Distribution System Workshop

Distribution System Plan Workshop # 4 | 24 – July 25, 2024

Meeting Logistics


Audio


Microphone


Chat box


Video


Raise Hand


Closed Caption

Operating Agreements

Establishing norms with our communities is foundational to building trust

To create a **safe space**, we established **common agreements** such as **respect, honoring diversity of thought**, and **inclusivity**

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

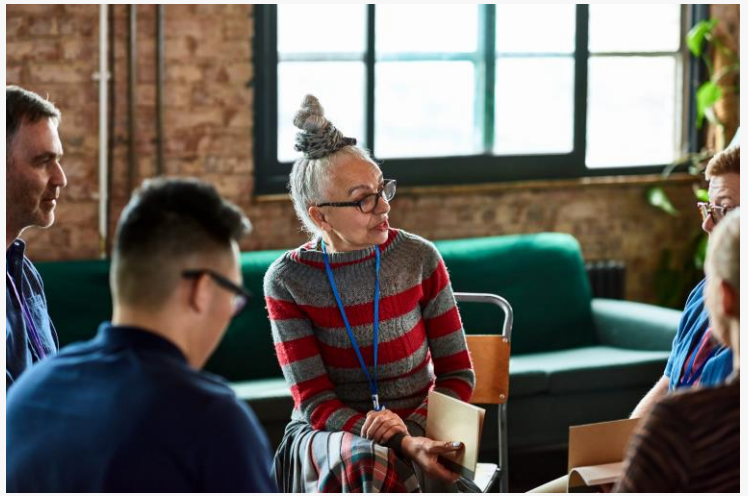
Stay Engaged

Be Willing To Experience Discomfort

Speak Your Truth

Expect and Accept Non-closure

Share the Airtime



The courageous conversations framework
by Glenn Singleton and Curtis Linton

Agenda

9:00 – Welcome & Meeting Logistics

9:10 – Grid Needs Analysis: Supporting DER Integration & Operation

10:20 – Flex Load /Multi-Year Plan Update

10:55 – Closing Remarks & Next Steps

11:00 – Adjourn



Grid Needs Analysis: Supporting DER Integration & Operation

Joe Boyles, Resource Planning Project Manager

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Key Takeaways

- Pressure on the grid is increasing
- Unmanaged DERs contribute to that pressure
- Orchestration of DERs through a Virtual Power Plant (VPP) can relieve some pressure and provide customer benefits

Overview

Building capabilities to enable Non-wires Solutions and Virtual Power Plants

Background

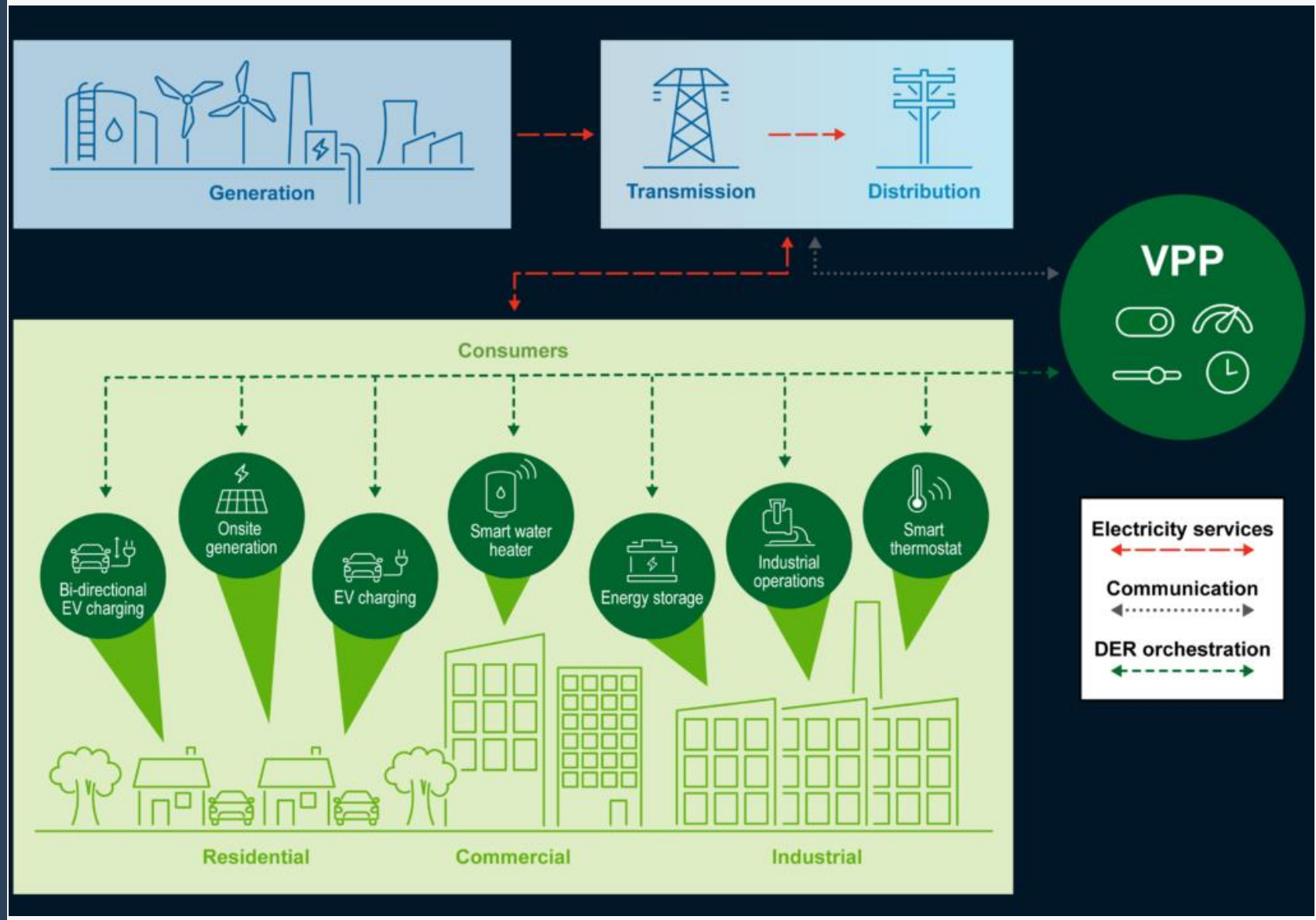
- DSP guidelines requested submission of two NWS concept proposals. We submitted:
  - Eastport substation: > 3 MW load relief
  - Dayton substation: >1.5 MW load relief
- Conceptualized how different combinations of DERs could cost-effectively provide load relief and defer capital investment
- Determined that there was not a pathway to execution due lack of:
  - project management,
  - regulatory approval,
  - capability to deploy, and
  - capability to call on/control DERs

Proposed direction for next iteration of DSP – develop a plan to do the following in 2025

- Demonstrate capabilities necessary to deliver an NWS and a VPP that involves customer-sited DERs
- Demonstrate delivery and measurement of community benefits
- Investigate how CBREs can deliver an NWS or otherwise address grid needs

What is a Virtual Power Plant (VPP)?

Aggregations of distributed energy resources (DERs) such as smart appliances, rooftop solar with batteries, EVs and chargers, and commercial and industrial loads that can balance electricity demand and supply and provide grid services like a traditional power plant.



Source: https://liftoff.energy.gov/vpp/

What is accelerating the need for grid modernization?

Customer expectations for increasingly clean energy, without compromising reliability and keeping costs as low as possible, require increased integration of Distributed Energy Resources and Flexible Loads

RESIDENTIAL
(SINGLE-, MULTI-FAMILY)

- Rooftop Solar
- Distributed Batteries
- Smart Devices
- Vehicle Charging
- Heat Pumps
- Thermostats
- Hot water

IOC
(INTEGRATED OPERATIONS CENTER)

- Uniform standards
- Open-source API
- Plug-and-play connectivity

COMMERCIAL & INDUSTRIAL

- Heating Systems
- Building Management Systems
- Industrial Processes
- Warehouse Automation
- Chillers
- Data Center
- Back up Batteries & Generation

MUNICIPALITY, SCHOOL, UNIVERSITY, HOSPITAL

- Community-based renewables
- Microgrids
- School bus V2G
- Advanced Heating/Cooling

As Virtual Power Plant capabilities increase, customers have more choice and control of the energy that powers their home, work, life and community

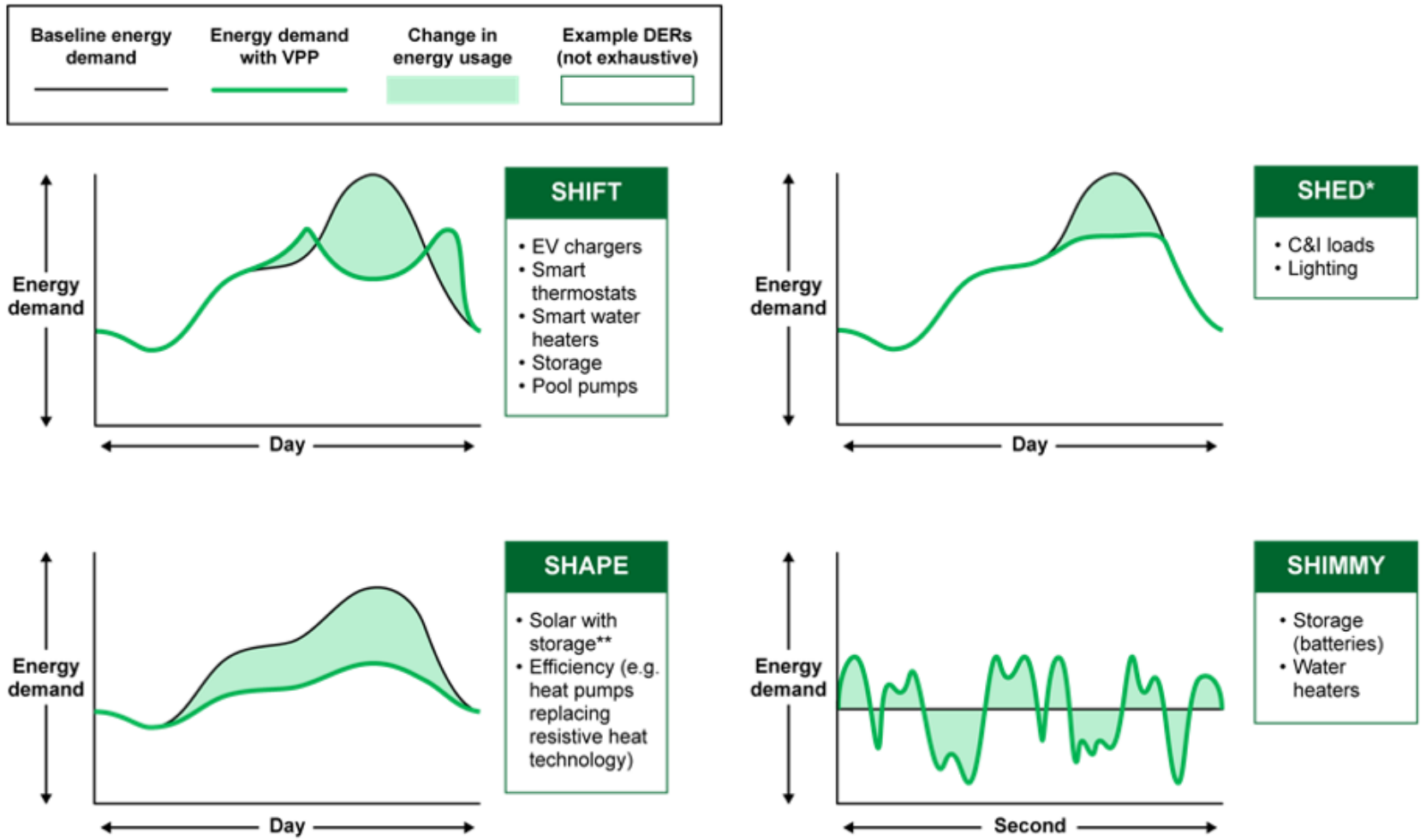
TRANSPORTATION ELECTRIFICATION

- Transit & Freight
- Fleet Charging
- Public Charging
- Rental Properties
- OEM V2G and V2X

VPPs function in different ways to meet needs

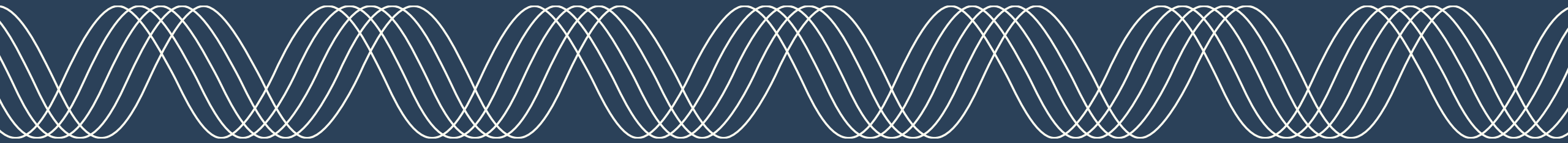
For example

- Supplying homes with energy from on-site solar-plus-storage systems during peak hours when bulk power generation is scarce
- Shifting the timing of EV charging to avoid overloading local distribution system equipment
- Charging distributed batteries (increasing demand) when clean electricity is abundant to reduce curtailment, for example, of utility-scale solar



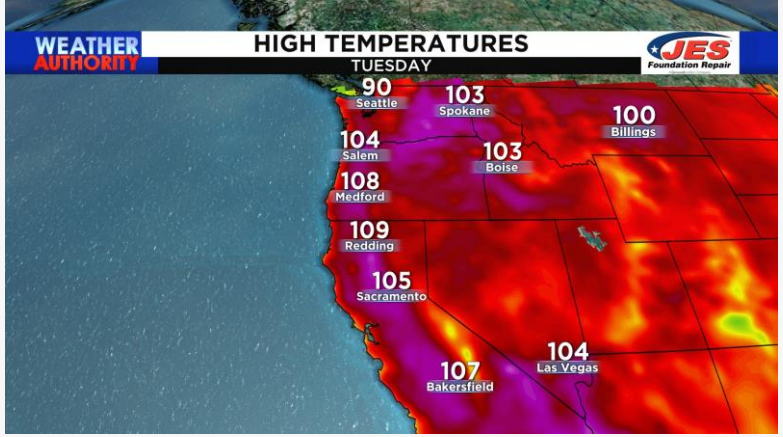
Source: https://liftoff.energy.gov/vpp/

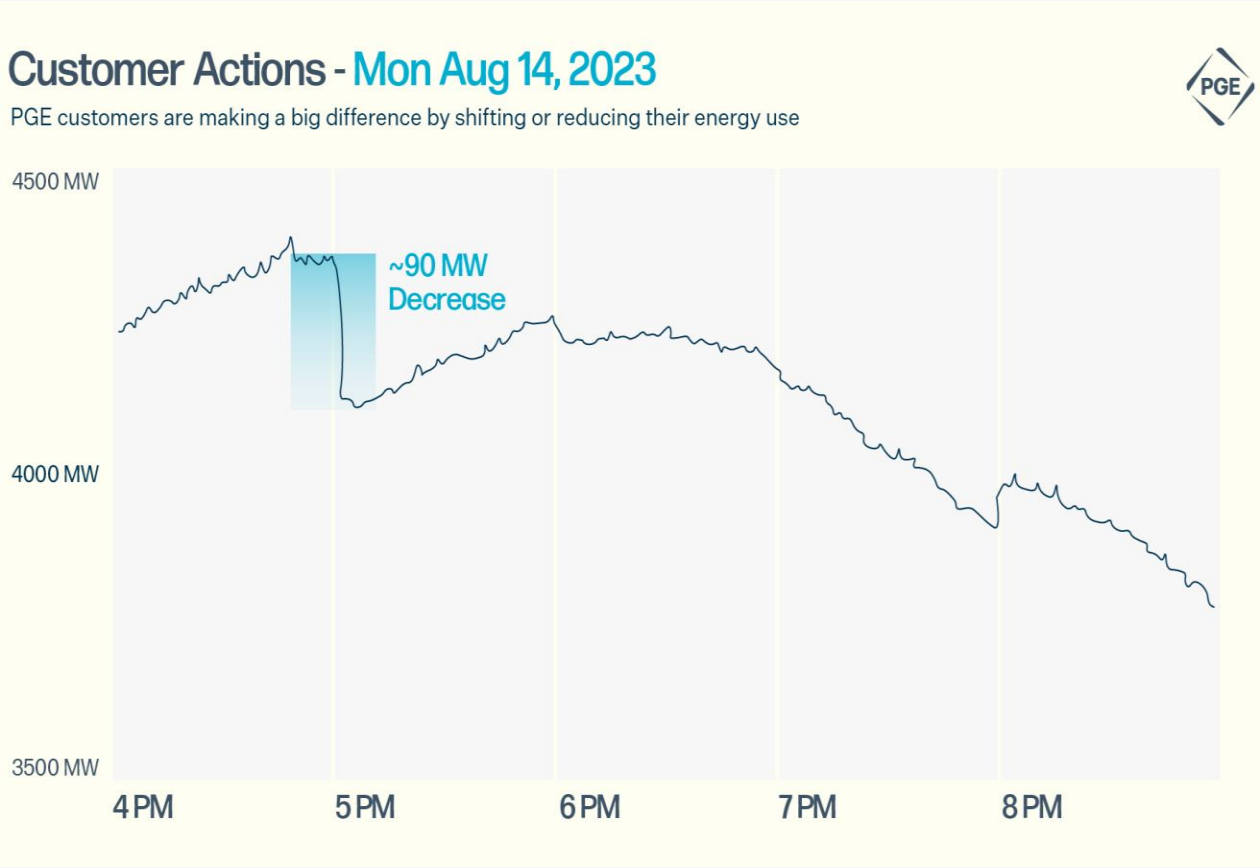
Heatwaves (Aug 2023 & Jul 2024)

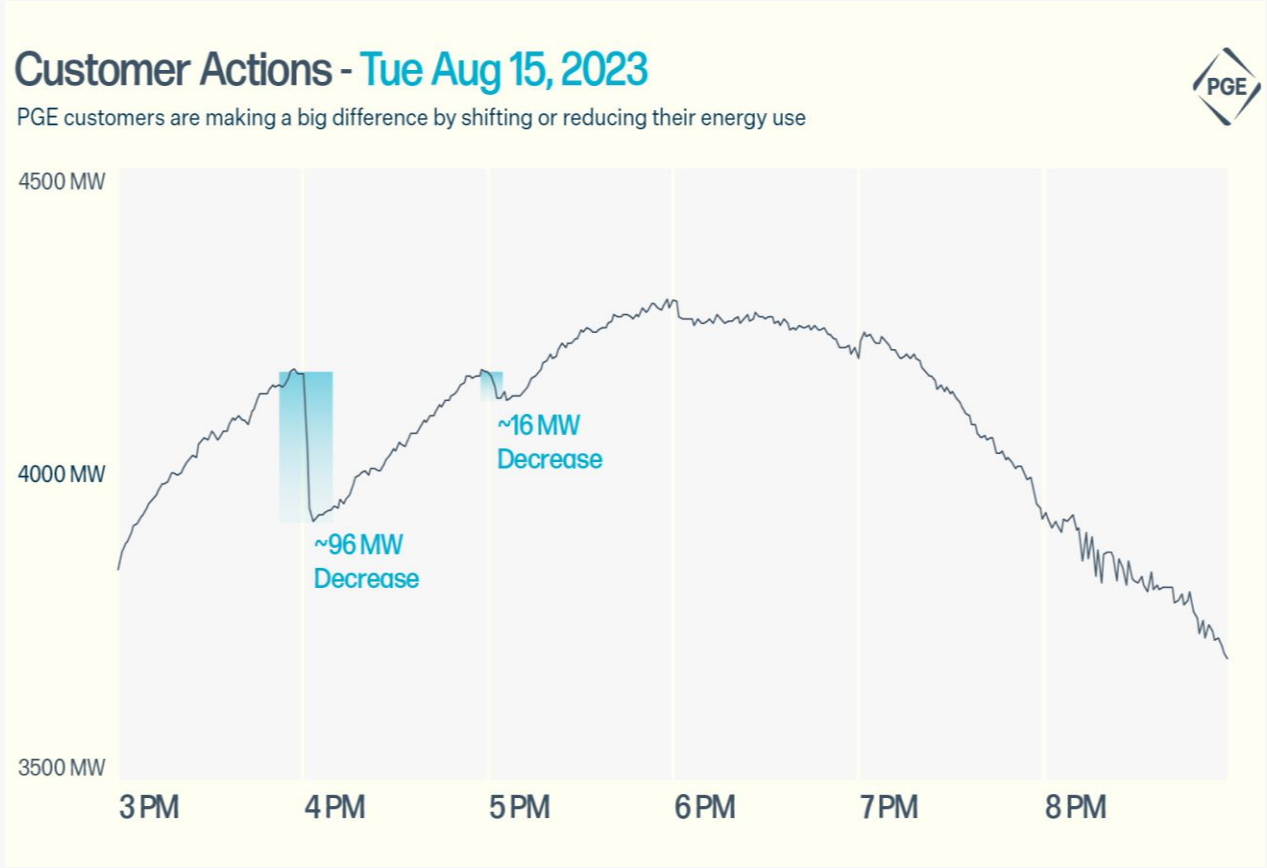


August 2023 Heatwave

Weekday	Date	High	Low
Sunday	Aug 13	100	67
Monday	**Aug 14**	**108**	**65**
Tuesday	**Aug 15**	**102**	**68**
Wednesday	Aug 16	102	69
Thursday	Aug 17	91	65

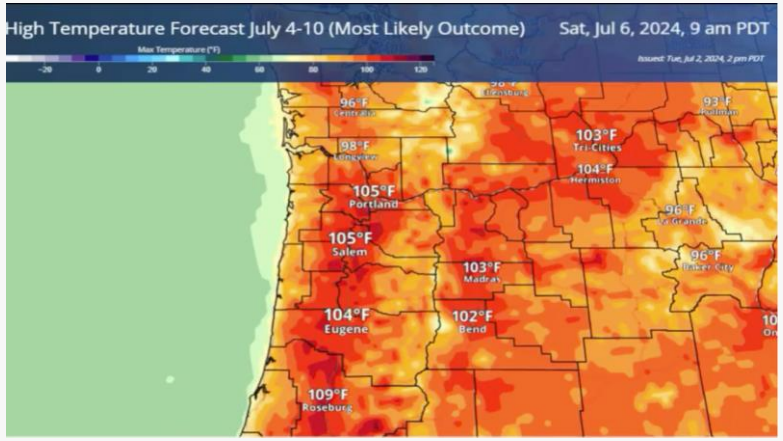


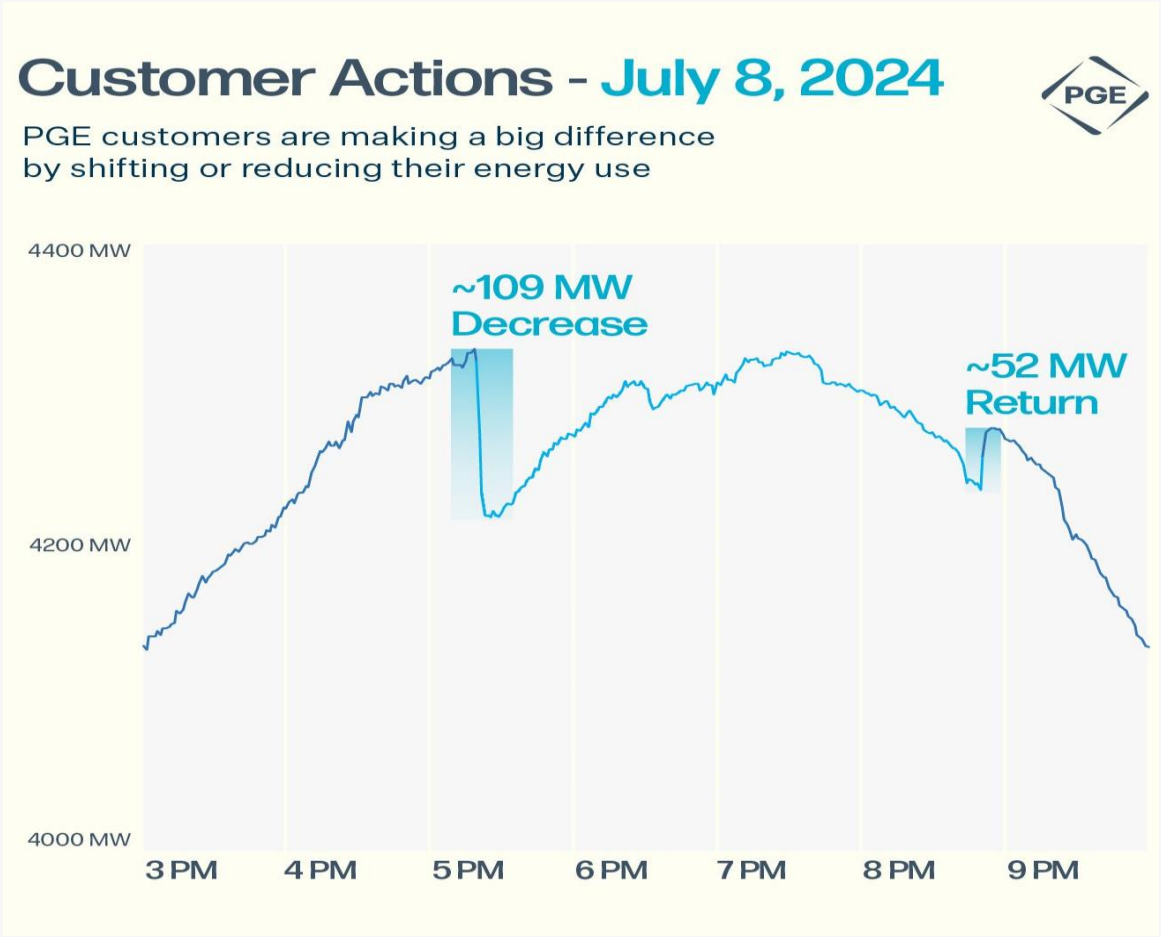


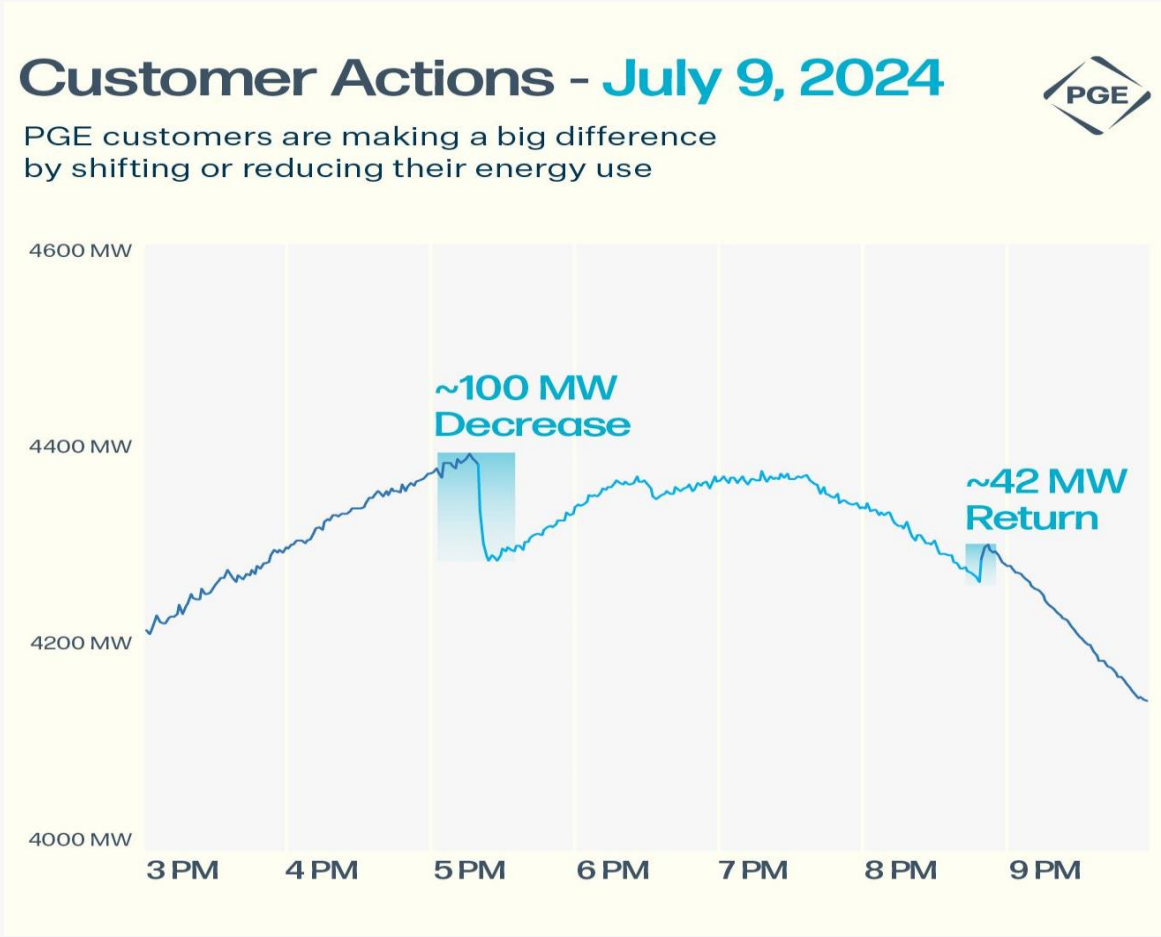


July 2024 Heatwave

Weekday	Date	High	Low
Sunday	Jul 7	101	65
Monday	**Jul 8**	**102**	**65**
Tuesday	**Jul 9**	**104**	**68**
Wednesday	Jul 10	94	58
Thursday	Jul 11	88	56







During these week's heat waves

PGE customers cut peak electricity demand by

- **90 MW** on Mon, Aug 14, 2023 (108 F)
- **96 MW** on Tue, Aug 15, 2023 (102 F)
- **109 MW** on Mon, July 8,2024 (102 F)
- **100 MW** on Tues, July 9,2024 (104 F)

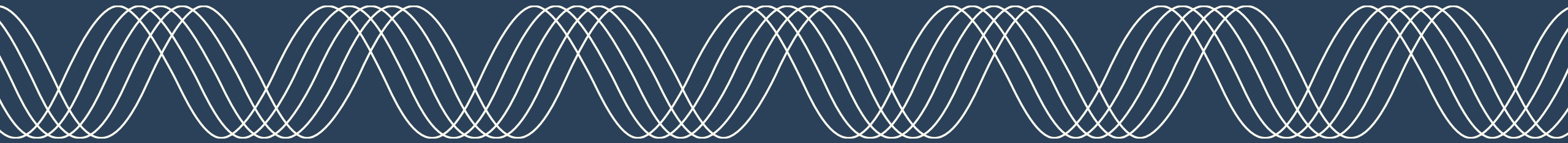
Achieved by participating in PGE's energy shifting programs

These collective actions

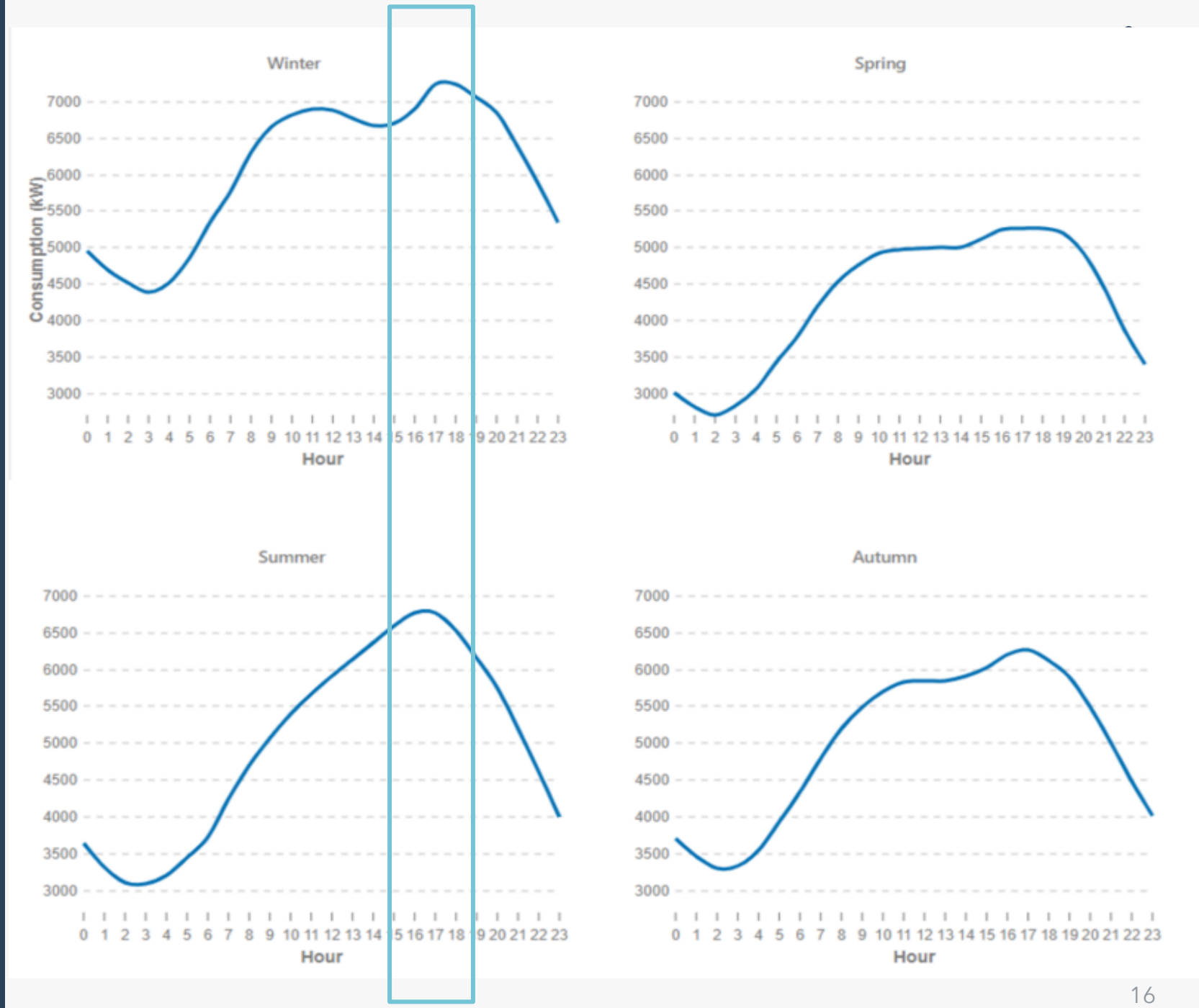
- Supported reliable power delivery
- Ensured grid stability during extremely high-power demand

Huge thanks to everyone involved.
Together, we're driving a more resilient, sustainable energy future

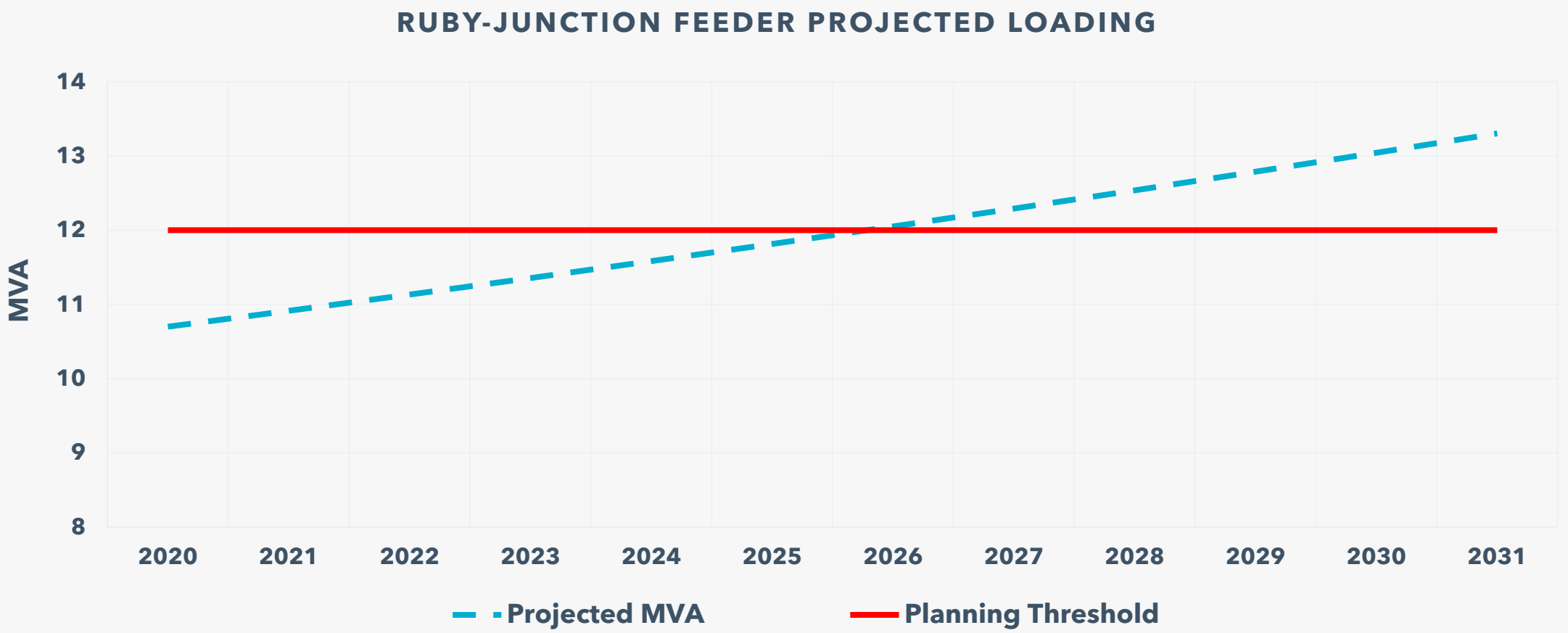
2021 Non-Wire Solution Analysis at the Ruby Substation



Ruby Substation average seasonal load profiles (2021)



Load Growth vs Planning Threshold



Collectively, VPPs Can Deliver a Range of Benefits

Cost Control	Reliability & Resilience	Decarbonization	T&D Infrastructure Relief	Community Benefit
• Defer grid capex (generation, T & D) • Avoid fuel costs • Compensate consumers and businesses	• Integrate back-up power • Eliminate single-point-of-failure	• Add distributed renewable generation • Reduce curtailment of renewables • Reduce reliance on fossil fuels	• Increase efficiency by smoothing peaks • Alleviate congestion with local dispatch	• Enable consumers to optimize energy cost, use, and source • Retain and create good jobs

Source: https://liftoff.energy.gov/vpp/

Capabilities Required for NWS/VPP

Capability	Description
Grid Modeling & Analysis	Digital twin/network model development, including analysis of SCADA and field sensor data, typology models and control settings, and DER performance data.
DER Control & Dispatch	Design and implement DER controls, including DERMS alignment, lab simulation, hardware-interoperability and testing, OEM communication and coordination.
Product Design & Marketing	Analyze customer composition of chosen locations, assess customer preferences/needs, customize product offerings to maximize participation/adoption, incorporate considerations for disadvantaged populations, design and implement measurement and evaluation framework.
Contractor Training & Management	Identify installers who are willing to add DER integration requirements to the install process, work with installers to design efficient installation processes, prepare installers to configure DERs to integrate with PGE systems/controls.
ADMS/DERMS Controls Integration	Configure system ADMS, DERMS to recognize and operate DERs, develop operations procedures to cover DER orchestration use cases.
Equity Lens	Apply environmental justice principles in the deployment of DER-based solutions

Decarbonize

Electrify

Perform

Virtual Power Plant

PGE will enable customers to shift their power usage from peak times while providing reliable and affordable energy

Virtual Power Plant

The orchestration of
Distributed Energy Resources and Flexible Load,
through technology platforms,
to provide grid and power operations services.

Customer Programs	Distributed Solar	Distributed Thermal	Distributed Storage	Utility Storage

Technology Platforms

Policy and Regulation

To achieve a 25% peak usage offset while serving 100% of customer energy needs
PGE is targeting 2,000 VPP-enabled megawatts by 2030

Key Takeaways

- Pressure on the grid is increasing
- Unmanaged DERs contribute to that pressure
- Orchestration of DERs through a Virtual Power Plant (VPP) can relieve some pressure and provide customer benefits

Questions/ Comments

Flex Load Multi-Year Plan Update

Kai Lübbe | Kati Harper |Jason Salmi-Klotz

Distribution System Workshop # 3 | 24 – July 25, 2024

Objectives

Flex Load Multi-Year Plan (MYP) inform timing and content

Flex Load Customer Portfolio overview and performance

Smart Battery pilot update

Relationship to CEP, IRP, & DSP

Clean Energy Plan (CEP)

Integrated Resource Plan (IRP)

Vision: Technically feasible portfolio that best balances risk, cost and community benefits to ensure continual progress to emissions targets
Regulatory Context:
- Complies with IRP rules and guidance listed in OAR 860-027-0400
- Complies with CEP requirements from HB 2021 and UM 2225 Orders

Timeline: Mar. 2023
Areas of Focus:
- Accessible/non-technical plan overview
- Forecast of system-level resource needs
- Evaluate community benefit indicators and resiliency opportunities
- Select preferred resource portfolio
- Action plan of resource and community-related actions

Key dependencies: load forecast and DER resource options informed by DSP analysis; preferred portfolio inclusive of DERs and non-wires solutions from DSP; community engagement coordination

Distribution System Plan (DSP)

Vision: 21st century community-centered distribution system
Regulatory Context: satisfies OPUC-adopted DSP guidance via Order 20-485
Timeline: Initial plan filed in two parts, Oct. 2021 and Aug. 2022
Areas of Focus:
- DER and load forecasts
- Community engagement strategies
- Analyze grid needs and potential solutions
- Analyze non-wires solution opportunities
- Action plan of distribution grid-related actions

Key dependencies: DER analysis informed by avoided costs from IRP, resiliency strategies informed by resource development; community engagement coordination

Request for Proposals (RFP)

Flex Load Multi-Year Plan (MYP)

Transportation Electrification Plan (TE Plan)

Other Resource Programs and Actions

Flexible Load Multi-Year Plan

Purpose

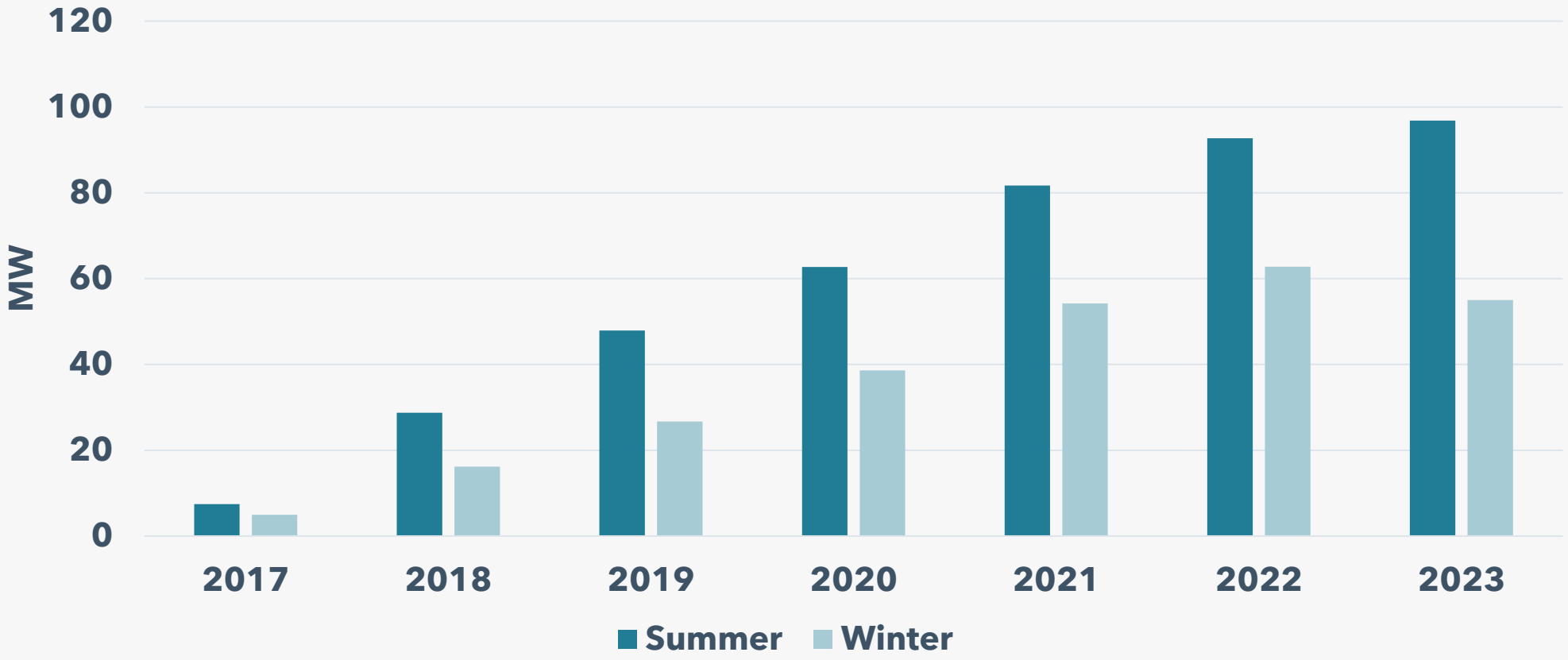
1. Provide comprehensive view of Flex Load activities in **context** of regional work, stakeholder engagement, and PGE's decarbonization strategy
2. Regular **reporting** of activities annual MW acquisition, and associated budget forecasts
3. Demonstrate pilot-to-program **progress**, resource development, and proposed changes to practices
4. Propose and seek **approval** for new pilots
5. **Inform** regarding new demonstrations with potential to move to pilot

Flexible Load Multi-Year Plan

History of Filings (UM 2141)

- 2020 Established the Flex Load Plan
- 2021 Inaugural Flex Load Multi-Year Plan for 2022-2023
- 2023 Flex Load Multi-Year Plan Supplemental for 2024

More than 12x growth in Flex Load programs since 2017



PGE's Flex Load programs make up a ~ 100 MW virtual power plant that engages over 20% of our customers

101 MW

summer capacity across **7 programs** spanning residential, multi-family, commercial, and industrial

22%

of residential households participate in one or more programs

10.8 MW

additional summer capacity expected in 2024

Summer Flex Load Capacity

As of 6/30/2024

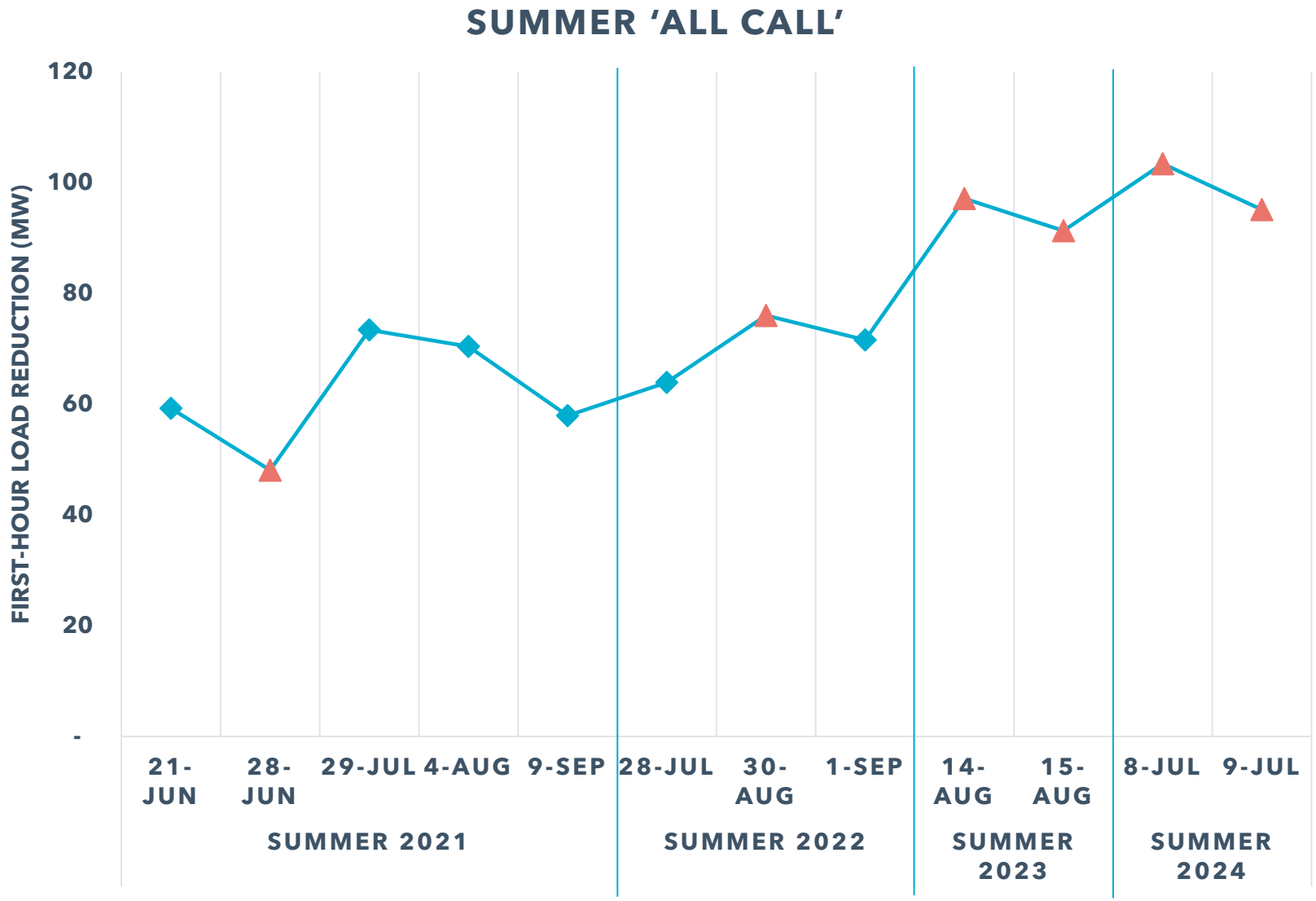
Peak Time Rebates	• 15.4 MW • 126k customers
Residential Smart Thermostat	• 41.2 MW • 52k t-stats summer
Time of Day	1.9 MW 17,465 customers
EV Smart Charging	• 1.2 MW • 5.4k chargers
Multi-Family Water Heater	• 1.9 MW • 10.3k water heaters
Commercial Smart Thermostat	• 1 MW • 2.5k t-stats summer
Energy Partner on Demand (Large C&I)	• 38.6 MW • ~120 customers

Portfolio overview of pilot programs

Customer Segment	Behavioral / Manual DR	Direct Load Control / Auto DR
Residential	**Peak Time Rebates**: Customers receive day ahead and day of notifications for events and are asked to shift their electrical energy use outside event hours (includes batteries) **Time of Day**: Time-varying rate customers shift energy taking advantage of lower prices for using less energy during the high demand weekday hours of 5–9 pm	**Smart Thermostats**: PGE adjusts T-stat between 1-3 degrees during events **EV Chargers**: PGE stops charging EVs during events (dispatched daily)
Multi-Family		**MF Water Heater**: PGE adjusts water heating to times when demand is low. Controls ensure hot water is available for tenants (dispatched daily)
Small/Medium Commercial		**Commercial Smart Thermostats (Sch 25)**: PGE adjusts T-stat between 1-3 degrees during events
Large Commercial and Industrial	**Energy Partner on Demand (Sch 26)**: Customers manually participate in events based on their load curtailment plan (includes batteries)	**Energy Partner on Demand (Sch 26)**: PGE dispatches event signal for automatic participation in events (includes batteries)

Flexible load summer season 'All Call' trends

- **Summer season (6/1 - 9/30)**
- **All calls = Deployment of all resources on one day**
- **All call trends**
  - Higher temperatures
  - Multi-day



*Preliminary estimate (3-4 days post-event) of first-hour load reduction. Points with triangle markers indicate that the high temperature was 100 degrees F or more.

Flex Load Multi-Year Plan (MYP)

Planned **September/October 2024 filing** requests funding for 2025-26 flex load activity and provides updates on the portfolio operations

Continued Growth

- Incremental MW growth
- Updated cost effectiveness

Advance Program Maturity

- Program hood for maturing pilots
- Remaining pilots outlined with pathway to program hood

Enhance Portfolio Operations

- Increase utilization of customer programs as a grid resource
- Improve flexibility of portfolio operations including tariff alignment

Smart Battery Pilot

https://assets.ctfassets.net/416ywc1laqmd/6Rc1XUV4b9R3tPhzYhhz7T/c50e4a38f88543856d52435ca558c634/Sched_014.pdf

Smart Battery Pilot

Launched in 2020

PGE's first customer battery program. Part of larger initiative requiring the study of batteries on the grid.
Five-year pilot, set to expire in Q3 2025.

Objective to Study Value to…

Customers: Tested incentive structures, messaging, rebate campaigns, participation preferences. One size does not fit all!
Electrical Grid: Grid services, dispatch strategies to optimize load shed, summer vs. winter impacts
PGE Operations: How to seamlessly enroll customers, dispatch batteries, manage inquiries

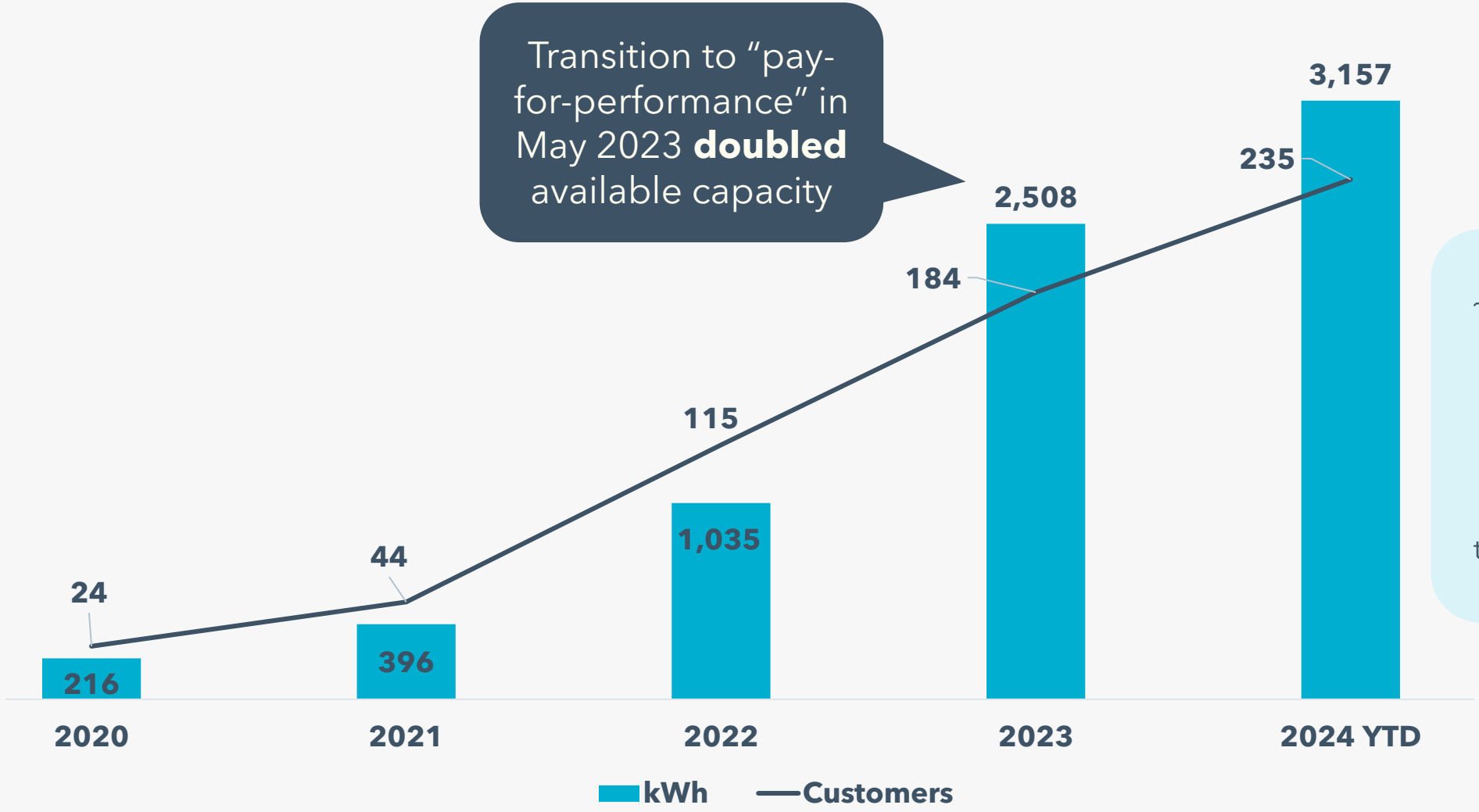
Batteries are dispatched for Grid Value

Primary use is Peak Time Event. Batteries are sent a signal on the hottest or coldest days of the year to provide power to the home or grid, support reliability and keep energy costs low.

Keep Growing, Keep Learning!

Offering will continue after original pilot expires, though the details may change based on what we have learned. This is an important resource!

Smart Battery Growth



~27% of eligible devices are enrolled in the Pilot.

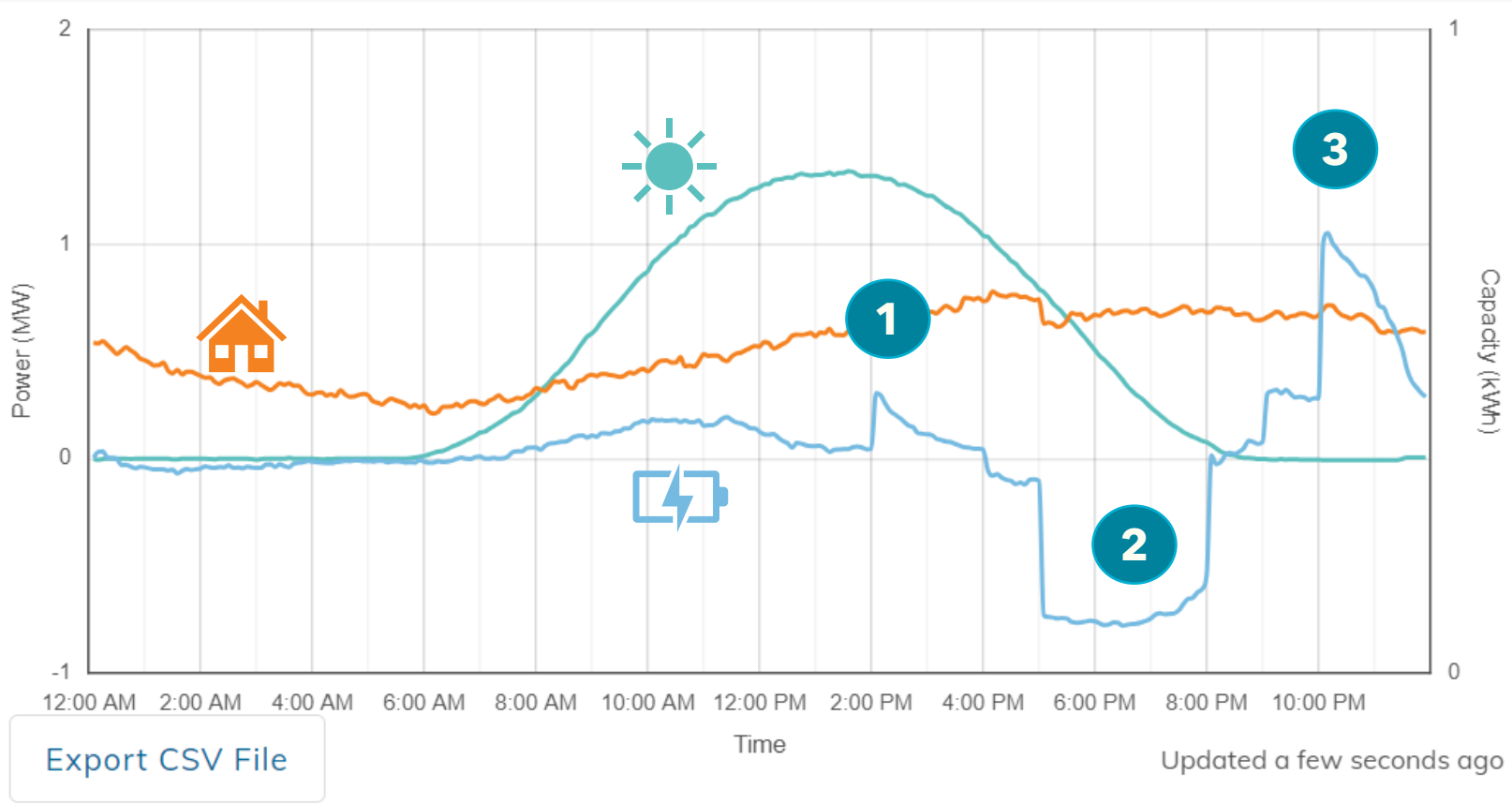
~800 eligible batteries (1,030 total residential)

Heat Wave Performance

Batteries were dispatched four times during the July heat event and provided consistent power during peak times.

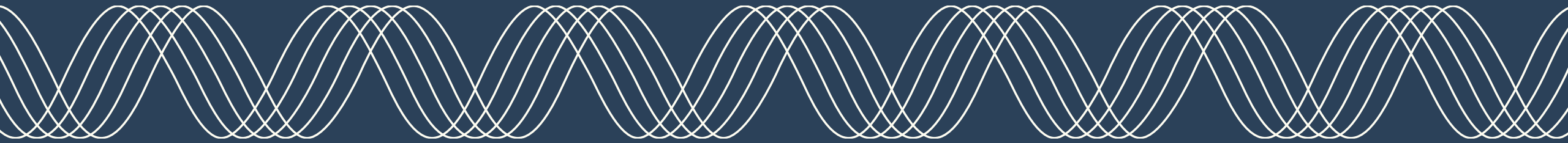
Each event is three separate signals

1. Charge the batteries to ensure they are full before the event
2. The peak time event! 750 kW was provided to the grid for three hours during this example on July 9, 2024
3. Fill the batteries back up after the event



Questions/ Comments

Next Steps and Closing Remarks



Next Steps & Closing Remarks

- Friday July 26 | End of comment period on DSP Guideline Revisions | UM 2005
- Wednesday Aug 7 | 9-11:30a | Zoom | CEP/IRP Roundtable
- Thursday Aug 8 | 12-1p | Zoom | Distribution System Workshop | OFFICE HOURS
- Wednesday Aug 28 | 10a-12p | Zoom | CBIAG Meeting
- Wednesday Sep 12 | 10a-12p | Zoom | Distribution System Workshop

Meeting materials and recording will be posted to our Plan's Engagement webpage at Plans Engagement | Portland General Electric

For more information or if you have questions, please email us at dsp@pgn.com

Thank You for your participation in our plans

An

kind of energy