Non-wire solution Overview

Distributed Resource Planning (DRP)

April 14, 2021

Background

UM2005 Guidelines for first utility DSP filing contain guidance on non-wire solutions (also known as non-wire alternatives or NWAs)

Guidance shows up in a couple of ways:

- Most prominently in section 6: Solution Identification
  - Utilities must file minimum of two non-wire solutions pilots with Part II of the initial filing (due date August 2022)
  - In its pilot concept proposals, a utility should discuss:
    - the grid need(s) addressed,
    - various alternative solutions considered, and
    - provide detailed accounting of the relative costs and benefits of the chosen and alternative solutions.
  - Emphasizes need for community involvement in developing solutions

Context

PGE is transitioning to human-centered planning. This is in line with UM2005 feedback from community groups and participants.

- We want to bring community partners along when we investigate non-wire solutions. This is called out in final DSP guidance, and we agree it is the right thing to do.
- As we ramp up Community Engagement efforts, we are working internally to vet different tools that help us assess advanced DER use cases for non-wire solutions.
- We expect the Community Engagement efforts (highlighted previously) will directly inform future non-wire solution proposal development, and that fresh community needs assessments will be conducted for each project.
- We intend to empower customers and communities in making their energy decisions.

These slides cover needed updates to utility modeling, ***they are a start to the conversation, not the end.***

Update on PGE planning practices

(Specifically, just the non-wire solutions stuff)

Planning to meet customer needs

Today we are only looking at non-wire solutions selectively and reactively.

With improved forecasting and planning tools, we are aiming to move to proactive solutions across the territory

Here is an example of how a non-wire solution currently takes place:

Customer Need	Planning Challenge	Solution
Customer planned to convert 100 HDVs to electric Aimed to use 150 kW chargers with 1:1 vehicle to charger ratio	Resulting 15 MW of added load would require substation upgrade Very costly and would have impacted ability to achieve fleet conversion goals	PGE's technical outreach and engineering teams worked with customer to identify managed charging practices Resulted in 3:1 EV to charger ratio and reduced expected grid upgrade needs

Non-wire Solution Studies

Contracted with software vendor to conduct detailed time-series power flow studies of substations facing growth-related constraints.

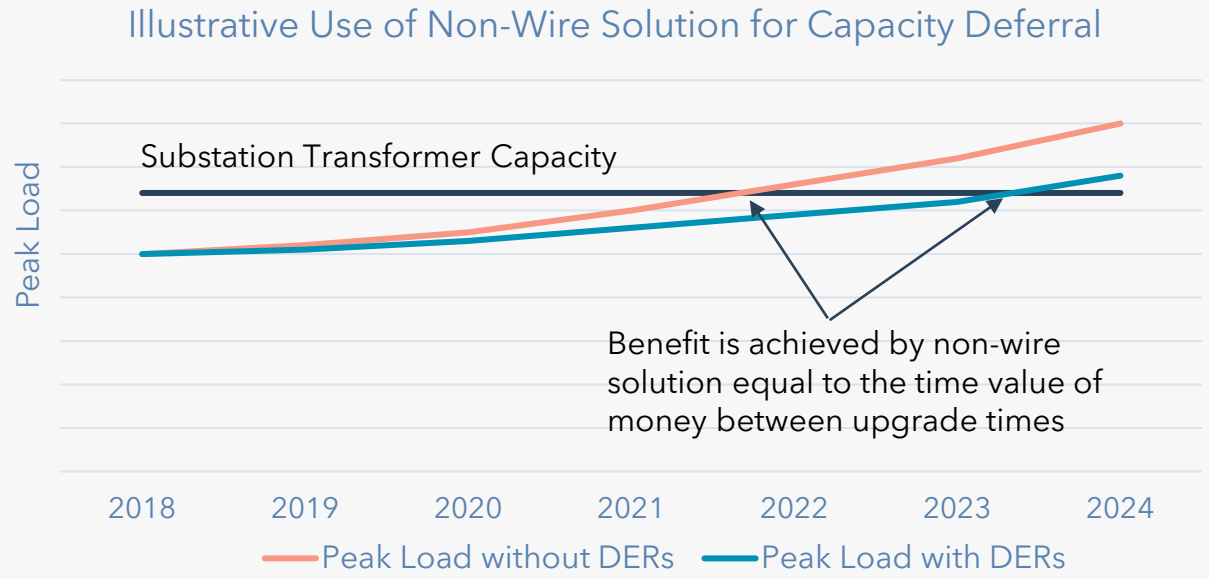
Aim is to evaluate tools and processes needed for non-wires project selection, including ability of DER adoption to influence the traditional system upgrades needed to maintain safety and reliability targets.

Results will inform short-term internal planning requirements for PGE, and will also be helpful as we get further into community engagement planning and Part II solutions identification discussions.

Expected value from capacity deferral

Most common use case for non-wires solution is deferring capital investment in traditional infrastructure (new substation, transmission line, etc.).

Due to the time value of money, investments deferred into the future through non-wires solutions can yield economic benefit to PGE customers.



Selecting Substations

Developed screening list based on internal discussions and brief literature review

Used a combination of engineering criteria and community criteria

First attempt at this – and meant to inform knowledge sharing, not be final precedent

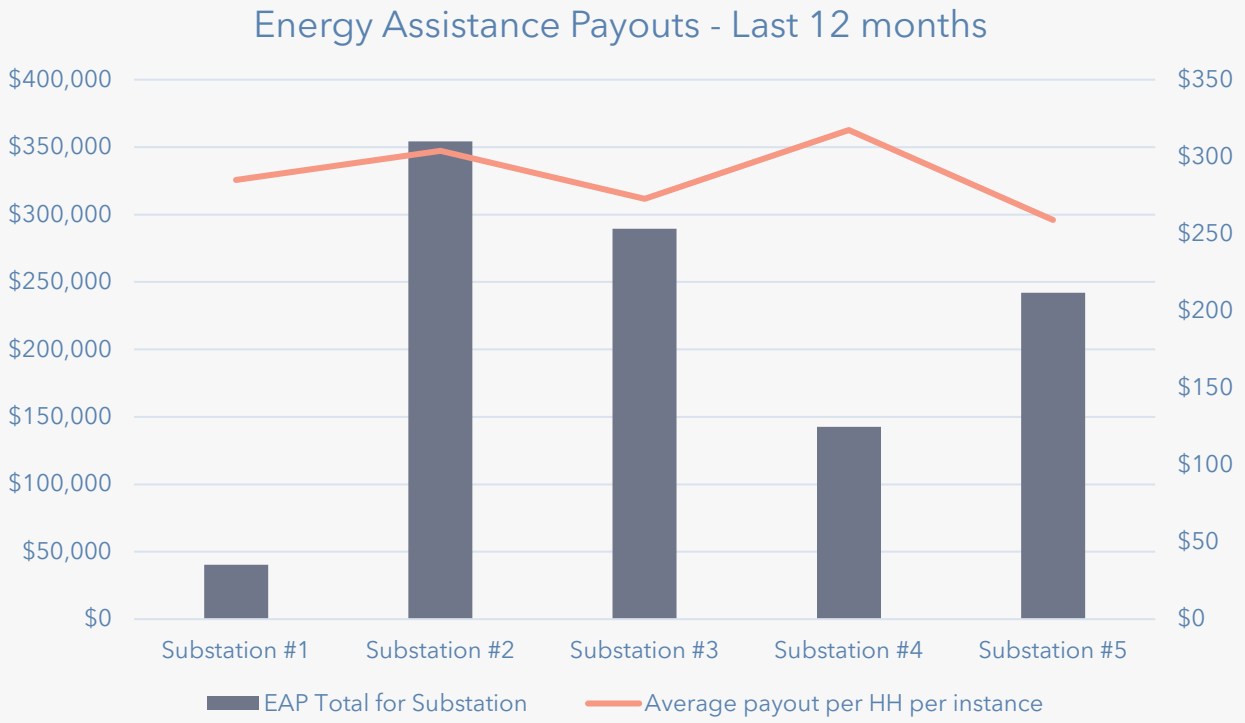
Initial lessons learned:

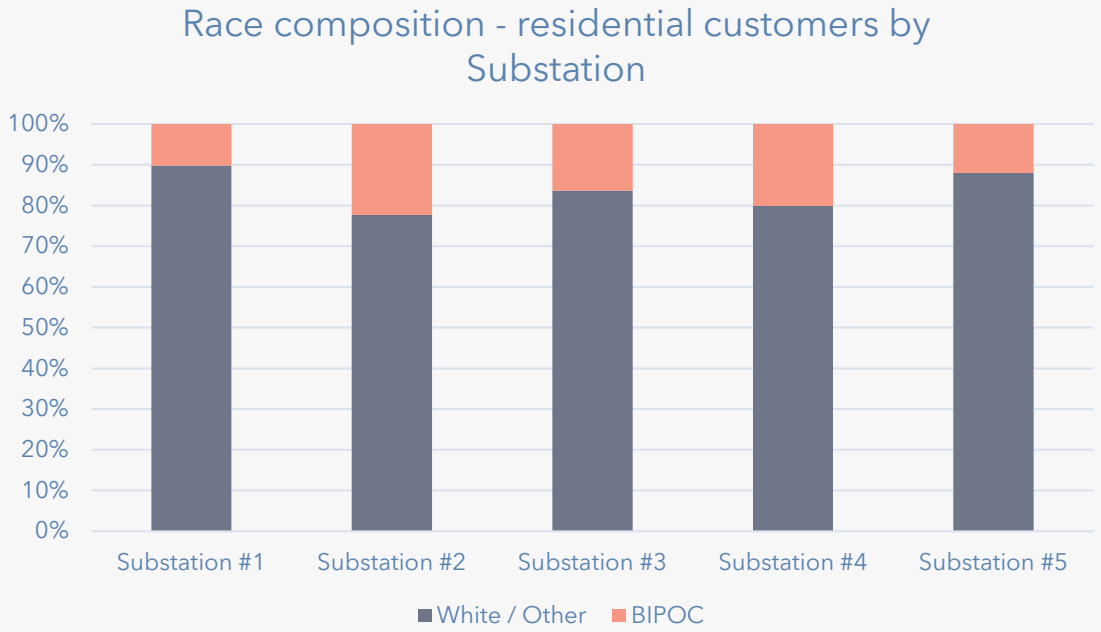
- Hard to pull together a comprehensive criteria! These are disparate datasets
- Scoring and weighting needs more conversation, particularly around the appropriate DEI and community metrics
- Importance is to investigate the various perspectives, rather than get it right first time

Example Screening Criteria For Substations

Metric	Category	Detailed Description	Weight
1	Capacity constraint	Distribution system equipment (transformers, feeders, etc.) are nearing their seasonal loading capacity thresholds (80% and 67% of nameplate, respectively). May be due to either existing load growth or anticipated lumped load additions (new subdivision, EV growth, etc.)	30%
2	Risk / cost mitigation	Equipment fails and needs to be replaced, or equipment is viewed as high risk and needs replacing	20%
3	Operational / performance issue	Difficulty in keeping feeder voltage balanced, or performance of feeders is limited by excess renewable generation backfeeding	20%
4	Data availability	Sufficient historical data exists to evaluate granular time needs of non-wires solution, and/or baseline periods do not have extended periods of abnormal system conditions to mask underlying load/generation drivers.	10%
5	Community metric (draft)	Community needs reflected through a combination of utility analysis and community engagement, including 1) Diversity of customer mix (% of residential, commercial, and industrial), 2) Proportion of residential customers that are low-income or renters, 3) % of customers that identify as BIPOC, 4) Calculated energy burden compared to rest of customer mix, 5) scoring on a vetted third-party social vulnerability index.	20%

Preliminary demographic data used

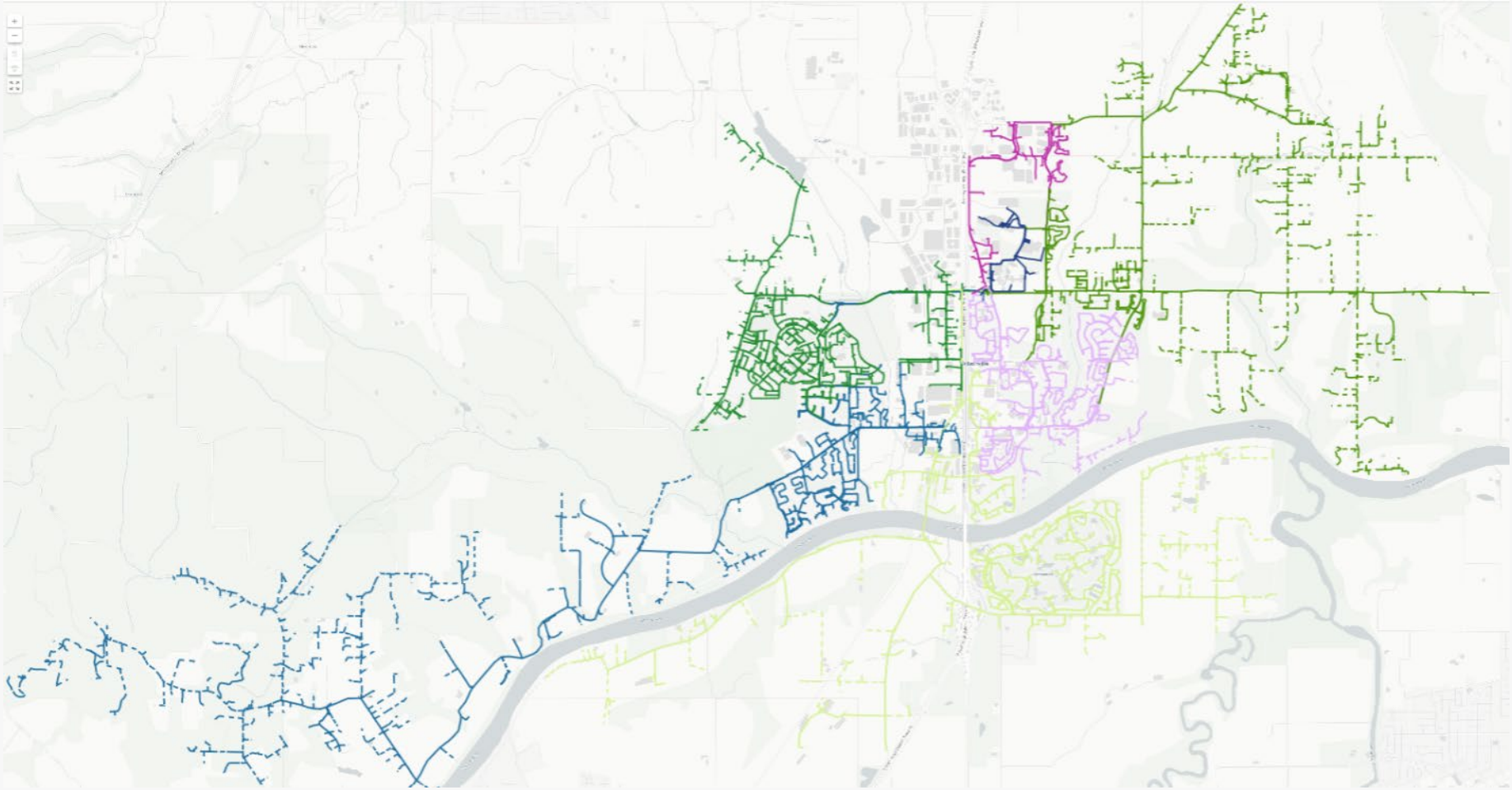




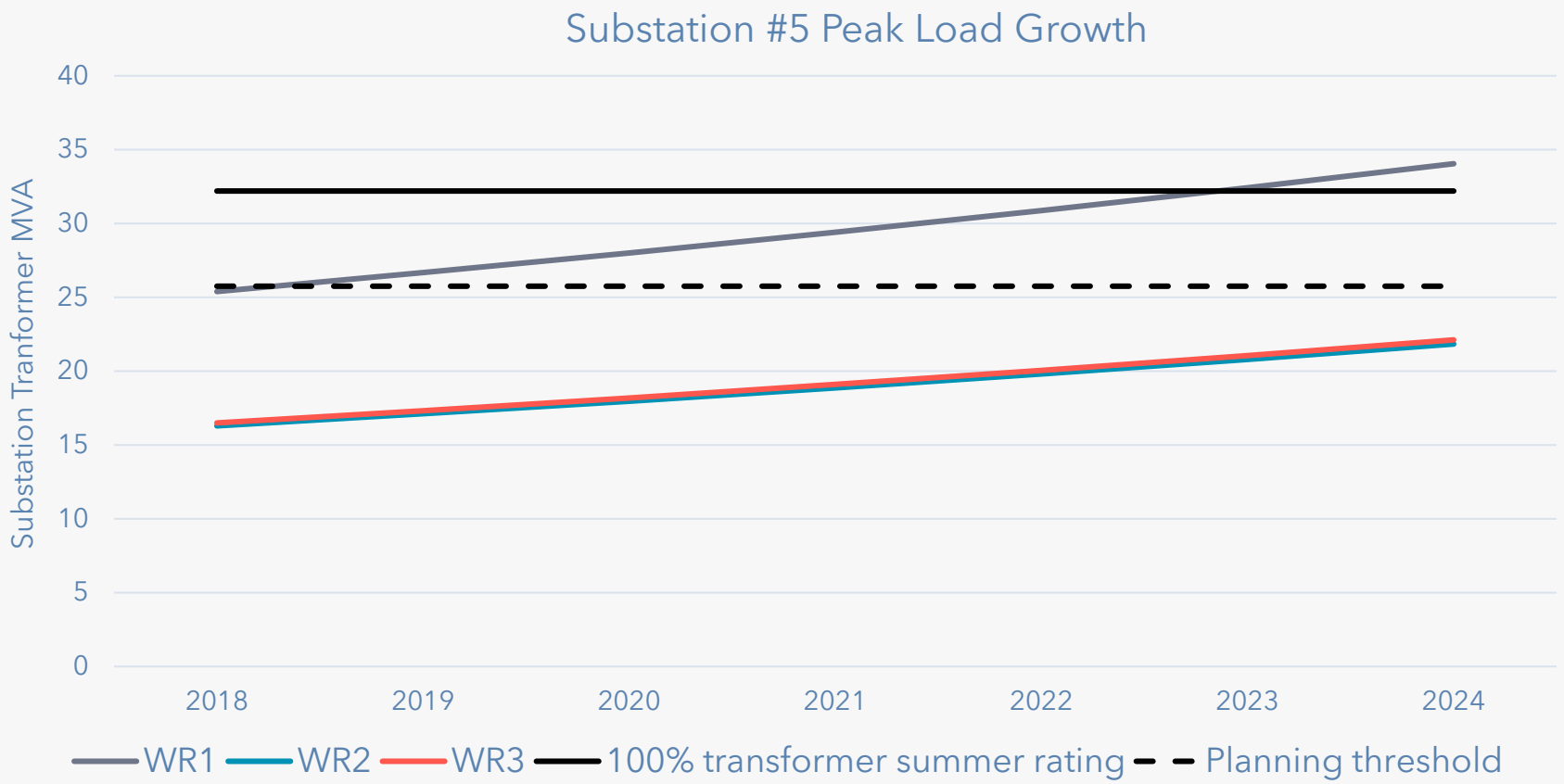
Non-Wires Solutions Analysis in Opus One's IDP

Data Gathering Steps	**Step 1** **Model Feeder in IDP**	Import feeder models to GridOS
	Step 2 **Collect Asset and Cost Data**	Collect asset age, reliability and cost of ownership data.
	Step 3 **Forecast Feeder Load**	Create 5 year load growth forecast for modeled feeder. Create scenarios to reflect different growth possibilities.
	Step 4 **Assess DER Availability**	Use 3D visualization to identify utility owned and customer owned DER potential for the modeled feeder.
IDP Modeling Steps	**Step 5** **Evaluate the System Need**	Simulate the system operation for the forecast duration, IDP will identify constraints
	Step 6 **Design Wires Solution**	Design wires solution(s) that clears constraints, technical feasibility and project cost is handled by IDP.
	Step 7 **Design Non-Wires Solution**	Design non-wires solution to clear constraints in a new network version, technical feasibility and project cost is handled by IDP.
Reporting Step	**Step 8** **Create Business Case**	IDP will visualize the technical and economic feasibility of each solution

Substation #5 feeder topology mapped



Case study load growth – Substation #5



Non-wire solutions studied

Collected DER performance and cost data from PGE existing pilots and energy efficiency offerings

Developed scenarios to test the incremental changes to the solutions with each tier of DER addition

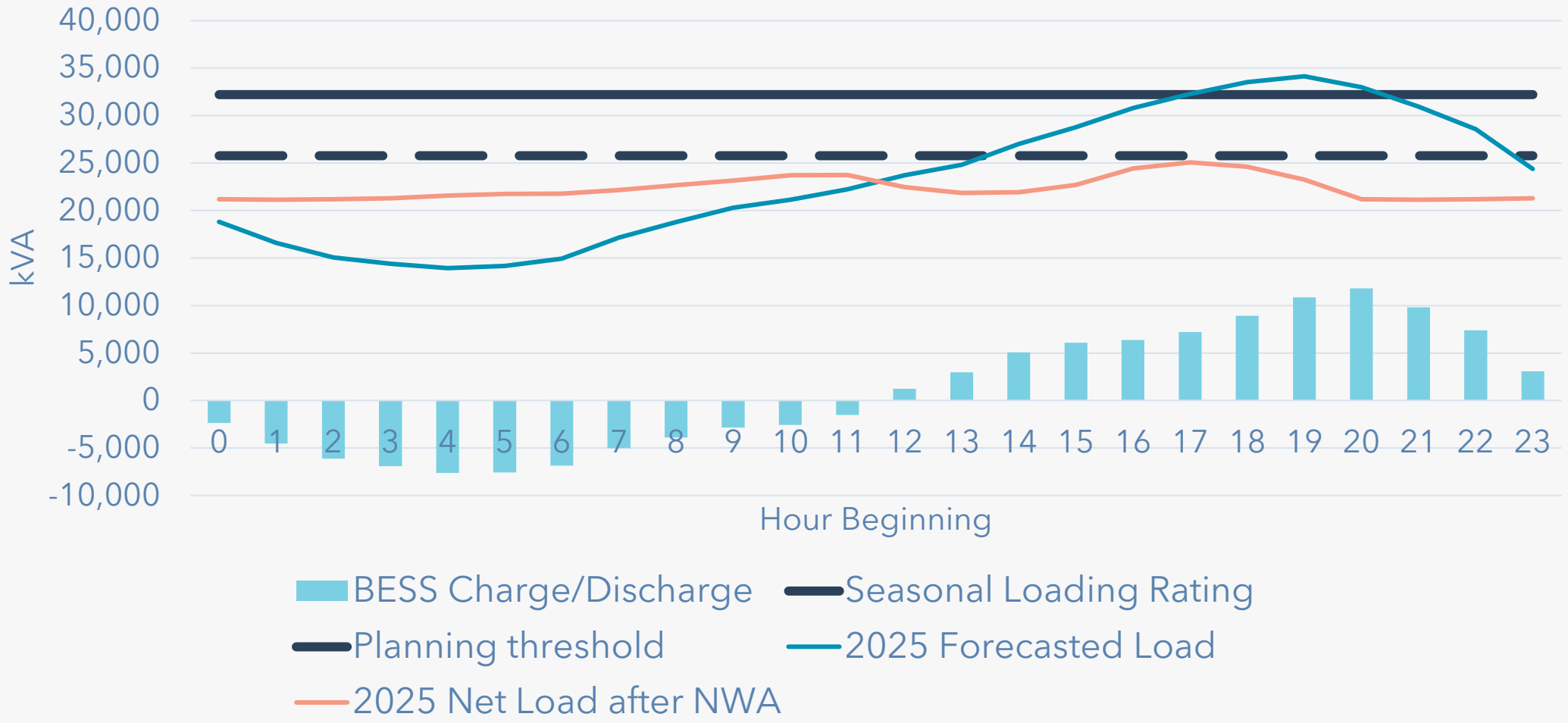
Overview of DERs included in study:

- Distribution-scale battery
- Aggregated customer storage devices
- Demand response / flexible load
- Energy efficiency

Scenarios modeled were:

- Distribution-scale battery only
- Distribution-scale battery + base case DER
- Distribution-scale battery + aggressive DER

Results – Time-Series Dispatch



Results – Scenario Findings

Across the three scenarios, thermal and voltage violations at substation transformer resolved via:

- Scenario 1: Distribution-scale battery only
  - Two (2) 5 MW / 55 MWh batteries

- Scenario 2: Distribution-scale battery + base case DER
  - Two (2) 2 MW / 16 MWh batteries
  - 50 residential batteries
  - ~2,500 DR / Flex Load enrollments
  - ~1,231 EE projects

- Scenario 3: Distribution-scale battery + aggressive case DER
  - Eliminated need for distribution-connected battery
  - 250 residential batteries
  - ~7,800 DR / Flex Load enrollments
  - ~6,500 EE projects

NOTE: This analysis only focuses on the physics and not the economics of each scenario

Next Steps

Continue refining screening criteria with community input

Expand use case definition from growth-driven constraints to include reliability/resiliency

Continue partner engagement to inform development of pilot proposals for Part II of DSP filing in August 2022

Begin discussions about cost and risk analysis for non-wire solutions under varying deferral scenarios