Transportation Electrification

2023 Annual Report

Submitted to the Washington Utilities and Transportation Commission

March 31, 2024

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About Avista

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!

I. Executive Summary and Future Direction

Avista's TE programs and activities were successfully implemented and managed in 2023, consistent with the Transportation Electrification (TE) Plan[1] and tariff schedule 077. The table below summarizes key results for the calendar year ending December 31, 2023.

4,995	Number of light-duty passenger and truck EVs registered in Avista's service territory in Washington State, as of December 31, 2023
50%	% annual growth
$5.9 million	Regional transportation cost savings
15,816	Avoided tons of CO_2 emissions
10,971	MWh charging consumption
2.7	MW charging peak load
$1,104,154	Revenue from light-duty EV charging
$2,074,602	TE Capital investments
$486,646	TE Operating & Maintenance expenses
$208,373	Grant reimbursements received
751	Residential AC Level 2 (ACL2) ports in service
590	Commercial ACL2 ports in service
30	DC Fast Charging (DCFC) ports in service
98%	ACL2 equipment uptime
86%	DCFC equipment uptime
97%	Customer satisfaction with Avista TE programs
17	Electric forklift incentives
19	Fleet consultation services
17,061	Customer web page visits
10	Active number of Community-Based Organization (CBO) partners
53,157	Travel services provided by CBO partners (passenger-miles)
177	Public charging ports in Named Communities and CBOs
31	Community and stakeholder education and outreach engagements

Table 1: 2023 TE Results

Note that estimates for regional transportation savings, avoided CO2 emissions, electricity consumption, peak load, and revenue from EV charging are based on light-duty EVs only. Additional benefits provided by other forms of electric transportation will be reported as more data becomes available.

[1] See www.myavista.com/transportation for a web link to the TE Plan.

Significant EV adoption growth of 50% in 2023 exceeded the high adoption forecast in the TE Plan, and other segments such as mass transit buses and school buses also grew substantially. Trends at the regional, national and global levels point to sustained and major growth over the long-term, that accelerates for light- and medium-duty on-road vehicles in the next few years. Avista initiated a comprehensive load study at the feeder level in 2023, expected to be completed in 2024, which will be used to inform System Planning and Integrated Resource Planning efforts in light of this expected load growth.

ACL2 programs continued to achieve strong results, maintaining high customer satisfaction, equipment reliability (particularly non-networked EVSE), and cost effectiveness, and are poised for growth as the market expands. Networked EVSE remain a challenge in several respects, which will be an area of focus with industry partners in terms of reducing problem frequency and resolution lead time. New telematics technologies and load management methods were initiated with a select group of customers and showed excellent results. The Company plans to expand this program as a broadly offered residential Smart Charging program in 2024 utilizing Clean Fuels Program (CFP) funding. This program is intended to play a major role in achieving the strategic goal of supporting beneficial adoption, providing value to residential customers while achieving cost-effective load shifts of 50% or more to off-peak times of the day and night – resulting in net cost reductions to the grid and the general body of customers.

Public DCFC owned by Avista and other 3rd-parties were expanded in the region, but at a pace below the level needed to achieve accelerating market growth. Site acquisitions continue to pose major challenges, particularly in certain commercial centers where property owners are not willing to partner as DCFC site hosts. Uptime reliability at 86% and positive customer experience is higher than reported levels in other regions, however it remains well below the 95% uptime level on a per-unit basis that is required to meet the needs of the mass-market. These challenges will be a strong area of focus in the future, in conjunction with industry partners and the application of grant funding to enable high quality, adequate charging infrastructure and strategic placement to support the mass-market EV adoption. The Company will continue to support the development and implementation of the region's DCFC charging network, through ongoing engagement with local stakeholders including the Spokane Regional Transportation Council, Tribes, Municipalities, CBOs, Avista's Equity Advisory Group, and customers, and with guidance from the Washington State Department of Transportation and the State's Transportation Electrification Strategy.[2]

[2] https://www.commerce.wa.gov/growing-the-economy/energy/clean-transportation/ev-coordinating-council/transportation-electrification-strategy/

Community and low-income support programs were also successful, expanding the CBO EV program to 10 partners, installing DCFC and ACL2 at a number of community centers and rural towns, and supporting an innovative carsharing service with a successful state grant application. Fleet advisory services for electric school buses were a highlight of the year, which resulted in successful deployments at three school districts and six additional grant awards for implementation in 2024. Avista also supported the Spokane Transit Authority in its historic commissioning of the rapid bus transit City Line service and the expanded electrification reaching 40 buses representing nearly 25% of the fleet. Expanded fleet services for other commercial customers, including public municipal fleets and small commercial customers throughout the region, is an area of great opportunity in the future – providing a highly valued service for customers to develop informed plans, minimizing costs and maximizing benefits both to the customer and to the grid by shifting a higher percentage of load to off-peak.

Overall funding for TE programs at $2.6 million was less than prescribed by the TE Plan but remained within the planned range of $2 million to $6 million annual funding through 2030. This was mostly due to lower spending than estimated or targeted for charging infrastructure as well as education and outreach activities, and initial receipts of grant funding which reduced net expenditures. The company intends to broadly resource programs for future growth consistent with the TE Plan, as well as through the supplemental funding of CFP credits and state and federal grants. This includes the Washington State Electric Vehicle Charging Program (WAEVCP) grant administered by the Dept of Commerce, which Avista has just recently been awarded $2.3 million to install DCFC and ACL2 throughout its service territory for public, fleet, workplace and multiple-unit dwellings (MUDs). Developing partnerships and grant applications for vehicle-to-grid integration (VGI) demonstration projects is a new area of activity, as these capabilities may be key to enabling more cost-effective fleet electrification, optimized with grid conditions and capacity limitations, as well as providing backup power to certain critical loads and community centers.

II. TE Adoption and Forecasts

Light-duty registered vehicles in Washington counties served by Avista are summarized below for the years 2020 – 2023, based on Washington Department of Licensing data.[3] Registered EVs reached 4,955 by year-end as shown in the figure below, exceeding the high adoption scenario in the TE Plan, in which 4,418 EVs were predicted by year-end.

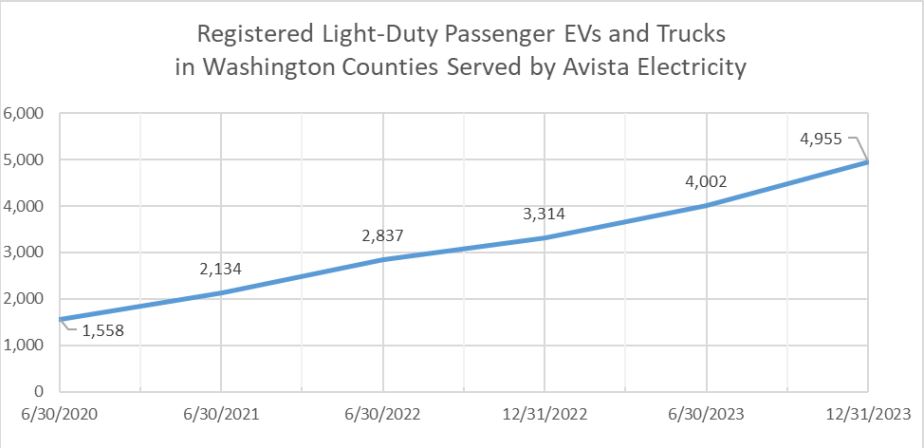


Figure 1: Light-duty Registered EVs in Washington Counties Served by Avista, 2020-2023

	2020	2021	2022	2023
Total Passenger Vehicles	416,749	417,245	418,481	411,363
Total Truck Vehicles	149,724	149,698	150,458	147,912
Total All Vehicles	566,473	566,943	568,939	559,275
Total EVs	1,558	2,134	2,837	4,002
% EVs of Total	0.3%	0.4%	0.5%	0.7%
% EV Growth	25%	37%	33%	41%

Table 2: Comparison of EVs to all Registered Light-Duty Vehicles, as of mid-year from 2020 to 2023, for Light-duty Registered EVs in Washington Counties Served by Avista

Light-duty adoption in Avista's service territory picked up considerably in 2023, at a pace of 41% annual growth rate by mid-year as shown in the table above, reaching 50% annual growth rate by year-end. This compares to 35% and 10% respectively for the State of Washington. The percent of EVs on the road reached

[3] See https://data.wa.gov/Transportation/Electric-Vehicle-Population-Size-History-By-County/3d5d-sdqb

0.9% by year-end in counties served, compared to 2.2% for the state. Nationwide, new light-duty EV sales exceeded 10% market share in 17 states, and in Washington State reached 20% market share in Q4. Globally, EV sales reached 14 million in 2023, representing 7% of the global vehicle market. Low cost EVs are driving adoption in India, Thailand, and Indonesia.[4]

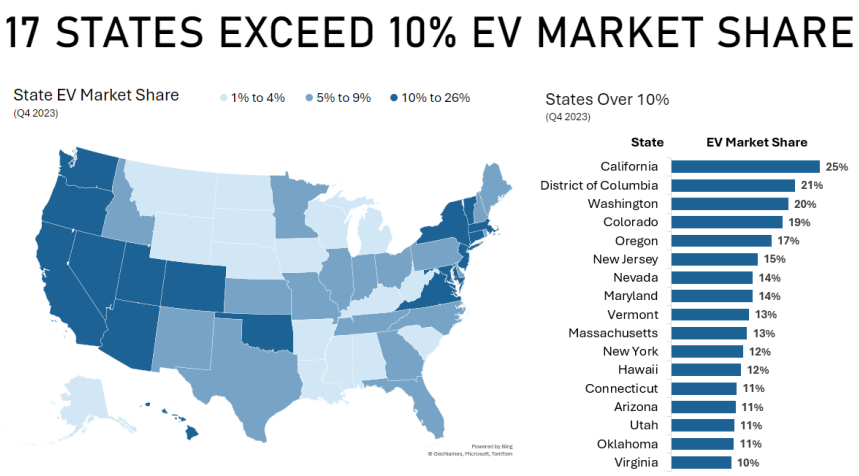


Figure 2: Light-duty EV Sales Data for Washington State (www.atlasevhub.com)

In other vehicle segments, mass-transit buses and school buses continued to electrify in 2023, a trend that is expected to grow – especially given the ongoing availability of state and federal grant funding. Avista has also recently engaged commercial customers with plans to electrify medium-duty delivery vans, as well as municipal light-duty fleets.

Figure 3: Electric delivery van (Amazon-Rivian)

[4] Bloomberg New-Energy Finance. "Zero-Emission Vehicles Factbook, special report for COP28" (December 2023)

Based on research from the National Renewable Energy Lab[5] and Washington vehicle registration data, estimates regarding a high adoption scenario by 2030 were developed for on-road vehicle classes 1 through 8, as shown in the table below. This represents a peak load increase of 3% to 11% from current system peak load, depending on the degree to which charging may be accomplished off-peak.

Given that the availability of light-duty trucks was more limited than expected in 2023 and appears likely to persist for one or more years, it is likely that actual adoption in this segment will lag below initial estimates. Regardless, it remains that sustained regional, national and global trends point to accelerating adoption in the years ahead for all vehicle classes, other than perhaps certain heavier classes such as long-haul freight transport.

	Total Vehicles	% Electrified	EVs	Peak Load (MW)	Consumption (MWh)
 **Passenger Cars (C1)**	704,261	10%	70,426	21 – 106	260,577
 **Light Trucks & SUVs (C2)**	264,848	7%	18,539	9 - 37	101,966
 **Light Medium (C3)**	24,802	17%	4,216	4 – 11	34,471
 **Medium (C4-6)**	20,360	11%	2,321	5 – 12	28,208
 **Heavy (C7-8)**	30,375	5%	1,519	12 – 24	26,218
Total	**1,044,646**	**9%**	**97,022**	**51 - 191**	**451,440**

Table 3: 2030 High Adoption Forecast for all On-Road Vehicles (Class 1-8)

[5] Ledna, Muratori, Yip, Jadun and Hoehne. "Decarbonizing Medium- & Heavy-Duty On-Road Vehicles: Zero-Emission Vehicles Cost Analysis. National Renewable Energy Lab. March, 2022. Transportation Decarbonization Research | Transportation and Mobility Research | NREL

A comprehensive study was initiated in 2023 and is expected to conclude in 2024 to update adoption and load forecasts from transportation electrification and other distributed energy resources, at the feeder level across Avista's service territory. This study will be used to better inform System Planning for the distribution system as well as Integrated Resource Planning efforts and will be summarized in future reports.

III. Expenses and Revenues

The following table itemizes TE Capital and Operations and Maintenance (O&M) spending for 2023, referenced to the targeted allocations for each category over the 5-year period of the TE Plan, from 2021 through 2025.

	Capital	O&M	Total	% of Total	TE Plan 2021-2025 Target
Residential ACL2 Charging Infrastructure	$166,888	$6,358	$173,246		
Commercial ACL2 Charging Infrastructure	$510,013	$25,767	$535,779		
DCFC Charging Infrastructure	$850,267	$22,843	$873,110		
Total Charging Infrastructure Installations and Maintenance	$1,527,167	$54,968	$1,582,135	62%	45%
Community and Low-Income Support	$380,547	$58,712	$439,259	17%	30%
Education and Outreach	$0	$78,312	$78,312	3%	10%
Fleet Services	$0	$38,686	$38,686	2%	5%
Load Management and Grid Integration	$166,888	$72,077	$238,964	9%	5%
Market and Technology Monitoring and Testing	$0	$59,276	$59,276	2%	3%
Analysis and Reporting	$0	$124,616	$124,616	5%	2%
Totals	$2,074,602	$486,646	**$2,561,248**		

Table 4: 2023 TE Capital and O&M Spending

Overall spending was less than the estimated $3.6 million in Capital and $875k in O&M spending per the TE Plan but was within the prescribed range of $2 million to $6 million total spending per year through 2025, commensurate with market conditions and adoption over time. Grant funding of $208,373 reduced net capital spending, and while some CFP credits were received in 2023, the bulk of expected CFP credits and

monetized funding for TE programs is not expected until the Dept of Ecology finalizes rules and issues residential base credits.

Avista provides electricity to approximately 88% of households in the Washington counties it serves. Taking this percentage of 4,002 light-duty EVs registered in counties served by mid-year (as an average for 2023), and $304 average utility billing revenue per EV, provides an estimate of $1,057,774 total billing revenue for 2023. In addition, DCFC user fee revenue of $46,380 results in total EV charging revenue of $1,104,154 from light-duty EVs in 2023.

IV. AC Level 2 Charging

Avista's AC Level 2 (ACL2) charging infrastructure programs continued in high demand in 2023, meeting cost expectations and achieving high customer satisfaction. The table below summarizes ACL2 ports installed in 2023 and total cumulative ports in service, as well as the average cost and lead time for residential and commercial installations.

	Residential ACL2	**Commercial ACL2**
# Ports Installed	272	127
Total # Ports In-Service	751	590
Installation Cost per Port including charger	$1,730	$7,450
Lead Time	3.5 weeks	18 weeks

Table 5: Charging Installation Results for 2023

In the residential ACL2 program in 2023, Avista provided eligible customers with an Avista owned and maintained charger, pays the direct installation costs and 50% of premises wiring costs, up to $1,000. A non-networked charger is installed, rated at 24 to 32 amps and capable of delivering 5.8 to 7.6 kW (approximately 20 to 25 miles of driving range per hour of charging). As part of the program, customers agree to ongoing load management experiments. This involves programming their EV to charge overnight with the ability to override and provide an immediate charge when necessary. Beginning in July 2023, customers with eligible vehicles were asked to enroll in a vehicle telematics program, which provides Avista access to charging data

and location to aid in development of load profiles and additional insights of charging behavior to prepare for future load growth. Customers receive notifications if they charge during on-peak hours that serve as a behavioral influence to change their charging habits. In addition to load management experiments, residential program participants agree to respond to periodic surveys and give feedback about the program and their experiences related to electric transportation and EV charging.

Commercial ACL2 may be used for a variety of purposes including charging for fleet, workplace, public, and/or multi-unit dwellings (MUDs). Eligible customers may select from a standard program that is very similar to the residential program, with Avista owning and maintaining the charger, and paying supply infrastructure costs up to $2,000 per port installed, or a make-ready program option, with customers owning and maintaining the charger and Avista paying for supply infrastructure up to $2,500 per port installed. Commercial customers also agree to participate in load management efforts and provide feedback through periodic surveys.

For the commercial program, discussions occur with the customer to identify the primary use of the charger and charging requirements, including power output, appropriate number of chargers, and future expansion planning. In general, non-networked chargers are preferable in terms of lower upfront and ongoing operational costs, superior reliability, and ease of use for drivers and site hosts alike. Commercial customers are often interested in networked units however, as they allow for transacting point-of-use fees and can provide detailed charging session data. Despite this initial interest, customers rarely proceed with a networked unit once the associated cost of networking fees and lower reliability is understood, weighed against the relatively low energy costs. For example, networking fees alone typically cost more than $350 annually per port, compared to less than $300 per year in electricity costs incurred by the average employee utilizing workplace charging. Despite these costs, 4 customers opted to install networked units in 2023, 11% of total ports installed. This is a large increase from the 3% networked ports installed in 2022. Each of the new networked locations allow charging access to the public and provided the owner with the desired ability to recover energy expenses from drivers, via point-of-use fees. It appears likely the relatively low rate of networked ACL2 will continue until reliability, networking and maintenance costs significantly improve for this type of equipment. If networked ACL2 costs and reliability do not improve sufficiently, then new innovations will be required to satisfactorily address the needs of many property and business owners – most prominently cost-effective, practical, and reliable ways to collect revenue from end-users.

Installations and Costs

The chart below shows the status of completed residential applications in 2023, in driver categories of Battery Electric Vehicle (BEV) Commuter, BEV Non-Commuter, Plug-In Hybrid Electric (PHEV) Commuter, and PHEV Non-Commuter.

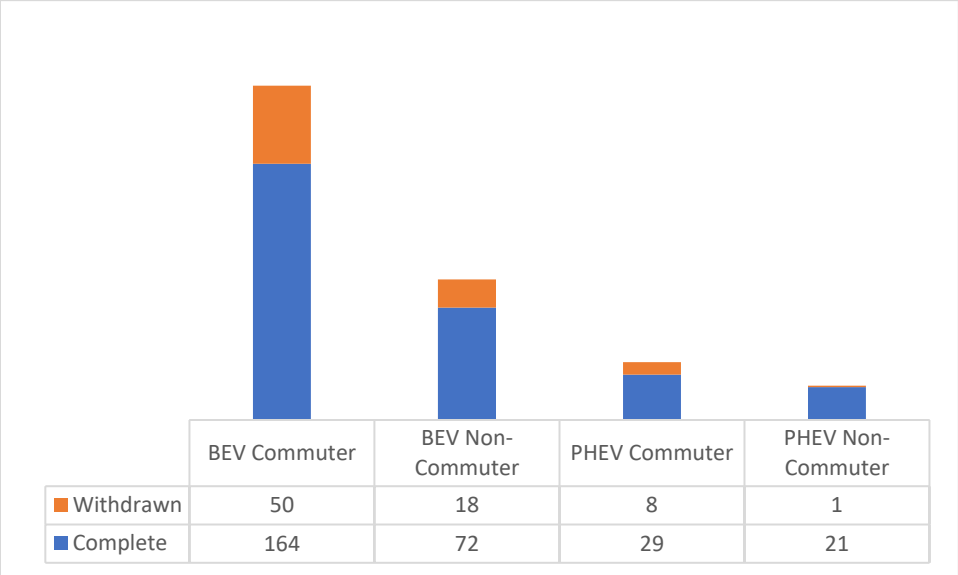


Figure 4: Residential charger installations by driver category (2023)

77 out of 363 residential applications were withdrawn (21%). Reasons for withdrawing were distributed fairly evenly between too expensive, unresponsive, other or unknown, and wanting to use a different contractor or self-install. The increase in withdrawn application and the more diverse set of reasons indicates customers have an increased desire in having more control of their installation and equipment and supports a revised approach to Avista's residential program.

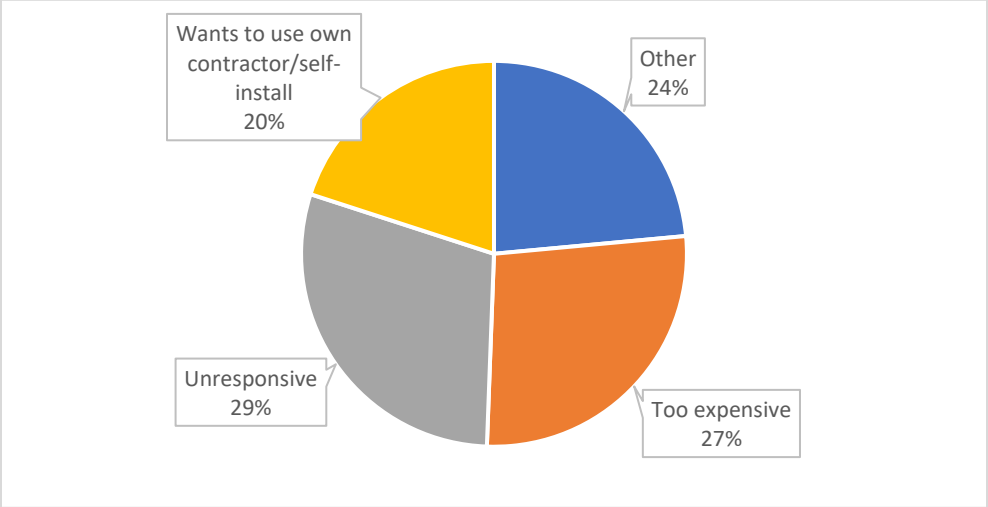


Figure 5: Residential charger application withdraw reasons (2023)

Average residential installation costs in 2023 were $1,730 including the cost of the charger, which is a slight decrease than the 2022 average installation cost $1,863. This can be attributed to contractor efficiencies as they become more familiar with the process and installation requirements. Non-networked EVSE costs also saw a modest decrease, which is reflected in the total installation expense.

Purchasing chargers in bulk and having established and well-trained contractors created efficiencies in the process, allowing costs to remain stable despite the fluctuations and inconsistencies in the market the past few years. Supply chain disruptions were also less impactful than the initial post-COVID installations. With close attention to inventory management, average lead time from customer application to completed residential installation was maintained under 3.5 weeks.

The majority of residential program applicants owned a BEV (84%) and utilized their EV for commuting (71% including both BEV and PHEV drivers). This compares to 79% and 68% respectively for 2022, indicating a trend toward more BEVs and work commuting overall.

Figure 6: Residential charger installation

The chart below shows completed and withdrawn commercial applications for 2023, categorized by primary use type.

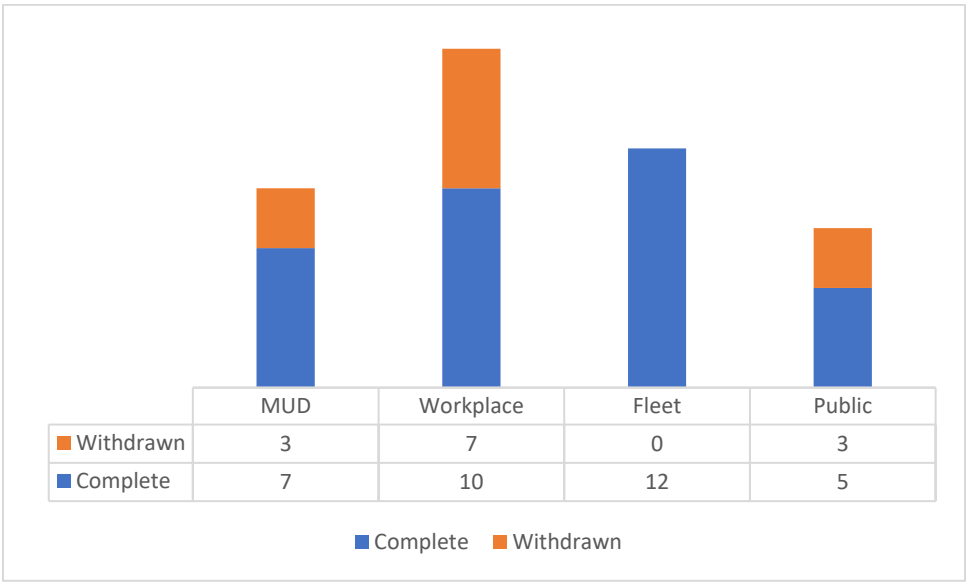


Figure 7: Commercial ACL2 charging installations by use type (2023)

A total of 127 ACL2 ports were installed at 44 commercial facility locations, averaging 2.8 ports per location. This compares to 3.2 ports per commercial location in 2022. Most locations installing charging only need two to four ports to support initial workplace and fleet needs but those figures are expected to grow as market adoption accelerates in the coming years.

Workplace and fleet use cases had the highest interest in EV charging, supporting these as the easiest use cases and early wins for EV charging. However, public, workplace, and MUD applications had higher withdrawn rates (37.5%, 41%, and 43% respectively). 100% of fleet applications moved forward with installation. Much of this may be attributed to the ability to use non-networked chargers for fleet applications, as no point-of-use payments are typically needed or desired by the customer. In other use cases, property and business owners continue to express concern with how to recover ongoing operation and maintenance costs, including networking fees, electric bills, and station repairs. Business owners are exploring workplace charging to meet employee, policy, and societal expectations but are hesitant to commit to offering workplace charging as an amenity and are not interested in developing internal administrative policies as an alternative to networked chargers employing user fees, as a way to recover operational expenses. Landlords and property owners face similar challenges and are often unwilling to include charging in overhead costs for the property but are also not open to developing an alternative process to recover energy fees from users as a part of rent or parking services.

Avista's TE Plan indicates a goal to support up to 12 ACL2 public charging sites each year. In addition to high withdraw rates, initial interest in public ACL2 charging has been lower than anticipated as site hosts are discouraged by a negative ROI with networking fees to recover costs from drivers and the expense of energy. Site hosts have concerns that a free service will be heavily utilized, without an equitable growth in business and are opting to abstain from installations. Two of the five completed ACL2 public charging sites were installed under a grant and sited at public libraries. One was installed by a smaller city entity who received their own grant to cover the charging costs and are hoping to entice travelers to visit their main street shopping. Two were installed in small rural towns, providing value for the local community and a beneficial geographic distribution of EVSE throughout eastern Washington. The Company intends to continue support for ACL2 in rural towns as described further in the Community and Low-Income Support section of this report. Public sites provide an important benefit in establishing a more robust distribution of public charging throughout the region, enabling confidence in making personal and business-related travel when planned dwell times at destinations allow for several hours charging on ACL2, as well as when the unforeseen need may arise – thereby alleviating range anxiety among EV drivers and supporting early market growth. In order to achieve targets for public ACL2 in more populated areas such as in the Spokane metro area, program adjustments may be needed to increase awareness of the program and to address site host concerns.

Figure 8: Public charging installation

Commercial installation costs averaged $7,450 per port, including the charger. However, this is skewed higher by school bus installations that are more expensive than most commercial ACL2 installations. Excluding school bus installations, the commercial ACL2 installations costs average $5,640 per port. This is a 24% increase from 2022 costs, which averaged $4,546 per port. Mid-year, Avista began sub-metering EVSE installs when economical to do so. This allows for separation of EV load to enable data collection to aid in development of load profiles, reliably usage data to collect commercial Clean Fuels Program (CFP) credits, and in the future, may allow for utilization of an EV Charging rate. In 2023, 16 installs were sub-metered and 8 sites had separate meters installed. The range of commercial installation costs fluctuate more than residential costs depending on the size of the installation, significant infrastructure upgrades such as new service panels, and the amount of trenching and restoration work. Supply chain disruptions were minimal in 2023, but in some cases were problematic such as for certain supply panels which required lengthy procurement lead times and caused some installation delays.

Figure 9: Multi-unit dwelling charging installation

Customer Surveys

All ACL2 program participants receive a post-installation survey and a recurring annual survey that measures customer satisfaction and provides valuable feedback. Response rates are lower than expected and are declining from previous years.

	Response Rate	Net-promoter Score	Satisfied or Highly Satisfied
Residential	39% (106 of 272)	90	98%
Commercial	18% (8 of 44)	76	95%

Table 6: 2023 post-installation customer survey results

General comments are very positive, and customers have high rates of satisfaction for both programs. Residential customers have a net-promoter score (NPS)[6] of 90, and 98% of customers are satisfied or highly satisfied with the program. Some constructive criticism was received related to costs, scheduling and communication challenges with contractors in a few instances. Commercial customers also indicated very high satisfaction levels (95% satisfied or highly satisfied); however, response rates to commercial surveys continues to be low.

In addition to the post-installation survey, in August 2023, Avista sent an annual survey to residential and commercial customers with an EV charger installed for six months or more.

[6] NPS measures customer satisfaction and the likelihood to recommend a product or service, for more details see: https://en.wikipedia.org/wiki/Net_promoter_score

	Response Rate	Net-promoter Score	Satisfied or Highly Satisfied
Residential	17% (83 of 500)	78	92%
Commercial	6% (7 of 117)	14	86%

Table 7: 2023 annual customer survey results

Customer engagement decreases post-installation, as seen by the decrease in response rates compared to surveys completed immediately after installation. Overall satisfaction remains high for both residential and commercial installations, however these are small sample sizes and may not be representative of all customers. Residential feedback indicated opportunities for education of the benefits and goals of off-peak charging, recommended public charging locations, and customer opportunities to better understand their own charging behaviors. Information was summarized and sent to the broader survey group. Low and declining survey participation indicates a change may be warranted to elicit better engagement with customers and to effectively evaluate ongoing program results. Lower response rates from previous years may also indicate a growing set of participants are part of the mainstream customer segment as compared to early adopters and are less inclined to engage with surveys and constructive feedback.

V. DC Fast Charging

The buildout of our DCFC station network continued in 2023 with the construction of four sites in partnership with site hosts and the Spokane Regional Transportation Council (SRTC), under the Washington State Clean Energy Fund III, Electrification of Transportation Systems (ETS) grant in Spokane County, and two sites identified as strategic travel corridor charging locations outside Spokane County. With the completion of these six sites, a total of 10 new DCFC stations with 20 charging ports have been built in the last two years. These stations account for close to 20% of the planned charging stations identified in the regional buildout plan for Eastern Washington. This buildout plan aims to populate urban population centers with a robust charging network that encourages accelerated electrification in the region, as well as charging stations every 30 to 50 miles along major travel corridors.

Station Name	Status	Completion Date (Actual or Targeted)	Site Type
Sprague	Completed	6/1/2022	Rural Access
NE Community Center	Completed	8/30/2022	Community
The Hive	Completed	9/1/2022	Community
Indian Trail Library	Completed	9/2/2022	Community
Moran Prairie Library	Completed	9/21/2023	Community
North Spokane Library	Completed	9/22/2023	Community
Trailhead Golf Course	Completed	9/25/2023	Community
Port of Clarkston	Completed	9/25/2023	Community
West Valley SD	Completed	9/27/2023	Community
SpokoFuel Chewelah	Completed	12/15/2023	Rural Access
Deer Park - Yokes	Construction Pending	Q2 2024	Rural Access
City of Colville	Construction Pending	Q2 2024	Rural Access
Town of Wilbur	Construction Pending	Q2 2024	Rural Access
MLK Community Center	Construction Pending	Q3 2024	Community
Pullman Airport	Contract Negotiation	Q3 2024	Rural Access
Uniontown	Contract Signed	Q4 2024	Rural Access
Two Rivers Resort	Construction Pending	Q4 2024	Rural Access
Town of Davenport	Site acquisition	Q4 2024	Rural Access
Lincoln Heights Shopping	Site acquisition	Q4 2024/Q1 2025	Retail
N. HWY 2/Mead	Site acquisition	Q4 2024/Q1 2025	Retail
E. Sprague Shopping	Site acquisition	Q1 2025	Retail

Table 8: DCFC siting and construction progress (2022 - Present)

The design of DCFC stations was changed this year to improve accessibility for disabled customers. The previous design iteration provided a 5-foot wide ADA walkway between the two ACL2 parking stalls and the two DCFC parking stalls. While this walkway allowed disabled individuals access to EV parking, it did not provide an appropriate path to the chargers themselves. To address this, an additional walkway was added between the ACL2 and DCFC chargers which connects to the ADA walkway in the parking lot. The DC charger has been turned 90 degrees, so the user interface is accessible from the walkway. The two parking stalls next to the walkway were widened to 11 feet, this allows for van access and helps maintain stall spacing when building in existing lots (two 11-foot wide stalls plus a 5 foot walkway fit in the same footprint as three 9 foot stalls). The figures below show the original ADA access design and the modifications made this year.

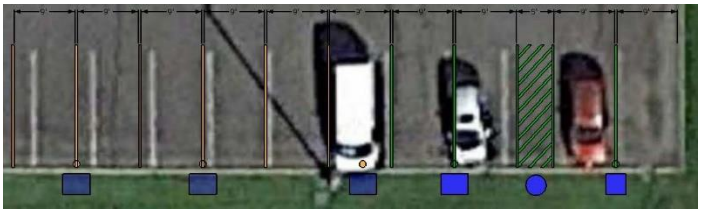


Figure 10: Original ADA Access Design

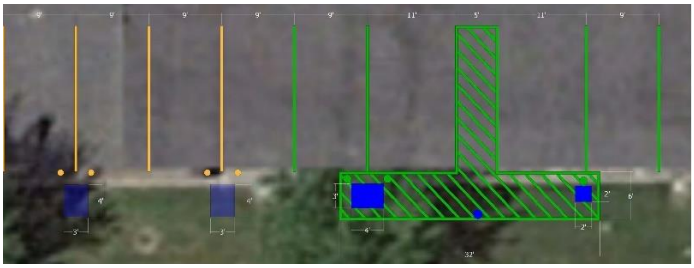


Figure 11: Modified ADA Access Design

With this new design, a customer in a wheelchair will now be able to exit their vehicle, access the chargers and plug in their vehicle using designated walkways, providing an enhanced customer experience.

The four completed ETS grant sites were located at Moran Prairie library, North Spokane Library, West Valley School District, and the Trailhead Golf Course in Liberty Lake. The North Spokane Library and West Valley School District sites were designed using the 1MW[7] standard design. Due to parking lot size and restrictions on the distribution grid, the Moran Prairie Library and Trailhead Golf Course stations were limited to a 500kW design.

The station built at Trailhead Golf Course was originally planned to be located at the Townsquare in Liberty Lake per the ETS grant application. The city requested that the DCFC station be built at the golf course to compliment the new clubhouse that was under construction. While the location provided good public exposure and decent access to amenities, it did present some challenges around site design and placement of the required electrical equipment. The 8-foot-tall black chain link fence that would be installed around the electric equipment did not fit the aesthetic of the new facility and would obstruct the view of the clubhouse from street level. To accommodate the city's design requirements, the electric equipment was installed along a walking path that is 14 feet below the elevation of the chargers. Having the electric equipment located down a hill presented some challenges in trenching and required more conduit and conductors than if the equipment was installed at the same elevation as the chargers.

The figure below shows the completed charging station as viewed from the parking lot. From the road, a driver will see the charging stations with the new clubhouse as a backdrop.

[7] Design specifications for the 1MW and 500kW stations can be found in Appendix A.

Figure 12: Trailhead Golf Course Charging Station

Figure 13: ABB Terra 184 DCFC – Trailhead Golf Course

The next figure shows the first 3-inch conduit run down the hill for this installation. In total, two 4-inch conduits were run from the transformer to the electric gear, three 3-inch conduits and two 1.5-inch conduits were run from the electric gear to the charger locations.

Figure 14: Conduit – Trailhead Golf Course

The two corridor sites completed in 2023 are located in Clarkston along the Snake River and just south of Chewelah on the Spokane Tribe reservation. Each of these sites filled a void in public DC fast charging access in their region and on the major US 195/395 travel corridor and have seen significant use since their commissioning. Due to grid constraints, the Clarkston station was limited to a 500kW design. The Chewelah station was built to the standard 1MW design and is a good candidate as an expanded site utilizing future National Electric Vehicle Infrastructure (NEVI) funding.

By the end of 2023 five contracts were in place for charging stations to be built in 2024. This includes two ETS grant sites, (Deer Park and the Martin Luther King Community Center) and three corridor charging sites with significant funding from the state WAEVCP grant. The first of those three sites, located in Colville, will add another link in the chain of chargers leading from Spokane to the Canadian border.

Figure 15: ABB Terra 184 DC Fast charger – Clarkston, WA DCFC Site

A site in Wilbur will be Avista's first DCFC installation on the US-2 travel corridor. The third site will be at the Two Rivers Resort, which is located on the Spokane Tribes Reservation. This site provides recreational access to the Spokane and Columbia rivers and will see usage from outdoor enthusiasts wishing to electrify their pickups and boats in the future. Despite these successes, it remains a major challenge to find willing site host partners, particularly in certain retail commercial centers. More resources and/or alternative methods will be needed to acquire sites in order to meet strategic buildout plan objectives.

Supply chain delays continue to be an issue for electric equipment needed at DCFC sites. Lead times for electrical equipment vary from 20 weeks not made in America to 52 weeks for American made. To mitigate these delays, larger orders of electrical equipment well in advance are necessary to meet construction schedules.

To encourage more private investment in the regional DCFC network, Avista offers a make-ready program for public DCFC, and an optional time-of-use (TOU) rate schedule to mitigate high demand charges on their monthly electricity bills. The make-ready program covers the cost of a new transformer and provides (up to) $20,000 funding to cover the cost of a service line-extension, in addition to the standard Schedule 51 line extension allowances. In exchange for this financial assistance, the customer designates Avista as the credit generator for any CFP credits and agrees to a price per kWh that Avista sets. In 2023, five auto dealerships

signed up for the program as well as a customer that will be building public stations in Clarkston and Pullman. The following summarizes the number of DCFC ports in Avista's service territory in eastern Washington:

	No. of DCFC Ports / Connection Type				
Station Owner	**CHAdeMO**	**CCS**	**NACS**	**Total**	**% of Total**
Avista	7	27	0	34	33%
Tesla	0	0	24	24	23%
Other	6	40	0	46	44%
Totals	13	67	24	104	100%

Table 9: DCFC ownership by connector type

As described in the TE Plan, a target of at least 50% of investments to form the initial DCFC network are funded by private parties and grant funding. Although this appears to be the case from the table above, several DCFC are owned and operated by auto dealerships in locations that are not ideal from a driver perspective, and in the region outside of the Spokane metro area there are more limited privately-owned charging sites to-date. Work must continue to support strategically locating charging infrastructure throughout eastern Washington, beyond just I-90, to meet driver charging needs and transition to accelerating market growth. Furthermore, this highlights the ongoing need for utility investment and grant funding to build a backbone of reliable charging in the region, that is essential to accelerated adoption in the mass market. The Company will continue to support the development and implementation of the region's DCFC charging network, through ongoing engagement with local stakeholders including the Spokane Regional Transportation Council, Tribes, Municipalities, CBOs, Avista's Equity Advisory Group, and customers, and with guidance from the Washington State Department of Transportation and the State's Transportation Electrification Strategy.

VI. Reliability and Utilization

State and federal policy, along with driver feedback, shows a strong interest in ensuring EV charging equipment is highly reliable. Driver sentiment indicates that while drivers continue to express a desire for investments in new charging infrastructure to meet demand and reduce range anxiety, focus is also shifting to acknowledge that current infrastructure is not always online and functional. Avista has maintained a very

high priority in maintaining a robust charging network, with high uptime and customer experience. Our near-term goal is 95% uptime (online and functional), with a longer-term goal of 99% uptime, on a per-unit basis. Some reliability improvements are noted, but more work is needed for consistency and to reduce downtime when issues do occur, followed by root cause analysis and long-term, preventative solutions that are necessary to creating sustainable and lasting improvements.

EVSE Type	Ports in Service (year-end)	Uptime %
Residential ACL2	751	99.9%
Commercial Non-networked ACL2	486	99.5%
Commercial Networked ACL2	104	95.1%
Networked DCFC	30	86.3%

Table 10: Uptime by charger type (2023)

Many commercial ACL2 site hosts do not need charging data or require user fees for charging sessions. Employers may offer charging as an amenity or to encourage customers to visit their businesses. Fleet vehicles often have separate methods for tracking energy use and mileage. In these cases, non-networked chargers are a perfect fit and a much more cost effective and reliable equipment choice. This enables the business owner to install charging at a lower upfront cost and reduce the amount of ongoing operations and maintenance compared to networked ACL2 chargers. Avista's turn-key program further supports this by providing the chargers and the security of knowing Avista will maintain the chargers if issues do arise. Using this approach, Avista has been able to meet and exceed the long-term uptime goal of 99% for a majority of our residential and commercial installations. This best practice will continue to be shared as a strong recommendation for the applicable use cases well into the future.

For customers that need to require payment for use or have more control over the station, networked chargers are the best option. While we have seen considerable improvement in connectivity and reliability over the past several years, uptime remains a top concern of drivers and is a complicated and time-consuming issue for site hosts and station owners. Proper identification of issues, remote troubleshooting, determining root cause, and developing well defined statements of work for solutions continues to be a major challenge. There are many integrations and partners involved in networked stations: hardware manufacturers, network

software providers, utility power providers, credit card payment processors, cellular communication partners, and vehicle OEMs. EVSE faults and downtime can be attributed to one or more of any of these parties. It may be a firmware or software update, a loss in communications to any of the parties, an integration failure between parties, and more. As more hardware manufacturers, software providers, and vehicles enter the market, the number of permutations, problems and complexities increase.

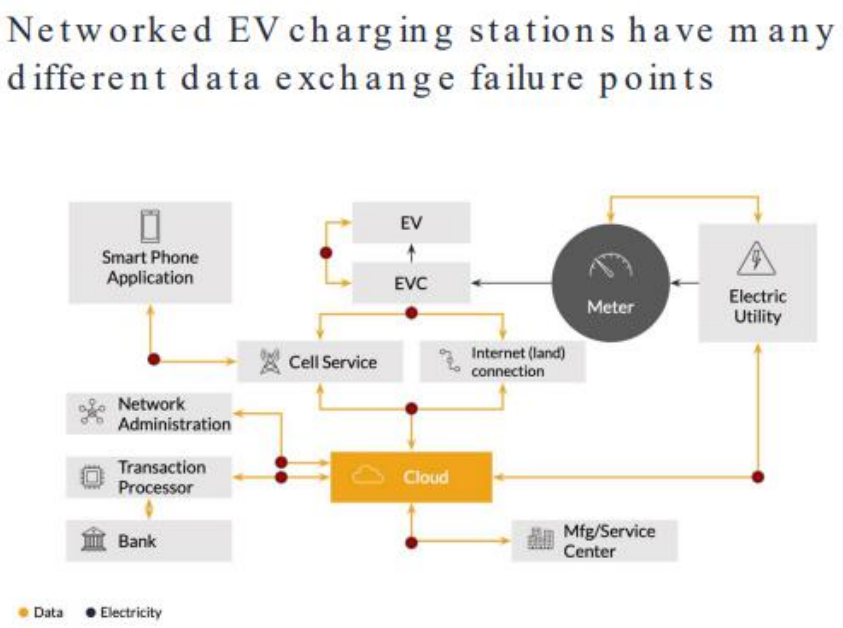


Figure 16: Visual of interoperability of networked EVSE as shared by ChargerHelp! during EPRI IWC meeting (2022) PowerPoint Presentation (epri.com), Slide 6.

Rapid changes in technology create further expense and complication for networked chargers. The expense of upgrading station components can outweigh the remaining un-depreciated cost of a station shortly after a station exceeds its warranty period, resulting in it being more cost effective to replace stations than repair them. This issue can be compounded by the lack of clarity of root cause and therefore unclear part requirements, or unnecessary parts recommended to mitigate the risk of not having the necessary parts during a scheduled maintenance site visit.

DCFC uptime was 86.3% in 2023, a slight decrease from 89% in 2022. Several factors negatively impacted uptime including vehicle integration issues, poorly tested firmware and software updates, vehicle issues, and unclear maintenance procedures. There were multiple instances of ongoing vehicle integration issues,

impacting drivers' ability to use stations. Several network provider updates had unintended consequences, resulting in stations becoming inoperable for periods of time for specific station manufacturers. This highlights another important issue: hardware manufacturers, software providers, and vehicle OEMs need to establish integrated testing procedures prior to deploying updates to mitigate interoperability risks. In our experience, this practice is not adequately in place nor a high enough priority for industry stakeholders.

One DCFC station had two separate instances where a driver's vehicle became inoperable after charging at the station. After the first instance, the station was turned off for a period of time to allow for investigation. The station manufacturer did a complete check and determined the station was not at fault. This occurred a second time, with a different vehicle type. The station was again thoroughly evaluated and the issue determined again to be a vehicle issue. Both vehicles had the same issue, requiring battery replacement. This is a known issue for a few specific vehicle OEMs that utilize the same batteries and components for their vehicles. It has been determined that these OEMs allow too many communication pings to their vehicles which drains the 12V battery, as it is not recharged until the vehicle is driven using a DC-to-DC converter that sends power from the high-voltage system to the 12V auxiliary system.

Remote monitoring, regular testing and on-site inspections are important to maintain and improve uptime. Avista staff monitors public comments on PlugShare.com on a regular basis and completed 538 ACL2 and 33 DCFC field inspections in 2023. Of these scheduled inspections, 11% resulted in an issue being identified and the station failing inspection. Due to known reliability issues and the complexity of stations, networked stations are inspected more frequently than non-networked stations. However, all commercial stations had at least one inspection in 2023. Networked station inspections resulted in a failed inspection 15% of the time while non-networked stations failed 10% of inspections. Regular inspections are necessary for both networked and non-networked stations to identify issues not found by remote monitoring or issues not capable of being remotely identified such as broken connectors or damaged screens. Monitoring PlugShare and other sources for driver feedback can help supplement information gathering but does not replace the need for routine visual inspections and testing procedures.

Figure 17: Station hit by vehicle identified during an inspection.

Third-party adapters and other components not in compliance standards create additional charging and maintenance issues. Particularly, third-party adapters for Tesla vehicles that use J1772 connectors have caused a number of issues, as they do not always properly connect. Many stations fault if the connectors are not properly seated, causing sessions to fail, or end early. Improperly connected adapters can allow for small electrical connections to occur that create heat and in some instances, melted adapters to charge cords. This restricts drivers from being able to disconnect the adapter from the charge cord and damages the charging cords themselves, requiring replacement and added maintenance costs for the station owner/operator.

Figure 18: Connector pin damaged (missing internal piece) after utilization of a non-Tesla adapter.

Normal wear and tear and occasional vandalism will also continue as ongoing issues to be monitored and addressed. Examples include cut or stolen cords, broken connector clips, and broken/failed screens, particularly LCD screens. This has not been a major issue in Avista's territory to-date but is a known risk and requires continued attention.

Figure 19: Payment module screen damaged and protective covering smashed.

The chart below represents the top 10 problem types accounting for 96% of the 526 problems that were identified and tracked in 2023, for all EVSE owned and maintained by Avista. Networked EVSE representing 8% of the total ports in service disproportionately exhibited 85% of the problems tracked.

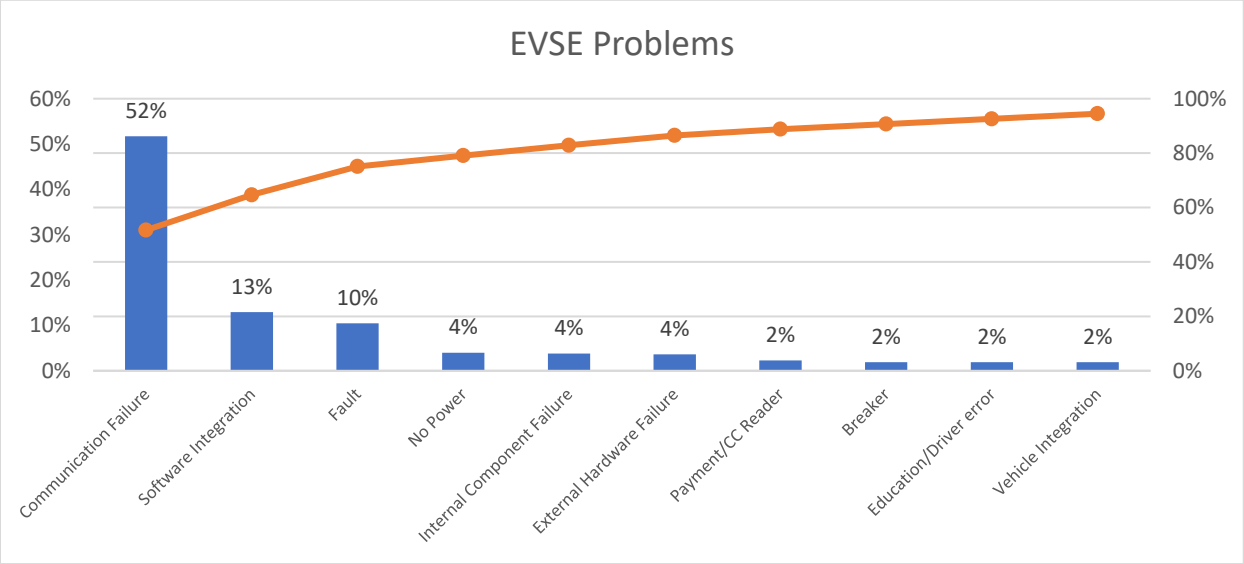


Figure 20: Pareto chart of combined ACL2 and DCFC problem types (2023)

Year over year, the most common issue for EVSEs are communication failures, accounting for 52% of the problems identified in 2023. Communication failures are typically caused by temporary losses in cellular signal strength or modem malfunctions, often self-resolving after some period of time but then reoccurring over several days, weeks or months. Frequently, an EVSE is capable of delivering a charge for the customer in the event of communication failure, if the software is configured to default to a "free vend" mode, meaning the charging session is provided without a user fee. However, in many instances, enabling this feature removes the requirement for drivers to authenticate to begin a charge session, even when communications are functional.

The next most frequent problems include software integration issues (13%), station faults (10%) and then internal and external hardware component failures and loss of power. These three combined account for another 12% of problems. Root cause is often difficult to determine and isolate among several parties including EVSE manufacturers, network providers and vehicle OEMs. The persistence of EVSE problem frequency and complexity makes it clear that much work remains to establish reliable compliance with clear and effective standards that integrates EV battery management systems, EVSE and network communications protocols and interoperability, as well as testing and certification processes across the industry.

Figure 21: Credit card reader error.

Equipment manufacturers and network providers – particularly those involving DCFC – must provide improved reliability and service capabilities, in order for accelerated EV adoption to occur in the mainstream market. The table below shows the number of problems tracked in 2023 and resolved by the end of the year according to severity, as well as the average and mean number of days to resolve for each. Average days to resolve is significantly longer than the mean, as a result of a relative few problems taking a very long time compared to the rest.

Problem severity	Number of occurrences	Number resolved	Median days to resolve	Average days to resolve
Urgent	8	8	20	29
High	407	407	2	7
Medium	88	84	6	16
Low	23	15	27	53

Table 11: ACL2 and DCFC problems by severity and time to resolve (2023)

Average resolution times have direct correlation to the amount of time and effort invested on Avista's part to continue to push on service partners for support and resolution. Avista's uptime and reliability is better than many independent reports across the country but is due to regular check-ins and persistent tracking

and management of issues. Support services and well-trained technicians and analysts are lacking in the industry. As a result, maintaining high uptime will be an ongoing challenge, especially for small business owners or independent station owners without knowledge of EVSE operations and relationships. In order for mass-market adoption of electric transportation and sustainable station reliability practices to become mainstream, significant work, communication, and cross-functional partnerships need to be established and nurtured.

Figure 22: DCFC station with out of order error displayed on user interface (U/I) screen

Charger Utilization

The table below shows utilization by station type for networked ACL2 in 2023. While these averages provide some value in terms of capturing the current state in the early market, future utilization and energy consumption is expected to increase as the market matures. In particular, MUD and fleet utilization data is limited by a relatively small data set. The range of fleet utilization and energy consumption is expected to vary considerably between different customers, depending on the number, type and driving patterns of electrified fleet vehicles.

	Number of ACL2 Ports	Annual Sessions per Port	Average kWh per Session	Annual kWh per Port
Public	43	123	7.0	861
Workplace	44	92	11.6	1,067
MUD	13	114	12.4	1,414
Fleet	8	72	11.3	814

Table 12: Networked ACL2 session data (2023)

Public and workplace ACL2 have the highest number of networked units still in service. These networked units are generally capable of delivering 7.7 kW power output, indicating that the average charge session durations are less than two hours for all use types, similar to results from Avista's 2016-2019 Pilot. Vehicle dwell times for workplace, fleet, and MUD locations are usually much longer than two hours, indicating charging output power could be reduced for most EVSE and still allow vehicles to fully recharge, or if feasible more than one vehicle could utilize a common charger port, e.g. if charge cords are swapped between vehicles midday in the case of workplace charging.

EVSE network data indicates a number of sites experiencing consistent, daily utilization for DCFC in the greater Spokane area as well as along major travel corridors or areas with limited DCFC infrastructure. The Hive in Spokane and the site in Clarkston, WA average more than two sessions per day and the station in Pullman is just under two sessions per day. Six sites range from 0.9 to 1.3 sessions per day. Chewelah SpokoFuel and Rosalia both have stations situated strategically along well traveled corridors and experience about 0.7 sessions per day. While not quite daily, these sites are well utilized considering the size of the community and are vital for travelers to have confidence in making longer trips driving electric. Sessions vary but average energy dispensed remains consistent with previous years, about 25 kWh per session, which gives drivers approximately 75 to 85 miles of added range.

	In-Service Date	# DCFC ports per site	kW per port	2023 Charging Sessions	Average kWh per Session	Annual kWh
The HIVE	9/1/2022	2	90-180	895	27	24,223
Sprague	5/17/2022	2	90-180	489	24	11,955
Indian Trail Library	8/31/2022	2	90-180	335	31	10,366
NE Community Center	8/30/2022	2	90-180	262	27	6,767
Rosalia	7/12/2022	2	90-180	240	25	5,972
Kendall Yards	9/21/2023	2	90-180	239	35	8,322
Clarkston	9/29/2023	2	90-180	226	24	5,504
North Spokane Library	9/22/2023	2	90-180	132	26	3,413
Moran Prairie Library	9/22/2023	2	90-180	88	33	2,904
West Valley School Dist	9/27/2023	2	90-180	73	19	1,367
Liberty Lake Trailhead	9/25/2023	2	90-180	53	31	1,662
Chewelah SpokoFuel	12/11/2023	2	90-180	13	11	138
Liberty Lake STA	12/1/2023	2	90-180	11	14	151
Pilot DCFC Sites (5)	2017-2019	1	50	1,976	24	49,771

Table 13: DCFC site utilization and energy consumption (2023)

VII. Community and Low-Income Support Programs

TE programs benefiting communities and low-income customers include partnerships with community-based organizations (CBOs), charging infrastructure at CBOs and in low-income and underserved communities, and in areas of emerging opportunities such as school buses, mass-transit, ride/car sharing, and micro-mobility. Spending for 2023 in this category was $439,259 out of $2,561,248 in total spending, or 17% of the total. For the year, this is less than the aspirational goal of 30% of overall TE spending from 2021 through 2025 per the TE Plan. The Company intends to increase the level of activity with school bus electrification, as well as charging infrastructure in low-income and underserved communities, and in other areas as noted, which should help in moving closer to the aspirational goal. Criteria will also be evaluated to ensure legitimate investments in this category are accounted for. For example, not all charging infrastructure costs for installations in Named Communities has thus far been accounted for in this category.

Partnerships with CBOs

Each year, Avista engages a local network of CBOs, soliciting proposals utilizing electric transportation to serve communities in need. CBO proposals include a variety of transportation services such as non-emergency medical appointments, food deliveries, and shelter transport. In this program, Avista provides resources such as an EV and charging infrastructure tailored to the CBO's needs. The CBO is responsible for managing transportation services as well as EV insurance, fuel, maintenance, and utilizing volunteer and/or staff resources as drivers.

Figure 23: Tri-County Economic Development District's EV Bolt Charging in Ritzville, WA CBO Partner with Avista (2023)

This model effectively leverages resources of the CBO, providing expanded clean transportation services to disadvantaged groups at lower operating costs for the CBO. It also provides an added benefit of education and outreach for CBO management, staff, and passengers, increasing positive awareness of electric transportation and support for broader electrification of passenger fleets as well as personal vehicles. Annual reports and feedback are provided by the CBO, including narratives such as the following example from the International Rescue Committee in Spokane, which partnered with Avista in 2023:

> "This vehicle has been indispensable for serving our clients. For most of our staff and clients this is the first experience they have had in an electric vehicle. Most of our trips are shorter than we anticipated, which is well suited for the EV . . . Our dedicated Level 2 EVSE allowed us to schedule charging nightly (off-peak), and to have a full battery at the start of each day.

We expect that use will increase substantially as our staff is growing and are now aware of the resource, we have implemented an online reservation system, and are actively encouraging all staff to prioritize the use of the EV for all work-related trips. The interest has increased so much that we will be applying for a second vehicle to make full use of the charging infrastructure at our office and reduce our costs."

The CBO program was again expanded in 2023, resulting in three additional partnerships, for a total of ten active CBO partnerships to-date. Services picked up substantially from 896 trips in 2022 to 2,286 trips in 2023, providing 53,157 passenger-miles served. Engagement with local CBOs has increased in outreach to over 100 organizations and will continue. The program may be further expanded with the potential of using credits from the Clean Fuels Program administered by the Washington State Department of Ecology.

CBO Partnership	**Year Started**
Transitions for Women	2018
Spokane Regional Health District	2018
Asotin Co. Health District	2021
Rural Resources	2021
Whitman Community Action Center	2021
Compassionate Addiction Treatment	2022
COAST Public Transportation	2022
International Rescue Committee	2023
Spokane Neighborhood Action Partners	2023
Tri-County Economic Development District	2023

Table 14: Active CBO partnerships utilizing EVs and charging provided by Avista (2022)

Charging Infrastructure

Support for communities and low-income customers includes charging installed at public libraries and community centers, underserved rural towns, CBO partnerships, low-income MUDs, and for customers receiving low-income assistance. By year-end 2023, 24 charging ports were installed at CBOs, and 177 charging ports in Named Communities. ACL2 public charging and DC fast charging were installed in a number of smaller rural towns, such as the SpoKo facility on the Spokane Tribe property in Chewelah, and at several public libraries in the Spokane area including DC fast chargers at Moran Prairie and N. Spokane County Library

branches. Where feasible, charging infrastructure installed at CBOs and in Named Communities will be leveraged with emerging opportunities to support innovative community transportation options including ride hailing, ride and car sharing, and micro-mobility.

Public Transportation

Electrification of public transit buses continues in the area. In the Spokane area, STA launched its historic City Line battery-electric, rapid transit service in 2023, and now operates 40 battery-electric buses representing 25% of the coach fleet. Elsewhere, Pullman Transit operates three BEV transit buses and is exploring grant opportunities to further electrify. Avista's commercial EV TOU rates are instrumental in addressing the adoption barrier of high demand charges for transit buses, while promoting off-peak charging benefiting all customers. In addition, the Company collaborates and supports transit agencies in grant applications to procure buses, develop fleet electrification plans, and to install charging infrastructure that minimizes local grid impacts. In the future, transit shuttles and carpool vans may be electrified as well as vehicles operated by smaller transit services and Tribes, with Avista's collaboration and support that may include appropriate charging infrastructure investments and grant application partnerships.

Electric school buses are also gaining momentum with the support of state and federal grants. Avista continues to provide outreach awareness to a large number of school districts in its service territory, as well as comprehensive fleet advisory services and grant application support for several districts. In 2023, electric school buses were placed in service at three different school districts, and awards for six other districts were announced. For Washington customers, Avista provides a full range of services including grid capacity assessments, in-depth route analysis and consultation, as well as tailored, multi-year plans for charging infrastructure expansion. The result is an effective and valued service for school districts, making it easier and lower cost to electrify, and in the process strengthening business and community relationships.

Emerging Opportunities

Other e-mobility innovations are taking place in areas such as ride- and car-sharing, as well as mini- and micro-mobility serving "last mile" transportation needs. Where feasible, charging infrastructure installed with partners serving local communities may be leveraged to support demonstration projects in these areas. This may provide low-income and underserved communities with new and exciting transportation options, while testing the feasibility of scaling for the future. In 2023, Avista and the non-profit Urbanova in Spokane supported a successful Zero Emissions Access Program (ZAP) state grant application by ZEV Co-op, which will

provide the first pilot of EV ridesharing services in the Spokane area starting in 2024. If successful, this business model and ridesharing EVs may be further deployed at other community centers throughout the region, with the support of Avista's charging infrastructure and Community programs.

VIII. Education and Outreach

Avista strives to act as a trusted energy advisor for our customers. Electric transportation education and outreach efforts align with this objective as we create messaging, tools, and services to aid our customers in making informed decisions benefiting themselves and their communities.

The TE website at myavista.com/transportation is maintained as a robust information source for all customers to explore basic information, review vehicles for personal or fleet use, fuel savings, charging options, and tax incentives, grants, or program options. These tools sets are ideal for residential and business customers at any stage of their journey. An advanced fleet evaluation tool has been added to the suite of website information, which should prove useful to commercial customers as the options for commercial electric transportation grow.

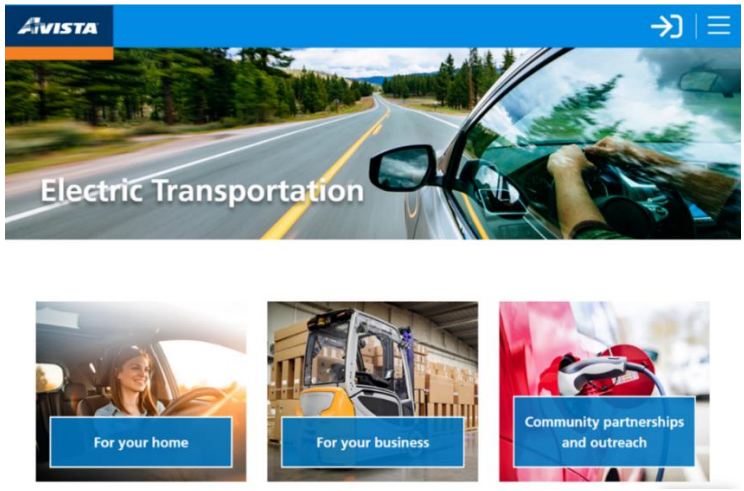


Figure 24: Electric Transportation Website at myavista.com/transportation

Web page visits are trending upward, with approximately a 200% increase in page visits between 2021 and 2023. A targeted residential media placement in 2022 resulted in significant page hits, which normalized after the end of the ad campaign. A similar spike was seen in 2023 after a targeted fleet digital media placement. Program enrollments and inquiries did not reflect an immediate increase, but the campaign is considered a

success in growing awareness and planting seeds for customers to begin exploring and evaluating whether electrification is right for their home or business.

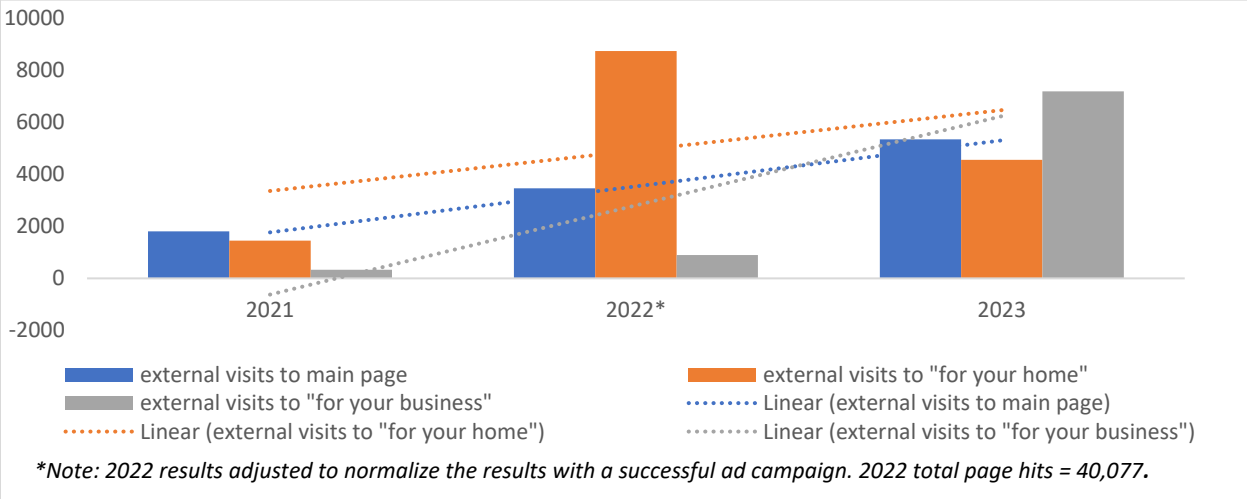


Figure 25: Combined TE web page visits by year.

The consumer awareness and perception research survey completed in 2021 was not replicated in 2023 but will be conducted in early 2024, with results shared in the next annual report. Avista continues to utilize the learnings from the initial survey to guide education and outreach efforts but recognizes overall awareness of electric transportation has increased since the original study as it is a common topic of both policy and media coverage. The updated survey results will provide valuable information on the current state of both awareness and positive or negative perceptions which will allow for development of an informed education and outreach strategy that addresses the current views and concerns of customers.

The Spokane Central Library recently underwent a major remodel, re-opening in 2023. This location serves as home of one of the two EV Experience displays, which was updated in 2023 to include an interactive information kiosk. Display materials and the interactive information kiosk allow the public to explore TE areas of interest, a fuel savings calculator, and frequently asked questions, which can also be emailed to the user for future review. Printed information pamphlets and an EVSE unit are available for hands on interaction. The EV Experience site provides an ideal location for educational presentations and discussions. The display and materials will be rotated throughout additional branch locations to further awareness and grow access to the public at low cost.

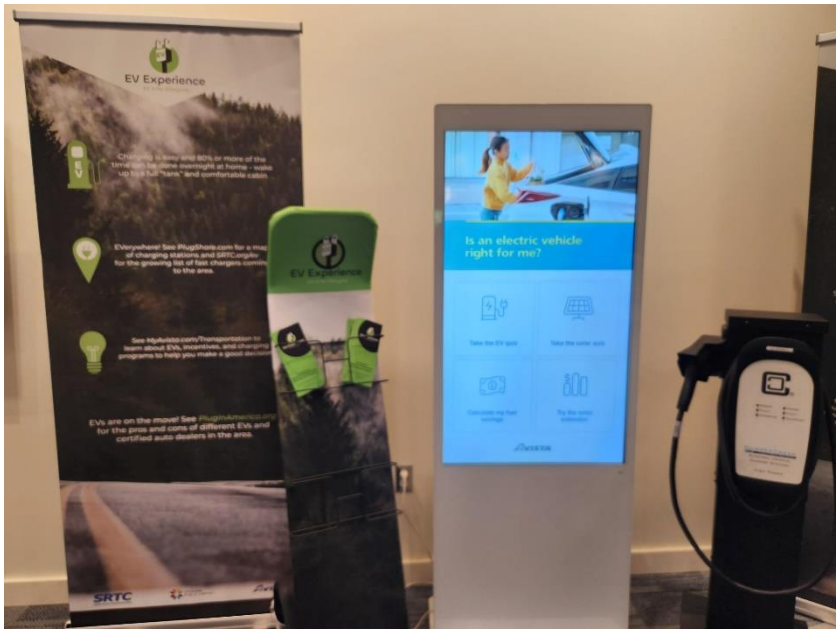


Figure 26: EV Experience Displays and Informational Kiosk at the Spokane Public Library, Central Branch

Auto dealerships in the area are generally aware of Avista's programs and with the sustained increase in EV demand, the dealer referral program was no longer of great value and was discontinued. Avista will continue to evaluate opportunities to inform and engage dealers as programs are adjusted to benefit our mutual customers and support growth of the electric transportation market.

As previously noted, three school districts in Avista's service territory were the first to commission and operate electric school buses in 2023. Completed projects serve as a great opportunity to celebrate the new buses and benefits to the communities. Avista met with school district leadership and the board of directors and shared a public news release, which was included in local news as well as Avista social media and customer bill newsletters.

Figure 27: Media campaign celebrating first electric school busses deployed in Avista service territory.

Ongoing education and outreach efforts include case studies, webinars, bill newsletter articles, and presentations in a variety of forums with interested community groups, as listed in the table below.

Case studies	2
Webinars	1
Bill newsletter articles	2
Educational presentations	31

Table 15: Completed education and outreach activities (2023)

In 2024 we intend to increase outreach efforts, leveraging customer relationships and projects to highlight success stories similar to what was done with the VL Transport electric school bus project. This will create opportunities to engage new audiences and grow interest in programs. In addition, a social media strategy is being developed, particularly focused on business and professional platforms, to increase awareness and connections within the commercial customer segment.

IX. Fleet Support Services

Avista provides helpful information to inquiring commercial customers, and in many cases more detailed consultation. This includes analysis of fleet routes and duty cycles, EV availability and incentives, charging requirements, long-term planning, utility rates and load management, total cost of ownership (TCO) comparisons, and external referrals to additional technical resources. This is an area of increasing opportunity and growth for light, medium and heavy-duty (MHD) on-road vehicle fleets, as well as off-road vehicles such as forklifts and other industrial transport equipment. Avista's consultation services are focused on smaller commercial businesses with more limited means and fleets operated by local municipalities, school districts, and public CBOs. Larger commercial customers typically have sufficient resources to properly evaluate fleet electrification options, leaving the issues of optimal rate schedules and off-peak charging, electric grid capacity and planning as primary discussion topics with the utility.

In 2023, state and federal Clean School Bus programs prompted a dramatic increase in customer interest amongst local school districts in Eastern Washington. In August, Loon Lake and Valley School Districts each received one new electric bus from the Washington Department of Ecology CSB Program. In October, Tekoa School District received one electric bus from the federal EPA Clean School Bus Program.

Figure 28: The first electric school bus in Eastern Washington: Loon Lake School District

These initial successes created additional interest and similar results for neighboring school districts. The 2023 round of funding in the EPA Clean School Bus program included the following award announcements in late December:

2023 EPA Clean School Bus Awards Served by Avista	# of Electric Buses
Central Valley School District	5
West Valley School District	3
Mead School District	2
Reardan School District	2
Pullman School District	1
Chewelah School District	1
Tekoa School District	1

Table 16: 2023 Clean School Bus Awards

Summary and Breakdown of Avista Customer Engagements:

During 2023, comprehensive consultation services were provided to eight organizations, with an additional 14 educational meetings or discussions primarily involving school districts. As described in the Community and Low-Income Support section of this report, electric school buses are a fast-growing segment of electrified MHD fleets. Avista is in a unique position to provide fleet advisory services that help customers design and implement a practical fleet electrification plan that is cost-effective, reduces risks and maximizes off-peak charging for the benefit of all customers. With large federal and state grants available, the school bus segment continues to grow each year. It is an excellent opportunity for Avista to provide valuable assistance that benefits school districts and the communities they serve, while strengthening customer and community relationships.

Avista also attended monthly Transportation Supervisor meetings and conference calls for Educational Service District 101, which provides administrative services for 59 school districts throughout Eastern Washington. Avista provided timely information about the state and federal CSB program rules and application deadlines, as well as completing the EPA program's required Utility Partnership Agreements. Local school transportation supervisors frequently mention that submitting the paperwork for the EPA program can be confusing, as the paperwork and program rules have changed significantly between 2022 and 2023, and Avista's assistance is most helpful.

The Company also meets regularly and consults with the Spokane Transit Authority (STA) and the City of Spokane as those organizations continue to pursue fleet electrification. In the future, more fleet advisory services may be provided to public organizations, small businesses, CBOs and Tribes as various types of EVs become more viable and commercial awareness and interest grows.

Electric Forklift Program

In addition to on-road vehicle electrification, electric forklifts continue to be an important market opportunity to realize benefits of reduced carbon emissions and operational cost savings. Avista's electric forklift program provides point-of-purchase incentives for Class 1 forklifts powered by either traditional lead-acid batteries ($2,000 incentive) or lithium-ion batteries ($3,000 incentive). Additional goals of this program include data gathering, load-profiling, and promotion of off-peak charging. In 2023, incentives for 12 electric forklifts were processed (8 lead-acid and 4 lithium-ion). Dealer interviews indicate the incentives were effective in achieving growth in market share, in several cases making the critical difference in the customer's purchase decision over a propane or diesel forklift. The table below summarizes results based on the Industrial Trucking Association Annual Sales Report (ITA) for Eastern Washington and North Idaho, comparing a time span from 2019 to 2023.

	2019	**2022**	**2023**
Annual new lift truck sales, not including leases (all classes)	400	400	400
Average Service Life	10	10	10
Total New & Used lift trucks in service (not including leased units)	4000	4100	4150
Additional leased lift trucks in service	1000	1100	1100
Total lift trucks in service, including leased units	5000	5200	5250
Total lift trucks in service in Eastern Washington	3250	3380	3413
Total lift trucks in service in Northern Idaho/Western Montana	1750	1820	1837
Electric rider (Class 1) lift truck new sales	105	133	138
ICE rider lift truck new sales	185	200	202
Electric percent of total rider lift truck new sales	**36%**	**40%**	**41%**

Table 17: Class 1 Electric Forklift Market Summary (2023)

These results show the market share of new electric forklifts sales has improved from 36% to 41% but Eastern Washington continues to lag the national market which stands at over 60%. Dealers indicate the primary reasons why electric forklifts are challenging to sell include perception fears by customers that are unfamiliar with them, such as stories of fires and the risk of explosions. They also cite the higher up-front costs of electric forklifts, lower customer awareness in the region, a higher percentage of businesses with less discretionary income to afford higher upfront purchase costs, as well as more industries requiring heavy-duty lift trucks (over 12,000 pounds lift capacity). As of 2023, electric heavy-duty lifts are still not widely available. However,

many manufacturers such as BYD, Toyota and Crown are now offering some of their Class-1 forklifts as lithium-ion models and ramping up production, gradually improving local inventories.

In addition to supporting beneficial adoption, the forklift program allows Avista to develop load profiles for grid impact modeling and to experiment with load management techniques that maximize off-peak charging. Especially in the case of lifts powered by lithium-ion batteries, the ability to charge 100% off-peak is feasible with all but those businesses running 24/7 shifts, as a full charge can usually be achieved in 4-5 hours. Even with these types of operations, battery swapping can often prove effective in eliminating on-peak loads.

Further details on forklift load profiling and off-peak charging are provided in the following section of the report. Results to-date indicate many forklifts are highly utilized, consuming an average of 5,900 kWh per year. This provides a payback period of roughly three to four years, in terms of gross revenue received from electric billing compared to the forklift purchase incentives.

X. Load Management and Grid Integration

Residential

Recently, an increase in the number of residential customers with two EVs has been noted. Some of these customers charge their vehicles concurrently with either multiple chargers or chargers with two integrated ports. As EV adoption continues to increase, understanding the impact that multiple EVs has on a customer's electric demand will become more important. The figure below is a graph of whole home usage for a customer with 2 EVs. The data set runs from November of 2020 up through 2024. As shown on the graph, the customer purchased their first EV (Tesla Model Y) in October of 2021 and then added the second (Tesla Model 3) the following year. The addition of the first EV increased their average demand from 1.4kW to 1.7kW, a 21% increase. The second EV increased the average demand another 47% to 2.5kW. This increase in demand is significant and may require the replacement of a residential transformer if several customers served by that transformer adds similar charging load. The further development of programs that shift charging loads to off-peak times will be increasingly important as we move into a future where customer having two EVs and the subsequent increase in hourly demand become the norm.

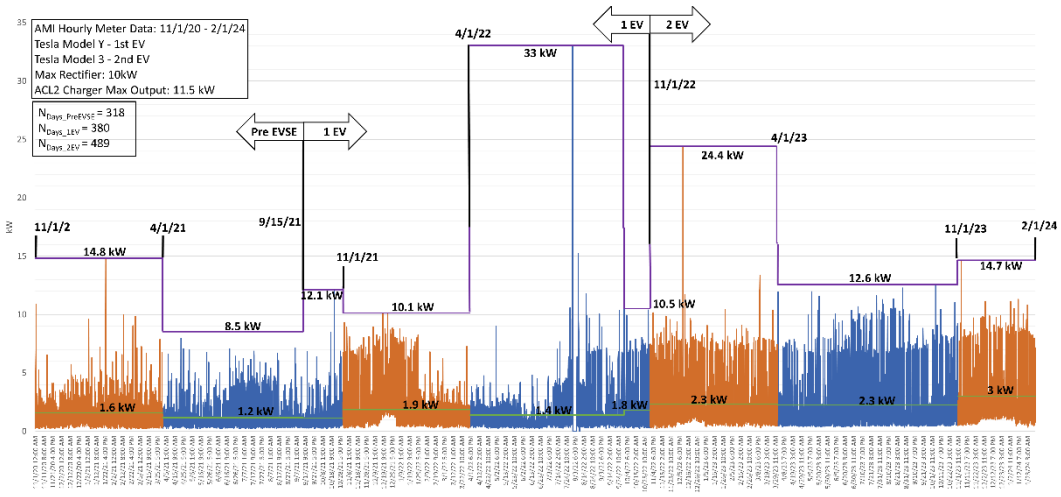
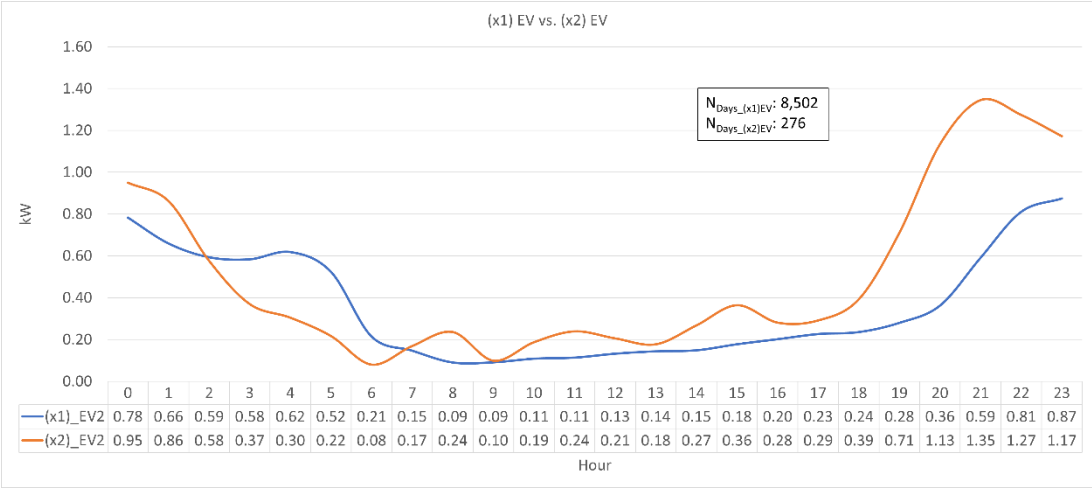


Figure 29: Residential Customer with 2 EVs

An EV monitoring and load management program using vehicle telematics was launched at the end of July 2023. The purpose of this program is to influence drivers to shift their charging loads to off-peak periods and to collect charging data directly from the vehicle. Charging session data has been collected from 97 customers and was used to update Avista's EV charging load profiles for residential customers. These include annual profiles, as well daily and seasonal profiles. The following figure represents the aggregate annual charging profile of all participating customers with one EV to the annual profile of the example customer with two EVs.



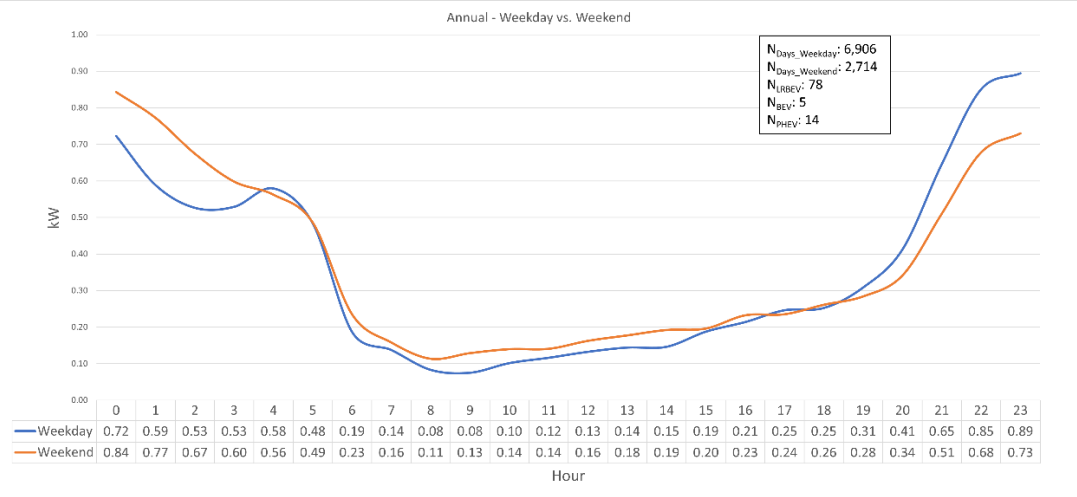
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
(x1)_EV2	0.78	0.66	0.59	0.58	0.62	0.52	0.21	0.15	0.09	0.09	0.11	0.11	0.13	0.14	0.15	0.18	0.20	0.23	0.24	0.28	0.36	0.59	0.81	0.87
(x2)_EV2	0.95	0.86	0.58	0.37	0.30	0.22	0.08	0.17	0.24	0.10	0.19	0.24	0.21	0.18	0.27	0.36	0.28	0.29	0.39	0.71	1.13	1.35	1.27	1.17

Figure 30: Residential Customer (x1) EV vs (x2) EV

The two profiles follow a similar shape with the majority of the charging load focused in the evening and early morning hours. The main differences are that the customer with two EVs has increased usage in the late morning to afternoon hours, which may be attributed to one of the tenants working from home and charging

as needed during the day. The customer with 2 EVs also has a charging peak at 9pm compared to 11pm for the customer with one EV. Average daily charging usage is 11.9 kWh for the customer with two EVS and 8.7 kWh for customers with one. The addition of the second EV increased this customer's average daily charging load by 3.2 kWh, or 37%, when compared to customers with one EV.

The remainder of this analysis focuses on the aggregate charging load profiles for all customers in the telematics program. The figure below compares the annual usage profiles for Weekday and Weekend charging.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	0.72	0.59	0.53	0.53	0.58	0.48	0.19	0.14	0.08	0.08	0.10	0.12	0.13	0.14	0.15	0.19	0.21	0.25	0.25	0.31	0.41	0.65	0.85	0.89
Weekend	0.84	0.77	0.67	0.60	0.56	0.49	0.23	0.16	0.11	0.13	0.14	0.14	0.16	0.18	0.19	0.20	0.23	0.24	0.26	0.28	0.34	0.51	0.68	0.73

Figure 31: Residential Customer –Weekday Vs Weekend Charging

As is expected with a managed charging program, the majority of the charge sessions occur during off-peak hours. On average, program participants charge off-peak 88% of the time. The weekday and weekend profiles are similar, with one notable difference. There is a defined peak in weekday charging that occurs during the hours of 3am and 5am. This peak is likely attributed to customers using "ready by" features that are built into most EVs on the market. This feature allows a user to have their vehicle pre-conditioned and charged by a chosen departure time. Based on this data it can be inferred that customers do not routinely use this feature on the weekend.

The following figure compares the average summer load profile to the winter.

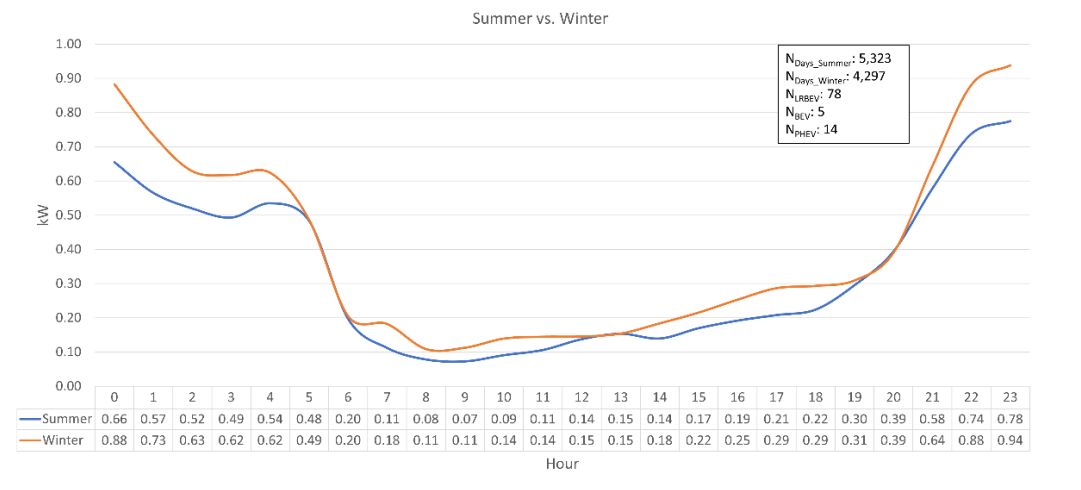


Figure 32: Residential Customer –Summer Vs Winter Charging

As was observed in last year's study, electric vehicles require more energy to charge in the winter. Per the results of this study, an EV requires 7.9 kWh a day in the summer and 9.6 kWh in the winter. This additional usage can almost entirely be attributed to energy consumed by heaters. Occupant comfort is part of that usage, battery conditioning is the other part. Lithium-ion batteries need to be maintained at a temperature around 70°F to operate and charge efficiently. When the ambient temperature is low and the temperature of the batteries is below that threshold, heaters need to be used to ensure efficient operations. While this additional usage will increase the average charge session duration, customers can still fully charge their vehicles during off-peak periods.

Additional load profiles are included in Appendix B. These profiles explore the differences in weekday and weekend charging for each season. The table below summarizes the information on those graphs and lists the % of on-peak and off-peak charging.

Average Charge Session kWh						
		kWh	On Peak kWh	% On Peak	Off Peak kWh	% Off Peak
All	Overall	8.65	1.00	11.58%	7.65	88.42%
	Weekday	8.57	0.98	11.46%	7.58	88.54%
	Weekend	8.85	1.05	11.85%	7.80	88.15%
Summer	Overall	7.91	0.79	10.03%	7.12	89.97%
	Weekday	7.65	0.79	10.29%	6.86	89.71%
	Weekend	8.62	0.81	9.41%	7.81	90.59%
Winter	Overall	9.55	1.29	13.51%	8.26	86.49%
	Weekday	9.73	1.25	12.87%	8.48	87.13%
	Weekend	9.12	1.38	15.16%	7.74	84.84%

Table 16: Residential Customer – Charging Summary

Prior to this managed charging program, load management was accomplished by simply asking customers to program (or allow Avista's EVSE installation contractors to program) their EV itself to charge off-peak, via the vehicle's onboard charge scheduling features. Through those efforts, an average of 84.6% of annual charging load occurring off-peak was achieved. The managed charging program has achieved an average of 88.4% of annual charging load occurring off-peak, a 3.8% increase over the previous method. The most significant increase in off-peak charging occurred during the winter months, at 79.3% off-peak in the previous study compared to 86.5% currently. These incremental gains in off-peak charging at least initially prove that the managed charging program using telematics can achieve equal or greater load shifts to off-peak. Further efforts expanding the participant pool and evaluating costs and other factors can show the degree to which it may be superior from a cost and scalability perspective.

The previous residential load profile study relied on the use of 5-minute interval data collected through AMI meters, paired with load disaggregation based on known parameters. Participants were customers who had received a charger through Avista's programs, in operation for a minimum of six months at the time of the study. Usage data was pulled for a one-year period prior to the charger being installed and then from the charger installation to present date. Whole-home aggregate profiles for all customers in each time period were developed and labeled Pre EVSE and Post EVSE. Assuming all else in the home remained the same, the difference between the Pre and Post profiles was assumed to be EV charging load. A similar study was conducted this year with the pool of managed charging customers. The intent of this study is to validate the accuracy of the load profile graphs developed previously using AMI data, compared to telematics data. From that pool, 51 customers had the required amount of data for a statistically significant study to be completed. The results were then compared to the telematics data results. The figure below compares the aggregate charging profiles developed through telematic data and AMI data.

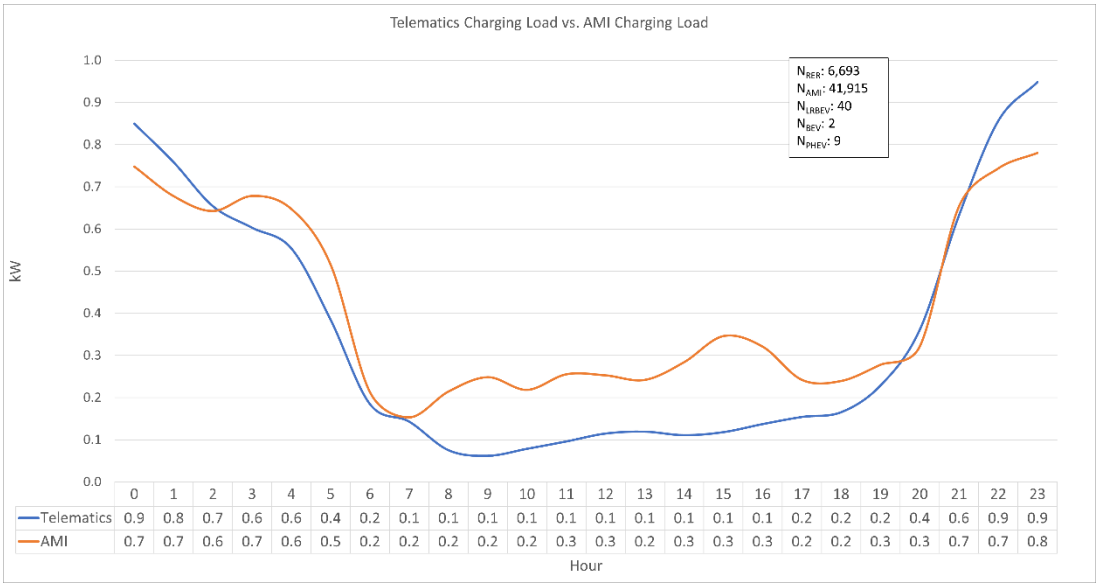


Figure 33: Residential Customer – Telematics Vs. Meter Data

The overall load shape for each method is similar, with the majority of charging load occurring during off-peak periods. The profile developed with AMI data shows around 50% more charging between the hours of 7 am and 7 pm compared to the telematics profile. This is likely attributed to other loads in the home skewing the data. On average the AMI data shows that an EV required 9.9 kWh per day, a 15% increase over the 8.4 kWh in daily consumption shown by the telematics data. The AMI data does capture the morning peak associated with the ready-by feature more clearly that the telematics data does with this group of customers, showing that AMI data can produce reasonably accurate load profiles. While good results are possible using this method, it relies on knowing when customers have chargers installed and access to sufficient data pre and post. Without that, the method loses its usefulness. The profiles developed with telematics data are inherently more accurate due to the charging values being directly measured from the vehicles themselves and are not reliant on detailed customer information that was only available through customer participation in Avista's charging programs.

It should be noted that the telematics load profiles were developed with only five months' worth of data and may not fully represent how EV customers charge in our service territory throughout the year. As more data becomes available these load profiles will be refined and updated.

Forklifts

Direct measurement of forklift chargers has provided load profiles for four different customer types: food distributors, retail customers, warehouses, and manufacturing facilities. Directly measuring the charging

loads is achieved through the use of data loggers that are installed at the electric panel. Charging loads are relatively small compared to the facilities overall use and isolating them is the most accurate method of collecting the data needed to develop these profiles. The following figures represent charging profiles for food distributors, retail customers, and warehouses.

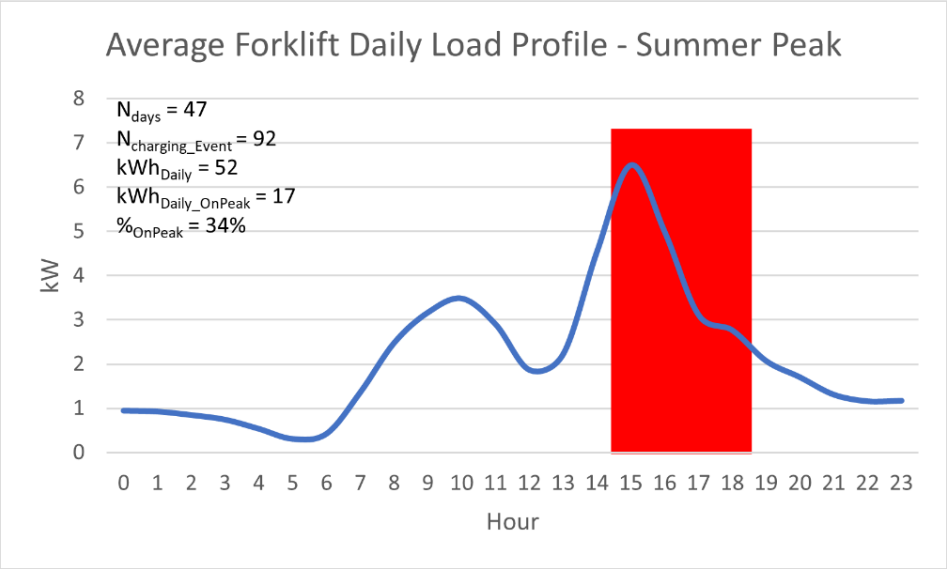


Figure 34: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Food Distributor

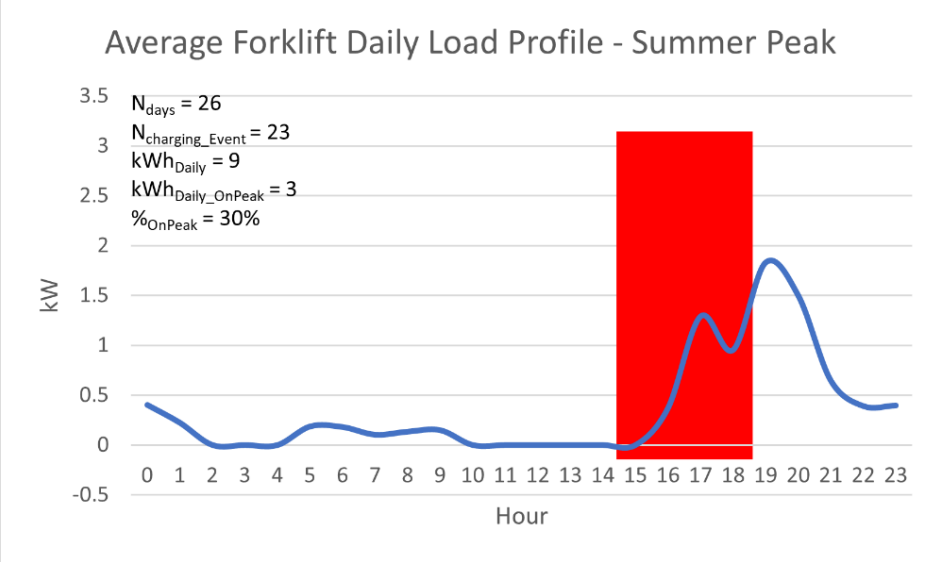


Figure 35: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Retail

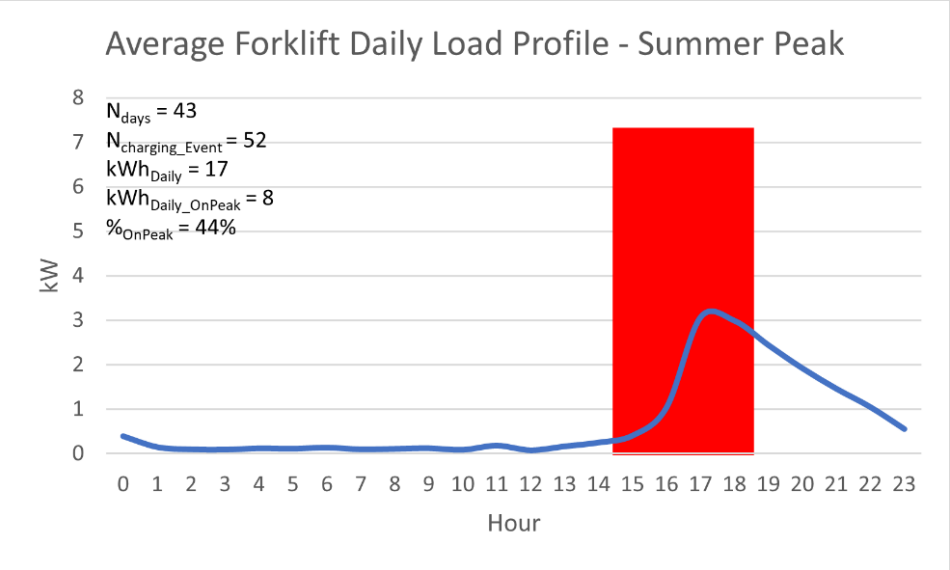


Figure 36: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Warehouse

The load profile below represents forklift use in three manufacturing facilities that participate in Avista's programs, one of which purchased two electric lifts.

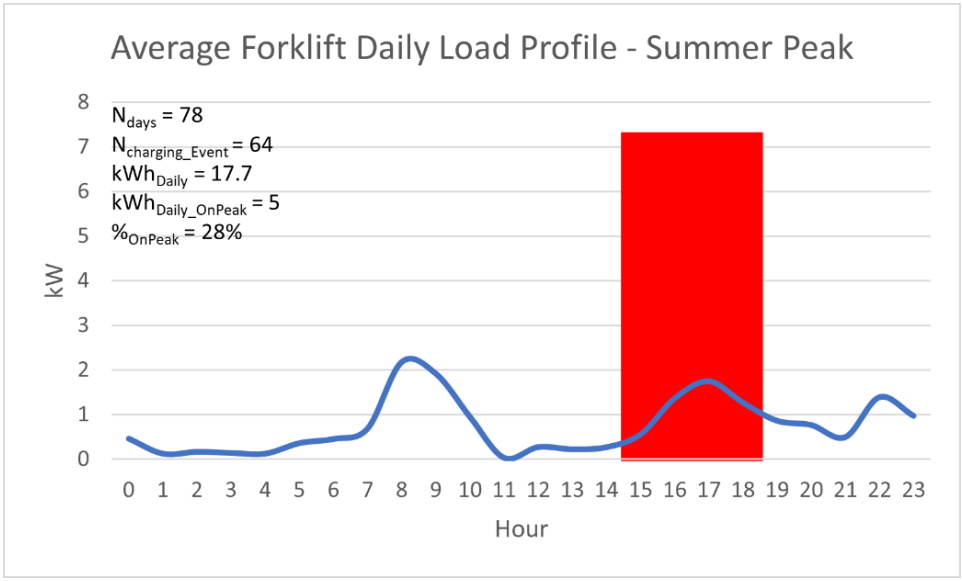


Figure 37: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Manufacturing

These facilities use their lifts heavily throughout the day and have three distinct charging times. This charging profile is similar to forklift load profiles for food distributors and other customers that run multiple shifts. It is feasible that some of their charging load may be shifted to off-peak periods, but not 100%.

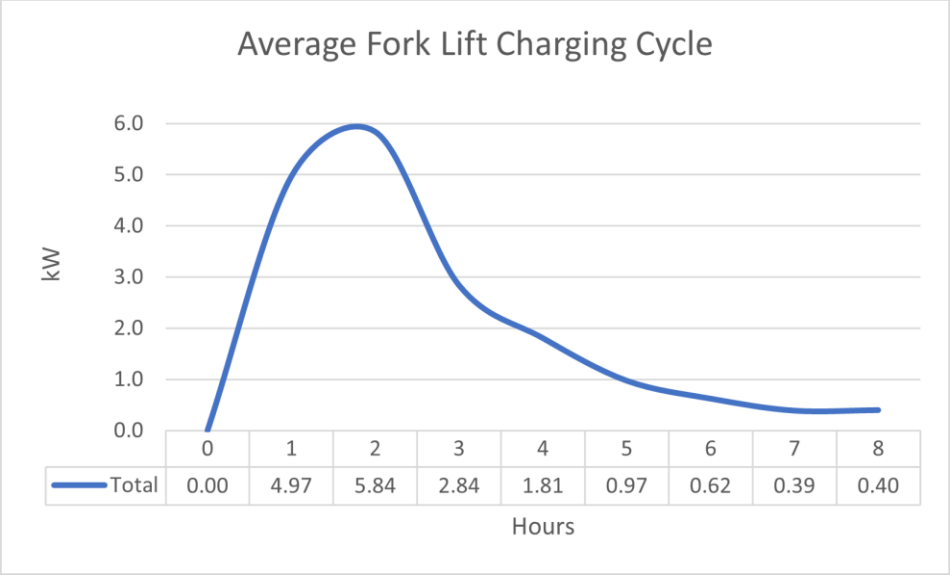
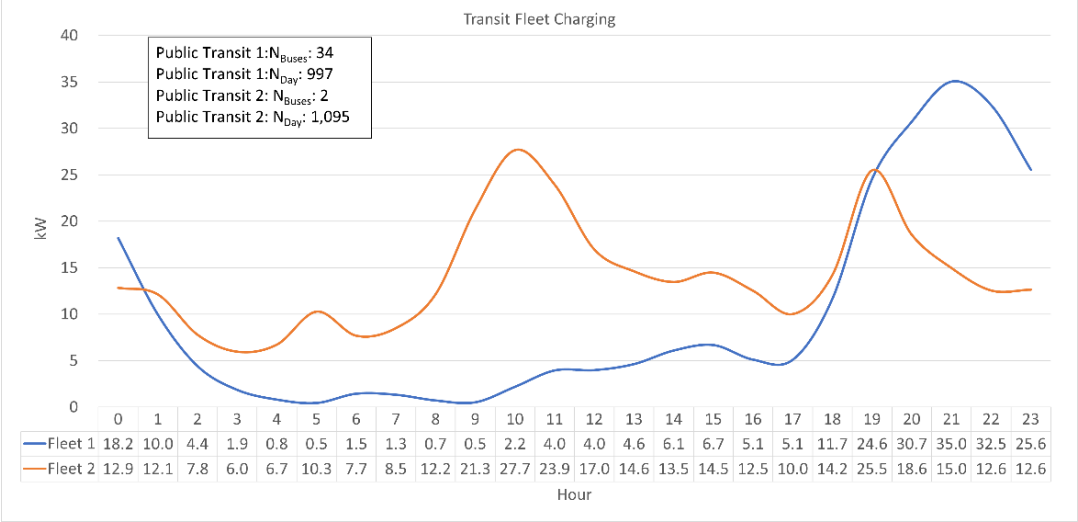


Figure 38: Average Forklift Charging Profile

The above figure represents the average charging cycle for all forklifts in this study. Even with the addition of four forklifts used in manufacturing facilities, this profile remains relatively unchanged from the previous year's results. This speaks to the charging optimization efforts made by the manufacturers. With the majority of the load delivered in the first four hours of the charging cycle, those customers that are not multi-shift operations will be able to move their charging to off-peak times.

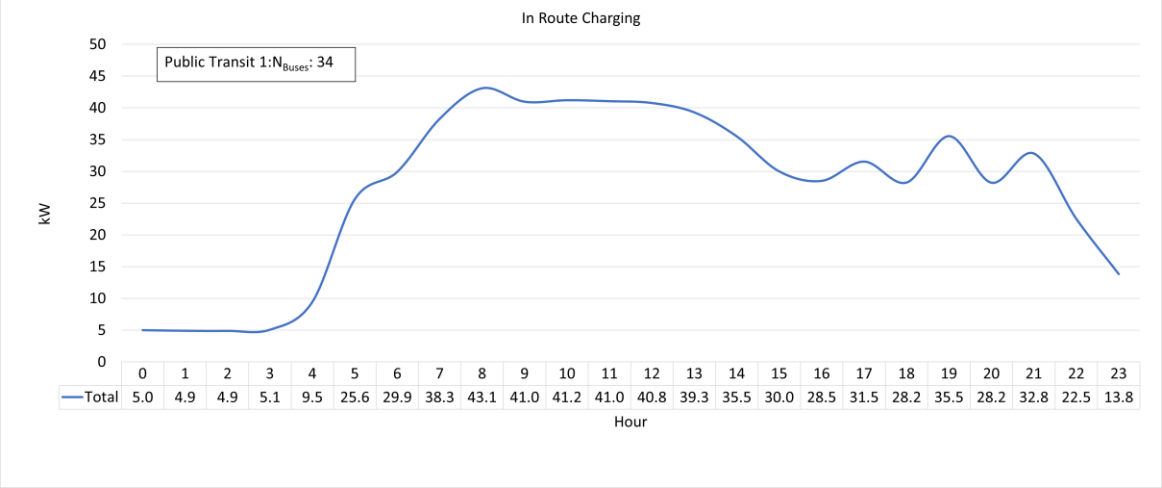
Electric Buses – Transit and School

Two transit agencies in Avista's WA service territory have electric buses in their fleets. Public Transit 1 operated 34 battery-electric buses in 2023, and utilizes depot charging as well as in-route charging, while Public Transit 2 operates 2 buses and only has depot charging. Load profiles of the respective depots are provided in the figure below. Public Transit 1 is able to primarily charge their buses off-peak 88% of the time at the depot, compared to Public Transit 2 that routinely charges in the middle of the day and is charging off-peak 82% of the time.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Fleet 1	18.2	10.0	4.4	1.9	0.8	0.5	1.5	1.3	0.7	0.5	2.2	4.0	4.0	4.6	6.1	6.7	5.1	5.1	11.7	24.6	30.7	35.0	32.5	25.6
Fleet 2	12.9	12.1	7.8	6.0	6.7	10.3	7.7	8.5	12.2	21.3	27.7	23.9	17.0	14.6	13.5	14.5	12.5	10.0	14.2	25.5	18.6	15.0	12.6	12.6

Figure 39: Transit Customer: Bus Depot Charging

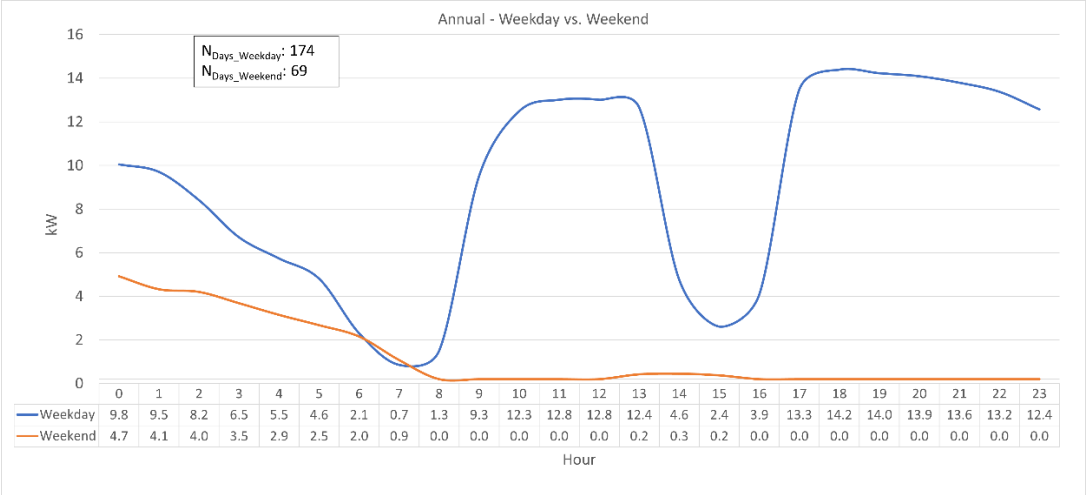


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Total	5.0	4.9	4.9	5.1	9.5	25.6	29.9	38.3	43.1	41.0	41.2	41.0	40.8	39.3	35.5	30.0	28.5	31.5	28.2	35.5	28.2	32.8	22.5	13.8

Figure 40: Transit Customer with in-route Charging

In contrast to the majority of depot charging for Public Transit 1 occurring overnight, over 80% of in-route charging occurs between the hours of 6am and 8pm. This type of charging is installed with the intent of keeping buses on the road and limiting disruptions to their customers. As such, it is to be expected that a steady charging load will be seen throughout the day. As Public Transit 1 adds more electric buses and installs more in-route charging, this on-peak charging load will increase in kind. Because these loads cannot be moved off-peak, it is important that all other charging loads be moved off-peak to the maximum extent possible.

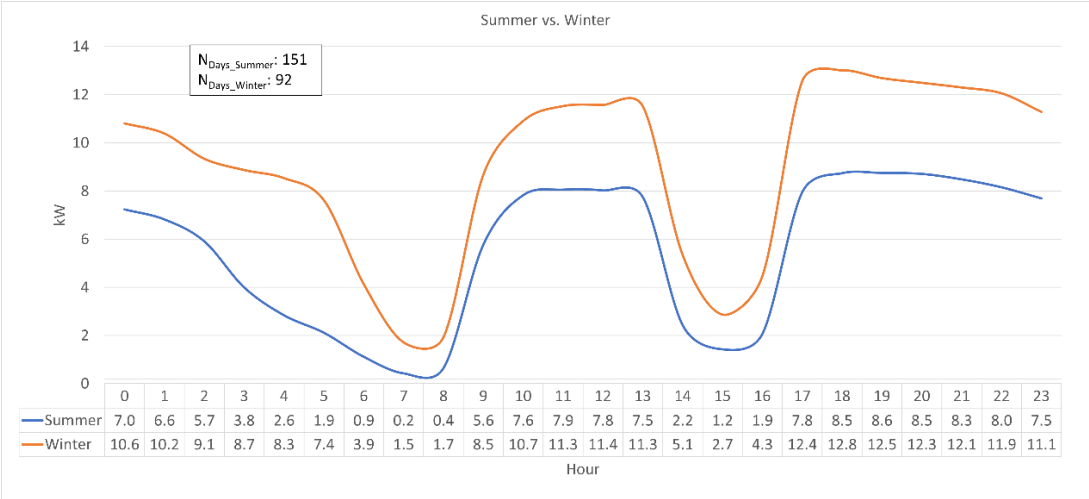
In addition to transit bus electrification in the region, electric school buses are also electrifying. Two school districts have purchased electric buses and integrated them into their fleets. The figure below shows weekday and weekend charging use for a school district that has been operating two buses since August of 2023.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	9.8	9.5	8.2	6.5	5.5	4.6	2.1	0.7	1.3	9.3	12.3	12.8	12.8	12.4	4.6	2.4	3.9	13.3	14.2	14.0	13.9	13.6	13.2	12.4
Weekend	4.7	4.1	4.0	3.5	2.9	2.5	2.0	0.9	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 41: Electric School Bus – Weekday Vs. Weekend

This school district operates north of Spokane serving rural communities and runs 8 bus routes with an average of 96 miles per day. The other district only recently started operating their bus and does not have enough data for a significant profile to be developed. The weekday profile shows that midday charging is required to ensure that the bus has sufficient range to complete the afternoon route. The customer has been educated on the importance of off-peak charging and a plan is being implemented to program the buses for off-peak charging. Minimal charging load is seen on the weekends, what is shown can be attributed to the completion of a charge cycle started on Friday evening.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Summer	7.0	6.6	5.7	3.8	2.6	1.9	0.9	0.2	0.4	5.6	7.6	7.9	7.8	7.5	2.2	1.2	1.9	7.8	8.5	8.6	8.5	8.3	8.0	7.5
Winter	10.6	10.2	9.1	8.7	8.3	7.4	3.9	1.5	1.7	8.5	10.7	11.3	11.4	11.3	5.1	2.7	4.3	12.4	12.8	12.5	12.3	12.1	11.9	11.1

Figure 42: School Bus – Summer Vs. Winter

As with passenger vehicles, electric buses require more energy in the colder months to charge. This again can be attributed to the use of heaters, both in the cabin and in the battery compartment. On a 50-mile route that takes 3 hours to complete, the heater will account for 45% of the overall consumption. This effectively reduces the range by 50%. To manage this, proper route planning paired with appropriately sized chargers is needed. Avista provides a consulting service that analyzes each route and determines which is best suited for electrification. Weather, time on the road, heater consumption and battery degradation are all considered. Utilizing the consulting information provided, the school district featured in this section has been able to successfully electrify two of their routes.

Additional load profiles for depot, in-route, and school bus charging are included in Appendix C, these profiles explore the differences in weekday and weekend charging for each season.

Demand Response for DCFC

Avista's chosen DCFC manufacturer and network provider have direct energy management controls built into their operating platforms which allows for adjustment to the DCFC output power. The station output can be throttled down to a minimum of 1.4 kW per port if required. These control signals can be set up as recuring events with start and stop times, or onetime events for specific days. Testing methodology is in progress to determine the effectiveness of these controls and the speed at which the signals are sent to the chargers. Once the effectiveness of the controls is proven out, they will be implemented on selected charging stations installed in rural areas of Avista's service territory that have limited grid capacity. This form of load management requires individual signals sent to each station when the need arises and is not an efficient method at scale. Work on building an integrated and dedicated (Avista owned) DR server with the network provider server through OpenADR (Automated Demand Response) protocols is slated to begin this year, through the use of Avista's Energy Innovation Lab resources. Longer term, the OpenADR option is the preferable solution from an automation and security standpoint across the full network of DCFC.

Commercial EV Time-of-Use (TOU) Rates

Avista's optional commercial EV TOU rate schedules 013 and 023 saw a significant increase in enrollment in 2023, more than doubling the connected meters between end of year 2022 to end of year 2023. Customers indicate these rate designs are crucial in their decision to support investments in both private and public EVSE

installations, and they effectively incent customers to maximize off-peak charging, benefiting the grid and all customers.

	Schedule 013	Schedule 023
Basic Charge	$21	$600
On-Peak Energy Charge, per kWh	$0.22149	$0.17039
Off-Peak Energy Charge, per kWh	$0.08820	$0.06885

Period	Morning Peak	Afternoon-peak
Apr 1 – Oct 31	NA	3pm – 7pm
Nov 1 – Mar 31	7am – 10am	5pm – 8pm

Table 19: Commercial EV TOU Rate Parameters

As of December 31, 2023, nineteen customers with a total of thirty-six meters adopted one of the two optional rates, a 125% increase in meters compared to 2022. One-third of meters support ACL2 installations, the remaining are for DCFC sites. The use case of these sites is mixed between public and private use, for fleet, public, workplace, and MUD. All meters thus far use rate schedule 013, with the exception of one public transit customer that utilizes schedule 023 for three meters, each at separate facility locations.

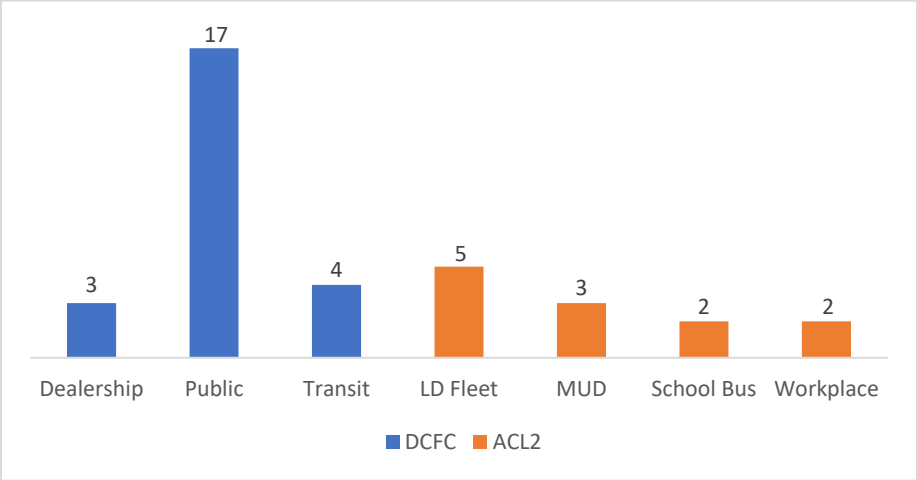
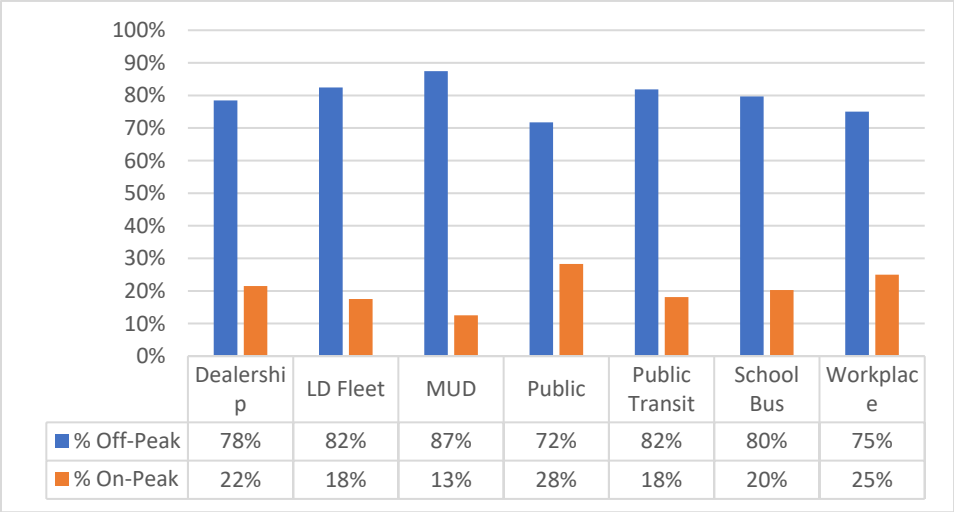


Figure 43: Meters billed on an EV rate, by EVSE type and use case.

Analysis of billed usage positively indicates the EV TOU rate is effective in achieving off-peak charging, particularly for use cases with the ability to control charging behaviors. Nearly three-quarters of billed usage occurs during off-peak hours. Public charging is slightly lower, as expected, with 72% of charging occurring off-peak. Light duty fleets and school bus and transit fleets show 80% or more off-peak charging. This

indicates fleet managers with control over charging schedules have the ability, interest, and commitment to shifting load when possible. Charging billed usage is shown below by location type and charging times for 2023.



	Dealership	LD Fleet	MUD	Public	Public Transit	School Bus	Workplace
% Off-Peak	78%	82%	87%	72%	82%	80%	75%
% On-Peak	22%	18%	13%	28%	18%	20%	25%

Figure 44: Percent of on-peak and off-peak charging, by location type for customers using Rate Schedule 013.

Further analysis shows most of the usage billed on the EV charging rate is for DCFC charging, with 92% of usage occurring at a DCFC and 8% occurring at ACL2 locations. Long term, we will need to continue to evaluate opportunities to encourage shift of flexible DCFC load to occur during off-peak hours as this will represent a significant load overall. Early indications show a very high percentage of fleet charging can be shifted with proper education and incentive. Some public DCFC load may be shiftable with the introduction of TOU pricing to users, incentivizing these customers to fill up during off-peak hours and may be considered in the future.

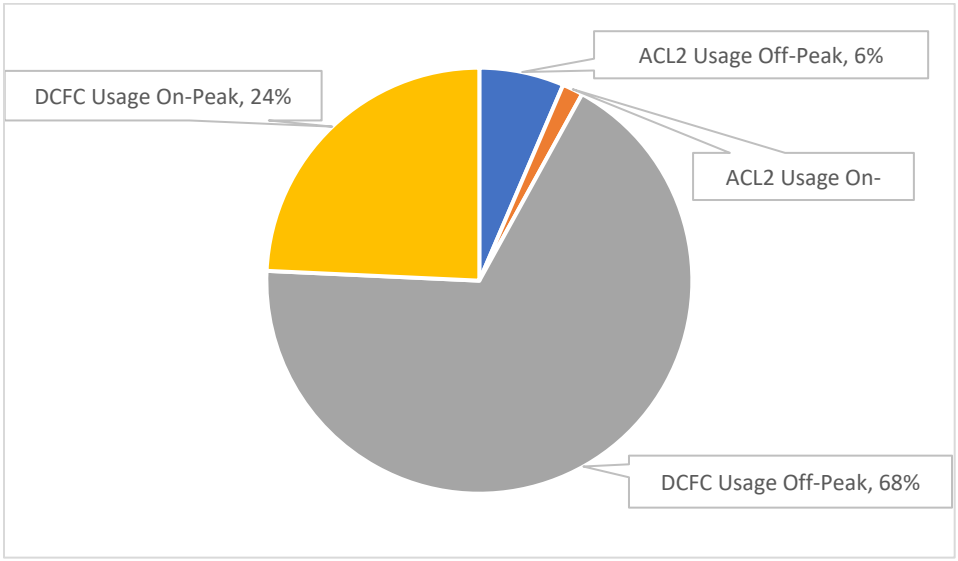


Figure 45: Annual percentage of EV Rate billed usage, by EVSE type and time of charging. (2023)

Appendix A – Standard Design Specifications for DC Fast Charging Sites

A 1 MW standard design is broken down into three phases over several years. This phased construction is completed as justified by future demands and helps minimize total costs over time. Phase I includes the installation of a 500 kW transformer on a concrete pad sized for a future 1 MW transformer upgrade, 800A-480V three phase switchgear, step down transformer and 208V three phase panel, one 180 kW dual port DCFC, two 19 kW ACL2 chargers as backup, and associated conduit from electrical panels to the chargers, including conduit to future charger locations in Phases II and III. Once demand justifies expansion, Phase II installs a second 180 kW dual port DCFC. This is accomplished at low cost without ground disturbance, pulling wire through existing conduit installed in phase I, and mounting and commissioning the DCFC at the predetermined location. In Phase III the 500 kW transformer is replaced with a 1 MW unit, 800A switch gear with 1600A equipment, and two 350 kW DCFC are installed, with replaced 500 kW transformer and 800A switch gear redeployed or sold for salvage value. A 500 kW design is comprised of phases I and II as listed above. An example preliminary layout for a standard design is shown below.

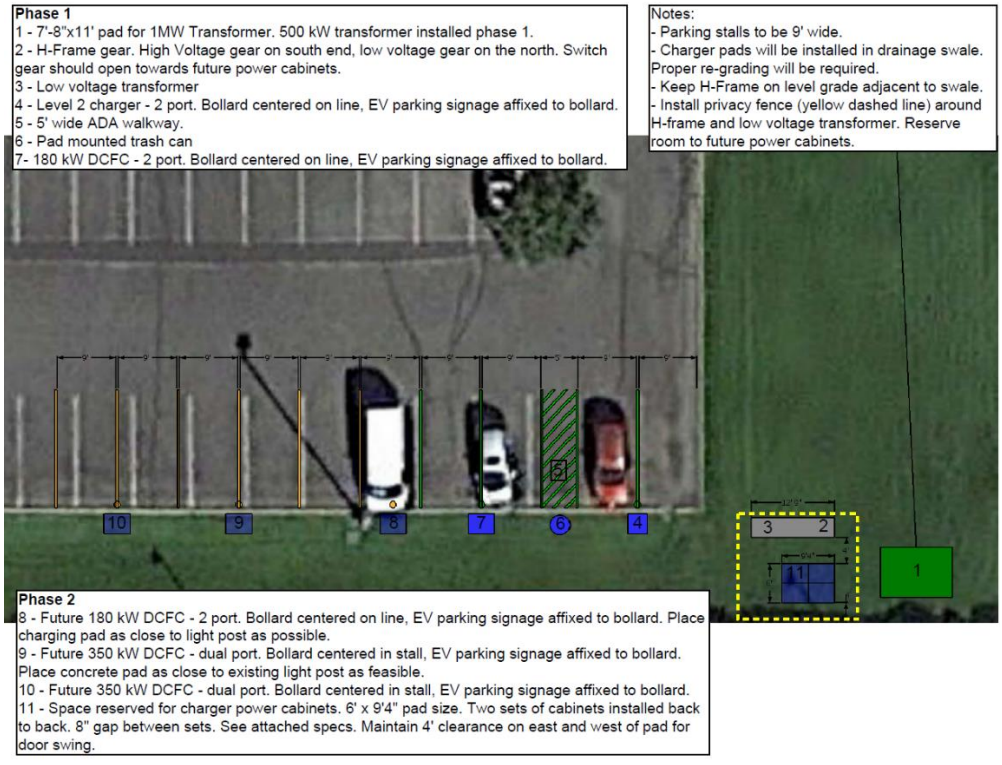
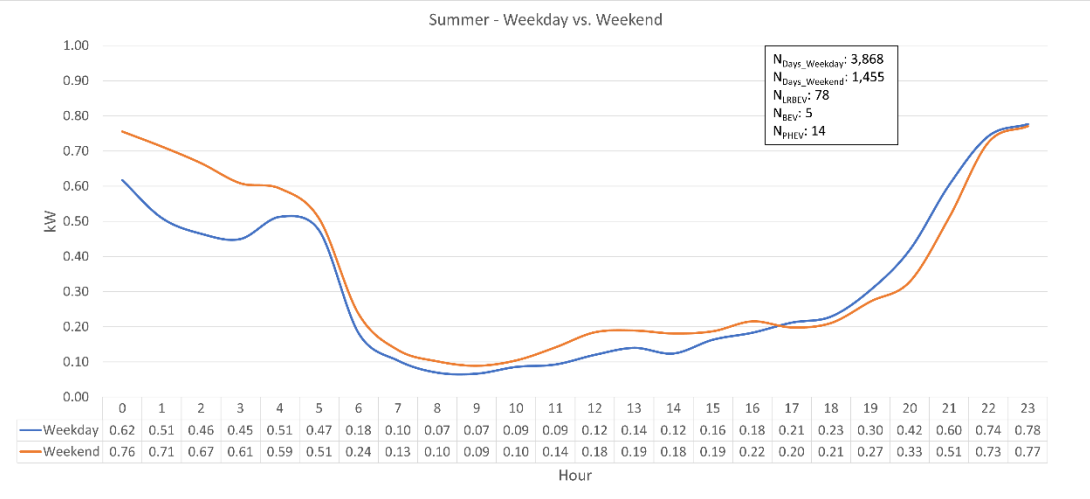


Figure 46: Standard DCFC layout, with Phase I and II details

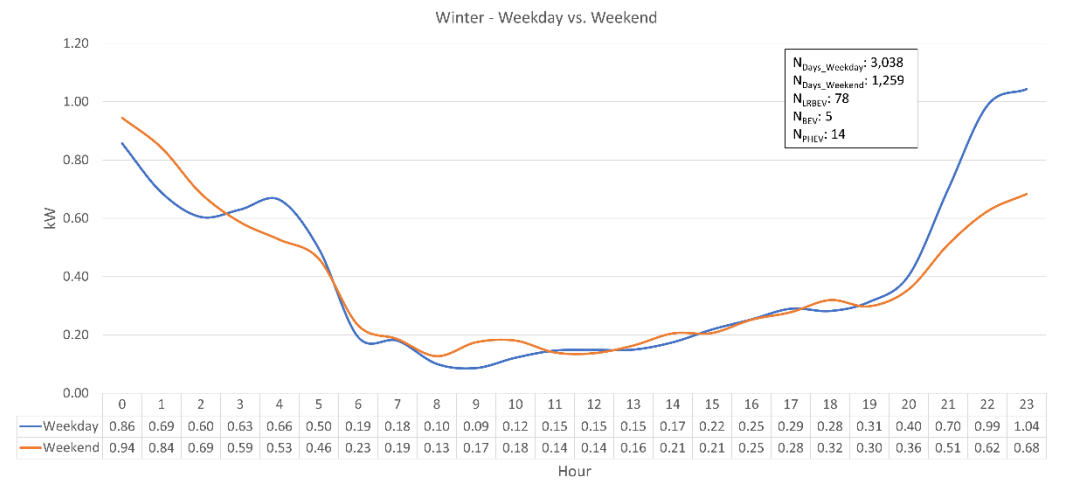
(modified ADA designs to be incorporated, not shown here)

Appendix B – Residential Load Profiles based on Telematics Data



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	0.62	0.51	0.46	0.45	0.51	0.47	0.18	0.10	0.07	0.07	0.09	0.09	0.12	0.14	0.12	0.16	0.18	0.21	0.23	0.30	0.42	0.60	0.74	0.78
Weekend	0.76	0.71	0.67	0.61	0.59	0.51	0.24	0.13	0.10	0.09	0.10	0.14	0.18	0.19	0.18	0.19	0.22	0.20	0.21	0.27	0.33	0.51	0.73	0.77

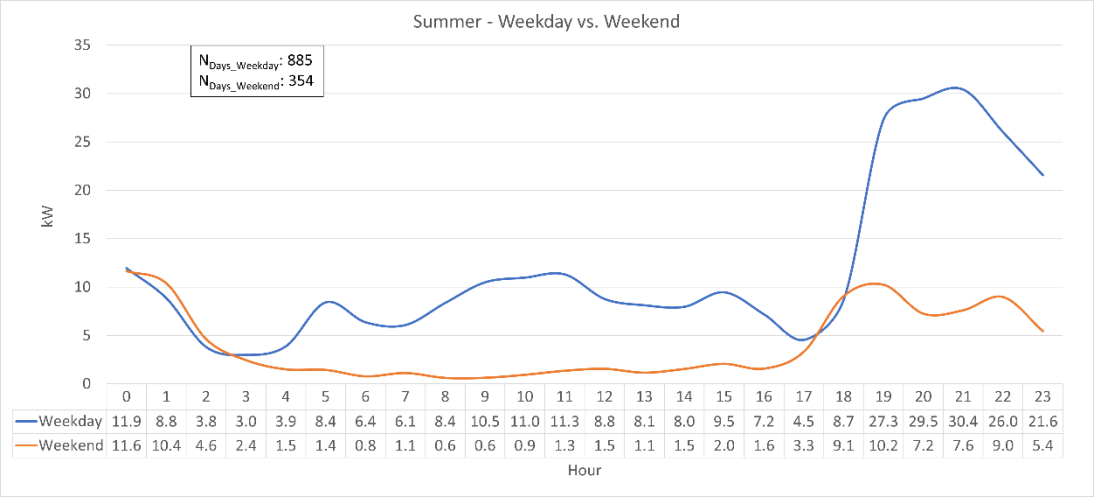
Figure 47: Residential Customer –Summer Charging, Weekday vs. Weekend based on telematics data



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	0.86	0.69	0.60	0.63	0.66	0.50	0.19	0.18	0.10	0.09	0.12	0.15	0.15	0.15	0.17	0.22	0.25	0.29	0.28	0.31	0.40	0.70	0.99	1.04
Weekend	0.94	0.84	0.69	0.59	0.53	0.46	0.23	0.19	0.13	0.17	0.18	0.14	0.14	0.16	0.21	0.21	0.25	0.28	0.32	0.30	0.36	0.51	0.62	0.68

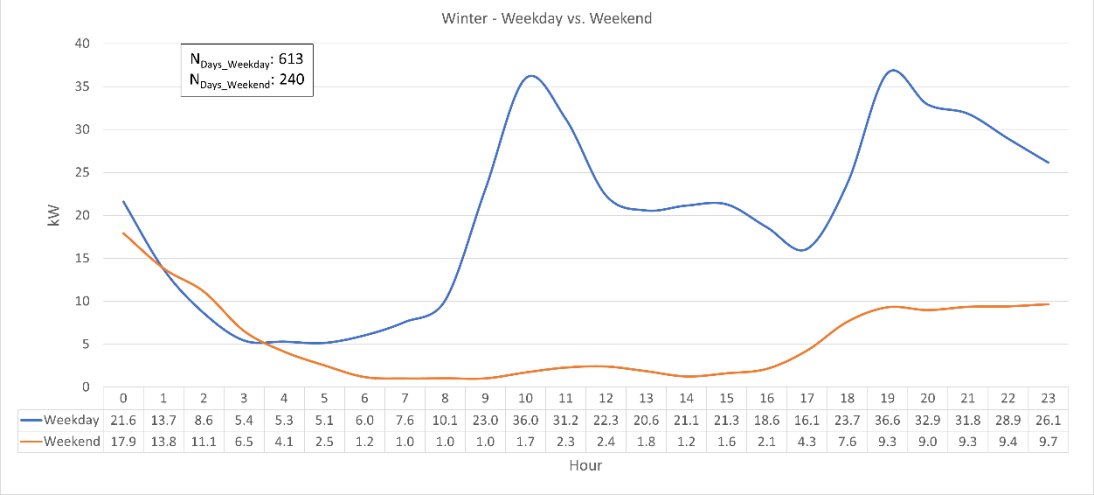
Figure 48: Residential Customer – Winter Charging, Weekday vs. Weekend based on telematics data

Appendix C – Transit Load Profiles



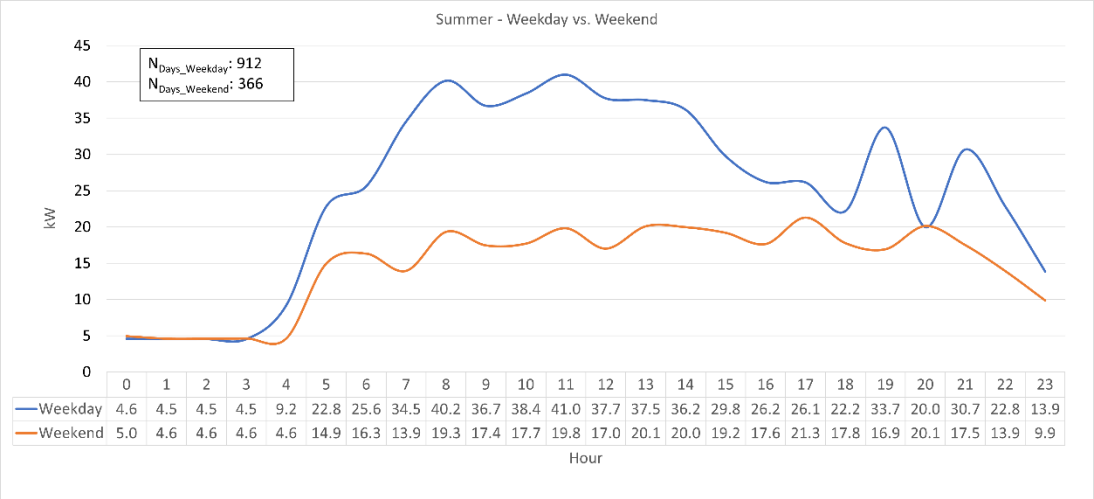
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	11.9	8.8	3.8	3.0	3.9	8.4	6.4	6.1	8.4	10.5	11.0	11.3	8.8	8.1	8.0	9.5	7.2	4.5	8.7	27.3	29.5	30.4	26.0	21.6
Weekend	11.6	10.4	4.6	2.4	1.5	1.4	0.8	1.1	0.6	0.6	0.9	1.3	1.5	1.1	1.5	2.0	1.6	3.3	9.1	10.2	7.2	7.6	9.0	5.4

Figure 49: Transit Depot Charging –Summer – Weekday vs. Weekend



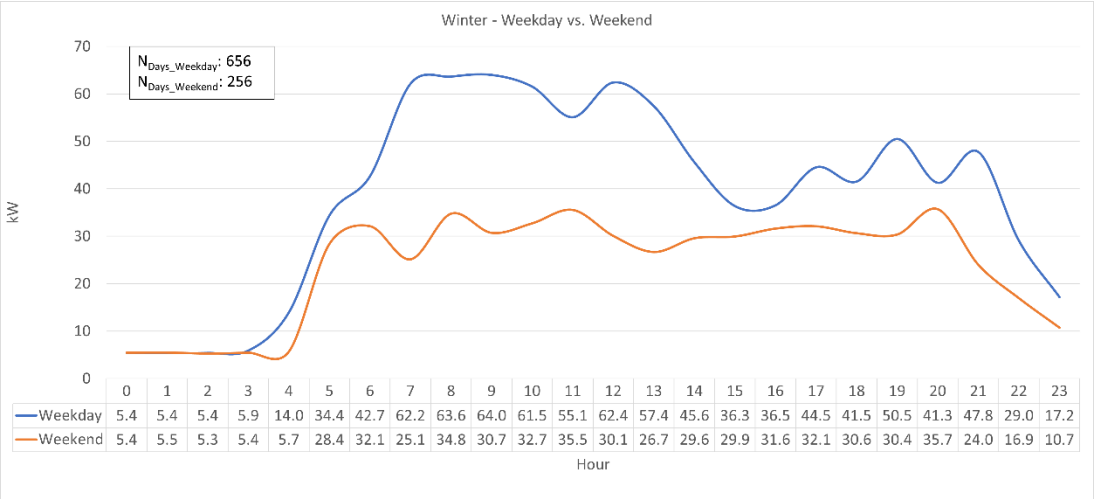
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	21.6	13.7	8.6	5.4	5.3	5.1	6.0	7.6	10.1	23.0	36.0	31.2	22.3	20.6	21.1	21.3	18.6	16.1	23.7	36.6	32.9	31.8	28.9	26.1
Weekend	17.9	13.8	11.1	6.5	4.1	2.5	1.2	1.0	1.0	1.0	1.7	2.3	2.4	1.8	1.2	1.6	2.1	4.3	7.6	9.3	9.0	9.3	9.4	9.7

Figure 50: Transit Depot Charging – Winter – Weekday vs. Weekend



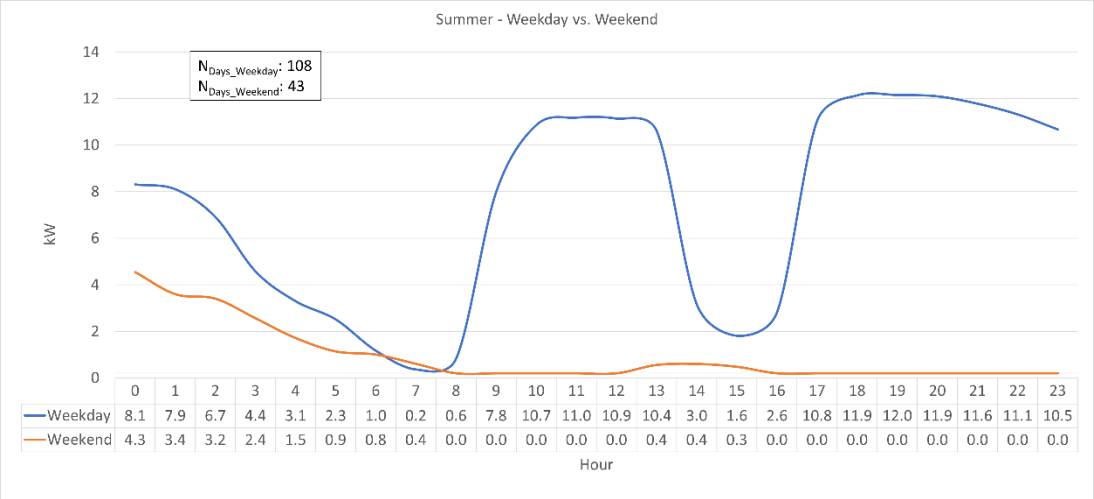
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	4.6	4.5	4.5	4.5	9.2	22.8	25.6	34.5	40.2	36.7	38.4	41.0	37.7	37.5	36.2	29.8	26.2	26.1	22.2	33.7	20.0	30.7	22.8	13.9
Weekend	5.0	4.6	4.6	4.6	4.6	14.9	16.3	13.9	19.3	17.4	17.7	19.8	17.0	20.1	20.0	19.2	17.6	21.3	17.8	16.9	20.1	17.5	13.9	9.9

Figure 51: Transit In-Route Charging –Summer – Weekday vs. Weekend



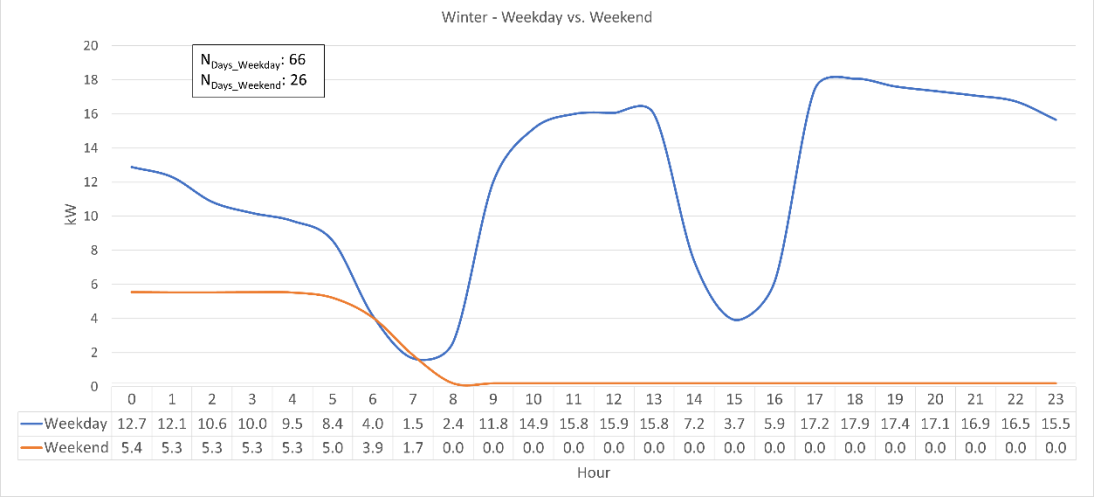
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	5.4	5.4	5.4	5.9	14.0	34.4	42.7	62.2	63.6	64.0	61.5	55.1	62.4	57.4	45.6	36.3	36.5	44.5	41.5	50.5	41.3	47.8	29.0	17.2
Weekend	5.4	5.5	5.3	5.4	5.7	28.4	32.1	25.1	34.8	30.7	32.7	35.5	30.1	26.7	29.6	29.9	31.6	32.1	30.6	30.4	35.7	24.0	16.9	10.7

Figure 52: Transit In-Route Charging – Winter – Weekday vs. Weekend



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	8.1	7.9	6.7	4.4	3.1	2.3	1.0	0.2	0.6	7.8	10.7	11.0	10.9	10.4	3.0	1.6	2.6	10.8	11.9	12.0	11.9	11.6	11.1	10.5
Weekend	4.3	3.4	3.2	2.4	1.5	0.9	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 53: School Bus Charging –Summer – Weekday vs. Weekend



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	12.7	12.1	10.6	10.0	9.5	8.4	4.0	1.5	2.4	11.8	14.9	15.8	15.9	15.8	7.2	3.7	5.9	17.2	17.9	17.4	17.1	16.9	16.5	15.5
Weekend	5.4	5.3	5.3	5.3	5.3	5.0	3.9	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 54: School Bus Charging – Winter – Weekday vs. Weekend