

**PUBLIC UTILITY COMMISSION OF OREGON
STAFF REPORT
PUBLIC MEETING DATE: February 13, 2020**

REGULAR X CONSENT _____ EFFECTIVE DATE February 13, 2020

DATE: February 4, 2020

TO: Public Utility Commission

FROM: Eric Shierman

THROUGH: Michael Dougherty and JP Batmale **SIGNED**

SUBJECT: OREGON PUBLIC UTILITY COMMISSION STAFF:
(Docket No. UM 2033)
Staff recommendation on acceptance of Portland General Electric's
Transportation Electrification Plan.

STAFF RECOMMENDATION:

The Commission should accept Portland General Electric's (PGE or the Company) Transportation Electrification Plan (the Plan) as having met the requirements of OAR 860-087-0020.

DISCUSSION:

Issue

Whether the Commission should accept PGE's Transportation Electrification Plan.

Applicable Rule

On April 16, 2019, the Commission issued Order No. 19-134, prescribing the required elements of utility transportation electrification plans (TE Plans). These elements were adopted as OAR 860-087-0020(3), under which utilities must report:

- a) Current condition of the transportation electrification market in the electric company's Oregon service territory, including, but not limited to:
 - A) A discussion of existing state policies and programs;

- B) Market barriers that the electric company can address and the barriers that are beyond the electric company's control, including any identified emerging challenges to transportation electrification;
 - C) Existing data on the availability and usage patterns of charging stations;
 - D) Number of electric vehicles of various sizes in the utility service territory and projected number of vehicles in the next five years;
 - E) Other transportation electrification infrastructure, if applicable;
 - F) Charging and vehicle technology updates; and
 - G) Distribution system impacts and opportunities for efficient grid management.
- b) A summary of the electric company's transportation electrification program(s) and future transportation electrification concepts and actions in its Oregon service territory. The TE Plan must incorporate project learnings and any other relevant information gathered from other transportation electrification infrastructure investments, programs, and actions to ensure that lessons learned are carried forward;
 - c) A discussion of how the electric company's investments, programs, and actions are expected to accelerate transportation electrification, address barriers to adoption, and extend access to traditionally underserved communities;
 - d) Supporting data and analysis used to develop the TE Plan, which may be derived from elements such as review of costs and benefits; rate design, energy use and consumption, overlap with other electric company programs, and customer and electric vehicle user engagement;
 - e) A discussion of the electric company's potential impact on the competitive electric vehicle supply equipment market, including consideration of alternative infrastructure ownership and business models, and identification of a sustainable role for the electric company in the transportation electrification market;
 - f) A discussion of the current and anticipated electric company system impacts resulting from increased transportation electrification and the electric company's portfolio of actions, how transportation electrification can support the efficient integration of renewable energy, and how the TE Plan is designed to address these system impacts; and
 - g) A discussion of how programs and concepts in the TE Plan relate to carbon reduction goals, requirements and other state programs, including expected greenhouse gas emission reductions based on publicly available metrics.

Under OAR 860-087-0020(2), Commission acceptance of a TE Plan means the Commission finds that a plan satisfies the requirements of this rule and does not constitute a determination on the prudence of the individual actions discussed in the plan, and non-acceptance means that the plan does not meet the rule requirements.

Analysis

Background

PGE filed its Plan on September 30, 2019. In comments filed on December 6, 2019, Staff sought clarification and additional information in several areas. Eight other entities also filed comments on PGE's Plan. PGE filed reply comments on December 31, 2019. The Company's reply comments addressed most of Staff's concerns.

Existing State Policies and Programs

The Plan included HB 2020, which did not become law, on a list of existing policies.¹ Staff sought clarification on the purpose of including it on the list.² In the Company's reply comments, PGE clarified that: "Its inclusion was in error."³ Since cap and trade legislation may still be enacted, Staff asked if HB 2020's passage would have made the Company's transportation electrification efforts less costly. PGE did not answer that broader question, but as future legislation is not within the scope of the rule and the Company clarified its inclusion of HB 2020, Staff considers this requirement met.

Market Barriers

Staff asked for more analysis on the degree to which the Company can alter the total cost of EV ownership (TCO). We specifically asked for the math behind PGE's expected impact.⁴ The Company provided a mostly qualitative description of the functional relationship between the total cost of ownership and the various fixed and variable costs associated with EV ownership.⁵ In an information request, Staff followed up on the expected impact of the Company on home charging. PGE explained that the Residential EV Charging pilot will reduce the cost by \$500. A time of use (TOU) pilot could reduce fuel costs, but: "The TCO impact of this pilot will depend on the final pilot design that will be filed by PGE and potentially approved by the Commission."⁶ This is important analysis to understand the expected impact of a utility's promotion of electric vehicle (EV) adoption. Staff accepts PGE's reply, that without knowing the final pilot design, the TCO cannot yet be determined.

Charging Station Availability and Usage Patterns

Staff sought to better understand how the Company plans to avoid EV charging at peak hours beyond 3pm to 8pm.⁷ The Company replied: "PGE intends to design programs and rates to get new and current EV drivers to charge at noncritical hours. We will work

¹ PGE. *Transportation Electrification Plan* September 30, 2019, page 16, Table 1.

² OPUC. *Staff Comments* December 6, 2019, page 3.

³ PGE. *Reply Comments* December 31, 2019, page 3.

⁴ OPUC. *Staff Comments* December 6, 2019, page 3.

⁵ PGE. *Reply Comments* December 31, 2019, page 4.

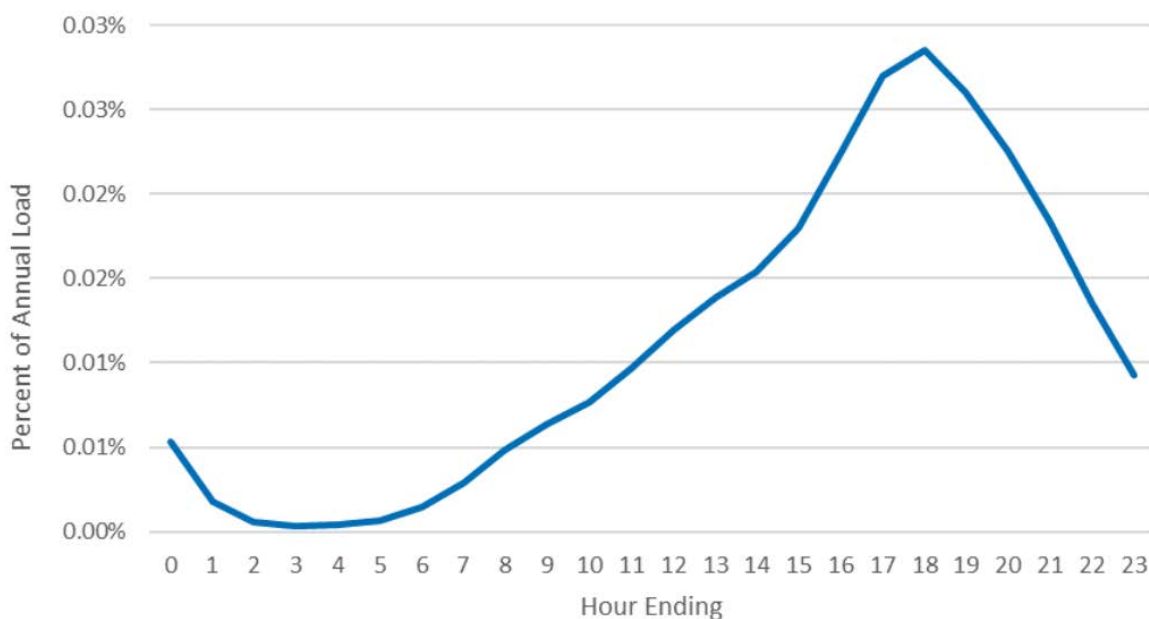
⁶ PGE. *PGE Response to OPUC Information Request No. 001* January 28, 2020, page 1.

⁷ OPUC. *Staff Comments* December 6, 2019, page 4.

to ensure that the rate design creates price signals to shift loads off peak.”⁸ Staff accepts this answer as satisfactory. The Company is saying it plans to have plans that will shift loads off peak hours outside of 3pm to 8pm. This will be important data to develop for future TE Plans because this planning process has revealed there are no current plans to avoid EV charging during morning peak hours.

The Plan did not present data on observed residential charging by EV owning PGE customers. Instead, it displayed an estimation in Figure 8 on page 35 of the Plan:

Figure 8 – Estimated Residential EV Load Shape



The text of PGE’s Plan explained a load shape estimate was used to represent residential charging behavior because: “Without a current residential EV charging program, PGE does not have a clear line of sight into how customers are actually charging at home.”⁹ In our comments, Staff found this statement problematic, given the extent of PGE’s investment in advanced metering infrastructure (AMI).¹⁰

Staff sought clarification on whether or not the Plan’s estimated residential EV charging load shape is the Company’s expectation of customer behavior without participation in the time-of-use (TOU) and demand response (DR) programs the Plan refers.¹¹ The Company replied it is: “It depicts the light-duty vehicle (LDV) charging load shape in the

⁸ PGE. *Reply Comments* December 31, 2019, page 5.

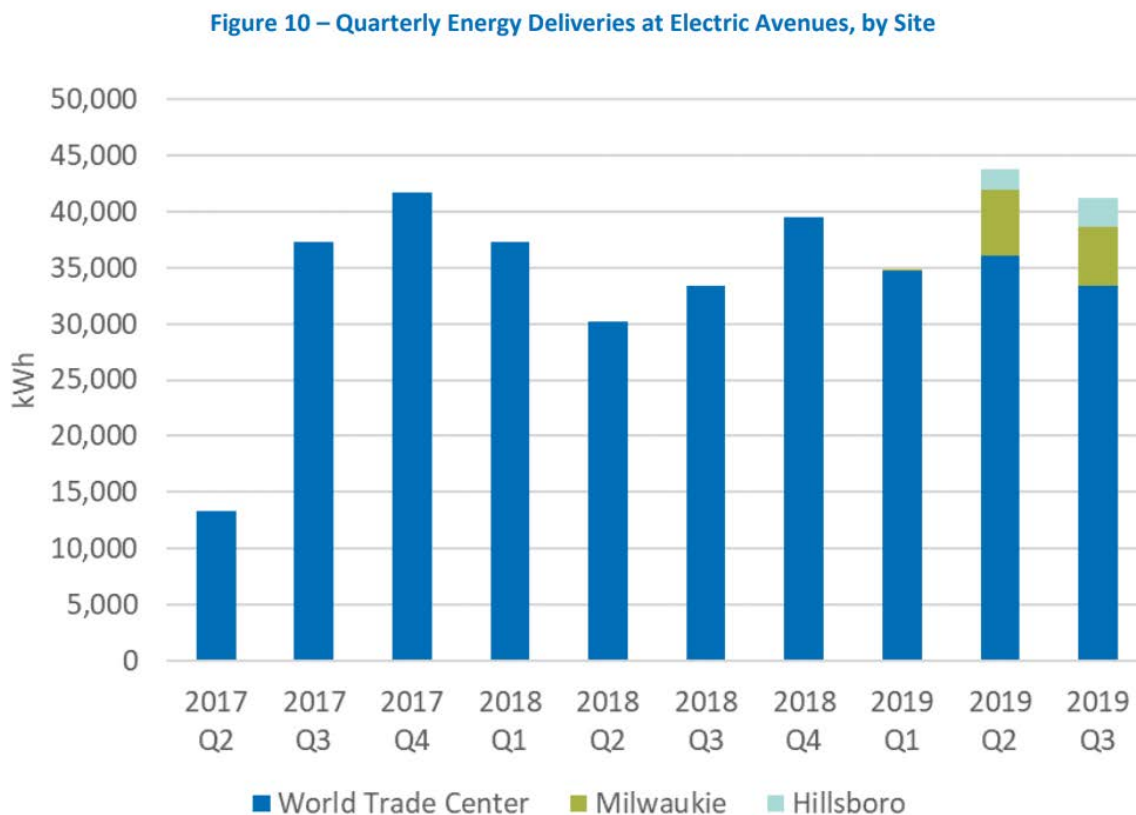
⁹ PGE. *Transportation Electrification Plan* September 30, 2019, page 35.

¹⁰ OPUC. *Staff Comments* December 6, 2019, page 5.

¹¹ *Ibid.*

absence of [TOU] pricing or managed charging intervention.”¹² This was an important distinction. Staff now finds the residential portion of this requirement is met.

For the usage pattern of public charging stations, Figure 10 on page 37 of the Plan depicts energy deliveries to the World Trade Center (WTC) Electric Avenue site:



In our comments, Staff observed these deliveries appear remarkably flat given the rate of EV ownership growth over the same time period.¹³ In reply comments, the Company explained the third quarter of 2019, as presented in the Plan in Figure 10 above, did not have complete data, making the growth rate appear flatter than it actually was, nor did Q2 2017 present all deliveries of electricity in that quarter.¹⁴

Staff also sought clarification on whether or not PGE has data for Electric Avenue’s WTC site before the second quarter of 2017.¹⁵ In reply comments, the Company

¹² PGE. *Reply Comments* December 31, 2019, page 5.

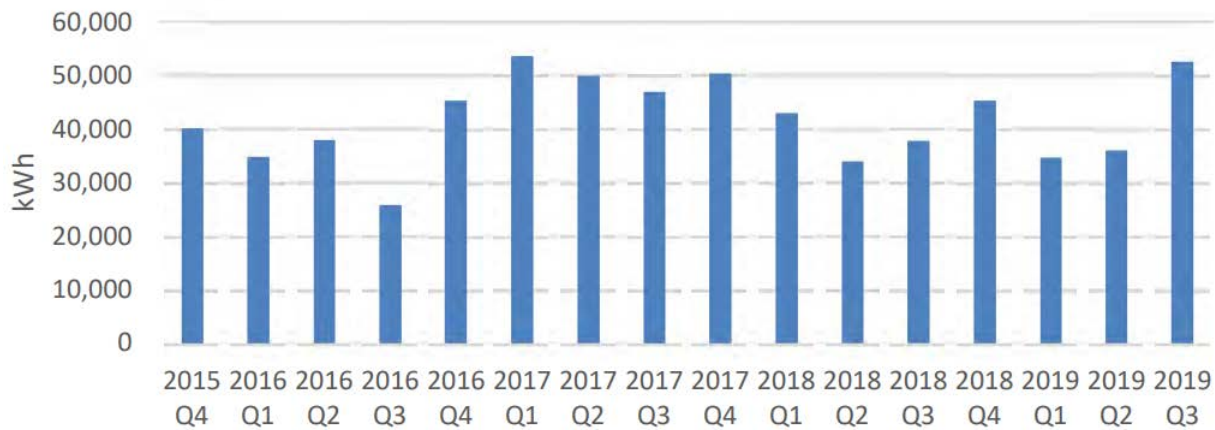
¹³ OPUC. *Staff Comments* December 6, 2019, page 7.

¹⁴ PGE. *Reply Comments* December 31, 2019, page 6.

¹⁵ OPUC. *Staff Comments* December 6, 2019, page 7.

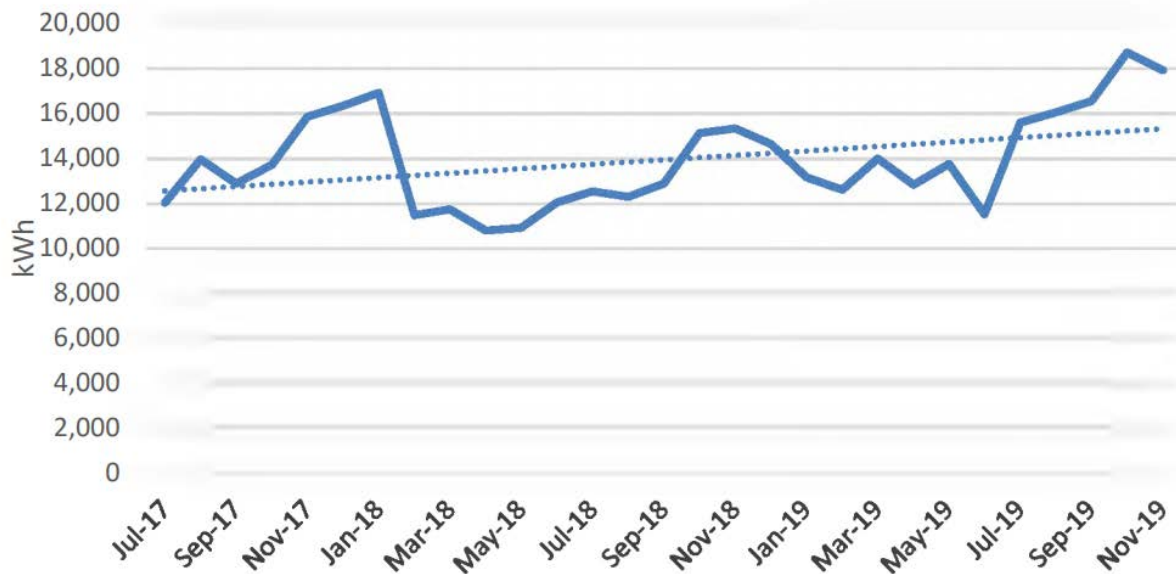
provided a graph of data going back to the fourth quarter of 2015, including completed data collection for the third quarter of 2019:¹⁶

*Figure 1 – WTC Electric Avenue (Additional Historical Data)**



In reply comments, the Company depicted the slope of load growth at Electric Avenue's WTC as positive using monthly data:¹⁷

Figure 2 – Monthly kWh Sales WTC Electric Avenue



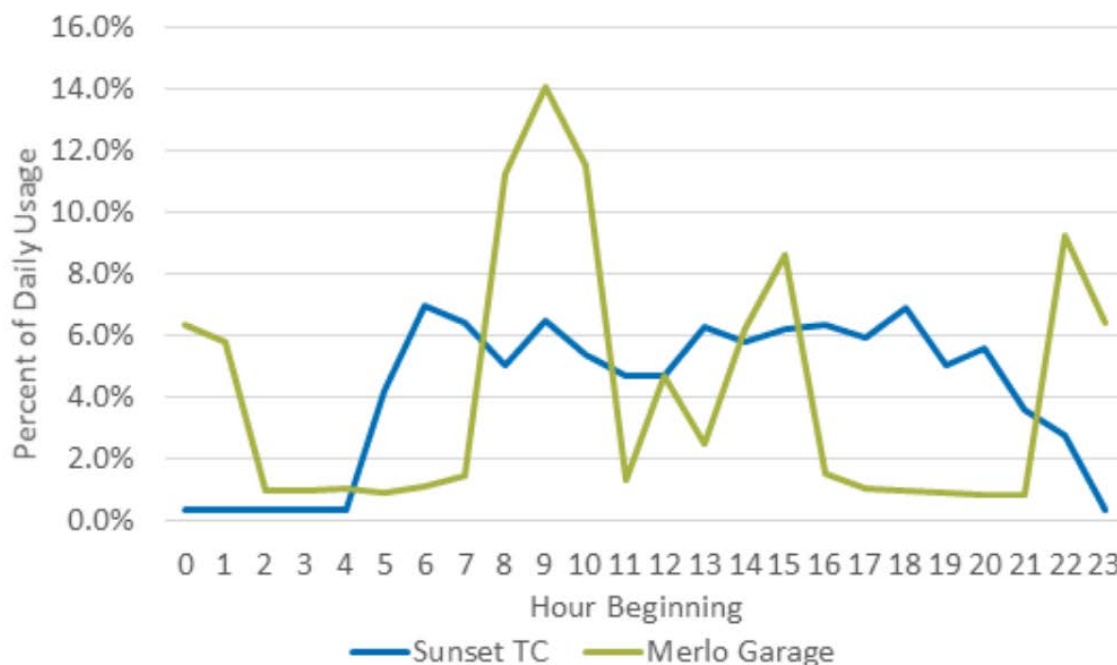
¹⁶ PGE. *Reply Comments* December 31, 2019, page 6.

¹⁷ *Ibid.*, page 7.

Part of what this graph is depicting, however, is the difference in season. EVs consume more energy in cold weather. The better comparison for July 2017 is July 2019, for which the slope is flat while the number of EVs in PGE's service territory was compounding at a growth rate of 32 and 37 percent during those two years. A comparison of November 2017 and November 2019 does show some positivity, with an annual growth rate in the single digits. Staff now considers the public charging portion of this requirement met.

For mass transit charging, Staff observed that the TriMet pilot's highest point of peak demand, as shown in Figure 18 on page 47 of the Plan, is 9am, an hour PGE's 2019 IRP identifies as critical for the PGE's system.¹⁸

Figure 18 – Hourly Load Shape of Electric Mass Transit Pilot

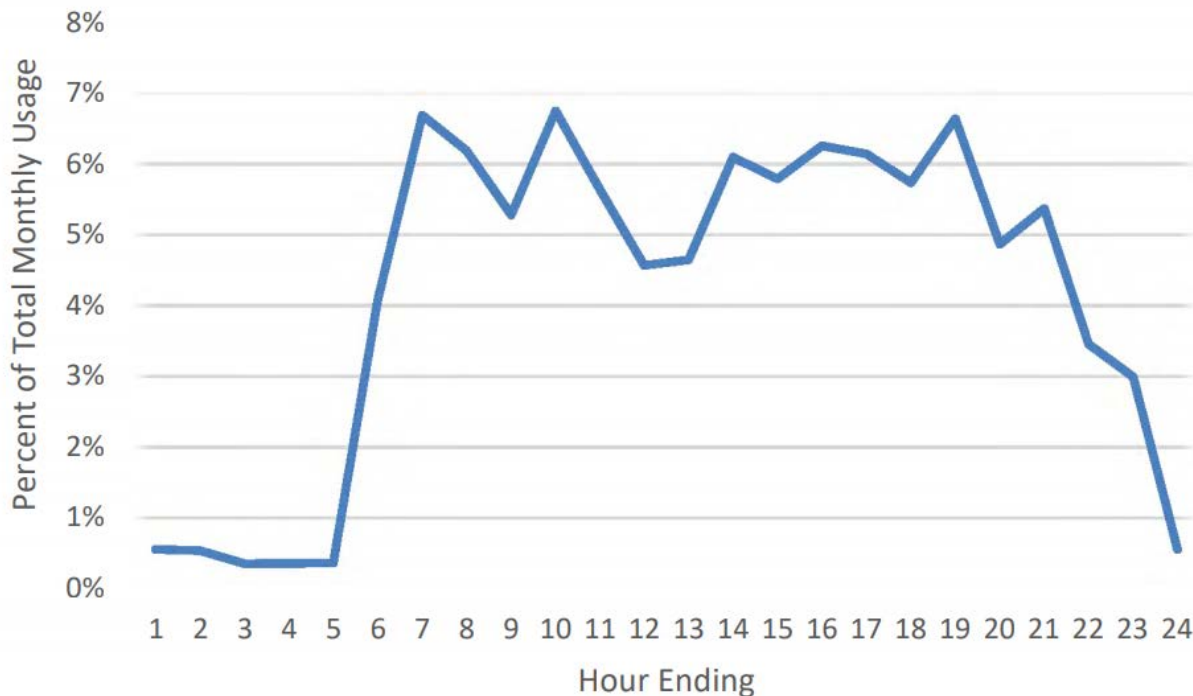


In reply comments, PGE explained why that is not the case.¹⁹ The depiction of TriMet's charging in the graph above does not distinguish between the difference in charging capacity between the Sunset Transit Center and the Merlo Garage. The transit center has the 400 kW capacity. The Merlo Garage is only 150 kW. Combining data for both locations' deliveries shows the charging at 9am does not rise above the daily peak demand of this program:

¹⁸ PGE. 2019 Integrated Resource Plan July 2019, page 668.

¹⁹ PGE. *Reply Comments* December 31, 2019, page 9.

Figure 3 – Combined TriMet Load Profile (August 2019)



Staff now considers the mass transit portion of this section met. PGE is making efforts to shift TriMet’s load away from the peak hours of 3pm to 8pm. The consolidated graph above shows the vast majority of TriMet’s charging is happening between 6am and 10pm.

In our comments, Staff asked for the forecasted EV adoption impact on PGE’s peak load.²⁰ In reply comments, the Company presented this table:²¹

Table 3 – LDV Peak Demand by Season (MW) based on Navigant DER Study

Seasonal Capacity	2020	2025	2030	2035	2040	2045	2050
Summer MW	24	85	194	322	468	630	779
Winter MW	26	90	205	340	494	665	822

In an information request, Staff asked for the Company’s forecasted peak load after subtracting Navigant’s forecast of EV direct load control. PGE replied with this table:²²

²⁰ OPUC. *Staff Comments* December 6, 2019, page 12.

²¹ PGE. *Reply Comments* December 31, 2019, page 12.

²² PGE. *PGE Response to OPUC Information Request No. 018* January 28, 2020, page 1.

Season	2020	2025	2030	2035	2040	2045	2050
Summer MW	20	69	156	257	370	497	611
Winter MW	22	77	173	286	414	556	685

The Navigant forecast represents the best forward-looking analysis PGE currently has. By presenting this forecast beyond energy, to include both unmanaged peak and managed peak loads, PGE has presented the expected peak impact from their current planning. By 2050, PGE expects only 22 percent of EV peak load can be mitigated by direct load control in the summer and only 17 percent in the winter.

Vehicle Technology

The Plan displayed a list of corporate announcements for medium and heavy duty fleet acquisitions.²³ In our comments, Staff asked what distribution of these vehicles PGE expects to see in its territory.²⁴ In the Company's reply comments, PGE said it cannot comment on any specific customer's plans.²⁵ Staff views vehicle size as adequately addressed in this filing due to the absence of heavy vehicle charging in PGE's territory. Staff hopes the next transportation electrification plan will better describe the extent of heavy vehicle charging in PGE's territory. If no such market has yet developed, Staff hopes the Company will make that status clear in its next Plan.

In our comments, Staff asked the Company how far down the road PGE foresees vehicle to grid (V2G) programs in its own territory.²⁶ In reply comments the Company stated:

PGE responds that currently the technology is not near a mature state. PGE has conducted limited integration testing at one of our fleet sites to test V2G charging. This effort is not at a state where there are any meaningful results to report yet. As the technology matures, we must continue to keep an eye on manufacturer activity in this space, so that we can ensure processes to reduce friction to customer interconnection of this technology.²⁷

With this clarification from PGE, Staff views V2G as adequately addressed in this filing. In the next transportation electrification plan, Staff would like to see a clear description of the availability of this technology.

²³ PGE. *Transportation Electrification Plan* September 30, 2019, page 60.

²⁴ OPUC. *Staff Comments* December 6, 2019, page 11.

²⁵ PGE. *Reply Comments* December 31, 2019, page 11.

²⁶ OPUC. *Staff Comments* December 6, 2019, page 10.

²⁷ PGE. *Reply Comments* December 31, 2019, page 11.

Distribution System Impacts

In our comments, Staff sought to understand why the Company has not conducted a power flow analysis to determine EV hosting capacity or estimate location value, noting the AMI and customer analytic software investments ratepayers have financed.²⁸ In reply comments, PGE stated:

The Distribution System Impacts section represents PGE's most thorough effort to date to conceptualize grid planning with a focus solely on the challenges of EVs and EV charging. As a matter of practice, new EV load is currently addressed case-by-case and uses Power Flow modeling as appropriate (for example, if a customer EV charging installation triggers distribution upgrades).²⁹

The Company further explained:

PGE has not undertaken the requested analysis as it relies on data analytics and forecasting capabilities that we do not currently have. Through the DRP effort, we are working toward incorporating AMI data into our forecasting and study processes so we can provide better insights into where distribution constraints may exist for future EV growth.³⁰

It appears to Staff that PGE has the infrastructure for the data collection. The Company intends to develop the technical processes needed for rigorous, large-scale analysis of EV charging and power flows in future distribution system planning (DSP). Staff will work to ensure that the DSP docket (UM 2005) develops a comprehensive planning standard for assessing and forecasting the impact of EVs to PGE's distribution system. In the meantime, Staff does not expect the Company's critical operational planning for EVs to be on hold until that docket's completion. Staff considers this requirement met for the purposes of this filing, given the current level of PGE's analysis of the distribution system impacts of EV charging. Staff expects more rigorous analysis in future transportation electrification plans.

In our comments, Staff sought clarification on how the Company intends to recover the expected cost of upgrading 3 percent of EV driver's transformers.³¹ PGE replied: "Transformer upgrades (when necessary) will be capitalized and recovered through base rates."³² With information requests, Staff sought more detail on how the Company arrived at this estimate. PGE clarified "that the 3% of EVs estimate was for those EVs participating in a proposed residential charging program and would thus have Level 2

²⁸ OPUC. *Staff Comments* December 6, 2019, page 11.

²⁹ PGE. *Reply Comments* December 31, 2019, page 11.

³⁰ *Ibid.*, page 12.

³¹ OPUC. *Staff Comments* December 6, 2019, page 12.

³² PGE. *Reply Comments* December 31, 2019, page 13.

charging.”³³ The Company explained how it arrived at this this estimate and how it intends to improve the precision of its analysis:

The estimate of the number of EVs that would require a transformer replacement was based on professional judgement and anecdotal evidence from the field. Initial assumptions were that 2-5% of the 3,600 projected EV participants installing a Level 2 charging station in PGE’s proposed residential charging program would need a transformer replacement. PGE is actively working to develop new methods to estimate potential transformer impacts from increased EV charging. To complete more rigorous analysis, it was first necessary to clean up some of the underlying Geospatial Information System data linking customer service accounts to specific service transformers. At the time the TE Plan was written, this work had not been completed, and so PGE opted to use the 3% estimate as a preliminary planning estimate. Since filing the TE Plan, field validation and database cleanup efforts have begun to better understand this issue. PGE expects to complete such analysis with greater confidence in the future, either through the Distribution Resource Plan or future iterations of the TE Plan.³⁴

Staff accepts this response as reflective of the current level of PGE’s planning. Staff looks forward to more rigorous analysis in future planning.

A Summary of the Electric Company’s Transportation Electrification Programs and Future Transportation Electrification Concepts

Staff sought clarification on whether or not the Plan has exhaustively covered all existing EV programs and those planned for the next two years.³⁵ The Company said it did.³⁶ Staff accepts this answer.

Lessons Learned

Staff asked for more information on the challenges the Company referred to in its TriMet pilot and Electric Avenue.³⁷ Regarding the TriMet pilot, PGE shared this table:³⁸

³³ PGE. *PGE Response to OPUC Information Request No. 020* January 28, 2020, page 1.

³⁴ PGE. *PGE Response to OPUC Information Request No. 021* January 28, 2020, page 1.

³⁵ OPUC. *Staff Comments* December 6, 2019, page 12.

³⁶ PGE. *Reply Comments* December 31, 2019, page 13.

³⁷ OPUC. *Staff Comments* December 6, 2019, page 13.

³⁸ PGE. *Reply Comments* December 31, 2019, page 15.

Table 5 – List of Known Bus Charging Issues

Issue	Details	Status
120V depot charger circuit breaker tripping	Unclear instruction on breaker sizing and circuit configuration	Resolved
Communications and interoperability	Bus and charging station required additional integration work to establish communications	Resolved
Sequential charging	Bus and charging station required additional integration work to establish consistent sequential overnight charging	Resolved
Sequential cabin conditioning	Bus and charging station required additional integration work to establish consistent sequential cabin conditioning	Resolved
Nuisance emergency stop activations	Public and drivers activated emergency stop at Sunset TC when not needed	Resolved (button reset and signage & shield installed)
Backend software service reliability	Back-end software service platform went offline on several occasions	Substantially resolved (platform outages rare and typically resolved quickly)
Alignment errors	Misalignment of bus and charger at Sunset TC	Substantially resolved
Vandalism and wear	Occasional graffiti on machines; cable connectors damaged from wear	Ongoing (replacements / repairs made as necessary)

Staff accepts this response as adequately addressing the TriMet issues relevant to this requirement. Being an early adopter of this technology has presented many challenges.

Regarding Electric Avenue, PGE shared this table:³⁹

³⁹ PGE. *Reply Comments* December 31, 2019, page 16.

Table 6 – List of Known Challenges with Electric Avenue

Issue	Details	Status
DC fast charger build quality	Back-lit logo at top of station has aesthetic issues; gasket between touchscreen and station failed on some machines; intermittent touchscreen failures; door status switches, power supplies, electronic failures (i.e., fuses, breakers, contactors, circuit boards, etc.).	Partially resolved (screen gaskets repaired; back-lit logo and touchscreen issues require additional work, other issues resolved as issues arise).
Commissioning	Equipment required multiple rounds of testing and commissioning for initial configuration	Resolved
DC fast charger session initiation	DC fast chargers failed to consistently initiate sessions	Partially resolved (failure rate significantly decreased, additional improvement ongoing)
Payment processing issues	Level 2 station credit card readers failed to work; all stations had issues with monthly subscription plan; mobile application did not function correctly	Resolved
Back-end software service reliability	Back-end software service platform went offline on several occasions	Substantially resolved (platform outages rare and typically resolved quickly)
Vandalism and wear	Touchscreens and cable connectors damaged from wear or vandalism; occasional graffiti on machines	Ongoing (replacements / repairs made as necessary)

Staff accepts this response as adequately addressing the Electric Avenue issues relevant to this requirement. PGE’s management of public charging stations has also overcome significant challenges.

Staff sought more detail on how the Company foresees its Clean Fuels Program (CFP) programs converging with its ratepayer-supported programs.⁴⁰ PGE replied that:

PGE responds though we do not plan on making any changes in the near term, it is possible that our utility programs and CFP may begin to converge at some point in the future, if such convergence supports a more efficient or effective path towards realizing the State's decarbonization and electrification goals. We have not designed what that could look like but should have an open mind about how our offerings evolve so that they create the most value for our customers. Any such changes would be

⁴⁰ OPUC. *Staff Comments* December 6, 2019, page 13.

discussed with stakeholders and consider the CFP principles adopted by the Commission in UM 1826.⁴¹

By clarifying that PGE has no current plans to converge these two sets of programs, the Company gave a clear enough answer for the purposes of this filing.

Acceleration of Transportation Electrification

Staff sought the costs of the programs promoting transportation electrification presented in a table by program and by year.⁴² The Company responded: “Future TE activity forecasted costs have not been determined.”⁴³

Staff is disappointed the known costs in UM 1811 and UM 1938 have not been used as inputs to model expected costs of eventually deploying these projects into utility scale programs. This absence prevents a comparison of the expected acceleration of transportation with the expected costs of the EV-promoting programs, which Staff views as important cost-benefit analysis for TE planning. Staff will be looking for this in future EV planning, to compare with modeling of the expected impact of each program.

Supporting Data

Among other data, the Plan presented a revenue forecast from future sales to passenger EVs that assumed current tariff rates.⁴⁴ Staff asked for a forecast that assumed the demand charge relief the Plan also calls for, such as raising Schedule 38’s 200 kW exemption, and clarification on whether or not TOU pricing was optional or mandatory in this forecast.^{45,46} The Company did not reply with an adjusted forecast, but did give helpful detail on the assumptions of the original estimate:

- 75% were to be on PGE’s Rate Schedule 7 Basic Service price plan (non-TOU);
- 10% would be on Schedule 7 TOU (which was not mandatory);
- 10% were to be using workplace charging and would likely be on Schedule 38; and
- 5% were to be using public charging (non-electric avenue) which would likely be owned by a company and metered through Schedule 38.⁴⁷

These assumptions show only 15 percent of the revenue is expected to come from Schedule 38, which narrows the sensitivity of this forecast to the effects of PGE’s proposal. Staff notes that no revenue was expected to come from Electric Avenue from 2020 to 2050. In an information request, Staff asked why Electric Avenue was excluded.

⁴¹ PGE. *Reply Comments* December 31, 2019, page 16.

⁴² OPUC. *Staff Comments* December 6, 2019, page 13.

⁴³ PGE. *Reply Comments* December 31, 2019, page 14.

⁴⁴ PGE. *Transportation Electrification Plan* September 30, 2019, page 144.

⁴⁵ OPUC. *Staff Comments* December 6, 2019, page 13.

⁴⁶ PGE. *Transportation Electrification Plan* September 30, 2019, page 122.

⁴⁷ PGE. *Reply Comments* December 31, 2019, page 17.

The Company replied: “Because Electric Avenue is assumed to be such a small subset of all public charging stations, we did not create a sub-segment using Schedule 50, which is the tariff schedule applying to Electric Avenue.”⁴⁸ This is an important clarification, because it may shed light on the relative attribution of Electric Avenue on the promotion of EVs in PGE’s territory. Staff now considers this requirement met.

Review of Costs and Benefits

Before costs can be weighed against benefits, a weighing mechanism needs to be identified. In the Plan, the Company identified the 1983 edition of *California’s Standard Practice for Cost-Benefit Analysis of Conservation and Load Management Programs* as the appropriate basis for cost benefit analysis in EV planning and then summarized another, more recent version with a different title, the *Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects* (the Manual), with this table:^{49,50}

Table 59 – Cost Effectiveness Tests¹⁴⁷

Test	Acronym	Approach	Focus
Ratepayer Impact Measure	RIM	Compares administration costs and potential bill reductions to a supply-side resource	What are the economic benefits of the program compared to the costs of a supply-side resource?
Total Resource Cost	TRC	Determines whether the total costs of energy in the utility service territory will decrease	Builds on the economic foundation of the RIM test, in some states, this test can include the monetized benefits of avoided emissions or other resource-driven savings
Societal Cost Test	SCT	Determines whether the municipality/state/nation is better off due to the program	Includes economic principles like the RIM and TRC costs. Can also include non-cash costs and benefits such as environmental impact
Participant Cost Test	PCT	Assesses whether the participants benefit from the program	Comparison of the costs and benefits of the customer participating in the program.

Source: *Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects*

Staff sought clarification on which one of these approaches the Company meant.⁵¹ In reply comments, PGE clarified that the Plan did not contemplate the total resource cost (TRC) test. Instead the Company referred to its February 2019 filing in UM 1811 where PGE proposed the *Transportation Electrification Assessment Methodology* (TEAM).

In that filing TEAM was detailed with this table:⁵²

⁴⁸ PGE. *PGE Response to OPUC Information Request No. 006* January 28, 2020, page 1.

⁴⁹ PGE. *Transportation Electrification Plan* September 30, 2019, page 142.

⁵⁰ In 2010 the 2001 version became “Chapter 7 Life-Cycle Analysis: The Economic Analysis of Demand-Side Programs and Projects in California” of *Sustainable Communities Design Handbook*.

⁵¹ OPUC. *Staff Comments* December 6, 2019, page 14.

⁵² PGE. *UM 1811 Transportation Electrification Compliance Filing Exhibit A* February 15, 2019, page 83.

Table 31 TEAM vs. RIM factors

Component	RIM	Additional Factors	TEAM
Increased energy and capacity supply costs	Cost		Cost
Monetized Environmental Benefits (e.g. Carbon)		Benefit	Benefit
Increased Retail Revenue	Benefit		Benefit
Program Overhead costs	Cost		Cost
Market Participation Revenue (e.g. CFP)	Benefit		Benefit
Incentive Payments	Cost		Cost
Bill Savings	Cost		Cost
Incremental equipment costs (as applicable; separate from incentive payments)		Cost	Cost

TEAM was presented in UM 1811 as a ratepayer impact test (RIM) plus environmental benefits. This clarification is important, because California’s Manual captures environmental benefits in the TRC, the approach PGE did not use.

Understanding whether, and if so, why, PGE considers its cited source’s standard approach inadequate for incorporating environmental benefits will be an important topic in future prudence reviews of EV-related investments. In the Plan, the Company explained why it believes that traditional methods to assess prudence should change to meet the opportunity of rapid decarbonization:

In contrast to traditional utility investments including other customer-sited technologies, utility involvement in accelerating TE is a relatively new and emerging area nationally and methods to assess prudence are evolving in turn. Analyzing the cost effectiveness of TE investments requires a different framework than traditional energy efficiency and DR programs because of the following characteristics of TE:

- Increases electricity consumption;
- May increase the need for electricity infrastructure;
- Involves substituting electricity for gasoline, diesel, and other combustible fuels;
- Includes mobile technology, which may travel in and out of a utility’s service territory, as well as provide locational flexibility (ability to

- add an energy sink or source at varying locations on the utility's system); and
- Includes several demonstrable benefits (environmental, health, economic, etc.) attributable to reducing emissions from another sector.⁵³

It is not obvious why the Manual's TRC is less able to capture these aspects of transportation electrification than the Company's TEAM approach. For example, the Manual specifically identifies increasing demand for electricity as a substitute for another source of energy (fuel substitution) as a component of demand-side management.⁵⁴ The Manual goes into careful detail explaining how to do that.

The key initial in TRC is T for "total." Using TRC would look at all costs. So if the Commission were to accept the consideration of externalities when weighing the prudence of EV investments, using the Manual would entail a look at all externalities, including the cost to society for subsidizing EV ownership with rebates through the tax code, raising the TCO of EVs from a societal perspective.⁵⁵ The Company's TEAM approach would not.

In lieu of projected costs, the Plan presented a conceptualization of what the Company expects them to be relative to benefits.⁵⁶

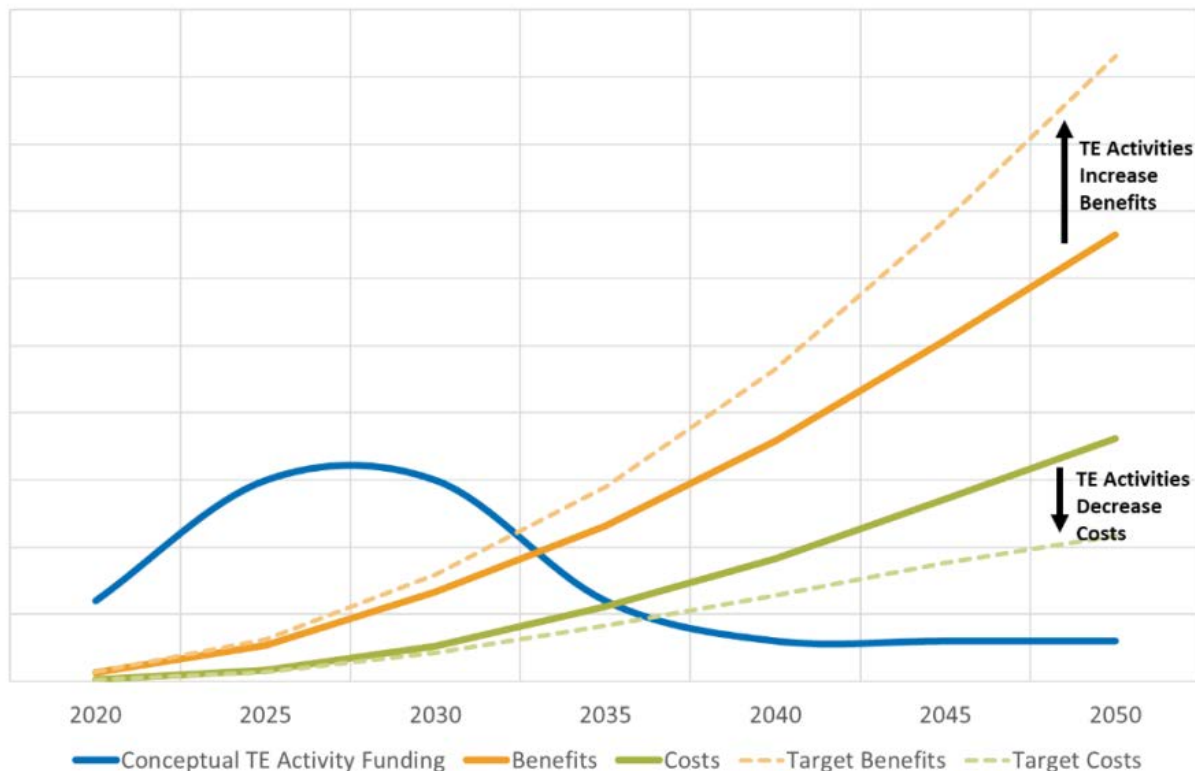
⁵³ PGE. *Transportation Electrification Plan* September 30, 2019, page 142, 143.

⁵⁴ California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects October 2001, page 2.

⁵⁵ California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects October 2001, page 18.

⁵⁶ PGE. *Transportation Electrification Plan* September 30, 2019, page 144.

Figure 65 – Conceptualization of TE Costs, Benefits, and Activity Funding



The conceptual graph above does not clearly present the benefits of PGE’s plan as exceeding its costs. The area underneath the blue line is not obviously smaller than the area between the two sources of benefit. If discounted to present value, the size of those benefits may be even smaller. What is clear, however, is that if the area between the solid and perforated green lines represents ratepayer impact, this graphic communicates, conceptually, that PGE expects the costs of promoting transportation electrification to fail a RIM test. Given the current state of PGE’s EV planning, Staff accepts this conceptual graph as meeting the planning requirement. In future transportation electrification plans, Staff expects to see modeling derived from observed costs in the Company’s pilot programs and the extant literature.

Impact on the Competitive Electric Vehicle Supply Equipment Market

Staff sought an explanation from the Company when PGE considers it inappropriate to use ratepayer funds for investing in charging stations.⁵⁷ The Company replied:

PGE responds that the OAR Staff references (OAR 860-087-0020, specifically rules (3)(e)) is discussed in Section 4 of the TE Plan on the

⁵⁷ OPUC. *Staff Comments* December 6, 2019, page 15.

potential impact of the utility. PGE has a critical role to play in supporting the rapid, safe, affordable, equitable and clean deployment of EVs in Oregon. Depending on the investment opportunity, PGE will make that business decision at that time.⁵⁸

It was precisely because the Company insufficiently addressed this requirement in the Plan that Staff sought this clarification. OAR 860-087-0020 (3)(e) requires PGE provide: “A discussion of the electric company’s potential impact on the competitive electric vehicle supply equipment market, including consideration of alternative infrastructure ownership and business models, and identification of a sustainable role for the electric company in the transportation electrification market.”

The Plan only addressed the Company’s potential beneficial impact on this market, but a reasonable reading of that requirement also anticipates discussion of what potential harmful impacts are to be avoided by the electric Company’s planning. Both Chair Decker and Commissioner Tawney signaled the importance of this requirement in the questions they posed at the Company’s presentation of the Plan at the November 21, 2019, public meeting.^{59,60} Staff interprets the Company’s reply comments to mean PGE does not yet know where the line is between appropriate investments and inappropriate investments, but, “depending on the investment opportunity,” plans to carefully consider this issue as it develops.

Staff also gave PGE an opportunity to use its reply comments to give a more direct answer to Commissioner Tawney’s question about how the Company will provide “breathing space” for national charging networks. PGE stated this will require continuous review of the TE landscape. PGE focused on Navigant’s estimates of public charging station needs, emphasizing PGE’s desire to avoid a shortage. PGE cited its involvement in the West Coast Clean Transit Corridor as an example of how the Company is partnering with other utilities and PGE’s R&D partnership with the Department of Energy as an example of how PGE is monitoring this issue. PGE doesn’t yet have a direct answer to Commissioner Tawney’s question, but the Company concluded:

By joining efforts with such national experts and their growing cohort of stakeholders from across industries, PGE hopes to advance the conversation about how to optimally plan for this newly emergent load in a manner that meets the needs of electricity providers and transportation

⁵⁸ PGE. *Reply Comments* December 31, 2019, page 20.

⁵⁹ OPUC Public Meeting, November 21, 2019 (timestamp 51:27), available at https://oregonpuc.granicus.com/MediaPlayer.php?view_id=2&clip_id=438 (comments of Chair Megan Decker).

⁶⁰ OPUC Public Meeting, November 21, 2019 (timestamp 53:30), available at https://oregonpuc.granicus.com/MediaPlayer.php?view_id=2&clip_id=438 (comments of Commissioner Letha Tawney).

stakeholders who have a very different set of constraints and needs. Similarly, PGE notes that ChargePoint acknowledges support and coordination is needed by multiple partners and uses the example of using roaming agreements between networks.

PGE agrees that we will continue to monitor as the industry develops and will keep Parties informed as it engages with the community in a macro-vision of the customer experience in TE. However, in the short-term, there is a lot of work that still needs to be done, which is reflective in the listed future TE activities, which is where PGE is focusing its planning for now.⁶¹

Staff now considers this requirement met. A dialogue on this issue was facilitated by PGE's Plan. A clear articulation of an investment principal has not been given, but that may be reasonable given the amount of uncertainty today in the market to supply charging equipment services to EV operators.

System Impacts

Staff sought the numbers behind the Plan's description of 100 MW of distributed flexibility.^{62,63} The Company stated this came from the Navigant Study's forecast of EV direct load control by 2040; "so this represents a long-term resource potential."⁶⁴

Staff also asked for the cost risk associated with peak load impact in MW calculations, ranging from the Navigant Study's 99,216 LDV base case and 236,427 LDV high case of expected adoption in PGE's service territory by 2025. The Company's reply comments did not provide such an estimate. PGE instead emphasized the uncertainty in such a forecast at this time.

Staff notes the Company did provide the means for an estimate. Using PGE's rule-of-thumb that 3 percent of EV owners will require a transformer upgrade, and the cost of each upgrade is expected to be \$3,315, the expected reference cost by 2025 would be \$9.9 million and the expected high cost would be \$23.5 million (both in 2020 dollars).^{65,66}

Given PGE's current state of planning on the system impacts of EV adoption, Staff considers the Plan's limited analysis to be a good faith reporting of what the Company currently knows about this planning requirement. Staff will expect a more comprehensive study of system impacts in future planning.

⁶¹ PGE. *Reply Comments* December 31, 2019, page 20,21.

⁶² PGE. *Transportation Electrification Plan* September 30, 2019, page 159.

⁶³ OPUC. *Staff Comments* December 6, 2019, page 16.

⁶⁴ PGE. *Reply Comments* December 31, 2019, page 22.

⁶⁵ PGE. *Ibid.* page 13.

⁶⁶ PGE. *PGE Response to OPUC Information Request No. 017 Attachment B* January 28, 2020.

Stakeholder Comments

The Alliance of Western Energy Consumers (AWEC) filed comments. AWEC stated the Plan “complies with the strict requirements” of OAR 860-087-0200, also concluding: “AWEC emphasizes, however, that its recommendation for acceptance is based solely on the requirements of the rules and does not indicate support for any subsequent TE Program PGE proposes from its TE Plan, or the substantive conclusions of PGE’s TE Plan. AWEC will evaluate PGE’s subsequent TE Programs on their own merits when they are proposed.”⁶⁷

ChargePoint filed comments and was mostly supportive of acceptance of PGE’s Plan. ChargePoint appreciates PGE’s support for the charging industry’s work on interoperability. ChargePoint appreciates page 85 of PGE’s Plan where PGE notes that innovative rate design and smart/managed charging are critical to successful transportation electrification. ChargePoint also values PGE’s pursuit of demand charge relief for commercial charging. ChargePoint would like PGE to avoid promoting specific brands or types of EV and EVSE.

ChargePoint presented its views on utility ownership of public charging stations. ChargePoint supports all three of the utility roles PGE’s Plan detailed on page 113 on a case-by-case basis: ownership, make-ready, and rate-based support if five best practices are followed:

1. Fostering and supporting the existing competitive market for EV charging infrastructure.
2. Allowing site hosts to continue to have a choice in charging solutions from multiple, qualified vendors of equipment and charging networks, as required by SB 1547.
3. Site host operational control of EV charging infrastructure, including pricing and access control.
4. Stimulate and leverage private investment in EV charging infrastructure, lowering risks to ratepayer funds, and ensuring that certain site hosts are invested in the success of deployments.
5. A requirement for all deployments to be smart, networked charging infrastructure, to maximize flexibility and control, and to deliver grid benefits.⁶⁸

ChargePoint weighed in directly on the issue of when it is not appropriate for a regulated electric company to use ratepayer funds to invest in charging stations: “When using ratepayer dollars to invest in EVSE ownership, a prudence test should be used to ensure actual gaps are being filled and that other investments are not being duplicated

⁶⁷ Comments of the Alliance of Western Energy Consumers December 6, 2019, page 3.

⁶⁸ *Comments of ChargePoint, Inc.* December 6, 2019, page 5.

or preempted.”⁶⁹ ChargePoint would also like the Commission to “review the impact that PGE’s current ownership of public charging has had on competition for public charging in the Portland area. In our experience, it is difficult to sell a charging station to a business at full cost when the assumption is that drivers will use PGE’s provided infrastructure nearby instead.”⁷⁰

ChargePoint notes that fleet charging is different from public charging. Fleet charging is not as standardized. Fleet managers should own their own EVSE. Fleets are more sensitive to the cost implications of rate design, and fleets can be less flexible with charging at night.

ChargePoint ended its comments with six ideas for demand charge relief:

- Replacing or pairing demand charges with higher volumetric pricing to provide greater certainty for charging station operators with low utilization.
- A monthly bill credit representing a percentage of the nameplate demand associated with installed charging station’s behind a commercial customer’s metered service.
- Implement a “rate limiter” as EV adoption increases, in which the average cost equivalent of a customer’s demand charges would be limited to no more than a set cents/kWh value.
- A retroactive and variable credit based on the difference of the effective blended per kWh distribution charge, including demand charges, and an agreed upon target blended rate, multiplied by the volumetric energy throughput in a given billing cycle for commercial customers with dedicated EV charging stations.
- Forgive a portion of billed demand when the customer has a low load factor.
- Charging stations could separately-metered with a unique “EV charging” rate.⁷¹

The Northwest Energy Coalition (NWECC) filed comments that were generally supportive of acceptance of PGE’s Plan. NWECC wants PGE’s investments to minimize the need for additional generation and distribution system upgrades and help shift charging times to capture excess renewable energy.

One area of PGE’s Plan about which NWECC voiced concern was in PGE’s investments in pole-mounted charging stations. NWECC stated PGE should:

- Determine whether or not they meet a community’s identified mobility needs;
- Ensure additional barriers to light-duty vehicle adoption do not prove the investment obsolete; and,

⁶⁹ *Comments of ChargePoint, Inc.* December 6, 2019, page 6.

⁷⁰*Ibid.*, page 6,7.

⁷¹*Ibid.*, page 8.

- Consider whether the program could exacerbate conditions for residential displacement and whether or not there are opportunities to alleviate displacement risks through TE strategies.⁷²

NWEC recommends avoiding attribution in assessing the cost-effectiveness of projects that promote transportation electrification. NWEC finds the traditional metrics of California's Manual to be insufficiently holistic.⁷³

Tesla filed comments, stating the way to ensure all charging standards are available is for PGE to focus on supplying make-ready public charging infrastructure to "ensure the infrastructure that is deployed is compatible with the vehicles being purchased by drivers."⁷⁴ Tesla shared some of its experience with public charging station capacity:

It is important to deploy enough chargers at a site to satisfy customer demand on peak travel days to ensure a good customer experience, and to provide redundancy in case of an equipment outage. For these reasons, Tesla typically deploys at least eight DCFCs at each location. However, it is difficult to conclude that this is the best site design for all DCFC sites and EVs at this time.⁷⁵

Tesla recommends PGE consult with EVSE providers to find the right fit.

Tesla offered an interpretation of the EV household load profile in Figure 9 of PGE's Plan: "Based on the data provided in the Plan, it is unclear how PGE obtained the information on vehicle type and how many vehicles this assessment included. PGE notes that Teslas can accept a higher rate of charge for Level 2, which likely assumes that many Tesla owners are using the Tesla wall connector rather than some other Level 2 equipment or the mobile connector."⁷⁶ Tesla recommends home charging data get evaluated with the context of battery range and does not expect home charging to rely on "extremely fast charging speeds" because most will be idle for several hours and lack of panel space will require electrical upgrades.⁷⁷

Tesla expressed appreciation for several other aspects of PGE's Plan: the expansion of business services, raising the demand charge threshold of Schedule 38 above the 200 kW limit, and PGE's sandbox exploration of heavy-duty vehicle charging. Tesla also contrasted PGE's core competency in promoting make-ready infrastructure with the

⁷² *Intervener Comments of Northwest Energy Coalition* December 6, 2019, page 4.

⁷³ *Ibid.*, page 4,5.

⁷⁴ *Comments of Tesla, Inc.* December 6, 2019, page 4.

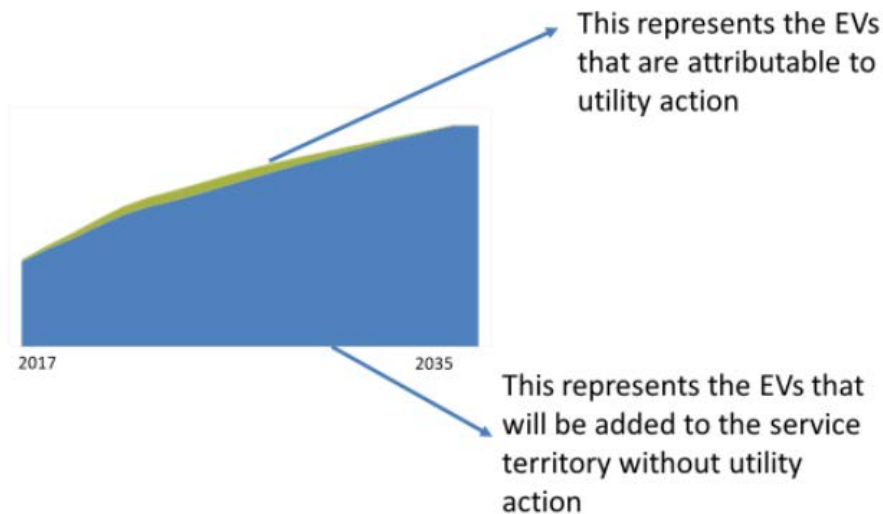
⁷⁵ *Ibid.*, page 4.

⁷⁶ *Ibid.*,

⁷⁷ *Ibid.*, page 5.

traditional limitation that a “utility investment in infrastructure has gone up to the utility meter but not extended on the customer side of the meter.”⁷⁸

The Citizens’ Utility Board (CUB) filed comments. CUB is concerned that PGE’s Plan focuses too much on meeting EV adoption targets, rather than strategies to manage the new load that will follow EVs. CUB expects little of the EV adoption in PGE’s territory will be reasonably attributed to PGE’s programs:⁷⁹



This prompted CUB to ask PGE to rank the barriers to EV adoption in terms of their relative impact on transportation electrification. PGE replied with the following ranking:⁸⁰

⁷⁸ *Comments of Tesla, Inc.* December 6, 2019, page 5.

⁷⁹ *Comments of the Citizen’s Utility Board* December 6, 2019, page 10.

⁸⁰ *PGE. Reply Comments* December 30, 2019, page 4.

Table 1 – Ranking of EV Barriers

Customer Considerations	Utility Ability to Impact (1=low; 5=high)	Relative ranking (1=high impact; 6=low impact)
First Cost	2	2
Model availability	1	1
Model functionality (e.g. vehicle range)		
Awareness	4	3
Total Cost of Ownership (TCO)	5	5
Fueling infrastructure availability	5	4
Equitable access to all segments	3	{spans all}
Dealer sales process	4	6

In this table above, the scale of utility ability to impact is different from the relative ranking in the column to the right. The table shows matching numbers, but the two rankings are inversely related. The factors that have the highest impact on EV adoption are where a utility’s ability to impact is small. PGE expects these rankings to change over time as the technology changes.

UM 2033’s review of PGE’s Plan facilitated good stakeholder dialogue on the issue of attribution. PGE responded to both CUB and NVEC on this issue in its reply comments, noting both of these stakeholders reject an approach guided by attribution:

PGE agrees that there are many factors that go into a customers’ vehicle purchasing decision and that attribution is not an appropriate mechanism for evaluating utility TE investment. PGE appreciates the feedback regarding this issue—this is consistent with what we have heard from other stakeholders at previous cost/benefit workshops and is consistent with how other utility programs are being evaluated across the country. Basing investment on attribution is not worthwhile given the difficulty in establishing a methodology to prove causation. However, in evaluation of its pilots, PGE is, and will continue to, survey the community to determine the extent to which they have been exposed to PGE program activities that could have influenced EV adoption such as: educational materials/campaigns, auto dealership partnerships/incentives, ride and drive opportunities, and improved access to fast charging (i.e., Electric Avenues). PGE acknowledges the many challenges and imprecision with customer self-reporting on customer behavior influences and does not intend to calculate “formal” attribution metrics.⁸¹

⁸¹ PGE. *Reply Comments* December 30, 2019, page 19.

Staff notes there is an important difference in NWEAC and CUB's argument about attribution. Staff understands that NWEAC sees attribution as impossible and draws the conclusion this is evidence that traditional metrics for cost effectiveness are inappropriate. Staff understands that CUB sees the methodological challenges inherent in attribution as evidence that PGE has little ability to promote EV adoption.

CUB sees attribution inherent in the language of SB 1547. CUB warned PGE risks investing ratepayer money in violation of Section 20:

If market barriers unrelated to the investment made by an electric company prevent electric vehicles from adequately utilizing available electric vehicle charging infrastructure, the commission may not permit additional investments in transportation electrification without a reasonable showing that the investments would not result in long-term stranded costs recoverable from the customers of electric companies.⁸²

CUB expressed skepticism that utility investment in public charging stations has a significant impact on EV adoption in PGE's service territory, citing the consistently low utilization rate of Electric Avenue.⁸³ CUB suggest PGE would have a relatively greater impact promoting grid-efficient residential charging, namely subsidizing home installation of level 2 chargers in exchange for customer enrollment in grid-connected charging at a TOU rate.⁸⁴

PGE responded to CUB by saying:

PGE agrees with CUB that most charging currently occurs at home and we should take a holistic/system view on evaluating charging stations. Our needs assessment supports that public charging is necessary to serve many customers who: 1) do not have access to home charging (i.e., they do not currently appear in the data because they do not have EVs due to their lack of charging ability); 2) are using their EV to do more than just a simple out and back commute (e.g., running errands, travelling); and 3) have other high vehicle-miles-travelled use case (e.g., transportation network companies).⁸⁵

CUB offered an alternative cost-effectiveness methodology, applying the principals behind PGE's line extension allowance to investment in EV infrastructure, what CUB calls a Grid Integration Allowance (GIA). CUB finds new load from EVs analogous to

⁸² SB 1547 as quoted in *Comments of the Citizen's Utility Board* December 6, 2019, page 4.

⁸³ *Comments of the Citizen's Utility Board* December 6, 2019, page 5.

⁸⁴ *Ibid.*

⁸⁵ PGE. *Reply Comments* December 30, 2019, page 17.

new load from home construction. So CUB argues the same principles that govern a utility's expenditures on extending new lines to new homes should govern ratepayer investment in residential EV charging infrastructure.⁸⁶ PGE appeared interested in CUB's proposal, stating: "Such an allowance could be a useful way to spread the costs of integrating EV loads among customers in each rate class."⁸⁷

Greenlots filed comments. Greenlots would like PGE to set numeric EV adoption goals in the utility's service territory. Greenlots would also like to see more near-term focus on heavier EVs, more support for multiunit housing, successful pilots scaled to deployment, and more pilots. Greenlots was overall supportive of acceptance of PGE's plan, concluding: "Greenlots is encouraged by and impressed with the scope and scale of PGE's TE Plan, which represents one of, if not the most, encompassing and comprehensive efforts we've seen of its kind."⁸⁸

The Alliance for Transportation Electrification (ATE) filed comments. ATE offered an interesting observation:

Although the planning issues around EV infrastructure are implicated in all such proceedings, the Oregon PUC is the only Commission that has specifically highlighted the need for formal planning in a rulemaking (AR 609). In this sense, the PGE filing should be regarded as nearly a first-of-its-kind in the country and the utility should be commended for responding with this first Plan. This Plan has quickly become a benchmark and guidepost for other utilities to follow, and for Commissions to monitor, in its comprehensive approach, its depth of analysis, and its discussion of how the utility can help resolve market gaps and complement public policy (along with other Plans developed earlier, such as SCE and PG&E in California, the Electrification of Transportation (EoT) plan of Hawaiian Electric, among others).⁸⁹

Congruent with that observation, ATE's comments were fully supportive of acceptance of PGE's Plan.

Climate Solutions and the Oregon Environmental Council filed comments jointly (CS&OEC). Overall CS&OEC found PGE's Plan thorough and a model for most utilities around the country, but would have liked to have seen a projection of future spending, more detail on customer engagement, and a clearer presentation of PGE's opportunity to invest in charging infrastructure both for public transit agencies and school districts. CS&OEC recommended a specific dollar amount of investment on transportation

⁸⁶ *Comments of the Citizen's Utility Board* December 6, 2019, pages 6-18.

⁸⁷ PGE. *Reply Comments* December 30, 2019, page 18.

⁸⁸ *Comments of Greenlots on Portland General Electric's Transportation Electrification Plan* December 6, 2019, page 4.

⁸⁹ *Comments of the Alliance for Transportation Electrification* December 6, 2019, page 1.

electrification: “It is our belief that PGE needs to invest at least \$50 million per year in TE infrastructure, outreach and programs, over the next three years (and probably higher investments over time), to put Oregon on track to achieve the legislative targets and climate imperative.”⁹⁰

Reason for Staff Recommendation

OAR 860-087-0020 requires comprehensive planning for transportation electrification by a regulated utility. In Staff’s opinion, there are parts of PGE’s Plan that do not rise to the level of planning ordered by the Commission’s rule. The biggest obstacle for Staff to recommend acceptance was the absence of a forward projection of cost, using what is known already from UM 1811 and UM 1938. However, Staff is allowing PGE’s conceptualization of future costs to meet this requirement. We are doing this for three reasons. First, PGE deserves credit for being the first Oregon utility to file a TE Plan. PGE filed its TE Plan less than six months after the associated rulemaking (AR 609) closed. The TE space (pilots, activities, and analysis) is relatively new.

Second, the time between the filing of Staff’s comments and the Company’s deadline for reply comments occurred during the holiday. Key PGE analysts were out on leave. PGE notified Staff they were understaffed due to the holiday before the Company filed its reply comments.

Third, Staff is convinced PGE has made a good faith effort to disclose its current state of EV planning to the public. The Company has never before produced some of the analysis required by OAR 860-087-0020. Staff finds the current small size and remaining uncertainty of the EV market as reasonable explanations for PGE’s current level of planning. Staff also notes, the Company is far ahead of most utilities in the United States in its EV planning. Staff expects a more mature EV market two years from now and will expect a more mature state of planning and supporting data and analysis from PGE when we review the Company’s next TE Plan. In the next TE Plan, Staff will expect far more detailed modeling of projected program and system costs, as we all learn more about this important market and role for our Oregon utilities.

Conclusion

After engaging with Staff in the Company’s reply comments and data responses, PGE has met the requirements of OAR 860-087-0020.

PROPOSED COMMISSION MOTION:

Accept PGE’s Transportation Electrification Plan.

⁹⁰ *Climate Solutions and Oregon Environmental Council’s Joint Comments on Portland General Electric’s Transportation Electrification (TE) Draft Plan* December 6, 2019, page 2.