Chapter 9. Budget

This chapter details the portfolio budget for this TE Plan. The focus of this Plan is the incremental or "new" activities and proposed budgets (including extensions and expansions of existing activities) and our envisioned portfolio over the 2023-2025 timeframe. Based on OPUC Staff guidance, we also include the budget for currently approved or "existing" activities.[222]

As explained in the Summary for Policy Makers Section, the Plan balances the needs of the market with the incremental funding request of customers. At the same time, the Plan's activities collect the necessary data and experience in areas such as make-ready, rate, and tariff design to transition PGE's TE activity to more sustainable traditional structures beyond program development.

Table 31. Summary of Transportation Electrification Expenditures

	2023	2024	2025	2023-2025 Total
Existing Approved Activities[223]	$18,082,553	$8,272,666	$2,009,728	$28,364,947
All Clean Fuels Program	$11,758,817	$13,714,381	$17,856,449	$43,329,647
New Activities[224]	$-	$8,018,318	$16,318,944	$24,337,262
Total	$29,841,370	$30,005,365	$36,185,121	$96,031,856

The above table provides a high-level summary of PGE's proposed TE expenditures, for both the "new" activities within the three-year (2023-2025) period of the proposed plan as well as the "existing" expenditures in program years (2022-2025) for additional context. Note that the New Activities line item in the above table includes both start-up programs and also incremental expenditures for existing activities. The PGE Clean Fuels Programs line item is based on projected revenues from the sale of Oregon Clean Fuels credits, and thus can be expected to vary depending on wholesale market prices as credits are monetized.

9.1 Context of Long-Term Expenditures (next 10 years)

PGE has carefully weighed an array of inputs, detailed in previous sections of the Plan, to arrive at the TE budget supporting this plan. The budget reflects a measured approach in the developing TE market and balances the need to prepare for the coming growth in TE load with management of the associated risk and cost to customers.

It should, however, be noted that the rapid pace of change in the TE market does present uncertainties which, if left unmanaged, could impact the success of utility TE activities. In this section, we assess these key sensitivities and their potential impact to our long-term (10 year) expenditures, and also lay out our plan to monitor, manage, and adapt to the concomitant risks.

[222] Per OPUC Staff Memo, Public Meeting May 5, 2022. The 2022 TE Plan should include year 2022 its scope.
[223] Excludes CFP. The figures shown in the "Existing Approved Activities" row of this budget have been approved previously by the Commission through docketed proceedings, detailed in Appendix I.
[224] Includes PGE programs which are funded by forecasted CFP dollars.

9.1.1 Sensitivity: Supply Chain and Inflation

The TE Portfolio relies on the availability of a variety of EVSE to meet the needs of residential homeowners, renters, underserved communities, fleet expansion, and heavy-duty and public charging. PGE has seen extended timeframes for key components of the make-ready infrastructure to the charger equipment (e.g., switchgear and transformers). Materials costs have also dramatically increased over the last several years.[225] PGE will continue to evaluate our implementation and ordering processes to ensure we meet program demand within budget over the next three years and beyond.

Supply chain delays and the inflation risk have the potential to slow down EV adoption across all sectors in the next year.[226] PGE will continue to monitor, manage, and adapt to these risks as well as factor in our ability to meet the anticipated market demand anticipated by the TEINA and in PGE's own forecasts. Material changes will be reflected in future filings. These risks could require PGE to slow some program implementations or, conversely, create new practices and/or supply chain agreements to speed the implementation of other necessary programs.

9.1.2 Sensitivity: Changes in the TE Market

Technology improvements are likely to continue to affect EV adoption and therefore utility TE activities. Automakers are expected to continue their focus on extending vehicle range and capabilities to further EV adoption. It is important to note that the battery is the most expensive component in many EVs and that advances in that technology may increase EV purchase costs. If EV purchase costs increase, customers may purchase EVs with smaller batteries, with reduced range and increased need for charging access. PGE will continue to focus on adequate charging as a means to mitigate this risk. Conversely, technology improvements may reduce the cost of batteries and therefore help address EV purchase costs. Our TE portfolio may require increased focus on public charging if we see technology changes that require a larger investment in underserved communities, or if technology advancements change charging behavior.

The broader economy and EV and EVSE markets also influence the best pace of utility TE activities. During the 2020 economic downturn driven by the COVID-19 pandemic, U.S. EV sales rose 4 percent while U.S. ICE sales fell by 14-15 percent.[227] Future economic downturns may exhibit different characteristics that impact the EV market in unexpected ways, potentially slowing the pace of EV purchases.

Manufacturers are expanding consumer options by increasing the number and type of EVs they offer. The extent and location of investment in EV charging by private EVSE networks and manufacturers also influences charging adequacy in the PGE service area as well as the charging experience of utility customers. PGE will continue to monitor both of these factors as we adjust our TE portfolio.

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[225] See Section 4.6.5.2 for discussion of the impact of supply chain challenges.
[226] Paoli, Gül; International Energy Agency (IEA). *Electric Cars Fend Off Supply Challenges to More Than Double Global Sales*. Retrieved on September 26, 2022 from https://www.iea.org/commentaries/electric-cars-fend-off-supply-challenges-to-more-than-double-global-sales.
[227] Gorner, Paoli; International Energy Agency (IEA). *How global electric car sales defied Covid-19 in 2020*. Retrieved on September 23, 2022 from https://www.iea.org/commentaries/how-global-electric-car-sales-defied-covid-19-in-2020.

9.1.3 Sensitivity: Uneven EV Adoption Across Customer Communities

We know that EV adoption will be slower in underserved communities relative to the general population due to less car ownership in underserved communities along with less charging availability as well.[228] These two factors mean that the utilization rate of chargers in these areas may not match that in other growth areas which decreases private market interest in locating charging in underserved communities.

This may occur in more rural areas, communities of color, communities with lower incomes, or multi-family residences. PGE's TE portfolio is designed to serve all our customers with a focus on underserved communities. Our technical assistance services to fleet customers and online cost of ownership tools for all customers may be especially useful to these communities, which may exhibit lower EV adoption. We may see greater uptake of infrastructure measures in some areas, and if we see higher than expected utilization of chargers in underserved communities, we will evaluate the need to further extend public charging programs in those areas.

9.1.4 Sensitivity: Changing Needs for Non-Residential Customers

PGE's Fleet Partner program has received significant interest. We believe fleet electrification will continue to be a priority over the next 10 years for fleet owners in PGE's service area. This could lead to an extension of the Fleet Partner program and provide a high benefit-cost ratio, which could in turn bolster PGE's overall TE portfolio and support our continued efforts to meet the needs of other segments of the non-residential TE market. Economic conditions and unexpected challenges such as the recent COVID-19 pandemic may impact charging patterns across different use cases such as workplace or public charging. PGE will continue to evaluate these activities alongside other public charging programs to ensure they continue to meet the needs of our communities.

9.1.5 Summary of Long-Term Expenditures (next 10 years)

Based on PGE's adjusted TEINA results, we know that this Plan does not, by itself, address the entirety of the charging need anticipated over the next 10 years in our service area. PGE will continue to carefully monitor its TE portfolio and balance the need for adequate preparation for the coming growth in TE load with our commitment to management of associated risks and costs to customers. In doing so, PGE will assess the adequacy of investments in underserved communities, equity, uptake of programs, economic conditions, fleet electrification, availability of electric heavy-duty vehicles, and also changes in EV adoption. While we cannot predict with certainty the impact that the above factors may have upon the specific programs and measures called for in our 2023 TE Plan, we believe they represent a measured approach and are funded at a responsible level to lay the groundwork for continued TE support over the next 10 years and beyond. This plan does not include the distribution grid-level investments required for EV charging as they will be included and addressed in the Distribution System Plan.

[228] See Disadvantaged Communities section, Oregon Department of Transportation TEINA Study, retrieved from https://www.oregon.gov/odot/Programs/Documents/23021%20T031%20TEINA%20Report%20August%202022.pdf.

9.2 Expenditures

The following table presents existing approved budgets combined with a forecast for new programs of proposed operating and capital expenditures (OpEx and CapEx, respectively[229]). For a detailed breakout of existing and proposed budgets by activity, please see Appendices A-C.

Table 32. Program Operating and Capital Expenditures, 2023-2025[230]

Programs	2023	2024	2025	2023-2025 Total
Business and Multi-family Make-ready Solutions[231]	$210,100	$1,085,452	$1,251,578	$2,547,130
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Business EV Charging Rebates	$460,000	$2,328,728	-	$2,788,728
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Clean Fuels Program[232]	$11,758,817	$13,714,381	$17,856,449	$43,329,647
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
EV Ready Affordable Housing Grants	$1,000,000	-	-	$1,000,000
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Fleet Partner Pilot	$5,258,760	$6,415,740	$6,442,773	$18,117,273
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]

[229] Operating expenditures are costs recovered in rates each year. Capital expenditures are costs recovered in rates over many years (the period varies with the life of the asset, which reduces impact on customer bills).
[230] Figures shown in this budget include those approved previously by the Commission through docketed proceedings, detailed in Appendix I.
[231] Clean Fuels Program is covering the costs of the Business and Multi-family Make-ready Solutions program in 2024 and 2025.
[232] Clean Fuels Program forecasted totals for 2024 and 2025 do not include the dollars which are allocated to fund Business and Multi-family Make-ready Solutions.

Programs	2023	2024	2025	2023-2025 Total
Heavy Duty Charging Pilot	$1,997,290	$1,186,441	$436,723	$3,620,453
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Portfolio Support	$1,811,500	$387,500	$287,500	$2,486,500
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Public Charging - Municipal Charging Collaboration and Electric Ave	$4,927,903	$2,941,812	$7,779,689	$15,649,404
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Residential Smart EV Charging Pilot	$2,417,000	$1,945,313	$2,130,409	$6,492,722
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Grand Total	$29,841,370	$30,005,365	$36,185,121	$96,031,856
Total CapEx	[redacted]	[redacted]	[redacted]	[redacted]
Total OpEx	[redacted]	[redacted]	[redacted]	[redacted]

Table 33. Detail on Program Operating and Capital Expenditures[233]

Programs	2023	2024	2025	2023-2025 Total
Business & Multi-Family Make-Ready Solutions	$210,100	$1,085,452	$1,251,578	$2,547,130
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Business EV Charging Rebates	$460,000	$2,328,728	-	$2,788,728
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Clean Fuels Program[234]	$11,758,817	$13,714,381	$17,856,449	$43,329,647
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
EV Ready Affordable Housing Grants	$1,000,000	-	-	$1,000,000
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]

[233] For a detailed breakout of existing and proposed budgets by activity, please see Appendices A-C. Figures shown in this budget include those approved previously by the Commission through docketed proceedings, detailed in Appendix I.

[234] Operating expenditures are costs recovered in rates each year. Capital expenditures are costs recovered in rates over many years (the period varies with the life of the asset, which reduces impact on customer bills).

Programs	2023	2024	2025	2023-2025 Total
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Fleet Partner Pilot	$5,258,760	$6,415,740	$6,442,773	$18,117,273
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Heavy Duty Charging Pilot	$1,997,290	$1,186,441	$436,723	$3,620,453
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Portfolio Support	$1,811,500	$387,500	$287,500	$2,486,500
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Public Charging - Municipal Charging Collaboration and Electric Ave	$4,927,903	$2,941,812	$7,779,689	$15,649,404
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments - Electric Avenue	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments - Municipal Charging Collaboration	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation - Electric Avenue	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation - Municipal Charging Collaboration	[redacted]	[redacted]	[redacted]	[redacted]

Programs	2023	2024	2025	2023-2025 Total
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Residential Smart Charging Pilot	$2,417,000	$1,945,313	$2,130,409	$6,492,722
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]
Grand Total	$29,841,370	$30,005,365	$36,185,121	$96,031,856
CapEx	[redacted]	[redacted]	[redacted]	[redacted]
OpEx	[redacted]	[redacted]	[redacted]	[redacted]
Incentives	[redacted]	[redacted]	[redacted]	[redacted]
Program Operations	[redacted]	[redacted]	[redacted]	[redacted]
O&M on Investments	[redacted]	[redacted]	[redacted]	[redacted]
Evaluation	[redacted]	[redacted]	[redacted]	[redacted]
Education and Outreach	[redacted]	[redacted]	[redacted]	[redacted]
Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]

9.3 Funding Sources

The following table provides a forecast of all funding sources to be utilized in support of PGE's TE-related activities during the 2023-2025 planning cycle for both existing and new activities, by year. Due to regulatory and other priorities, the proposed values in the table below and throughout this section may be further refined.

Table 34. Summary of Funding Sources for TE-related Activities, Existing and New (2023-2025)[235]

	2023	2024	2025	2023-2025 Total
Existing/Approved	$18,082,553	$8,272,666	$2,009,728	$28,364,947
Deferral	$2,646,059	$678,162	$305,747	$3,629,968
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
GRC/Base Rates	$7,410,200	$5,267,177	$1,505,181	$14,182,557
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MMC	$8,026,294	$2,327,328	$198,800	$10,552,422
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[235] Figures shown in this budget include those approved previously by the Commission through docketed proceedings, detailed in Appendix I.

	2023	2024	2025	2023-2025 Total
PGE Clean Fuels Programs	$11,758,817	$13,714,381	$19,809,449	$45,282,647
[redacted]				
[redacted]				
Incremental	-	$8,018,318	$14,365,944	$22,384,262
GRC/Base Rates	-	$3,296,506	$6,593,530	$9,890,036
[redacted]				
[redacted]				
MMC	-	$4,721,812	$7,772,414	$12,494,226
[redacted]				
[redacted]				
Grand Total	$29,841,370	$30,005,365	$36,185,121	$96,031,856
[redacted]				
[redacted]				

All forecasts are inherently uncertain, so we reiterate that the dollar projections in the above table are based on the best information available to PGE at the time this plan was prepared. Actual revenue may–and likely will–vary from these estimates. For instance, PGE Clean Fuels program revenues are dependent on EV adoption rates, the rules and policies of the Oregon Department of Environmental Quality in issuing Clean Fuels credits, and market prices for the sale of Clean Fuels credits. Market prices in particular are subject to potential volatility during the three-year period of this plan and can be expected to fall short of or exceed current projections. Likewise, Monthly Meter Charge revenues are based on PGE's current base rates and projected retail power sales during the planning period. Should base rates change in a future General Rate Case or power sales exceed or fall short of projections, Monthly Meter Charge revenues will diverge from these estimates.

The revised Division 87 rules adopted by the Commission on September 6, 2022 require PGE to file an update to its TE Plan and Budget in the event that material changes occur during the period of the plan.[236] Material changes are new TE program or infrastructure measure applications, or program or infrastructure changes that require new incremental customer dollars. PGE will seek to manage within its overall TE budget to address variations in revenue from projections. PGE will file a budget update for Commission approval in the event that we determine significant shortfalls in non-ratepayer funding sources which should be backfilled with additional ratepayer funds to achieve essential TE portfolio objectives.

The two tables below provide additional transparency by listing funding sources for each program by year for both approved and incremental program spend. Note that the spend is a forecast and may extend beyond the year shown depending on customer interest and decision-making timeframes.

[236] OPUC Order No. 22-336, Appendix A, Page 5 of 14, available online at https://apps.puc.state.or.us/orders/2022ords/22-336.pdf.

Table 35. Detail on Program Spend by Funding Source for Incremental Spend

Incremental	2023	2024	2025	2023-2025 Total
Business and Multi-family Make-ready Solutions	-	-	-	-
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Business EV Charging Rebates	-	-	-	-
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Clean Fuels Program[237]	-	$13,714,381	$17,856,449	$31,570,830
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	$13,714,381	$17,856,449	$31,570,830
EV Ready Affordable Housing Grants	-	-	-	-
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Fleet Partner Pilot	-	$3,036,856	$6,427,093	$9,463,949
GRC/Base Rates	-	$3,036,856	$6,427,093	$9,463,949
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Heavy Duty Charging Pilot	-	-	-	-
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Portfolio Support	-	$387,500	$287,500	$675,000

[237] Clean Fuels Program forecasted totals for 2024 and 2025 do not include the dollars which are allocated to Business and Multi-family Make-ready solutions.

Incremental	2023	2024	2025	2023-2025 Total
GRC/Base Rates	-	$100,000	-	$100,000
MMC	-	$287,500	$287,500	$575,000
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Public Charging - Electric Ave	-	-	-	-
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Public Charging - Municipal Charging Collaboration	-	**$2,648,650**	**$7,473,942**	**$10,122,591**
GRC/Base Rates	-	$159,650	$166,437	$326,087
MMC	-	$2,489,000	$5,354,505	$7,843,504
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	$1,953,000	$1,953,000
Residential Smart Charging Pilot	-	**$1,945,313**	**$2,130,409**	**$4,075,722**
GRC/Base Rates	-	-	-	-
MMC	-	$1,945,313	$2,130,409	$4,075,722
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Grand Total	-	**$21,732,699**	**$34,175,393**	**$55,908,092**
GRC/Base Rates	-	$3,296,506	$6,593,530	$9,890,036
MMC	-	$4,721,812	$7,772,414	$12,494,226
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	$13,714,381	$19,809,449	$33,523,830

Table 36. Detail on Program Spend by Funding Source for Approved Spend[238]

Existing and Approved	2023	2024	2025	2023-2025 Total
Business & Multi-Family Make-ready Pilot	**$210,100**	**$1,085,452**	**$1,251,578**	**$2,547,130**
GRC/Base Rates	$100,000	$701,852	$1,052,778	$1,854,630
MMC	$110,100	$383,600	$198,800	$692,500
Deferral	-	-	-	-
Grants	-	-	-	-

[238] The figures shown in this budget have been approved previously by the Commission through docketed proceedings, detailed in Appendix I.

Existing and Approved	2023	2024	2025	2023-2025 Total
Clean Fuels	-	-	-	-
Business EV Charging Rebates	**$460,000**	**$2,328,728**	**-**	**$2,788,728**
GRC/Base Rates	-	-	-	-
MMC	$14,000	$1,943,728	-	$1,957,728
Deferral	$446,000	$385,000	-	$831,000
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Clean Fuels Program	**$11,758,817**	**-**	**-**	**$11,758,817**
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	$11,758,817	-	-	$11,758,817
EV Ready Affordable Housing Grants	**$1,000,000**	**-**	**-**	**$1,000,000**
GRC/Base Rates	-	-	-	-
MMC	$1,000,000	-	-	$1,000,000
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Fleet Partner Pilot	**$5,258,760**	**$3,378,884**	**$15,680**	**$8,653,324**
GRC/Base Rates	$4,426,760	$3,378,884	$15,680	$7,821,324
MMC	$832,000	-	-	$832,000
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Heavy Duty Charging Pilot	**$1,997,290**	**$1,186,441**	**$436,723**	**$3,620,453**
GRC/Base Rates	$1,997,290	$1,186,441	$436,723	$3,620,453
MMC	-	-	-	-
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Portfolio Support	**$1,811,500**	**-**	**-**	**$1,811,500**
GRC/Base Rates	$300,000	-	-	$300,000
MMC	$1,511,500	-	-	$1,511,500
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Public Charging - Electric Ave	**$520,059**	**$293,162**	**$305,747**	**$1,118,968**
GRC/Base Rates	-	-	-	-
MMC	-	-	-	-
Deferral	$520,059	$293,162	$305,747	$1,118,968
Grants	-	-	-	-
Clean Fuels	-	-	-	-

Existing and Approved	2023	2024	2025	2023-2025 Total
Public Charging - Municipal Charging Collaboration	**$4,407,844**	**-**	**-**	**$4,407,844**
GRC/Base Rates	$586,150	-	-	$586,150
MMC	$3,821,694	-	-	$3,821,694
Deferral	-	-	-	-
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Residential Smart Charging Pilot	**$2,417,000**	**-**	**-**	**$2,417,000**
GRC/Base Rates	-	-	-	-
MMC	$737,000	-	-	$737,000
Deferral	$1,680,000	-	-	$1,680,000
Grants	-	-	-	-
Clean Fuels	-	-	-	-
Grand Total	**$29,841,370**	**$8,272,666**	**$2,009,728**	**$40,123,764**
GRC/Base Rates	$7,410,200	$5,267,177	$1,505,181	$14,182,557
MMC	$8,026,294	$2,327,328	$198,800	$10,552,422
Deferral	$2,646,059	$678,162	$305,747	$3,629,968
Grants	-	-	-	-
Clean Fuels	$11,758,817	-	-	$11,758,817

9.3.1 Monthly Meter Charge Expenditures

HB 2165 requires that utilities make reasonable efforts to expend no less than half of the funds collected to support transportation electrification in underserved communities.[239] PGE allocated the Monthly Meter Charge across its portfolio to support a variety of activities and identified the portion of these allocations that support underserved communities. The following table provides a forecast of the percentage of each activity's Monthly Meter Charge allocations that are expected to provide benefit to underserved communities. Overall, PGE projects spending 63 percent of the 2022-2025 Monthly Meter Charge funding on activities that meet the needs of underserved communities.

[239] HB 2165 Section 2(6), retrieved from https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB2165/Enrolled.

Table 37. Forecasted Percentage and Amount of Monthly Meter Charge Allocations that Benefit Underserved Communities

Program	Underserved Contribution %	Spending Categories	2023	2024	2025	2023-2025
Business & Multi-Family Make-Ready Solutions	**60%**	**Underserved Contribution**	**$66,060**	**$230,160**	**$119,280**	**$415,500**
		Not Contributing to Underserved	$44,040	$153,440	$79,520	$277,000
		Total MMC Allocation	$110,100	$383,600	$198,800	$692,500
Business EV Charging Rebates	**38%**	**Underserved Contribution**	**$5,320**	**$738,617**	**-**	**$743,937**
		Not Contributing to Underserved	$8,680	$1,205,111	-	$1,213,791
		Total MMC Allocation	$14,000	$1,943,728	-	$1,957,728
EV Ready Affordable Housing Grants	**100%**	**Underserved Contribution**	**$1,000,000**	**-**	**-**	**$1,000,000**
		Not Contributing to Underserved	-	-	-	-
		Total MMC Allocation	$1,000,000	-	-	$1,000,000
Fleet Partner Pilot	**20%**	**Underserved Contribution**	**$166,400**	**-**	**-**	**$166,400**
		Not Contributing to Underserved	$665,600	-	-	$665,600
		Total MMC Allocation	$832,000	-	-	$832,000
Heavy Duty Charging Pilot	**0%**	**Underserved Contribution**	**-**	**-**	**-**	**-**
		Not Contributing to Underserved	-	-	-	-
		Total MMC Allocation	-	-	-	-
Portfolio Support	**50%**	**Underserved Contribution**	**$755,750**	**$143,750**	**$143,750**	**$1,043,250**
		Not Contributing to Underserved	$755,750	$143,750	$143,750	$1,043,250
		Total MMC Allocation	$1,511,500	$287,500	$287,500	$2,086,500
Public Charging - Municipal Charging Collaboration	**75%**	**Underserved Contribution**	**$2,866,271**	**$1,866,750**	**$4,015,878**	**$8,748,899**
		Not Contributing to Underserved	$955,424	$622,250	$1,338,626	$2,916,300
		Total MMC Allocation	$3,821,694	$2,489,000	$5,354,505	$11,665,198
Residential Smart Charging Pilot	**50%**	**Underserved Contribution**	**$368,500**	**$972,656**	**$1,065,205**	**$2,406,361**

Program	Underserved Contribution %	Spending Categories	2023	2024	2025	2023-2025
		Not Contributing to Underserved	$368,500	$972,656	$1,065,205	$2,406,361
		Total MMC Allocation	$737,000	$1,945,313	$2,130,409	$4,812,722
Total MMC Allocations	**63%**	**Underserved Contribution**	**$5,228,301**	**$3,951,932**	**$5,344,113**	**$14,524,346**
		Not Contributing to Underserved	$2,797,994	$3,097,207	$2,627,101	$8,522,302
		Total MMC Allocation	$8,026,294	$7,049,140	$7,971,214	$23,046,648

9.3.2 Clean Fuels Program Credits

PGE participates in the Oregon Clean Fuels Program as a credit generator on behalf of residential customers. Revenues are dependent on the number of EVs attributed to PGE's service area by the DEQ, as well as market prices for the sale of Clean Fuels credits. Both of these factors are subject to potential volatility during the three-year period of this plan and may fall short of (or exceed) current projections. The credits-per-vehicle is based on assumptions made by the DEQ on average usage, vehicle efficiency, and the carbon intensity of the fuel.

The DEQ uses the below methodology to calculate residential CFP credits:

$$EV\ Electricity\ Use = \#\ of\ vehicles\ x\ Daily\ Average\ Electricity\ Use\ x\ \#\ of\ Days\ in\ Compliance\ Period$$

- $Credits = (CI\ Standard - Fuel\ CI/EER) * Energy * Energy\ Density * EER$
- Where:
  - Carbon Intensity (CI) Standard is the gasoline or diesel standard for a given compliance period (gCO2e/MJ)
  - Fuel CI is either the statewide CI for electricity or a utility-specific value as requested by the utility (gCO2e/MJ)
  - EER is the energy economy ratio based on the type of vehicle
  - Energy is the amount of electricity used (kWh)
  - Energy Density is the energy density of electricity (MJ/kWh)

Credits are then allocated to individual electric utilities based on the number of EVs registered in their service territories.

Figure 19. Residential CFP Credit Methodology[240]

[240] Oregon DEQ. *Oregon Clean Fuels Program: Calculating Residential EV Credits*. Retrieved from https://www.oregon.gov/deq/FilterDocs/cfp-resevcredits.pdf.

This portfolio includes the use of CFP revenues to support the broader TE portfolio, possible with the Commission Order No. 22-314[241], which removed the CFP principle requiring programs be independent from ratepayer supported programs. With this shift, PGE proposes to use approximately $2.0 million in CFP revenue to support activities across the TE portfolio supporting infrastructure in underserved residential communities. While the Commission removed the principle from ratepayer supported programs, expenditures must still meet the remaining CFP principles to be funded by CFP revenue:

1. Support the goal of electrifying Oregon's transportation sectors
2. Provide majority of benefits to residential customers
3. Provide benefits to traditionally underserved communities
4. Programs are developed collaboratively and transparently
5. Maximization of funds for implementation of programs

Additionally, this is the first time the company has published a forward-looking estimate of CFP revenue. It is important to note that PGE is a participant in the CFP marketplace, which is subject to market fluctuations. As this forecast is based on multiple forward-looking estimates, readers should assume actual credit revenue will vary. PGE will continue to report actual credit revenue to both the OPUC and DEQ on an annual basis.

The following table details assumptions for the cost estimate of the CFP:

Table 38. Assumptions for the Cost Estimate of the Clean Fuels Program

No.	Assumptions
1	Residential CFP credits are issued to PGE from DEQ based on the number of LDVs registered through the DMV in PGE's service area for the previous year
2	The actual vehicle and credit counts are current through 2021
3	2022-2025 CFP estimation is based on the PGE LDV count forecast from AdopDER, developed as part of the DSP
4	It takes PGE one calendar year to monetize residential CFP credits
5	Each year's forecast is based on the vehicle/CFP count from two years prior (e.g., 2022 is based on 2020 EV count)
6	CFP programs are incorporated into the TE Plan process
7	In the cost estimate, the portfolio percentage approach is applied through 2025
8	We utilize a conservative, stable growth scenario based on the average CFP credit price over the past two years. This scenario forecasts a short term dip in credit prices reflecting decreased demand and increased credit supply, followed by a longer term, steady rise due

[241] OPUC Order No. 22-314, retrieved from https://apps.puc.state.or.us/orders/2022ords/22-314.pdf.

No.	Assumptions
	to increasing credit demand as it becomes more expensive for fuel suppliers/credit buyers to marginally reduce emissions.
9	PGE will leverage renewable energy credits (RECs) to claim all available residential incremental credits
10	REC prices are not forecasted in this estimate; they represent an administrative expenditure
11	The 2022-2025 CFP cost estimate is dependent on three market driven elements: EV counts, CFP credit price, REC prices
12	The CFP market will continue through 2025, and the rules and policies of the Department of Environmental Quality will not materially change credit generation calculations during that period

9.3.3 Deferrals

PGE has three open deferrals supporting transportation electrification work:

- UM 1938, which covers PGE's UM 1811 TE pilots for Electric Avenue expansion, TriMet charging, as well as education and technical assistance
- UM 2003, which covers the original portions of PGE's Business EV Charging Rebates and Residential Smart Charging pilots
- UM 2218, a balancing account for the Monthly Meter Charge

PGE does not propose to open any new deferrals to support the future TE work described in this Plan.

9.4 Spending to Benefit Underserved Communities

PGE has identified the amount of program spend for each program intended to meet the needs of underserved communities. In cases such as Business and Multi-family Make-ready Solutions, the entire customer segment eligible for the program is designated as underserved. In other cases such as Residential Smart EV Charging, PGE has forecasted the portion of the program that will benefit underserved communities. In the latter instance, there is a possibility that enrollment of customers who are either themselves part of an underserved community or serve those communities will exceed the programmatic requirement or forecast. As required, PGE will track actual spend on underserved communities and report this in our annual TE Plan Report.

Table 39, below, presents a forecast of all spending on underserved communities, grouped by program and/or infrastructure measure, and further divided into:

- Expenditures of funds collected through the Monthly Meter Charge, as required by Oregon Laws 2021, Chapter 95, Section 2
- Spending from revenues other than the Monthly Meter Charge, including but not limited to grants, Oregon Clean Fuels Program credits, base rates, and deferrals

Table 39. Program Spending to Benefit Underserved Communities[242]

Program	Funding Source	2023	2024	2025	2023-2025 Total
Business and Multi-family Make-Ready Solutions	**Subtotal**	**$126,060**	**$651,271**	**$750,947**	**$1,528,278**
	GRC/Base Rates	$60,000	$421,111	$631,667	$1,112,778
	MMC	$66,060	$230,160	$119,280	$415,500
Business EV Charging Rebates	**Subtotal**	**$174,800**	**$884,917**	**-**	**$1,059,717**
	MMC	$5,320	$738,617	-	$743,937
	Deferral	$169,480	$146,300	-	$315,780
Clean Fuels Program	**Subtotal**	**$8,301,725**	**$9,682,353**	**$12,423,071**	**$30,407,149**
	Clean Fuels	$8,301,725	$9,682,353	$12,423,071	$30,407,149
EV Ready Affordable Housing Grants	**Subtotal**	**$1,000,000**	**-**	**-**	**$1,000,000**
	MMC	$1,000,000	-	-	$1,000,000
Fleet Partner Pilot	**Subtotal**	**$1,051,752**	**$1,283,148**	**$1,288,555**	**$3,623,455**
	GRC/Base Rates	$885,352	$1,283,148	$1,288,555	$3,457,055
	MMC	$166,400	-	-	$166,400
Heavy Duty Charging Pilot	**Subtotal**	**$998,645**	**$593,220**	**$218,361**	**$1,810,226**
	GRC/Base Rates	$998,645	$593,220	$218,361	$1,810,226
Portfolio Support	**Subtotal**	**$905,750**	**$193,750**	**$143,750**	**$1,243,250**
	GRC/Base Rates	$150,000	$50,000	-	$200,000
	MMC	$755,750	$143,750	$143,750	$1,043,250
Public Charging - Electric Ave	**Subtotal**	**$390,044**	**$219,872**	**$229,310**	**$839,226**
	Deferral	$390,044	$219,872	$229,310	$839,226
Public Charging - Municipal Charging Collaboration	**Subtotal**	**$3,305,883**	**$1,986,487**	**$5,605,456**	**$10,897,827**
	GRC/Base Rates	$439,613	$119,738	$124,828	$684,178
	MMC	$2,866,271	$1,866,750	$4,015,878	$8,748,899
	Clean Fuels	-	-	$1,464,750	$1,464,750
Residential Smart EV Charging	**Subtotal**	**$1,208,500**	**$972,656**	**$1,065,205**	**$3,246,361**
	MMC	$368,500	$972,656	$1,065,205	$2,406,361
	Deferral	$840,000	-	-	$840,000
Grand Total Underserved Spending		**$17,463,159**	**$16,467,674**	**$21,724,655**	**$55,655,488**

[242] Figures shown in this budget include those approved previously by the Commission through docketed proceedings, detailed in Appendix I.

9.5 Transportation Electrification-Related Costs and Benefits

Generally, the introduction of transportation electrification and other decarbonization goals across the economy are requiring changes to be made to legacy decision-making tools such as cost-effectiveness. OPUC Order 22-314 highlights the importance of transparent cost and benefit analysis to inform discussion and prioritization of utility investments in the TE space, while making clear that budget approvals for this TE Plan are not conditioned upon an investment in TE infrastructure or programs being cost-effective under current tests. Rather, the order notes that this information will be used to inform ongoing efforts to determine any necessary updates preceding subsequent TEP filings.

In developing our assessment of the costs and benefits of TE activity, we first reviewed the literature and engaged expert consultants to understand the range of thinking in this area and seek emerging best practices. We begin this section, then, with an overview and discussion of the general landscape regarding cost effectiveness for TE. Following that, we outline the costs and benefits of TE according to the three perspectives required by the Commission. Finally, we close the section with a discussion of possible trajectories for continued evolution around TE cost effectiveness in Oregon.

9.5.1 Literature Review and Policy Background

California's Standard Practice Manual (SPM) has been used for decades to inform and steer approaches to evaluating utility demand-side management programs, such as energy efficiency and demand response.[243] Although it was primarily developed for demand reduction programs, it was also intended for applications that add load, such as fuel switching or electrification. The main test perspectives of the SPM are:

- Utility Cost Test (UCT), alternatively referred to as the Program Administrator Cost Test (PACT), aims to reflect the perspective of the utility. The UCT includes costs and benefits pertaining to the utility system.
- Total Resource Cost (TRC) Test attempts to broaden the perspective to consider a more holistic view of the resource costs and benefits. Therefore, the TRC includes costs and benefits experienced by the utility system, plus costs and benefits to host customers.
- Societal Cost Test (SCT) takes the broadest view and includes the costs and benefits experienced by society.
- Participant Cost Test (PCT) includes costs and benefits experienced by host customers (i.e., participants).
- Ratepayer Impact Measure (RIM) Test aims to assess potential rate impacts resulting from DER investment applicable to both participants and non-participants.

In 2019, EPRI conducted a review of the California SPM and its various test perspectives to identify major critiques of the traditional tests and their applications, with particular attention to the suitability of applying the SPM to transportation electrification programs.[244] Their research found that the traditional SPM tests were still relevant and applicable to evaluating TE programs, but that "several

[243] See California Standard Practice Manual (2002), retrieved from https://www.calmac.org/events/spm_9_20_02.pdf.
[244] EPRI (2019). *The Total Value Test: A Framework for Evaluating the Cost-Effectiveness of Efficient Electrification*. Retrieved from https://www.epri.com/research/products/000000003002017017

refinements and additions to the SPM methodologies can improve its application to electrification projects."[245] This is especially true, the authors argue, due to the newness and associated uncertainties of TE programs stemming from, for example, long-term customer behavior, rapid technological change, amid other factors. EPRI proposes development of a new test, the "Total Value Test", for beneficial electrification, that seeks to amend the traditional SPM test perspectives for use in evaluating TE investments.

Other recent efforts have similarly sought to modernize or supplement the SPM, most notably the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM for DERs) developed by the National Energy Screening Project.[246] The NSPM for DERS was initially developed in 2017 and focused on energy efficiency program cost effectiveness and was updated in 2020 to broaden the scope to all DERs, including EVs. The 2020 version of the NSPM for DERs contains an entire chapter dedicated to providing guidance on electrification programs and considerations for cost effectiveness.[247] One of the most relevant takeaways from the NSPM for DERS regarding electrification is that the traditional SPM tests do not explicitly contain any treatment of the policy objectives that regulators are inherently aiming to balance in reviewing utility proposals.

Common among these publications is the notion that many perspectives need to be taken into consideration when evaluating the costs and benefits of TE programs, and there are several methods to demonstrate and understand costs and benefits. According to a 2018 report sponsored by the US DOE's Future Electric Utility Regulation series, the significant benefits of TE that lie outside of the typical utility system purview motivate a broadening of the perspectives used to judge TE investments, especially as early pilot programs begin to scale up.[248] These findings are consistent with the ongoing conversations with Staff and stakeholders regarding the appropriate role of cost effectiveness at this juncture in the evolution of TE in Oregon. Per Commission Guidance in Order 22-314, we have calculated values for a RIM, TRC, and SCT, discussed in detail later in this section.

Note that Commission Staff's guidance for implementing the new Division 87 rules, incorporated into Order No. 22-314,[249] indicates that Staff will not use benefit/cost analysis as the basis for recommending Commission approval of TE Budgets in the current planning cycle. Rather, Staff's intent in requiring standard cost tests in the current TE Plan is to enhance ongoing discussion about the role of this analysis in later budget development for subsequent TE Plan cycles. PGE looks forward to actively participating in workshops on this topic as Staff leads development of a jurisdiction-specific cost test for use in developing and evaluating TE Budgets in the future.

9.6 Costs and Benefits Results

This section describes the benefits and costs associated with PGE's TE-related activity. The results are presented along with key methodology considerations for which values are included under each test

[245] Ibid., p. 12.
[246] See https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/
[247] See Chapter 10 of the updated NSPM, which provides key points to consider for assessing cost-effectiveness of electrification, including TE.
[248] Jones et al. (2018). *The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives*. Retrieved from https://escholarship.org/content/qt92m984bs/qt92m984bs.pdf. The authors note that the RIM test may be suitable for early pilots and experiments, but that the broad and significant benefits of TE, coupled with the policy drivers at the federal, state, and local level, point towards more reliance on SCT or other yet-to-be-defined mechanisms.
[249] OPUC Order No. 22-314, Appendix A, Page 8 of 17, https://apps.puc.state.or.us/orders/2022ords/22-314.pdf.

perspective required under Order 22-314. We note here that, although a full expression of costs and benefits related to PGE's TE activity is included in the following sections, this is mainly to support constructive dialogue between Staff and stakeholders as to the overall picture of TE activity. The incremental costs and benefits related solely to the new activity proposed for PGE's TE Portfolio included in this TE Plan, and thus not already approved by the Commission or reflected in rates, will be proportionally lesser. For ease of distinguishing the summary results, at the end of this section we present separate model results for both PGE's overall TE activity, and the more limited 2023-2025 incremental TE Plan Portfolio of activity.

Before performing these tests, it is important to understand the revenue necessary to recover the costs associated with the programs, including an allowed return on capital. This revenue requirement, offset by revenues collected from programs' participants, informs overall rate impacts to customers. These values are shown in the following table:

Table 40. Summary of CapEx, OpEx, and Revenue Requirement All Expenditures, 2023-2025[250, 251]

Year	CAPEX	Capital Carrying Costs	Operating Expense	Total Revenue Requirement
2023	$6,456,274	$313,911	$23,385,096	$23,699,008
2024	$6,825,390	$767,124	$23,179,975	$23,947,099
2025	$8,314,059	$2,473,422	$27,871,062	$30,344,484
Totals	$21,595,723	$3,554,457	$74,436,134	$77,990,591

The above revenue requirement, revenues, energy sales, and net customer benefits are foundational for the following benefit-cost tests[252].

9.6.1 Rate Impact Measure Test

The Rate Impact Measure is a standard cost test to evaluate utility programs. It assesses the impact that an activity or set of activities have upon customer rates. The Regulatory Assistance Project (RAP) defines the RIM test as:

> *A test of energy efficiency cost-effectiveness that measures the impact of increased energy efficiency on prices. It is used to determine whether all utility consumers, including non-participants (i.e., the customers not deploying the energy efficiency), will receive lower rates as a result of implementing an efficiency measure.*[253]

[250] Due to regulatory and other priorities the proposed values in Table 40 and throughout this section may be further refined. We note that only new expenditures that may impact rates are included; existing, approved budgets and MMC are considered part of rate baseline and are excluded, as are Clean Fuels Program revenues, which have no rate impact.
[251] Figures shown in this budget include those approved previously by the Commission through docketed proceedings, detailed in Appendix I.
[252] For further detail on how the following benefit-cost tests relate to each other, see Lazar, Jim et al. *The Regulatory Assistance Project. Electricity Regulation In the US: A Guide Second Edition*, Section 17.6 Cost-Benefit Tests (page 125), retrieved from https://www.raponline.org/wp-content/uploads/2016/07/rap-lazar-electricity-regulation-US-june-2016.pdf.
[253] Ibid, page 194.

The inputs used to calculate the RIM test are presented in Table 41 below.

Table 41. RIM Test Primary Cost and Benefit Input Variables for TE Programs

Costs	Benefits
• Program delivery costs (admin, education and outreach, incentives, EM&V) • Utility O&M on investments • PGE capital carrying costs • Increased energy supply costs (including energy and capacity)	• Revenue gained from increased sales • Revenue gained from Clean Fuels Credits (where applicable) related to PGE charger ownership or allocated through PGE's Clean Fuels Program

Key assumptions and methods:

- Load shapes based on PGE forecasts
- The RIM cost test is based on the net present value of costs and benefits, assuming annual inflation of 2 percent
- Peak load hours are assumed to be 5 PM to 9 PM, Monday through Friday, year-round except for federal holidays

Interpretation: This test is expressed as a benefit/cost ratio. Any value over 1.0 means that the program is generating surplus benefit compared to cost, driving downward rate pressure on ratepayers. Values less than 1.0 mean that the program is not generating enough revenue to cover costs, putting upward pressure on rates overall.

9.6.2 Total Resource Cost Test

The Total Resource Cost test expands upon the RIM test by adding the net economic benefit to other parties, in this case customers. The RAP defines the TRC as:

> *A measure of energy efficiency cost-effectiveness that considers all resource-related costs and resource-related benefits of the measure. This is a broad test that includes costs paid by utilities, consumers, and third parties, and considers savings in all resource areas, including electricity, other fuels, labor, and comfort.*[254]

The most significant cost-savings factor when it comes to electrifying transportation options for the consumer are O&M savings, notably fuel cost savings and reduced maintenance and repair needs. These are assessed over the lifetime of the vehicle and contribute substantially to the overall benefits of TE.

There have been many studies conducted on the total cost of ownership which have used varying levels of detail and generally have relied on estimates versus actual historical data. This is understandable given the nascency of TE and relative lack of historical data for items like

[254] Lazar, Jim et al. *The Regulatory Assistance Project. Electricity Regulation In the US: A Guide Second Edition*, Section 17.6 Cost-Benefit Tests (page 199), retrieved from https://www.raponline.org/wp-content/uploads/2016/07/rap-lazar-electricity-regulation-US-june-2016.pdf.

maintenance and repair, or insurance costs of EVs. For this TE Plan, we rely on PGE's TCO tool, developed by West Monroe consultants.[255] We include TCO savings in the TRC test for the most common vehicle types expected to go through our programs. As an example, Figure 20 shows the lifetime customer benefits for adopting an electric Sedan over a comparable ICE model for the main drivers of the reduced TCO.

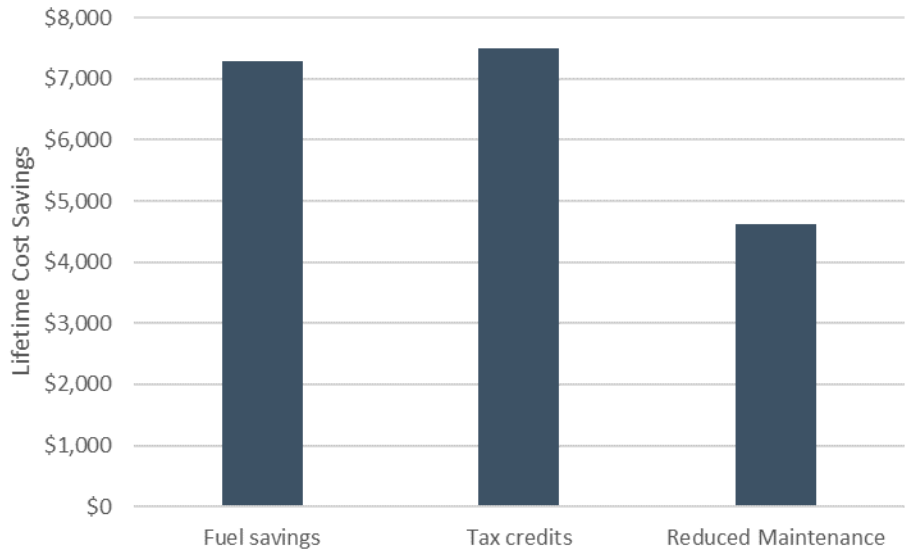

Figure 20. Total Cost of Ownership: Lifetime Dollar Savings from Adopting an EV Sedan compared to ICE-equivalent Vehicle

The inputs used to calculate the TRC test are presented in Table 42 below.

Table 42. TRC Test Primary Cost and Benefit Input Variables for TE Programs

Costs	Benefits
• Program delivery costs (admin, education and outreach, EM&V) • Utility O&M on investments • PGE capital carrying costs • Increased energy supply costs (including energy and capacity)	• Cost savings of an EV compared to an ICE vehicle • Revenue gained from Clean Fuels Credits (where applicable) related to PGE charger ownership or allocated through PGE's Clean Fuels Program

[255] PGE. *Fleet Total Cost of Ownership* Tool. Retrieved from https://portlandgeneral.com/form-fleet-total-cost-of-ownership-tool.

Key assumptions and methods:

- EV and ICE costs include purchase cost, tax credits, fuel cost, and maintenance cost over an assumed 10 year vehicle life. TCO for ICE vehicles and EVs is determined in part from values in PGE's EV Cost and Savings Calculator.
- Assumes equivalent mileage as EVs are substituted for existing ICE vehicles.
- Calculated as cost-per-MWh cost/benefit and applied to program generated load (driven by utilization of program-installed infrastructure).

Interpretation: The TRC test helps identify other non-utility benefits to assess whether the activity has benefits to other stakeholders that outweigh the costs. For this case, PGE added the net economic benefit of EV ownership. Although this helps us better evaluate the monetary benefits of this activity compared to the cost, it is important to note that it does not suggest that the program administrator–in this case the utility–has a positive economic case for the activity; rather, it simply means that benefits (and costs) exist and that the economic impact of the activity is felt by parties other than the administrator.

9.6.3 Societal Cost Test

The Societal Cost Test adds to the TRC a factor for benefits that impact society as a whole, rather than just explicitly the utility or EV drivers. The RAP defines the SCT as:

> *A measure of energy efficiency cost-effectiveness that considers all costs and all benefits of a measure, regardless of who pays or who benefits. This is the broadest cost test, and includes utility, customer, and third-party payments, energy benefits, non-energy economic benefits, plus societal benefits such as public health, economic development, and energy security.*[256]

PGE worked with consultants at Cadmus to review the literature surrounding non-energy impacts, including the societal impacts identified in the NSPM, and determined which of these were applicable to TE. The review determined that the following impacts were applicable to TE:

- Economic and jobs impacts
- GHG reductions
- Public health
- Energy security
- Other environmental impacts
- Resilience

For quantifying values for this test, PGE has included two interim values representing reduced carbon emissions and energy security impacts. Our approach to account for the cost of carbon in the SCT is to use the Social Cost of Carbon (SCC) and a reduced discount rate, consistent with the recommendations to the Oregon Global Warming Commission by the Oregon DOE.[257] The SCC is a

[256] Lazar, Jim et al. *The Regulatory Assistance Project. Electricity Regulation In the US: A Guide Second Edition*, Section 17.6 Cost-Benefit Tests (page 198), retrieved from https://www.raponline.org/wp-content/uploads/2016/07/rap-lazar-electricity-regulation-US-june-2016.pdf.
[257] Oregon Department of Energy. *Primer on the Social Cost of Carbon*. May 2020. Retrieved from https://www.oregon.gov/energy/energy-oregon/Documents/2020-Social-Cost-of-Carbon-Primer.pdf.

widely used metric and a popular method to quantify externalities associated with carbon release or sequestration.

For energy security impacts, we rely on recommendations provided by our consultants, E3, regarding use of EPA macroeconomic oil security premiums.[258] These values reflect energy security benefits based on avoiding sudden increases in oil prices that can lead to macroeconomic disruption. The EPA calculates these benefits based on a forward-looking expectation of marginal change in expected import costs and related changes to gross domestic product, which is a measure of macroeconomic activity. The values can be applied to reductions in crude oil imports resulting from TE. The energy security impact ranges from $3.15 (in 2018$/barrel) to $4.21/barrel in 2040.[259]

Note that these metrics are expected to evolve as PGE, Staff, and stakeholders continue to develop and align on an accepted methodology for future filings.[260]

Table 43, below, shows the cost and benefit inputs used to calculate the TRC test.

Table 43. SCT Primary Cost and Benefit Input Variables for TE Programs

Costs	Benefits
• Program delivery costs (admin, education and outreach, incentives, EM&V) • Utility O&M on investments • PGE capital carrying costs • Increased energy supply costs (including energy and capacity)	• Cost savings of an EV compared to an ICE vehicle • Revenue gained from Clean Fuels Credits (where applicable) related to PGE charger ownership or allocated through PGE's Clean Fuels Program • Benefit of reduced carbon emissions (using SCC), see key assumptions below • Benefit of improved energy security leveraging the US EPA macroeconomic oil security premium

[258] U.S. Environmental Protection Agency. (December 2021). *Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis.* Retrieved from https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year-light-duty-vehicle-greenhouse-gas-emissions-standards.

[259] These values in $/barrel are converted to lifetime $/vehicle based on the methodology followed by Malmgren, I. (2016). "Quantifying the Societal Benefits of Electric Vehicles" *World Electric Vehicle Journal, v*ol 8. There are roughly 19 gallons of gasoline per barrel of oil produced, translating to $0.17 to $0.22 per gallon. We then apply these to the lifetime gallons of gasoline saved by EVs as determined by the PGE's TCO calculator referenced above.

[260] Importantly, the public health benefits of TE are undoubtedly large, and yet are not explicitly included here. However, by leveraging an SCC value, a portion of the external damages (including health impacts) associated with vehicle emissions are implicitly captured. Given the difficulties associated with disentangling individual components of the SCC and comparing to alternative methods, we believe this is a suitable proxy for the time being.

Key assumptions and methods:

- Compared carbon emissions from ICE vehicles compared to EVs for equivalent usage per vehicle assuming a one-for-one substitution.
- Carbon intensity for electricity is PGE's system value (0.32 mt/MWh in 2023), which is declining as PGE moves toward CEP goals.
- Valued carbon using values from the Primer on the Social Cost of Carbon. The central estimate was used, incorporating a 3 percent social discount rate.
- Calculated as cost-per-MWh cost/benefit and applied to program generated load (driven by utilization of program-installed infrastructure).

Interpretation: The SCT takes the TRC one step further in that it includes impacts to parties not directly involved in the activity. By including the net benefit of carbon reduction, PGE has factored in benefits to society that we can estimate from the TE activity. Since this benefit is non-economic, it does not imply headroom for the administrator to spend to achieve these benefits, but it does enumerate their value.

Table 44, below, presents the overall benefit-cost ratios for each of the three test perspectives.

Table 44. Cost Effectiveness Tests, New Incremental Expenditures

Cost Effectiveness Results (Benefit Cost Ratio)[261]	All Years	2023-2032
Rate Impact Measure Test	0.68	0.69
Total Resource Cost Test	1.54	1.61
Societal Cost Test	1.79	1.85

9.7 Ratepayer Impact

9.7.1 Analysis of Ratepayer Impact for New Expenditures Not Already in Rates (2023-2025)

In proposing this Transportation Electrification budget, the Company has considered the need to prepare for significant new electric load within a challenging macroeconomic environment.[262] We do not propose to attempt to fulfill the entire need for TE infrastructure development in our service area with this Plan, but instead to advance toward that goal at a level that considers the range of utility activities that impact customer prices and establishes an appropriate, ongoing utility role in this effort.

[261] Costs associated with the incremental capacity need from EV charging are based off of electric load carrying capability data derived from the 2019 IRP. As soon as we have completed an updated analysis for TE activity from the recent IRP, we will update these calculations accordingly.

[262] PGE's 2022 DSP forecasts a load increase range of 12-40 MWa from 2022-2025.
See Chapter 3. DSP Chapter 3. Load and DER forecasting, Table 18. Transportation electrification potential forecasts. Retrieved from https://assets.ctfassets.net/416ywc1laqmd/46I2n65SyTv3TUMMdq1I55/a993aebb7b7a84ebd3209d798454a33a/DSP_Part_2_-_Chapter03.pdf.

In proposing this budget, we also engage directly in load management use cases and lay the groundwork for future managed charging scenarios. We believe this Plan reflects an investment that will benefit all customers.

Table 45. Estimated Rate Impact, New Expenditures (2023-2025)

Category	Schedule	2023 Rate Impact	2024 Rate Impact	2025 Rate Impact
Residential	7	0.11%	0.20%	0.23%
Small Non-residential	32	0.10%	0.18%	0.21%
Large Non-residential Time of Day	38	0.15%	0.26%	0.30%
Large Non-residential Capacity Tier	83	0.01%	0.02%	0.03%
Large Non-residential Capacity Tier	85	0.02%	0.03%	0.03%
Large Non- residential Capacity Tier	89	0.02%	0.04%	0.05%
Large Non- residential Capacity Tier	90	0.01%	0.02%	0.02%
Total Impact, All Schedules			0.08%	0.13%

The above table represents the total rate impact by year and schedule. Total rate impact is the total percentage increase in revenues from rates in all schedules compared with a 2022 base year.