Transportation Electrification

2025 Annual Report

Submitted to the Washington Utilities and Transportation Commission

March 30, 2026

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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 abundant renewable energy we've generated and delivered since our founding in 1889 – and grows with our mission to enable vibrant communities through innovative energy solutions. Safely, Responsibly, and Affordably, putting those we serve at the center of everything we do.

I. Executive Summary and Future Direction

Avista's TE programs and activities were successful in 2025, achieving results and objectives aligned with the Transportation Electrification (TE) Plan[1] and tariff schedule 077. The table below summarizes key results for the calendar year ending December 31, 2025:

Table 1: 2025 TE Results

8,872	Number of light-duty passenger and truck EVs registered in Avista's service territory in Washington State (as of December 31, 2025)
24%	% annual growth light-duty (LD) EVs
67	Number of medium- and heavy-duty (MHD) EVs[2]
$16,351,486	Regional transportation cost savings
35,968	Avoided tons of CO_2 emissions
33,293	MWh charging consumption
5.7	MW average peak load from light-duty EVs
4.6	MW average peak load from MHD EVs and forklifts
$6,852,089	TE Capital investments
$700,837	TE Operating & Maintenance expenses
48%	% TE spending benefiting Communities and Low-Income
$3,010,613	Utility revenue from light-duty EV charging and EVSE user fees
$1,242,322	Utility revenue from MHD and forklift charging
$2,672,217	Grant reimbursements received
$547,000	Clean Fuel Program (CFP) monetized credits
828	Commercial AC Level 2 (L2) ports in service
60	DC Fast Charging (DCFC) ports in service
99.6%	L2 non-networked uptime
93%	L2 networked uptime
95%	DCFC uptime
94%	Customer satisfaction with Avista TE programs
329,807	Customer web page visits
8	Fleet consultations
9	Forklift incentives
16	Active Community-Based Organization (CBO) partnerships
121,677	Travel services provided by CBO partners (passenger-miles)
234	Public charging ports in Named Communities and CBOs
14	Community and stakeholder education and outreach engagements

[1] See www.myavista.com/transportation for a web link to the TE Plan
[2] 45 mass transit, 22 electric school buses, and 1,044 forklifts in service, as of December 31, 2025

TE Adoption and Load Forecasts

By the end of 2025, registered light-duty (LD) EVs reached 8,872 in Washington counties served by Avista, within 3% of the predicted 8,624 in the high adoption scenario of the 2020 TE Plan. The adoption rate dropped significantly in the latter half of the year, corresponding to major changes in federal support policies. Lower but steady LD growth is expected in the next several years, while long-term growth expectations remain very strong with 90% electrification of LD vehicles within 20 years. Medium- and heavy-duty (MHD) EVs grew substantially with ongoing electrification of mass transit and school buses in 2025. However, despite strong policy support in Washington state, this segment may see significantly reduced growth in the near term with limited vehicle availability, due to a lack of federal policy support. The Company continues to gather data and analysis of TE load profiles and forecasts, integrated with overall system planning to reliably and most affordably meet customer demands over time.

Expenses and Revenues

$6.90 million Capital investments and $0.70 million O&M expenses were aligned with TE Plan guidelines, supplemented by $0.37 million from Washington State's Clean Fuels Program (CFP), with 48% of spending benefiting communities and low-income customers. Spending was offset by $2.67 million in grant reimbursements and $4.25 million in revenue from electrical billing and public charger user fees Avista's TE investments continued to support a high level of TE adoption, resulting in $16.4 million in regional transportation cost savings, while avoiding 36 tons of CO_2 emissions.

EV Charging

213 L2 port installations were completed in 2025, a substantial increase from past years. However, this was not reflective of program marketing effectiveness or other changes in customer demand for the program, but rather due to grant funding that provided additional incentives for site hosts. 17 DCFC port installations were also significant, enabling high-power DCFC along major travel corridors and in various metro areas. Costs remained within expectations and budget. High customer satisfaction continues, with improving equipment reliability and utilization. However, significant challenges remain with high problem frequency and coordinated problem identification, root cause analysis, and resolutions between manufacturers, software, and service providers of major equipment, sub-component systems and user-interface platforms.

Community and Low-Income Support Programs

Three new community-based organizations (CBOs) were awarded EVs and charging infrastructure, bringing the total to 17 EVs actively managed by 15 CBO partners serving local communities. These EVs provided 3,563 trips and 121,677 passenger-miles to groups and individuals in need, enabling expanded transportation services at lower cost to CBOs, while raising positive awareness of EVs in the community.

Education and Outreach

Communication and marketing efforts resulted in much higher web traffic to websites with respective information, tools and programs; however, this did not translate to increased levels of customer program participation beyond those sites with additional incentives provided by grants. Positive customer awareness of TE has moved in a negative direction, particularly in rural areas. Future education and outreach efforts will continue to focus on providing helpful information to customers that emphasizes the economic benefits provided by electric transportation, in terms of total cost of ownership and lower fuel cost volatility, while developing customer and market insights that may improve program offerings.

Fleet Services

Collaborations with regional school bus administrators and operations achieved a total of 10 facilities operating 23 electric school buses. Mass transit bus electrification also expanded to 45 battery-electric buses (BEBs) operating in Spokane and Pullman, representing 25% of the market segment. Significant efforts to expand outreach and fleet advisory services to the broader customer base are currently underway and a major area of focus for 2026.

Vehicle-Grid Integration

Customer participation in Avista's Commercial EV TOU rates continues to grow, demonstrating its effectiveness incenting private investments in public, fleet and workplace charging, and in achieving 78% off-peak load profiles. The SmartCharging program utilizing vehicle telematics demonstrated consistent residential load profiles averaging 88% off-peak, but has not yet proven cost-effectiveness required for scaling. New technology development enabling direct load control of DCFC progressed as well, with initial deployments expected in 2026.

Future Direction

Future focus areas include expanding fleet, workplace and community programs, proving out and scaling cost-effective load management programs and technology platforms, and maintaining a backbone of reliable public fast charging in the region. Internal coordination with Avista's System Planning, Integrated Resource Planning, and the Innovation Lab teams will help ensure timely and cost-effective buildout of resources and technology platforms that enable beneficial TE load growth. Multi-year strategic objectives and key results include the following, consistent with the 2025 TE Plan currently pending UTC acknowledgment:

- Maintain a backbone of reliable public charging in the region, transitioning from a "push" to "pull" approach for the development of new DCFC sites, expansion of existing sites to meet growing demand, and effective make-ready solutions that encourage more third-party investment in charging infrastructure.

- Demonstrate and begin to scale cost-effective load management programs for both residential and commercial fleet vehicles; explore the viability of a new Distributed Energy Resource (DER) tariff as a dependable funding mechanism for optimally managing EV loads, as well as other forms of demand response and DERs.

- Commit to annual TE net capital budgets of $3 Million to $5 Million and O&M spending of $300,000 to $600,000 for TE programs, providing flexibility and adjustment to changing market conditions.

- Maximize funding from the CFP to supplement rate-based capital and O&M, with CFP funds estimated at $600k per year in 2026 and growing to over $1M per year by 2030. CFP funds are utilized to supplement authorized programs and activities, including but not limited to community EV programs, EVSE operational expenses, fleet advisory services, EV ride-hailing and sharing programs, education and outreach, new technology demonstrations, and rural access and agricultural applications.

- Apply for grants where appropriate and feasible to minimize net costs for certain DCFC and innovative technology demonstration projects.

- Provide regular updates of EV load profiles and forecasts in UTC annual reports and for System Planning and Integrated Resource Planning purposes.

II. TE Adoption and Load Forecasts

Registered light-duty vehicles in Washington counties served by Avista are summarized below for the years 2023 - 2025, based on Washington Department of Licensing data.[3] By the end of 2025, registered EVs reached 8,872, compared to the predicted 8,624 in the high adoption scenario of the 2020 TE Plan. Of the 8,872 total EVs, battery electric vehicles (BEVs) accounted for 6,296 registrations, while plug-in hybrid electric vehicles (PHEVs) accounted for 2,576 registrations. Although EV adoption remained strong in the first half of 2025, the growth rate moderated significantly in the second half of the year following the changes in federal support policies.

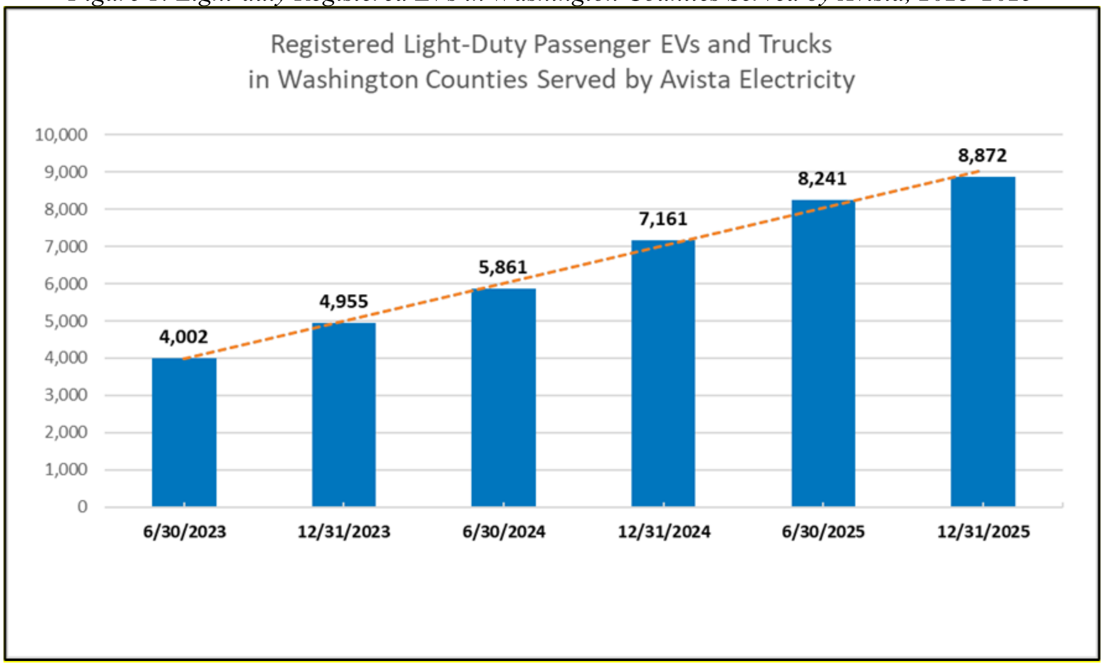
Table 2: Comparison of EVs to all Registered Light-Duty Vehicles in Washington Counties Served by Avista

	6/30/23	**12/31/23**	**6/30/24**	**12/31/24**	**6/30/25**	**12/31/25**
Total Passenger Vehicles	411,363	404,194	406,821	403,982	416,990	408,682
Total Truck Vehicles	147,912	144,587	145,629	144,033	148,312	143,794
Total All Vehicles	559,275	548,781	552,450	548,015	565,302	552,476
Total EV Passenger Vehicles	3,954	4,880	5,724	6,945	7,951	8,541
Total EV Truck Vehicles (light duty)	48	75	137	216	290	331

[3] See Electric Vehicle Population Size History by County | Data.WA | State of Washington

Total EVs	4,002	4,955	5,861	7,161	8,241	8,872
% EVs of Total Vehicles	0.7%	0.9%	1.1%	1.3%	1.5%	1.6%
Annualized EV Growth Rate	42%	48%	37%	44%	30%	15%

Figure 1: Light-duty Registered EVs in Washington Counties Served by Avista, 2023-2025



A detailed study of adoption and load forecasts from transportation electrification and other distributed energy resources was completed in 2024 at the feeder level across Avista's service territory.[4] Summary results are shown below, indicating significant loads from TE adoption over the next several decades, consistent with previous studies forecasting 20% or more of overall system load from TE by 2050.

[4] Avista DER Potential Study, Final Report (Applied Energy Group, 2024)

Figure 2: Avista DER Potential Results Summary, 2045 Reference Scenario (Applied Energy Group, 2024)

Resource	Nameplate Capacity (MW)	Annual Load Impact (GWh)	Share of Nameplate Capacity in Named Community[3]	July Peak Load Impact[a] (MW)	December Peak Load Impact[a] (MW)
Customer Solar	105	-127	46%	-33	0
Customer Battery Storage	96	2	58%	-3	-9
Customer Wind	1	-0.3	45%	-0.1	0
Residential EVSE	1,544	853	38%	62	62
Fleet EVSE	692	841	67%	101	105
Public and Workplace EVSE	171	206	60%	33	33

III. Expenses and Revenues

Total gross spending of $6.8 million in Capital and $0.7 million in O&M was within the TE Plan's guidelines given lower spending levels in recent years and in order to meet match requirements for federal and state grant awards. Spending benefiting communities and low-income customers reached 48% in 2025, exceeding the aspirational goal of 30%.

Table 3: 2025 TE Spending

	Capital	O&M	Clean Fuels Program (CFP)	Total	Portion Benefiting Communities and Low-Income Customers
Charging Infrastructure and Maintenance					
Residential L2	$0	$10,193	$0	$10,193	$938
Commercial L2	$2,580,302	$40,382	$0	$2,620,684	$1,375,859
DCFC	$3,503,142	$14,892	$98,131	$3,616,165	$1,384,991
DCFC meter billing	$0	$127,298	$0	$127,298	$48,755
Community and Low-Income Support	$768,646	$1,255	$0	$769,901	$769,901
Subtotal Charging Infrastructure Installations and Maintenance	$6,852,089	$194,020	$0	$7,144,241	$3,580,444

Community and Low-Income Support (other)	$0	$0	$252,689	$252,689[5]	$252,689
Education and Outreach	$0	$205,141	$0	$205,141	-
Fleet Services	$0	$23,552	$0	$23,552	-
Vehicle-Grid Integration	$0	$65,601	$24,101	$89,702	-
Market and Technology Monitoring and Testing	$0	$93,656	$0	$93,656	-
Analysis and Reporting	$0	$118,866	$0	$118,866	-
Subtotals	**$6,852,089**	**$700,837**	**$374,921**	**$7,927,847**	**$3,833,133**
% Benefiting Community & Low-Income Customers to Total Spending					**48%**

Avista provides electricity to approximately 88% of households in the Washington counties it serves. Taking this percentage of 5,861 light-duty EVs registered in counties served by mid-year (as an average for 2025), and $340.52 average utility billing revenue per EV, provides an estimate of $2,800,211 billing revenue for light-duty EVs. In addition, EV charging owned and operated by Avista generated user fee revenues of $210,402. A total of 45 known MHD EVs served by Avista were identified in 2024, including 43 mass transit buses and three school buses in-service. Metering data shows a total of $502,959 billing revenue for these MHD EVs. Based on load profile data, an estimated 1,034 electric forklifts contributed $739,363 in billing revenue.

In addition to electric billing revenue from various forms of EV charging, grant reimbursements of $2,672,217 and monetized Clean Fuel Program (CFP) credits of $547,000 were received. CFP funds are accounted for separately from rate-based capital and O&M spending and as listed in the table above, utilized to supplement programs consistent with the TE Plan.

Table 4: TE Utility Revenue

Light-duty charging	$2,800,211
MHD charging	$502,959
Forklift charging	$739,363
EVSE user fees	$210,402
Total TE Utility Revenue	**$4,252,935**

[5] Additional funding provided by monetized CFP credits reflected in total.

IV. AC Level 2 (L2) Charging

The table below summarizes L2 ports installed in 2025, the cumulative number of ports in service, and the average cost and lead time for commercial installations completed through the Turn-Key and Make-Ready programs. Under the Turn-Key Program, Avista owns and operates the charging equipment, while the Make-Ready Program provides power infrastructure up to the charger, owned and operated by the customer. The Turn-Key Program primarily supports small businesses, community-based organizations, and rural access sites, using non-networked chargers that offer high reliability at a low cost. The Make-Ready Program is designed for larger organizations and for customers who prefer networked chargers and/or ownership of the charging equipment.

Table 5: L2 Charging Installations

	Commercial Turn-Key L2	**Commercial Make-Ready L2**
# Ports Installed	176	37
Total # Ports In-Service	828	84
Average Installation Cost per Port	$4,358	$4,601
Average Charger Cost per Port	$1,042	(paid by customer)
Lead Time	26.3 weeks	15.9 weeks

In 2025, the Make-Ready Program saw increased participation compared to prior years, reflecting growing interest from this market segment. However, the Turn-Key Program continued to be the more frequently utilized option, offering slightly lower average installation costs and lead times overall, although for a given project, long lead times can often result from site-specific construction and material delays.

Avista installed significantly more L2 charging ports in 2025 compared to prior years, while achieving lower average installation costs in both programs compared to 2024. However, larger volumes were mainly due to grant awards that reduced customer costs and thereby increased participation levels. Both programs continued to deliver cost-effective, high-quality installations that received high customer satisfaction ratings due to the strong value proposition and streamlined installation process with excellent contracting services.

V. DC Fast Charging (DCFC)

17 DCFC charging ports were added to the Avista charging network in 2025, bringing the total number of charging ports in-service to 60 that are owned and operated by Avista.

Table 6: Avista DCFC Site Acquisition and Construction

Station Name	Status	Commissioning / Target Date	Site Type
Wandermere Shopping Center upgrade	Completed	2/26/25	Corridor / Retail
Gonzaga University Hertz Field	Completed	3/12/25	Corridor / Community
City of Colville	Completed	6/12/25	Corridor / Rural Access
Lincoln Heights Shopping Center	Completed	6/29/25	Retail
WSU Visitor Center addition	Completed	7/8/25	Corridor / Rural Access
Two Rivers Resort	Completed	8/19/25	Corridor / Rural Access
5 Mile STA Park and Ride	Completed	8/25/25	Community
West Plains Transit Center upgrade	Completed	11/2/25	Corridor
Moran Prairie STA Park and Ride	Completed	11/20/25	Community
Gonzaga University 395	Under Construction	Q1 2026	Corridor / Community
Town of Wilbur	Construction Pending	Q2 2026	Corridor / Rural Access
City of Kettle Falls	Construction Pending	Q2 2026	Corridor / Rural Access
City of Othello	Site design	Q3 2026	Rural Access
Town of Davenport	Site acquisition	Q4 2026	Corridor / Rural Access
City of Spokane	Site acquisition	Q1 2027	Community

Several customers showed interest in the DCFC Make-Ready program but did not move forward with site agreements in 2025. This compared to strong participation in 2024, mainly from auto dealers complying with corporate requirements to install DCFC. Participation in the DCFC Make-Ready program will be closely monitored in 2026 and evaluated for ongoing adjustments, which may be needed to improve customer participation.

Table 7: Regional DCFC operators and connector types

DCFC Ports by Connection Type					
Site Operator	**CHAdeMO**	**CCS**	**NACS**	**Total**	**% of Total**
Avista Owned/Operated	3	56	1	60	28%
Avista Make-Ready	0	23	0	23	11%
ChargePoint	2	7	4	13	6%
EVgo	1	1	0	2	1%
Blink	0	8	0	8	4%
EVCS	5	28	0	33	15%
Tesla	0	0	40	40	19%
Rivian	0	7	0	7	3%
Electrify America	2	28	0	30	14%
Totals	**13**	**158**	**45**	**216**	**100%**

VI. Reliability and Utilization

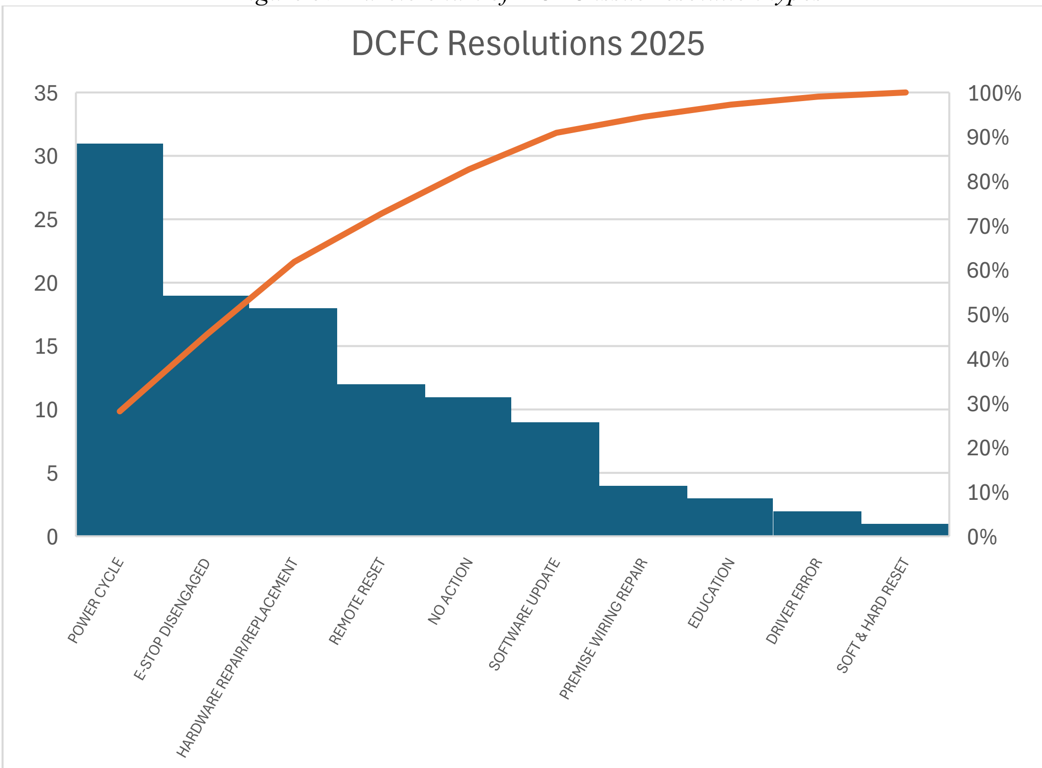
Charger reliability continues to be a top priority, from both a customer and policy perspective. Despite a number of ongoing difficulties including a few incidents of vandalism, overall uptime improved significantly over the course of 2025. This was due mainly to ongoing pattern detection efforts in tracking software update schedules and recurrent problems at particular locations, equipment replacements, and vandalism mitigation efforts.

Table 8: EVSE ports in service and uptime results

EVSE Type	**Ports in Service (year-end)**	**Average Uptime %**
Commercial non-networked L2	618	99.6%
Commercial networked L2	209	93.4%
Networked DCFC	60	95.0%

Multiple entities involved with operating and maintaining charging equipment creates a number of coordination and accountability challenges among EVSE manufacturers, network providers, cellular communication services, credit card payment providers, vehicle OEMs, EVSE owner/operators, and site hosts. All of these entities need to be well coordinated to achieve high EVSE uptime and customer satisfaction. As shown in the chart below, a large proportion of problems were due to network communication errors and rising cases of vandalism.

Figure 3: Pareto chart of DCFC issue resolution types



Stronger relationships between network providers and EVSE manufacturers has resulted in improved response times and effectiveness but remain a major area of opportunity. Avista is committed to achieving consistently high EVSE uptime and customer satisfaction through strong coordination, evaluation and testing of equipment and service vendors.

Table 9: L2 and DCFC problems by severity and time to resolve

Problem severity	Number of occurrences	Number resolved	Median days to resolve	Average days to resolve
Urgent	1	1	-	2
High	245	244	3	11
Medium	61	59	1	10
Low	16	14	0	0

Vandalism incidents can cause downtime from a few days to several months, depending on the severity of damage and part availability. Several incidents led to research, vetting, and deployment of anti-theft concepts in collaboration with a utility and industry consortium. Three DCFC stations that were subject to vandalism were installed with a *CatStrap* product that surrounds the charging cable with hardened steel strips housed inside a nylon sleeve. Daily monitoring via online platforms and network providers as well as frequent inspections has helped mitigate vandalism risks and improve overall uptime across Avista's EVSE network.

L2 and DCFC Utilization

The following tables show 2025 utilization data in terms of kWh for various port types. Utilization is expected to increase with respect to EV adoption over time. Note that fleet utilization includes both light- and medium-duty EVs utilizing L2 charging, such as electric school buses which typically require more daily energy than light-duty fleet EVs.

Table 10: L2 utilization by port type

Category	# Ports	Avg Monthly kWh per Port
Public	91	346
Workplace	152	241
Fleet	111	412
MUD	38	258

Table 11: DCFC site utilization

Location	In-Service Date	# DCFC ports	kW output capacity per port	2025 Charging Sessions	Annual kWh	Avg kWh per Session	Avg minutes per Session
Sprague	5/17/2022	2	90-180	564	15,019	26.6	28.7
Rosalia	7/12/2022	2	90-180	325	6,847	21.1	23.6
North East Community Center	8/30/2022	2	90-180	914	29,442	32.2	36.3
Indian Trail Library	8/31/2022	2	90-180	1189	39,326	33.1	38.4
The Hive	9/1/2022	2	90-180	1721	44,673	26.0	35.9
Moran Prairie Library	9/22/2023	2	90-180	896	31,204	34.8	35.7
North Spokane Library	9/22/2023	2	90-180	1223	40,643	33.2	32.9
Kendall Yards	9/23/2023	2	90-180	2027	78,767	38.9	40.8
Trailhead Golf Course	9/25/2023	2	90-180	374	15,905	42.5	33.8
Millwood Shopping Center	9/27/2023	2	90-180	618	21,333	34.5	31.3
Liberty Lake STA Park & Ride	12/1/2023	2	90-180	412	14,877	36.1	33.7
Chewelah Spoko Fuel	12/11/2023	2	90-180	564	17,560	31.1	28.0
Yoke's Fresh Market - Deer Park	4/23/2024	2	90-180	629	19,752	31.4	27.7
Port of Clarkston	4/29/2024	4	90-180	686	25,138	36.6	35.2
WSU Visitor Center	7/8/2024	4	90-180	2078	77,567	37.3	36.0

MLK Community Center	8/14/2024	2	90-180	345	13,364	38.7	39.6
The Harvester	10/30/2024	4	90-180	256	7,596	29.7	23.8
WA Trust Bank – Manito Shopping Center	11/23/2024	2	90-180	747	29,520	39.5	37.2
WA Trust Bank – Wandermere Shopping Center	2/26/2025	2	90-180	564	21,884	38.8	32.2
Gonzaga - Hertz Field	3/12/2025	2	160-320	749	30,819	41.1	34.3
City of Colville	6/12/2025	4	160-320	483	17,551	36.3	30.2
Lincoln Heights Shopping Center	6/29/2025	2	160-320	207	8,204	39.6	34.7
Two Rivers Resort	8/19/2025	2	160-320	39	1,156	29.7	25.8
STA 5 Mile Park & Ride	8/25/2025	2	160-320	380	14,159	37.3	37.4
STA West Plains Transit Center	11/2/2025	2	160-320	185	4,565	24.7	35.5
STA Moran Prairie Park & Ride	11/20/2025	2	160-320	15	456.9	30.5	26.3
Total:		**60**		**18,190**	**627,327**	**33.9**	**32.9**

VII. Community and Low-Income Support Programs

Through a competitive application process, the Community EV program offers funding for both EVs and charging infrastructure to community-based organizations, partnering with Avista to provide electric transportation and raising positive awareness benefiting communities and low-income customers. Since launching in 2018, the program has grown to include 17 electric vehicles managed by 15 active partners.

In 2025, funding was awarded to Rural Resources Community Action, Ronald McDonald House Charities of the Inland Northwest, and Habitat for Humanity Spokane. Rural resources utilized the funding to purchase a Chevy Blazer EV, while both Ronald McDonald House and Habitat for Humanity purchased Volkswagen ID.Buzz passenger vans. Annual EV reports from community partners provided valuable feedback and assisted in evaluating progress. The program continues to expand and demonstrate effectiveness, completing 3,563 trips over 64,590 miles, providing 121,677 passenger-miles of clean and affordable electric transportation in 2025.

In the years ahead, Avista intends to expand the program while actively seeking new and innovative opportunities to advance electric transportation throughout Eastern Washington with community partners.

Table 12: Active CBO partnerships utilizing EVs and charging provided by Avista

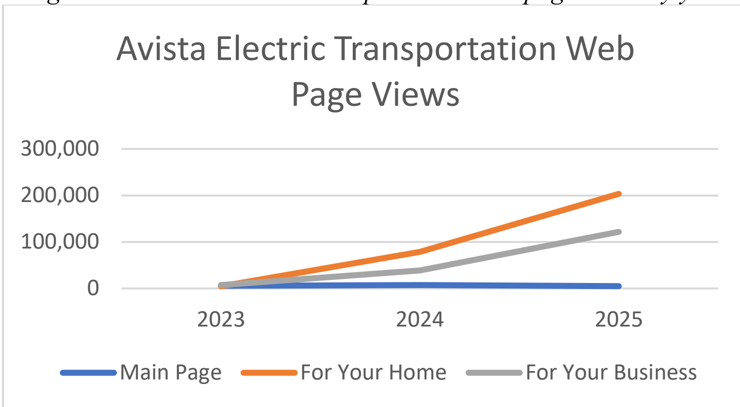
CBO Partnership	Year Awarded	# EVs in Service
Transitions for Women	2018	1
Spokane Regional Health District	2018	1
Asotin Co. Health District	2021	1
Rural Resources Community Action	2021, 2025	2
Whitman Community Action Center	2021	1
Compassionate Addiction Treatment	2022	1
COAST Public Transportation	2022, 2024	2
International Rescue Committee	2023	1
Spokane Neighborhood Action Partners	2023	1
Tri-County Economic Development District	2023	1
Meals on Wheels	2024	1
Career Path Services	2024	1
ZEV Co-op (EV charging infrastructure only)	2024	1
Ronald McDonald House Charities of the Inland NW	2025	1
Habitat for Humanity Spokane	2025	1
Total	**15 Partnerships**	**17 EVs**

VIII. Education and Outreach

In 2025, Avista expanded education and outreach efforts with the goal of increasing positive awareness of electric transportation, programs and incentives. Activities included multiple digital advertising campaigns focused on fleet and workplace charging, general EV awareness messaging, and two video series showcasing participating commercial customers. These efforts increased website traffic, however program applications did not rise correspondingly, which may be indicative of typical business decision-making cycles of 6–18 months.

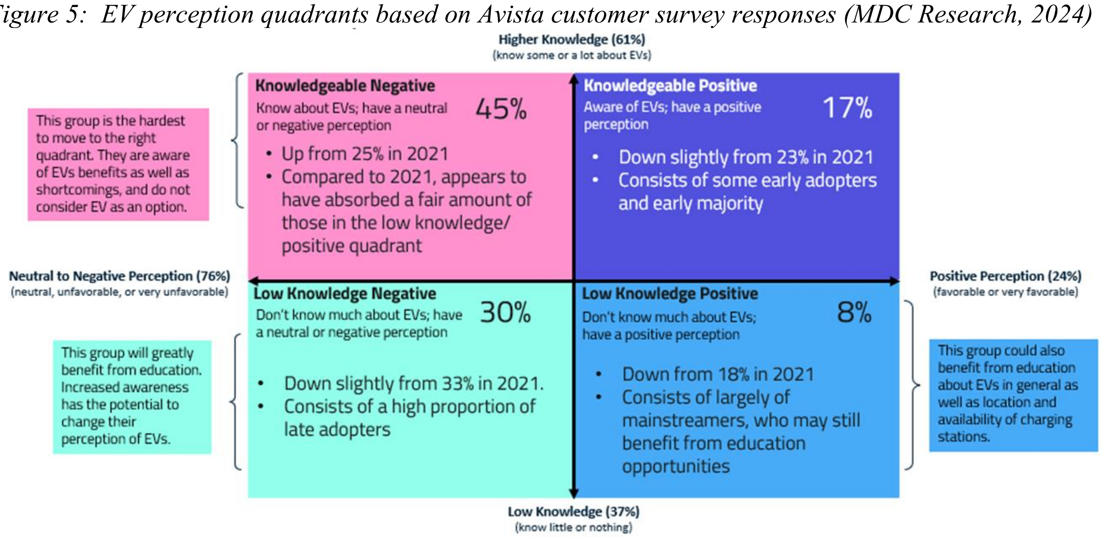
In 2026, Avista will conduct a survey to assess commercial customer awareness, interest, timelines for electrification, and barriers to participation. Results will help guide future adjustments to education and outreach activities, including digital campaigns, social media outreach, customer video content, and direct engagement through targeted events and one-on-one discussions.

Figure 4: Avista Electric Transportation Web page views by year



A follow-up survey was completed in 2024, similar to the survey completed in 2021 that tracked customer awareness and sentiment across a number of factors. Summary results of the four perception quadrants according to the level of EV awareness (high/low), and perception (positive/negative) are shown below.

Figure 5: EV perception quadrants based on Avista customer survey responses (MDC Research, 2024)



The results show a 13% decrease in awareness, and a 16% decrease in positive perception since the 2021 survey across Avista's service territory. These disappointing results are even more prominent in the majority of rural areas served by Avista. For these customers, a focus on economic benefits in terms of transportation cost savings for both individuals and as a region, charging infrastructure availability, and the use of local energy resources can help move perceptions and knowledge levels in a positive direction. This contrasts with an emphasis on environmental benefits which often provoke a negative response in a large segment of customers. Additional information demonstrating the reliability and low price volatility of local electricity may also help raise positive awareness and consideration in EV adoption in both the near and long term.

Overall, it's clear that consistent and effective education and outreach will be needed for many years to "Cross the Chasm"[6] and transition to accelerating adoption in the mass market.

IX. Fleet Services

A total of 8 fleet consultations and 9 forklift incentives were provided in 2025, with the most prominent success demonstrated by expanded mass transit electric buses and collaborations resulting in electric school buses in operation at 10 facilities across the region, averaging 69 miles/day per bus. Charging system installations were completed in 2025 for the Reardan, Kettle Falls, Inchelium, Central Valley, and Odessa school districts. Two of these sites—Reardan and Kettle Falls—received DC fast chargers in addition to AC Level 2 units. With these five installations, a total of 10 school districts have now benefitted from Avista's consultation and construction services, supporting 23 electric school buses now in service.

Table 13: Electric School Bus Charging Facilities and Buses in Service

School/Facility	# of Electric Buses	Avg miles traveled per bus, per day
VL Transport	2	97
Tekoa School District	3	50
Central Valley School District	5	82
West Valley School District	3	36
Mead School District	2	64
Reardan School District	2	78
Odessa School District	2	86
Kettle Falls School District	2	68
Northport School District	1	62
Inchelium School District	1	64
Total / Avg	**23**	**69**

Avista is dedicated to supporting TE initiatives that deliver long-term benefits to all customers, with advanced transportation of people, goods and services that provide a more affordable, vibrant, and sustainable regional economy. The Fleet Advisory Program is a key part of this objective by providing business customers with fleet consulting, Cost of Ownership (COO) & route planning tools. With the expansion of EV applications and charging infrastructure, Avista will partner with commercial customers through an objective, data-driven process and act as a trusted energy advisor.

[6] Crossing the Chasm. Moore, Geoffrey (2014).

Avista will target fleets with Light, Medium & Heavy-Duty trucks, forklifts and other "off-road" vehicles with a facility and operations in Avista's Washington service territory. Qualifying fleets at every stage of their electrification journey— from initial planning to post-energization – will be eligible for Avista's products and programs.

This may be accomplished by: (1) advancing and simplifying the electrification process for commercial customers, (2) providing customized resources and tailored education, (3) guiding customers from the initial planning stage through post-energization, (4) increase fleet access to electric transportation products and services, (5) utilize Pricing Plan Support for Lower-Cost Fleet Charging, (6) continue to advance load forecasting and utility system planning, and (7) raise positive awareness of electric transportation in the business community through tailored education and outreach.

X. Vehicle-Grid Integration (VGI)

Direct Load Control (DLC) for DCFC

A VGI pilot project is currently underway in partnership with Avista's Innovation Lab and a leading industry provider, enabling DLC for DCFC owned and operated by Avista. The project includes installation of a controller device at several DC fast charging stations: the Martin Luther King Jr. Community Center, The Hive, Gonzaga Hertz Field, Two Rivers Resort, and the Town of Wilbur. These controllers are installed on site and directly connected to each charger via CAT5 cables. Remote curtailment is achieved through industry provider's online portal, where operators can set kW output limits. During the first phase of the pilot, Avista's distribution grid operators will be given access to the portal and will manually initiate curtailment events.

The second phase of the pilot will utilize the controller's ability to accept Modbus signals from the utility, enabling Avista to send real-time feeder loading data directly to the DLC platform. The controller will then automatically adjust charger outputs based on available grid capacity. This capability will allow operators to monitor stations without needing to actively manage charging levels. If the system proves effective and scalable, it may be expanded to all company-owned DCFC as well as privately owned and fleet charging sites. These types of automated control systems can support widescale electrification, especially in areas where distribution capacity is limited. Such a capability could prove valuable in several ways, not only in the event of unexpected emergencies, but also to allow for siting of DCFC in areas where local distribution constraints would not normally allow for the addition of DCFC connected loads, i.e. it may provide a way to prudently site DCFC in certain remote, strategic locations that would not otherwise be possible.

Residential Smart Charging

Vehicle-to-grid integration (VGI) demonstration work, including the use of telematics technologies, remains a key area of focus, with the objective of delivering customer value while achieving cost-effective off-peak load shifts of 50% or more. In 2025, the Company offered a short Smart Charging pilot to residential customers alongside the pilot whole-home TOU rate, including optional direct load control. Participation was limited, with only 12 customers enrolled and only four opting into direct load control. These results suggest that customer participation may require incentives beyond a whole-home TOU rate or additional benefits to support broader system value.

In the near term, cost-effectiveness remains the primary challenge. Daily load shifts at this level provide approximately $50 to $100 in annual grid savings per customer which is insufficient to offset customer incentives, marketing, vendor services and administration costs. To better understand how incentive levels influence charging behavior and participation, the Company is exploring a joint study between its telematics vendor, ev.energy, and a university research partner. The study may also evaluate customer flexibility during extreme grid events. Given that many EVs have battery capacities above 60kWh and average daily use near 10kWh, many customers may be able to sustain multi-day load shifts. Such events may provide the greatest system value relative to program operating costs. See Appendix A for load profiles based on telematics data from the Smart Charging program.

Commercial EV Time-of-Use (TOU) Rates

The following summarizes the parameters of commercial EV TOU rate schedules 013 and 023:

Table 14: Commercial EV TOU Rate Parameters

	Schedule 013	**Schedule 023**
Basic Charge	$25	$750
On-Peak Energy Charge, per kWh	$0.22327	$0.15323
Off-Peak Energy Charge, per kWh	$0.08891	$0.06192

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

Customers indicate these TOU rate options are essential in their decision to invest in larger fleet, workplace and DCFC charging. Participation has steadily increased each year since implementation in 2021, with overall meter data showing 76% of usage off-peak in 2025.

Table 15: Commercial EV TOU Rate Participation and Energy Use

Year	# Customers	Annual kWh	% On-peak	% Off-peak
2021	9	279,808	22%	78%
2022	15	615,080	21%	79%
2023	34	2,002,992	26%	74%
2024	57	5,150,618	26%	74%
2025	89	6,413,503	24%	76%

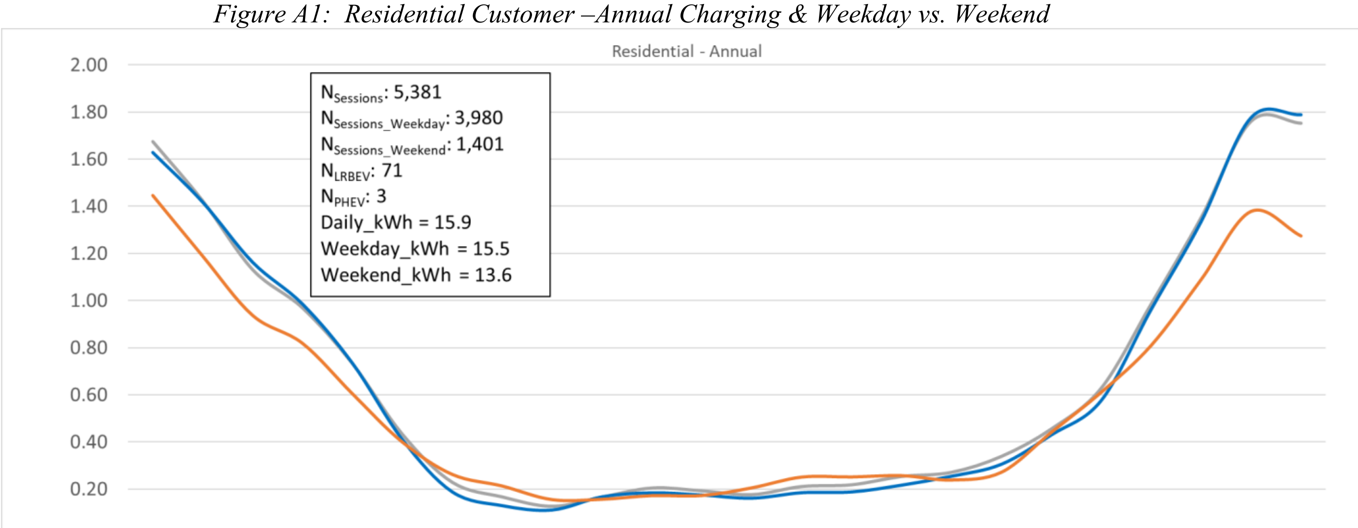
Experience has shown that education for each customer is necessary to help maximize off-peak charging, which benefits both the customer and the grid. Fleet operators often have some operational needs to charge on-peak to some degree but typically are able to shift a high percentage charging load to off-peak. For example, delaying charging at the end of regular shifts in the afternoon and early evening, to commence later in the evening and overnight.

Appendix A – Load Profiles

The following charts use telematics data gathered through Avista's Smart Charging load management program, in order to derive aggregated load profiles for residential charging locations, as well as load profiles by vehicle type that include all charging locations.

Customers in the Smart Charging program are influenced to shift charging loads to off-peak hours via periodic email prompts. While no other ongoing incentives or a time-of-use (TOU) rate are applied, these customers agreed to participate in load management programs as a condition of the residential L2 installation program, in which Avista owns and maintains EVSE on customer premises.

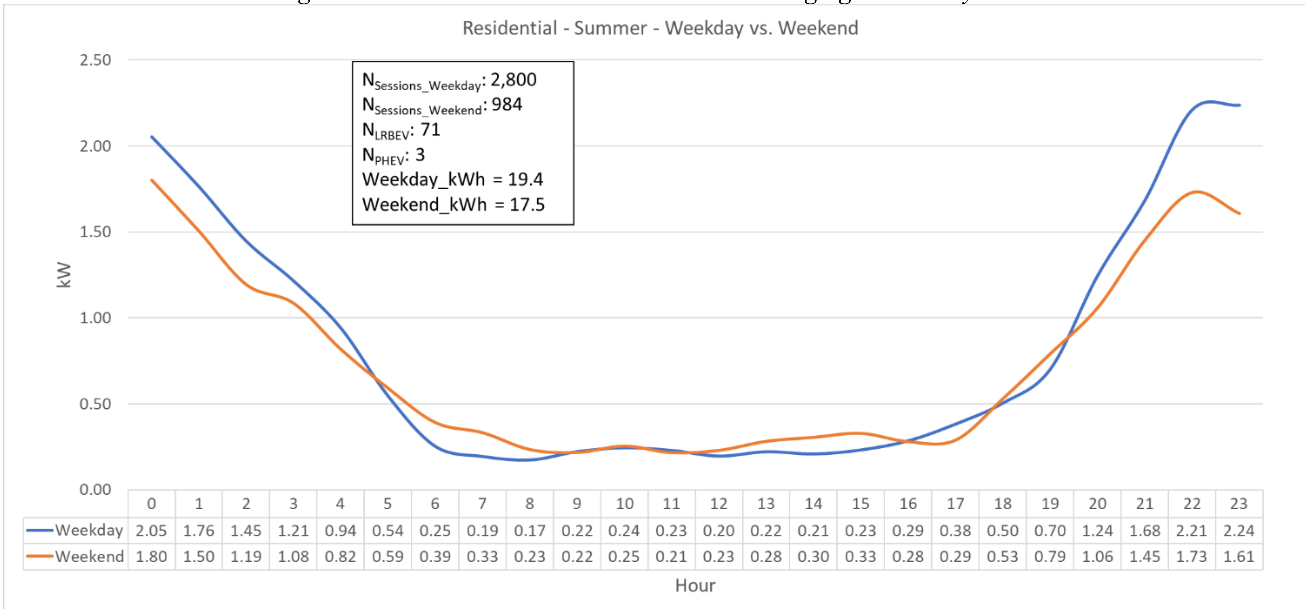
Figure A1: Residential Customer –Annual Charging & Weekday vs. Weekend



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	1.68	1.42	1.13	0.97	0.73	0.43	0.23	0.17	0.13	0.17	0.20	0.19	0.18	0.21	0.22	0.25	0.27	0.34	0.45	0.63	0.99	1.35	1.76	1.75
Weekday	1.63	1.42	1.16	0.99	0.73	0.41	0.19	0.13	0.11	0.17	0.18	0.18	0.16	0.19	0.19	0.22	0.26	0.31	0.43	0.58	0.96	1.34	1.78	1.79
Weekend	1.45	1.19	0.94	0.82	0.60	0.40	0.26	0.21	0.16	0.16	0.17	0.17	0.21	0.25	0.25	0.26	0.24	0.27	0.44	0.61	0.81	1.09	1.38	1.27

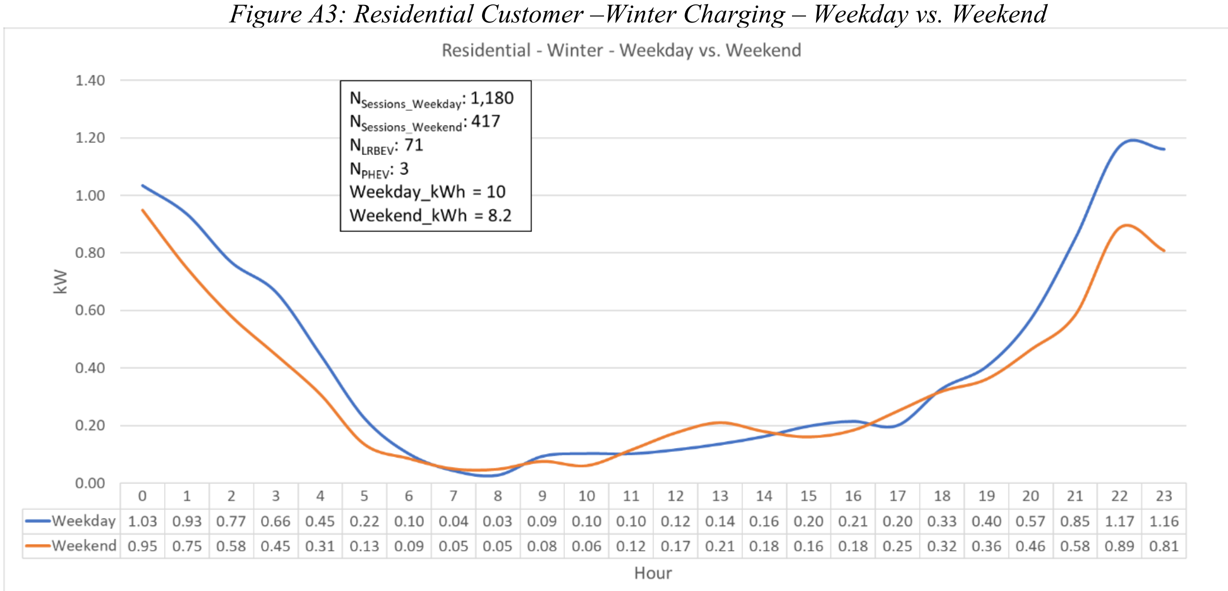
88% of charging occurs during off-peak hours for these influenced customers, a significant shift from uninfluenced load profiles that averaged 64% off-peak. The Weekday and Weekend profiles follow a similar curve except for an increase in charging during the evening hours starting at 9pm, and another increase in the early morning hours, 3am to 5am. The increase in the evening charging load can be attributed to the additional miles driven during the week when commuting to work, and the morning increase indicates that drivers are using a "ready by" feature that will precondition their vehicle by a set time while maintaining the required state of charge (SOC) of the battery.

Figure A2: Residential Customer – Summer Charging – Weekday vs. Weekend



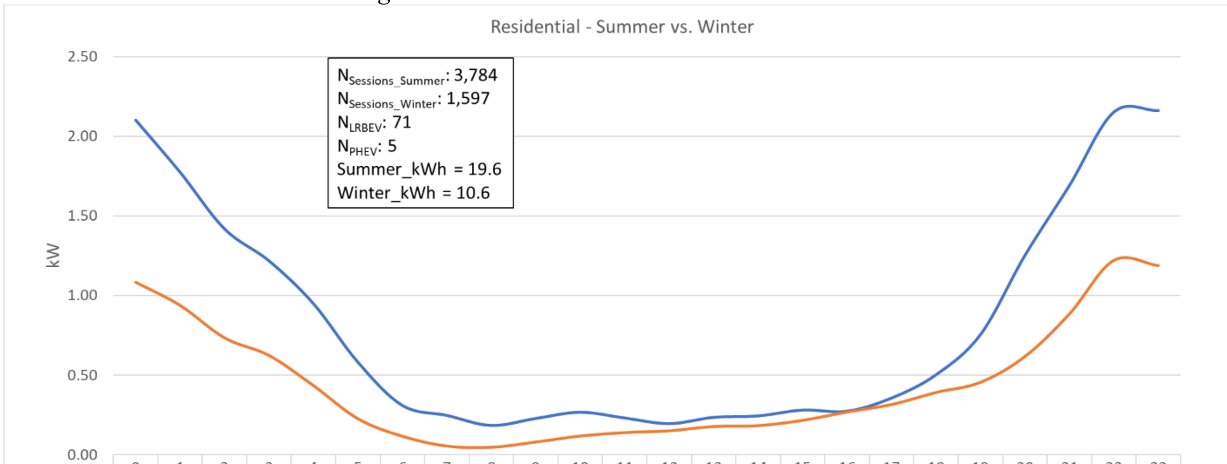
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	2.05	1.76	1.45	1.21	0.94	0.54	0.25	0.19	0.17	0.22	0.24	0.23	0.20	0.22	0.21	0.23	0.29	0.38	0.50	0.70	1.24	1.68	2.21	2.24
Weekend	1.80	1.50	1.19	1.08	0.82	0.59	0.39	0.33	0.23	0.22	0.25	0.21	0.23	0.28	0.30	0.33	0.28	0.29	0.53	0.79	1.06	1.45	1.73	1.61

Figure A3: Residential Customer –Winter Charging – 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	1.03	0.93	0.77	0.66	0.45	0.22	0.10	0.04	0.03	0.09	0.10	0.10	0.12	0.14	0.16	0.20	0.21	0.20	0.33	0.40	0.57	0.85	1.17	1.16
Weekend	0.95	0.75	0.58	0.45	0.31	0.13	0.09	0.05	0.05	0.08	0.06	0.12	0.17	0.21	0.18	0.16	0.18	0.25	0.32	0.36	0.46	0.58	0.89	0.81

Figure A4: Residential Customer – Summer vs. Winter

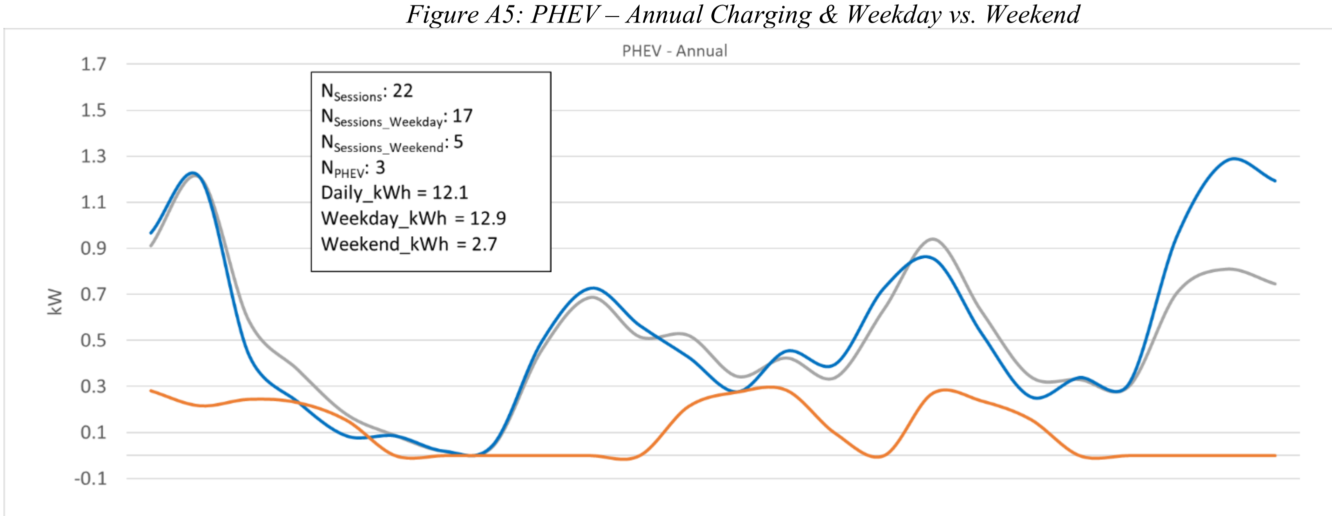


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Summer	2.10	1.77	1.42	1.22	0.95	0.58	0.31	0.25	0.18	0.23	0.27	0.23	0.19	0.23	0.24	0.28	0.27	0.35	0.50	0.75	1.25	1.69	2.15	2.16
Winter	1.08	0.94	0.73	0.62	0.43	0.23	0.12	0.05	0.05	0.08	0.12	0.14	0.15	0.18	0.18	0.22	0.27	0.32	0.39	0.45	0.62	0.88	1.22	1.19

Hour

Of the 76 customers enrolled in the telematics program, 5 drive plug-in hybrids (PHEV), and the remaining 71 drive long range all-electric vehicles (LRBEV). The following charts represent the average charging profiles for these two vehicle types. Note that these profiles, in contrast to the residential load profile, include charging from all locations for the vehicle. The load profile for the PHEV does not follow the same curve as the graphs above, which is due to these vehicles having significantly smaller batteries and charge times. The graphs for the LRBEV vehicles do follow the same curve, however with slightly higher peaks due to removing the PHEV data.

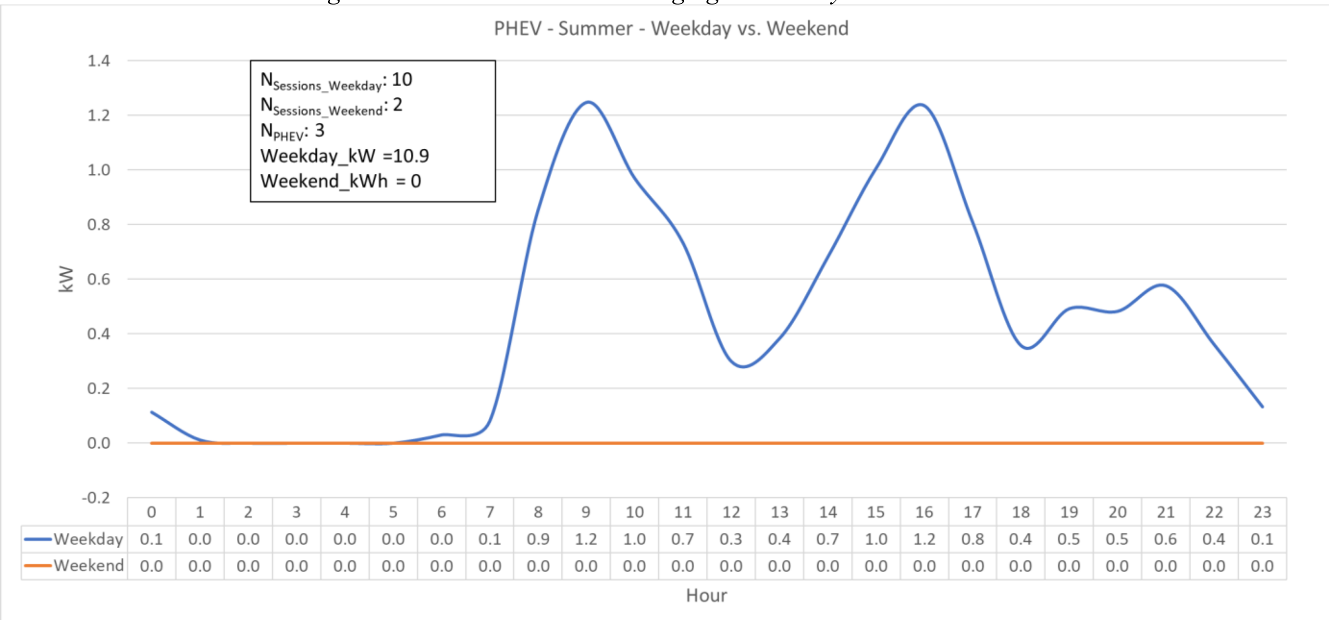
Figure A5: PHEV – Annual Charging & Weekday vs. Weekend



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	0.9	1.2	0.6	0.4	0.2	0.1	0.0	0.0	0.5	0.7	0.5	0.5	0.3	0.4	0.3	0.6	0.9	0.6	0.3	0.3	0.3	0.7	0.8	0.7
Weekday	1.0	1.2	0.4	0.2	0.1	0.1	0.0	0.0	0.5	0.7	0.6	0.4	0.3	0.5	0.4	0.7	0.9	0.5	0.3	0.3	0.3	1.0	1.3	1.2
Weekend	0.3	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.1	0.0	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0

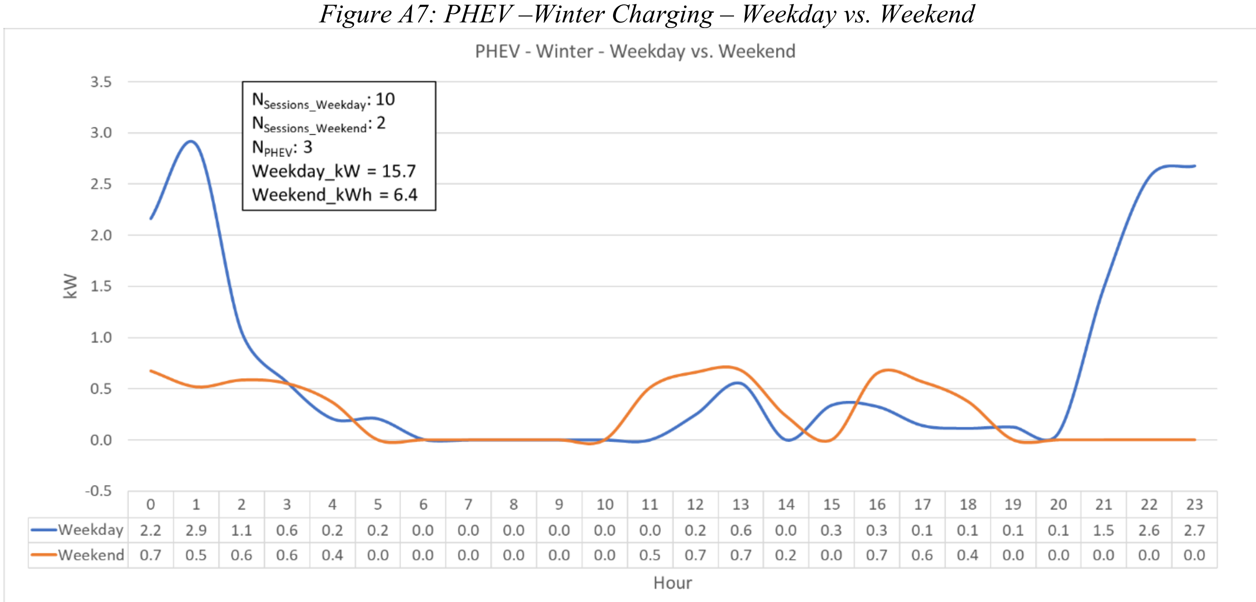
Hour

Figure A6: PHEV – Summer Charging – Weekday vs. Weekend



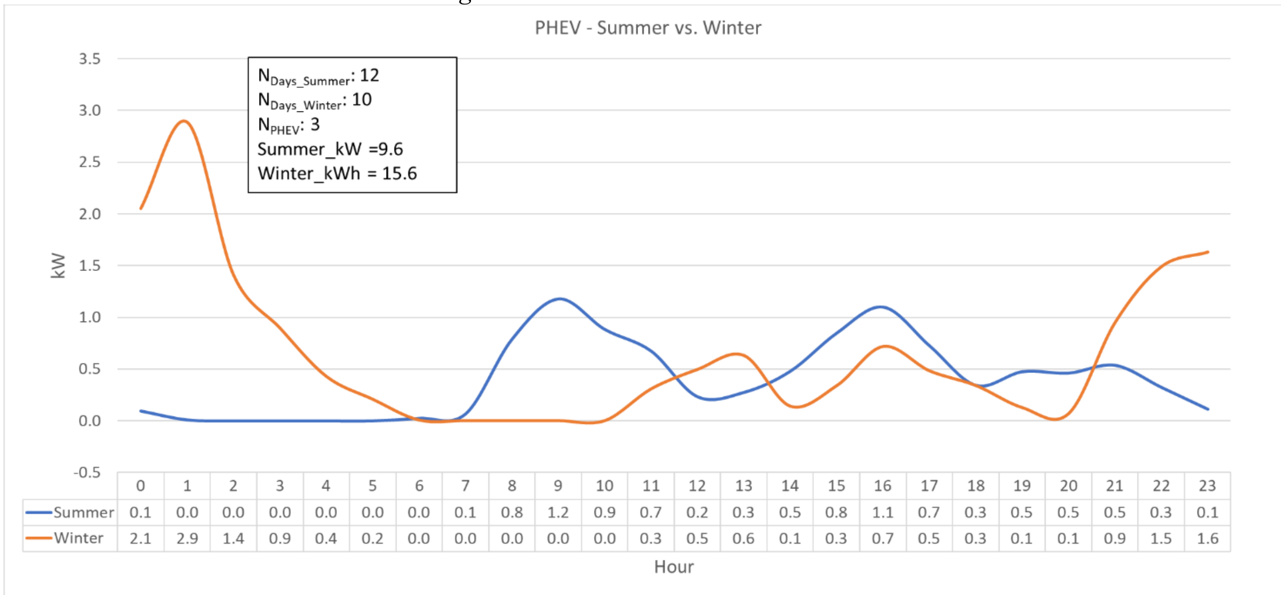
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	1.2	1.0	0.7	0.3	0.4	0.7	1.0	1.2	0.8	0.4	0.5	0.5	0.6	0.4	0.1
Weekend	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure A7: PHEV –Winter Charging – Weekday vs. Weekend



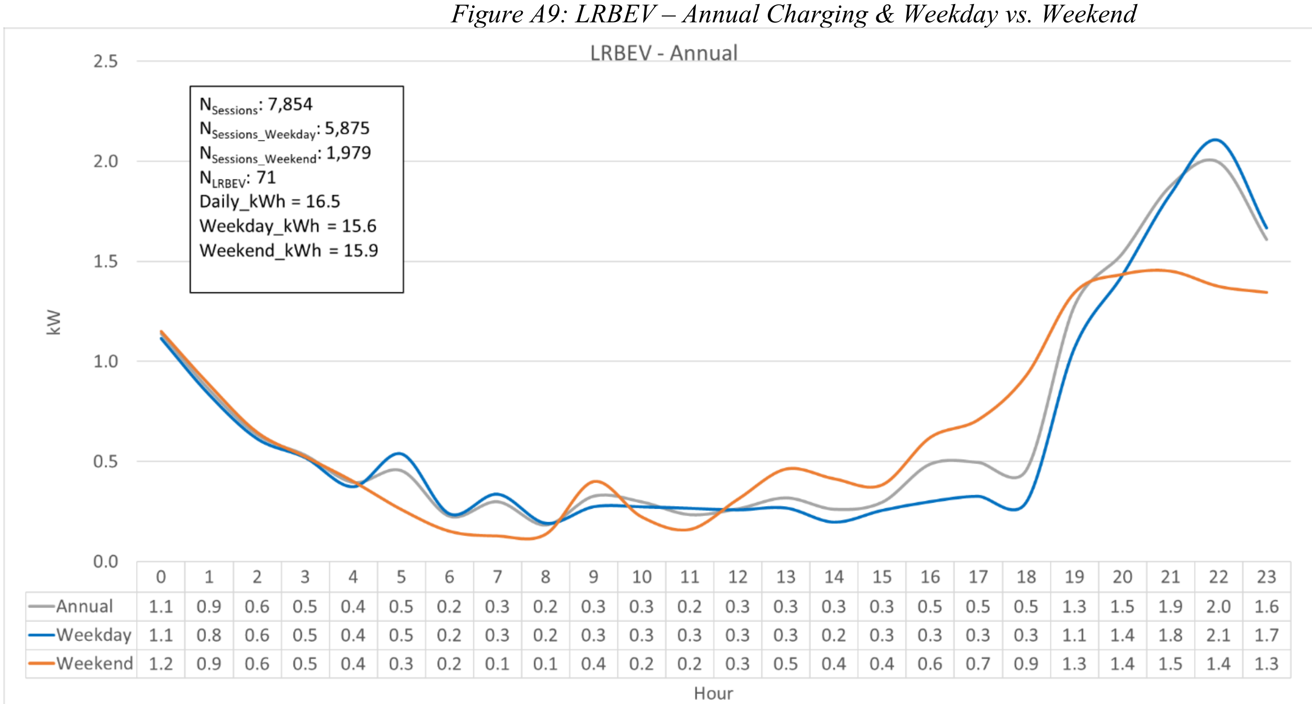
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	2.2	2.9	1.1	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.3	0.3	0.1	0.1	0.1	0.1	1.5	2.6	2.7
Weekend	0.7	0.5	0.6	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.7	0.7	0.2	0.0	0.7	0.6	0.4	0.0	0.0	0.0	0.0	0.0

Figure A8: PHEV – Summer vs. Winter



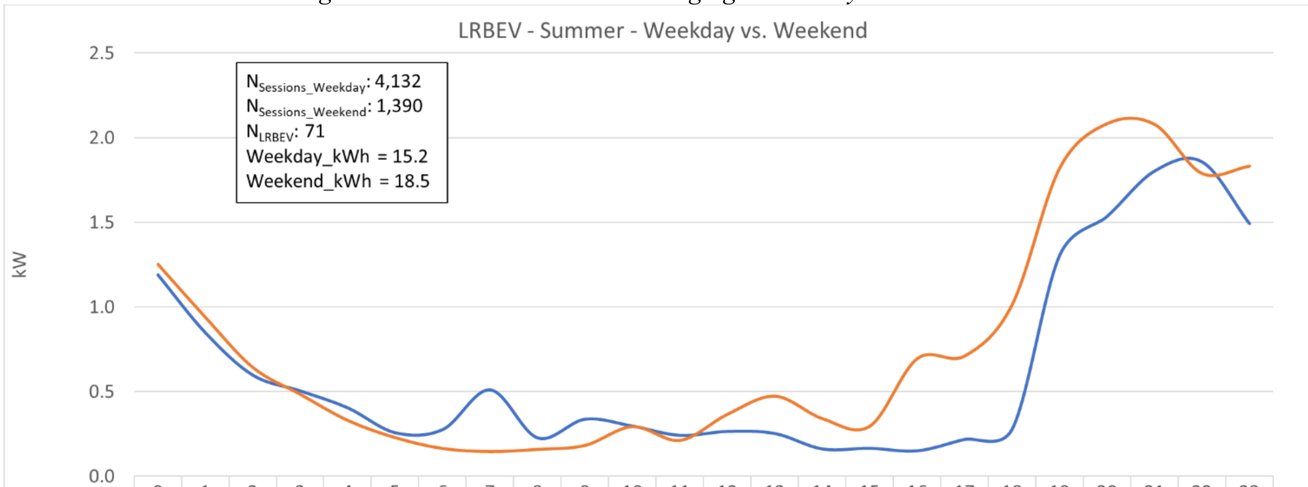
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Summer	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	1.2	0.9	0.7	0.2	0.3	0.5	0.8	1.1	0.7	0.3	0.5	0.5	0.5	0.3	0.1
Winter	2.1	2.9	1.4	0.9	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.6	0.1	0.3	0.7	0.5	0.3	0.1	0.1	0.9	1.5	1.6

Figure A9: LRBEV – Annual Charging & Weekday vs. Weekend



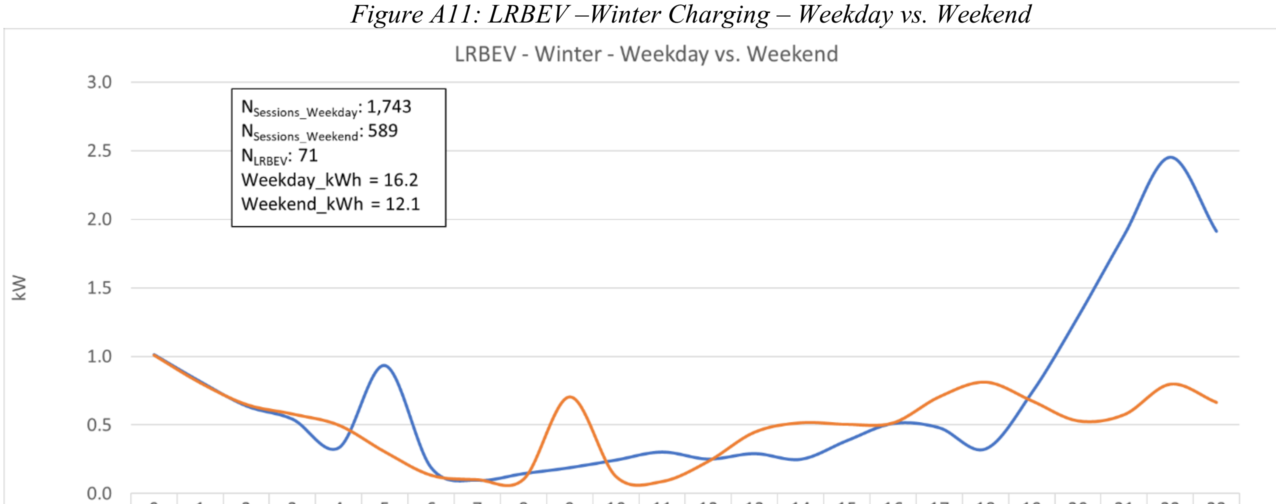
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	1.1	0.9	0.6	0.5	0.4	0.5	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.5	0.5	0.5	1.3	1.5	1.9	2.0	1.6
Weekday	1.1	0.8	0.6	0.5	0.4	0.5	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	1.1	1.4	1.8	2.1	1.7
Weekend	1.2	0.9	0.6	0.5	0.4	0.3	0.2	0.1	0.1	0.4	0.2	0.2	0.3	0.5	0.4	0.4	0.6	0.7	0.9	1.3	1.4	1.5	1.4	1.3

Figure A10: LRBEV – Summer Charging – Weekday vs. Weekend



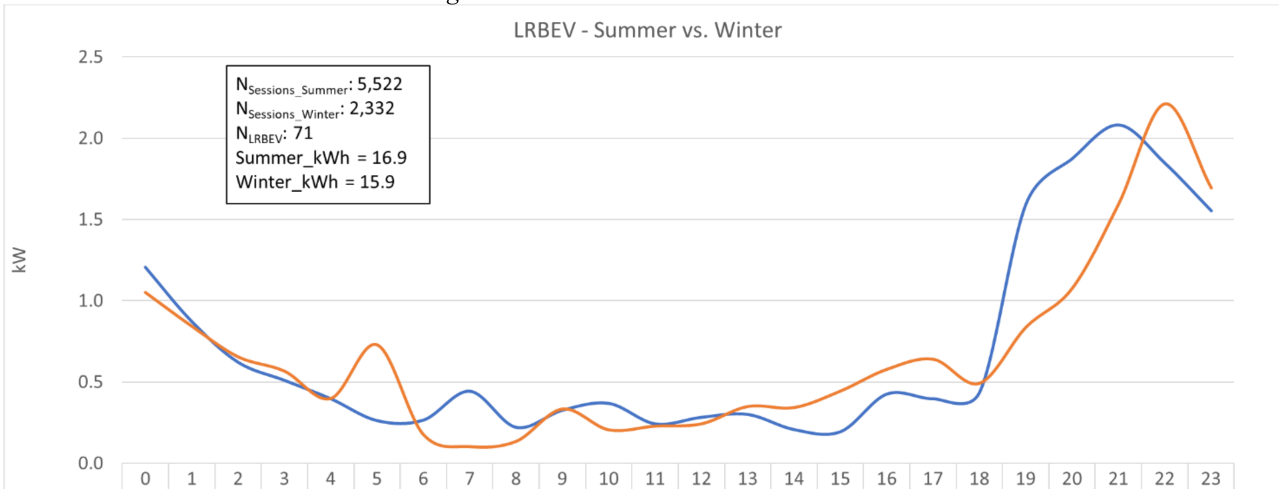
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	1.2	0.8	0.6	0.5	0.4	0.3	0.3	0.5	0.2	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	1.3	1.5	1.8	1.9	1.5
Weekend	1.3	0.9	0.6	0.5	0.3	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.4	0.5	0.3	0.3	0.7	0.7	1.0	1.8	2.1	2.1	1.8	1.8

Figure A11: LRBEV –Winter Charging – Weekday vs. Weekend



Hour	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	1.0	0.8	0.6	0.5	0.3	0.9	0.2	0.1	0.1	0.2	0.2	0.3	0.2	0.3	0.2	0.4	0.5	0.5	0.3	0.7	1.3	1.9	2.5	1.9
Weekend	1.0	0.8	0.7	0.6	0.5	0.3	0.1	0.1	0.1	0.7	0.1	0.1	0.2	0.4	0.5	0.5	0.5	0.7	0.8	0.7	0.5	0.6	0.8	0.7

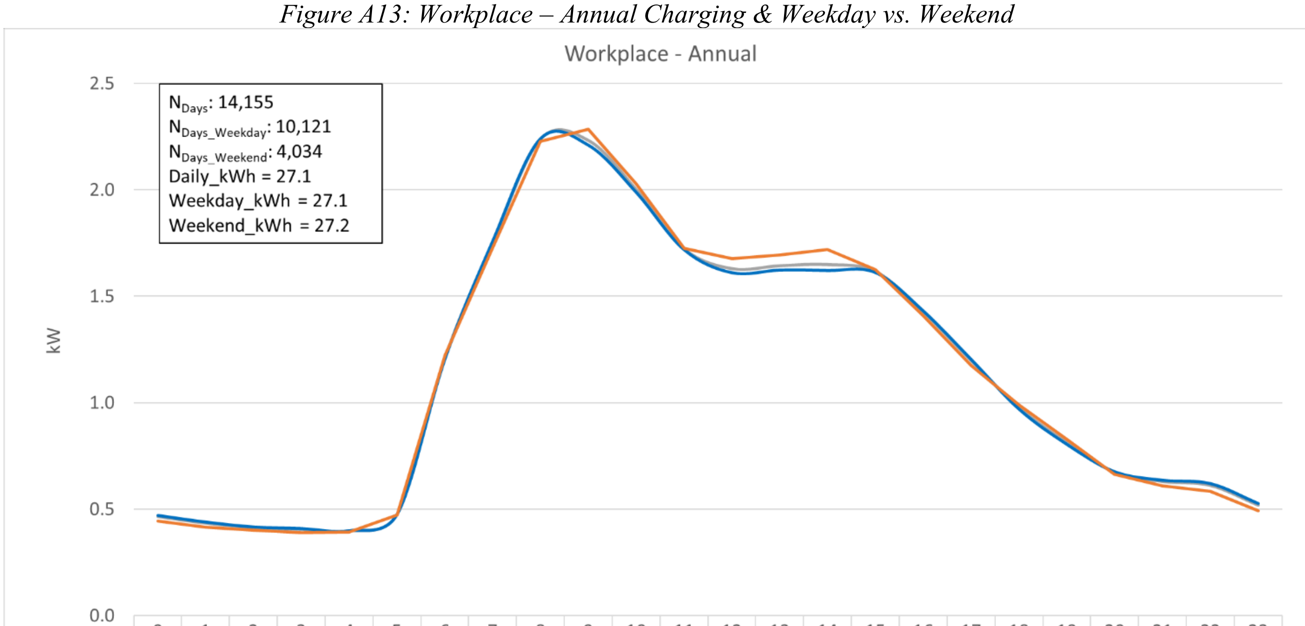
Figure A12: LRBEV – Summer vs. Winter



Hour	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	1.2	0.9	0.6	0.5	0.4	0.3	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.3	0.2	0.2	0.4	0.4	0.4	1.6	1.9	2.1	1.8	1.6
Winter	1.1	0.8	0.7	0.6	0.4	0.7	0.2	0.1	0.1	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.6	0.6	0.5	0.8	1.1	1.6	2.2	1.7

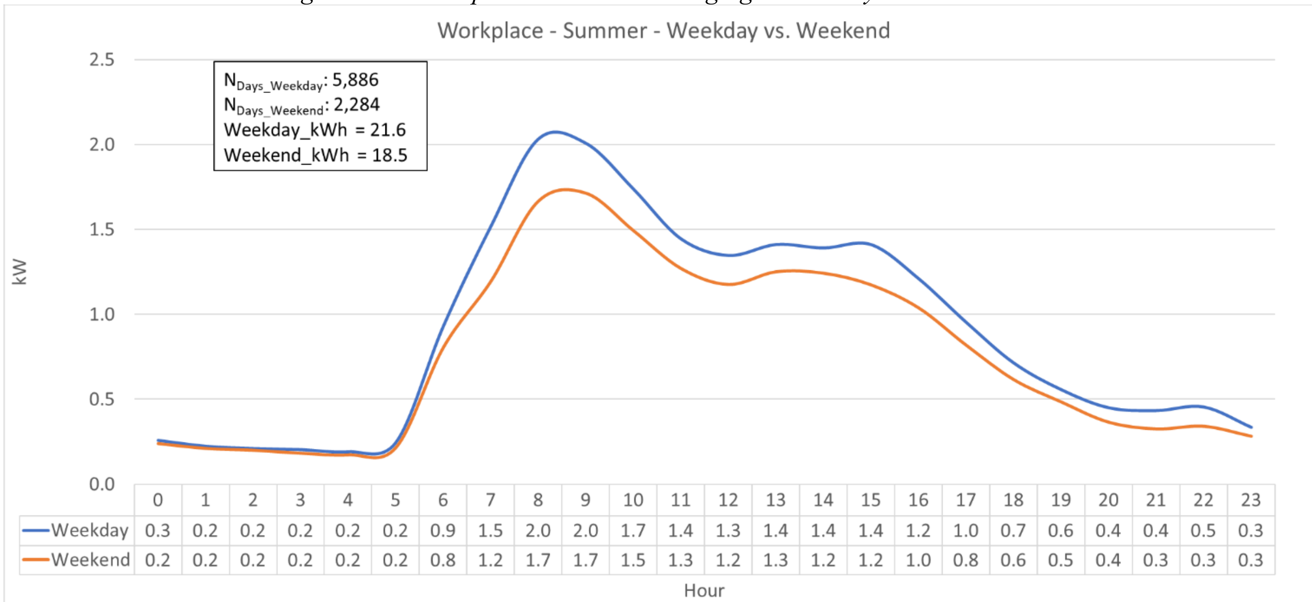
The following workplace load profiles were developed using meter data from 41 customers with charging infrastructure separately metered from their primary facility load. Workplace charging demand consistently peaks at 8 a.m. year-round, aligning with typical employee arrival times.

Figure A13: Workplace – Annual Charging & Weekday vs. Weekend



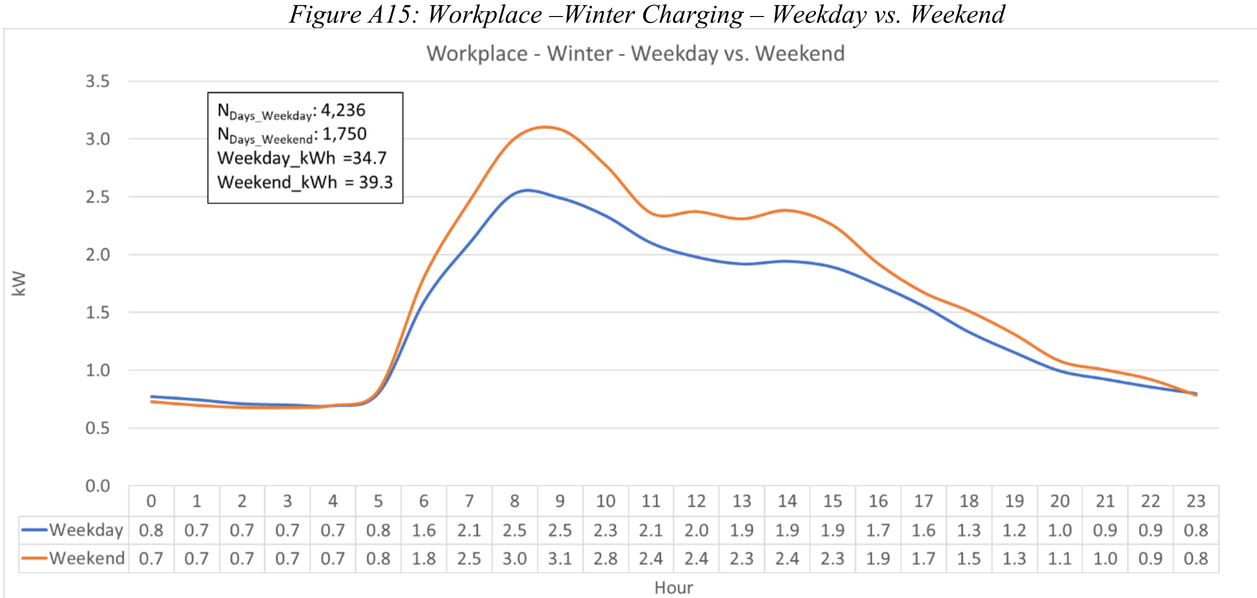
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	0.5	0.4	0.4	0.4	0.4	0.5	1.2	1.8	2.2	2.2	2.0	1.7	1.6	1.6	1.6	1.6	1.4	1.2	1.0	0.8	0.7	0.6	0.6	0.5
Weekday	0.5	0.4	0.4	0.4	0.4	0.5	1.2	1.8	2.2	2.2	2.0	1.7	1.6	1.6	1.6	1.6	1.4	1.2	1.0	0.8	0.7	0.6	0.6	0.5
Weekend	0.4	0.4	0.4	0.4	0.4	0.5	1.2	1.7	2.2	2.3	2.0	1.7	1.7	1.7	1.7	1.6	1.4	1.2	1.0	0.8	0.7	0.6	0.6	0.5

Figure A14: Workplace – Summer Charging – Weekday vs. Weekend



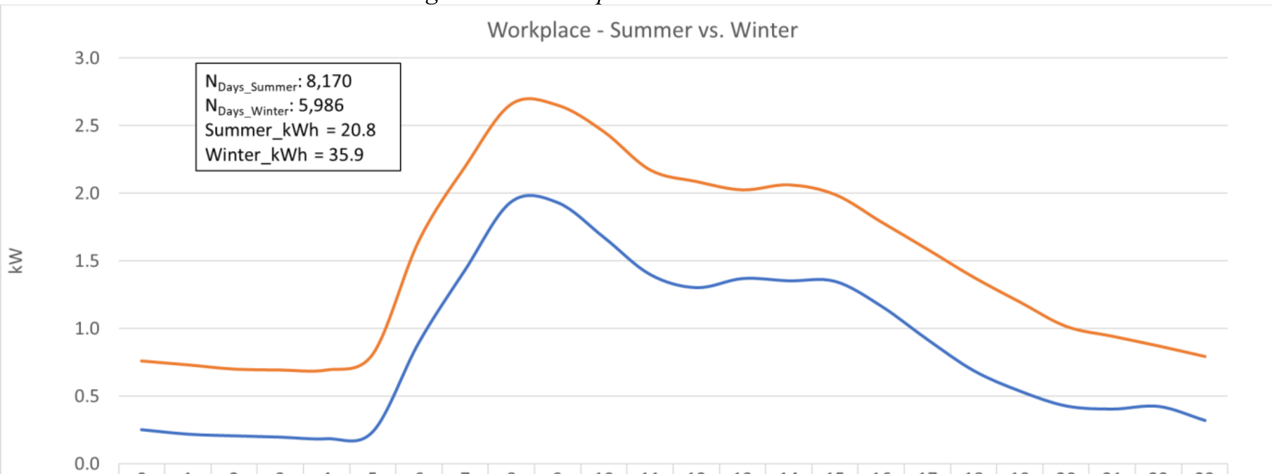
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	0.3	0.2	0.2	0.2	0.2	0.2	0.9	1.5	2.0	2.0	1.7	1.4	1.3	1.4	1.4	1.4	1.2	1.0	0.7	0.6	0.4	0.4	0.5	0.3
Weekend	0.2	0.2	0.2	0.2	0.2	0.2	0.8	1.2	1.7	1.7	1.5	1.3	1.2	1.3	1.2	1.2	1.0	0.8	0.6	0.5	0.4	0.3	0.3	0.3

Figure A15: Workplace –Winter Charging – 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	0.8	0.7	0.7	0.7	0.7	0.8	1.6	2.1	2.5	2.5	2.3	2.1	2.0	1.9	1.9	1.9	1.7	1.6	1.3	1.2	1.0	0.9	0.9	0.8
Weekend	0.7	0.7	0.7	0.7	0.7	0.8	1.8	2.5	3.0	3.1	2.8	2.4	2.4	2.3	2.4	2.3	1.9	1.7	1.5	1.3	1.1	1.0	0.9	0.8

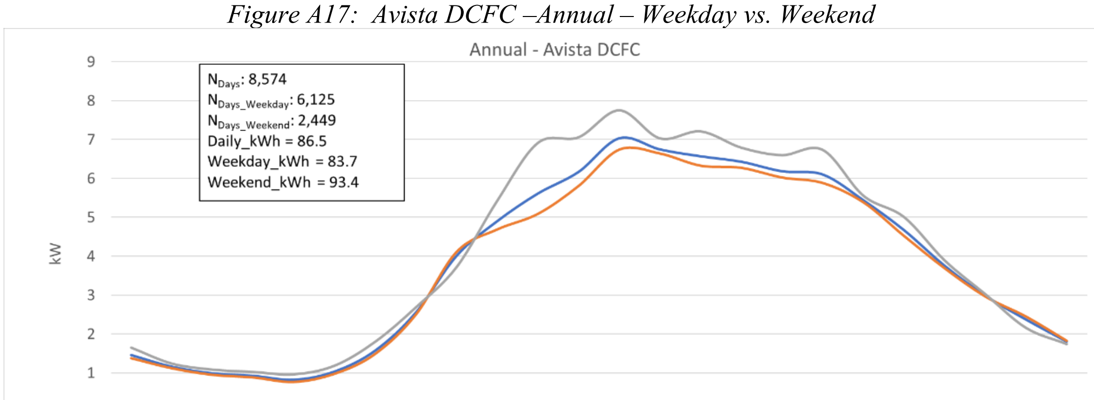
Figure A16: Workplace – Summer vs. Winter



	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	0.3	0.2	0.2	0.2	0.2	0.2	0.9	1.4	1.9	1.9	1.7	1.4	1.3	1.4	1.4	1.3	1.2	0.9	0.7	0.5	0.4	0.4	0.4	0.3
Winter	0.8	0.7	0.7	0.7	0.7	0.8	1.7	2.2	2.7	2.7	2.5	2.2	2.1	2.0	2.1	2.0	1.8	1.6	1.4	1.2	1.0	0.9	0.9	0.8

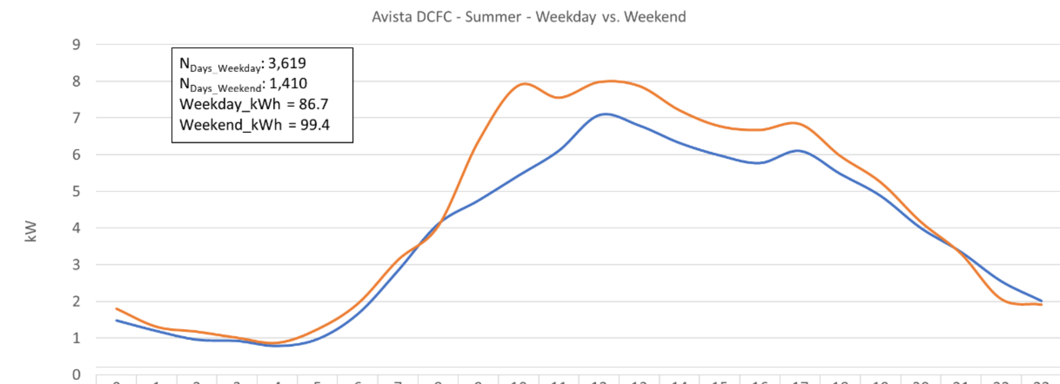
To better understand the impacts of DC fast charging on the electric system, load profiles were developed for both Avista-owned stations and larger third-party networks, including Tesla, Electrify America, and Rivian. Across all networks, daily charging demand consistently peaks between 11 a.m. and 1 p.m**.**, a pattern observed annually as well as within the summer and winter seasons. Weekend load levels are notably higher than weekday levels, reflecting heavier use of DCFC infrastructure for regional and long-distance travel on weekends, compared to shorter, routine trips during the workweek.

Figure A17: Avista DCFC –Annual – Weekday vs. Weekend



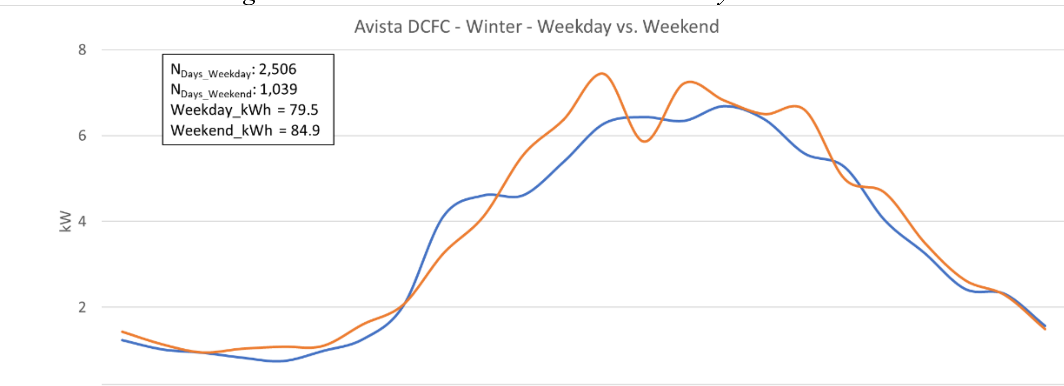
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	1.3	1.0	0.8	0.7	0.6	0.8	1.4	2.4	3.8	4.7	5.4	6.0	6.8	6.5	6.4	6.2	6.0	5.9	5.2	4.5	3.6	2.8	2.2	1.6
Weekday	1.2	0.9	0.8	0.7	0.6	0.8	1.3	2.3	3.9	4.5	4.9	5.6	6.5	6.4	6.1	6.1	5.8	5.7	5.2	4.3	3.5	2.8	2.2	1.6
Weekend	1.4	1.0	0.9	0.8	0.8	1.0	1.6	2.5	3.5	5.2	6.7	6.9	7.6	6.8	7.0	6.6	6.4	6.5	5.4	4.8	3.7	2.8	2.0	1.5

Figure A18: Avista DCFC –Summer – Weekday vs. Weekend



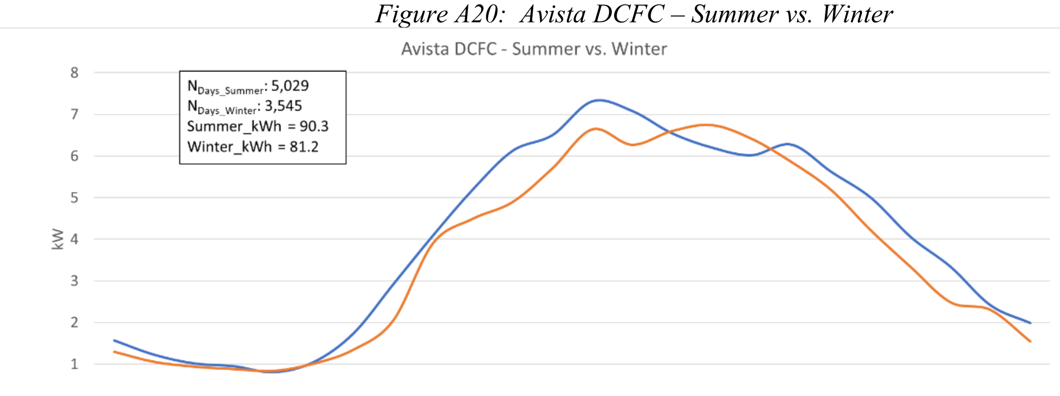
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	1.3	1.0	0.8	0.7	0.6	0.8	1.5	2.6	3.9	4.5	5.2	5.9	6.9	6.6	6.1	5.8	5.6	5.9	5.3	4.7	3.8	3.1	2.4	1.8
Weekend	1.6	1.1	1.0	0.8	0.7	1.0	1.7	2.9	3.9	6.2	7.7	7.3	7.8	7.7	7.0	6.6	6.5	6.6	5.8	5.0	4.0	3.1	1.9	1.7

Figure A19: Avista DCFC – Winter – Weekday vs. Weekend



Hour	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	1.0	0.8	0.7	0.6	0.5	0.8	1.1	1.8	3.9	4.4	4.4	5.2	6.1	6.2	6.1	6.5	6.2	5.4	5.1	3.8	3.1	2.2	2.1	1.4
Weekend	1.2	0.9	0.7	0.8	0.9	0.9	1.4	1.9	3.1	3.9	5.4	6.2	7.2	5.7	7.0	6.6	6.3	6.4	4.8	4.5	3.3	2.4	2.1	1.3

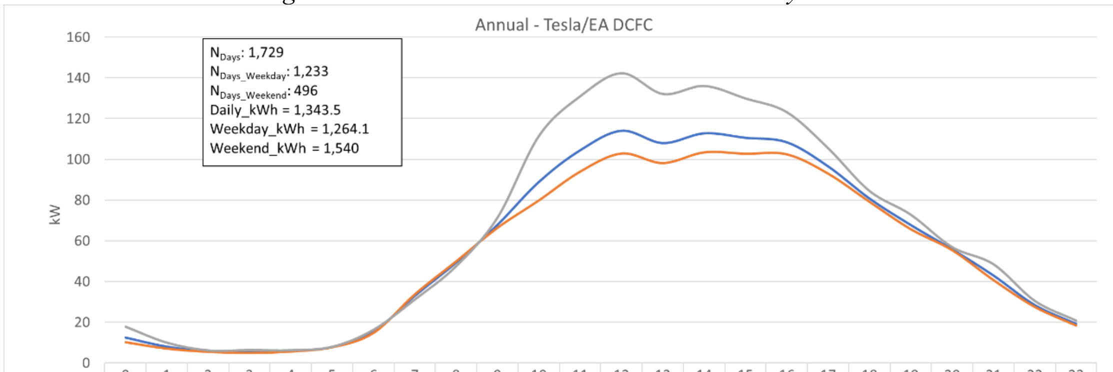
Figure A20: Avista DCFC – Summer vs. Winter



Hour	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	1.4	1.0	0.8	0.8	0.6	0.8	1.5	2.7	3.9	5.0	5.9	6.3	7.1	6.9	6.4	6.0	5.8	6.1	5.4	4.8	3.9	3.1	2.2	1.8
Winter	1.1	0.9	0.7	0.7	0.6	0.8	1.1	1.8	3.7	4.3	4.7	5.5	6.4	6.1	6.4	6.5	6.2	5.7	5.0	4.0	3.1	2.3	2.1	1.3

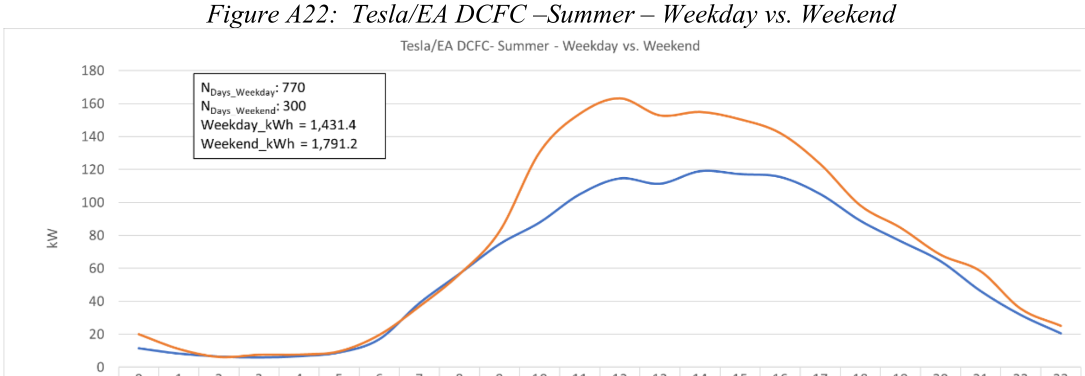
While third-party network stations exhibit a similar load shape throughout the year, their daily energy dispensed is approximately fifteen times higher than the average Avista-owned site. This difference is expected, as third-party sites typically operate a greater number of charging ports and are located along the I-90 travel corridor, where utilization is significantly higher. Additionally, Teslas represent nearly half of the EVs on the road, contributing to substantially greater use of those networks compared to all others.

Figure A21: Tesla/EA DCFC –Annual – Weekday vs. Weekend



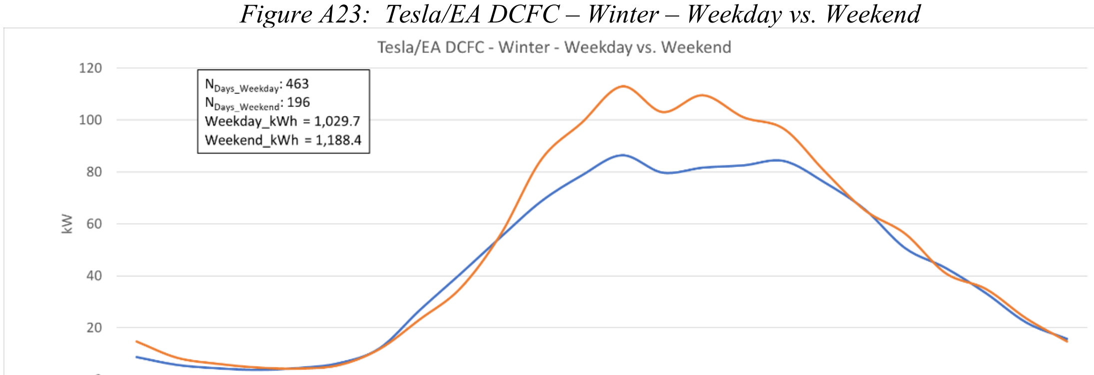
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	12.2	7.7	5.5	5.1	5.6	7.6	15.1	32.8	49.1	67.6	88.7	104.2	113.8	107.7	112.5	110.3	108.1	96.3	80.5	67.5	55.6	42.7	28.2	18.9
Weekday	10.0	6.9	5.3	4.7	5.5	7.6	14.6	33.6	49.7	66.2	79.6	93.7	102.6	97.9	103.1	102.5	102.2	92.7	78.9	65.4	55.2	40.5	27.3	18.2
Weekend	17.6	9.7	5.9	6.1	6.0	7.7	16.1	30.9	47.3	71.2	111.2	130.7	142.0	131.8	135.7	129.6	122.9	105.2	84.2	72.5	56.6	48.2	30.2	20.5

Figure A22: Tesla/EA DCFC –Summer – Weekday vs. Weekend



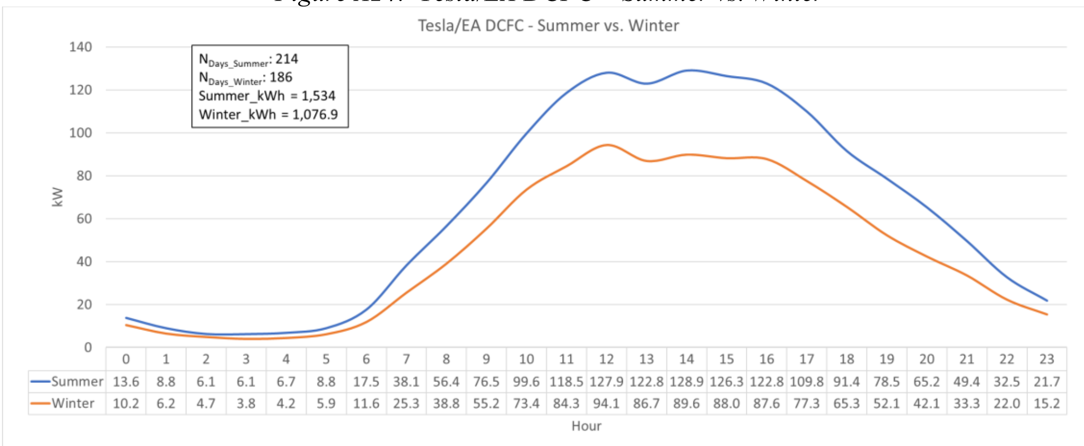
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	11.2	8.0	6.2	5.6	6.4	8.6	16.7	38.6	56.4	74.4	87.6	104.7	114.3	111.0	118.6	116.9	115.2	104.8	88.6	76.2	64.0	45.9	31.4	20.2
Weekend	19.7	10.8	5.9	7.2	7.3	9.3	19.3	36.6	56.1	82.2	130.2	153.5	162.9	152.5	154.6	150.2	141.8	123.0	97.9	84.4	67.9	57.9	35.2	24.8

Figure A23: Tesla/EA DCFC – Winter – Weekday vs. Weekend



Hour	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	8.4	5.4	4.1	3.5	4.2	6.1	11.7	26.5	40.4	54.6	68.4	78.4	86.2	79.5	81.4	82.3	84.0	75.8	65.4	50.4	42.8	33.0	21.7	15.4
Weekend	14.6	8.3	6.0	4.5	4.1	5.4	11.6	23.0	35.0	55.8	84.5	98.7	112.7	102.9	109.3	100.9	96.4	80.2	65.1	56.0	40.8	34.7	23.4	14.6

Figure A24: Tesla/EA DCFC – Summer vs. Winter

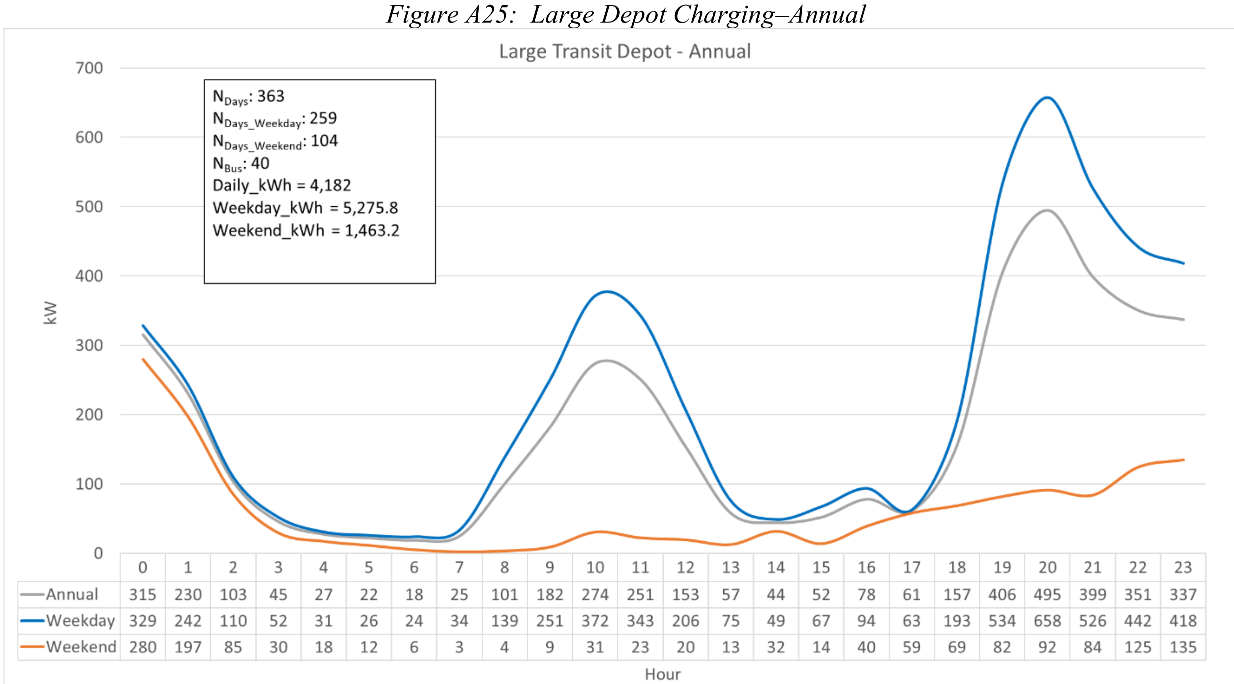


Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Summer	13.6	8.8	6.1	6.1	6.7	8.8	17.5	38.1	56.4	76.5	99.6	118.5	127.9	122.8	128.9	126.3	122.8	109.8	91.4	78.5	65.2	49.4	32.5	21.7
Winter	10.2	6.2	4.7	3.8	4.2	5.9	11.6	25.3	38.8	55.2	73.4	84.3	94.1	86.7	89.6	88.0	87.6	77.3	65.3	52.1	42.1	33.3	22.0	15.2

School/Transit Buses

The following charts use dedicated EV charging meter data for each customer. These meters utilize commercial EV TOU rate schedules 013 or 023.

Figure A25: Large Depot Charging–Annual



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	315	230	103	45	27	22	18	25	101	182	274	251	153	57	44	52	78	61	157	406	495	399	351	337
Weekday	329	242	110	52	31	26	24	34	139	251	372	343	206	75	49	67	94	63	193	534	658	526	442	418
Weekend	280	197	85	30	18	12	6	3	4	9	31	23	20	13	32	14	40	59	69	82	92	84	125	135

This profile shows two distinct daily charging periods. The first peak occurs between 8 a.m. and 1 p.m., driven by in-route charging using the two pantograph chargers located at the depot. The second peak, from 6 p.m. to 3 a.m., reflects the overnight charging needed to prepare buses for their morning routes. As battery ranges increase and in-route charging needs decline, the daytime peak is expected to flatten.

The profile also shows a significant reduction in weekend charging compared to weekdays. The transit agency operates a weekday-equivalent schedule on Saturdays and a reduced schedule on Sundays, which largely explains the lower charging activity on Sundays. The following figures compare weekday and weekend charging for summer and winter months, and the resulting load shapes are consistent with the annual profile, leading to similar conclusions.

Figure A26: Large Depot Charging –Summer – Weekday vs. Weekend

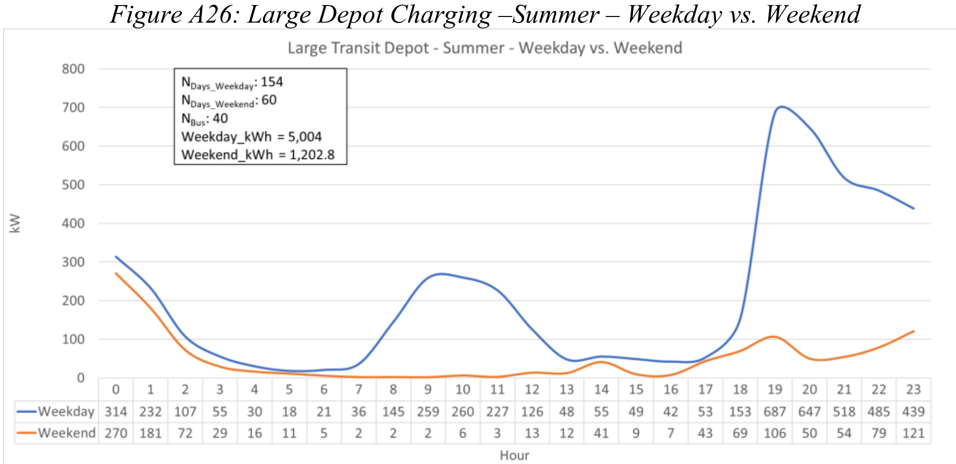


Figure A27: Large Depot Charging – Winter – Weekday vs. Weekend

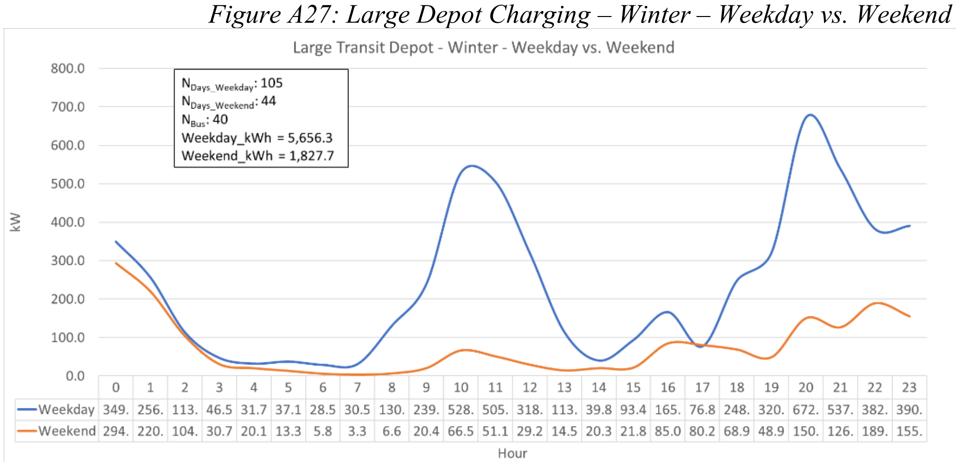
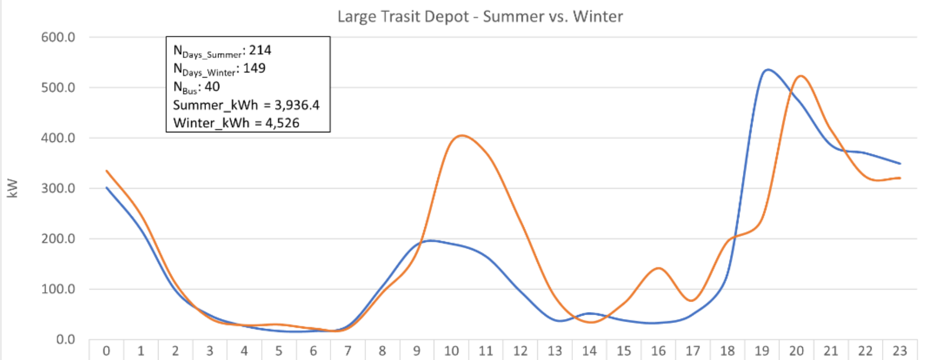


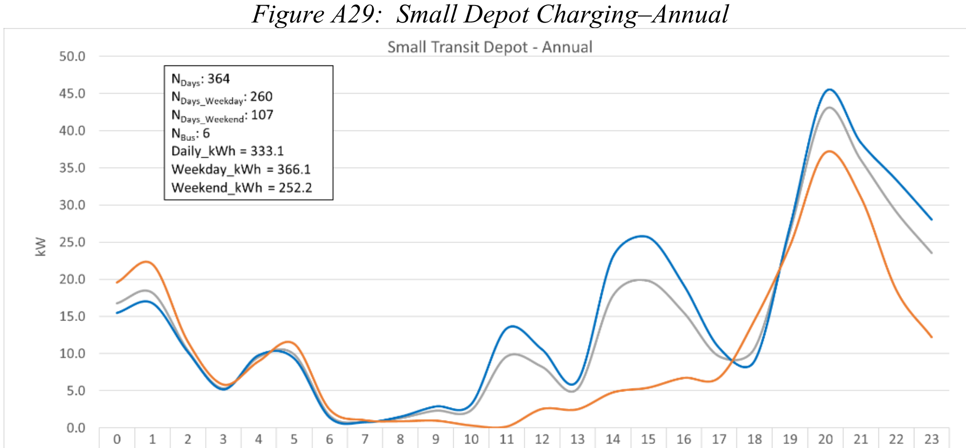
Figure A28: Large Depot Charging – Summer vs. Winter



Hour	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	301.	217.	96.8	47.4	26.3	16.2	16.2	26.4	105.	188.	189.	164.	94.8	37.7	51.1	37.4	32.3	49.9	130.	524.	478.	385.	369.	349.
Winter	335.	247.	111.	42.1	28.4	29.7	21.7	22.3	93.4	174.	392.	371.	234.	84.7	33.9	72.0	141.	77.7	194.	239.	518.	416.	323.	320.

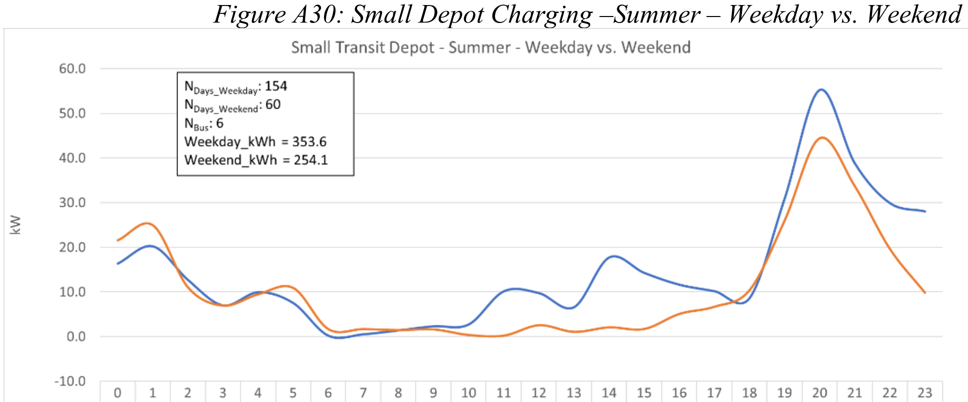
A smaller transit agency in our service territory operates six electric buses and utilizes daily depot charging to keep the road. Their load profile is similar in shape to the larger depot profile.

Figure A29: Small Depot Charging–Annual



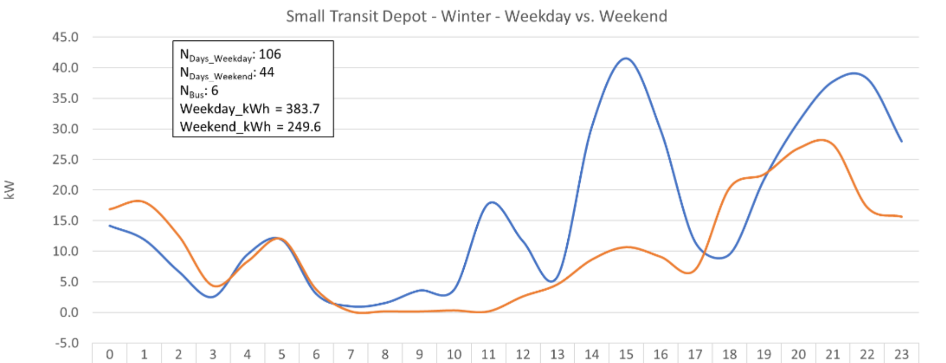
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	16.8	18.2	10.4	5.3	9.5	9.9	1.7	0.8	1.3	2.3	2.4	9.6	8.2	5.2	17.8	19.8	15.5	9.6	10.7	26.4	42.9	36.1	29.1	23.6
Weekday	15.5	16.8	10.2	5.1	9.8	9.3	1.4	0.7	1.5	2.9	3.2	13.3	10.5	6.3	23.0	25.6	19.2	10.7	9.0	27.1	45.2	38.4	33.4	28.0
Weekend	19.6	22.0	11.6	5.8	9.0	11.3	2.5	1.1	0.9	1.0	0.3	0.2	2.6	2.5	4.8	5.4	6.7	6.8	14.5	24.5	37.1	31.1	18.6	12.2

Figure A30: Small Depot Charging –Summer – Weekday vs. Weekend



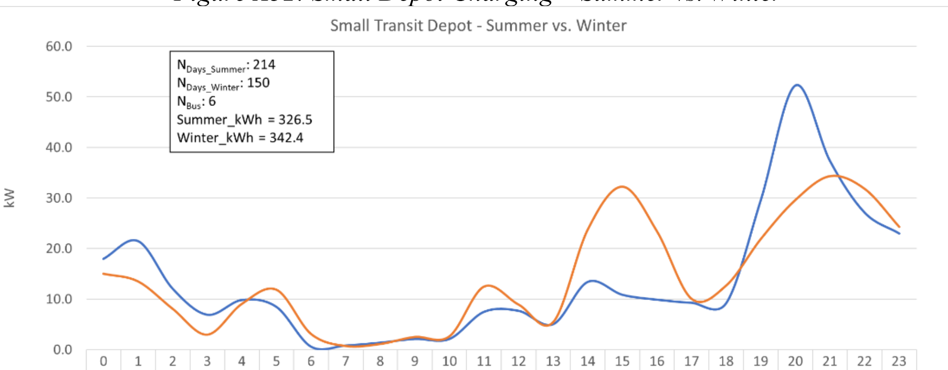
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	16.4	20.3	12.7	7.0	10.0	7.6	0.3	0.6	1.4	2.4	2.8	10.2	9.8	6.6	17.8	14.3	11.7	10.2	8.7	30.9	55.3	38.8	29.9	28.1
Weekend	21.5	24.9	11.0	6.9	9.4	10.9	1.6	1.7	1.4	1.6	0.3	0.2	2.5	1.0	2.0	1.7	5.1	6.7	10.4	25.9	44.4	33.6	19.6	9.8

Figure A31: Small Depot Charging – Winter – Weekday vs. Weekend



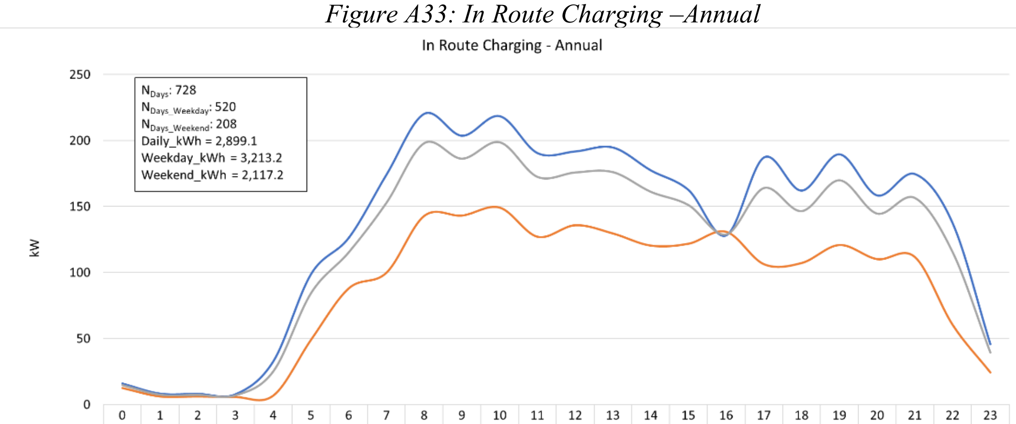
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	14.1	11.9	6.7	2.5	9.5	11.8	3.0	1.0	1.5	3.6	3.7	17.8	11.6	5.8	30.3	41.5	29.8	11.5	9.5	21.7	31.1	37.7	38.2	27.9
Weekend	16.9	18.0	12.6	4.4	8.3	12.0	3.7	0.2	0.2	0.2	0.3	0.2	2.6	4.6	8.6	10.7	9.1	7.0	20.3	22.5	26.8	27.5	17.2	15.6

Figure A32: Small Depot Charging – Summer vs. Winter



	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	18.0	21.5	12.1	6.9	9.8	8.5	0.6	0.8	1.4	2.1	2.1	7.5	7.7	5.1	13.4	10.9	9.9	9.3	9.2	29.7	52.3	37.3	27.1	23.0
Winter	15.1	13.5	8.1	3.0	9.1	11.9	3.1	0.8	1.2	2.5	2.7	12.5	8.9	5.5	23.8	32.3	23.4	10.1	12.7	21.9	29.7	34.4	31.8	24.3

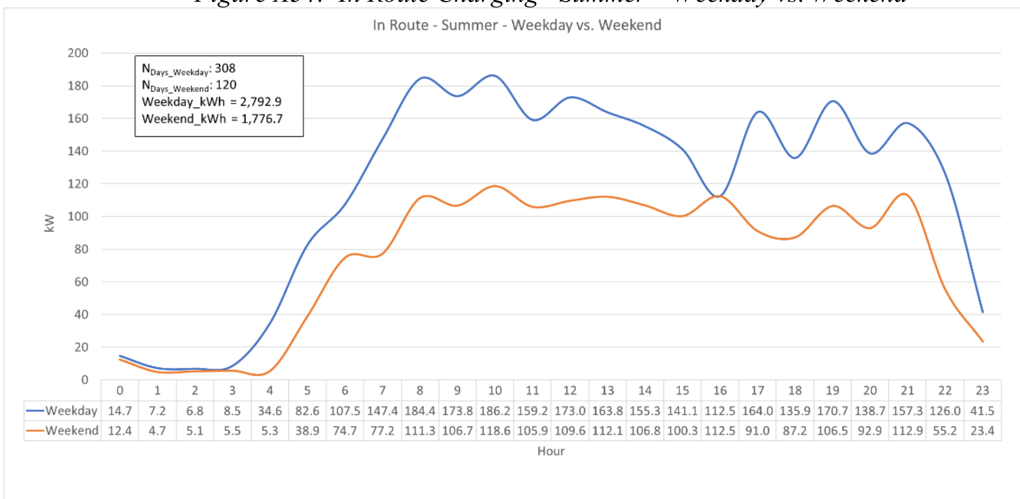
Figure A33: In Route Charging –Annual



	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	15.8	8.2	8.0	7.7	32.7	98.8	126.3	174.2	220.2	203.6	218.4	190.4	191.7	194.7	177.4	162.5	128.1	187.1	162.0	189.5	158.4	174.6	137.4	45.6
Weekend	12.6	6.3	6.3	5.8	6.9	49.2	88.1	100.0	142.9	143.1	149.1	127.1	135.8	129.6	120.4	121.8	130.8	106.3	107.2	120.9	110.2	111.8	60.5	24.4
Annual	14.9	7.6	7.5	7.2	25.3	84.5	115.4	152.9	197.9	186.2	198.5	172.4	175.7	176.0	161.1	151.1	128.8	163.9	146.5	169.8	144.6	156.4	115.5	39.5

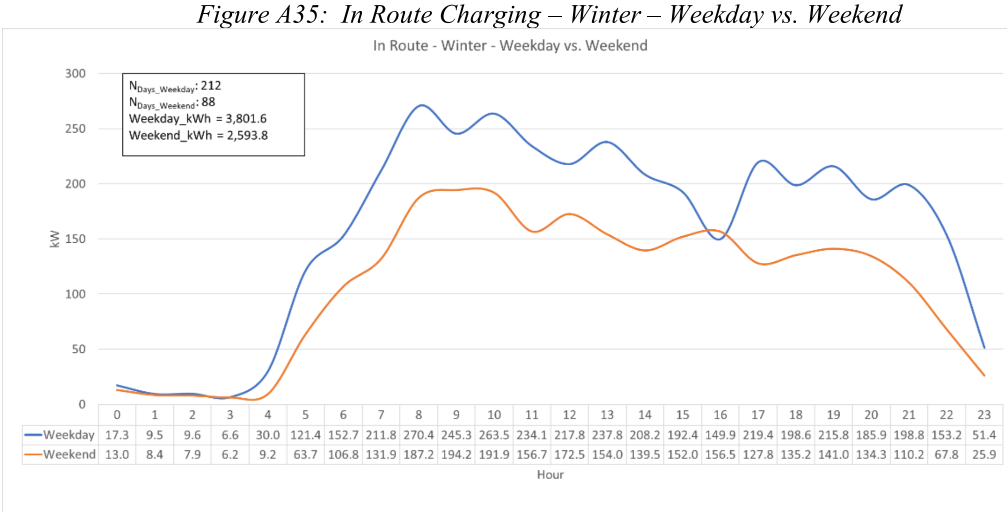
In-route charging is used to keep buses in service throughout the day and is placed strategically along transit routes as needed. Charging at these stations occurs across most hours, with peak activity at 9 a.m. and 7 p.m. These peaks closely align with those observed at the depot, indicating that the transit agency is effectively utilizing all available charging assets to maintain route reliability. Weekend charging loads are lower than weekday levels, consistent with the agency's reduced Sunday schedule, which includes fewer buses and shorter operating hours. The following figures compare weekday and weekend charging for the summer and winter months. The resulting profiles mirror the annual patterns, and the same conclusions may be drawn.

Figure A34: In Route Charging –Summer – Weekday vs. Weekend



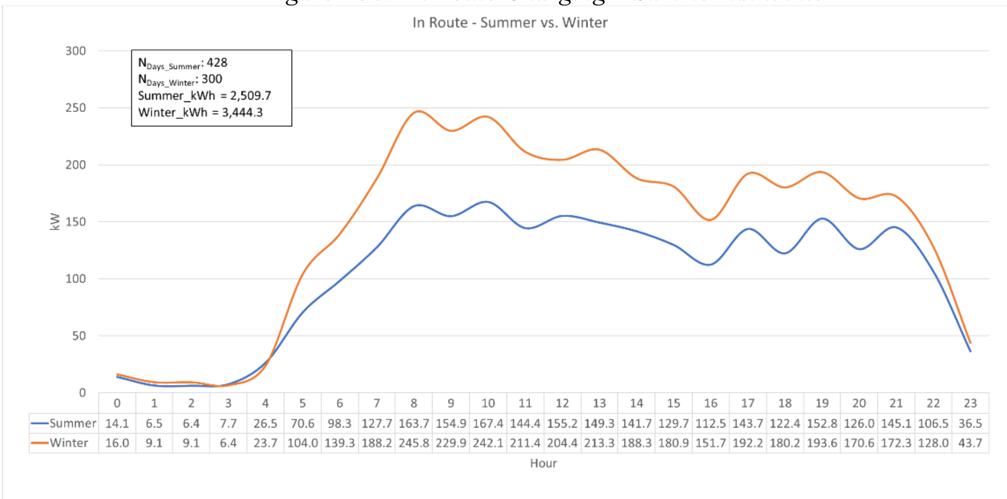
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weekday	14.7	7.2	6.8	8.5	34.6	82.6	107.5	147.4	184.4	173.8	186.2	159.2	173.0	163.8	155.3	141.1	112.5	164.0	135.9	170.7	138.7	157.3	126.0	41.5
Weekend	12.4	4.7	5.1	5.5	5.3	38.9	74.7	77.2	111.3	106.7	118.6	105.9	109.6	112.1	106.8	100.3	112.5	91.0	87.2	106.5	92.9	112.9	55.2	23.4

Figure A35: In Route Charging – Winter – Weekday vs. Weekend



Hour	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	17.3	9.5	9.6	6.6	30.0	121.4	152.7	211.8	270.4	245.3	263.5	234.1	217.8	237.8	208.2	192.4	149.9	219.4	198.6	215.8	185.9	198.8	153.2	51.4
Weekend	13.0	8.4	7.9	6.2	9.2	63.7	106.8	131.9	187.2	194.2	191.9	156.7	172.5	154.0	139.5	152.0	156.5	127.8	135.2	141.0	134.3	110.2	67.8	25.9

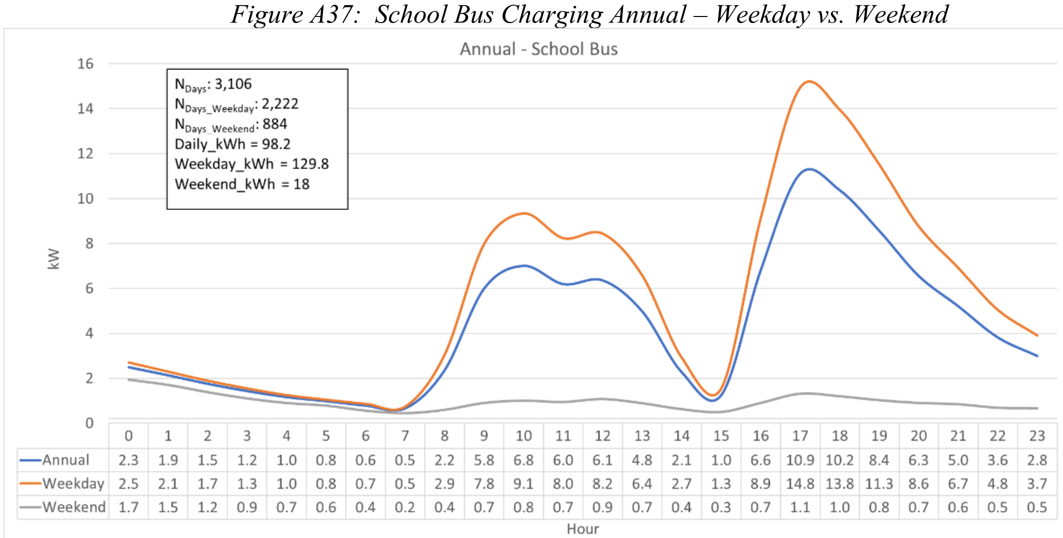
Figure A36: In Route Charging – Summer vs. Winter



Hour	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	14.1	6.5	6.4	7.7	26.5	70.6	98.3	127.7	163.7	154.9	167.4	144.4	155.2	149.3	141.7	129.7	112.5	143.7	122.4	152.8	126.0	145.1	106.5	36.5
Winter	16.0	9.1	9.1	6.4	23.7	104.0	139.3	188.2	245.8	229.9	242.1	211.4	204.4	213.3	188.3	180.9	151.7	192.2	180.2	193.6	170.6	172.3	128.0	43.7

Similar to depot charging, the winter charging load is 30% higher than the summer load. Cabin heaters and battery conditioning also accounts for this increase.

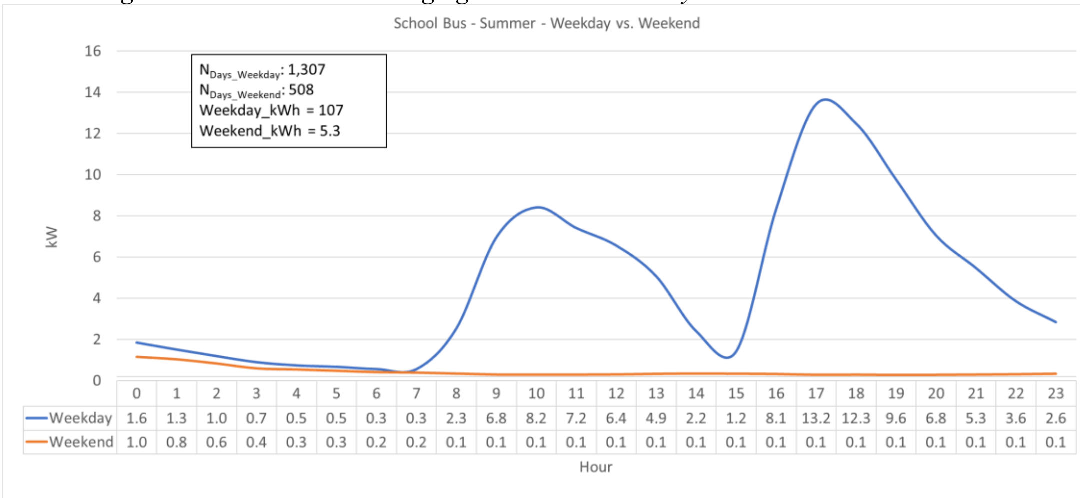
Figure A37: School Bus Charging Annual – Weekday vs. Weekend



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Annual	2.3	1.9	1.5	1.2	1.0	0.8	0.6	0.5	2.2	5.8	6.8	6.0	6.1	4.8	2.1	1.0	6.6	10.9	10.2	8.4	6.3	5.0	3.6	2.8
Weekday	2.5	2.1	1.7	1.3	1.0	0.8	0.7	0.5	2.9	7.8	9.1	8.0	8.2	6.4	2.7	1.3	8.9	14.8	13.8	11.3	8.6	6.7	4.8	3.7
Weekend	1.7	1.5	1.2	0.9	0.7	0.6	0.4	0.2	0.4	0.7	0.8	0.7	0.9	0.7	0.4	0.3	0.7	1.1	1.0	0.8	0.7	0.6	0.5	0.5

Ten school districts now operate a cumulative total of 23 electric school buses within Avista's service territory. Each district has received Avista's support with the installation of their charging infrastructure, and all are currently equipped with 80A AC Level 2 chargers. Across districts, charging data consistently shows a significant portion of activity occurring between 8:00 a.m. and 1:00 p.m. This midday charging is necessary to ensure buses have sufficient battery capacity to complete afternoon routes. However, in all cases, both this morning charging and the subsequent afternoon charging can be shifted until after Avista's system peak periods. Additional customer education—paired with potential fleet management programs—will be needed to facilitate this operational change and unlock the associated grid benefits.

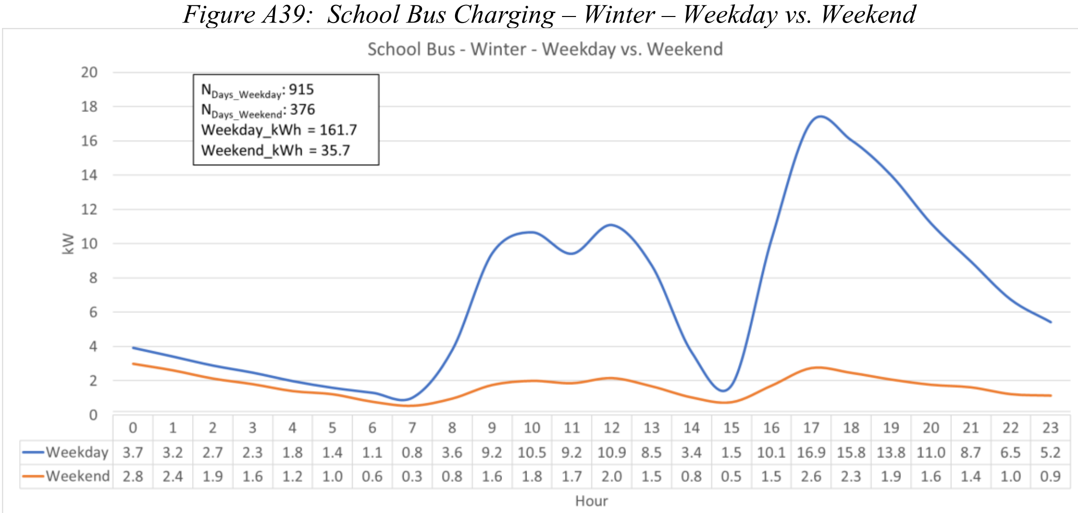
Figure A38: School Bus Charging–Summer – Weekday vs. Weekend



	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	1.6	1.3	1.0	0.7	0.5	0.5	0.3	0.3	2.3	6.8	8.2	7.2	6.4	4.9	2.2	1.2	8.1	13.2	12.3	9.6	6.8	5.3	3.6	2.6
Weekend	1.0	0.8	0.6	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

The charging loads during the summer months are significantly lower than those for the rest of the year, as expected with the school year ending in June and the buses unused in the summer until September.

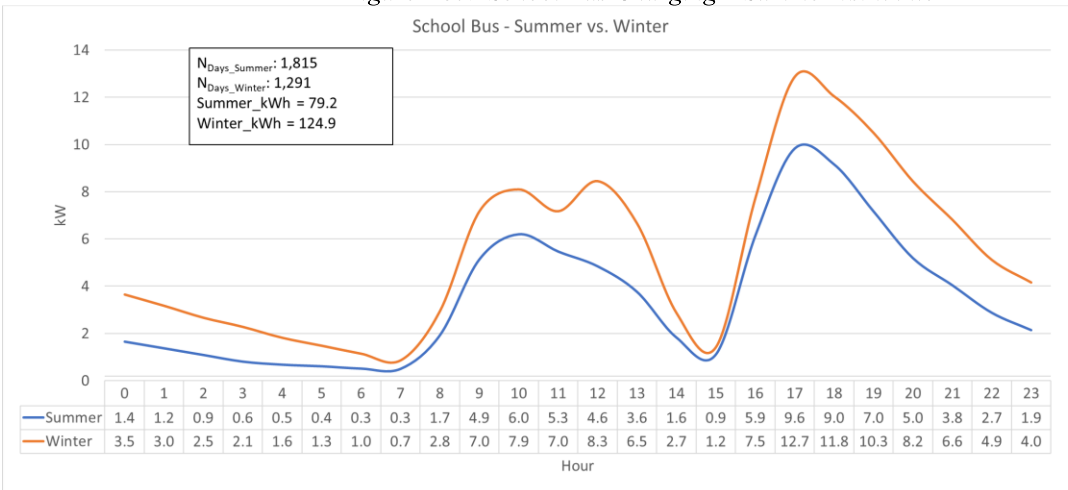
Figure A39: School Bus Charging – Winter – Weekday vs. Weekend



	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	3.7	3.2	2.7	2.3	1.8	1.4	1.1	0.8	3.6	9.2	10.5	9.2	10.9	8.5	3.4	1.5	10.1	16.9	15.8	13.8	11.0	8.7	6.5	5.2
Weekend	2.8	2.4	1.9	1.6	1.2	1.0	0.6	0.3	0.8	1.6	1.8	1.7	2.0	1.5	0.8	0.5	1.5	2.6	2.3	1.9	1.6	1.4	1.0	0.9

The winter charging load is, on average, 15% higher than the annual charging load. Like the transit buses, this increase is due to cabin heaters and battery conditioning.

Figure A40: School Bus Charging – Summer vs. Winter



Forklifts

Forklift profiles were developed using data logging devices at the electrical panel. Each forklift on average requires 5,900 kWh annually 2.8 kW average daily demand.

Figure A41: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Food Distributor

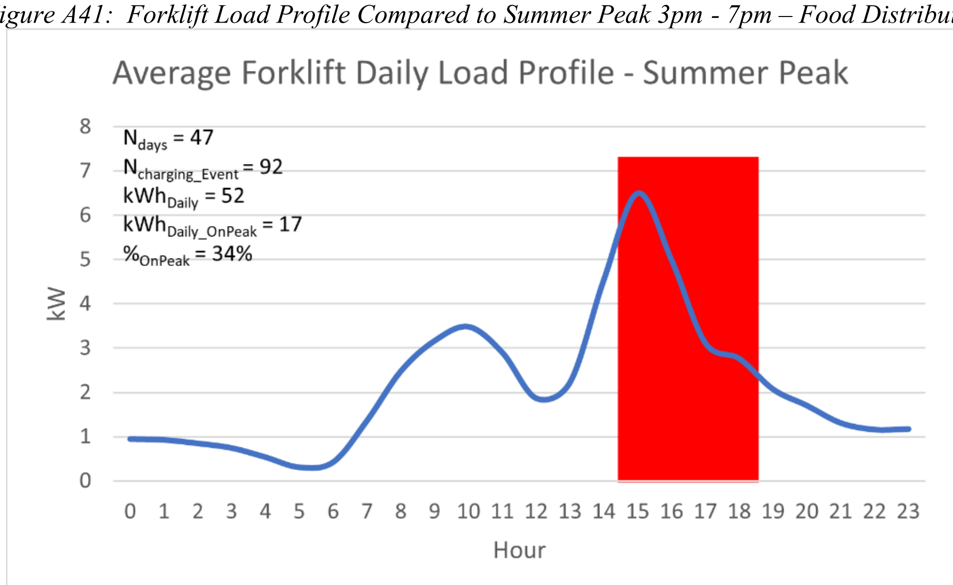


Figure A42: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Retail

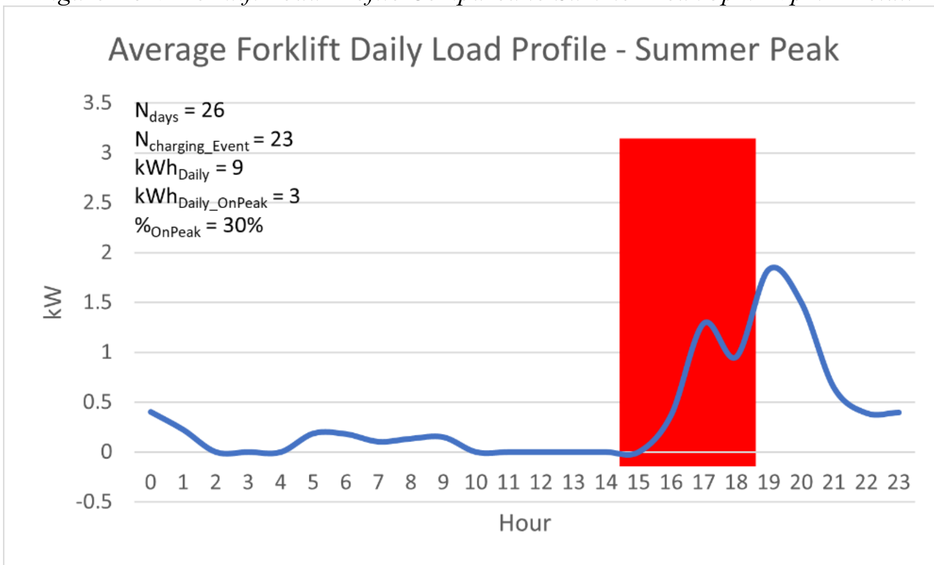


Figure A43: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Warehouse

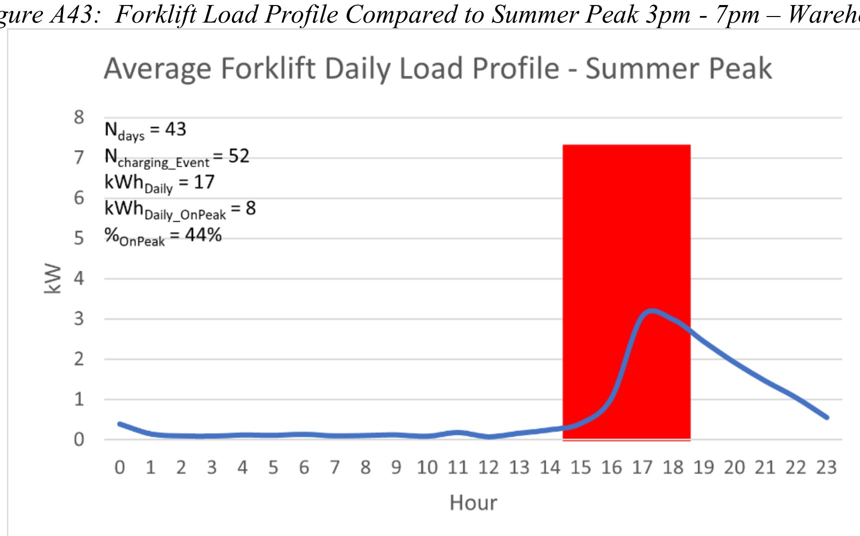


Figure A44: Forklift Load Profile Compared to Summer Peak 3pm - 7pm – Manufacturing

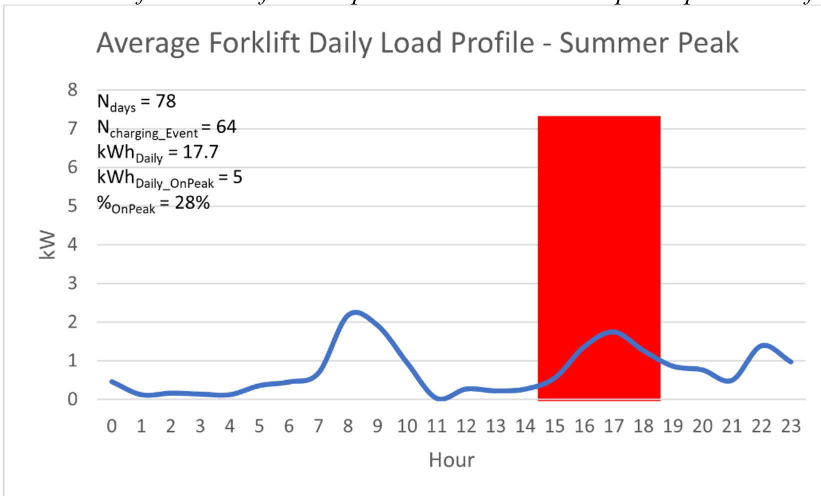
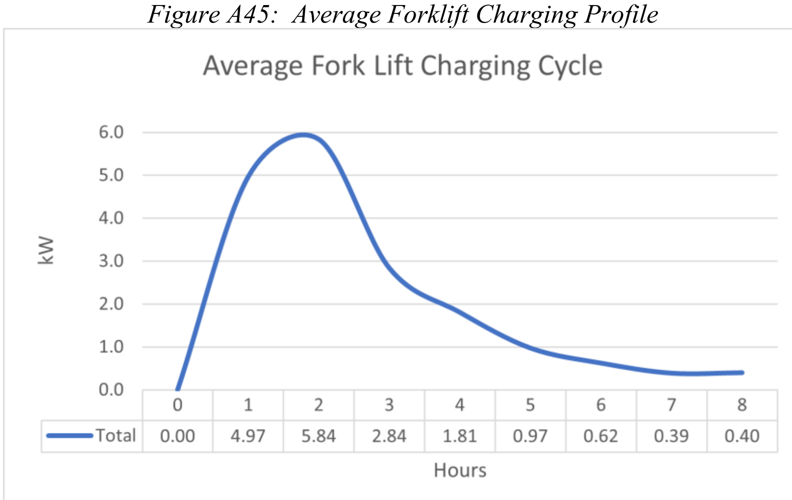


Figure A45: Average Forklift Charging Profile



	0	1	2	3	4	5	6	7	8
Total	0.00	4.97	5.84	2.84	1.81	0.97	0.62	0.39	0.40

Appendix B – Transformer Study and Load Profiles

The following study was carried out to determine how the number of EV customers may affect transformer loading, to inform transformer sizing and changeout policy.

In a residential neighborhood it is common for multiple homes to be served by one transformer, as many as 12 or more homes in some cases. The following table shows the average number of homes served by each residential transformer size and the average kW each residential home is allotted, according to system data:

Table B1: Average # of Homes and allotted kW demand for common transformer sizes

Transformer kVA	Average # Homes	kW per home
15	2	6.73
25	4	6.66
38	7	5.77
50	8	6.13
75	10	7.39
100	11	9.09

The next table shows the minimum number of connected homes per transformer size and the maximum number of homes.

Table B2: Min and Max # of Homes for common transformer sizes

Transformer kVA	Min # Homes	Max # Homes
15	1	7
25	1	11
38	2	21
50	1	23
75	5	25
100	3	19

The current sizing system has worked well for many decades due to load diversity, as not all connected homes reach their maximum power consumption at the same time, paired with a large amount of water and space heat served by natural gas appliances. Dividing the kVA output of the transformers (excluding the 100 kVA units) by the maximum # of connected homes yields an average kVA allowance of 2, which is the average rating for an electric stove. If all customers were to consume energy equally at the same time, the transformer would reach max loading and potentially overload. Load diversity allows transformers to serve the households shown in table 2 without overloading. It also allows for one connected customer to charge an EV at 3.6 kW to 11 kW without issue.

Will the current sizing system allow transformers to serve additional customers with EV charging loads, and/or at what point may the transformers be overloaded? Based on load profile data, it's likely that each EV residential customer will do most of their charging in the evening and overnight. If two or more of those customers are served by a single transformer it is also likely that their charging loads will at some point in time occur simultaneously, with the potential to take the transformer loading to its nameplate capacity or beyond.

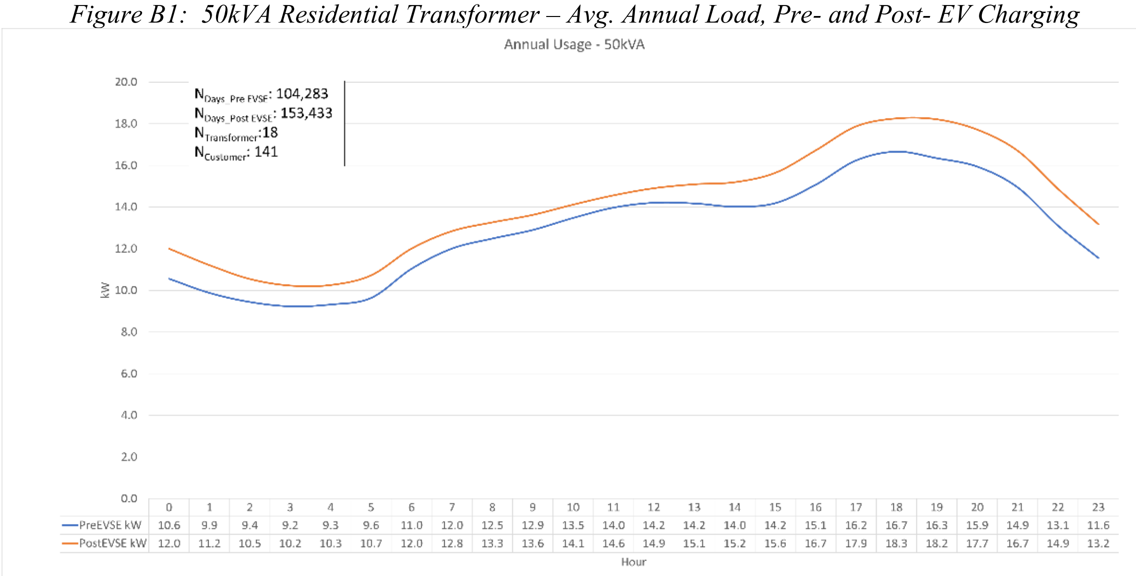
A data pool of 256 transformers and 1,626 residential customers were used for this study. To reduce computational requirements, a sample of each transformer size was chosen at random. The following table details the count of each transformer size identified and the corresponding transformer sample size used.

Table B3: Residential Transformer Sizes and Counts

kVA	Count	Sample Size
15	22	4
25	49	10
38	61	12
50	92	18
75	28	5
100	4	1

The 50 transformers chosen for this study based on the sample sizes above serve a total of 335 customers – 50 customers with EV charging and 285 non-EV customers. Five years of AMI data at hourly intervals was pulled for each customer and used to build average daily load profiles for each transformer size. The following chart shows the average annual load profile, pre- and post-EVSE, for the 50kVA transformers in this study.

Figure B1: 50kVA Residential Transformer – Avg. Annual Load, Pre- and Post- EV Charging

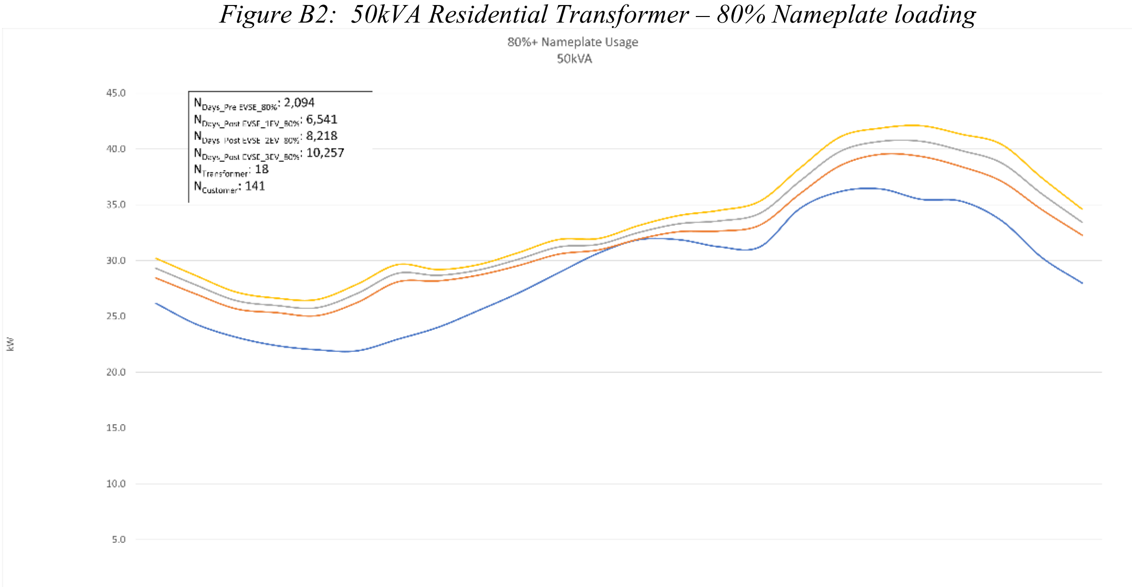


Average daily load profiles are useful in determining customer usage patterns along with peak loading times and duration. The profile above shows that this group of residential customers follows a very consistent pattern of electric usage, as expected for residential customers. This chart also shows that the average usage increased between the pre- and post-EVSE periods, indicating that the addition of the charging load did increase the overall loading of each transformer. While these average patterns are useful in understanding how transformers are affected more generally, they do not provide information on what a specific peak loading day looks like, how often those days occur, or how the addition of EV charging has increased those peak loads.

To address these shortcomings, an analysis was conducted to determine the load profile when the daily peak load exceeded 80% of the nameplate capacity. This analysis was completed for the pre- and post- EVSE period and for two additional scenarios where two and three EV charging loads were added to the transformer. The 2EV and 3EV scenarios assume the worst case of loading coincidence with charging loads stacked on each other.

Figure 5 presents peak load profiles: Pre-EVSE, Post-EVSE 1EV, Post-EVSE 2EV, and Post-EVSE 3EV, for the 50kVA transformers in the study. The shape of these profiles matches the average annual profiles with evening peaks occurring between 6pm and 7pm. Before EV charging, the average peak load was 36.4kW, or

Figure B2: 50kVA Residential Transformer – 80% Nameplate loading



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW >80%	26.2	24.3	23.1	22.4	22.0	21.9	22.9	24.0	25.5	27.1	28.9	30.7	31.9	31.9	31.2	31.2	34.7	36.2	36.4	35.5	35.3	33.6	30.3	28.0
PostEVSE 1EV kW >80%	28.4	27.0	25.7	25.3	25.1	26.2	28.1	28.2	28.7	29.5	30.6	31.0	31.9	32.6	32.6	33.2	36.0	38.5	39.5	39.3	38.4	37.1	34.6	32.3
PostEVSE 2EV kW >80%	29.3	27.8	26.4	26.0	25.8	27.1	28.9	28.7	29.2	30.1	31.2	31.5	32.5	33.3	33.6	34.2	37.1	39.8	40.7	40.7	39.9	38.7	36.0	33.4
PostEVSE 3EV kW >80%	30.2	28.6	27.2	26.6	26.5	27.9	29.6	29.2	29.6	30.7	31.9	32.0	33.2	34.0	34.5	35.3	38.3	41.1	41.9	42.1	41.3	40.4	37.4	34.6

73% of nameplate. The addition of 1 EV charger moved that peak to 39.3kW, 2EVs peaked at 40.7kW, and 3EVs at 42.1kW, resulting in 79%, 81%, and 84% of transformer nameplate capacity respectively. As expected, each charging load that is added increases the peak load. To fully understand the impact of these additional loads, the frequency that they occur needs to be understood.

Table B4: # of days peak load exceeds 80% transformer nameplate capacity

	Total Days		No. of Days with Peak kW above 80%			
Transformer kVA	Ndays_ Pre- EVSE	Ndays_ Post- EVSE	Ndays_Pre - EVSE_80 %	Ndays_Post- EVSE_80%	Ndays_Post- EVSE_80% 2EV	Ndays_Post- EVSE_80% 3EV
15	3,689	5,286	0	12	37	305
25	20,274	23,217	341	517	786	1869
38	72,845	87,468	2,631	6,712	7,402	8,591
50	104,283	153,433	2,094	6,541	8,218	10,257
75	26,225	45,025	0	64	64	80
100	16,516	17,082	0	0	0	0

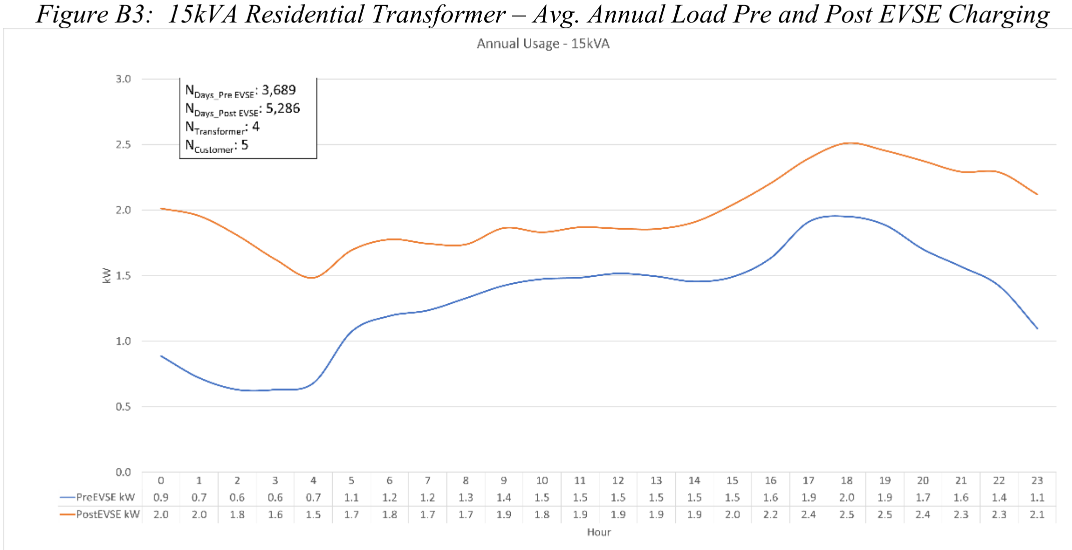
The total number of days for the pre- and post- periods are broken down by transformer size and presented in the table above. It also shows how many days the peak load exceeded 80% of nameplate capacity for each scenario modeled. For the 50kVA transformer group, Pre-EVSE daily peak loading above 80% of name plate capacity occurred 2% of the time, equating to one day every 1.5 months. After the charger was installed, that percentage increased to 4.3%, or one day every 3.5 weeks. As more EV chargers are added we see a steady increase in the number of days the transformer is above 80% loading. With 2EVs we see peak loading 5.4% of the time (one day every 2.5 weeks), and with 3EVs that peak loading increases to 6.7% of the time (one day every 2 weeks). As more EV chargers are added to these transformers, we would expect to see the peak load continue to move towards 100% of nameplate capacity and the occurrence of those peak loads to increase in kind. For a transformer to be at risk of overloading, the peak load would need to be at or above 100% for several hours. The scenarios modeled in this study show that that is unlikely to happen for transformers with the average # of connected customers.

Two transformer sizes stand out in this study as outliers. The 100kVA unit in this study has 19 connected customers, which is the max shown in figure 2. Even with the max # of homes connected, this unit never reached 80% of nameplate loading for any of the scenarios presented, as 40% of nameplate was the maximum. This shows that even when serving 19 homes, the addition of EV charging does not have a large enough effect on the peak loads to cause concern of overloading. On the other hand, as EV charging loads are added to the 15kVA transformer we see a much more dramatic effect. Before EV charging was added peak loading never exceeded 80% nameplate. Once EV charging was added the peak load exceeded 80% nameplate 0.2% of the time, 2 EV chargers moved that to 0.7%, and 3 EV chargers pushed it to 5.8%. If this trend were to continue, a 4th EV charger would push the transformer to peak loading 42% of the time. For those 15kVA transformers that serve the max # of homes it is likely that the transformer will be loaded past 100% of nameplate as electrification continues and risks failure. One conclusion of this study is that these 15kVA transformers should be prioritized for replacement, identified and upsized proactively to reduce this risk.

The results of this study show that residential transformers that serve the average number of customers (as shown in table 1) are sized appropriately for their existing connected load and can serve additional future EV loads without issue. If the number of connected customers exceeds the average, the transformer will likely need to be replaced with a larger unit as EV adoption increases.

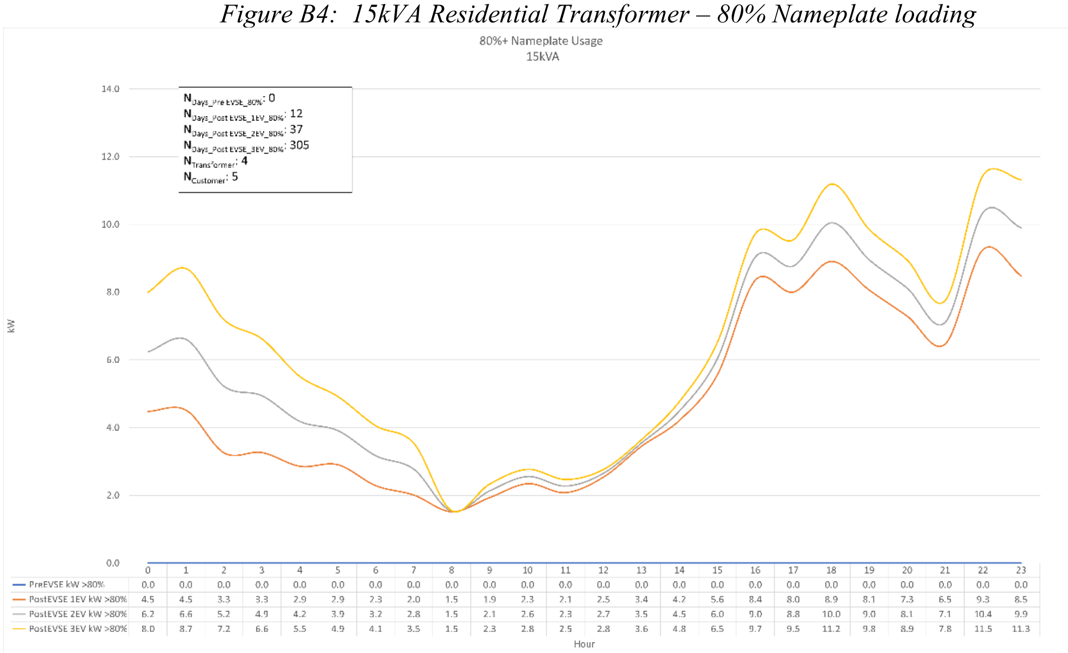
Additional charts showing the 80% peak loading for the 15kVA, 25kVA, 38kVA, and 75kVA, transformers are shown below.

Figure B3: 15kVA Residential Transformer – Avg. Annual Load Pre and Post EVSE Charging



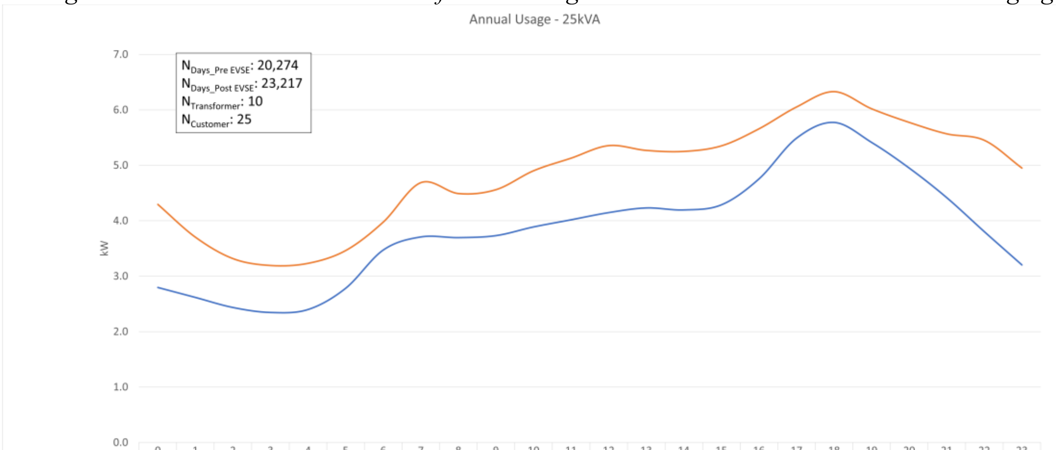
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW	0.9	0.7	0.6	0.6	0.7	1.1	1.2	1.2	1.3	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.9	2.0	1.9	1.7	1.6	1.4	1.1
PostEVSE kW	2.0	2.0	1.8	1.6	1.5	1.7	1.8	1.7	1.7	1.9	1.8	1.9	1.9	1.9	1.9	2.0	2.2	2.4	2.5	2.5	2.4	2.3	2.3	2.1

Figure B4: 15kVA Residential Transformer – 80% Nameplate loading



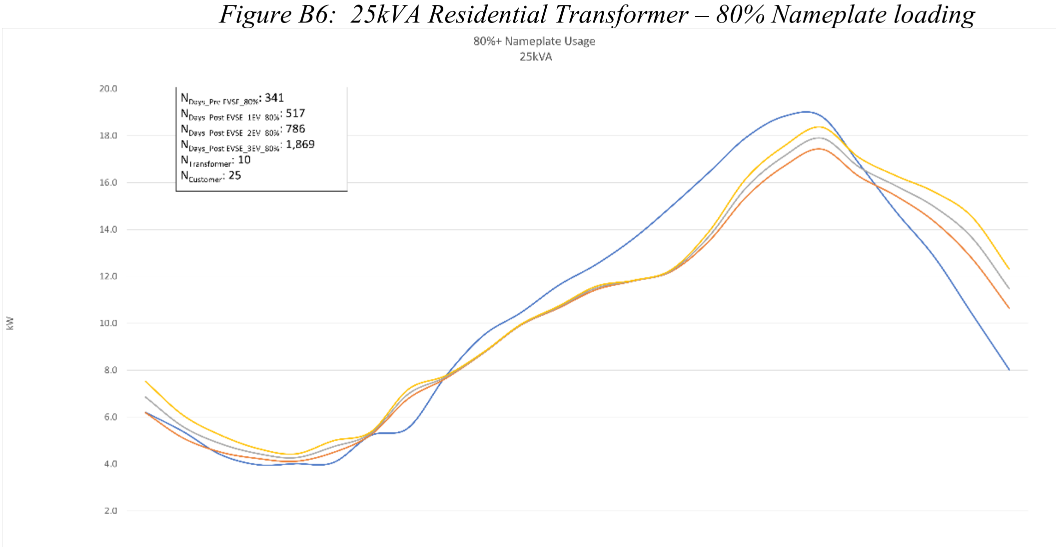
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW >80%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PostEVSE 1EV kW >80%	4.5	4.5	3.3	3.3	2.9	2.9	2.3	2.0	1.5	1.9	2.3	2.1	2.5	3.4	4.2	5.6	8.4	8.0	8.9	8.1	7.3	6.5	9.3	8.5
PostEVSE 2EV kW >80%	6.2	6.6	5.2	4.9	4.2	3.9	3.2	2.8	1.5	2.1	2.6	2.3	2.7	3.5	4.5	6.0	9.0	8.8	10.0	9.0	8.1	7.1	10.4	9.9
PostEVSE 3EV kW >80%	8.0	8.7	7.2	6.6	5.5	4.9	4.1	3.5	1.5	2.3	2.8	2.5	2.8	3.6	4.8	6.5	9.7	9.5	11.2	9.8	8.9	7.8	11.5	11.3

Figure B5: 25kVA Residential Transformer – Avg. Annual Load Pre and Post EVSE Charging



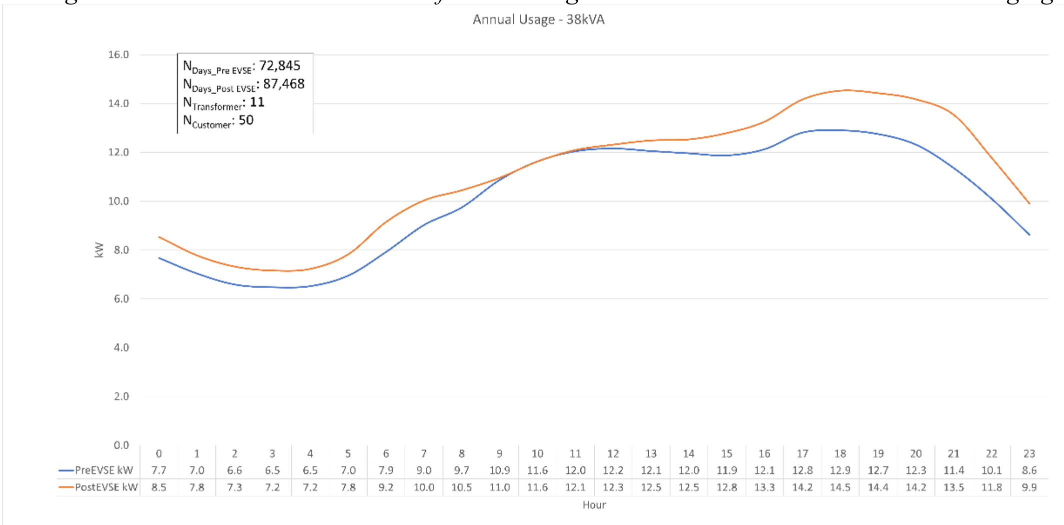
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW	2.8	2.6	2.4	2.3	2.4	2.8	3.5	3.7	3.7	3.7	3.9	4.0	4.1	4.2	4.2	4.3	4.8	5.5	5.8	5.4	5.0	4.4	3.8	3.2
PostEVSE kW	4.3	3.7	3.3	3.2	3.2	3.5	4.0	4.7	4.5	4.6	4.9	5.1	5.4	5.3	5.2	5.4	5.7	6.1	6.3	6.0	5.8	5.6	5.5	4.9

Figure B6: 25kVA Residential Transformer – 80% Nameplate loading



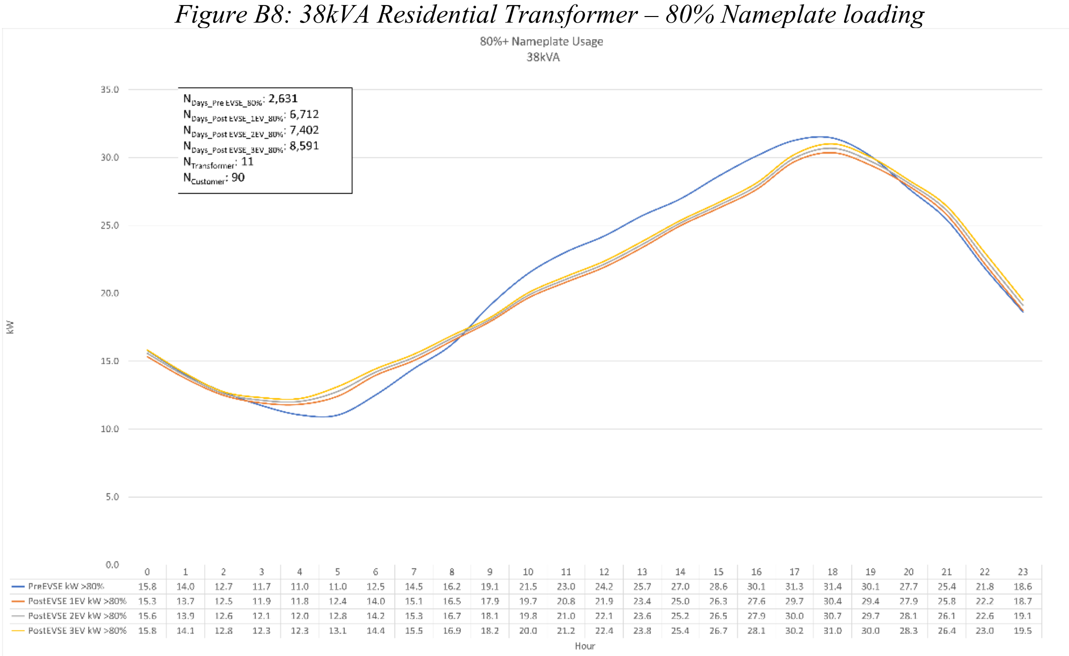
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW >80%	6.2	5.4	4.4	4.0	4.0	4.1	5.2	5.5	7.8	9.5	10.5	11.6	12.5	13.6	15.0	16.4	17.9	18.8	18.8	16.8	14.7	12.8	10.4	8.0
PostEVSE 1EV kW >80%	6.2	5.1	4.5	4.2	4.1	4.5	5.2	6.8	7.7	8.7	9.9	10.6	11.4	11.8	12.2	13.5	15.4	16.7	17.4	16.3	15.4	14.3	12.8	10.6
PostEVSE 2EV kW >80%	6.9	5.6	4.9	4.4	4.3	4.7	5.3	7.0	7.7	8.7	9.9	10.7	11.5	11.8	12.2	13.7	15.8	17.1	17.9	16.7	15.8	15.0	13.7	11.5
PostEVSE 3EV kW >80%	7.5	6.1	5.2	4.7	4.4	5.0	5.4	7.2	7.8	8.8	10.0	10.7	11.6	11.8	12.3	13.9	16.2	17.6	18.4	17.1	16.3	15.6	14.6	12.3

Figure B7: 38kVA Residential Transformer – Avg. Annual Load Pre and Post EVSE Charging



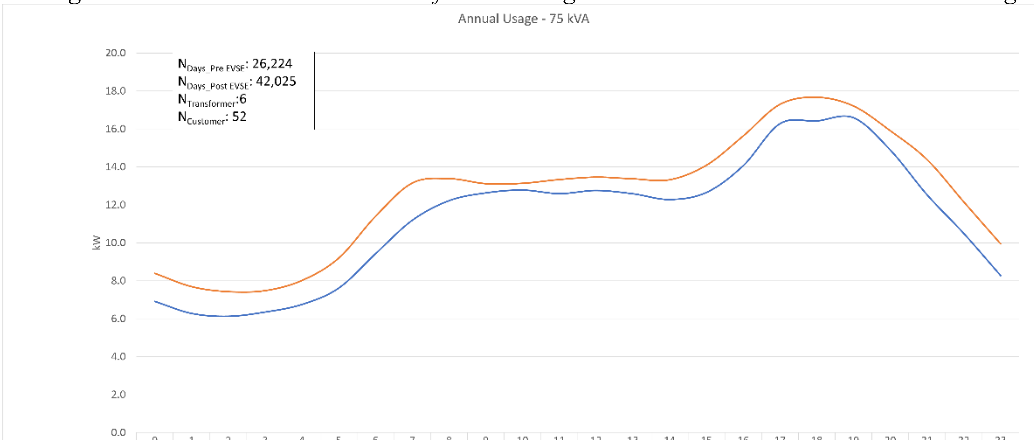
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW	7.7	7.0	6.6	6.5	6.5	7.0	7.9	9.0	9.7	10.9	11.6	12.0	12.2	12.1	12.0	11.9	12.1	12.8	12.9	12.7	12.3	11.4	10.1	8.6
PostEVSE kW	8.5	7.8	7.3	7.2	7.2	7.8	9.2	10.0	10.5	11.0	11.6	12.1	12.3	12.5	12.5	12.8	13.3	14.2	14.5	14.4	14.2	13.5	11.8	9.9

Figure B8: 38kVA Residential Transformer – 80% Nameplate loading



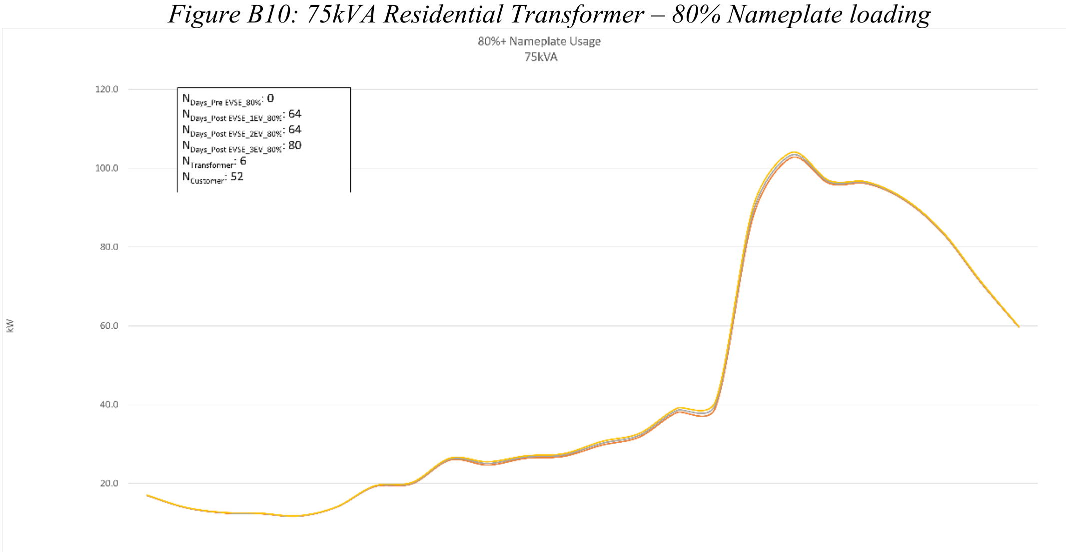
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW >80%	15.8	14.0	12.7	11.7	11.0	11.0	12.5	14.5	16.2	19.1	21.5	23.0	24.2	25.7	27.0	28.6	30.1	31.3	31.4	30.1	27.7	25.4	21.8	18.6
PostEVSE 1EV kW >80%	15.3	13.7	12.5	11.9	11.8	12.4	14.0	15.1	16.5	17.9	19.7	20.8	21.9	23.4	25.0	26.3	27.6	29.7	30.4	29.4	27.9	25.8	22.2	18.7
PostEVSE 2EV kW >80%	15.6	13.9	12.6	12.1	12.0	12.8	14.2	15.3	16.7	18.1	19.8	21.0	22.1	23.6	25.2	26.5	27.9	30.0	30.7	29.7	28.1	26.1	22.6	19.1
PostEVSE 3EV kW >80%	15.8	14.1	12.8	12.3	12.3	13.1	14.4	15.5	16.9	18.2	20.0	21.2	22.4	23.8	25.4	26.7	28.1	30.2	31.0	30.0	28.3	26.4	23.0	19.5

Figure B9: 75kVA Residential Transformer – Avg. Annual Load Pre and Post EVSE Charging



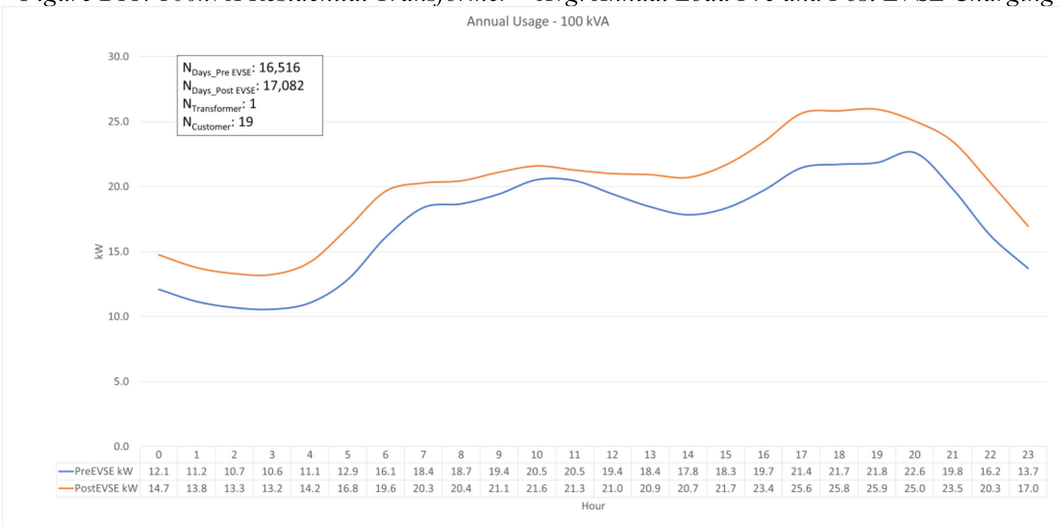
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW	6.9	6.3	6.1	6.3	6.7	7.6	9.4	11.2	12.2	12.6	12.8	12.6	12.8	12.6	12.3	12.7	14.1	16.3	16.4	16.6	14.9	12.5	10.5	8.3
PostEVSE kW	8.4	7.7	7.4	7.5	8.0	9.2	11.4	13.2	13.4	13.1	13.1	13.3	13.5	13.4	13.3	14.1	15.6	17.3	17.7	17.2	15.9	14.4	12.2	9.9

Figure B10: 75kVA Residential Transformer – 80% Nameplate loading



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW >80%	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PostEVSE 1EV kW >80%	16.9	13.9	12.5	12.3	11.7	14.0	19.2	19.9	25.9	24.7	26.4	26.9	29.7	31.8	38.0	39.2	87.9	102.6	96.1	96.0	91.8	83.4	70.9	59.7
PostEVSE 2EV kW >80%	17.0	13.9	12.6	12.4	11.7	14.0	19.3	20.1	26.2	25.1	26.7	27.2	30.2	32.3	38.6	40.1	89.1	103.3	96.5	96.3	91.9	83.6	71.1	59.8
PostEVSE 3EV kW >80%	17.0	14.0	12.7	12.4	11.8	14.1	19.4	20.3	26.4	25.5	27.0	27.6	30.7	32.7	39.1	40.9	90.4	104.0	96.9	96.5	92.1	83.8	71.3	59.9

Figure B11: 100kVA Residential Transformer – Avg. Annual Load Pre and Post EVSE Charging



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PreEVSE kW	12.1	11.2	10.7	10.6	11.1	12.9	16.1	18.4	18.7	19.4	20.5	20.5	19.4	18.4	17.8	18.3	19.7	21.4	21.7	21.8	22.6	19.8	16.2	13.7
PostEVSE kW	14.7	13.8	13.3	13.2	14.2	16.8	19.6	20.3	20.4	21.1	21.6	21.3	21.0	20.9	20.7	21.7	23.4	25.6	25.8	25.9	25.0	23.5	20.3	17.0