help meet our City Council and Strategic Plan Goals.

- Colville is a community where people want to live and work.
- Colville effectively delivers services.
- Provide a high level of quality public services to the community.
- Improve the appearance of Colville's built environment.

The City of Colville fully supports Avista's Transportation Electrification Plan and looks forward to working with them in the future.

Sincerely,

Ralph K. Lane, Jr.
Mayor

CC: Randall Farley, P.E., Avista

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May 8, 2020

RenewableH2.org

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Red Rocket Creative Design
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Vashon Climate Action Group
Warner Hydrogen

To: Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

The Renewable Hydrogen Alliance (RHA) appreciates this opportunity to provide comments on Avista's Draft Transportation Electrification (TE) plan.

Renewable Hydrogen Alliance

RHA is a non-profit 501(c)(6) organization based in Portland, Oregon. Our mission is to advocate using renewable electricity to produce climate-neutral fuels and industrial feedstocks. We engage in lobbying, promotion, and education about the critical role climate-neutral fuels from renewable power have to play in reaching climate goals and reducing dependence on fossil fuels.

Our membership represents gas and electric utilities, clean energy advocacy organizations, developers, consultants, law firms, and manufacturers of equipment related to the production and consumption of clean fuels including hydrogen fuel cell electric vehicles (FCEVs). Members of RHA include several NW utilities including Puget Sound Energy, Tacoma Power, Douglas County PUD, Klickitat County PUD, and NW Natural.

Avista's Draft Plan

RHA applauds Washington State's and Avista's focus on transportation electrification. Decarbonizing transportation is critical to meeting climate goals; in Washington about 40% of all carbon emissions are due to transportation, roughly half from on-road gasoline vehicles, half from diesel and heavy-duty applications. While battery electric vehicles (BEVs) are good replacements for many gasoline vehicles they are not suitable replacements in all transportation applications, particularly those involving high-duty cycles or greater energy densities—e.g., long haul heavy-duty transportation, marine applications, and aircraft.

Where BEVs are not suitable replacements, an equally important pathway for transportation electrification is producing fuels from electricity, principally

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RHA Mission:
Promote using renewable electricity to produce climate-neutral hydrogen and other energy-intensive products that reduce dependence on fossil fuels.

(but not solely) hydrogen for use in FCEVs. Battery electric vehicles (BEVs) do have important advantages over FCEVs in some applications, but we urge Avista and the Commission to include FCEV electrification in the TE plan.

Importance of Fuel Cell Vehicles in Transportation Electrification

The absence of power-to-fuels in Avista's draft TE plan does not reflect the current state of development of FCEVs or of hydrogen production from renewable electricity. For example, there are already more than 25,000 hydrogen-powered forklifts in the US, more than 8,000 light-duty FCEVs in California, and about 50 hydrogen transit buses operating in the US. The city of San Bernardino, California, has ordered a hydrogen transit train, and a hydrogen ferry is under construction for San Francisco.

Europe is considerably farther ahead than the US in FCEV deployments. For example, the United Kingdom plans to change out its entire fleet of 100 diesel transit locomotives for hydrogen, Switzerland has ordered 1,000 medium-duty hydrogen trucks, and Denmark is getting 200 hydrogen buses.

Closer to home, Douglas County PUD has ordered a 5 MW electrolyzer—the device that produces hydrogen from electricity and water. That facility will produce enough hydrogen to fuel about 40 hydrogen transit buses. Most exciting is that the PUD intends to use the electrolyzer as an interruptible load that will serve as contingency reserve in place of reserves now held on their hydro project. In other words, this new interruptible load will free up 5 MW of capacity on their hydro system.

A key difference between serving BEV electric loads and FCEV loads is that the FCEV load is completely flexible and typically does not coincide with the time of vehicle fueling. This makes electrolyzer loads potentially very attractive interruptible loads for helping integrate renewable resources. Tacoma Power is considering a special rate for interruptible loads, recognizing the value to the utility of having an option to interrupt loads when system conditions or prices make it advantageous to the utility to do so.

Today, several RHA members have plans to build out hydrogen production and fueling stations in the Northwest, including Washington State. Both Toyota and Nikola Motor Company are eagerly looking to expand hydrogen fueling stations into the Northwest from California and British Columbia. RHA also sees special interest among ports, which are under pressure to reduce emissions and have applications for which FCEVs are particularly suitable.

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May 8, 2020

RenewableH2.org

Conclusion

We strongly urge that Avista's transportation electrification plan include electrolytic fuels production. These fuels can electrify transportation markets that battery electric vehicles cannot reach with today's technology, and can potentially provide even greater benefits to Washington ratepayers. RHA is dedicated to bringing both renewable hydrogen and hydrogen transportation to the Northwest in the next one to two years. We look forward to seeing FCEVs represented in utility transportation electrification plans and to working with both the WUTC and Avista toward that end.

Sincerely,

Ken Dragoon
Executive Director
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Renewable Hydrogen Alliance
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Portland, OR 97211

climate solutions
accelerating the transition to our clean energy future

May 8, 2020

Avista
1411 E Mission MSC-4
Spokane, WA 99202

Re: Climate Solutions comments on Avista's draft Transportation Electrification Plan

Dear Rendall Farley,

Climate Solutions thanks you for the opportunity to submit comments and recommendations on Avista's Transportation Electrification Plan as proposed. Climate Solutions is a clean energy nonprofit organization working to accelerate clean energy solutions to the climate crisis. The Northwest has emerged as a hub of climate action, and Climate Solutions is at the center of the movement as a catalyst, advocate, and campaign hub.

The transportation sector is responsible for the largest share of both Washington and Idaho's greenhouse gas emissions and other toxic pollutants, making electrification of transportation a critical component of achieving Washington's statutory greenhouse gas limits and addressing climate change and air quality in both states.[1,2] Utilities are uniquely positioned to catalyze electric vehicle deployment through strategic investments in electric vehicle supply equipment and other services that facilitate widespread transportation electrification. Given customers' high trust in utilities, providing programs, education, and resources will also help accelerate the transition to cleaner transportation powered by clean electricity.

Climate Solutions is very supportive of Avista's decision to create and implement this Transportation Electrification Plan. We are excited about its scope and encourage its adoption given that the benefits of implementing this plan will be significant. We also have some suggestions on how to augment or implement programs in the plan which we hope will be considered as the utility creates a final plan for submission to the Utilities and Transportation Commission. These recommendations are described in detail below.

General comments on the plan as proposed

According to numerous greenhouse gas reduction pathways studies (see the "Deep Decarbonization Pathways Analysis for Washington State" and "Meeting the Challenge of Our Time: Pathways to a Clean Energy Future for the Northwest"), on-road transportation must be nearly completely electrified, relying on power from a clean grid, by 2050 in order to meet greenhouse gas reduction goals. In addition to this imperative, the electrification of transportation has numerous health and economic benefits. Currently, over 1,000 Washingtonians die

[1] Washington Department of Ecology, "2017 greenhouse gas data." https://ecology.wa.gov/Air-Climate/Climate-change/Greenhouse-gases/2017-greenhouse-gas-data.
[2] Idaho Department of Environmental Quality, "Greenhouse Gases." https://www.deq.idaho.gov/air-quality/air-pollutants/greenhouse-gases/.

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annually as a result of air pollution—much of which would be eliminated by switching to electric vehicles.[3] And as Avista's plan notes, "if all light-duty vehicles were electric, this would result in regional savings of over $1 billion per year."

As the plan correctly states, due to electric vehicles reaching cost parity in the next few years, we will see accelerated growth starting as early as 2023. Washington already has the second highest rate of electric vehicle penetration, and penetration will continue to grow as we achieve cost parity.[4] It is critical that utilities take a lead role in planning for the transition to electrification in order to maximize customer benefits of electrification and minimize potential impacts to the grid. In order to support high levels of electric vehicle adoption, the groundwork in terms of electric vehicle supply equipment (EVSE), education, demand management strategies, equitable access, and more must be laid now. Avista is rightly focusing on near-term actions to support transportation electrification, and we encourage ambition in order to assure that the region benefits as much as possible from this shift.

Given the rapidly changing technology landscape, we strongly suggest that plans are iterative and can be reevaluated and adjusted during the evaluation for the mid-year reports. A lot can change in five years in the transportation electrification sector, and we want to ensure that Avista's programs and plans can adjust to a changing landscape. Since utility support is so important for the advancement of transportation electrification, we encourage frequent plan iteration and updates to ensure it is updated in alignment with shifting contexts.

Guiding Principles

Climate Solutions is in broad agreement with the guiding principles listed in the draft plan. We would like to specifically emphasize and comment on three of the principles listed.

Grid integration and net benefits

We are glad to see that grid integration that provides net benefits for all customers is listed as a principle. Washington's Deep Decarbonization Pathways Study found that the share of energy coming from the electricity sector could more than double as we electrify current uses of fossil fuels.[5] As Washington moves forward with decarbonizing and electrifying the transportation sector, it is important that utilities are able to manage peak demand and avoid new investments in fossil fuel resources as we transition to a 100% clean energy grid under the Clean Energy Transformation Act. As a part of this transition, utilities will need to work to integrate the variability of renewables and electrification.

In determining the net benefits stemming from programs, and in prioritizing programs, we encourage Avista to look at benefits comprehensively. In addition to evaluating the economic impacts to ratepayers, Climate

[3] Puget Sound Clean Air Agency, "Air Pollution & Your Health." https://pscleanair.gov/161/Air-Pollution-Your-Health.
[4] U.S. Department of Energy Alternative Fuels Data Center, "Electric Vehicle Registration Counts by State." https://afdc.energy.gov/data/10962.
[5] Evolved Energy Research, "Deep Decarbonization Pathways Analysis for Washington State." https://www.governor.wa.gov/sites/default/files/Deep_Decarbonization_Pathways_Analysis_for_Washington_State.pdf.

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Solutions strongly suggests the broader social impacts, the social cost of carbon, and the public interest are considered in order to better select and prioritize projects. The Washington State Legislature, in the Clean Energy Transformation Act, stated:

> *the public interest includes, but is not limited to: The equitable distribution of energy benefits and reduction of burdens to vulnerable populations and highly impacted communities; long-term and short-term public health, economic, and environmental benefits and the reduction of costs and risks; and energy security and resiliency.*[6]

Programs that allow the benefits of transportation electrification to be more widely and deeply felt in environmental, economic, and health terms across populations, and especially by highly impacted communities, should be prioritized and these wide ranges of benefits should be evaluated.

Cost-effective, integrated management

Load management strategies to avoid large increases in peak demand should be a critical component of utility strategies to electrify the transportation sector. As the draft plan notes, Avista found that each electric vehicle without managed charging presents net benefits, but with managed charging, those benefits are 28% greater. Even in cases where an individual utility would experience minimal impacts from increased electrification, well managed loads by one utility will contribute to broader system flexibility and ease regional resource adequacy impacts, as well as showcase overall best practices. Therefore, we strongly agree with including demand management into all program offerings under this plan.

We are extremely supportive of Avista's plan to offer a pilot commercial TOU rate starting next year, and to follow that with a residential TOU rate pilot, among other demand management strategies listed. As the plan notes, demand charges are a noted impediment to electrification, particularly of larger, commercial vehicles and fleets, and replacing these with a TOU rate would greatly assist customers in transitioning their fleet and reducing the pay-back period for electric vehicle purchases. Traditional rates can in fact eliminate financial benefits from electric vehicle ownership, preventing customers from experiencing the potential financial, health, environmental, and social benefits mentioned above. Avista's pilot TOU offering will be a crucial tool in enabling electric vehicle adoption and for studying best rate practices for transportation electric vehicles.

Partner and collaborate with key stakeholders

Working with a variety of different stakeholders that bring unique perspectives will be crucial for achieving widespread electrification of electrification. We would like to particularly highlight the importance of partnering with organizations who have strong community ties, a high level of trust within the community, and those that are identified as highly impacted communities within Avista's service area. The Clean Energy Transformation Act clearly states that all customers must benefit from the transition to clean energy, and it is important that this sentiment also apply to utility transportation programs as well. Therefore, communities should be involved in the

[6] RCW 19.405.040. https://app.leg.wa.gov/RCW/default.aspx?cite=19.405.010.

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decision-making process for determining what programs that would directly benefit them would look like. We are aware that Avista has already developed strong partnerships with community service organizations in its area and we would strongly encourage these partnerships to be further fostered and expanded. Given that Avista will be spending up to 30% of transportation electrification funding on community and equity-related programs, it is extremely important that these programs are well-designed so they have the desired impact; doing so will require partnerships and collaboration with those who have deep community ties and can advise on what will be beneficial and popular in the community. Obtaining community trust and support is crucial for transportation electrification programs to succeed and provide benefits to all utility customers. After all, if people are wary and have not bought into the program's purpose, and if they do not see how a program will benefit them, they will rightfully be uninvolved or resistant. Everyone should be able to reap the direct and benefits of transportation electrification. Therefore, working with trusted community partners and organizations to ensure that offerings meet community needs and desires is extremely important. We would also suggest that community support is integrated either into this principle or as its own and that a related point is added to the strategic objectives and goals: for example, under the fleet electrification support, working with a determined number of community partners.

Programs and activities

EVSE installations and maintenance

- *Public charging*

Public charging stations play an important role in advancing electric vehicle adoption, not only because they provide a needed resource, but also because they provide more visibility for the technology and assurance that charging is available, alleviating anxiety for potential electric vehicle purchasers. As electric vehicles become more accessible, the infrastructure to support them must as well—especially for those who do not have the ability to charge at home. Experts believe that, as more people utilize electric vehicles, the ratio of these vehicles to public charging stations should be between ten and twenty electric vehicles per station.[7] Polling also indicates that one of the largest concerns about purchasing an electric vehicle is charging infrastructure, with half of drivers worrying about finding a charging station.[8]

Avista should help provide the visible resource of public DCFC fast charging by working with partners as detailed in the plan. We agree that there is a need for some public fast charging in sites that will support both intra-city and longer distance travel, and that Avista-owned chargers should complement those offered by third-parties and thus expand coverage to the benefit of all by provided needed infrastructure and visibility. We would also suggest that gas stations may be an interesting partnership to pursue since siting public chargers at these businesses would provide an element of routine to new electric vehicle drivers, would be a visible site for those who do not currently own an electric vehicle, and would potentially bring customers to partnering businesses.

[7] EVAdoption, "What is the 'Minimum Acceptable' Ratio of EVs to Charging Stations?" https://evadoption.com/what-is-the-ideal-ratio-of-evs-to-charging-stations/.
[8] Green Car Reports, "Poll suggests more Americans might buy an EV—if only they had a place to charge" https://www.greencarreports.com/news/1121698_poll-suggests-more-americans-might-buy-an-ev-if-only-they-had-a-place-to-charge.

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We encourage Avista to explore potential partnerships like this to ensure that DCFC fast charging is accessible to those who need it within its territory, and to more broadly provide visibility for electric vehicles.

Public level 2 charging is also an important resource, for which siting considerations are different than for DCFC fast charging. Listening to customer feedback on where this charging type should be sited will be crucial to ensure that chargers are sited where they will be utilized. We suggest considering siting near multi-family buildings where residents may not otherwise have charging access, especially in buildings that do not have dedicated parking for all residents.

- *Workplace, fleet, and MUD AC level 2 charging*

Offering workplace, fleet, and multi-family dwelling charging access is important to ensure that electric vehicle access isn't limited to those who have the capability to charge vehicles at home. The inability to do so is a significant barrier to electric vehicle adoption. However, many people may not have access to parking where a charger may be sited, or, if they rent, they do not have the ability to install a charger. Although the availability of workplace charging is often viewed as an employee benefit, building owners may be concerned about increased electricity usage. We appreciate that Avista will offer ways of addressing this split incentive by helping cover costs, and that there will be options for utility-owned *or* third-party-owned EVSE. This will provide customers important choices, both of which have benefits, and spur beneficial competition. We are glad Avista will be incorporating demand management into this program as well. We also think this would be an opportunity to partner with affordable housing entities, thereby providing direct benefits of electrification to lower-income residents and helping achieve the plan's goal of up to 30% investment targeting disadvantaged communities and customers.

- *Residential AC level 2 charging*

Avista providing EVSE and partially covering wiring costs will likely support electric vehicle uptake, given reduced costs, provided that this program is well-publicized, including through dealer engagement. We are glad that off-peak charging will be facilitated and other demand management strategies will be tested. It is also important for customers to be offered choices in EVSE and program offerings. We encourage Avista to consider the potential future lease and rebate programs mentioned in the plan, as well as other EVSE ownership options in order to maintain flexibility and customer choice. Utility ownership provides a number of benefits, including technology support and maintenance, but it is also important that customers not be forced into one option.

Education and outreach

Avista has an important role to play in educating its customers about transportation electrification, thereby encouraging uptake of these technologies. Avista already has an established relationship and frequently communicates with its customers. This means the utility has a particular opportunity to educate its customers. Given their importance, we encourage Avista to be ambitious in its education programs.

Engagement with dealers is an important part of education and outreach, and we are happy to see the plan includes this. According to research done by Cox Automotive, the dealer had a strong influence on almost three-

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quarters of decisions to purchase an electric vehicle. At the same time, customers expect dealers to offer support such as detailed cost comparisons, charger maps, and assistance with arranging home charger installation—items that dealerships are rarely offering currently.[9] A recent investigation showed that around a third of dealerships did not provide any information on charging infrastructure and available incentives, and two-thirds of dealerships did not display electric vehicles prominently.[10] There is an opportunity for Avista and dealerships to collaborate on providing customers these resources that will help them feel more comfortable purchasing an electric vehicle. Other utilities in Washington have had success with dealer referral rewards, so we believe these would be successful for Avista as well and are glad to see them in the plan.

In addition to engaging with dealers, the plan includes engagement with customers and the general public. An EV Experience Center as described in the program could provide valuable information for potential purchasers and we would encourage that as much hands-on experience as possible that can be offered, such as ride-and-drives and EV rentals, be included. We also suggest that Avista consider partnering with other companies and organizations that engage in electric vehicle education to expand its reach and impact. The plan also mentions potentially siting charging for on-demand Transportation Network Company (TNC) drivers at such a center; if located in a convenient location, this could provide additional visibility for vehicle electrification. Furthermore, working with TNC drivers to electrify is an important fleet electrification opportunity. Often drivers cannot afford the current upfront cost of electric vehicles, but given the lower cost of fueling electrification and the high mileage of these vehicles, drivers would very quickly recoup costs as long as charging is available to them (there is a clear connection to DCFC fast charging programs mentioned above). Therefore, we are excited that Avista will deploy a pilot program to support TNC fleet electrification, especially since it will lead to amplified benefits given other, complimentary program offerings. We also suggest that demand management strategies and technologies are incorporated into these programs.

We also want to emphasize that in addition to collaborating with dealers, EV Experience Center visitors, and customers as a whole, Avista should make a concerted effort to reach out to community partners and organizations in vulnerable communities. Proactive efforts will need to be made to ensure that information about electric vehicles is heard by everyone, and that the information is communicated in a way that is responsive to community needs and desires—working with trusted community organizations can help ensure this is the case.

Community and equity

Transportation electrification provides significant health and economic benefits that everyone should have access to. It is imperative to ensure that low-income communities and communities of color, who are already

[9] Cox Automotive, "Evolution of Mobility: The Path to Electric Vehicle Adoption." https://d2n8sg27e5659d.cloudfront.net/wp-content/uploads/2019/08/2019-COX-AUTOMOTIVE-EVOLUTION-OF-MOBILITY-THE-PATH-TO-ELECTRIC-VEHICLE-ADOPTION-STUDY.pdf.

[10] Sierra Club, "Rev Up Electric Vehicles: A Nationwide Study of the Electric Vehicle Shopping Experience." https://www.sierraclub.org/sites/www.sierraclub.org/files/press-room/2153%20Rev%20Up%20Report%202019_3_web.pdf.

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disproportionately impacted by air pollution and have fewer resources to mitigate harms, experience both direct and indirect benefits from transportation electrification.[11]

As discussed above, for programs to truly have an impact, they have to address barriers faced by the community and provide options that they want. That is why it is important to work with partners that are trusted by the community. We are glad to see that Avista intends to partner with others including the Spokane Transportation Collaborative and can also build on its previous, successful pilot programs with two community service organizations. Additionally, as already mentioned, helping TNC drivers access electric vehicles is important. It is important to note that not only may drivers serve disadvantaged communities, but many TNC drivers are themselves low-income, and being able to drive a vehicle with lower operation costs would be a tremendous benefit.

We would also like to highlight the importance of medium- and heavy-duty electrification in relationship to its benefits for vulnerable communities. Lower-income communities and communities of color are more likely to live in areas that experience higher air pollution, much of which comes from vehicle travel. Diesel emissions from medium- and heavy-duty vehicles are particularly harmful. Promoting the electrification of these vehicle classes will provide health benefits.

Overall, we urge Avista to consider community and equity not just as a standalone item, but to incorporate it into other programs. For example, when working with transit agencies or school districts, prioritize routes for electrification that go through vulnerable communities and areas with poor quality. Or, when engaging with dealerships, ensure that used electric vehicles are included in their promotion efforts, and that they count toward the referral program.

Commercial and public fleets

As mentioned above, fleet electrification and electrification of medium- and heavy-duty vehicles is a significant opportunity, since these vehicles are one of the largest sources of poor air quality that leads to negative health impacts, particularly in low-income and vulnerable communities. In addition to supporting the near-term electrification of light duty fleets and forklifts followed by commercial delivery vehicles as stated in the plan, we encourage Avista to explore opportunities for electrifying larger vehicles such as garbage trucks. Though some applications are currently more prevalent and achievable than others, it is also reasonable to assume that, given the significant operational cost savings, these vehicle types will become more common. It will be important to be prepared and have the groundwork laid to support their deployment. Utility programs and rate designs tailored towards medium- and heavy-duty electrification will be essential to ensuring broad grid benefits are realized, and utilities avoid unnecessary upgrades to the grid, instead receiving grid benefits from controlled use patterns.

[11] Washington State Department of Health, "Washington Environmental Health Disparities Map." https://fortress.wa.gov/doh/wtn/WTNIBL/.

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Rate structures that effectively encourage off-peak charging may be different for heavier vehicles, compared to light-duty electric vehicles. Alternative components of rate design beyond the price of energy, such as non-coincidental demand charges and line extension policies, often impede large-scale deployment of heavy-duty electrification rather than incentivize it. Climate Solutions strongly supports the pilot commercial and residential TOU programs and other load management experiments listed in the plan that will help determine the best demand management strategies for different contexts, and encourages the utility to continue analyzing innovative rate structures and designs that encourage smart transportation eelctrification. For commercial transportation electrification, research indicates that removing demand charges and implementing TOU rates are effective in promoting off-peak charging and help customers more affordably transition their fleets.[12] Avista's proposed pilot aligns with these best practices. Electrification of medium- and heavy-duty vehicles can provide tremendous benefits to community health and to the grid, if managed well, making such programs important in the short-term so as to achieve long-term benefits.

Just as it is important for Avista to set a good example by electrifying its own fleet and supporting employees in driving electric (under the Utility Fleet Electrification, Facilities and Employee Engagement program), it is also important for municipalities to do the same. For example, the City of Spokane has committed to the purchase, conversion to, and use of electric vehicles.[13] We recommend that Avista partner with municipalities in its territory and assist them with electrifying their fleets and providing the requisite charging infrastructure for operations and for employees who drive to work.

Climate Solutions is excited to see Avista's plans to design and pilot programs for school buses and mass transit. In addition to their climate benefits, electric school buses protect children from harmful air pollution that they are particularly susceptible to given their age. One study found that children inside of a diesel school bus may be exposed to as much as four times the level of toxic diesel exhaust as someone riding in a car ahead of the bus--pollution that puts them at significant cancer risk.[14] There are other benefits as well: for example, bus drivers have credited the quiet electric buses with reducing their stress levels. As Avista works on the school bus pilot, it should utilize the ensuing success stories as an educational opportunity for other districts and entities. Sharing these stories will help others realize the wide-ranging benefits of transportation electrification as well as showcase that the technology is available and within reach today.

Working with transit agencies to electrify their fleet is another important program offering, as well as an opportunity to explore how to best integrate charging of heavier-duty vehicles onto the grid. We encourage Avista to work with transit agencies to determine rate structures and other management techniques that are mutually beneficial as a part of its commercial pilot TOU rate. Climate Solutions is very supportive of Avista's work on this pilot, and we are excited that the utility plans to roll it out next year. As the plan notes, Spokane

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[12] Synapse Energy Economics, Inc., "Best Practices for Commercial and Industrial EV Rates." https://www.nrdc.org/sites/default/files/media-uploads/best-practices-commercial-industrial-ev-rates_0.pdf.
[13] Spokane Municipal Code 15.05.050. https://my.spokanecity.org/smc/?Section=15.05.050.
[14] Gina M. Solomon, et al., "No Breathing in the Aisles: Diesel Exhaust Inside School Buses." https://www.nrdc.org/sites/default/files/schoolbus.pdf.

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Transit Agency, which is in the process of purchasing battery electric buses, currently estimates that 45% of associated electricity bills will come from demand charges. In addition, the electrical infrastructure for larger customers will likely often require capacity upgrades or extensions. Avista should be a ready and willing partner in this regard for transit agencies and other medium- and heavy-duty customers.

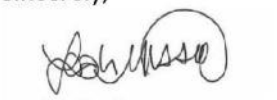
Conclusion

Thank you again for the opportunity to provide comments on Avista's Transportation Electrification Plan as proposed. Climate Solutions greatly appreciates the efforts of the utility in developing this plan to increase the adoption of widespread transportation electrification and we support its approval. We also recommend incorporation of the above suggestions as programs are being implemented. Specifically we believe the following are important overarching goals:

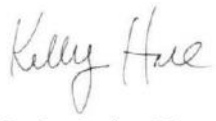
- Incorporate demand management into all programs
- Closely partner with community organizations to determine community barriers, needs, and desires related to transportation electrification
- Ensure that low-income and vulnerable communities benefit directly and indirectly from programs and play a role in shaping programs
- Support electrification of medium- and heavy-duty vehicles
- Continue providing education and outreach to customers
- Incorporate community feedback and learnings from implementation and pilots into programs as an iterative process and ensure timely updates given the rapidly changing technology landscape

We are excited by the significant opportunity that transportation electrification poses in reducing pollution and maximizing grid efficiencies, and believe utilities will play a significant role in the transformation of our transportation sector. We look forward to further engagement as these programs are implemented and as a part of the mid-period report, program iterations, and future plans.

Sincerely,



Leah Missik
Washington Transportation Policy Manager
Climate Solutions



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May 8, 2020

RE: Avista Transportation Electrification Plan (DRAFT), Request for Stakeholder Comments

Dear Rendall Farley,

The NW Energy Coalition appreciates the opportunity to provide input on Avista's draft Transportation Electrification Plan in advance of filing with the Washington Utilities and Transportation Commission. The Transportation Electrification Plan (TE Plan) includes a wealth of information and strong evaluation of current market conditions. We commend Avista's efforts to advance transportation electrification, especially Avista's plan to achieve 50% peak load reduction from light-duty EVs with net grid benefits by 2025. We believe several components of the plan are designed in a manner to provide long-term benefits to customers and we suggest additional perspective and modifications to help scale Avista's TE portfolio and meet customer needs, as detailed below.

Technology and Markets

Avista's TE Plan provides a detailed overview of the current transportation electrification (TE) market both globally and in Avista's service territory. This section illustratively demonstrates Avista's commitment to monitor market conditions and obligation to serve existing and future customers in a reliable, clean, and affordable manner as well as to support market transformation. In order to do this, we recommend:

1. Avista include a subsection highlighting public charging retail rates, payment options, and fees to better understand what and how customers are expected to pay for electricity through 3rd party providers.
2. Page 29 briefly mentions the opportunity to work with Tesla to provide additional Tesla compatible DCFC. NWEC agrees that Tesla is a popular vehicle choice but recommends caution when investing ratepayer dollars to support Tesla charging networks, infrastructure only available to Tesla drivers. We want to reiterate that investments would need to provide greater utilization, beneficial utility revenue AND support charging for all vehicle types in order to maintain connector interoperability.

Environmental, Economic, and Grid Impacts

Distribution Grid Impacts:

NWEC finds Avista's distribution grid impact analysis interesting in that it is projecting higher costs associated with the need for additional generation capacity but minimal distribution grid impacts from transportation electrification. The distribution grid impacts scenarios are modeled under the assumption that EV adoption will be random and equally disperse across Avista's distribution system, but EVs are typically found in clusters and it is likely that higher power fast-charging at future EV fleet locations will trigger location specific impacts to Avista's distribution

system.[1] We recommend Avista conduct a distribution system impact analysis that includes: (1) clustered electric vehicle charging scenarios; (2) targeted locations where large EV fleet and medium- and heavy-duty EV charging of greater than 1 MW is anticipated; and (3) strategies to couple TE demand side management with targeted energy efficiency and demand response. The analysis should be acknowledged in Avista's Analysis and Reporting section (pg. 50) and should be included with Avista's mid-period report.

Downward Pressure on Rates:

E3 and Avista's economic models project net benefits to customers due to incremental revenue from electricity sold to serve new EV load. Can Avista discuss how this is anticipated to interact with Avista's decoupling mechanism and the potential for downward pressure on rates for different customer classes?

Costs and Benefits

The economic and environmental costs and benefits included in the section titled, Environmental, Economic, and Grid Impacts, illustrates both regional and customer costs and benefits. Avista looks at a regional cost-benefit perspective and a customer cost-benefit perspective for light-duty EVs both with and without managed charging. NWEC is supportive of Avista's efforts to pursue managed charging opportunities of reasonable cost to realize the benefits outlined in the TE Plan.

Program Cost-Effectiveness:

Docket UE-160779, Policy and Interpretive Statement Concerning Commission Regulation of Electric Vehicle Charging Services, allows utilities to perform Societal Cost Tests to inform program design. Avista quantifies total cost of ownership savings for customers, GHG emissions savings, and utility costs to serve transportation electrification load. We find this to be very informative in evaluating program costs and benefits and we want to encourage program design that is informed by a comprehensive cost and benefit analysis rather than the sole use of traditional energy efficiency cost effectiveness tests to deem transportation electrification program portfolios cost effective.

Widespread adoption of transportation electrification is facing market transformation challenges. These challenges are similar to those that face new energy efficiency technology, and the rationale behind market transformation programs for energy efficiency – programs that help scale up the market. Utilities should be promoting market transformation for transportation electrification and ensuring that direct and indirect benefits accrue to all utility customers. The early stage of the market means transportation electrification is still an infant industry and traditional cost-benefit tools should not be applied.

Estimated Costs:

Page 46, Table 5 is pulled from the 2020 Electric Integrated Resource Plan and includes values that, to NWEC's knowledge, have not been reviewed by the Washington UTC. This table includes a "clean premium" that is used to estimate Avista's anticipated incremental cost to

[1] https://ieeexplore.ieee.org/document/8732007

comply with CETA in Washington. Can you share what this table was meant to represent in the original IRP, what assumptions were made and how Avista calculated this cost?

Page 47, Table 7 includes customer transportation fuel and maintenance cost savings. What assumptions are made about electricity costs in this calculation?

Avista's plan acknowledges that future updates to the TE Plan will include costs and benefits from other market segments beyond light-duty EVs. NWEC understands certain TE markets are still in early stages in Avista's service area and we strongly encourage Avista to include medium- and heavy-duty EV costs and benefits, including considerations for port, off-road, and agricultural applications, in the mid-period report, additional program filings, and future updates to the TE Plan.

Analysis and Reporting

NWEC is comfortable with Avista's proposal to re-issue the TE Plan every 5 years with the understanding that new program filings and program filing updates may and should be submitted on an on-going basis and that the mid-period report will provide comprehensive updates. We support the proposed metrics to monitor and report and strongly recommend adding:

- Stakeholder engagement – utility performance related to outreach to and participation of vulnerable populations in highly impacted communities as defined in the Clean Energy Transformation Act, low-income service providers, community-based and community service organizations, non-profit organizations, small businesses (particularly minority and women owned businesses), and tribes related to TE.[2]
- Direct and indirect benefits to low-income customers. Direct benefits mean a low-income customer or an entity directly serving low-income customers participated in a utility program and it resulted in cost savings, access to electric transportation technology, and an increase in reliable and affordable mobility due to utility TE investments. Indirect benefits mean low-income customers experience better air quality due to avoided GHG pollution and downward pressure on rates associated with utility TE investments.

Programs and Activities

EVSE Installations and Maintenance:

Public DCFC and AC Level 2 –

- NWEC is supportive of Avista's proposal to own and operate 30 public DCFC or half of the anticipated public DCFC needed to meet customer needs and 12 new AC Level 2 sites per year through 2024. Avista should not exceed 50% of the DCFC need and should ramp down public charging commitments if 3rd party ownership ramps up.
- We recommend Avista adapt their public charging retail rate to include an on-peak charging price to help shift load to off-peak periods and reduce the need for additional generation capacity (Portland General Electric uses an on-peak charging price for utility owned public charging, Schedule 50).[3]

[2] http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Session%20Laws/Senate/5116-S2.SL.pdf?q=20200506110601

[3] https://www.portlandgeneral.com/our-company/regulatory-documents/tariff

- We strongly support the inclusion of credit-card readers at public charging stations and encourage the use of multiple payment options to help support accessibility.
- We encourage Avista to work with city and county planners and stakeholders to prioritize public charging locations in areas that are not conveniently accessed by public and active modes of transportation.
- Avista should not use or allow time-based rates at AC Level 2 sites as older EVs often have lower capacity on-board chargers and therefore certain drivers pay more for electricity. Utilities should use the EVSE rules in the California Code of Regulations (4002.11. Electrical Vehicle Fueling Systems. (3.40.)) as guidance in developing unit prices and methods for communicating prices.[4]

Workplace, Fleet and MUD AC Level 2 –

- NWEC is supportive of Avista's efforts to support workplace, fleet, and MUD AC Level 2 charging. We are interested in the potential benefits of evaluating fleet incentives separately. Due to a more predictable use case for fleets, Avista could create fleet categories that correspond with anticipated incremental revenue from TE fleet investments in specific fleet categories. Avista could then develop incentives for fleet categories commensurate with the benefits they are expected to provide.

Residential AC Level 2 –

- NWEC is generally supportive of residential programs, particularly ones that support managed charging, but we request Avista provide an explanation for why utility ownership is the best model for this program.
- We are very concerned that Avista intends to install non-networked EVSE as it does not support flexible, future load management program design. Avista reported in their Electric Vehicle Supply Equipment Pilot Final Report that switching EVSE manufacturers resulted in "greatly improved connectivity" and demonstrated an aggregated "49% drop in peak demand compared to the uninfluenced load profile." [5] This pilot demonstrated successful outcomes and we cannot support this element of the plan unless it includes networked charger installation so the utility can remain flexible with future demand side management program options.

Education and Outreach:

We are supportive of utility investments in education and outreach, especially efforts that are designed to educate customers on beneficial charging behavior, and would like to raise the follow comments and questions:

- How is Avista justifying $250 incentives to dealers (limited at 100 referrals per year)?
- NWEC is supportive of Avista deploying informational kiosks.
- Continued installs of public charging has the co-benefit of increased TE visibility but should not be relied on as a primary means of education and outreach.

[4] https://govt.westlaw.com/calregs/Document/IE46E6433D170468DA724522E70EC6F01?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)
[5] See UTC docket UE-160082, Electric Vehicle Supply Equipment Pilot Final Report, pp. 82-83

- Can Avista provide data on the beneficial outcomes of investing in an EV Experience center?
- NWEC sees value in providing financing assistance to transportation network company (TNC) drivers to increase access to EVs and reduce costs. In considering any TNC programs, Avista should seek input directly from TNC drivers and organizations representing the interest of TNC drivers.

Community and Equity:

Avista has a long and trusted history serving communities throughout eastern Washington. We encourage Avista to leverage these relationships to develop more equitable TE programs that align with Avista's commitment to dedicating 30% of program funds to low-income TE on an aspirational basis.[6]

NWEC appreciates the inclusion of this section but feels it is crucial that Avista demonstrate clearer intent to achieve this goal. Identifying a range of 10% to 30% of the total portfolio budget range is not sufficient and we recommend:

- Avista expand the second objective identified on page 65. Avista should reach out to community based and community service organizations, low-income service providers, and those representing vulnerable populations in highly impacted communities to develop programs that provide direct and indirect benefits to low-income customers. Avista should resource these organizations for their time spent and expenses incurred in guiding the development of equitable TE programs. In addition, we encourage Avista to look at Puget Sound Energy's Low-Income program portfolio for scalable program ideas and to do further outreach to tribes to identify areas of opportunity.
- Avista initiate a more proactive approach to support Spokane Transit Authority (STA) and other transit agencies to help accelerate battery electric bus and shuttle adoption. Avista can further provide direct and indirect benefits to low-income customers by supporting; (1) the prioritization of transit route electrification in communities experience the greatest environmental health disparities as indicated in Washington's Environmental Health Disparities Map and (2) transit agency's efforts to expand service hours and routes due to sustained fuel and maintenance costs savings from TE.[7]
- Providing EVSE and car-sharing programs to disadvantaged communities does not necessarily provide direct and indirect benefits to low-income and rural communities if additional barriers to adoption exist. We strongly recommend working with community members to identify mobility needs and design relevant and affordable program solutions.
- Selected projects should not compete with weatherization, efficiency or bill assistance programs and should provide sustainable benefits to customers even in the event a pilot or program is terminated.

[6] See UTC docket UE-190334, et. Al, Partial Multiparty Settlement Stipulation, pp. 11-12
[7] https://fortress.wa.gov/doh/wtn/WTNIBL

Avista's detailed EVSE proposals demonstrate Avista's ability to develop strong programs. NWEC would like to continue working with Avista to support equitable program design and increase access to TE that distributes benefits to all of Avista's customers.

Commercial and Public Fleets:

We are very interested in the potential benefits of supporting lift truck electrification. We are supportive of the proposed program design that would result in net benefits to customers due to the anticipated additional annual utility revenue per lift truck. However, Avista is justifying the program based on a total cost of ownership (TCO) comparison between diesel, propane, and electric lift trucks. Has Avista also evaluated the TCO of hydrogen fuel cell lift trucks? Since Avista is projecting increased costs due to additional generation capacity needs, it would be interesting to evaluate viable alternative fuel options. If renewable hydrogen were to be produced in Avista's service area, it could provide additional benefits from increased sales and flexible load that provides system reserves and frees up capacity.

Planning, Load Management and Grid Integration:

NWEC appreciates that load management is integrated throughout the plan. We encourage Avista to pursue proactive demand side management measures and to match demand side management with increased and targeted energy efficiency and demand response. Please refer to comments throughout this document encouraging more distribution system planning and transit electrification.

Rate Design:

Residential EV TOU Pilot Rate –

- In concept, NWEC finds value in residential EV TOU rates. We feel more detail will be important to determine if a residential EV TOU rate is beneficial to Avista's customers. For example, is Avista planning to install a submeter and would there be an additional monthly fixed charge to utilize this rate?

Commercial EV TOU Pilot Rate –

- NWEC is supportive of efforts to reduce the burden of demand charges on customers that include price signals to help shift load to off-peak periods. We would like to note that STA's new bus depot facility could exceed 1 MW of maximum demand. We encourage Avista to included STA charging sites in targeted distribution system impact analysis and to consider rate structures that take into account the unique type of load presented by these utility customers.

Utility Fleet Electrification, Facilities and Employee Engagement:

NWEC is supportive of Avista's efforts to lead by example. As a trusted part of eastern Washington's communities, Avista has the opportunity to demonstrate the value of TE and reduce operation and maintenance costs.

Conclusion

NWEC appreciates Avista's works to develop this plan and we look forward to engaging in the development of Avista's future TE programs. We encourage Avista to undertake a proactive strategy to effectively enable efficient grid and resource management, increase access to transportation electrification for vulnerable populations in highly impacted communities, advance integration of clean energy resources, and expand programs to accelerate TE market transformation.

Thank you for your consideration of NW Energy Coalition's comments.

Sincerely,

Annabel Drayton
Policy Associate
NW Energy Coalition

WASHINGTON STATE UNIVERSITY

Office of
VP for Finance and Administration

May 26, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

Washington State University (WSU) is the land-grant institution for the state of Washington with over 31,000 students enrolled across six campuses and supported by over 6,700 faculty and staff.

WSU relies on Avista to provide major utility services and often partners with Avista to invest in infrastructure improvements at the Pullman and Spokane campuses. In the summer of 2019, WSU Facilities Services took advantage of the Avista Electric Vehicle Supply Equipment (EVSE) pilot program to install four dual port charging stations on our Pullman campus. Three of the stations are now being used for fleet charging and one for residential charging at the University President's residence. These electric vehicle (EV) charging stations were installed as a response to Washington State's recent mandate to add EVs to our fleet.

WSU has reviewed Avista's 2020 Draft Transportation Electrification Plan and supports their proposal to work with industry partners, community leaders, policymakers and regulators to innovate and create a better future for all. We are excited to continue a collaborative partnership with Avista.

Sincerely,

Stacy M Pearson

Stacy M. Pearson,
CFO and Vice President for Finance & Administration

PO Box 641045, Pullman, WA 99164-1045
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May 7, 2020

Washington Utilities and Transportation Commission
PO Box 47250
Olympia WA 98504-7250

RE: Avista's Transportation Electrification Plan

Dear Commissioners,

I write to you today on behalf of Forth, a nonprofit trade association that advocates for the advancement of electric, hydrogen, shared, smart, connected, and autonomous mobility. Forth has more than 180 members, including auto manufacturers, electric vehicle charging suppliers, industry partners, utilities, local governments, and non-profit environmental organizations.

Today, emissions from traditional internal combustion vehicles represent Washington's single largest contributor to greenhouse gases. At the same time, electric vehicles (EVs) have quickly gained attention in Washington by providing consumers with the ability to choose clean non-polluting transportation coupled with extremely low fuel and operating costs. In fact, electrically fueled vehicles help lower energy costs for all utility customers by providing improved utilization of the grid primarily during non-peak hours.

Forth has reviewed Avista's Transportation Electrification Plan and finds it to be both insightful and practical. We believe that the guiding principles used in the Avista plan (in particular, the program focus areas: EVSE infrastructure, customer education and outreach, community and equity, fleet support, and grid integration/load management) represent best practices for utilities working to provide their customers with clean and affordable transportation. As transportation electrification continues to increase, we would also recommend that Avista recognize the potential and importance of fuel cell electric vehicles in its future transportation electrification plans.

In closing, because of its numerous economic and environmental benefits, transportation electrification represents a unique value proposition for both EV drivers as well as non-EV drivers across the Avista service territory. Thank you for the opportunity to submit our letter in support of Avista's Transportation Electrification Plan.

Sincerely,

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Rhett Lawrence
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Spokane Transit

June 22, 2020

Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

RE: Avista's Transportation Electrification Plan

Dear Commissioners:

Spokane Transit Authority (STA) provides public transportation to thousands of workers, students, and other community members throughout Spokane County on a daily basis. In 2019, STA provided over 10 million rides on Fixed Route and Paratransit buses and vans.

Within STA's comprehensive plan, the agency has established a policy goal to pursue battery electric bus technology for our fixed route fleet as it becomes financially practicable and effective. To that end STA has recently completed a study evaluating both the timeline and costs of a zero-emission fleet transition, as well as an analysis of the probable performance and requirements for the first 20 battery-electric buses the agency expects to operate. At this time, 14 of those buses are on order for delivery over the next 18 months. Avista has played an important role in supporting our evaluation of the technology and requirements. This included regular consultations between the STA team and Avista staff, and several updates to Avista executive leadership in the course of planning and evaluation work.

Avista's Transportation Electrification Plan supports STA's efforts and aligns with our goal of providing cost effective and sustainable public transportation for the Spokane region.

Spokane Transit supports Avista's efforts in developing a vision and a roadmap to transportation electrification in the region, and we recommend approval of this plan.

Sincerely,

E. Susan Meyer

E. Susan Meyer
Chief Executive Officer

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June 28, 2020

Rendall Farley, Manager
Electric Transportation Manager
Avista Utilities
1411 E. Mission (MSC-4)
Spokane, WA 99202

Re: Avista Transportation Electrification (TE) Plan 2020

Dear Mr. Farley:

The Alliance for Transportation Electrification (ATE) wishes to express our strong support for your transportation electrification (TE) plan that you will submit to the Washington UTC, and the accompanying programs and tariffs over a five-year period. Your pilot programs have been innovative and well designed, and we agree with you that it is time to move now toward larger scale based on a portfolio approach of multiple use cases.

Overall comments

Your pilot programs, albeit modest, were one of the first to market among utilities in the country and have been nationally recognized for their scope and design. We believe you have learned a good deal about the early EV adopters in your service territory, and how their deployment and use of the charging infrastructure and behavior may be impacted by rates and program design. Furthermore:

- ATE supports and advocates in other States for the portfolio approach which tested out several use cases was sensible and prudent. These early pilot programs have provided you with valuable information on specific use cases in this nascent stage of market development.
- Your ownership and operation model, working on a turnkey basis with EV service providers, was consistent with the 2015 legislation that stipulated that utilities should play a primary role as a catalyst in market transformation.
- ATE is a strong supporter of open protocols and interoperability, and you have demonstrated that the use of open protocols (such as OCPP as a back-end communication protocol) has both been useful in working with vendors and helped to avoid stranded assets. We are pleased that you will continue with this support of open standards.
- We believe that a strong stakeholder process is essential to the ultimate success of utility-funded EV infrastructure programs, and you have established a robust stakeholder process by yourself, especially with community and equity groups, as well as supporting and participating in the UTC Stakeholder Process.

- We appreciate your projections of market growth of the EV market through 2025 and 2030, and the development of a baseline scenario as well as high and low. The Alliance recognizes that 2019 and now 2020 with the Covid-19 pandemic and recession have not been stellar years for EV sales and adoption. But we are inclined to express our support for a higher "High Scenario" projection by 2030 and believe 15 percent to be conservative. The Alliance would urge Avista and the Commission to adjust these numbers upwards during the next five years depending on technology, vehicle availability, and market trends.

Comments on specific program components

Public DC fast charging (DCFC) development:

The Alliance supports your approach of moving to hybrid model that supports both utility O&O (ownership and operation) as well as a make-ready investment approach with EV service providers (EVSPs), third party developers, and host sites. We believe this growing market is large enough for both types of market development, and neither works to the exclusion of the other; they are complementary. The utility make-ready investment, for example, is an enabler of the business model of the EVSPs and their unique strengths in siting and developing DC fast charging sites. The overall goal of 60 sites for development, over a five-year period, seems reasonable and will be split between Avista and the EVSPs.

We urge you, and the Commission, to stay focused on a couple of specific issues as these programs are implemented. The first is the maintenance and repair of all of these DCFC facilities and ensuring an adequate EVSE uptime – your goal of greater than 99 percent is appropriate. The second is ensuring that all members of the public who own an EV may have reasonable access to the infrastructure, or what is called public accessibility, while recognizing that certain market segments may wish to place the charging infrastructure (such as commercial fleet infrastructure) in depots and such.

Public AC Level 2 sites:

The Alliance strongly supports your approach to public Level 2 investments, which continues the program design principles adopted in the Phase 1 pilots. The cost-sharing requirements with the customers are reasonable and putting the program on a first-come first-served basis makes sense for the 10 sites per year. We agree that you should continue largely with the O&O model for this market segment with a path for make-ready investments as well.

Education & Outreach (E&O)

We also strongly support a robust utility program in educating consumers about all aspects of the EV experience: the large and growing number of vehicle types; comparison of petroleum prices to electricity (kwH prices), types of charging infrastructure and so forth. The Alliance works in many States across the country, and in all jurisdictions, including California, the market surveys indicate there is still a significant gap in awareness in this early stage of market development. ATE supports a reasonable budget to be allocated to these activities, and for you to engage in multiple activities with key players in the growing market. We also recognize the challenge of working with many traditional auto dealers that require a physical visit and presence to finalize the sales. But many of the OEMs, and other national web-based automobile firms, are experimenting successfully with "no-touch" sales of vehicles using Web-based tools. Especially in this era of the Covid-19 pandemic, we would urge both you and the

Commission to monitor these developments as well, and perhaps take advantage of these innovations both in technology, marketing, and adoption practices.

Community and Equity:

The members of ATE support a strong approach to equity, diversity, and low-moderate income communities and recently formed an internal task force to address these issues. We fully support your approach in this area and emphasize the need to work with community action agencies, neighborhoods, and others in your service territory on these issues. An aspirational goal of 30 percent is good. But we also wish to emphasize the importance of flexibility and changing community and market conditions here as well. For example, in its Phase 1 pilots, Southern California Edison (SCE) in the Los Angeles area started with a 10 percent goal for DACs, but actually achieved something closer to a 40 percent level of investment.

Commercial and Public Fleets

The Alliance believes that you have addressed some of the key issues affecting fleet electrification in your plan. The interest in medium and heavy-duty EV use cases has expanded dramatically over the past 12 or 18 months among utilities, bus and trucks OEMs, off-road electric lifts, and NGO stakeholders. The Alliance is pleased to see this as an essential part of this portfolio approach developed by Avista. The opportunities for commercial fleet operators are substantial for the medium and long term through a lower TCO (total cost of operations) for the fleet, but the relatively higher upfront costs of the vehicle and charging infrastructure can be impediments. At the same time, we urge you and the Commission to monitor the continuing positive trends in public transit and school buses during this period and be able to move quickly through the stakeholder and flexible regulatory process.

Load management, planning, and integration

The Alliance supports a variety of approaches to manage these loads more flexibly, including both the use of advanced technologies as well as more innovative rate design approaches cited above for commercial fleets. Avista has traditionally been a leader in advanced technologies in energy efficiency, load management, grid modernization, and moving toward consideration of transactive energy approaches. The specifics of these load management strategies are diverse and well balanced and will use the technologies built into the OEM telematics, the EVSE equipment itself, as well as focusing some attention on the non-networked EVSEs to understand consumer behavior better. Moreover, we agree with Avista's approach to move more gradually and begin such dynamic rates for certain EV owners/customers in 2023. In summary, the Alliance supports the overall goal of using these multiple strategies to demonstrate a greater than 50 percent peak load reduction from EVs.

Rate design

As stated above, the normal demand charge in a standard C&I rate class schedule can be a substantial barrier to the development of commercial and government fleets. Similar constraints apply to host sites and operators of DC fast charging sites as well. Accordingly, Avista's proposal to eliminate or mitigate these demand charges in the early stage of development, for both types of customers, makes great sense and should be supported. The Commission and the parties will review the details included in the program and tariff proposals, but it is sensible to require a meter for these EV TOU rates, and to put a cap (less than 1 MW) on their use. As is done in jurisdictions such as Hawaii and Colorado for fleets and

battery electric buses, a substantial price penalty is imposed if the customer violates the terms of the tariff and charges on-peak compared to the off-peak rate.

Therefore, the Alliance supports these changes in rate design, and the considerations given to the "early adopters" among commercial customers to take advantage of these EV rate designs. Avista, the Commission, and the stakeholders should continue to monitor the progress of these new customer rates during the initial period of 2021 to 2025, and then allow the early adopters to continue to use these for a longer period of time until 2030. From its work in other States, the Alliance has learned that the fleet operators and customers of utilities are especially sensitive to both transparent pricing, as well as certainty in pricing structures over the longer term as they switch from diesel fuel to kwH-electric fuel.

Budget:

The Alliance finds the proposed budget levels in the TE Plan to be reasonable and well grounded. Compared to other programs in States across the country, the $2 to $4 million in both capital and operating expenses for a broad portfolio suite of programs is certainly on the more modest size. However, we recognize the relatively lower number of EVs in your service territory today, and given the current difficult economic circumstances, the need to plan carefully. We would urge Avista, and the Commission, and the stakeholders to reassess the market conditions on a regular basis through the stakeholder process, the EV planning process, and its integration in to the IRP process for loads and resources. The Commission should allow some flexibility to adjust these overall budget numbers, and their specific allocation in these categories, as technology and market conditions change over the next five years. Moreover, the increasing ability of EVs and EV infrastructure to have flexibility at the edge of the grid, including e-mobility, may offer significant system benefits as the scale of the EV transformation takes place. While some of these benefits and costs may not always be easy to quantify using traditional methods, the utility and the Commission should refine these methodologies so that this information can be used for both cost-effectiveness and broader public interest tests.

In summary, the Alliance strongly supports the TE Plan developed by Avista in this docket, and the associated programs, tariffs, and budgets over the relevant five-year period. We urge the Commission to give prompt and favorable consideration to this TE plan and its specific programs. ATE stands ready to offer further comments and provide any guidance on best practices in other jurisdictions in the months ahead. We will continue to stay engaged in the Washington Transportation Electrification stakeholder group in the future, including a proposed meeting in late August.

Sincerely,

Philip B. Jones

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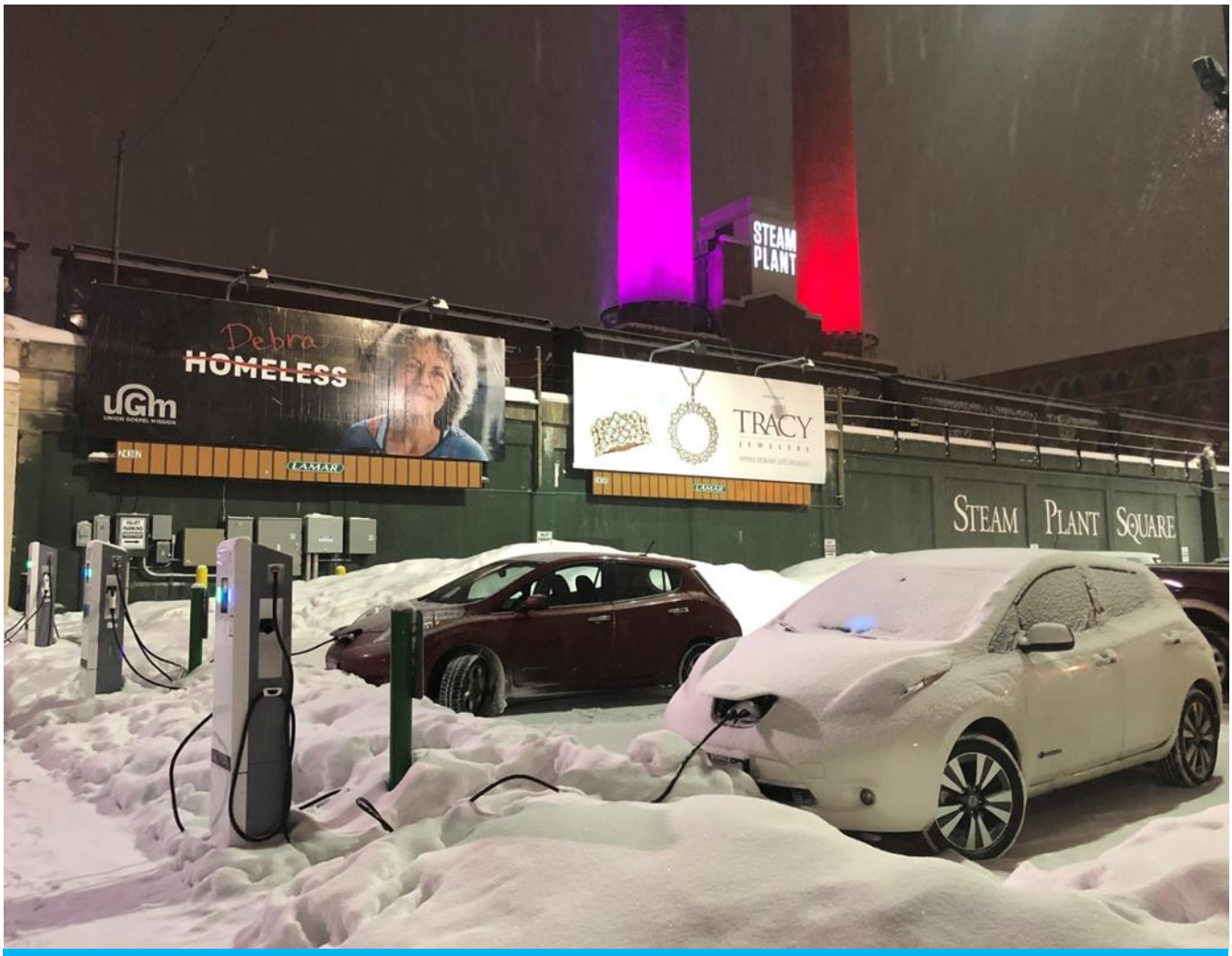

Public AC Level 2 EVSE at Steam Plant Square in downtown Spokane (2018)