

**EXH. WTE-3
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: WILLIAM T. EINSTEIN**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

**Docket UE-22___
Docket UG-22___**

**SECOND EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF**

WILLIAM T. EINSTEIN

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 31, 2022



January – June 2021 Update

Electric Vehicle Charging Pilot Programs

In its initial tariff filing of Puget Sound Energy’s (PSE) electric vehicle (EV) charging products and services under Docket UE-180877, PSE committed to provide progress reporting to the Joint Utility Transportation Electrification Stakeholder Group on specific items, which are represented below, as well as other measures and overall information on the program development and execution. This report provides updates on the specific metrics, as well as activities completed within each of the programs under Schedule 551 (workplace charging products and services and public charging services), Schedule 552 (single and multi-family residential charging products and services, including the residential off-peak charging service incentive), Schedule 553 (education and outreach), and Schedule 554 (low income transportation electrification programs).

This is the fourth progress report and represents activities performed from January 1 through June 30, 2021. During this period, PSE and its partners focused on construction, installation, and operations of all pilots.

Transportation Electrification Reporting Metrics

January 1, 2021 - June 30, 2021

Light Duty Electric Vehicles in PSE’s electric service territory as of June 30, 2021	38,550
Estimated annual light duty electric transportation load (MWh)	75,714 MWh
Percent of PSE total annual load in 2020* impacted by light duty electric transportation	0.33 %
Estimated coincident peak of electric transportation load, as compared to PSE’s system peak	11.6 MW estimated during PSE’s 2020 peak
Customer participation in pilot programs, in absolute numbers and as a percentage of electric vehicles in PSE’s service territory and geographically	See discussion of customers reached in pilot-specific paragraphs below.
Electric load served through Schedules 551 and 552 products and services	472,683 kWh
Transportation electrification products and services related program costs in 2021	Operating: \$678,554 Capital: \$413,649 For further detail, see last section of this report.
Load shifted to different times from pilot Schedules 551 and 552 charging products and services	298,153 kWh

Estimated cost savings associated with shifting loads in pilot Schedules 551 and 552 charging products and services	**Too early to measure
Revenues from public charging services	\$2,948.66

**PSE's 2021 total annual load data not yet available at time of this report.*

***PSE establishing method for valuing shifted load.*

Electric Vehicle Pilots Progress

Installation progress during the time period covered by this report continued to be impacted by COVID-19, however, these delays were primarily due to long equipment lead times caused by silicon chip and other material shortages. Regardless of the delays, PSE continued to make progress toward completing installations for the pilots. Surveys for residential, multifamily, and workplace program participants were released and data analyzed; the workplace program met its capacity of approved projects; and installation began on two additional public charging sites. PSE is still on track to complete installations for the multifamily and workplace properties this year in addition to at least two public sites.

Education and Outreach Program (Schedule 553)

Due to ongoing COVID-19 restrictions around in-person events, PSE continued the digitally focused customer engagement tactics it successfully implemented last year. Taking full advantage of these tactics, which are discussed further in this section, has resulted in very high customer engagement numbers, culminating in the program setting an all-time customer engagement record in May. These numbers are outlined in the table below.

Key to the higher engagement numbers in the first half of 2021 was the launch of PSE's interactive Electric Vehicle Guide web tool, replacing the EV Calculator tool on PSE's website. The Guide has a lower bounce rate, the percentage of visitors to a site who leave after only viewing one page; and unique page views were 16 times higher than for the Calculator over the same time period in 2020.

In addition to launching the new Electric Vehicle Guide, PSE hosted five live EV-centric webinars – or “virtual events” – for customers, including: two events focused on the residential experience; two focused on commercial partners; and one specific to PSE employees. During these events, PSE EV experts and external EV owners presented information and answered attendee questions around the environmental benefits, cost savings, and fun of driving EVs.

Other highlights of the first half of 2020 include the creation and release of a new EV Charging 101 video and an EV Test Drive Contest encouraging PSE customers to visit any local EV dealer to take a test drive. The contest resulted in 95 test drives and a dozen vehicle purchases.

Transportation Electrification Fleet Outreach & Advisory

In addition to providing broad customer education, outreach, and awareness, PSE also supported customers interested in transportation electrification through technical advisory services. Major activities in the past six months included:

- PSE's first in-person event in over a year was a vehicle experience with Lordstown Motors, where local fleets were invited to see, learn, and interact with the Lordstown Endurance truck. In total, there were 45 attendees from PSE, commercial customers, and Lordstown guests.

- In April, PSE partnered with Freightliner at their eMobility Road Show, where attendees had the opportunity to learn about their new, electric class 7 box truck and class 8 semi-truck. PSE provided information for interested fleets on how they could install the infrastructure to support electrified fleets.
- PSE continued supporting customer interest in electric fleets through a total-cost-of-ownership calculator. This tool was successful in supporting 5 fleets to learn about the cost-savings benefits of transitioning to electric.

The results of these and other tactics from January through June of 2021 are summarized below:

Measure	Result
Electric Vehicle Guide	Over 120,000 unique page views so far, already more than six times the unique page views the old EV Calculator had in 2020. A paid social campaign promoting the launch of the Guide in January resulted in nearly 123,000 impressions and a click-through rate more than double the industry standard.
Electric Vehicle Virtual Events	919 attendees across five virtual events. Answered 273 EV questions from attendees. On average, 93% of attendees rated the events as “excellent” or “good,” an improvement on the 84% who did so in 2020. Two-thirds of attendees said they were more likely to buy an EV after attending an event.
Electric Vehicle Test Drive Contest	95 PSE customers took an EV test drive at local dealerships. A dozen customers said they went ahead and purchased an EV. A paid Twitter campaign promoting the contest resulted in a click-through rate over 20 times the industry standard; the Facebook campaign’s click-through rate was five times the industry standard.
Social Media Marketing (organic and non-paid campaign only)	5,825 engagements (likes, comments, shares, etc). Plus, 77 social conversions (virtual event registrations or EV Test Drive Contest entries).
Search Engine Marketing to attract potential car buyers to pse.com/electriccars	Accounted for 30% of web sessions and 41,087 page views. The entire campaign over this time garnered 603,226 impressions with a 6.8% click through rate and \$0.70 cost per click.
Community events	No metrics to share as planned events were cancelled due to COVID-19 related restrictions.
Ride and Drives	No metrics to share as planned events were cancelled due to COVID-19 related restrictions.
Monthly electric vehicle email newsletter	Enrollment in PSE’s electric vehicle newsletter increased by 674 with a total of 11,707 subscribers at the end of June. The average open rate in 2021 is 43%, unchanged from the previous year. The open rate for the EV email newsletter is above the rate for PSE’s standard marketing emails, which tend to average 27%.

For the remainder of 2021, PSE anticipates conducting the following education and outreach activities:

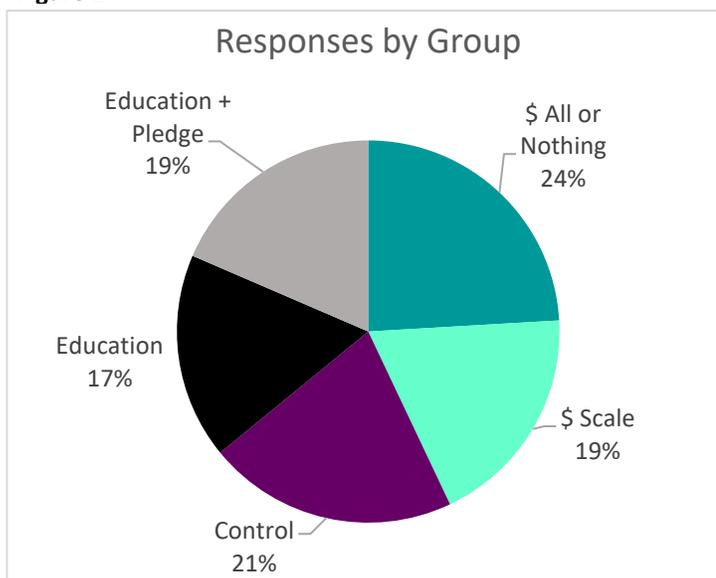
- The launch of 2-3 PSE Up & Go Electric public charging stations, including potential public ribbon-cutting ceremonies and digital promotion tactics.
- Two virtual events for PSE residential customers, as well as additional virtual events for commercial partners and PSE employees.
- Potential return to in-person events with a public ride & drive event
- Creation of new educational videos focused on EV savings and environmental benefits.
- Continued social media and online search engine marketing to promote email newsletter sign-ups and drive engagement with PSE.com.
- New campaigns focused specifically on expanding our Up & Go Electric newsletter list.
- Stepped up outreach efforts to local EV dealerships for potential partnerships
- Working with a local truck manufacturer, Kenworth, to support the launch of their first electric vehicles this summer.

Residential and Off-Peak Charging Program (Schedule 552)

The residential and off-peak charging pilot completed enrollment in 2020. In the first half of 2021, the focus has been on maintaining electric vehicle supply equipment (EVSE), monitoring load shifting activities, and measuring participant satisfaction. Though there has been some normal attrition in the program, it has been lower than forecast. After continuing discussions with Ford and BMW on their alternate technology demonstration, PSE determined the funds for that pilot would be better spent on diversity, equity, and inclusion research and community engagement for future programs. This work will be taking place in Q3 and Q4 of this year.

A survey was sent to all participants in mid-May to learn more about participants' charging behavior; what, if anything, has changed from their initial survey responses; and their general understanding of the benefits of charging during off-peak hours. Of the 493 active participants, 270 provided complete responses to the survey. There was a fairly even spread of participation across reinforcement groups, with the majority in the "All or Nothing" financial incentive group. The Education-only group had the lowest number of respondents, and the control group was the second-most represented in terms of respondents.

Figure 1



These results were consolidated by reinforcement group to further assess differences in load understanding, driving habits, and charging habits.

When asked about how often participants charged off-peak, 68% indicated they charge off-peak most or all of the time, with the majority of those participants being in one of the two financial incentive groups. These groups also seemed to feel as though they understood the benefits of charging during off-peak

hours very well or perfectly. Figures 2 and 3 show the complete responses by group. As further discussed in the load shape study results below, this is in line with the total amount of off-peak charging by all participants.

Figure 2

When do you charge Off-Peak?

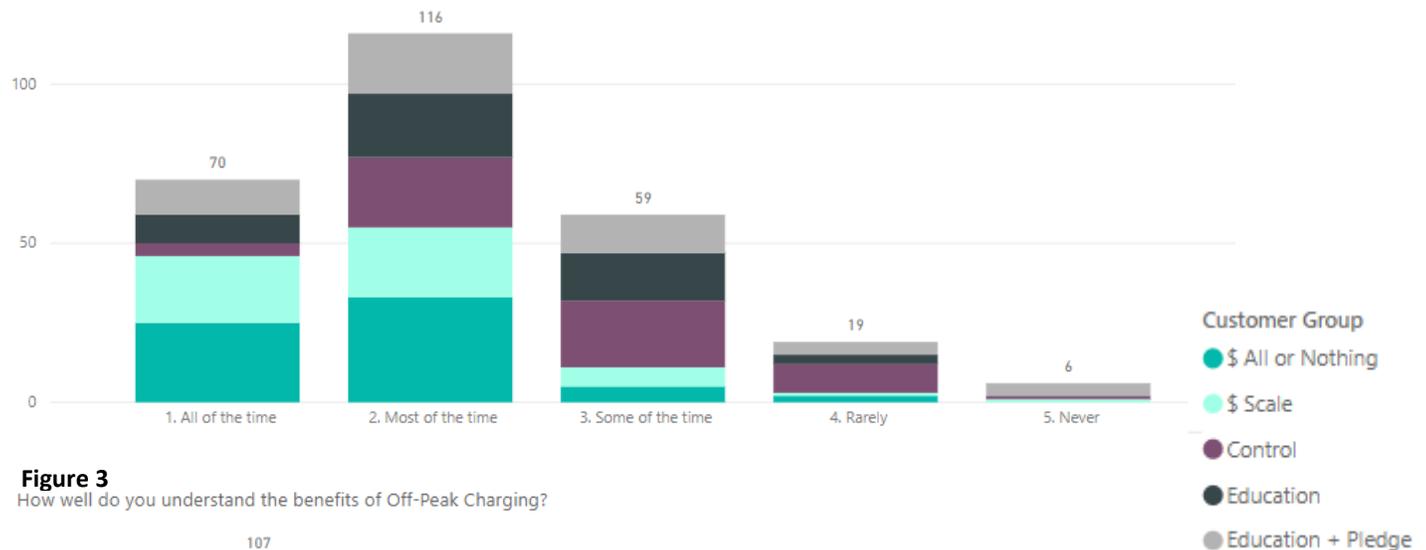
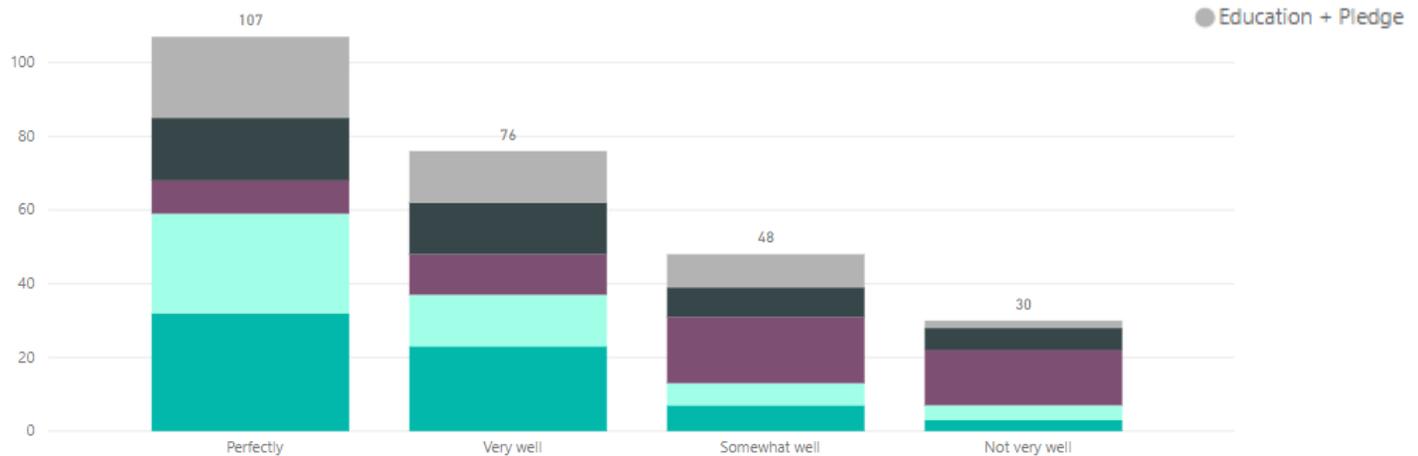


Figure 3

How well do you understand the benefits of Off-Peak Charging?



Overall participant satisfaction with the program remained high, with approximately 97% of respondents reporting they are mostly or completely satisfied with the program. For the monthly reinforcement messaging, 71% of participants open the messaging email each month, with the majority of those coming from the Sliding Scale reinforcement group.

For the remainder of the year, PSE will continue to focus on ongoing management of the off-peak charging study and maintenance of current chargers.

Residential Study First Year Load Research

The residential pilot launched in 2019 and completed the majority of installations by June 30, 2020. The goal of the pilot is to test and identify effective incentive methods to encourage customers to charge their EVs off-peak while at their homes. The results below cover the twelve month test period of July 1st, 2020 through June 30th, 2021.

Methodology Summary

PSE tested four methods of encouraging off-peak charging and compared these methods to a control group. As part of the pilot, PSE enrolled 500 participants into the program and provided a Level 2, Enel-X networked charger and 75% of the installation cost, up to \$2,000. Customers were randomly assigned to each of these five study groups as L2 charger were installed. To ensure each group was similar to each other (and the rest of the EV drivers in PSE’s service territory) PSE evenly distributed customers to the study groups based on geographic location, vehicle type (Battery Electric Vehicle vs Plug-in Hybrid Electric Vehicle), and typical weekly driving distance.

Group	Type	Name	Description
1	Control	Control	The purpose of this reinforcement group is to establish baseline. The customer will be provided an incentive upfront, but receive no further communication or ongoing incentives.
2	Education	Education	Identify charging that occurs after providing EV charge-time education but without any customer commitments or variable incentives; incentive received up front.
3	Education	Education with Social Pledge	Identify charging that occurs after providing EV charge-time education and with a non-binding written commitment by customer to shift EV charging behavior; incentive received up front.
4	Financial	All or Nothing \$	Customer forfeits incentive for month if more than three on-peak charge events are recorded. Identifies shifting behavior under a rigid/strict incentive structure.
5	Financial	Scale \$0 -10	Incentive amount is reduced, based on the number on-peak charge events incurred. Identifies shifting behavior under a flexible/relaxed incentive structure.

Within this pilot, **On-Peak** charging was defined as charging load occurring during one of two peak windows:

- Morning Peak: 6am (Hour Beginning) –11am (Hour Ending)
- Evening Peak: 5pm (Hour Beginning) – 10pm (Hour Ending).

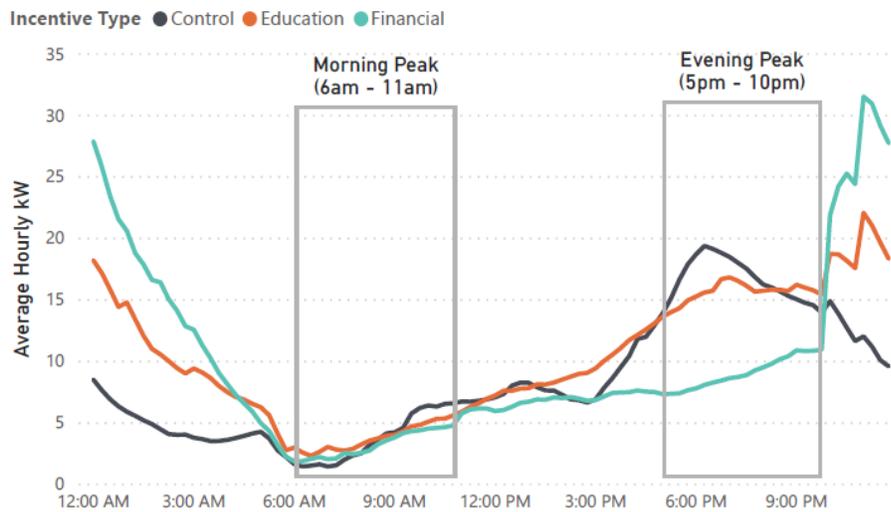
All hours not captured under either of these peak windows are defined as **Off-Peak**.

Residential Pilot Load Profiles

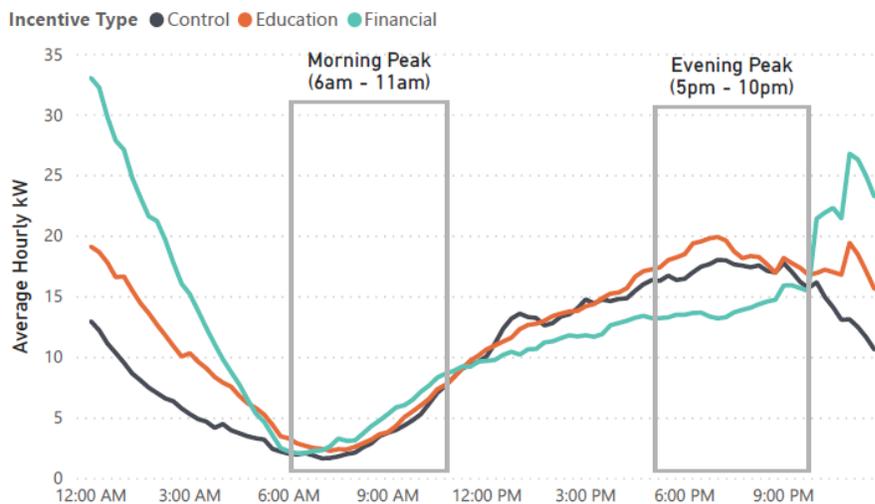
Figure 4, below, presents the average hourly weekday and weekend day load profiles. Within this these load profiles and subsequent analysis, the two education type groups have been combined into the “Education” line and the two financial groups have been combined into the “Financial” line.

Figure 4

Average Weekday Load Shape by Study Group



Average Weekend Load Shape by Study Group



Control Group

On an average weekday (and to a lesser degree on average weekend days), customers in the Control Group presented a slight charging bump just before the morning system peak, followed by a dip at about 6am, then a rapid rise to a plateau from roughly 9am to 1pm. This plateau dips slightly before a rapid rise from 3pm to a charging peak at roughly 6pm (during the evening system peak window) and then a slow descent until the following morning.

The Control group appears to have four unique charging peaks throughout the average day:

- The first charging peak (early morning) occurs just before 6am. This peak can likely be attributed to programmed vehicles ensuring the vehicle is fully charged before the end of the designated period.
- The second charging peak (midday) occurs at 1pm at the height of a slow rise that begins at 9am. This midday peak is “off-peak” but the rise begins during the latter half of the morning system peak window.

- The third charging peak (evening) occurs at 7pm at the height of a steep rise beginning at 3pm. This peak occurs during the evening system peak window and is the primary focus of load management efforts.
- The final charging peak (night) occurs just after 10pm as the load descends down from the evening system peak. This nighttime charging peak is similar to the pattern of customers in other study groups who have spikes immediately after the close of the evening system peak window. It's possible that the nighttime charging peak is the result of customers in the Control Group choosing to program their chargers and manage their load even without incentives. It is unclear if this behavior is indicative of typical EV customer behavior, the result of education and outreach efforts regarding EV charging that may have unintentionally reached the control group participants, or even the result of customers in other study groups sharing information with the Control Group members.

Education Groups

The average weekday load shape (and the average weekend day load shape) for Education groups demonstrate a similar pattern to the control group, but with smoother charging peaks and more load in the evening. The shape has an increase in load just before 3am before sharply dropping just before 6am, the beginning of the morning system peak. The load then slowly raises at a fairly steady pace until roughly 3pm when it increases at a slightly faster pace until reaching a charging peak and plateau at roughly 8pm. The plateau continues until the end of the evening system peak at which point the Education group load swiftly increases to a daily charging peak around 11pm.

The Education Groups also demonstrate four unique charging peaks throughout the day:

- The morning charging peak begins earlier than that of the Control Group.
- The group never experiences a midday charging peak, but instead slowly rises until 3pm, which is the same time as the beginning of the Control Group's evening charging peak.
- The group has an evening charging peak later than the control group but still within the Evening system peak window.
- The group has a night charging peak just after the close of the evening peak window, which is more pronounced than that of the control group. It staggers up and down for the first hour likely as a result of customers choosing different 15 minute intervals to begin their managed charging.

Financial Groups

The average weekday load shape (and the average weekend day load shape) of the financial group demonstrated the greatest response to the study, with the majority of the load being shifted into the night and a portion being shifted into midday. The Financial Groups' load has a sharp decrease in the early morning hours and begins to very slowly increase throughout the day, beginning during the morning system peak window and reaching a small hill during the midday before dropping slightly in the evening system peak window. During the latter half of the system peak window, the upward slope of the load shape begins to increase but never reaches any significant height. However, after the evening system peak window closes, the Financial Group load has a tremendous spike which then decreases sharply until the beginning of the morning system peak window.

The Financial Groups demonstrate a unique load shape compared to the Control and Education Groups:

- There is no evident morning charging peak.

- There is no significant midday charging peak, but there is a gentle hill between the two peak windows.
- There is a small evening charging peak and plateau at roughly 9:30pm.

The evening charging peak is significant and occurs between 10pm and 11pm. This charging peak for the financial group is greater than the highest peak of either the control or education groups by a magnitude of 2.6 and 1.4 respectively.

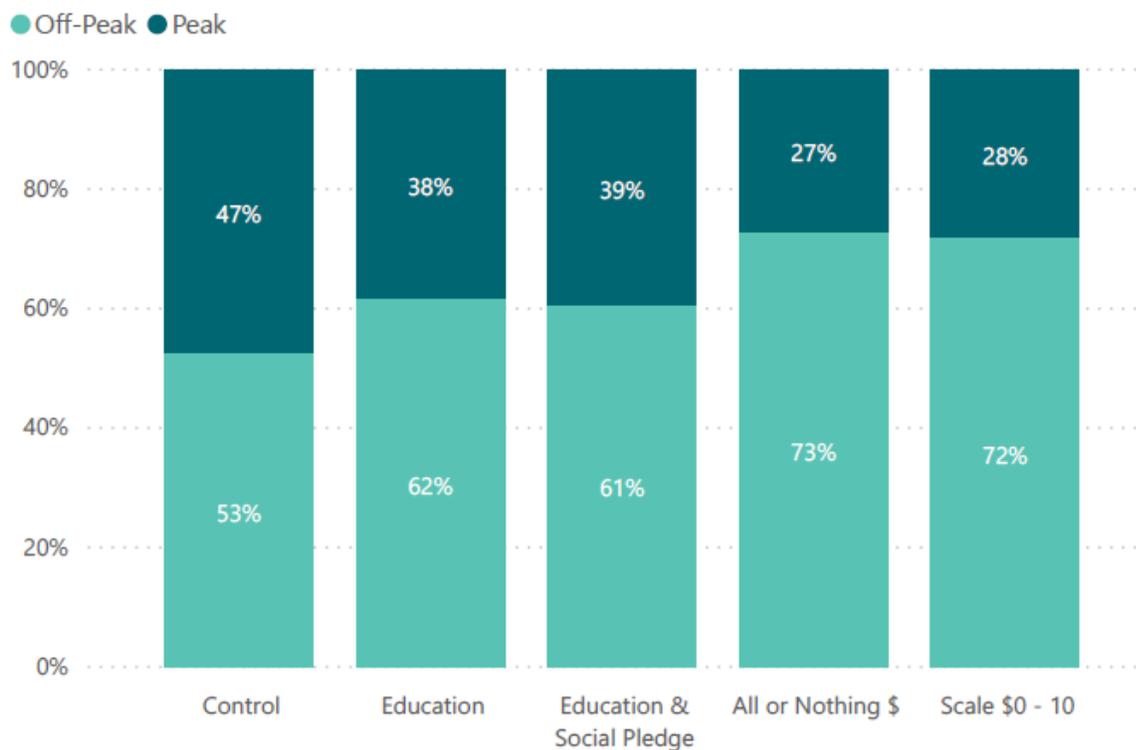
Which incentive mechanism was the most effective?

To compare the effectiveness of these incentive mechanisms, one of the key metrics PSE applied was to compare the percentages of off-peak versus on-peak charging between the study groups and the Control Group. The greater the difference between the study group’s off-peak charging percentage and the Control Group’s off-peak charging percentage, the more effective the incentive was at encourage off-peak charging.

Figure 5 presents the Percentage of Total Charging by Peak and Off-Peak periods by study group.

Figure 5

Percentage of Total Charging by Peak and Off Peak Periods



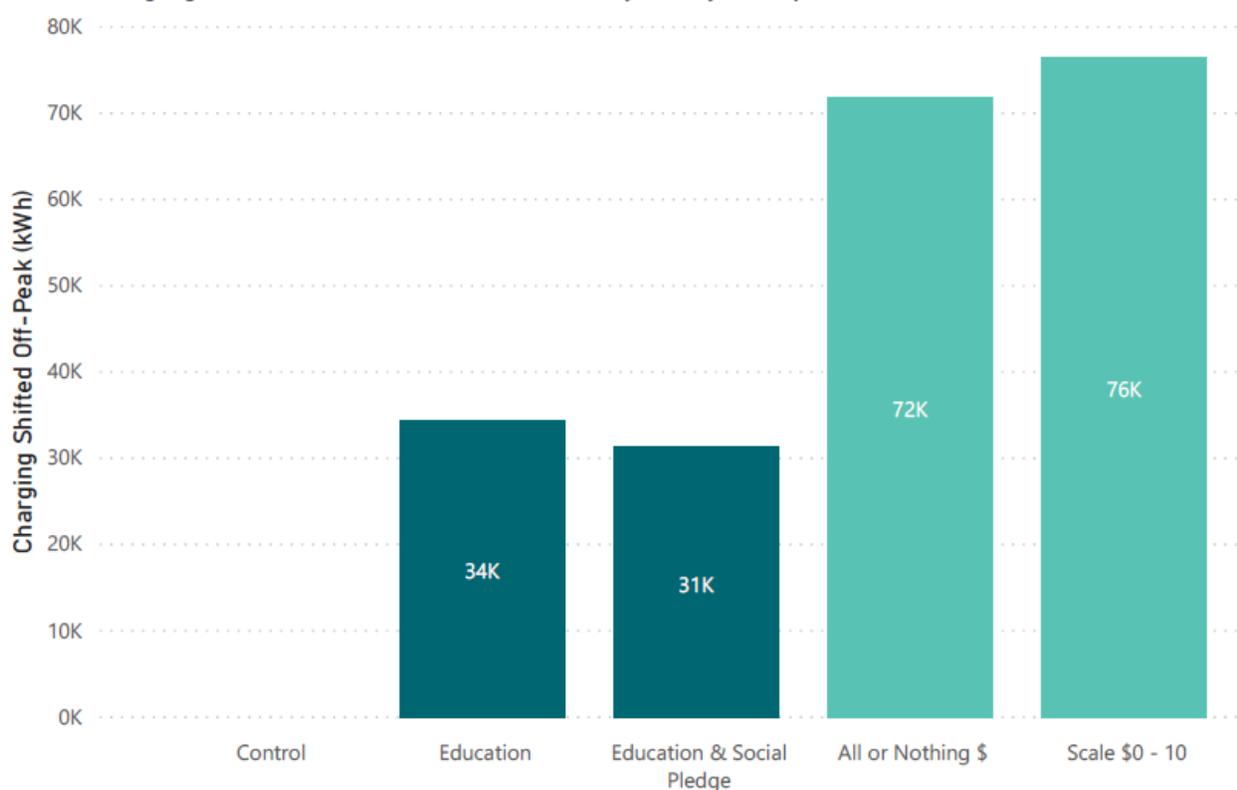
Financial incentives are the best method of encouraging off-peak charging and resulted in a roughly 20 percentage point increase in off-peak charging compared to the control group and an 11 percentage point increase compared to the Education groups. However, there is no evidence that the method of financial incentive (all or nothing versus proportional) impacts the percentage of off-peak charging.

While not as effective as financial incentives, **Education incentives** still worked to accomplish a 9 percentage point increase in Off-Peak charging relative to the control group. There was no difference between those who signed a social pledge to charge off-peak (Education & Social Pledge) and those who did not (Education).

Figure 6 presents the total number of kWh that PSE was able to shift to off-peak for each study group compared to the Control Group. In total, PSE was able to shift 214 MWh into off-peak periods. The majority of these shifted kWh came from the two Financial Groups, which represented 148.3 MWh of charging that was shifted off-peak during the test year. The two Education Groups represented the remaining 65.7 MWh of charging that was shifted off-peak.

Figure 6

Total Charging Shifted into Off Peak Windows by Study Group (in kWh)



Conclusion

The results of the first full test year of EV charging data for PSE’s Residential Up & Go Pilot clearly show that financial incentives are the most effective method to encourage off-peak charging. The pilot sought to compare the efficacy of both financial and education incentives for off-peak charging. While financial incentives were found to be the most effective, education incentives proved to still be an effective form of encouraging customers to charge off-peak. Though ongoing research is still required, PSE can use the valuable lessons learned from this first test year of data to build an expanded version of the pilot to reach a much broader audience of EV customers.

Based on the results described above, PSE would primarily rely on Financial Incentives for encouraging customers to shift off-peak. If PSE expands the pilot and designs it such that participants can achieve a

financial benefit of at least \$10 per month by participating in the program, then PSE can expect to see a 38% increase in off-peak charging among participants. This translates to nearly 640 kWh of off-peak charging per year per vehicle. If expanded to the entire population of Light Duty Electric Vehicles (LDEVs) in PSE's electric service territory (38,550 as of June 2021), PSE could shift over 24 GWh of LDEV charging into off-peak hours.

In addition to financial incentives, PSE could also lean on increased Education & Outreach opportunities to encourage customers to program their vehicles to charge off-peak. PSE could expand on the Education Group methodology within this study and provide EV drivers a financial stipend of \$120 to join an "EV Group". Through this educational, incentive-based concept, PSE could provide regular programming regarding the value and benefits of charging off-peak. In doing so, PSE could expect to shift an additional 287 kWh of LDEV charging load per participant into off-peak windows. If scaled to the entire population of 38,550 LDEVs in PSE's service territory, PSE could shift 11 GWh of LDEV charging into off-peak hours. While the "EV group" concept has the benefit of being a one-time payment rather than an ongoing monthly payment, further research is ongoing to discover if there is a drop off rate in participation over time as under this model customers only receive their incentive once, at the beginning.

Workplace and Fleet (Schedule 551) & Multi-Family (Schedule 552) Charging

The workplace and fleet program closed to new applicants on May 27, 2021. In total, 84 properties applied to the program, of which 53 moved to site evaluation and PSE approved 40 of those for construction. As a reminder, the program originally intended to install chargers at 50 workplace properties and 25 multifamily properties. However, due to low demand and higher installation cost for the workplace program, and a high demand for the multifamily program, PSE shifted to 40 workplace installations and 35 multifamily installations.

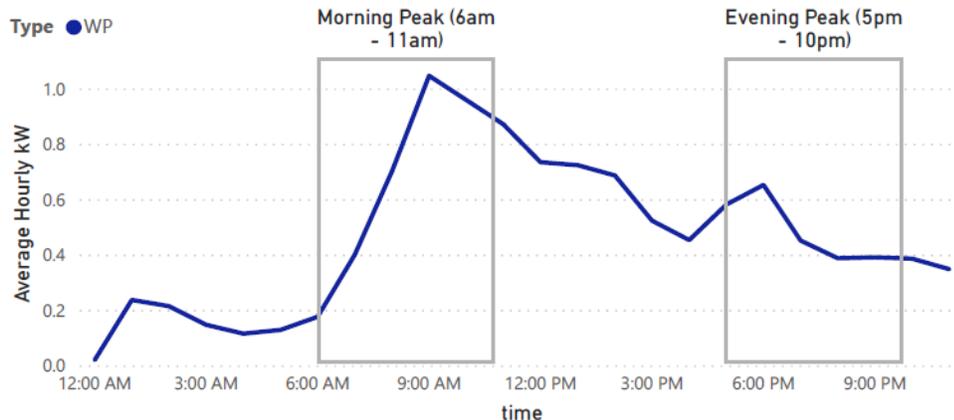
Due to severe equipment delays, PSE completed 11 additional sites in the period covered by this report, bringing the total number of completed sites to 28. The remaining projects will be completed by the end of the year, barring additional supply chain complications. To mitigate additional equipment delays, PSE has been working with its service partner, Greenlots, to identify an alternative charger for the remaining installations. This alternative model has a decreased lead time compared to the current manufacturer, but the power requirement and output is the same and there will be no impact to the customer experience.

Workplace Load Shapes

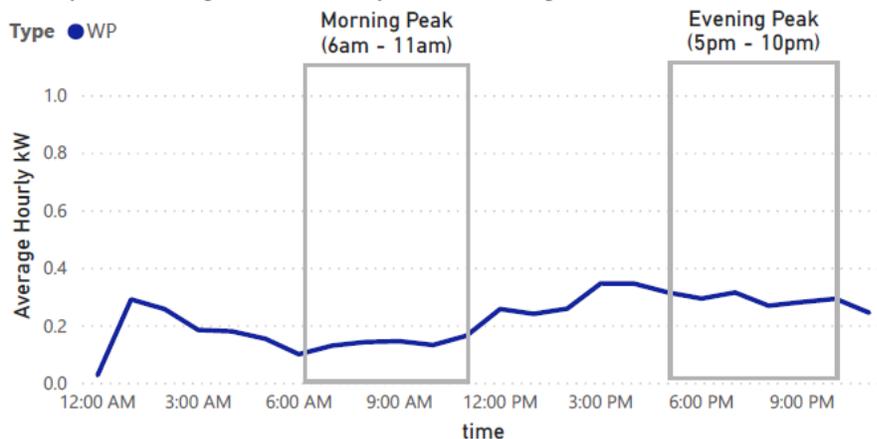
Figure 7 presents the load average hourly load shape for the workplace program.

Figure 7

Workplace Average Weekend Day Demand (Program Life)



Workplace Average Weekend Day Demand (Program Life)



PSE’s workplace program demonstrates very different load shapes between weekdays and weekend days. As was expected, the load on weekdays is much larger than that on the weekend and demonstrated very different peaks.

On weekdays there are four key charging peaks:

- The first charging peak occurs early in the morning around 2am. This is the lowest of the peaks and is followed by a gentle decrease until roughly 7am.
- The second charging peak (the morning peak) rapidly grows from 7am, peaks at 9am, and is the largest peak of the entire day. This likely corresponds to employees coming into work.
- The third, midday charging peak, occurs around 2pm after a short period of decrease from the morning peak. This is the second largest peak of the day.
- The fourth charging peak occurs during the evening peak window just after 6pm and is the third largest peak.

On weekend days, the workplace load profile demonstrates a no clear charging peaks but rather a general rise around 2am followed by a decrease until 6am and then a relatively gradual increase in load until 6pm. This gradual raise is followed by a slight decrease and then a slight increase until just after 10pm, followed by a gentle decrease.

The multifamily program also closed to new applicants on May 27, 2021 after receiving 73 applications. Of those applicants, 42 were selected for a site evaluation for one of the 35 available spots. In contrast

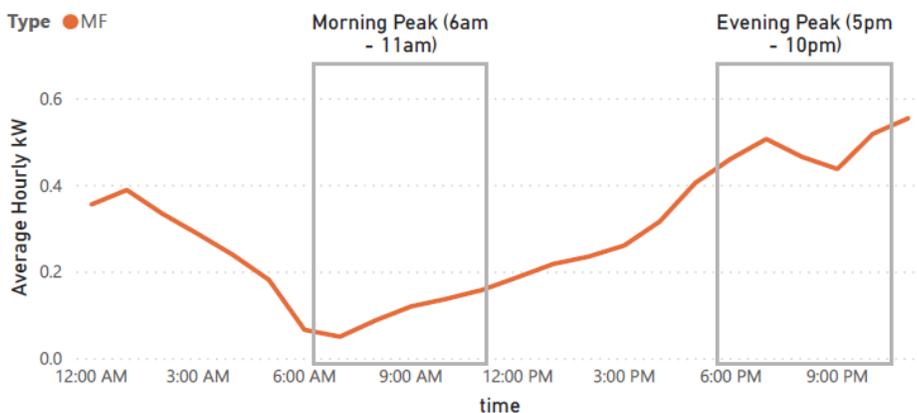
to above, PSE raised the number of properties from 25 to 35 due to positive reception to the opportunity. PSE did notice a slowdown in applications in the winter, resulting in only two additional projects being completed during the time period covered by this report and bringing the total number of completed sites to 23. However, the volume of applications picked up significantly in the spring and the remaining spots in the program were quickly claimed. PSE has experienced some equipment delays for the multifamily program, but they have not been significant enough to severely affect the construction timeline.

Multifamily Load Shapes

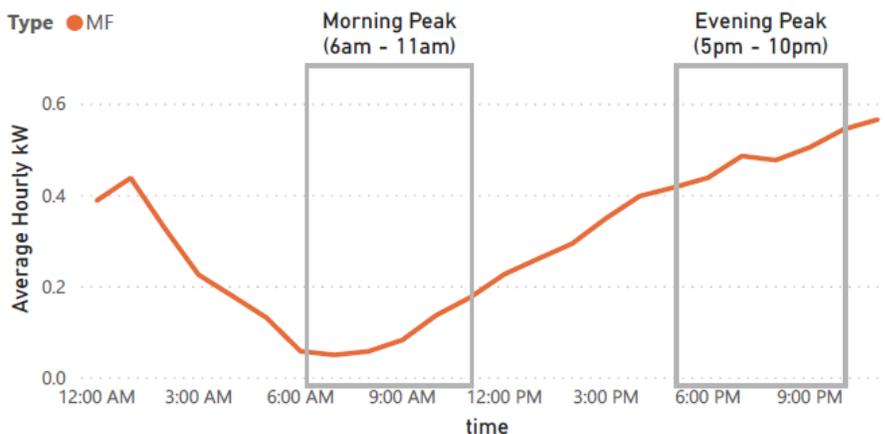
Figure 8 presents the average hourly load shape for the multifamily program.

Figure 8

Multifamily Average Weekday Demand (Program Life)



Multifamily Average Weekend Day Demand (Program Life)



The average hourly load profile demonstrates a similar load profile on weekdays as it does during weekend days, with a notable elevated evening peak on weekend days.

- The morning load shape involves a decline from the early morning until a low point at 7am (weekdays) and 8am (weekend days) followed by a gradual rise.
- The gradual rise continues through the midday at about the same speed for weekday and weekend.

- On weekdays, the load then begins a rapid increase on Weekdays to a charging peak just after 6pm while on weekends then continues at roughly the same pace until increase until closer to 7pm.
- After this evening charging peak on both weekdays and weekends, the load then decreases until roughly 9pm when it suddenly rises to a second evening charging peak before descending down until 6am. Interestingly, on weekends this second charging peak occurs around midnight, outside of the system peak window.

Before officially closing both programs to new applicants, PSE developed and posted a way for interested properties to put themselves on an “interest list” for notification of future multifamily and/or workplace EV charging programs. The form is available on PSE’s website. To date, eleven properties have completed the form and are on the interest list.

Process development and improvement on the multi-family and workplace charging programs is generally completed in parallel due to the similar characteristics. Between January and June 2021, both programs focused on:

- *Refinement of enrollment, installation, and onboarding process.* PSE collects feedback from participants as they are enrolled into the programs, and incorporates that information into improvements or learnings for future programs.
- *Diversifying participant property locations.* In the first half of 2021, PSE focused on conducting outreach in counties and areas that were not as well-represented in the programs thus far. This included properties in Pierce, Thurston, and Skagit counties. The PSE outreach team utilized a variety of methods to find potential participants, including placing informational bulletins in multi-family property business journals and cold calling workplace properties. Their efforts resulted in a noticeable increase in applicants after a brief lull over the winter.
- *Participant Surveys.* PSE released two types of surveys: one for property managers or owners of enrolled properties and one for tenants or employees, both via Survey Monkey. Property managers or owners were asked to distribute the tenant/employee survey. These surveys were only released to properties that had completed onboarding. Therefore the number of responses were not sufficient as to consider them conclusive. However, multiple respondents did note that they either purchased an EV due to the availability of new charging at their workplace or home, or were now considering an EV due to the availability of charging.

Upcoming activities in the multi-family residential and workplace pilots from July – December 2021 are:

- *Complete installations of projects.* PSE is still expecting to enroll all multifamily and workplace properties by year-end, which includes completion of charger installation and onboarding. The program is fully-subscribed and awaiting delivery of equipment in order to complete installations.
- *Continue to refine processes.* As additional sites are completed and new site hosts enrolled into the programs, PSE will use lessons learned to further refine site host onboarding.

Public Charging Program (Schedule 551)

PSE continues to work with site hosts to move projects forward. During the first half of 2021, PSE monitored operations at the Lacey Public charging site; began construction on a second site and

finalized construction details in order to begin work at a third site in early July. In addition, PSE received design approval on an additional property, secured business points with two more sites, and initiated conversations with another property.

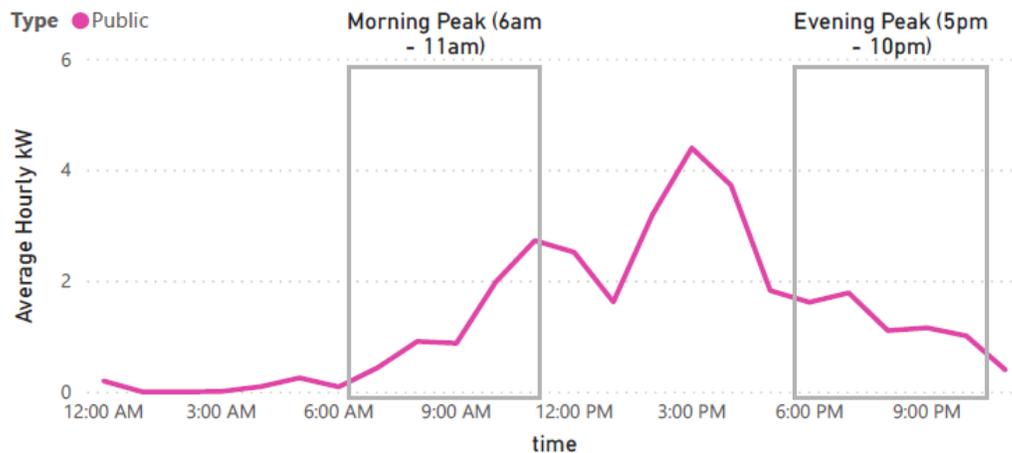
PSE has experienced delays due to the ongoing impacts from COVID-19, which are primarily the result of degraded supply chains and manufacturing shortages. The result has been an increase in copper prices and charger delivery timelines. PSE was able to mitigate these issues by switching from copper to aluminum wire, and is currently in the process of acquiring chargers from different manufacturers.

The public charging pilot key activities between January 1 and June 30, 2021, included the following:

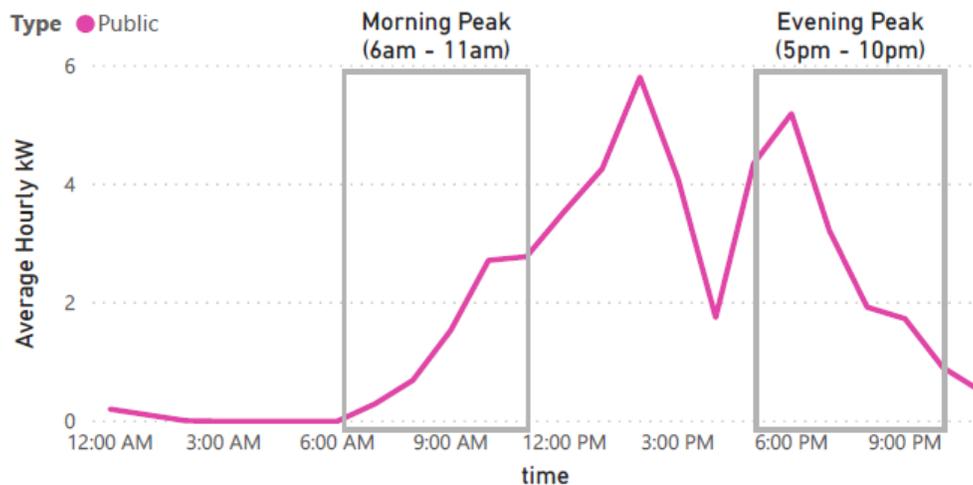
- *Siting Model Refresh.* PSE revamped the public charging siting model, including removing some outdated data and refining the metrics used for ranking target sites. The new model uses the Washington Department of Transportation's Annual Average Daily Travel (AADT), existing EVSE, and environmental health impact to rank target sites. The top three highest ranking sites per county in PSE's service area will now be pursued. Due to the significant change in site prioritization, PSE determined that, if all options in a geographical area on the previous list were exhausted, PSE would then move to the next prioritized location on the revised model.
 - Previously, locations were identified through "catchment zones" formed from Thiessen Polygons centered on target sites. This has been replaced with 1 mile buffer zones centered on target sites. The Thiessen polygon methodology had a tendency to under prioritize areas with dense numbers of recommended EVSE.
 - Walk Score was removed from the methodology for two reasons:
 1. The potential to deprioritize underserved customers.
 2. Walk Score is a Point feature, which means that the score is associated with a specific latitude/longitude rather than the entire area within one mile of the target site. Consequently, it doesn't provide for a valuable representation of the actual walkability of the area. Instead, this rendition of the model relies on the skill of the on-ground siting team to identify quality charging locations in the 1 mile area around the target site.
 - The Customer Survey has been removed from the siting prioritization model as it is now several years old.
- *Public session fee updates.* PSE filed updated pricing in March 2021 and implemented those changes following the approval of the Washington Utilities and Transportation Commission. The updated pricing includes a change from a per-minute charge to a per-kilowatt-hour charge, which more equitably reflects energy consumed by the vehicle. PSE proactively communicated the changes to customers including an email to Up & Go-registered app users who had used the stations, and publicizing the change in our monthly electric vehicle newsletter.
- *Lacey Public Charging Station.* Utilization of the Lacey station increased over the year, with an average of 2.6 charging sessions per day with the most use during the weekend. For the period covered by this report, the drivers used the station for a total of 467 charging sessions which equated to 6,745 kWh used, 674.5 gallons of gasoline saved, and 13,214 pounds of CO2 avoided.

As part of the program-wide load shape study, PSE analyzed utilization of the Lacey public charging station. Figure 9 presents the load average hourly load shape.

Figure 9
Public Average Weekday Demand (Program Life)



Public Average Weekend Day Demand (Program Life)



- This public charging station's load shape demonstrates a very different pattern between weekdays and weekend days, which is to be expected with a sample of one. The load is much larger on weekends, suggesting that this public charging station is primarily being used for destination travel (such as between Seattle and Portland) rather than regular commuting.
- On weekdays, the station demonstrates distinct patterns throughout the day:
 - There is very little load until the late morning, with the load raising to a hill close to 11am.
 - Following this hill is a dip around 1pm before the load raises to a midday peak around 3pm. This likely corresponds to people charging their cars on their commute
 - The midday peak is followed by a swift decrease until 7pm, which is followed by a small evening window spike

- The evening window spike swiftly decreases leading to the low load through the morning.
- On weekend days, the station is used much more than on weekdays:
 - It remains nearly unused until roughly 9am
 - After 9am, the load increases gradually until 11am before rising to a strong peak around 2pm.
 - Following the midday peak is a rapid decrease until roughly 4pm
 - The load then increases to another peak around 7pm before rapidly descending downward to near zero use
- *Kent and Bellingham Public Charging Stations.* Following approval of the 90% complete site design, PSE reached resolution with both site hosts on the leases and easements for their properties; was able to secure a signed non-disturbance agreement from the properties' lenders ahead of beginning construction; and obtained permits for both projects. By late June, construction had begun for the Kent; and preparations were underway for a July-start at the Bellingham project site. Both sites will launch later this year, with more details provided below.
- *Renton Public Charging Station.* PSE obtained approval on the 90% site design and is working on lease and easement negotiations with the site host. PSE also met with the City of Renton to discuss the project, determine required documentation, and obtain estimated processing costs and time. PSE will continue the permit application once the lease and easement negotiations is completed.
- *Olympia and Auburn Public Charging Stations.* After expanding the search area in Olympia, PSE initiated conversations with two potential site hosts, eventually narrowing conversations down to just one. Progress has been promising. In Auburn, PSE continued working with a potential site host until renovation plans confirmed that the property would no longer be suitable for the program. After conducting another review of properties in the target area, PSE determined that all options in Auburn had been exhausted and officially moved away from siting in Auburn on June 15. Per the revised siting model, PSE began researching the possibility of siting in Sumner as it was the highest ranked area in Pierce County.
- *Kirkland and Bremerton Public Charging Stations.* After securing business points from property owners in Kirkland and Bremerton, PSE conduct site evaluations for both properties and obtained approval of the 50% site designs. PSE is currently working with its Service Partner, Greenlots, on developing the 90% site design for both properties. Due to equipment delays, it is likely that these projects will not begin construction until 2022.
- *Refinement of site host engagement and acquisition process.* Due to the potential that lease negotiation can take a significant amount of time, PSE began introducing the documents once business points are signed. This ensures that lease negotiation can occur in conjunction with the site design and keeps a continuous flow of communication between PSE and the site host.

Upcoming activities in the Schedule 551 public charging station programs for the remainder of 2021 are:

- *Local siting, acquisition, and construction.* COVID-19-related supply chain delays have had a large impact on the forecasted construction schedule. Due to these impacts , PSE expects to

complete construction on two to three sites in 2021 and to secure the remaining sites for construction in 2022 and 2023. PSE plans to continue working with properties in Bremerton, Kirkland, and Renton, and will work on officially securing partnerships in Olympia and Sumner.

- *Launch of Kent and Bellingham charging stations.* The Kent station is scheduled to complete construction in August with a launch event tentatively scheduled for mid-September. Unfortunately, EVSE for the Bellingham station has been delayed and is not expected until late October, pushing the launch for that charging station to mid-November. PSE will complete as much construction as possible for Bellingham during the summer, so once the chargers arrive the final installation will only take a matter of days.

Diversity, Equity and Inclusion Electric Vehicle Transportation Pilot Projects (Schedule 554)

In early 2021, PSE continued to launch pilot projects designed to promote equitable access to electric mobility and the distribution of resulting environmental, social and economic benefits. As service providers' roles in their community normalize and members of the community become more comfortable with shared transportation models, usage patterns of the EVSE and corresponding EVs may continue to be different in the near term than PSE expects to see in the future. While PSE has begun tracking benefits, a more accurate picture of these benefits may start to form in late 2021 and early 2022. Finally, in order to be more inclusive, PSE has begun titling its products and services that serve highly impacted communities, vulnerable populations, and their service providers as 'Diversity, Equity and Inclusion (DEI)' as opposed to the term 'Low-income'.

Key activities for the Diversity, Equity and Inclusion (DEI) pilots between January 1 and June 30, 2021 included the following:

- Launched two net-new, electrified Community Van routes in partnership with King County Metro, in the cities of Algona and Pacific. Community Van is a flexible, shared electric transportation model designed to fill the gaps in service hours, including evenings and Saturdays, and provide access to destinations not served by local bus service. Additionally, the service area is situated in an equity priority area, given its higher percentage of income-eligible residents, people of color, and people with disabilities. In the other areas King County Metro operates Community Van, the service has been reserved by residents to provide weekly trips to local food banks, connecting residents with nutrition and other necessities, and King County Metro anticipates some trips in Algona and Pacific will fulfill that same need.
- The Muckleshoot Indian Tribe's electric shuttle was delivered in the spring of 2021 and the Tribe is now using it to expand and supplement transportation services to community members.
- Continued to negotiate a grant contract with Washington State Department of Commerce for installation of a dual port L2 charger at the Senior Housing Assistance Group's (SHAG) Auburn Court location.
- Continued preliminary benefits tracking strategies with DEI project participants to measure benefits in the following areas: carbon abatement, EV education and outreach, total cost of EV ownership, service expansion, and additional non-quantifiable social and safety impacts.

- In January through June 2021, Opportunity Council reported:
 - 68 trips totaling 1,803 miles. Trip purposes spanned weatherization, conservation education, home repair and administration.
 - HopeSource, another project participant, was able to utilize Opportunity Council's charger, making it feasible to bring their EV on a longer trip to Bellingham.
- In January through June 2021, HopeSource reported:
 - 143 trips totaling 4,932 miles. Trip purposes spanned weatherization, housing and homelessness outreach, veteran services, food bank trips, and other support service outreach.
 - Even with the recent addition of other vehicles to HopeSource's fleet, thus reducing the demand for a vehicle at any one time, utilization of the EV is growing steadily among staff, particularly for outreach.
- Received confirmation from Hopelink that no non-emergency medical transportation service providers in their network were interested in participating in PSE's pilot project at this time, due to the operational and financial difficulties presented by COVID-19. PSE will continue to explore this use case for potential future products.
- Participated in Hopelink's South King County Roundtable on Regional Advocacy in which cross-sector participants discussed emerging and existing needs of the communities they serve, including transportation.

Upcoming activities in the Schedule 554 projects during July through December 2021 are:

- Finalize grant contract with Washington State Department of Commerce and begin installation of a dual port L2 charger at SHAG's Auburn Court location. In addition, PSE will be providing funding to SHAG to assist in the purchase of a light-duty EV for the creation of a community car share service for SHAG's residents. Residents are predominantly comprised of income-eligible individuals who are 65 years and older or 50 years and older with a disability.
- Install a dual port L2 charger at Opportunity Council's East Whatcom Regional Resource Center in Maple Falls for future use by a co-funded Type A electric school bus. The school bus is expected to arrive in early 2022.
- Continue engagement with potential pilot project participant for final low-income weatherization service provider fleet project.
- Continue tracking benefits quarterly as projects come online and develop an aggregate dashboard of pilot project benefits.
- Continue to participate in Hopelink's local mobility coalition meetings and conversations with mobility service providers to stay apprised of the evolving mobility landscape, community needs and preferences, and potential future partnerships.

Transportation Electrification Products and Services Program Costs

Operating expense between January 1, 2021 and June 30, 2021 were \$678,554. Costs included in this area included PSE labor, overhead costs, outside services, and matching funds for DEI pilot projects. Operating expenses also included work related to the education and outreach program.

Capital expenditures between January 1, 2021 and June 30, 2021 were \$413,649 and include installation and charger costs for multifamily, workplace, and DEI pilot projects; costs related to developing projects for the public program; and applicable PSE labor, outside service contractors, and labor overheads. Due to lengthy equipment lead times, PSE expects a higher expenditure in the second half of 2021.