

Transportation Electrification Draft 2023-2025 Plan – key elements

Workshop 5

OCTOBER 6, 2022



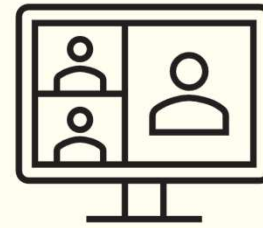
An Oregon kind of energy.



Meeting Logistics

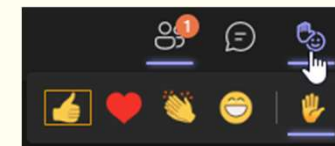
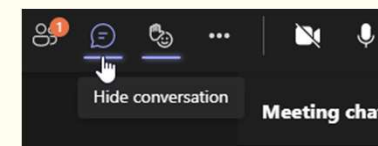
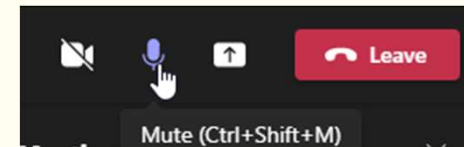
Teams Meeting

- Please click the meeting link sent to your email or [Click here to join the meeting](#)
 - +1 971-277-2317 (dial this number into your phone for best results)
 - Phone Conference ID: 284 133 834#
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During the presentation:

- All attendees will be muted; to unmute yourself via computer, click on the microphone that appears on the screen when you move your mouse
- To unmute yourself over the phone, **press *6**
- If you call in using your phone in addition to joining via the online link, please make sure to **mute your computer audio**
- Use the chat feature to share your comments and questions.
- Raise your hand icon to let us know you have a question



Operating Agreements

Establishing norms with our communities is foundational to building trust.

To create a **safe space**, we establish **common agreements** such as **respect** and **inclusivity**.

Practice curiosity and **seek to understand different perspectives**.

Stay Engaged

Experience Discomfort

Speak your Truth
(knowing it's only part of the truth)

Expect and Accept Non-closure

Share the Airtime. Step up, Step back.



[The courageous conversations framework](#)
By Glenn Singleton and Curtis Linton



Agenda

1. General remarks - 10 mins
2. Portfolio context - 10 min
3. TEINA Analysis - 10 min
4. Budget and outcomes - 30 min
5. Break - 5 min
6. Benchmarking - 10 min
7. Benefits and costs, rate impact - 30 min
8. Key topics and program design updates - 40 min
9. General discussion and Q&A - 20 mins
10. Closing and next Steps - 5 mins



General remarks...

1. Thank you!
2. The information presented here is the result of PGE's discussions with stakeholders and our vision for TE
3. Today's objectives
 1. Share changes based on what we've heard from stakeholders
 2. Review key plan elements and get your feedback
4. No decisions today, only input and feedback
5. Formal workshops following filing of draft TE Plan in November

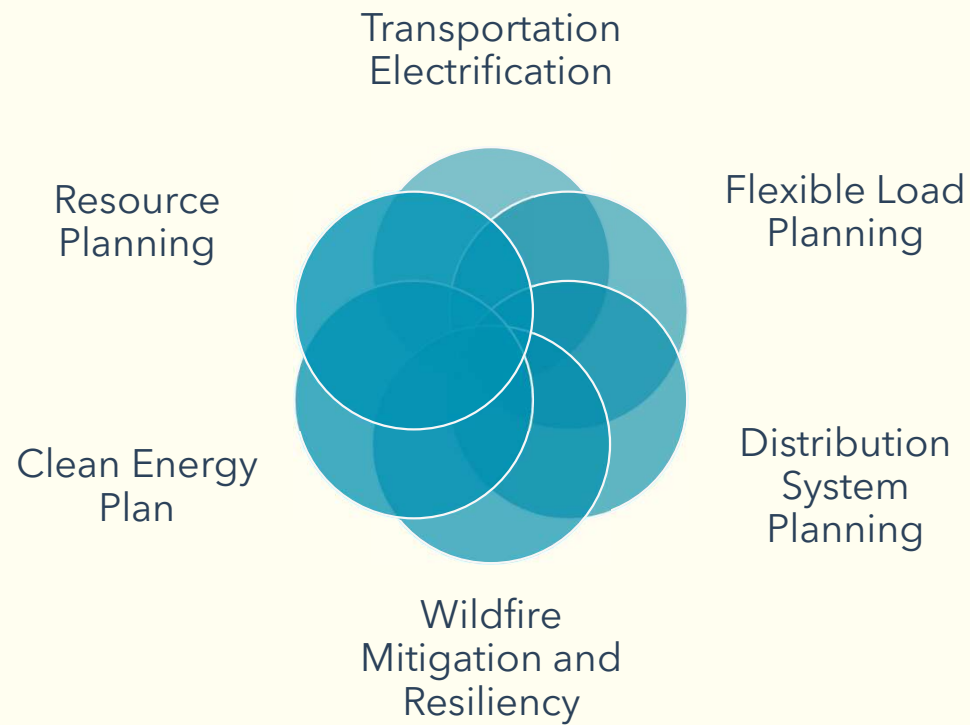




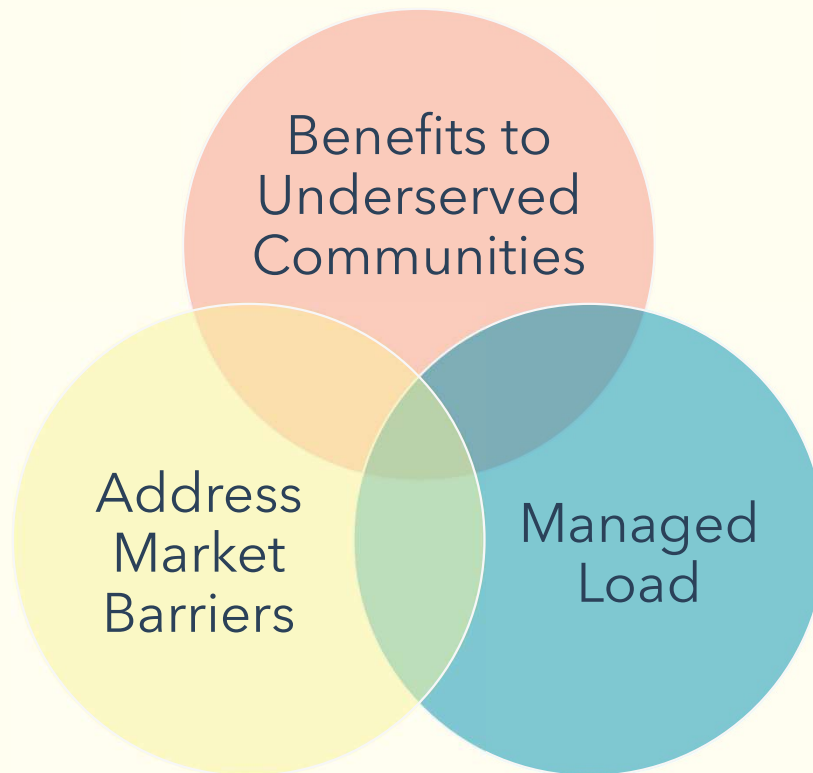
Portfolio context



Many Intersecting Needs... one PGE



Balanced Portfolio Objectives



From Division 87 rules:

"The TE Plan shall seek to address areas most affected by market barriers in the electric company's service territory, prioritize load management, and to provide benefits for underserved communities.

Underserved Communities – Outreach and Engagement

Funded by the Monthly Meter Charge and the Clean Fuels Program



	Near-Term Outreach	Long-Term Engagement
What	Needs assessment through a minority-owned and led vendor	Deeper relationship and capacity-building through continuous engagement
Research Question	What do underserved communities want and need regarding TE?	How can we improve program design to better serve the wants and needs of underserved communities?
How	Focus groups; survey	Workshops
When	Completed in August 2022	To start in early 2023 and go through 2025

- Percentage of budgets allocated to underserved communities covered later in presentation
- Integrating findings into program designs



Key Takeaways and Program Actions

Barriers Identified

Key Takeaways

Knowledge and education around EVs, charging, etc.

Costs associated with EVs

One-size-fits-all approach will not suffice

Further exploration needed into interest around other forms of TE (e-bikes, etc.)

Program Actions

More targeted marketing and outreach on programs, etc.

Higher rebate amounts

Long-term engagement strategy to get continual feedback on program design and implementation

Exploration of e-micromobility



2023-2025 TE Plan - Draft

- Passenger: Residential
- Passenger: Non-Residential
- Fleet
- Funded by Clean Fuels Program
- Regulatory

2022	2023	2024	2025
Electric Avenue Public Charging Sites			
Education and Outreach			
EV Costs & Savings Calculator			
Residential Charger Rebates and Smart Charging			
Residential Panel Upgrade Rebates			
Municipal Charging Pilot		Municipal Charging Collaboration	
Drive Change Fund			
Business L2 EVSE Rebates			
Business L2 Installation and DCFC Rebates			
Business Make-Ready Solutions			
Multifamily Charging Solutions			
Electric School Bus Fund			
Fleet Partner Pilot			Fleet Partner Program
Heavy-Duty Charging Sites			
2023-25 TE Plan		Develop 2026-28 TE Plan	



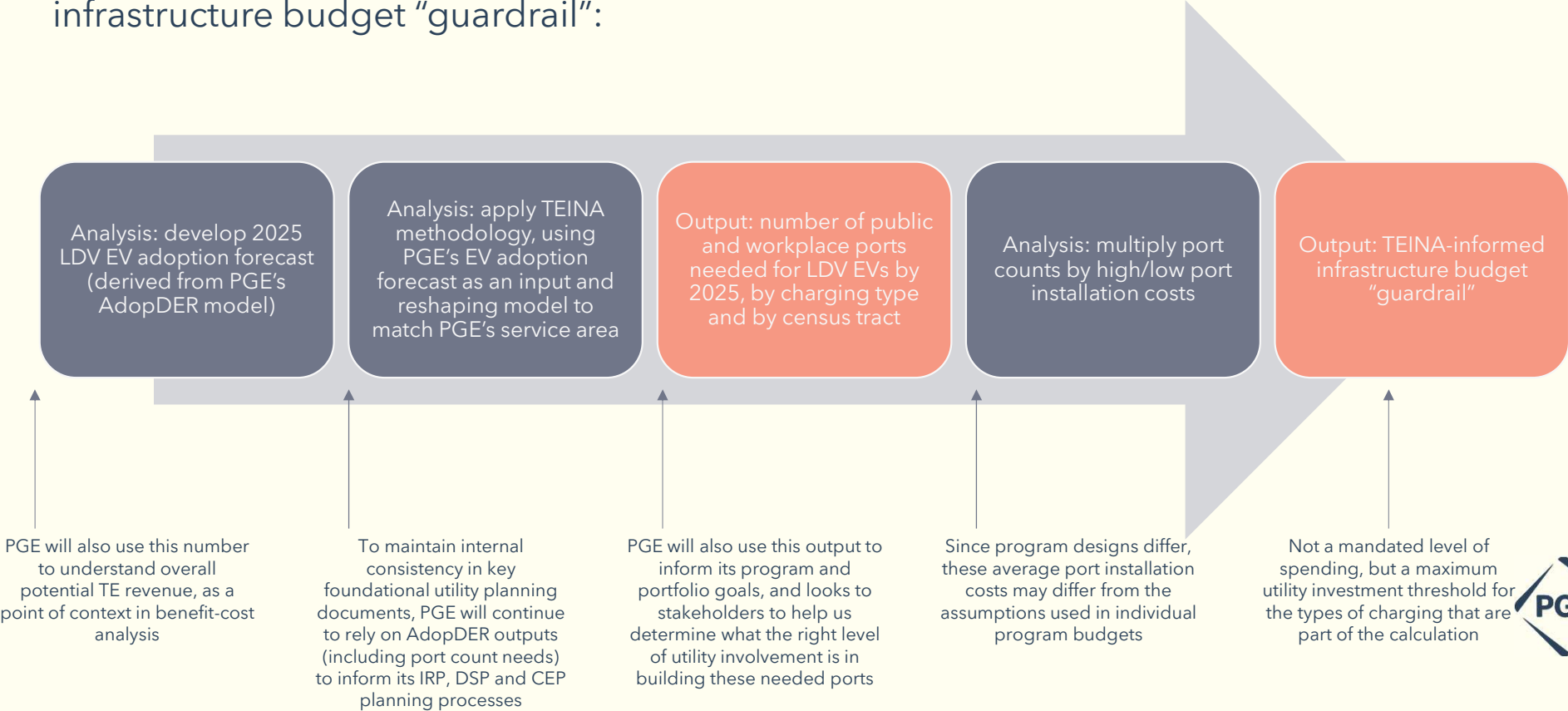


Use of TEINA



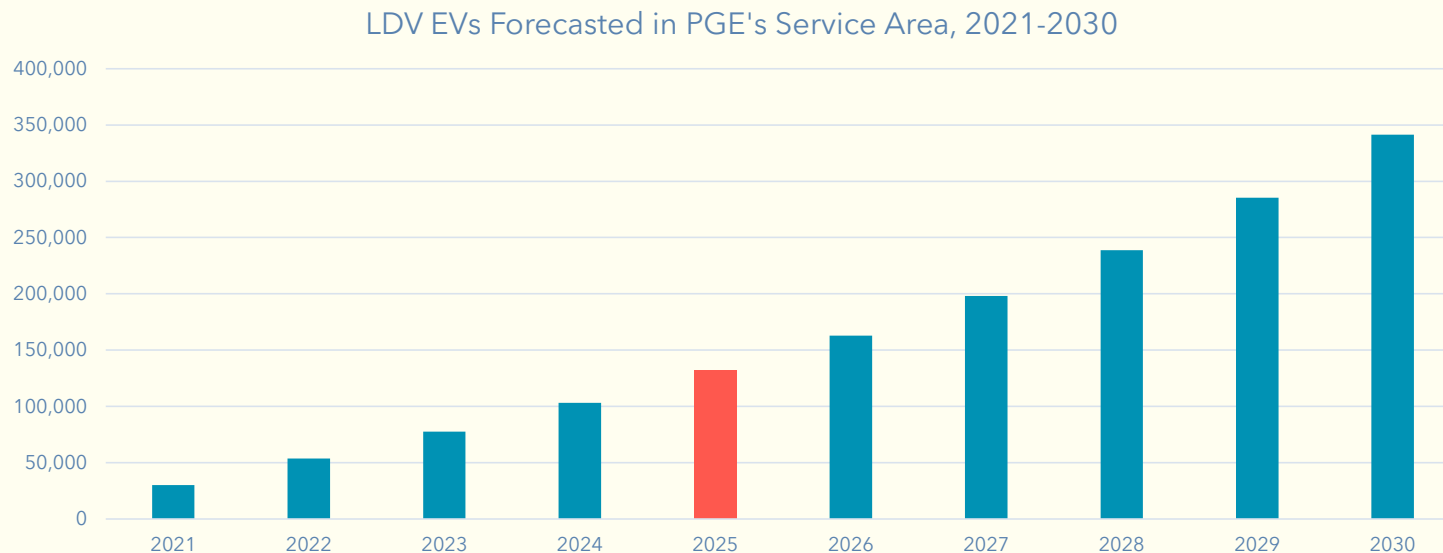
TEINA-Informed Analysis

As directed by OPUC Staff, PGE took the following steps to reach a TEINA-informed infrastructure budget “guardrail”:



LDV EV Adoption Forecast

By the end of 2025, PGE anticipates ~130,000 registered light-duty EVs in our service area, up from ~30,000 at the end of 2021. This forecast does not contemplate any acceleration in the EV market from the Infrastructure Investment and Jobs Act (NEVI funding), the Inflation Reduction Act (new tax credits for EVs), or Oregon's potential adoption of California's Advanced Clean Cars II Rule (100% ZEV sales by 2035).



Derived from PGE's AdopDER model (reference case)



Adjusted TEINA Modeling Outputs

When applied to PGE's LDV EV adoption forecast (rather than Oregon's state policy goals for EV adoption), the TEINA model projects the following needs for EV charging within PGE's service area.

This analysis was conducted by PGE analysts and, since it uses different input assumptions for vehicle adoption, the results differ from ODOT's TEINA results.

TEINA Use Case	Charging Type	2020	2025	2030
Urban / Rural LDV	Workplace L2	587	3,550	9,183
Urban / Rural LDV	Public L2	381	2,264	5,846
Urban / Rural LDV	DCFC	210	1,246	3,159
Corridor LDV	DCFC	78	267	282
DAC (Adjusted)	Workplace L2	28	171	442
DAC (Adjusted)	Public L2	19	114	295
DAC (Adjusted)	DCFC	9	54	137
TNC (Optimized)	DCFC	2	18	136
Micromobility*	Workplace L2	(1)	(50)	(356)
Micromobility*	Public L2	(1)	(34)	(236)
Micromobility*	DCFC	-	(16)	(112)
Total Public / Workplace L2 Need		1,013	6,015	15,174
Total Public DCFC Need		299	1,569	3,602

*Note that micromobility results are negative because they reduce overall port needs

Infrastructure Budget “Guardrail”

Port Type	Need by 2025	Installed as of Sept 2022	Incremental Need by 2025	Low Capital Cost per Port	High Capital Cost per Port	Low Guardrail	High Guardrail
Public / Workplace L2	6,015	991	5,024	\$5,000 ^A	\$25,000 ^B	\$25 MM	\$126 MM
Public DCFC	1,569	167	1,402	\$100,000 ^C	\$250,000 ^D	\$140 MM	\$351 MM
Total Infrastructure Budget “Guardrail” 2023-2025						\$165 MM	\$476 MM

Key Caveats:

- Low guardrail assumes that *all* ports are installed at lowest cost; high guardrail assumes that *all* ports are installed at the highest cost—neither of these scenarios is realistic
- The calculation considers only public and workplace charging needs for LDVs, and does not include PGE’s role in residential, multifamily, fleet depot, public MHD, or micromobility charging
- The calculation considers only EV charging infrastructure needs, and does not include PGE’s role in education and outreach or flexible load
- The infrastructure budget “guardrail” is not a mandated level of spending, but a maximum utility investment threshold for the types of charging that are part of the calculation (public and workplace L2 and public DCFC)

A: Assumes 20+ L2 ports installed during new construction, or pole charging at scale

B: Assumes 4 L2 ports retrofit installation with extensive site work

C: Assumes a 4-port site of 50 kW DCFCs close to utility infrastructure

D: Assumes a 4-port site of 150-350 kW DCFCs far from utility infrastructure










TE Draft Budget and Outcomes



2023-2025 TE Portfolio Draft Budget and Outcomes

Program	Focus on Public Charging	% of Funds to Underserved Communities	L2 Ports	DCFC Ports	Managed Charging Strategy	CapEx (\$MM)	OpEx (\$MM)	Total (\$MM)
Business Rebates*		38%	250	10	TOU rate	-	1.9	1.9
EV-Ready Affordable Housing	-	100%	-	-	TOU rate	-	0.9	0.9
CFP Education & Outreach	-	50%	-	-	N/A	-	4.6	4.6
CFP Emerging Tech	-	-	-	-	-	-	2.3	2.3
CFP Grants & Infrastructure		50%	TBD	TBD	Varies	-	28.0	28.0
CFP Operations	-	-	-	-	N/A	-	3.6	3.6
Res Smart Charging	-	50%	4,717	-	Flex Load (2.25 MW)	-	5.9	5.9
Heavy Duty Charging		50%	-	12	TOU rate	7.3	1.4	8.7
Fleet Partner	-	20%	1,230	174	TOU Rate, Sch 26, Fleet Optimization Software	25.9	5.8	31.7
Business Make Ready		58%	1,000	-	TOU rate	11.7	7.3	19.0
Multifamily Charging	-	100%	200	-	On-peak surcharge	4.6	2.9	7.5
Municipal Charging		75%	760	40	On-peak surcharge	22.9	12.2	35.1
Portfolio/Retail Fitness	-	-	-	-	N/A	12.1	-	12.1
Total Portfolio		56%	8,157	236	2.25MW	\$84.50	\$76.8	\$161.3

Existing Programs; Sunset
Existing Programs; Scale
New Programs; Build

Due to regulatory and other priorities the estimate above may be further refined



* To avoid double-counting, the port count totals for Business Rebates exclude rebates that are forecasted to support Fleet Partner customers

Funding Sources 2023-2025*

Funding source	2023	2024	2025	2023-2025 Total, \$MM
TE /Monthly Meter Charge	7.0	5.6	6.8	19.5
Clean Fuels Program	10.3	13.7	20.9	44.9
Grants	TBD	TBD	TBD	TBD
GRC/base rates CapEx	21.0	23.7	39.8	84.5
GRC/base rates OpEx	1.1	2.6	3.9	7.6
Deferral	2.9	1.6	0.3	4.8
Total	42.3	47.2	71.7	161.3

*PGE will seek grants and other external funding opportunities, as appropriate, to optimize use of funds and maximize deployment of assets to serve customers and create flexible load potential.

Key Caveats:

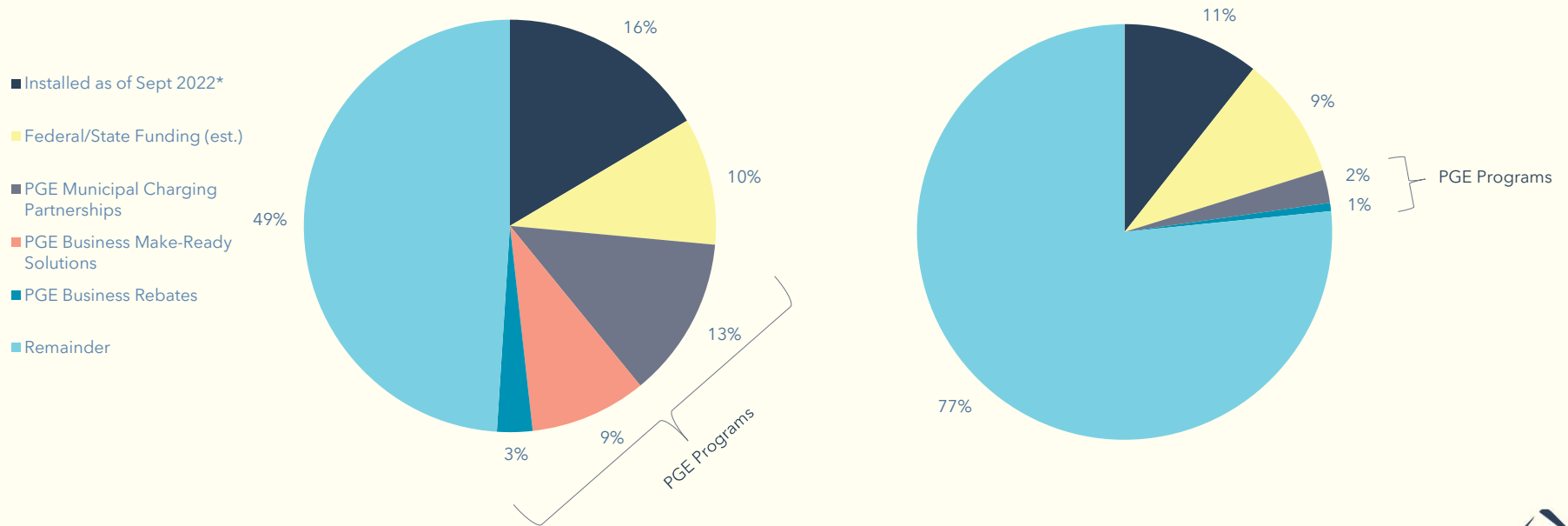
1. For many new programs, GRC/base rates as funding source is **conceptual only**
2. Due to regulatory and other priorities the estimate above may be further refined
3. Clean Fuels Program forecast will be updated prior to filing



PGE's Role In Public and Workplace Charging, Among All Market Actors

Public/Workplace L2 Ports (Est. need = 6015)

Public DCFC Ports (Est. need = 1569)



2023-2025 TE Plan forecast for delivery of public ports:
25% of needed L2 ports (1477), 3% of needed DCFC ports (50)



* This data is from U.S. Department of Energy's Alternative Fuels Data Center, and PGE cannot verify its accuracy nor completeness.



Portfolio Benchmarking



Comparison Approach

12 utilities in six states with comparable policies in place and EV adoption

PSE PUGET SOUND ENERGY

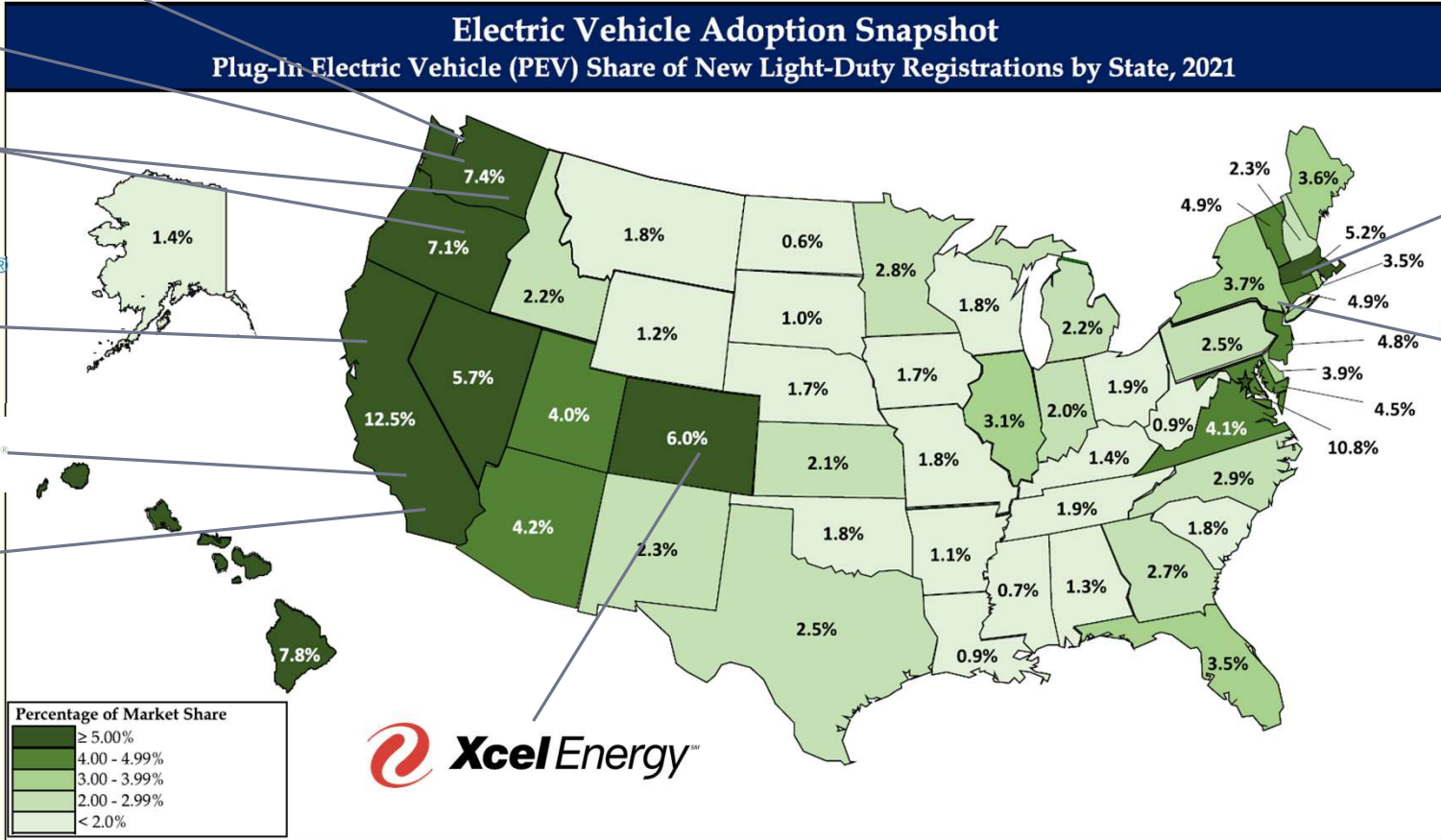
AVISTA

PACIFIC POWER
A DIVISION OF PACIFICORP

PG&E

SOUTHERN CALIFORNIA
EDISON

SDGE™



nationalgrid

conEdison

Xcel Energy™

PGE

Sources: Experian and Wells Fargo Securities, LLC.

Comparison Approach

- Direct comparisons are difficult - differing utility programs, definitions, timeframes, budget ranges, regulatory frameworks make TE program comparisons imperfect
- Comparisons are only across expenditures, not customer or system benefits
- Comparisons at program and portfolio level (program level in appendix)
- Results - Qualitative
 - Commonalities - portfolio approach, underserved communities focus, residential, fleet and commercial offers
 - Differences - Municipal focused offer (1 utility in 3 offer this), Clean Fuels funded programs
- Results - Quantitative
 - To make valid comparisons, costs normalized to customer and vehicle counts, LDV EV market penetration, population growth rates (US Census data '10-'20)



Portfolio Comparison Observations

- Comparison provides an imperfect but informative data point about portfolio scope and scale. There is no Goldilocks utility portfolio - different utilities must balance different priorities with regulators, stakeholders, customers.
- Other utilities have been investing in TE infrastructure for longer than PGE
 - PGE's portfolio ramps up quickly given the expected TE growth in our territory.
- EVs are coming to Oregon, and fast
 - Market penetration of new LD EVs ¹in Oregon is 4th nationally at 7.1% of new registrations (after CA 12.5%, HI 7.8%, WA 7.4%).
- California
 - Excluded from comparison: Much further on the adoption curve, has approx. 50% of EV registrations nationally, hundreds of millions of dollars already invested. Has higher level of both infrastructure and available incentives.



Portfolio Comparison Data

Comparable utilities - California excluded

Category	PGE	Low	PGE vs Avg	Average	High
Light Duty EV registrations in state where utility operates	52,033	52,033	↘	79,717	100,580
Percent of 2021 new vehicle registrations in state	7.10%	3.60%	↗	5.96%	7.40%
Portfolio - Dollars/Utility Customer	\$177	\$26	↗	\$111	\$260
Portfolio - Dollars/EV in State	\$3,094	\$38	↗	\$2,370	\$7,912
\$MM / % of 2021 new EV market penetration (indicates EV growth)	\$2,268	\$47	↘	\$2,698	\$7,000
\$MM / % of 2010-2020 of population growth	\$1,519	\$283	↘	\$2,175	\$6,000

Observation and conclusions

- PGE proposed budget per customer and per in-state EV is mid-range but above average - PGE is small, starting with a broad portfolio
- PGE proposed budget is compared to market penetration and population growth mid-range and below average - PGE investment lower than others for historical and future growth
- Overall, PGE expenditures are of reasonable scale among comparable utilities



↗ Indicates PGE vs relationship to average, higher or lower

Portfolio Comparison Data

Comparisons to comparable utilities - California included

Category	PGE	Low	PGE vs Avg	Average	High
Light Duty EV registrations in state where utility operates	52,033	52,033	↘	345,457	1,054,095
% of 2021 new vehicle registrations in state	7.10%	3.60%	↗	7.75%	12.50%
Portfolio - Dollars/Utility Customer	\$177	\$26	↗	\$119	\$260
Portfolio - Dollars/EV in State	\$3,094	\$38	↗	\$1,856	\$7,912
\$MM / % of 2021 new EV market penetration (indicates EV growth)	\$2,268	\$47	↘	\$3,075	\$7,000
\$MM / % of 2010-2020 of population growth	\$1,519	\$283	↘	\$3,863	\$14,295

Observation and conclusions

- PGE proposed budget per customer and per in-state EV is mid-range but above average - PGE is small, starting with a broad portfolio
- PGE proposed budget is compared to market penetration and population growth mid-range and below average - PGE investment lower than others for historical and future growth
- Overall, PGE expenditures are of reasonable scale among comparable utilities



↗ Indicates PGE vs relationship to average, higher or lower



Benefits, costs, rate impact



EV Adoption is Driving PGE Load

Year	# LD EVs	Energy Sales, mWh	Utility Billing Revenue \$MM (A)	Cost of Energy and Capacity \$MM (B)	Gross Margin \$MM (A-B)
2023	78,446	163,635	23.3	10.0	13.2
2024	104,413	230,287	33.5	13.7	19.8
2025	133,506	304,293	45.6	18.6	27.0

- The EV market in PGE's service territory is growing rapidly, and with that PGE's corporate load forecast
- The forecast load and revenue benefit is substantial and provides opportunity to support EV adoption
- The above forecast is also used for other PGE planning processes, including Distribution System, Clean Energy and Integrated Resource Plans



Preliminary Rate Impact by Customer Class

	Rate Schedule	2023	2024	2025
Residential	7	0.16%	0.46%	0.79%
Small non-res	32	0.12%	0.35%	0.60%
Large non-res ToD	38	0.21%	0.62%	1.06%
Large non-res capacity tier	83	0.02%	0.11%	0.19%
Large non-res capacity tier	85	0.02%	0.12%	0.96%
Large non-res capacity tier	89	0.03%	0.13%	0.23%
Large non-res capacity tier	90	0.01%	0.09%	0.16%
Total impact, all schedules		0.10%	0.32%	0.55%

Due to regulatory and other priorities the estimate above may be further refined





Key Topics and Program Design Updates



Public Charging Topics

PGE is considering the following requirements, standards and approaches for PGE-owned and customer-owned public charging. *Items below remain under discussion and are not finalized.*

Issue Category	PGE-Owned EVSE	Customer-Owned EVSE
Reliability	<ul style="list-style-type: none"> PGE has a target uptime of 97% PGE plans to look to national standards for an appropriate formula for calculating uptime 	<ul style="list-style-type: none"> PGE is considering a target uptime of 97% PGE plans to look to national standards for an appropriate formula for calculating uptime
Affordability	<ul style="list-style-type: none"> Cost to charge is set by Schedule 50 PGE's objectives for Schedule 50 are that it is equitable, grid-friendly, and simple 	<ul style="list-style-type: none"> PGE plans to require prices to be posted PGE does not plan to place requirements on the price that customers charge EV drivers
Accessibility	<ul style="list-style-type: none"> PGE installs DCFC with CCS and CHAdeMO ports PGE installs L2 with J-1772 ports PGE is considering following the U.S. Access Board's design recommendations for accessible EV charging PGE is considering following the Washington State Department of Agriculture rules (including effective dates) for payment methods <ul style="list-style-type: none"> Current draft: EMV chip reader required on DCFC and L2 installed after Jan. 1, 2024 PGE notes that the above standard may not be possible to implement on utility pole chargers due to safety requirements 	<ul style="list-style-type: none"> PGE plans to require DCFC to have CCS and CHAdeMO ports PGE plans to require L2 to have J-1772 ports PGE is considering following the U.S. Access Board's design recommendations for PGE-owned infrastructure (including make-ready) PGE is considering requiring customers to follow Washington State Department of Agriculture rules (including effective dates) for payment methods

Business Make-Ready Solutions

New

PGE will provide design and installation of make-ready infrastructure for installations of 8+ L2 ports

- Serves non-residential customers installing 8+ semi-public L2 charging (public, workplace, multifamily), with enrollment targets:
 - 45% of ports installed at multifamily
 - 25% of ports installed at public
 - 50% of public ports (12.5% of program ports) to be installed in underserved communities
- PGE designs, installs, owns and maintains the make-ready infrastructure and offers custom incentive based on charging type:
 - \$8,000 per port for workplace
 - \$10,000 per port for public
 - \$12,000 per port for multifamily
- Charger selected and owned by customer, receives a rebate:
 - \$1,000 per port for workplace/public
 - \$2,300 per port for multifamily



Total 3-year L2 port target: 1,000
Forecasted number of sites: 107
Total 3-year budget: \$19 MM



**New
Program**

Multifamily Charging Solutions

PGE provides design and installation of L2 chargers at multifamily locations

- PGE design and install utility and customer make ready, EVSE and maintains 8+ charging ports
 - Participation payment/port- \$2,000
 - Minimum number of EVs- 4
- Grid supportive L2 charging under Schedule 50- \$3 per session + \$0.19 per kWh during peak periods
- PGE will partner with Community Based Organizations to site MF EV charging in traditionally underserved communities.
 - Participation Payment/port- \$1,300
 - No requirement for minimum EVs
 - 15-20% of site allocations will be for underserved communities
 - Will provide EV 101 education to residents at locations receiving charging
- Revised Targets
 - 2-year total (2024-2025) L2 ports- 200
 - 2-year total sites- 20
 - 2-year total budget- \$7MM

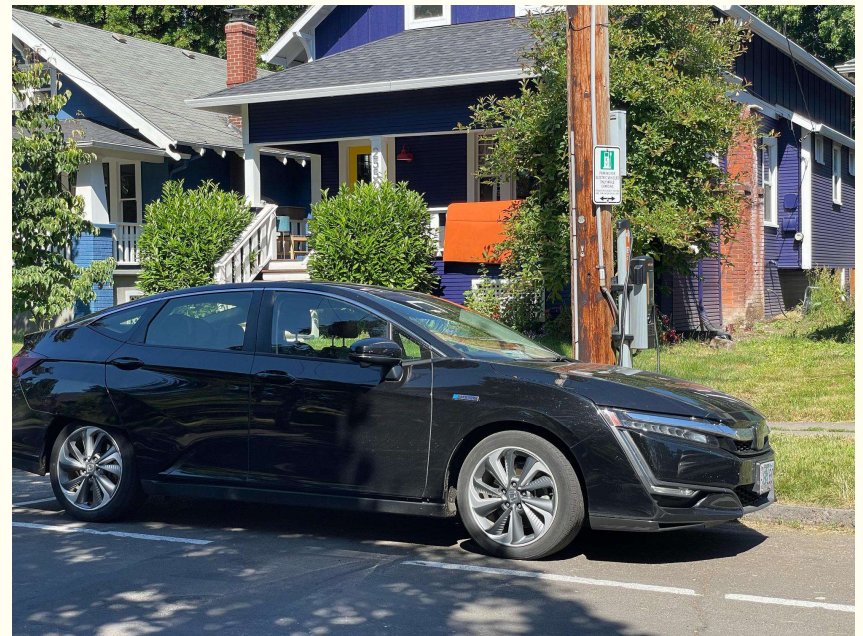


**New
Program**

Municipal Charging Collaboration

PGE designs, installs, owns, operates, and maintains L2 chargers in the ROW and DCFC on public property

- PGE designs, installs, owns, operates, and maintains L2 chargers in the ROW and DCFC on public property.
 - 100% of ports installed will be public
 - 75% or greater targeted to underserved populations
- PGE to work with Municipalities on outreach and engagement around siting and education
- Ensures that charging is grid-supportive through Schedule 50 price signals to encourage off-peak charging
 - DCFC: \$5 per session + \$0.19 per kWh during peak time
 - L2: \$3 per session + \$0.19 per kWh during peak time
- Revised Targets
 - Total 3-year L2 port target: 760
 - Total 3-year DCFC port target: 40
 - Total 3-year budget: \$33 MM





Q&A



Next steps

- Incorporate feedback from today's workshop
- Written comments requested by October 17th at TEP@pgn.com
- Additional stakeholder discussion to inform TE plan
- Please visit us [online](#) for more details

Thank you!



Contact information

- Regulatory - Steven Corson steven.corson@pgn.com
- Questions, comments, logistics - Jeremy Litow jeremy.litow@pgn.com
- Please join our mailing list and follow our TE Planning website at www.portlandgeneral.com/tep





Appendix



State Transportation Electrification Policies for Electric Companies

HB 2165: Utility TE infrastructure investment

- Monthly Meter Charge (MMC) funding:
 - 0.25% of revenue
 - ~ \$5M annually through 2030
- Utility must make reasonable efforts to spend 50% of funds to support TE for underserved communities

ORS 757.357 / Division 87: PUC rules for TE Programs

- Requires portfolio with variety of programs
- 3 year portfolio budget to support TE

Oregon DEQ / UM1826: Clean Fuels Funding

- IOUs administer funds from sale of Clean Fuels credits
- Funds must:
 - Support TE
 - Benefit residential customers
 - Benefit traditionally underserved communities



Portfolio Benchmark Comparison Data

Entity	State	Current budget cycle total, MM	Pop inc. '10-'20, %	MM \$/% of pop growth rate	MM \$/% of new EV market share	LDV sales rate % new regstrtns	Number of Customers	# registered EVs in State	\$TE investmt \$/customer	\$TE investmt \$/reg EV in State
SCE	CA	\$ 872	6%	\$ 14,295	\$ 6,976	12.5%	15,000,000	1,054,095	\$ 58	\$ 827
SDG&E	CA	\$ 238	6%	\$ 3,902	\$ 1,904	12.5%	1,364,304	1,054,095	\$ 174	\$ 226
PG&E	CA	\$ 421	6%	\$ 6,902	\$ 3,368	12.5%	16,000,000	1,054,095	\$ 26	\$ 399
Xcel	CO	\$ 110	15%	\$ 743	\$ 1,833	6.0%	1,600,000	51,545	\$ 69	\$ 2,134
National Grid	MA	\$ 278	7%	\$ 3,757	\$ 5,346	5.2%	1,300,000	60,000	\$ 214	\$ 4,633
National Grid	NY	\$ 160	4%	\$ 3,810	\$ 4,444	3.6%	1,600,000	100,580	\$ 100	\$ 1,591
ConEd	NY	\$ 252	4%	\$ 6,000	\$ 7,000	3.6%	3,500,000	100,580	\$ 72	\$ 7,912
PGE	OR	\$ 161	11%	\$ 1,519	\$ 2,268	7.1%	912,000	52,033	\$ 177	\$ 3,094
Pacific Power	OR	\$ 33	11%	\$ 311	\$ 465	7.1%	600,000	52,033	\$ 50	\$ 577
Puget Sound Energy	WA	\$ 119	15%	\$ 815	\$ 1,608	7.4%	1,200,000	91,000	\$ 99	\$ 1,308
Avista	WA	\$ 65	15%	\$ 445	\$ 878	7.4%	250,000	91,000	\$ 260	\$ 714
Pacific Power	WA	\$ 4	15%	\$ 24	\$ 47	7.4%	137,000	91,000	\$ 26	\$ 38

Note: rates for population increase, new and existing EV registrations are at state level



Comparing to other utilities – Fleet Partner

- **Scope of program** - very similar across most utilities with customer targets of commercial fleets, government agencies for both LVD & MHD; some utilities only focus only on MHD
- **Cost share** - Most utilities include up to 100% cost incentives for utility side MR and customer side MR and; nearly all require the customer to own the EVSE.
- **Project mins/maxes/constraints** - min load requirements range from 50-100 kW of new load, budget caps range from max of # ports: of 10 DCFC, or dollar max of up \$1.2M
- **Required customer commitments and time frames**- very similar across most utilities: chargers must be networked, & data shared with utility for anywhere from 5-10 years
- **Underserved/Disadvantaged Comms targets** - not well defined across any utilities
- **Other points of comparison** - program structures vary - some incentivize, own, operate, and build infrastructure, others provide rebates for MR after construction is complete
- **Changes made to program since workshop 2 with cost estimates**: reduced budget from \$47.4M to \$34.4M



Comparing to other utilities – Residential EV Smart Charging

- **Scope of program** – Program is unique from other Residential EV programs with PGE calling Smart Charge events rather than requiring customers to sign up for TOU rates.
- **Cost share (utility and customer) description:** Similar to most other utilities as the customer owns the EVSE. There are a few programs where the utility owns and leases out the charger.
- **Project mins/maxes/constraints** – With one exception, PGE offers a similarly sized and budgeted Residential EV pilot
- **Required customer commitments and time frames-** Customer must enroll in Smart Charging program that calls DR events. Minimal requirements to receive seasonal reward.
- **Underserved/Disadvantaged Comms targets, minimum funding level:** Other utilities offer a higher rebate amount for income-eligible customers, like PGE. There are also Multi-Family programs available at other utilities.
- **Other points of comparison:** Other utilities have other options PGE offers like panel upgrade rebate and vehicle telematics, but none offer all.
- **Changes made to program since workshop 2 with cost estimates:** No changes have been made.



Comparing to other utilities – HD Charging

No direct utility comparison available. Summary of PGE's program included below.

- **Scope of program** - The five-year Program has authorized funding of \$342.6 million. Funding is for MHD trucking and off road (forklifts). Program is for both DCFC and L2 charging
- **Cost share (utility and customer)** - Utility program covers both sides of the meter construction. The customer pays for chargers.
- **Project mins/maxes/constraints** - Utility will pay 100% of the make ready and line extension. If the customer would prefer to do their own make ready, utility will refund up to 80% of the construction costs. Either way, customer purchases the chargers.
- **Required customer commitments and time frames**- Procure or convert at least 2 vehicles to EVs. All EVSE purchased must comply with utility's requirements.
- **Underserved/Disadvantaged** - A minimum 40 percent to serve sites in disadvantaged communities (DACs) or transit agency sites not in DACs
- Other points of comparison
- **Changes made to program since workshop 2 with cost estimates:** None on the MHD program, Fleet Partner has added funding.



Comparing to other utilities – Business Make-Ready

- **Scope of program** - Typically businesses, workplaces, multifamily, destinations. Typically focused on L2, though some utilities offer DCFC make-ready.
- **Cost share (utility and customer) description** - PGE's program has per-port caps on utility make-ready expenditures and is open to all customers. Other programs offer the entire make-ready at no cost to the customer, but also reserve the right to decline applicants (and do - some programs have applicant success rates as low as ~33%).
- **Project mins/maxes/constraints** - Typically, utility make-ready programs install a new meter and therefore have port or load minimums, though these can vary by customer segment. PGE's proposed program has a minimum of 8 L2 ports. Typically, utility programs have targets by customer segment.
- **Required customer commitments and time frames** - Typically, make-ready programs require a customer commitment of 5-10 years. Networked chargers appear to be universally required, along with a data provision.
- **Underserved/Disadvantaged Comms targets** - It is common for utility make-ready programs to have targets for underserved or disadvantaged communities. PGE's program design offers this.
- **Changes made to program since workshop 2 with cost estimates** - PGE has decreased the number of ports and sites that this program is targeting; introduced cost caps on make-ready; and developed targets by customer segment and underserved community location.



Comparing to other utilities – Municipal Charging Collaboration

- **Scope of Program:** Unique from other utilities. Most utilities only offer Pole Charging, ROW charging or DCFC. The municipal charging collaboration is looking to offer all three.
- **Cost share (utility and customer) description:** In most instances, the city owns and operates charging infrastructure and not the utility. Utility only pays for make ready.
- **Project mins/maxes/constraints** - Most projects have capped under 100 ports, but are looking to expand.
- **Required customer commitments and time frames-** “EV Parking only” signage and clear markings are required by all municipalities and utilities
- **Underserved/Disadvantaged Comms targets, minimum funding level** - Other utilities are looking to serve underserved communities, but have not made this a specific target
- **Other points of comparison-** There is no direct comparison with PGE’s offering as it is more targeted towards underserved communities, and offers different types of charging infrastructures
- **Changes made to program since workshop 2 with cost estimates:** Reduced budget to \$33M, port counts down to 750 Public L2 and 40 Public DCFC



Comparing to other utilities– Multifamily Charging Solutions

- **Scope of program** - Comparable to other programs, in that we offer utility side make ready, as well as customer side make ready and EVSE. Where we differ is that for full utility owned and operated, in many cases the MF buildings need to be in underserved/disadvantaged communities.
- **Cost share (utility and customer)**- vary in amount and coverage. Most cover utility make ready. Many are offering generous incentives for make ready, 80-100% of cost, with incentives for EVSE between \$2k-\$17k/dual port (includes EVSE, maintenance, networking). Some programs require special commercial rate, and customer charge.
- **Project mins/maxes/constraints** - Most programs have a minimum port count of 4
- **Required customer commitments and time frames**- Near universal requirement of TOU and/or DR program enrollment, with a 10-year participation commitment
- **Underserved/Disadvantaged Comms targets, minimum funding level**- EV make ready distribution to underserved communities between 30-50% program wide. DAC are determined by census info.
- **Changes made to program since workshop 2 with cost estimates:** Revised the number of ports down significantly based on feedback from 2,000 across 200 locations, to 200 at 20 locations. Reduced budget significantly from ~\$57M to ~\$7M.



Glossary of terms and acronyms (A-H)

Term	Definition
AC Level 2 Charger	AC Level 2 (L2) chargers can be found in both commercial and residential locations. They provide power at 220V-240V and various amperages resulting in power output ranging from 3.3kW to 19.2kW.
Charger	A layperson's term for the on-board or off-board device that interconnects the EV battery with the electricity grid and manages the flow of electrons to recharge the battery. Also known as electric vehicle supply equipment (EVSE).
Charging	Charging is the process of recharging the onboard battery of an electric vehicle.
Charging Level	The terms "AC Level 1", "AC Level 2" and "DC fast" describe how energy is transferred from the electrical supply to the car's battery. Level 1 is the slowest charging speed. DC fast is the fastest. Charging rate varies within each charging level, depending on a variety of factors including the electrical supply and the car's capability.
Charging Station	The physical site where the electric vehicle supply equipment (EVSE) (also known as the charger) or inductive charging equipment is located. A charging station typically includes parking, one or more chargers, and any necessary "make-ready equip-ment" (i.e., conduit, wiring to the electrical panel, etc.) to connect the chargers to the electricity grid, and can include ancillary equipment such as a payment kiosk, battery storage or onsite generation.
Demand Response (DR, V1G, direct load management, controlled charging, intelligent charging, adaptive charging or smart charging)	Central or customer control of EV charging to provide vehicle grid integration (VGI) offerings, including wholesale market services. Includes ramping up and ramping down of charging for individual EVs or multiple EVs, whether the control is done at the EVSE, the EV, the EV-management system, the parking lot EV energy-management system or the building-management system, or elsewhere.
Demand Side Management	See Demand Response
Direct Current Fast Charger (DCFC)	Direct current fast charging equipment is designed to rapidly deliver direct current to a vehicle's onboard battery. DCFCs commonly have power ratings of 50kW or higher.
DRMS	Demand response management system
Electric Vehicle Supply Equipment (EVSE)	Electric vehicle supply equipment, also often called an EV charger, is stand-alone equipment used to deliver power to the input port connection on an EV. This device includes the ungrounded, grounded and equipment-grounding conductors and the electric vehicle connectors, attachment plugs and all other fittings, devices, power outlets or apparatus associated with the device, but does not include premises wiring.
EV	"Electric vehicle" is the commonly used name for vehicles with the capability to propel the vehicle fully or partially with onboard battery power and contains a mechanism to recharge the battery from an external power source. EVs can include full battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs).
Fleet EVSE	EVSE for use by business owned vehicles.
HDV	Heavy-duty vehicles have a gross vehicle weight above 26,000 pounds.

Glossary of terms and acronyms (L-T)

TCO	Total cost of ownership is a financial estimate that accounts for both purchase price and continued, variable operating costs of an asset.
TE	Transportation electrification
TEINA (Transportation Electrification Infrastructure Needs Analysis)	The TEINA study highlights gaps in the electric vehicle charging infrastructure and proposes solutions to help accelerate widespread transportation electrification in Oregon. The ODOT Climate Office, in partnership with the Oregon Department of Energy, completed the Transportation Electrification Infrastructure Needs Analysis study to identify the charging needs and gaps across Oregon.
TOU (Time of Use) Rate	"Time of use" often refers to electricity rates that can vary by the time of day. TOU rates can also be structured to vary by season.
Uptime	Defines the amount of time an EVSE is functionally able to provide a charge when requested, as opposed to a faulted state where no charge may occur. Depending on configuration settings, networked EVSE may still be able to provide a charge and maintain uptime status when offline from the network connection.
Workplace EVSE (charging)	Workplace EVSE are located on business property, primarily intended for use by employees. However, often the business owner will allow use by visitors or the public if it is located in an accessible location.
Underserved community	Communities of color, communities experiencing lower incomes, tribal communities, rural communities, frontier communities, coastal communities and other communities adversely harmed by environmental and health hazards
V2G	"Vehicle-to-grid" refers to vehicles capable of receiving power to the onboard battery from the electrical grid and vice-versa.



Glossary of terms and acronyms (L-S)

Term	Definition
Level 1/Level 2 (L1/L2)	Level 1 is part of the charging standard defined by the SAE for charging equipment using standard 120V household electricity. Level 2: Level 2 is part of the charging standard defined by the SAE for charging equipment using 208V or 240V electricity, similar to the power level used for ovens and clothes dryers.
Make-ready	Make-ready describes the installation and supply infrastructure up to, but not including, the charging equipment. The customer procures and pays for the charging equipment, which could be funded by a separate rebate or other incentive by the electric company or other entity.
Managed Charging	Managed charging allows an electric utility or a third party to control the charging of an EV remotely. This entity could enable or disable charging, or could control the power level for charging.
MDV	Medium-duty vehicles have a gross vehicle weight more than 14,000 and less than 26,001 pounds.
MF (MUD)	Multi family, or multi-unit dwelling, are a type of residence in which multiple housing units are located within a single building or building complex (e.g., an apartment complex, duplex, condos, etc). This is synonymous with a multi dwelling unit (MDU). EVSE at MUDs are intended for use by MUD residents. EVSE located on hotel or motel properties are also included within MUD session data in this report.
OCPP	The goal for the Open Charge Point Protocol (OCPP) is to offer a uniform solution for the method of communication between charge point and central system.
Platform	The base hardware and software upon which software applications run.
Port (also Connector)	The plug that connects the electricity supply to charge the car's battery. J-1772 is the standard connector used for Level 1 and Level 2 charging. CCS or "combo" connectors are used for DC Fast charging on most American and European cars. CHAde-MO is the connector used to DC fast charge some Japanese model cars.
Public EVSE	Public EVSE can be found in multiple types of locations including but not limited to business parking lots, public buildings and adjacent to public right-of-way. Public AC Level 2 EVSE have a standard J1772 connector, while DCFC have a CHAdeMO and/or CCS connectors. Tesla vehicles may utilize public EVSE with an adapter; however, other EVs cannot use Tesla EVSE, as no adapters are available.
Residential EVSE	Located within a person's home, most often in a garage, residential EVSE are usually used by one or two EVs intended only for use by the homeowner.
Standard	An agreed-upon method or approach of implementing a technology that is developed in an open and transparent process by a neutral, non-profit party. Standards can apply to many types of equipment (e.g., charging connectors, charging equipment, batteries, communications, signage), data formats, communications protocols, technical or business processes (e.g., measurement, charging access), cybersecurity requirements, and so on. Most standards are voluntary in the sense that they are offered for adoption by people or industry without being mandated in law. Some standards become mandatory when they are adopted by regulators as legal requirements.

