Distribution System Planning (DSP)

Angela Long, Manager, Distribution Resource Planning (DRP)

April 14, 2021 | Workshop 4

PGE

Meeting Logistics

- We are available at: DSP@pgn.com
- 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)
    - PW: 885 018 032#
  - Please use Microsoft Edge or Google Chrome with Teams as it will give you the best experience
  - 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
  - There is now a meeting chat feature rather than a Q&A feature. Pull this up on the menu bar when you move your mouse and look for the little message icon

Agenda

Opening Remarks

Community Engagement Plan: Community Facilitator Scope of Work Update

Forecasting of Load Growth, DER Adoption, and EV Adoption: DER Potential & Flex Load Analysis – Phase 1

Hosting Capacity Analysis: Options Analysis

Baseline Data and System Assessment: Example Datasets Update

Long Term Plan: Grid Modernization

Break

Non-Wire Alternatives (NWA): Draft Results

Question/Next Steps

Proposed partner engagement timeline

		2021									
		January	February	March	April	May	June	July	August	September	October
Distribution System Planning (DSP) plan - Part 1	Baseline data and system assessment	Data collection, organization, QA/QC, and visualization				Present to partners for feedback	Iterate as necessary	Final draft shared with partners		PGE review process	Filed on Oct 15th
	Hosting capacity	System evaluation map and hosting capacity option analysis					Present to partners for feedback	Iterate as necessary	Final draft shared with partners	PGE review process	Filed on Oct 15th
	Community engagement plan	Development of the Community Engagement Plan							Present to partners for feedback	PGE review process	Filed on Oct 15th
	Long term planning	Development of long-term plan						Present to partners for feedback	Final draft shared with partners	PGE review process	Filed on Oct 15th

Community Engagement Plan:
Community Facilitator Scope of Work Update

Our Engagement

Community Engagement Definition

In the context of the DSP, community engagement refers to the education and outreach to non-traditional stakeholders; those who have not historically had a seat at the table, those who have not historically been provided access or granted procedural equity, those who represent the Environmental Justice community.

This definition is a working definition which may evolve over time.

Customers

Utilities

DER Developers

Partner Engagement

Refers to traditional stakeholders. Those who possess energy/utility technical expertise, those who are already parties to the proceeding, those with whom we seek to partner in engaging with community.

Customer Advocates

Technical Experts

Regulators & State Agencies

CBO Partnerships

Energy Trust of Oregon
NW Energy Coalition
for a clean and affordable energy future
PGE

Technical Advisory

Community Energy Project → unite oregon → CCC=

Education:
- Assess/ Translate
- Energy 101
- DSP 101

Best Practice:
- Recruit/ Convene
- Workshops/ Surveys
- Collect Feedback

Best Practice:
- Analyze
- Synthesize
- Recommend

Initial Engagement Channels (2021)

Channel	Intended Scope	Timing
Community Engagement Workshops – Best Practice ("Series A")	Non-technical: Partner with Unite Oregon and Coalition of Communities of Color to conduct outreach, research and co-develop best practices	Monthly (April – June)
Community Engagement Workshops – Energy Education ("Series B")	Non-technical: Partner with CEP to provide targeted energy education	Monthly (April – June)
DSP Partner Workshops	Technical and Non-technical: Elicit Partner feedback	Monthly (Jan – Dec)

Technical Advisory provided by NWEC, ETO and PGE

Community Workshop Series

Series A: Best Practice

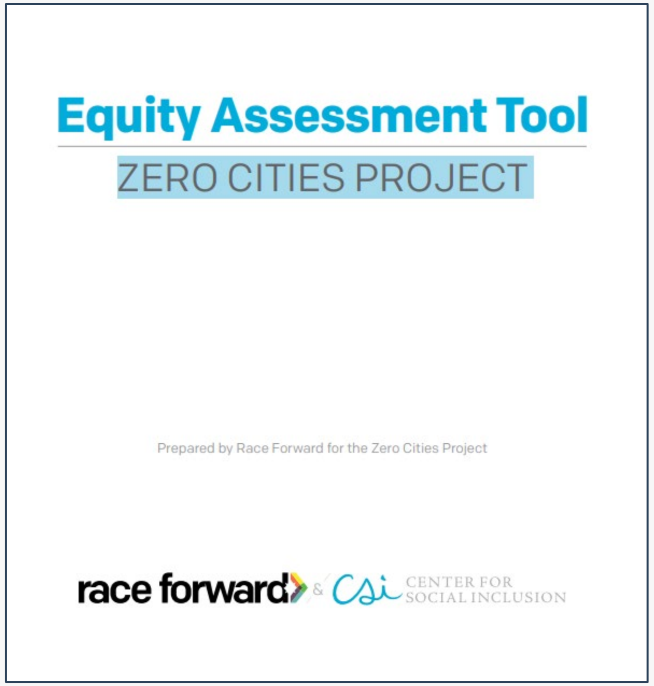
- Intent: Supports CEP development
- Activities: Recruit, Convene, Synthesize
- Scope /Timing:
  - Recruit, convene, and facilitate CE workshops series (March – May 2021)
  - Perform Community Needs and Impacts Assessment, informed by outreach and research activities (**May–June** 2021)
  - Develop Best Practices Community Engagement framework to support development of PGE's CEP (**May** – July 2021)
  - Develop Action Plan that provides findings and recommendations (July – August 2021)

Series B: Energy Education

- Intent: Support Best Practice workshops desire to foster meaningful engagement
- Activities: Translate and Inform
- Scope /Timing
  - Energy Education Needs Assessment, identifying gaps in education (**March** 2021)
  - Energy 101 + DSP 101 Educational Materials, addressing gaps inventoried in previous deliverable (**April** 2021)
  - Educational Workshops (**May** 2021)

Reference Models

In addition to our community engagement workshops we aim to draw inspiration from these models in the drafting of our Community Engagement Plan.



Equity Assessment Tool

ZERO CITIES PROJECT

Prepared by Race Forward for the Zero Cities Project

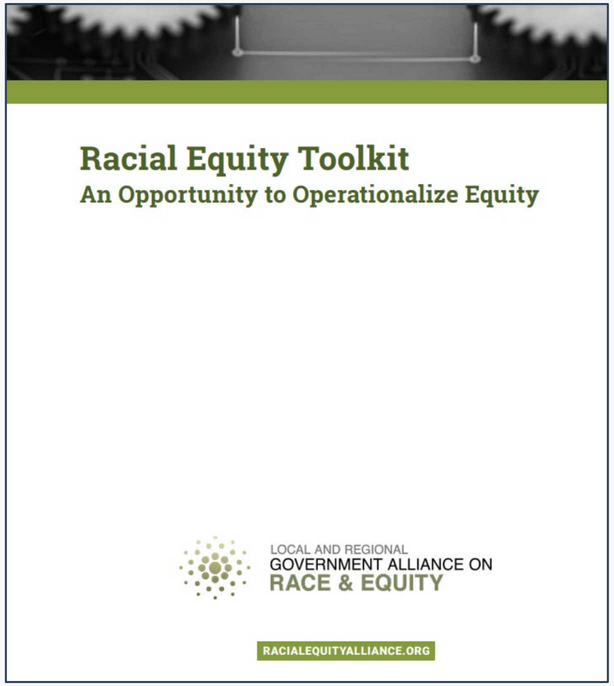
race forward & CSI CENTER FOR SOCIAL INCLUSION

State of Oregon
Climate Equity Blueprint

OCTOBER 2020

Estolano ADVISORS

Better World Group



Racial Equity Toolkit

An Opportunity to Operationalize Equity

LOCAL AND REGIONAL GOVERNMENT ALLIANCE ON RACE & EQUITY

RACIALEQUITYALLIANCE.ORG

Community Engagement Calendar

March – June: Recruit and Convene

March
- Community Facilitator secured
- Energy/DSP Education curriculum development partnership formalized
- **Recruit community members to attend PGE's community engagement workshops**

April – May
- **Convene community**

June
- Draft CEP
- Develop and present the CEP to community partners

July
- Compile feedback and review CEP

August
- Final CEP
- Present the finalized CE Plan at monthly DSP workshop

Updates since March Workshop:

- SOWs formalized, education outline drafted and core technical advisory committee formed
- Convened community consultants and advisory to discuss energy education outline and workshop timeline
- Flexible Learnings: Identified an opportunity to characterize engagement in both a COVID-virtual and physical environment in our development of best practices

DER Potential & Flex Load Analysis – Phase 1 project update

Current Status

In the March Meeting, PGE ran long on its presentation with Cadeo, which resulted in PGE not being able to share its example draft results.

PGE committed to share the remainder of the slides in the April DSP Partnership Workshop.

However, model and results QC still underway and require more time than appreciated.

Draft Final Results will be shown in the May DSP Partnership Meeting.

Today will be a quick update of status and some **example** results for discussion.

Advancing DER Modeling at PGE

Quick recap of the new method…

Or, why it's taking longer than planned

Through this study we sought to…

- Increase transparency of modeling approach (inputs, outputs, algorithms)
- Better capture resource parameters and key assumptions
- Advance understanding of Flex Load potential to achieve range of grid needs
- Develop supply curves with levelized costs to model on comparable basis within IRP analysis

Leveraging trusted third-party sources

The DER Study is leveraging open-source tools and best practices where possible, including:

- CalTRACK for standardized baseline and net load profile calculations
- NREL data sets and forecasts
  - PVWatts
  - Re-Opt Lite
  - EVI-Pro Lite
- NEEA CBSA/RBSA stock studies and end use load research studies
- Tie to ETO forecast whenever possible

DER Adoption Scenarios

Greater visibility into model mechanics

Chance to answer "what-ifs" with plausible scenarios

Important for quick changing markets (e.g., TE) and complex code futures

- Worked with IRP team to define boundary conditions across nine different future scenarios

		Load Forecast Scenarios		
		Low	Reference	High
DER Adoption Scenarios	Low	Low Load Low DER	Ref Load Low DER	High Load Low DER
	Reference	Low Load Ref DER	Ref Load Ref DER	High Load Ref DER
	High	Low Load High DER	Ref Load High DER	High Load High DER

Types of potential modeled

Technical potential

Amount of the resource that is technically possible, without consideration of cost or other market barriers.

Sets upper bound to determine what is max theoretical adoption.

Economic potential

Layers a cost-effectiveness screen on to technical potential to determine economically beneficial technologies.

Cost-effectiveness is used for utility deployed measures (e.g., DR) and simple payback for others (e.g., solar, unmanaged electric vehicle load).

Market forecast

Use of broad market forecasting methods for non-programmatic technologies.

E.g., solar and EVs.

Note vehicle chargers are a program, just not the vehicles themselves.

Achievable potential

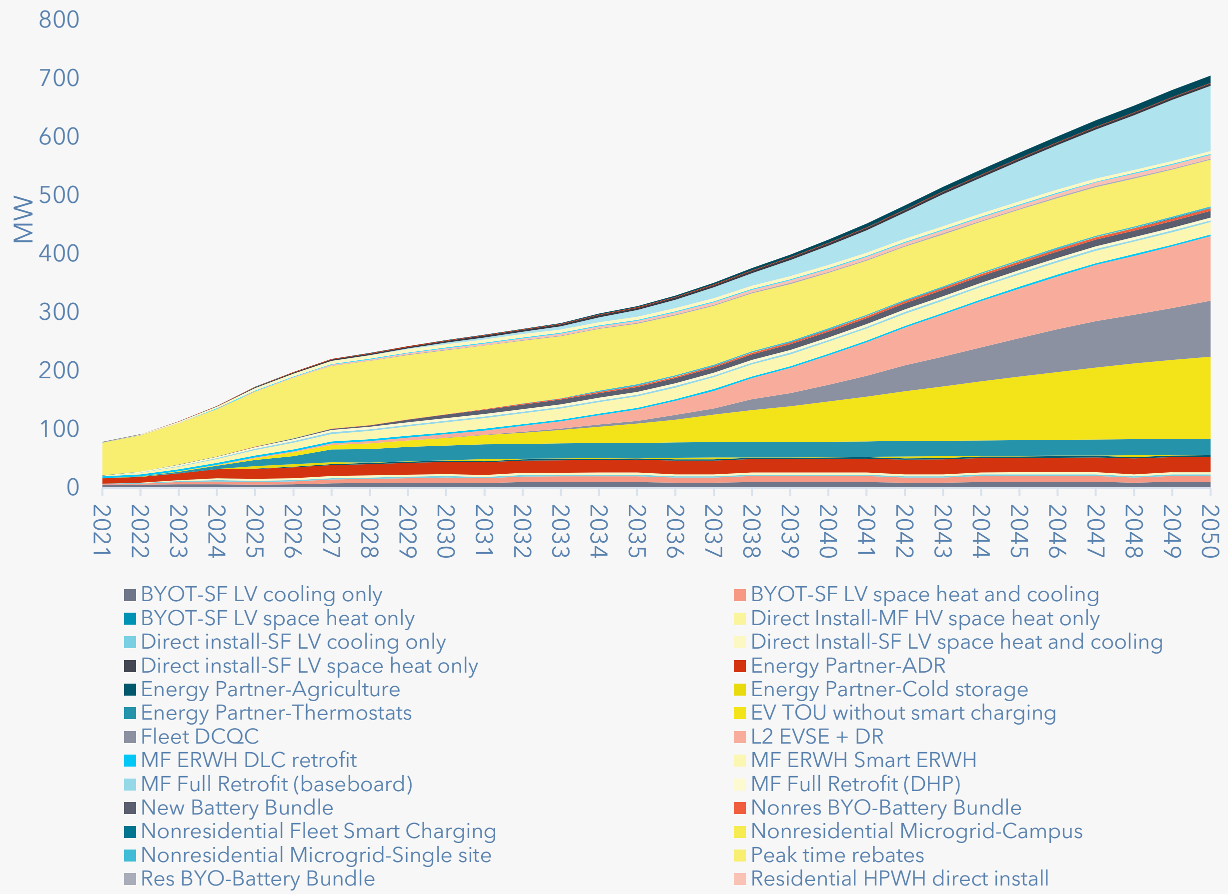
Subset of economic potential that PGE can realistically achieve, given market barriers and its DER programs.

This screen accounts for:

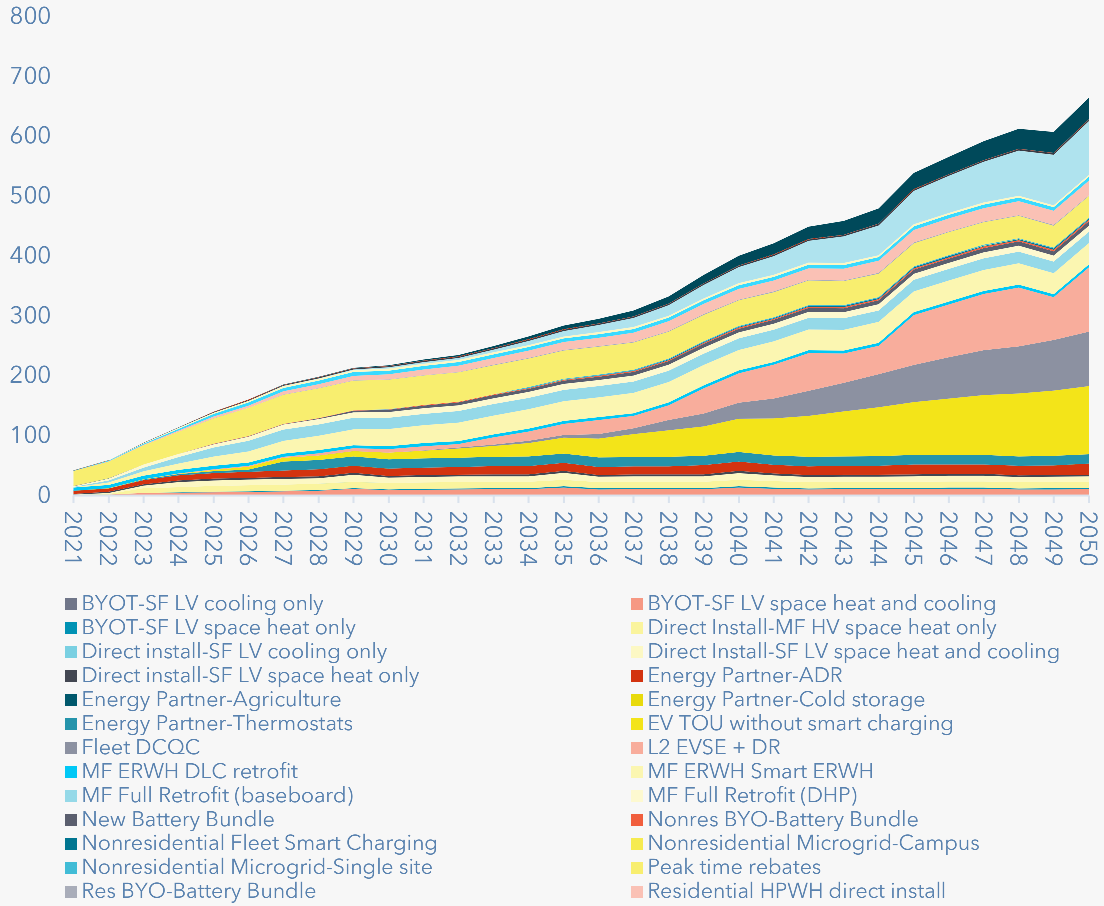
- Maximum penetration
- Time to maturity
- Ramp rate (adoption curve)

EXAMPLE Results Outputs - Potential

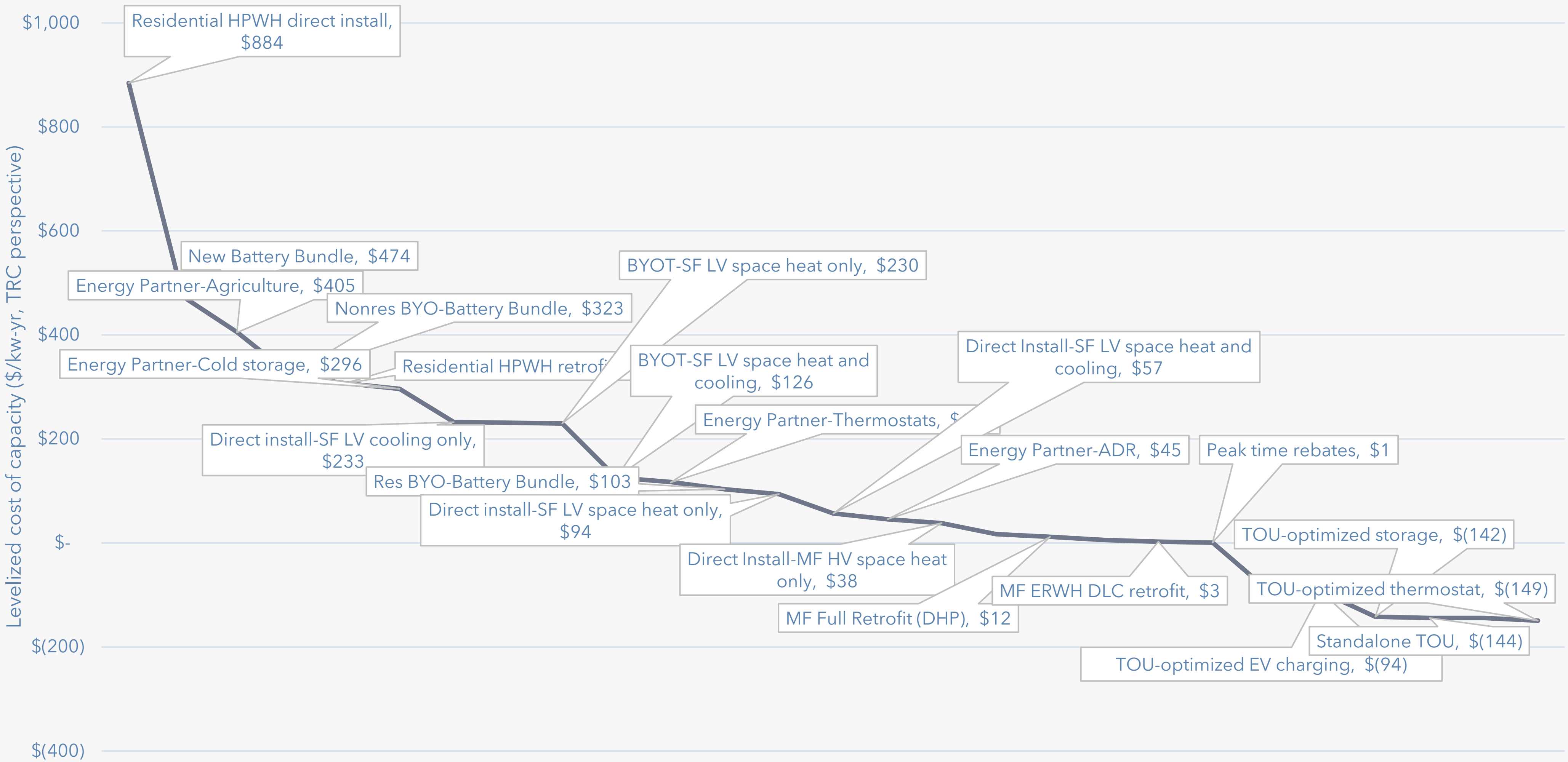
Summer MW (all achievable, reference load and DER)



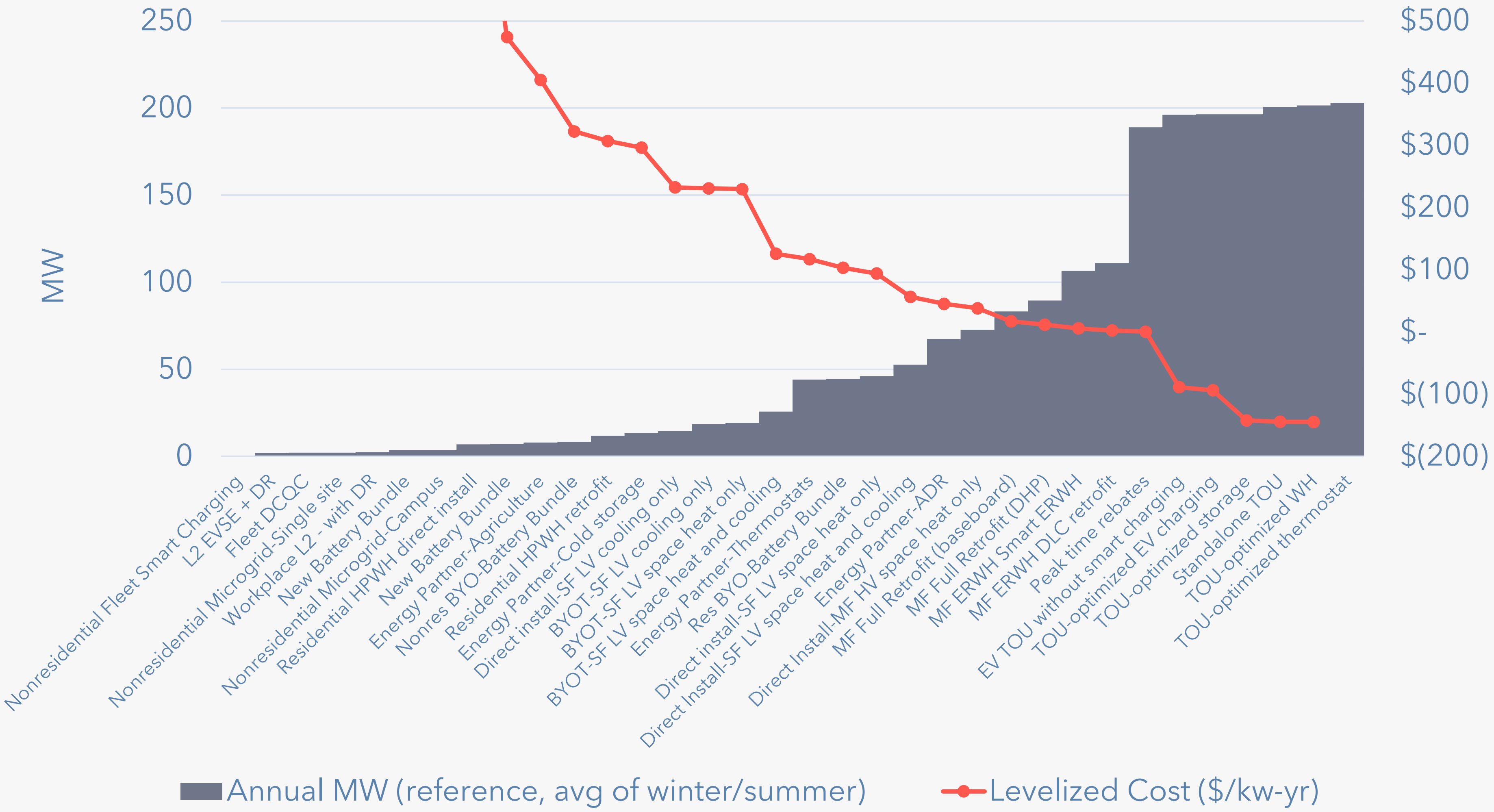
Winter MW (all achievable, reference load and DER)



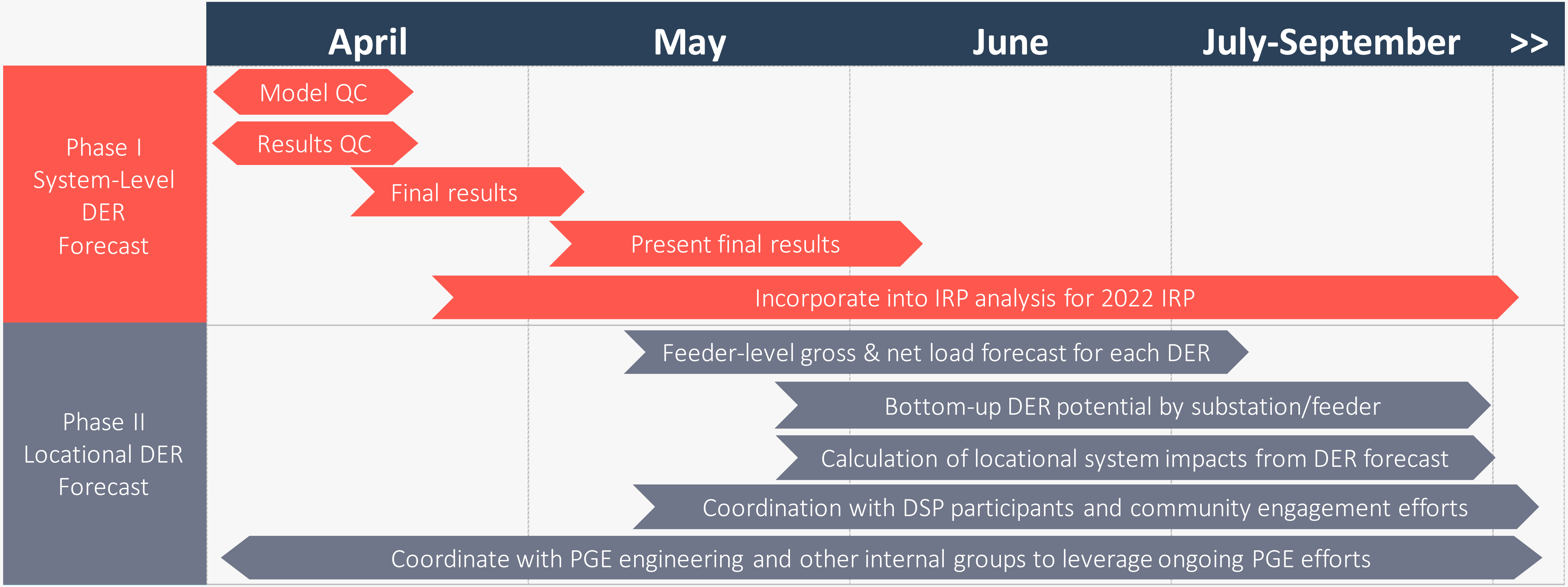
EXAMPLE Results Outputs – Supply Curve



EXAMPLE Results Outputs – Supply Curve



Timeline of near-term activities



Hosting Capacity Analysis:
Options Analysis

Hosting Capacity Analysis (HCA) Methods Examples

Method	Approach	Advantages	Disadvantages	Computation Time	Recommended Use Case
Stochastic	+Increase DER randomly +Run power flow for each solution	+Similar in concept to traditional interconnection studies +Becoming available in planning tools	+Computationally intensive +Limited scenarios	Hours/feeder	+DER planning
Iterative (Integration Capacity Analysis)	+Increase DER at specific location +Run power flow for each solution	+Similar in concept to traditional interconnection studies +Becoming available in planning tools	+Computationally intensive +Limited scenarios +Vendor-specific implementations can vary + does not determine small distributed (rooftop PV)	Hours/feeder	+Inform screening process +Inform developers
Streamlined	+Limited number of power flows +Utilizes combination of power flow and algorithms	+Computationally efficient +Not vendor tool specific	+Novel approach to hosting capacity +Not well understood method +Limited scenarios +Not available in current planning tools	Minutes/ feeder	+Inform screening process +Inform developers
DRIVE	+Limited number of power flows +Utilizes combination of power flow and algorithms	+Computationally efficient +Many DER scenarios considered +Not vendor tool specific +Broad utility industry adoption and input +Becoming available in planning tools	+Novel approach to hosting capacity +Not well understood method +Lag between modifications/ upgrades and associated documentation	Minutes/ feeder	+DER planning +Inform screening process +Inform developers

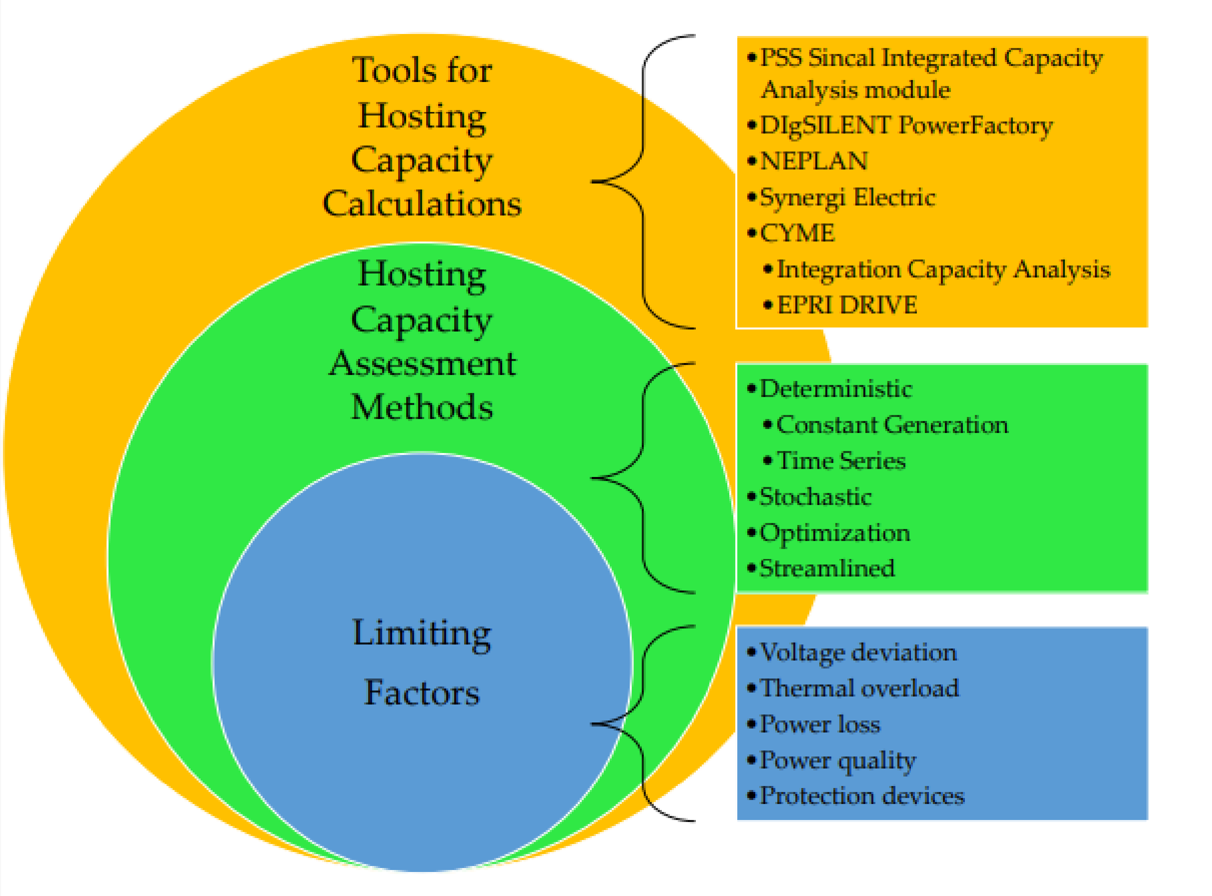
Source: [Methods and Application Considerations for Hosting Capacity (hawaiianelectric.com)]

Hosting Capacity Analysis (HCA) Methods Use Case

Method	Industry Adoption	Recommended Use Case
Stochastic	Pepco, ComEd	+Enabling Planning +Informing the public
Iterative	SCE, SDG&E	+Assisting with Interconnection +Informing the public
Streamlined	PG&E	+Enabling Planning +Informing the public
Hybrid – DRIVE	>27 utilities worldwide (including Xcel, NY)	+Enabling Planning +Assisting with Interconnection +Informing the public

Source: Impact Factors, Methods, and Considerations for Calculating and Applying Hosting Capacity-EPRI

HCA Review Structure Example



Source: **A Review of the Tools and Methods for Distribution Networks' Hosting Capacity Calculation**

HCA Options To Be Evaluated

HCA Characteristic	Option 1	Option 2	Option 3
Methodology	Stochastic modeling/EPRI DRIVE modeling	Same as option 1	Iterative modeling
Geographic granularity	Circuit	Feeder	Line segment
Temporal granularity	Annual minimum daily load	Monthly minimum daily load	Hourly assessment
Data presentation	Web-based map for the public and available tabular	Same as option 1	Same as option 1
Data update frequency	Annual refresh	Monthly refresh	Monthly refresh
Other info	Queued generation	Same as option 1	Same as option 1

HCA Option Questions

1. What are the strengths of each option?
2. What are the implementation barriers for each option?
3. What are the cost and timeline for each option?
4. What is our choice, for near-term, long-term?
5. How frequently to update the data and map?
6. How helpful will this be for grid needs identification?
7. How helpful will this be for interconnection studies?

HCA Option Evaluation Parameter

Evaluation Parameter	Option 1	Option 2	Option 3	Notes
Timeline	6 months	12-18 months	24-36 months	system integration and computation time
Cost	$	$$	$$$	system upgrades, labors
Data security	Low	High	High	input data, output data
Result validation	Low-Medium	High	High	input , output data QA (process, time, cost)
Implementation Concerns	Low	High	High	data availability, time and cost at PGE
Interconnection use case and implications	Low	High	High	Back feed issues, VoltVar
Planning use case and implications	Low	Medium-High	High	Forecasting and distribution system configuration
Locational value and benefits	N/A	High	High	Distribution System CapEx planning
Interaction with "grid Needs Identification	Medium	High	High	Feeder level DER forecast

Baseline Data & System Assessment:
Example Datasets Update

Baseline Workstream Timeline

January - April

- Data collection
- Develop data visuals
- Write plan

May

- Present at monthly partner meeting

May

- Incorporate partner feedback
- Provide final document for inclusion in the DSP

Long Term Plan:

Grid Modernization

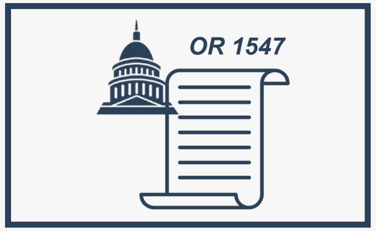
PGE

PGE is operating in an increasingly complex & changing environment

We need to evolve our grid capabilities to best meet our customer and community needs

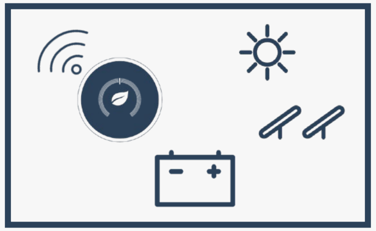
Customer Expectations

Regulatory Environment

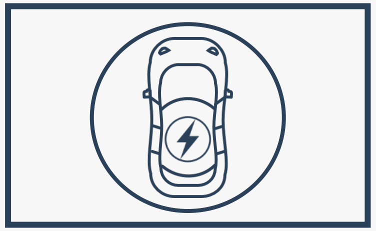


Evolving Energy Markets

Distributed Energy Resources *



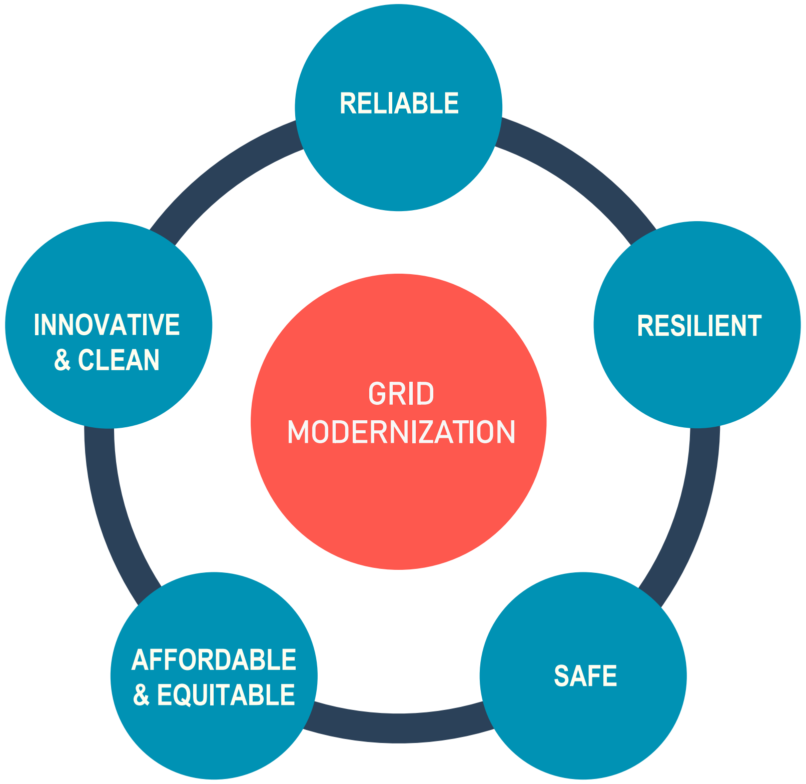
New Dynamic Loads

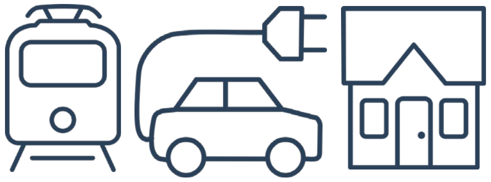


Increased Network Complexity

* Demand Response (DR), community solar and batteries, Distributed Standby Generation (DSG)

Integrated Grid Management







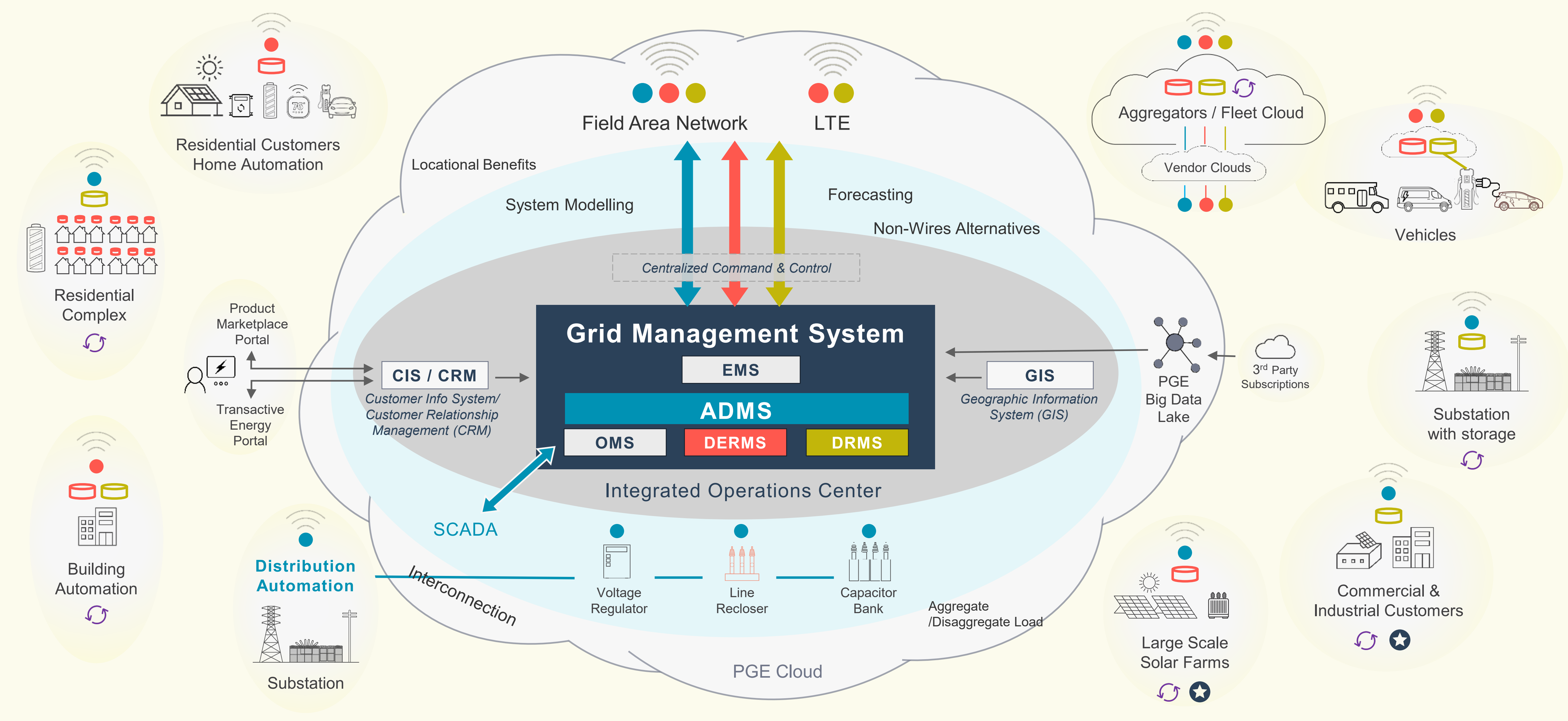


Updates to our grid will improve customer experience

Our customers are increasingly focused on reliability and resiliency

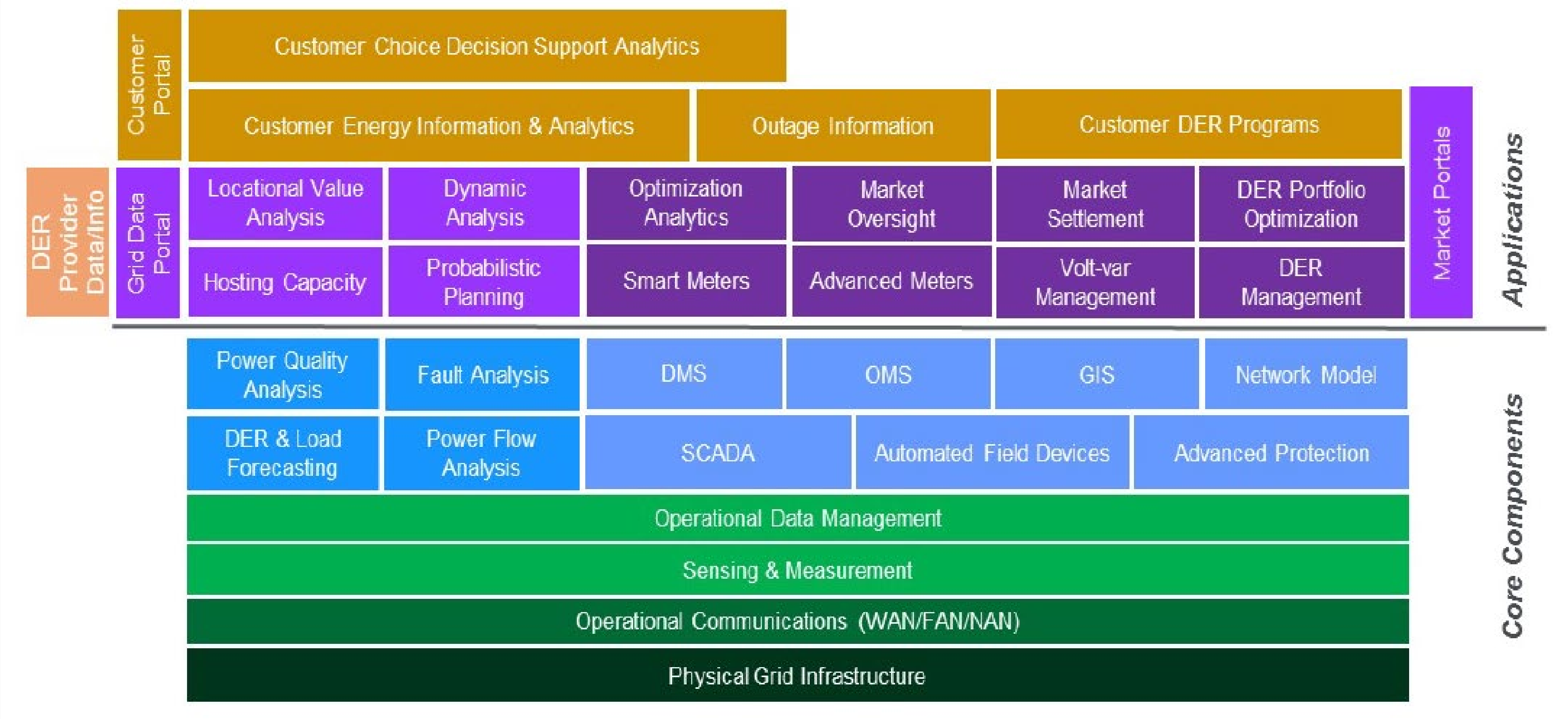
We are building the foundation to deliver reliable, affordable, and clean electricity to consumers where they want it, when they want it, how they want it.

PGE Grid Modernization – Conceptual Overview of the Grid



KEY Potential µGrid / Microgrid | Potential Qualified Facility | Demand Response Mgmt System (DRMS) | Distributed Energy Resource Mgmt System (DERMS) | Node communicating with system | 1-way or 2-way communication through Vendor, Aggregator, or direct to PGE

Another view of modernization technologies



Grid Modernization Program

Advanced Distribution Management System (ADMS)

PGE

ADMS (Advanced Distribution Management System) is a centralized software platform that we will use to model, monitor, control, predict, and safely operate our distribution network in real-time.

Current State: EMS + OMS

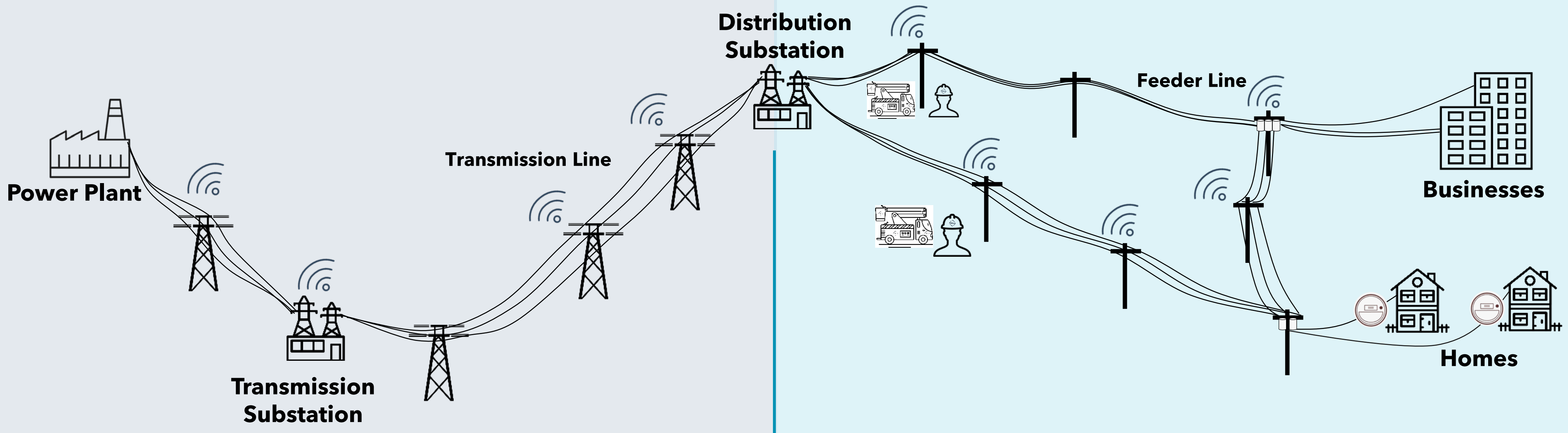
No current real-time monitoring of distribution network

Energy Management System (EMS)

- Real-time system representing the current state of generation and transmission assets
- Monitors and controls generation and transmission assets
- 1,250 miles of transmission lines
- OSI platform

Outage Management System (OMS)

- Near-real-time system representing the current state of distribution assets
- Monitors distribution assets and tracks customer outages
- 27,000+ miles of distribution lines; 1 million customers
- Oracle platform



Future State: EMS + OMS + ADMS (2021-2024)

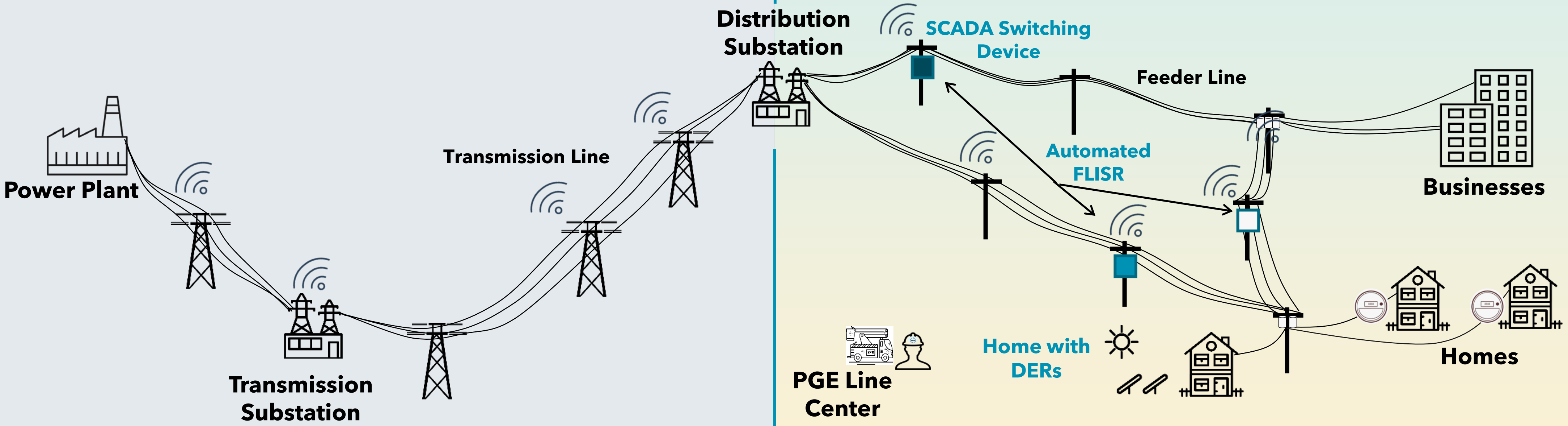
A new, centralized platform will enable real-time management of the distribution grid

Energy Management System (EMS)

- Real-time system representing the current state of generation and transmission assets
- Monitors and controls generation and transmission assets
- 1,250 miles of transmission lines
- OSI platform

Outage Management System (OMS)

- Near-real-time system representing the current state of distribution assets
- Monitors distribution assets and tracks customer outages
- 27,000+ miles of distribution lines; 1 million customers
- Oracle platform



Advanced Distribution Management System (ADMS)

- New, real-time system representing as-operated distribution grid
- Model, monitor, predict and control energy flow for distribution assets
- Enable automatable FLISR, Volt-VAR, voltage reduction
- OSI platform

DERs: Distributed Energy Resources
FLISR: Fault Location, Isolation, and Service Restoration
SCADA: Supervisory Control And Data Acquisition

ADMS

Advanced Distribution Management System Project

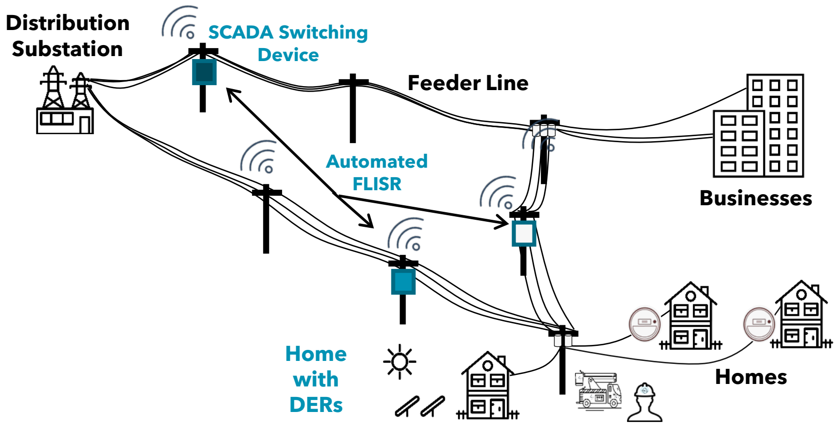
Enabling safer and more reliable distribution grid operations

ADMS is an overarching distribution software platform over DMS (Distribution Management System), OMS (Outage Management System), and DERMS (Distributed Energy Resource Management System). We will use ADMS and its associated infrastructure to model, monitor, control, predict and safely operate our distribution network in real-time.

.

Why is it important?

Customers are increasingly focused on reliability, decarbonization and renewables. Complexity of grid operations is increasing from electric vehicles (EVs), renewable generation, microgrids, battery energy storage systems, and smart inverters. Regulatory and energy market requirements are also becoming stricter and more complicated. In order to meet our customer and community needs, we need to evolve our grid capabilities.



Phase 1 Project Objectives

- *Create and modify business and IT groups*
- *Implement and integrate the ADMS software*
- *Separate Transmission & Distribution dispatch*
- *Create and update business processes*
- *Prepare stakeholders for new ways of working*

Expected Benefits

Improved reliability & faster service restoration for customers

Vastly improved visibility & control of the distribution network

Expanded renewable energy integration & usage

Advanced tools & business processes

Field Area Network

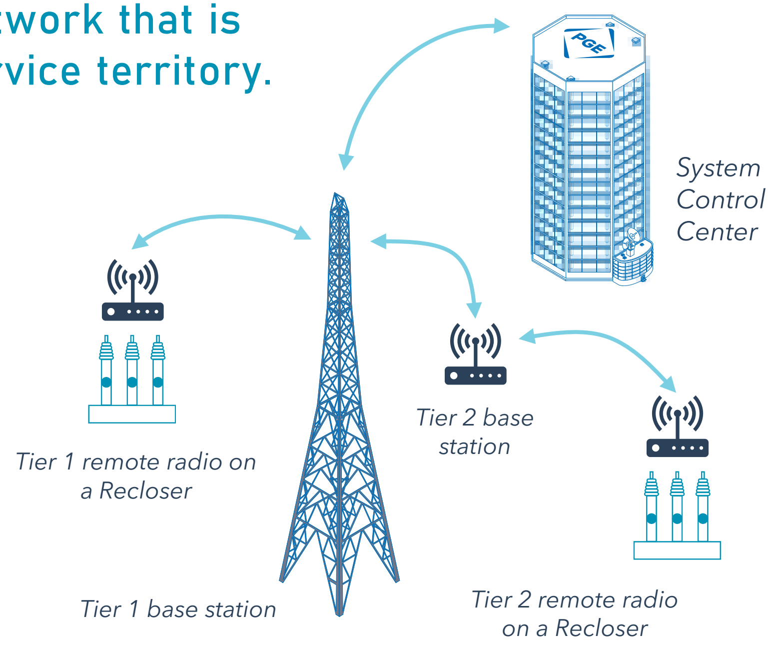
Field Area Network (FAN) Project

The FAN is a wireless communication network that is expanding to cover PGE's distribution service territory.

Why is it important?

Today, PGE's distribution assets in the grid are spread across our territory and hard to communicate to. We don't have the visibility and data that we need to effectively operate in an increasingly complex environment, (dynamic loads, new regulations, changing customer expectations, etc.).

We are executing several Grid Modernization initiatives that rely on two-way communication between our system control center and devices throughout PGE's service territory. These initiatives need the fast, reliable, and secure communication network that the FAN provides. We continue to expand the FAN to cover all our territories to efficiently operate the grid and serve our customers.



The FAN is a multi-tier point-to-point radio network that connects our distribution assets and system control center.

Expected benefits

More control over reliability and speed of restoration

More control over how quickly information is relayed throughout the grid

Greater ability to scale

More data on the grid, including greater visibility into customer demand for electricity

Better protection through increased security and encryption

Distribution Automation

Distribution Automation (DA) Program

DA is a suite of automated field devices that are deployed across PGE's service territory to monitor electrical characteristics of the grid.

As part of the DA program, we are currently implementing Integrated Reclosers and Smart Line Sensors/ Faulted Circuit Indicators. Faulted Circuit Indicators (FCIs) are being deployed in known wildfire areas within PGE's service territory to inform real-time operations. Additionally, wildfire mode protection settings are being used in Integrated Reclosers. Future DA plans include integrating new and existing Load Tap Changer (LTC) controllers into SCADA and deploying distribution capacitor banks.

Why is it important?

The DA Program is foundational to enabling other PGE Grid Modernization initiatives, including the Advanced Distribution Management System. Through the work of this project we will improve reliability for our customers, increase safety for our line crews and the community, and improve system awareness for our distribution system operators.

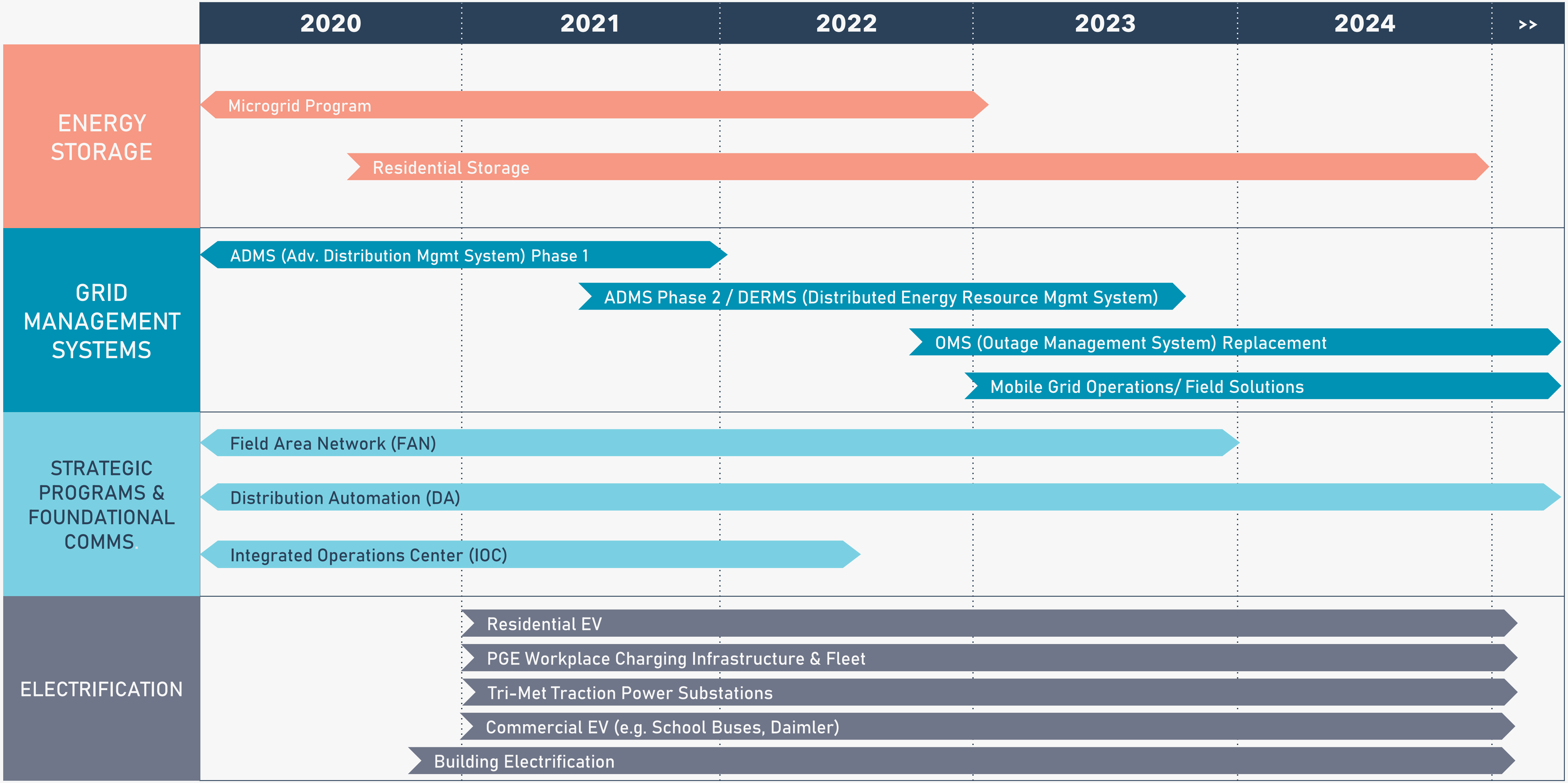
DA also enables Fault Location, Isolation, and Service Restoration (FLISR), Conservation Voltage Reduction (CVR), and Faulted Circuit Indication (FCI) integration within the broader Grid Modernization program.

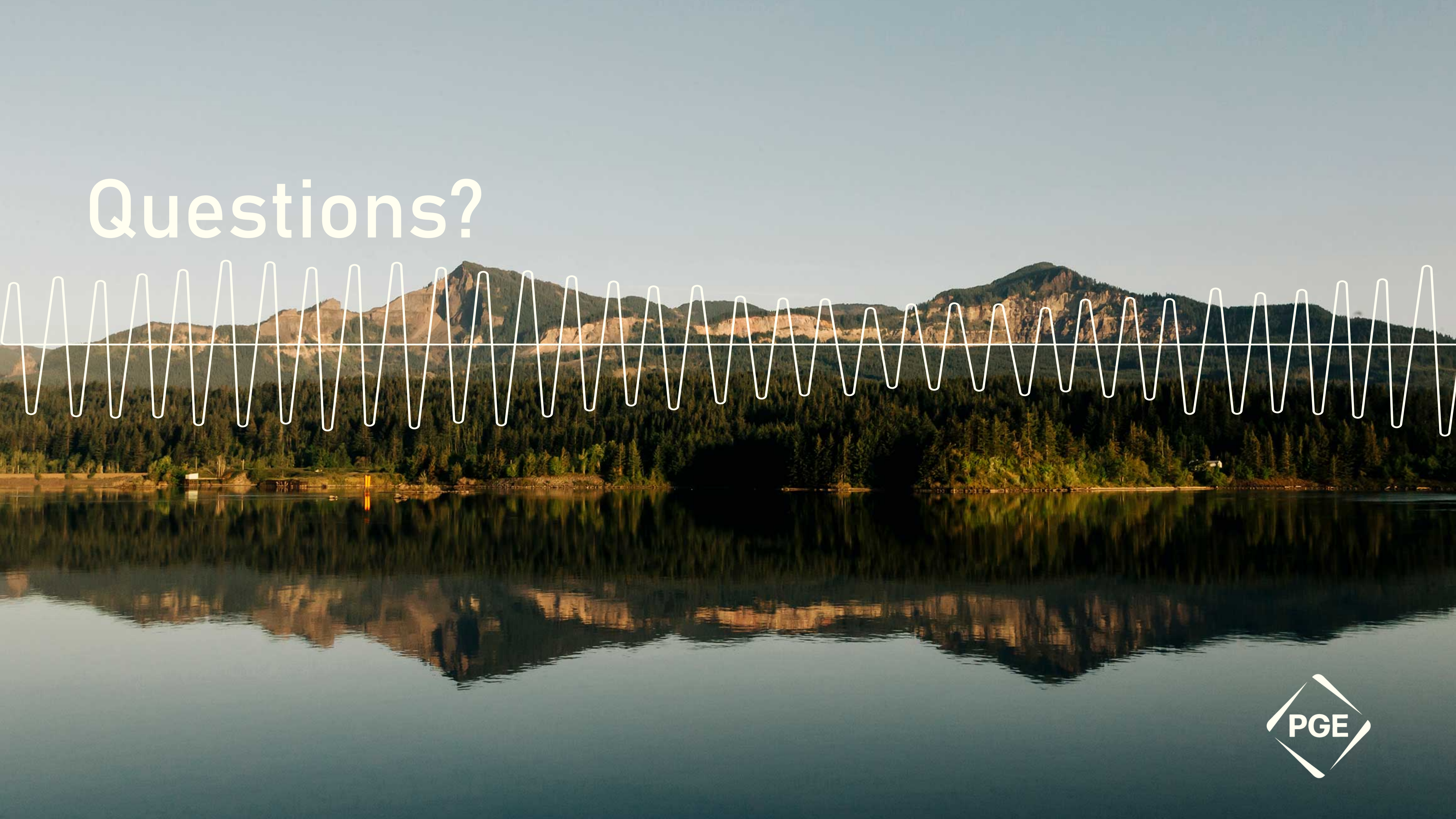
Near-Term DA Program Objectives

- *Expand Fault Location, Isolation, and Service Restoration (FLISR) capability throughout our service territory to15% of our feeders by 2024*
- *Improve distribution system resilience to extreme weather through equipment integration*
- *Enhance distribution system operators' ability to monitor, control, and optimize the distribution system*

Integrated Grid Roadmap – 5 Year View (DRAFT)

Note:
Includes future Initiatives




Questions?

Break

Non-Wire Alternatives (NWA):
Draft Results

Opus One Presentation

Presentation attached.

Questions/Next Steps

Future Agenda Topics

May Meeting – 2.5 hrs

Updates on guideline requirements: 30 mins

- Hosting Capacity
- Long-term Plan
- Community Engagement

Forecasting of Load Growth, DER Adoption, and EV Adoption 60 mins

Baseline Data & System Assessment: 60 mins

June Meeting – 2.5 hrs

Updates on guideline requirements: 30 mins

- Baseline Data & System Assessment
- Long-term Plan
- Community Engagement

Hosting Capacity: 60 mins

July Meeting – 2.5 hrs

Updates on guideline requirements: 30 mins

- Baseline Data & System Assessment
- Hosting Capacity
- Community Engagement

Long-term Plan: 60 mins

Next Steps

Propose Meeting Topics

- Email us at **DSP@pgn.com** with suggested topics

		2021									
		January	February	March	April	May	June	July	August	September	October
Distribution System Planning (DSP) plan - Part 1	Baseline data and system assessment	Data collection, organization, QA/QC, and visualization				Present to partners for feedback	Iterate as necessary	Final draft shared with partners		PGE review process	Filed on Oct 15th
	Hosting capacity	System evaluation map and hosting capacity option analysis					Present to partners for feedback	Iterate as necessary	Final draft shared with partners	PGE review process	Filed on Oct 15th
	Community engagement plan	Development of the Community Engagement Plan							Present to partners for feedback	PGE review process	Filed on Oct 15th
	Long term planning	Development of long-term plan						Present to partners for feedback	Final draft shared with partners	PGE review process	Filed on Oct 15th

An

Oregon

kind of energy

Additional Material

Runway

Overview of March Meeting

Topics included:

Presentation:

Forecasting of Load Growth, DER Adoption, and EV Adoption: DER Potential & Flex Load Analysis –Phase 1

DSP Details:

- Workstream Updates
  - Community Engagement Plan: Community Facilitator Scope of Work Update
  - Baseline Data and System Assessment: Example Datasets Update
  - Hosting Capacity Analysis: Approach Update
  - Long Term Plan: Approach Update

Topics of interest

- Work is in progress
- Completed
- Initial stages/under discussion

Transparency	Active involvement in the community engagement process	Stronger partnerships between customers and utilities	Education because there is a steep learning curve for those without a utility background	Usable, understandable mapping and website design	Flexibility and innovation
Monthly Partner Meetings (in progress)	Community Facilitator (discussed later in the presentation) (completed)	Community Facilitator (completed)	Distribution Planning 101 (completed)	Host Capacity Analysis (in progress)	Evolving Agendas (in progress)
DSP Timeline (in progress)	More time for Community Engagement discussion (in progress)	Community and Non-Technical Workshops (in progress)	DER Assessment (completed)	DSP Website (in progress)	Community Facilitator (completed)
Workstream Updates (in progress)		OPUC Technical Work Groups (TWGs) (in progress)	NWA Update (in progress)		Non-wires Alternative (in progress)
DSP Abbreviations & Definitions (in progress)			DER Forecast & Flex Load Update (in progress)		
DSP Website (in progress)			DSP for Non-Technical People (in progress)		

Topics of interest

- Work is in progress
- Completed
- Initial stages/under discussion

Diversity, equity and inclusion throughout the process	Keeping disadvantaged communities at the forefront of the project planning	Geographic equity	Role of building decarbonization	Data gathering and reporting	Keep costs down for rate payers when implementing climate change initiatives
Community Engagement Plan	Community Facilitator	Hosting Capacity Analysis	DER Forecasting	DER Forecasting	DER Forecasting
	Non-wires Alternatives	DER Potential and Flex Load Study		Hosting Capacity Analysis	UM 2099
	Data & Analytics	Non-wires Alternatives		Baseline Data and System Assessment	UM 2111

Parking Lot

Question/Comment	Partner	Name	Response
Will you be implementing a green button/utility API type solution for the interval data from customers?	Community Energy Labs	Tanya Barham	To be considered during DSP Part II in 2022

Appendix

DSP Abbreviations

ADMS = Advanced Distribution Management System

BIPOC = Black, Indigenous, and People of Color

C&I = Commercial and Industrial

CBO = Community-Based Organization

CE = Community Engagement

CEP = Community Engagement Plan

CTA = Consumer Technology Association

DCQC = Direct Current Quick Charge

DEI = Diversity, Equity, and Inclusion

DER = Distributed Energy Resource

DHP = Ductless Heat Pump

DR = Demand Response

DSP = Distribution System Plan

EJ = Environmental Justice

ERWH = Electric Resistance Water Heater

EV = Electric Vehicle

EVSE = Electric Vehicle Supply Equipment

HPWH = Heat Pump Water Heater

HVAC = Heating, Ventilation, and Air Conditioning

IRP = Integrated Resource Plan

kW = kilowatt

L2 = Level 2 EV Charging

LDV = Light-duty Vehicle

LIDAR = Light Detection and Ranging

MDHDV = Medium- and Heavy-duty Vehicles

MW = Megawatt

MWh = Megawatt-hour

NREL = National Renewable Energy Lab

NWA = Non-Wires Alternative

PTR = Peak Time Rebates

PV = Photovoltaic

SGTB = Smart Grid Test Bed

T&D = Transmission & Distribution

Tstat = Thermostat

TOU = Time of Use