*Silicon Valley Clean Energy presents*

# Watts For Lunch

## *Part 1: Demand Management & Demand Response*

Wednesday, October 15, 2025 - 10 A.M to 2 P.M.

# WATTS ON THE MENU?

**WELCOME & INTRO - 10 A.M.**

**PRESENTATIONS - 10:15 A.M.**

- SVCE - The Dollars and Cents of Demand Charges

**COFFEE BREAK**

- LBL – Smarter Buildings, Lower Bills with CalFlexHub

**LUNCH - 12 P.M.**

**PRESENTATIONS - 12:30 P.M.**

- ICF – Integrated Demand Side Management
- EPRI - Demand Flexibility in Industrial Facilities

**CLOSE & NETWORKING - 1:45 P.M.**

# About Silicon Valley Clean Energy


SILICON VALLEY
CLEAN ENERGY

# The Community Choice Energy Agency for 13 Santa Clara County communities

Providing clean electricity and innovative programs to fight climate change

**Campbell | Cupertino | Gilroy | Los Altos | Los Altos Hills**

**Los Gatos | Milpitas | Monte Sereno | Morgan Hill**

**Mountain View | Santa Clara County | Saratoga | Sunnyvale**

# How does it work?

| SOURCE | DELIVERY | CUSTOMER |
|---|---|---|
| **SVCE** | **PG&E** | **YOU** |
| buying and building energy supplies | delivering energy, repairing lines serving customers | benefitting from cleaner energy, local control |

SILICON VALLEY CLEAN ENERGY

# The Dollars and Cents
## Of Demand Charges

Peyton Parks
October 15, 2025

SILICON VALLEY
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# What are these ‘Demand Charges’?

Utilities charge for electricity measured by **Demand** and **Energy**

**Demand- an instantaneous measure of power**

- Charged by the kilowatt (kW)
- Applicable charges in Summer and Winter
- Can be charged separately by time of day
    - Peak, Part-Peak, and ‘Max’

**Energy- a measure of power over period of time**

- Charged by the kilowatt-hour (kWh)
- Applicable charges in Summer and Winter
- Charged separately for usage by time of day
    - Peak, Part-Peak, Off-Peak, and Super Off-Peak

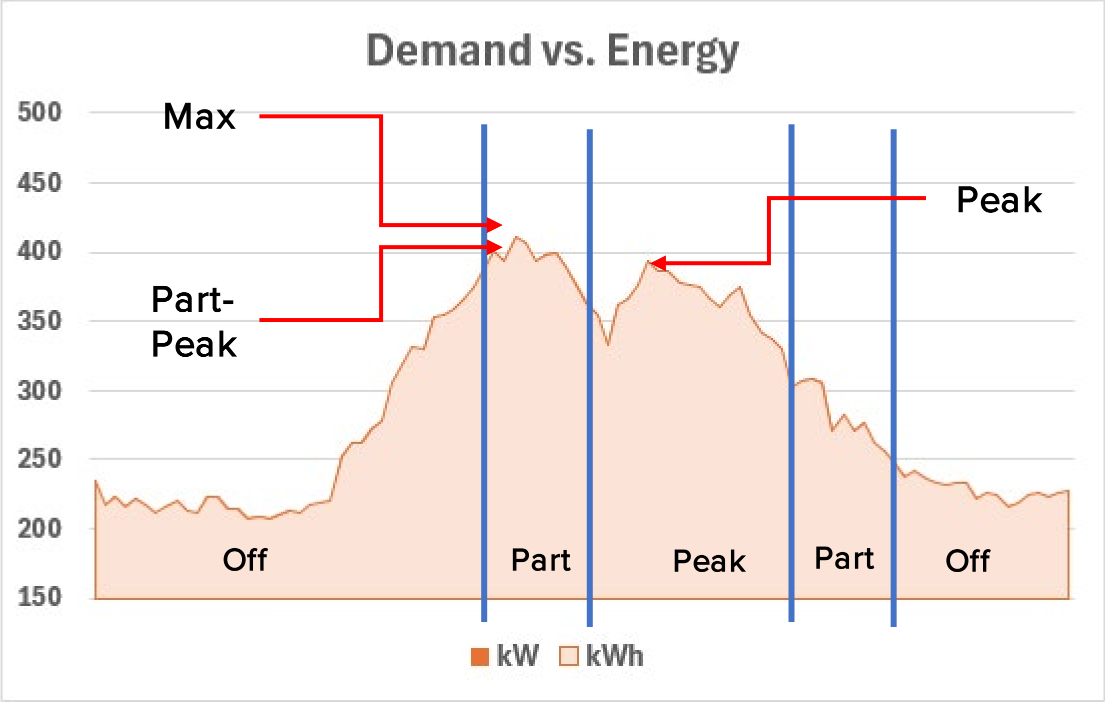
PG&E Tariff B19S

| **Total Demand Rates** ($ per kW) | | |
|---|---|---|
| Maximum Peak Demand Summer | $54.17 | (R) |
| Maximum Part-Peak Demand Summer | $11.75 | (R) |
| Maximum Demand Summer | $39.22 | (R) |
| Maximum Peak Demand Winter | $3.20 | |
| Maximum Demand Winter | $39.22 | (R) |

| **Total Energy Rates** ($ per kWh) | |
|---|---|
| Peak Summer | $0.21867 |
| Part-Peak Summer | $0.16493 |
| Off-Peak Summer | $0.12692 |
| Peak Winter | $0.18454 |
| Off-Peak Winter | $0.12677 |
| Super Off-Peak Winter | $0.04927 |

# What are these 'Demand Charges'?

## Demand Charges are Assessed on 15-min Meter Readings




Peak = 390 kW    Part-Peak = 415 kW    Max = 415 kW

- Demand for any period is the highest kW reading for a 15-minute interval
- Time-dependent demand intervals:
  - **Peak** – Occurring any day between 4-9 PM
  - **Part-Peak** – Any day between 2-4 PM and 9-11 PM
- **Max** demand is the highest reading for the entire billing period. Can occur in any hour/period.

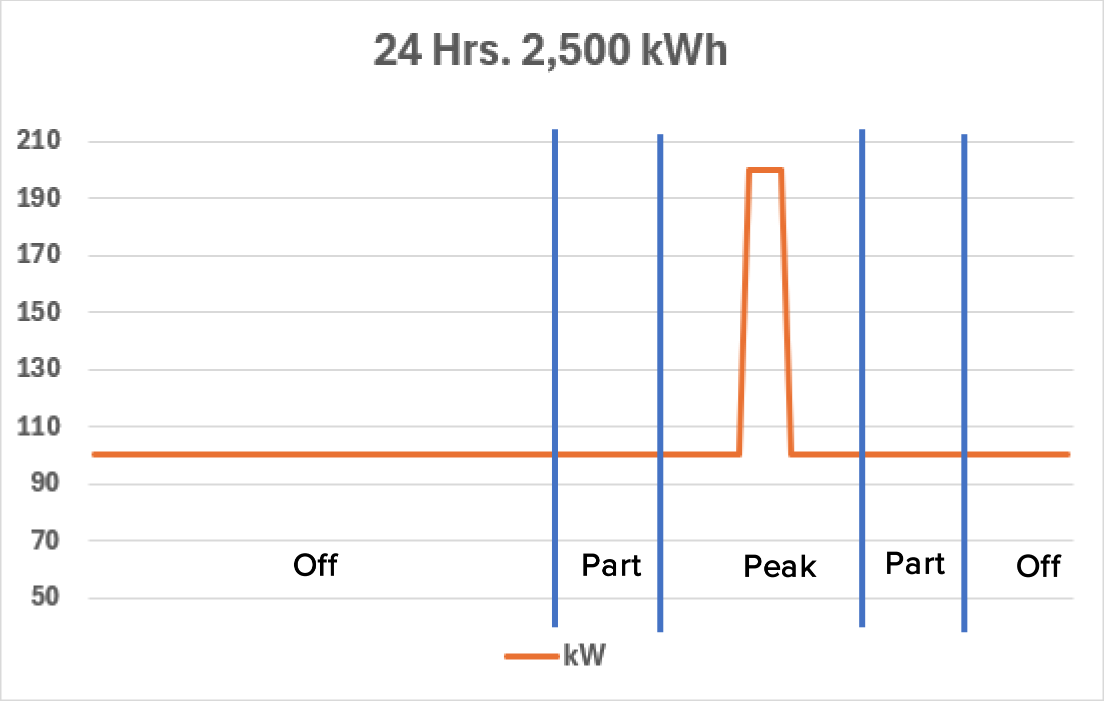
# What are these ‘Demand Charges’?

Demand charges are levied on Medium, Large, and Industrial customers

| Rate Code | Typical Use | Power | Peak | Part-Peak | Max |
|---|---|---|---|---|---|
| B1 | Small Commercial | 75 kW | ✗ | ✗ | ✗ |
| B6 | Small Commercial | 75 kW | ✗ | ✗ | ✗ |
| B10 | Medium Commercial | 500 kW | ✗ | ✗ | ⚡ |
| B19 | Large Commercial | 1000 kW | ⚡ | ⚡ | ⚡ |
| B20 | Industrial | >1000 kW | ⚡ | ⚡ | ⚡ |

# How Demand Affects Billing

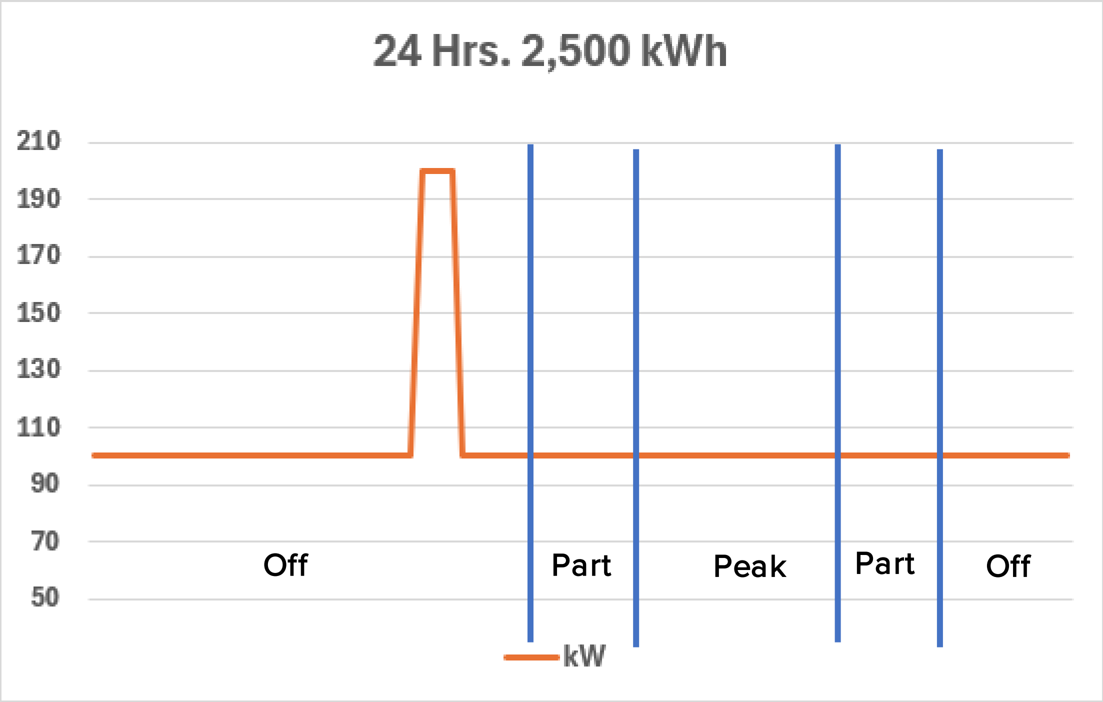
## "Peakier" loads incur higher demand charges than "Flatter" loads




| | TOU | Units | Qty | | Price | | Subtotal |
|---|---|---|---|---|---|---|---|
| **Demand** | | | | | | | |
| | Peak | kW | 200 | @ | $54.17 | = | $10,834.00 |
| | Part-Peak | kW | 100 | @ | $11.75 | = | $1,175.00 |
| | Max | kW | 200 | @ | $39.22 | = | $7,844.00 |
| **Energy** | | | | | | | |
| | Peak | kWh | 600 | @ | $0.21867 | = | $3,936.06 |
| | Part-Peak | kWh | 400 | @ | $0.16493 | = | $1,979.16 |
| | Off-Peak | kWh | 1500 | @ | $0.12692 | = | $5,711.40 |
| **Total** | | | | | | | **$31,479.62** |

# How Demand Affects Billing

Shifting Peak loads out of high-demand periods helps to reduce cost

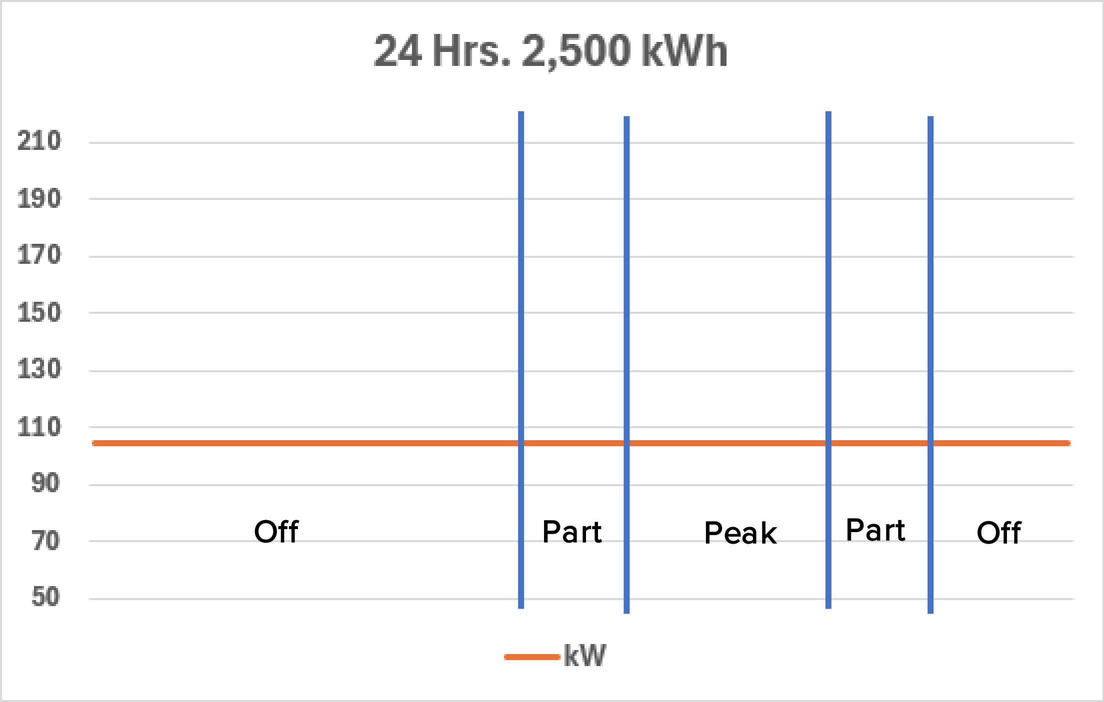



| | TOU | Units | Qty | | Price | | Subtotal |
|---|---|---|---|---|---|---|---|
| **Demand** | | | | | | | |
| | Peak | kW | 100 | @ | $54.17 | = | $5,417.00 |
| | Part-Peak | kW | 100 | @ | $11.75 | = | $1,175.00 |
| | Max | kW | 200 | @ | $39.22 | = | $7,844.00 |
| **Energy** | | | | | | | |
| | Peak | kWh | 500 | @ | $0.21867 | = | $3,280.05 |
| | Part-Peak | kWh | 400 | @ | $0.16493 | = | $1,979.16 |
| | Off-Peak | kWh | 1600 | @ | $0.12692 | = | $6,092.16 |
| **Total** | | | | | | | **$25,787.37** |

$5,000 Savings for Shifting!

# How Demand Affects Billing

The "Flatter" the load shape, the lower the overall demand charges



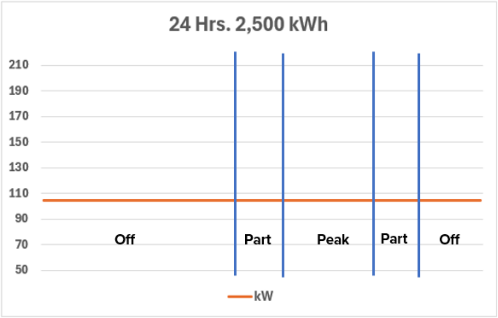

| | TOU | Units | Qty | | Price | | Subtotal |
|---|---|---|---|---|---|---|---|
| **Demand** | | | | | | | |
| | Peak | kW | 104 | @ | $54.17 | = | $5,633.68 |
| | Part-Peak | kW | 104 | @ | $11.75 | = | $1,222.00 |
| | Max | kW | 104 | @ | $39.22 | = | $4,078.88 |
| **Energy** | | | | | | | |
| | Peak | kWh | 520 | @ | $0.21867 | = | $3,411.25 |
| | Part-Peak | kWh | 417 | @ | $0.16493 | = | $2,063.27 |
| | Off-Peak | kWh | 1563 | @ | $0.12692 | = | $5,951.28 |
| **Total** | | | | | | | **$22,360.37** |

$9,000 Savings for Flattening!

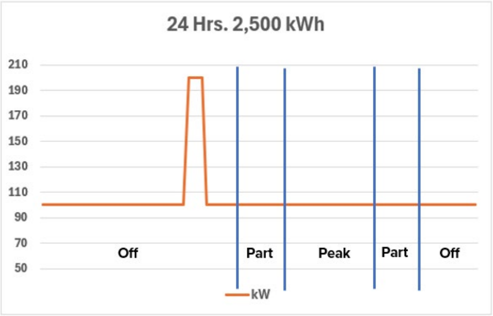
# Key Principles of Demand Management

Energy Managers should strive to reduce, flatten or shift their heavy loads

## Flatter Loads




## Shifted Loads

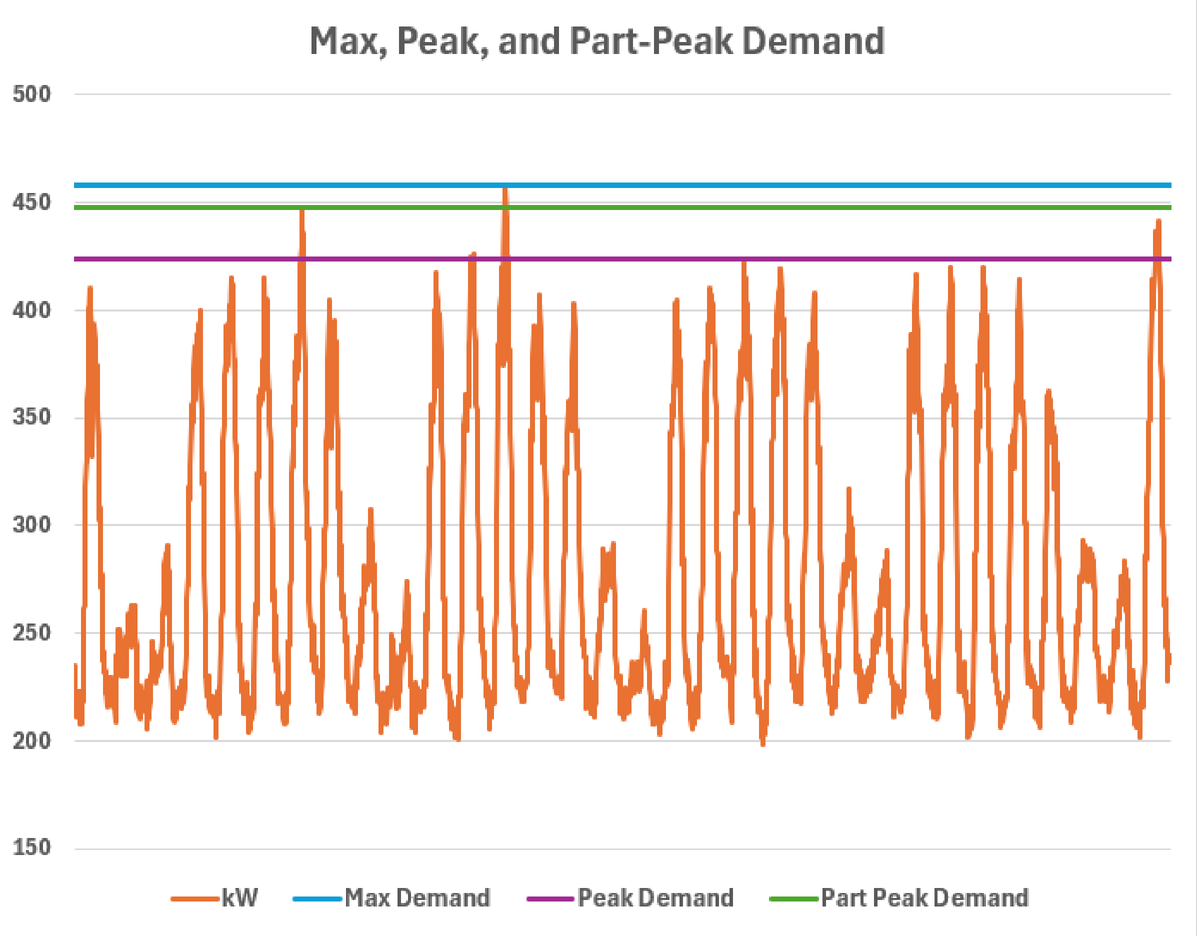



- Reduction in overall electricity consumption, particularly at times of heavy overall usage
- Moving non-critical loads away from peak and part-peak periods; "Raising the lows"
- Automation

- Moving non-critical loads away from peak and part-peak periods
- Changing the timing of equipment set to automatically run
- Automation

# Key Principles of Demand Management

Managing demand in the real world isn't always easy or obvious




| | TOU | Units | Qty | | Price | | Subtotal |
|---|---|---|---|---|---|---|---|
| **Demand** | | | | | | | |
| | Peak | kW | 423.6 | @ | $54.17 | = | $22,946.41 |
| | Part-Peak | kW | 447.6 | @ | $11.75 | = | $5,259.30 |
| | Max | kW | 458.4 | @ | $39.22 | = | $17,978.45 |
| **Energy** | | | | | | | |
| | Peak | kWh | 45,034 | @ | $0.21867 | = | $9,847.58 |
| | Part-Peak | kWh | 37,255 | @ | $0.16493 | = | $6,144.47 |
| | Off-Peak | kWh | 130,063 | @ | $0.12692 | = | $16,507.60 |
| **Total** | | | | | | | **$78,683.81** |
| **Potential Demand Savings (400 kW Max)** | | | | | | | |
| | Peak | kW | -23.6 | @ | $54.17 | = | -$1,278.41 |
| | Part-Peak | kW | -47.6 | @ | $11.75 | = | -$559.30 |
| | Max | kW | -58.4 | @ | $39.22 | = | -$2,290.45 |
| | | | | | | | **-$4,128.16** |

# Why focus on Demand Management?

Reducing demand peaks is in all of our interest

**SVCE**

- Must respond to regulatory and legislative pressure to reduce and manage system peaks
- SVCE buys Resource Adequacy (capacity) to ensure generation needs can be met at peak
- Lower peak demand reduces Resource Adequacy purchasing costs

**SVCE Customers**

- Often paying an outsized portion of energy bill on demand charges, even when consuming relatively little electricity
- Demand management tactics may yield both demand and generation savings, and potentially be paid (demand response)
- More effective demand management is often quite feasible…low hanging fruit!

**California**

- CEC load shifting goal of 7,000 MW by 2030
- Increasing effective demand management critical for grid reliability
- Numerous CPUC and CEC proceedings and initiatives designed to support achieving targets

# Questions?


Peyton Parks, Energy Services Manager

Silicon Valley Clean Energy

Peyton.parks@svcleanenergy.org

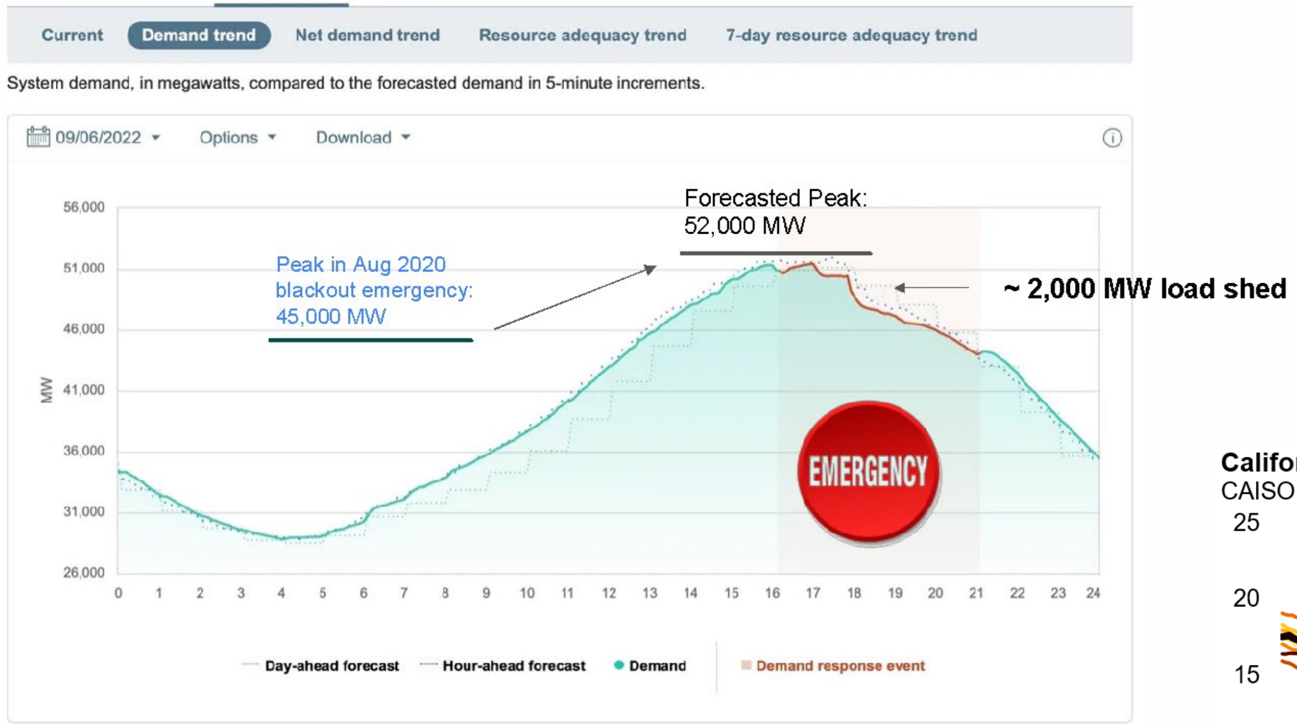
# COFFEE BREAK

# Smarter Buildings, Lower Bills with CalFlexHub

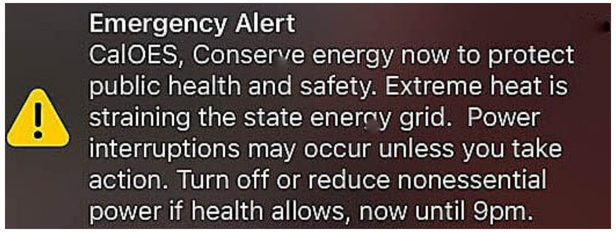
CalFlexHub

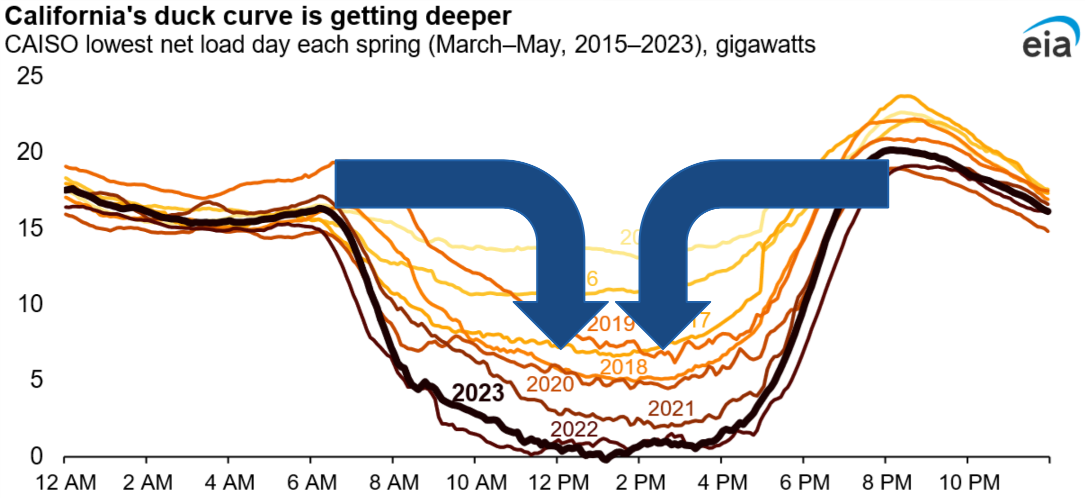
BERKELEY LAB

# Background


Current
Demand trend
Net demand trend
Resource adequacy trend
7-day resource adequacy trend
System demand, in megawatts, compared to the forecasted demand in 5-minute increments.
09/06/2022
Options
Download
Forecasted Peak:
52,000 MW
Peak in Aug 2020
blackout emergency:
45,000 MW
~ 2,000 MW load shed
EMERGENCY
56,000
51,000
46,000
41,000
36,000
31,000
26,000
MW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Day-ahead forecast
Hour-ahead forecast
Demand
Demand response event


5:50


Emergency Alert
CalOES, Conserve energy now to protect public health and safety. Extreme heat is straining the state energy grid. Power interruptions may occur unless you take action. Turn off or reduce nonessential power if health allows, now until 9pm.


California's duck curve is getting deeper
CAISO lowest net load day each spring (March–May, 2015–2023), gigawatts
eia
25
20
15
10
5
0
12 AM
2 AM
4 AM
6 AM
8 AM
10 AM
12 PM
2 PM
4 PM
6 PM
8 PM
10 PM
2019
2018
2020
2023
2021
2022

# CA's Policy Target

## Senate Bill 846 Load-Shift Goal Report

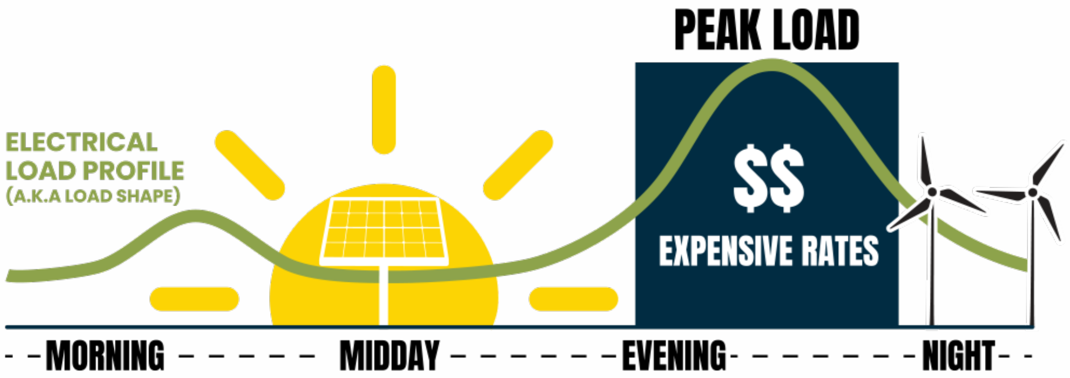



**Table ES-2: Proposed Statewide Load-Shift Goal by Intervention**

| Category | Intervention | 2022 Estimate | 2030 Goal |
|---|---|---|---|
| **Load-Modifying (LM)** | TOU Rates | 620–1,000 MW | 3,000 MW |
| | Dynamic Pricing | 30 MW | |
| | LM Programs | 7 MW | |
| **Resource Planning and Procurement** | Economic Supply-side DR | 670–825 MW | 4,000 MW |
| | Reliability Supply-Side DR | 740 MW | |
| | POU DR Programs (Non-ISO) | 210 MW | |
| **Incremental and Emergency (I&E)** | I&E Programs | 800 MW | |
| | Emergency Back-Up Generators* | 375 MW* | |
| **Total** (nearest 100) | | **3,100–3,600 MW** | **7,000 MW** |

CalFlexHub

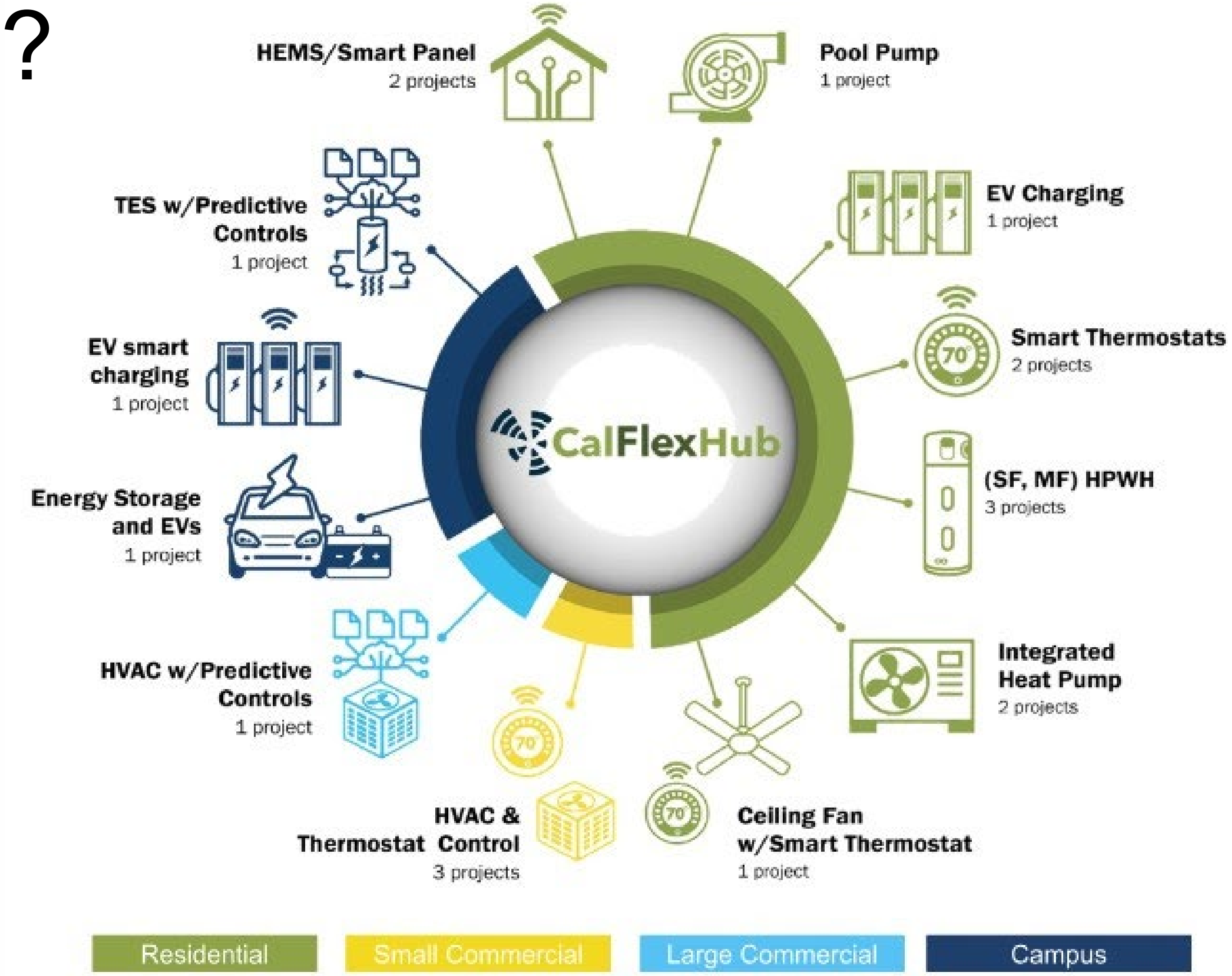
BERKELEY LAB

# What is CalFlexHub?

**CalFlexHub** is a $16M CEC EPIC funded research, development, demonstration, and deployment (RDD&D) program (Fall 2021 - 2026) led by **Berkeley Lab** with 17 funded partners.

CalFlexHub seeks to build a pipeline of technologies capable of providing **automated flexible building and EV-charging loads** to the California power grid.

https://calflexhub.lbl.gov/




CalFlexHub

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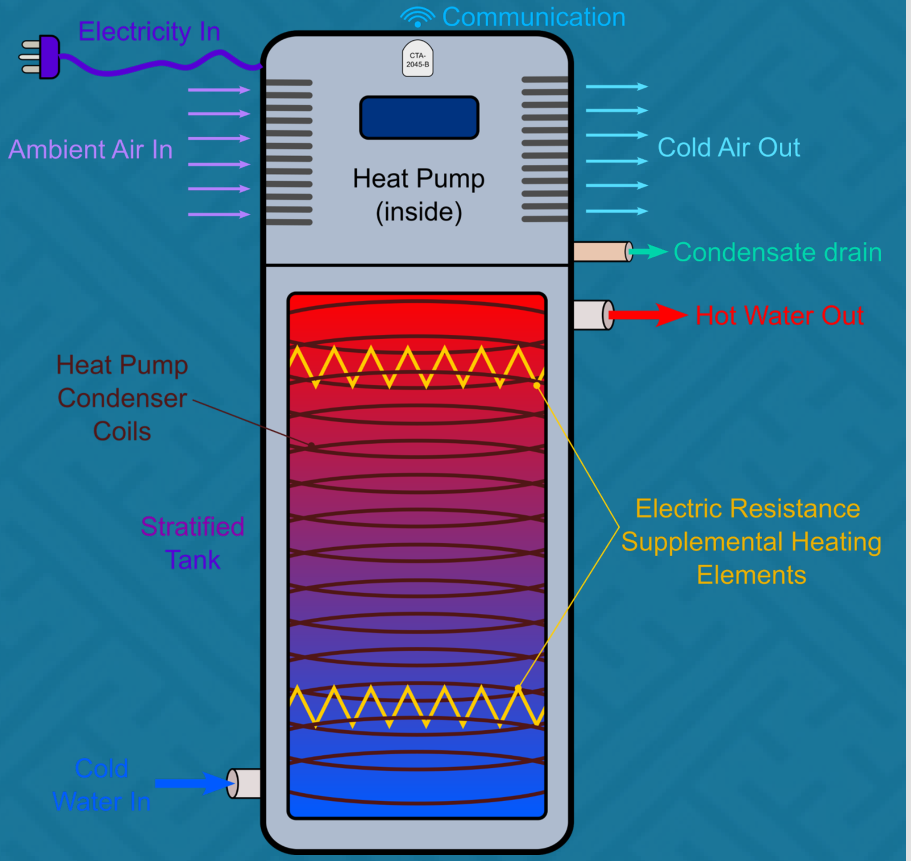
# Demand Flexibility and You

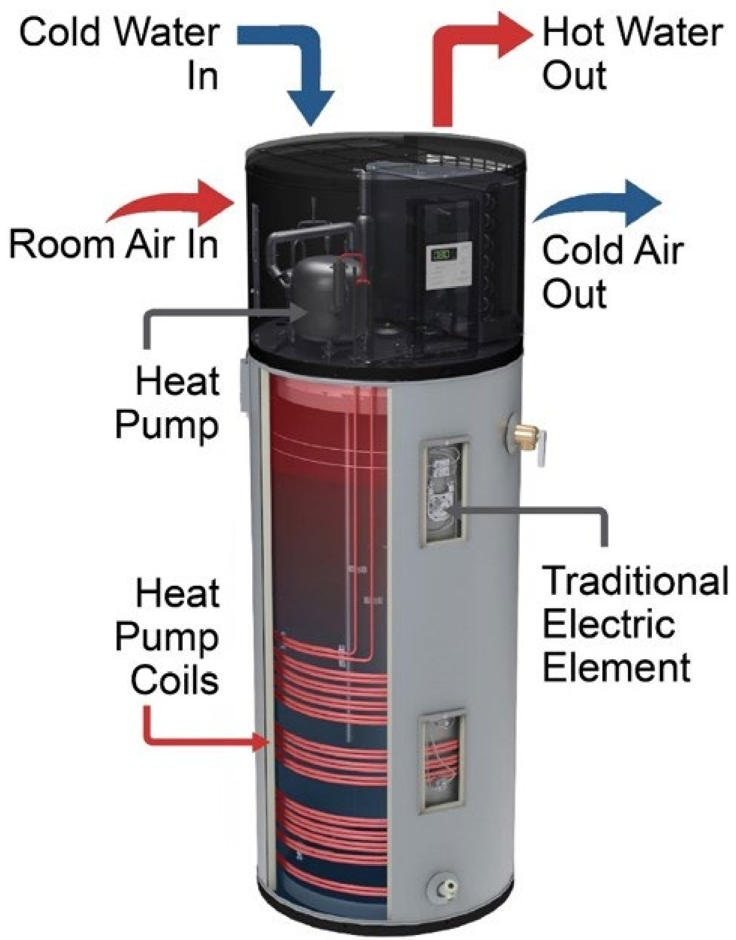
- Do you have goals for integrating demand flexibility into your building portfolios? What drives those goals?
- Are there major concerns or barriers preventing demand flexibility adoption?
- Do you have a timeline for demand flexibility integration?

# Residential Technologies

Peter Grant

# Single Family Heat Pump Water Heaters (HPWHs)



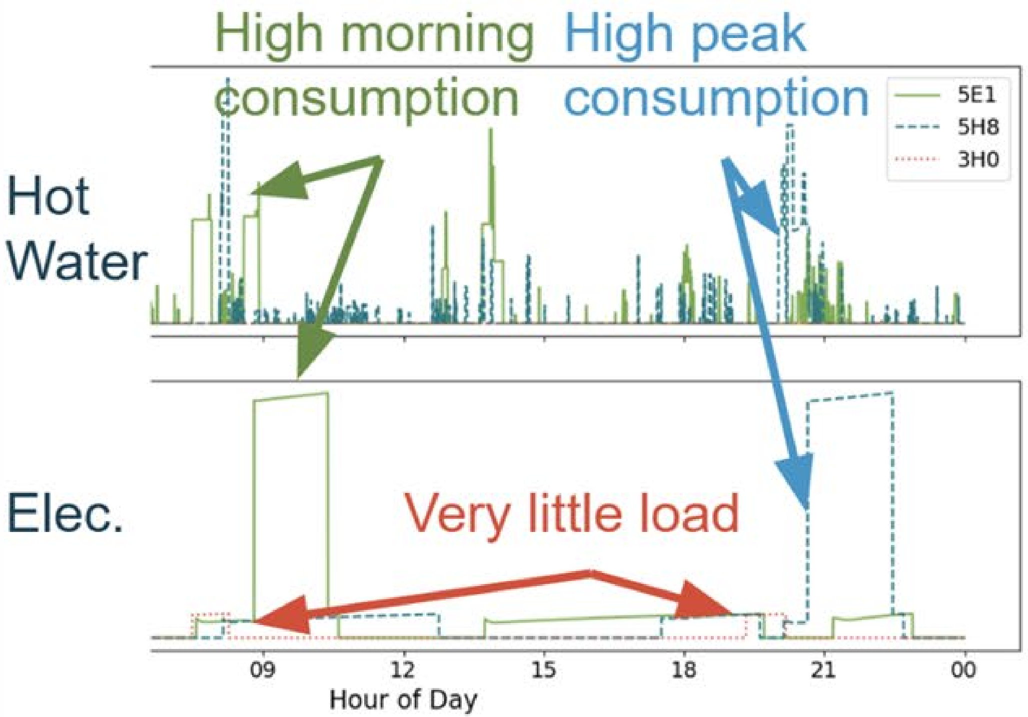



## Thermal Characteristics

- ~450 W-el / 1,350 W-th heat pump
- 2x ~4kW backup resistance elements
- 40-80 gallon storage tanks - **Existing thermal storage**

## Communication Capabilities

- CTA-2045-B
- **Shed**: Delay heating cycle
- **Load-Up**: Bring water to temperature now
- **Advanced Load-Up**: Increase set temperature, Load-Up



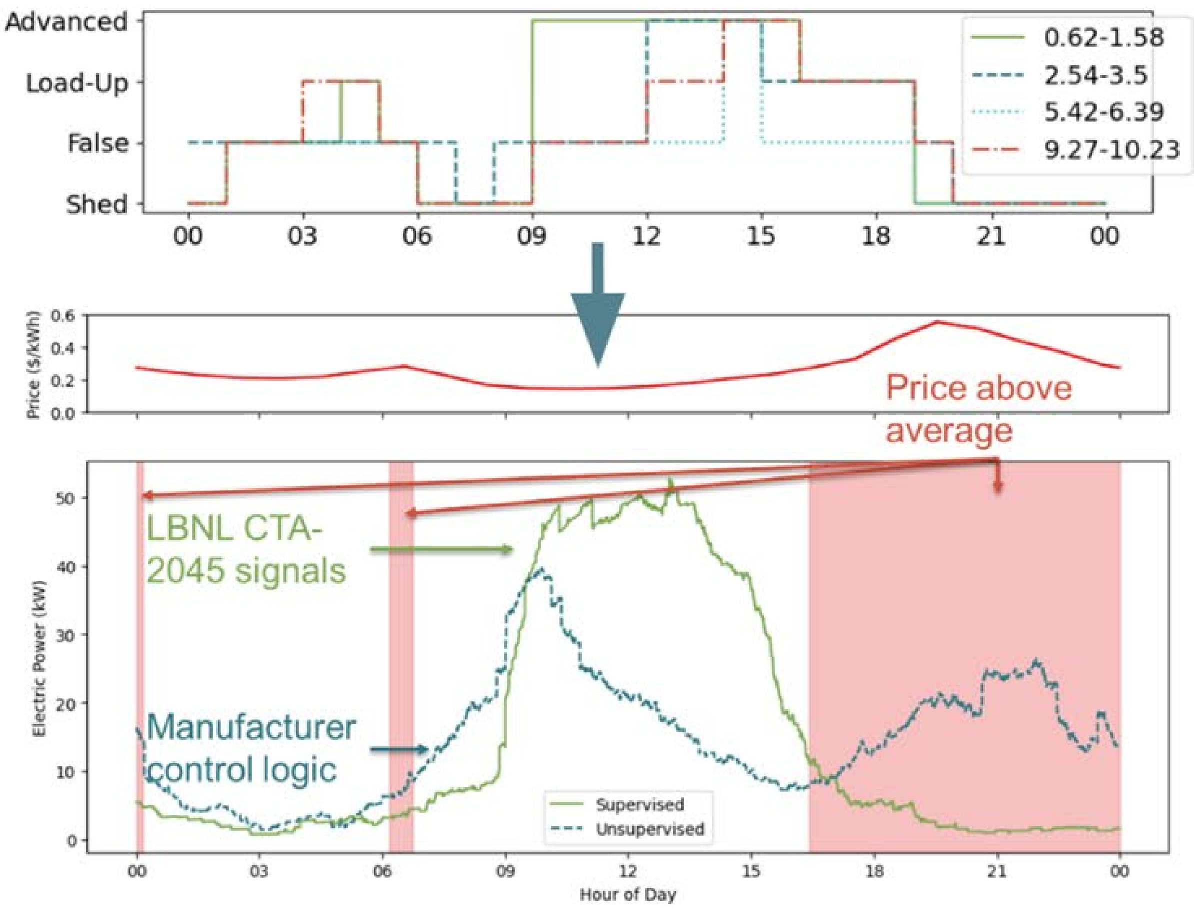

Different HPWHs need different signal schedules

5E1: Precharge tank in morning

5H8: Precharge tank in early afternoon

3H0: Do nothing

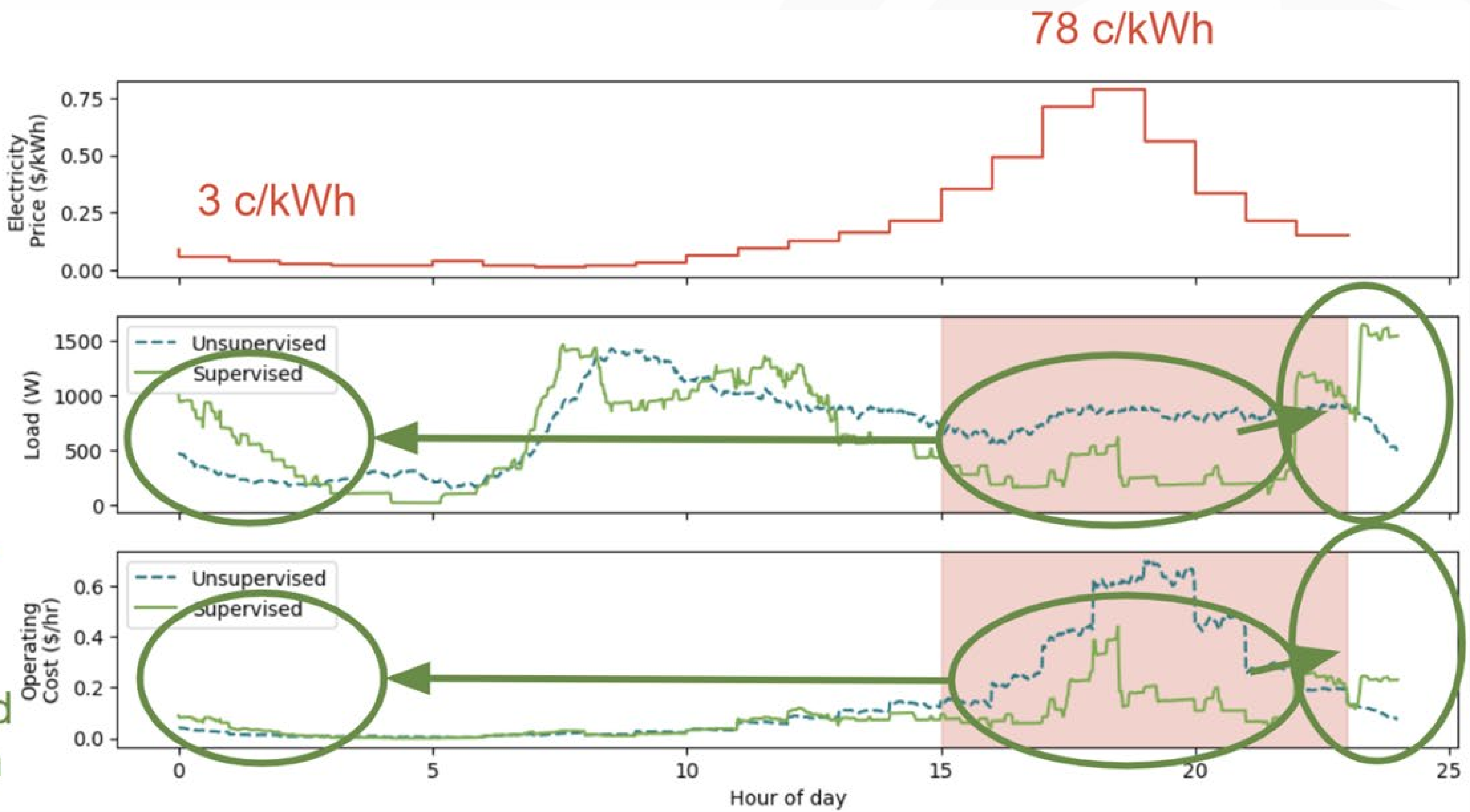
## Customized CTA-2045-B Signal Schedules



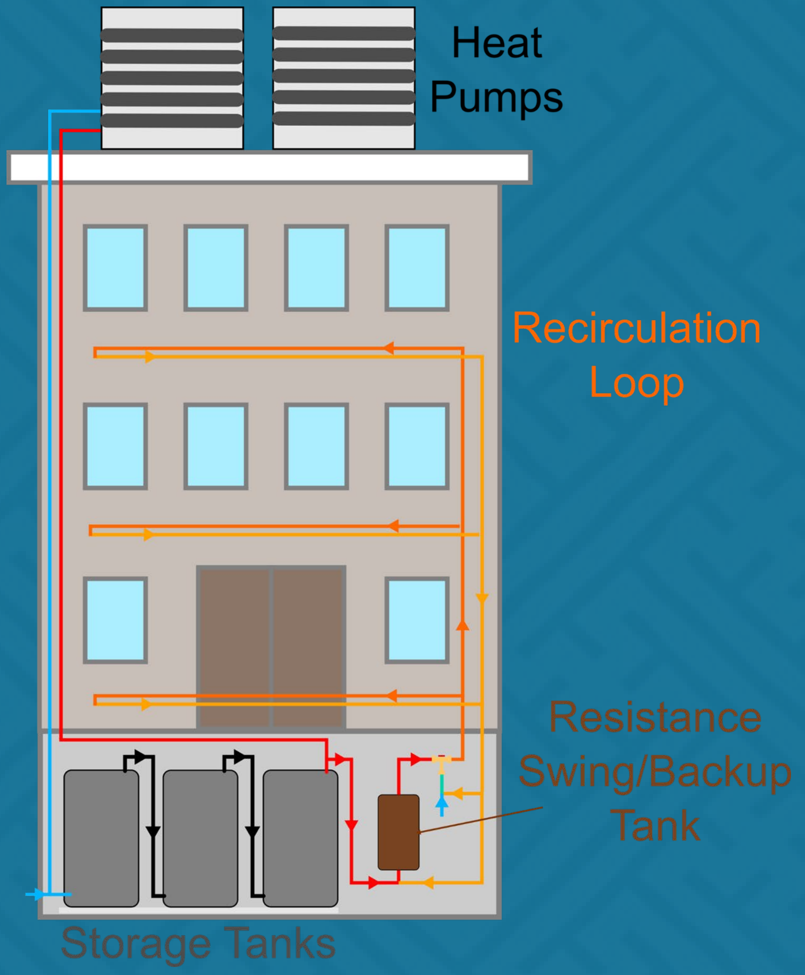

Simulated results showing potential load shapes with a fleet of 148 HPWHs

**Fleet Details**
10 HPWHs
120V plug-in ready
California
Single family
CTA-2045 (***Not*** B)
No Advanced Load Up

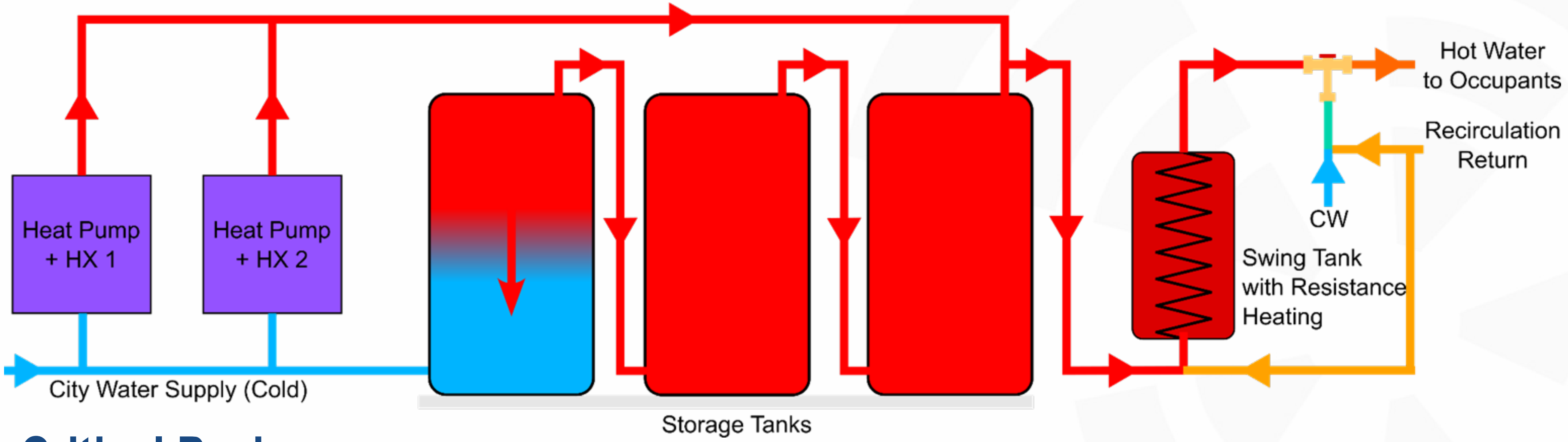
**Results**
52% of high-price load shifted
46% electricity cost reduction



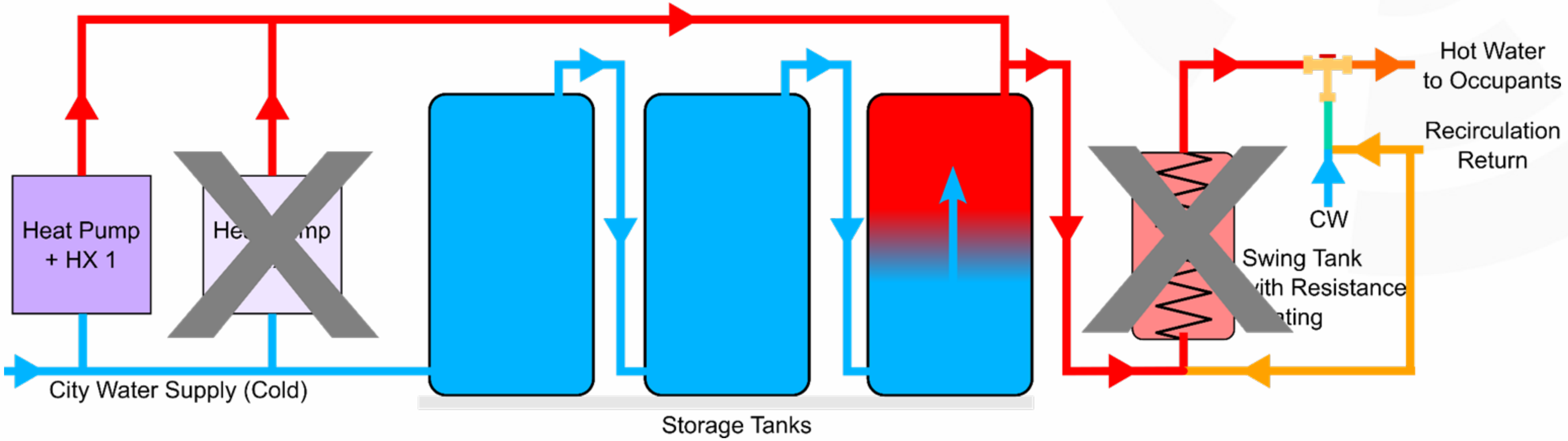
# Multi Family Central HPWHs



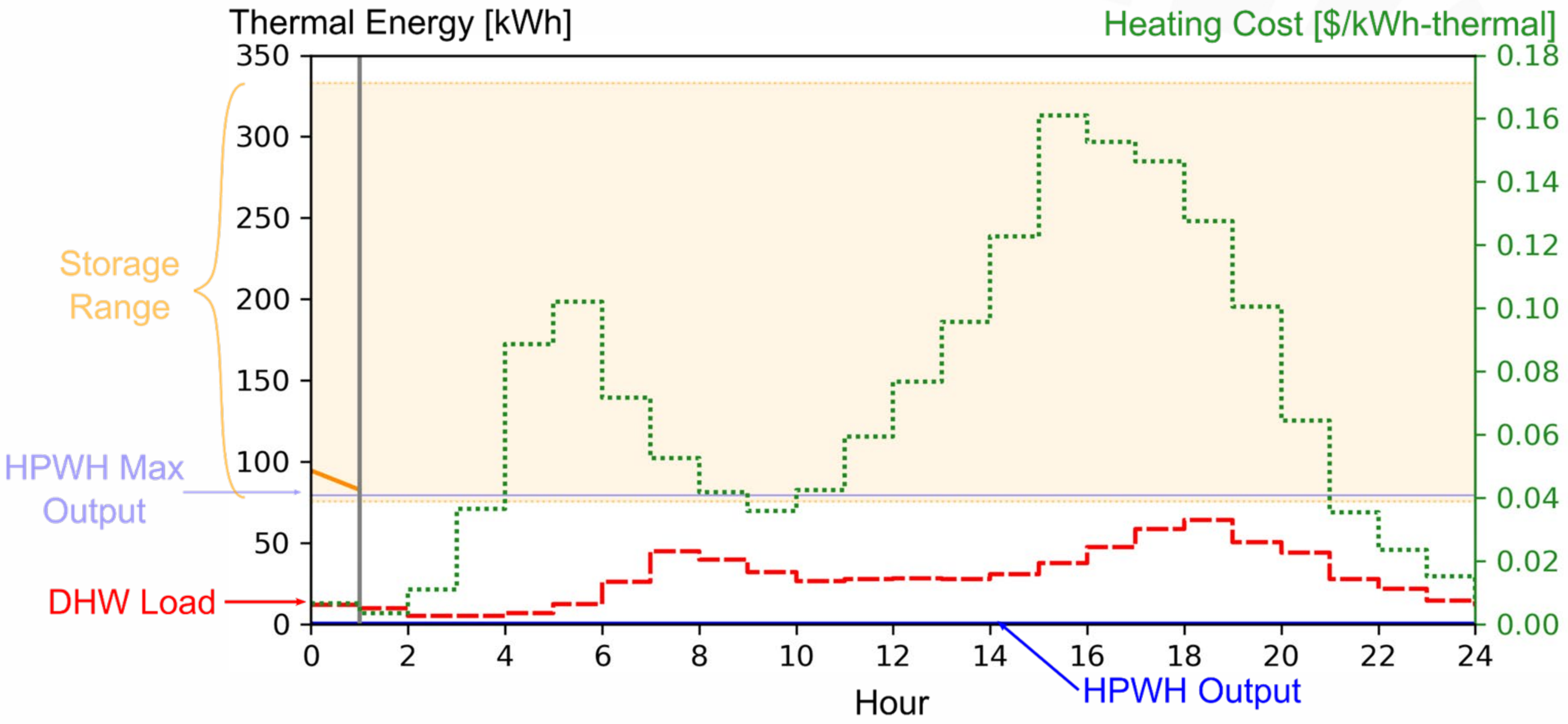
## Load Up




## Critical Peak

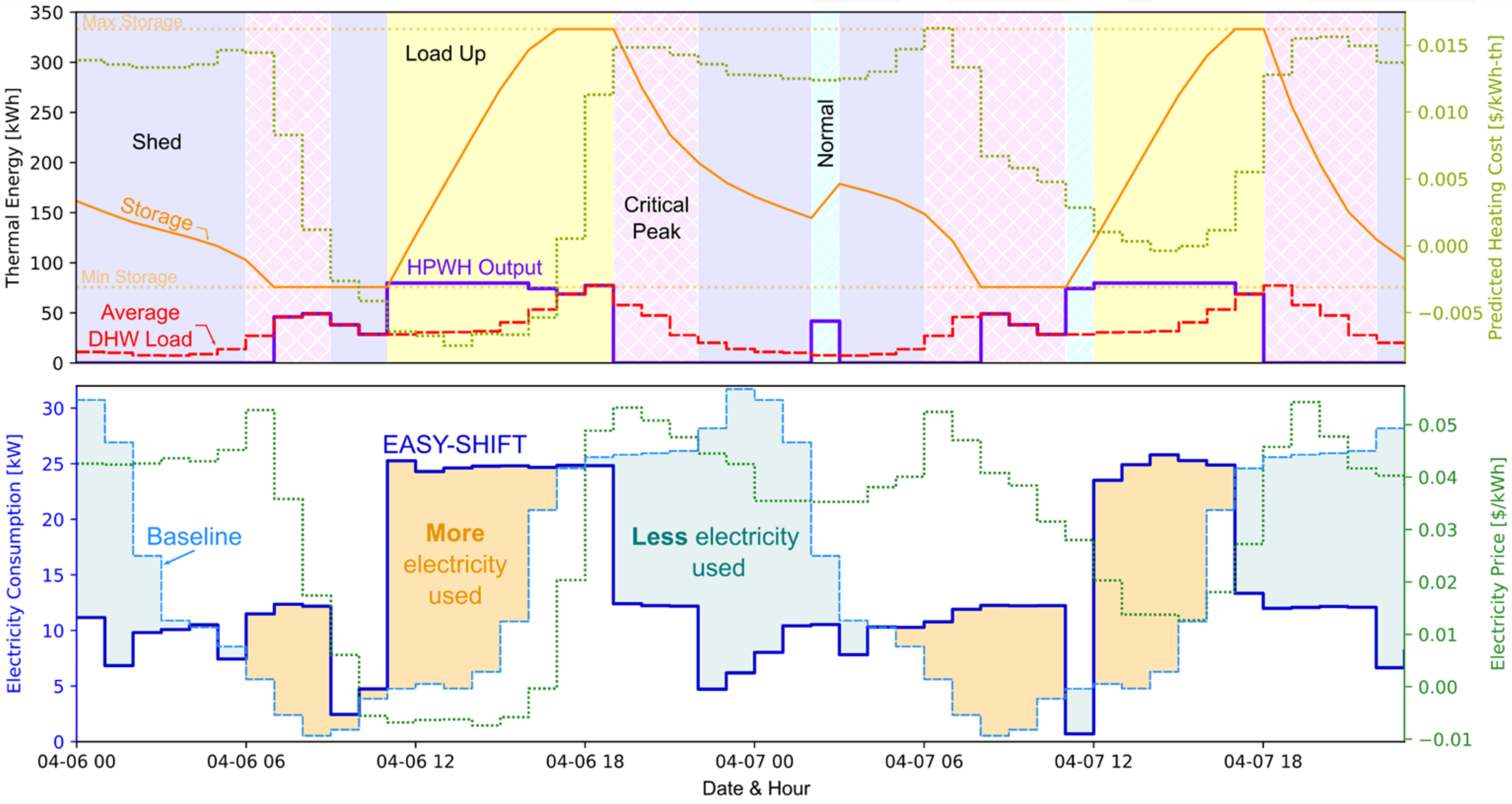


**Algorithm**: To generate schedule for a given horizon, increase HPWH output at least expensive time until storage requirements are met



# Electric load shifting compared to non-responsive baseline - **PG&E Hourly Flex Pricing**

Original schedule for 2 example days




Comparison of actual electric consumption during EASY-SHIFT testing and average baseline consumption. **36 % cost reduction**.

# Commercial Technologies

Armando Casillas

CalFlexHub

BERKELEY LAB

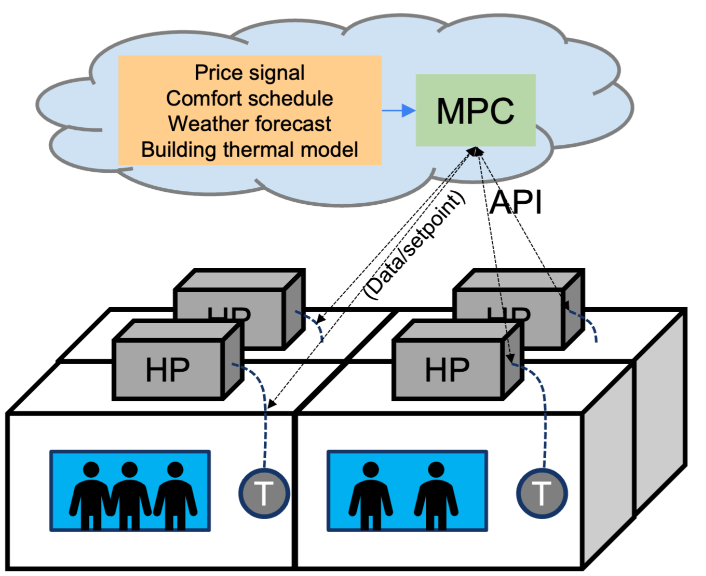
# Light Commercial

# Light Commercial HVAC: Huge Demand Resources

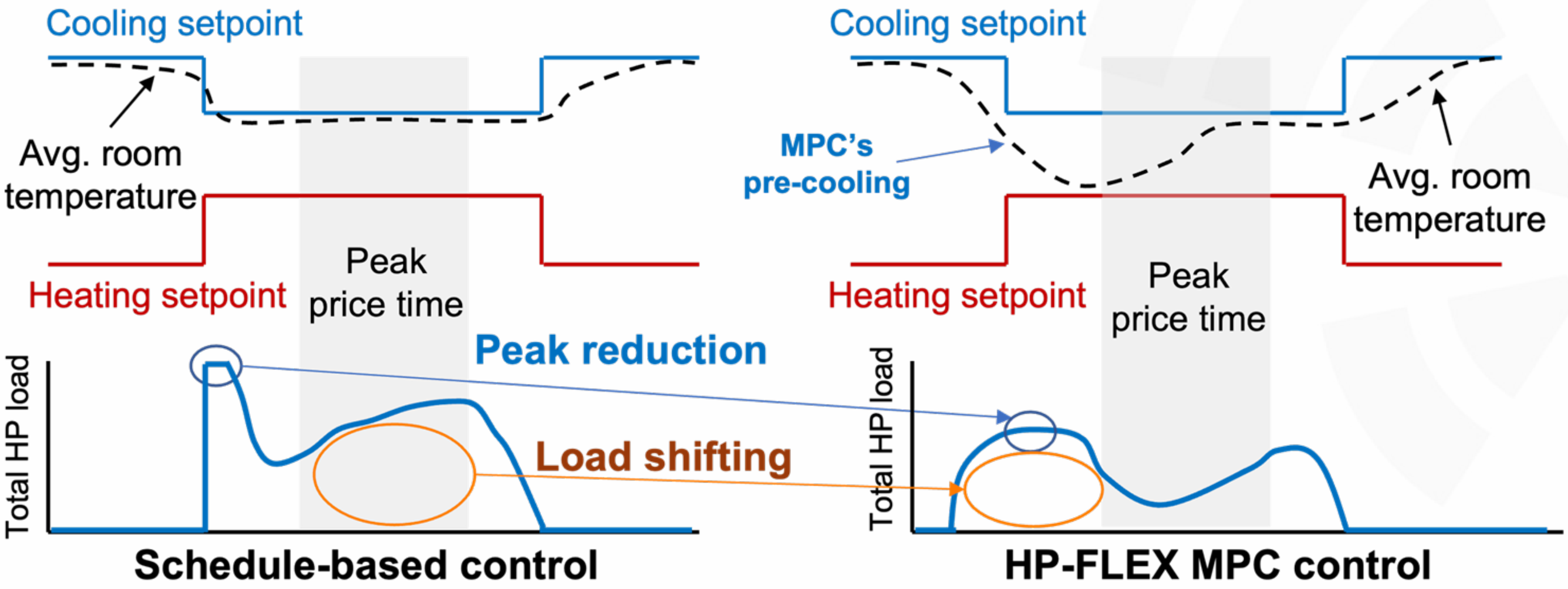
- SMCB (small, medium commercial building)
- ~50% of total commercial indoor floor space
- ~50% of energy usage in the commercial building sector
- **Gap**: very **few commercial control solutions** for demand flexibility (optimal load shifting and shedding)
- **Scalability potential**: highly scalable due to the consistent HVAC system configuration (RTUs or Mini-splits)

# Proposed Solution: HP-Flex

- **Model Predictive Control (MPC)** for SMCB with HVAC that **only** uses web-enabled or BMS-connected **thermostats** (**no additional sensors and networking**)
- Flexible **middleware** to integrate grid signals and weather forecasts
- Cloud-based or on-premises machine to run HP-Flex
- Semantic model-based deployment process for scalable solution.



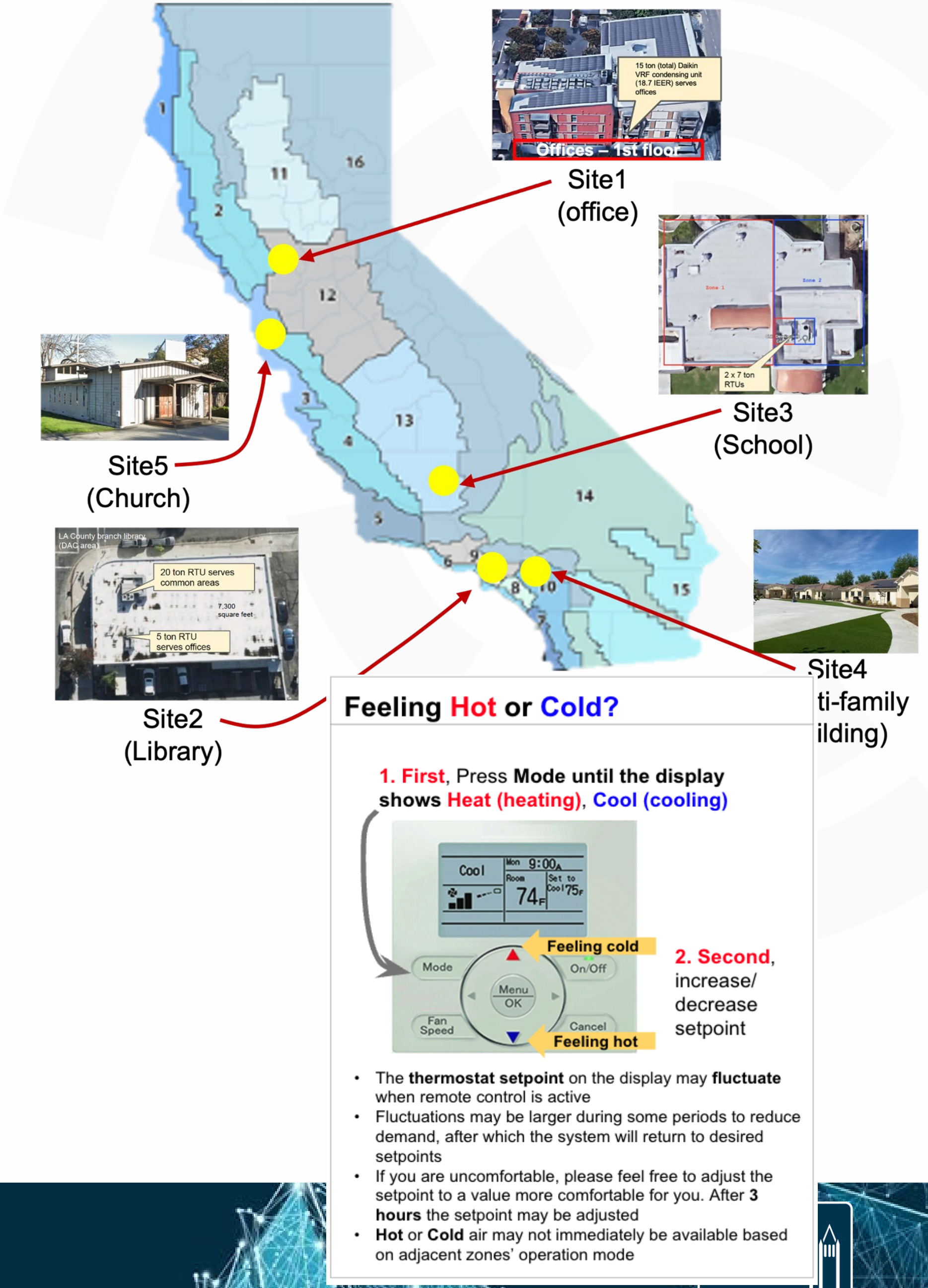
# How HP-Flex MPC works



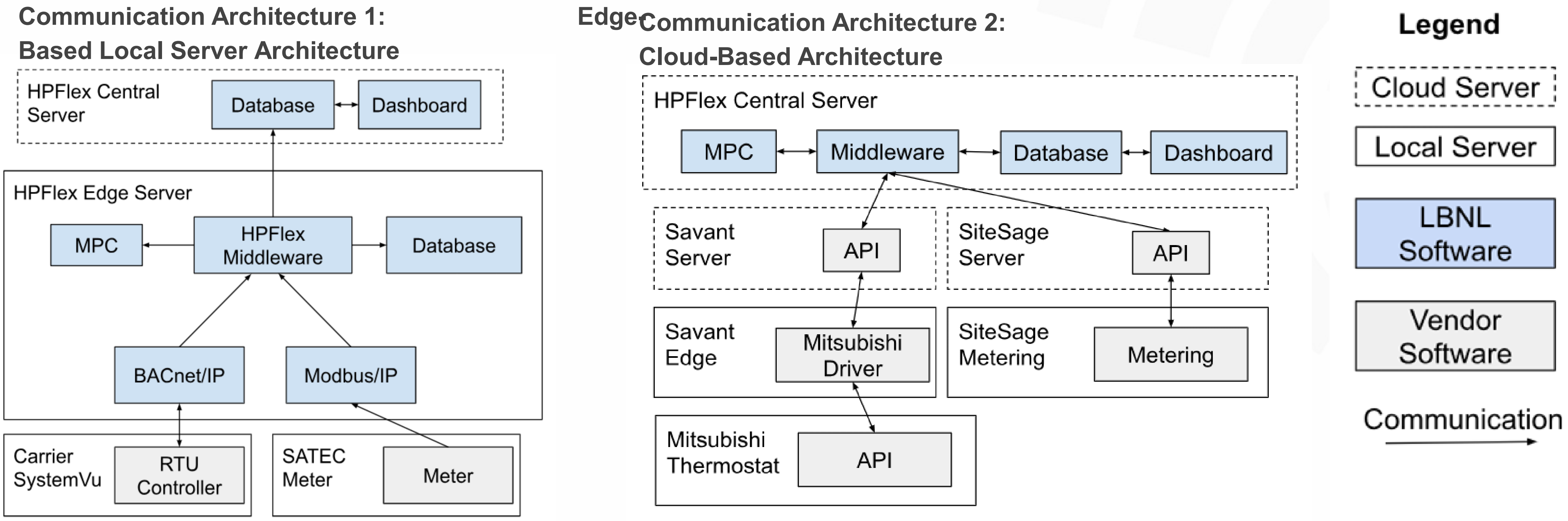

- Based on future temperature predictions, HP-Flex MPC plans when to use electricity to cool/heat the space based on the electricity price signal.

# HP-FLEX: Field Demonstration

- Deployed HP-Flex MPC for 5 demonstration sites for VRF or RTU systems for various buildings (office, church, library, multi-family building, school buildings)
- Occupants have full control over thermostats, MPC adapts for human input, allows override for hours before re-engaging control

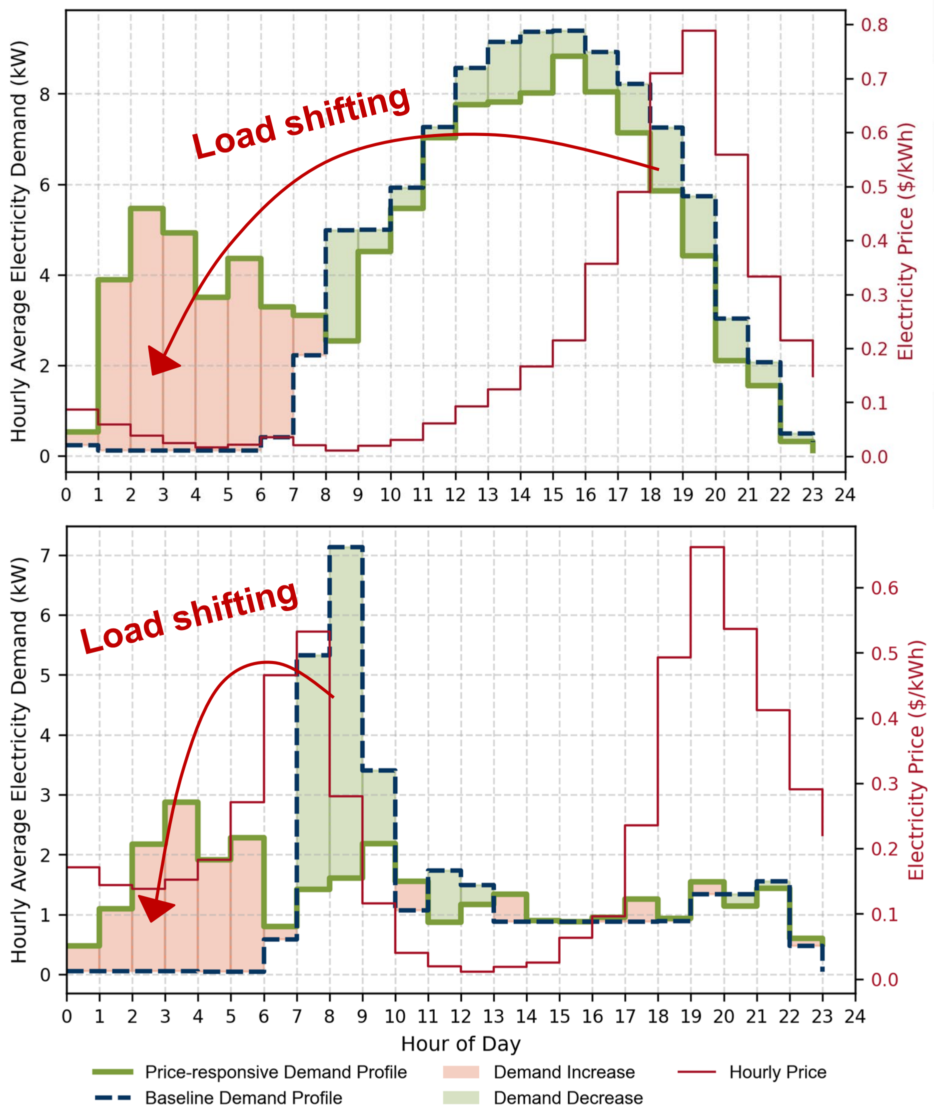


# HP-FLEX: Communication Architecture(s)



# HP-FLEX: Field Results

- On average, **14-23% peak load reduction**, **10-19% load shed** and **3-10% cost savings*** across 5 sites.
- Tested both one-peak and two peak price signal scenarios, across heating and cooling operation
- About **50% comfort range violation reductions**.



# HP-FLEX: Technology Transfer

DOE CODE / Search Results / HP-FLEX MPC v0

## HP-FLEX MPC v0.1.0

Full Project

RESOURCE

**Publicly Accessible Repository**

https://bitbucket.org/berkeleylab/hp-flex-mpc

https://doi.org/10.11578/dc.20250725.2

SAVE / SHARE

Export Metadata

### API Documentation.

- See the `docs/_build/latex/hp-flex-mpc.pdf` file.

### Implementation guideline

- See our implementation guideline link. The

### Tutorials

- See the `examples/sysid_demo_with_csv_dat`
- See the `examples/hp-flex-mpc_demo_with_c`

## Reproducibility

**End-to-End MPC Package**

MPC is consolidated in single Python script and accesses unified database file for streamlined communication and data management

**Ease of Hardware Installation**

The Sensibo Air device is a cost-effective and easy-to-install solution that enables seamless control of most IR-enabled HVAC units

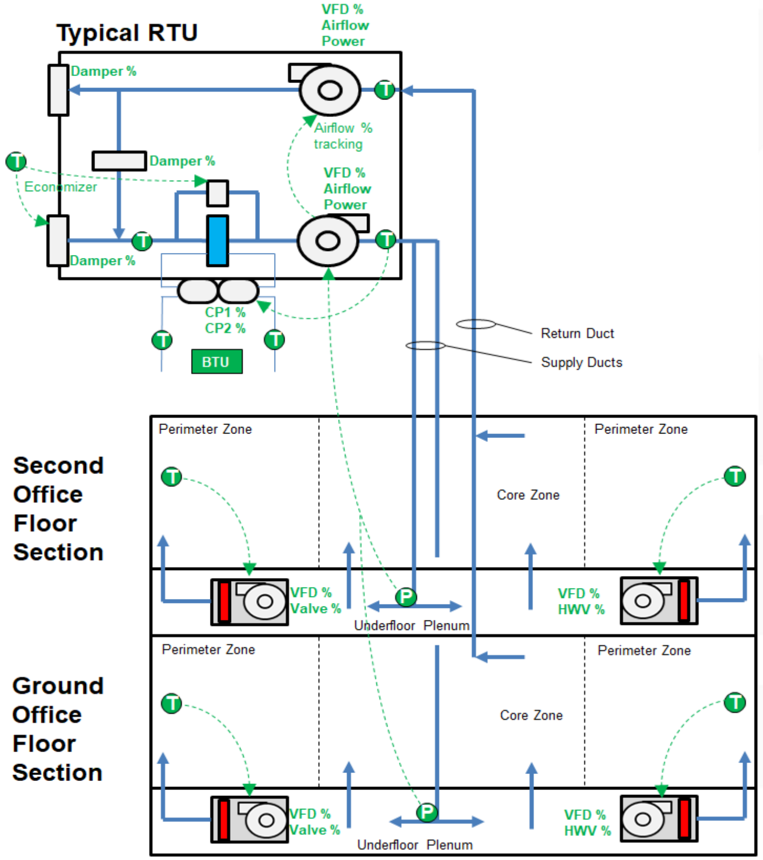
**Streamlined Deployment**

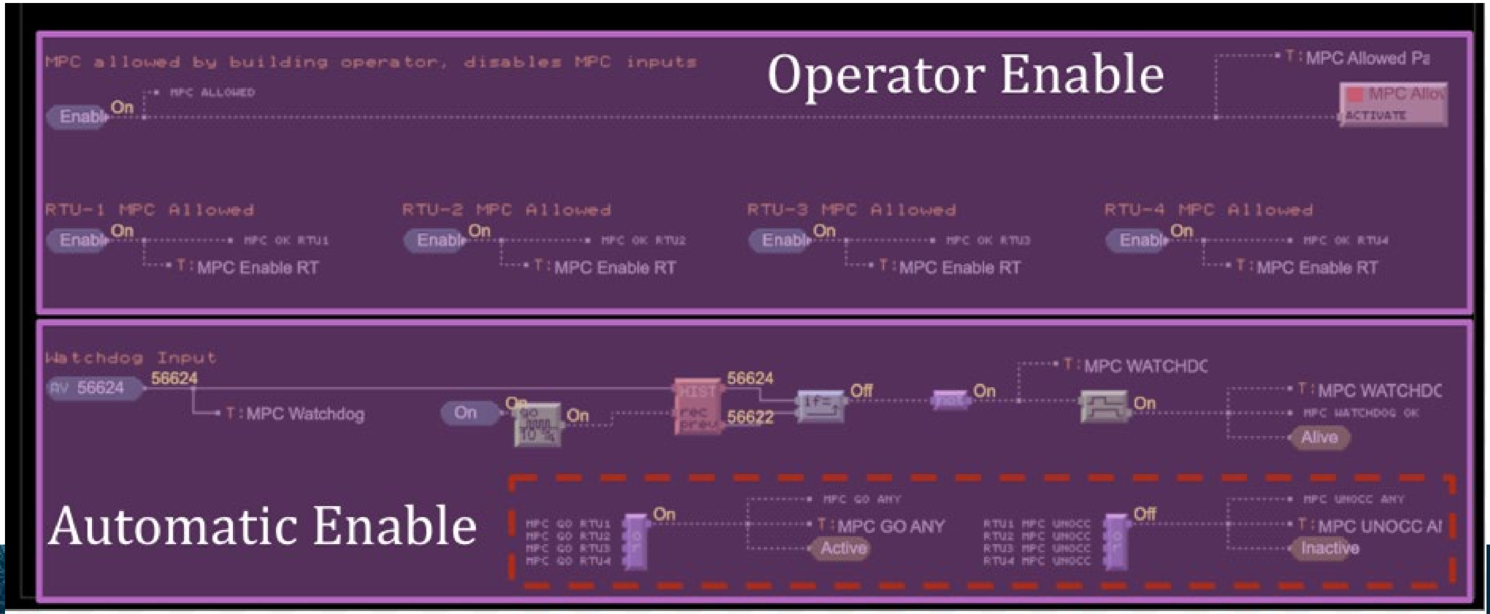
Google Cloud Platform enables fully autonomous scheduling and deployment of the MPC package with a user-friendly dashboard

# Large Commercial

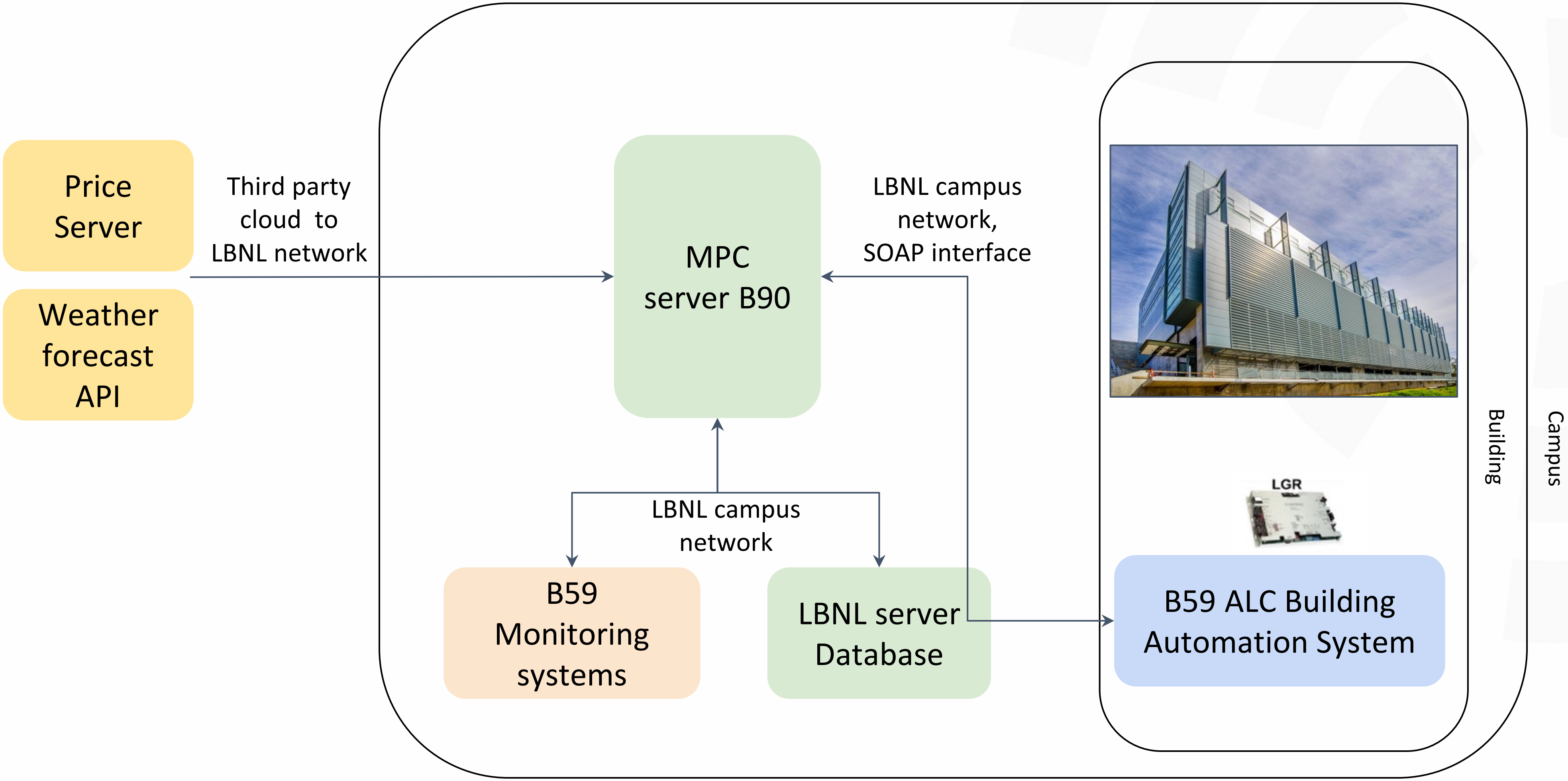
# Large Commercial HVAC: BAS-enabled Predictive Controls

- Supervisory MPC control system
- Coordinates with Building Automation System
- Can optimize for cost, energy, $CO_2$ emissions



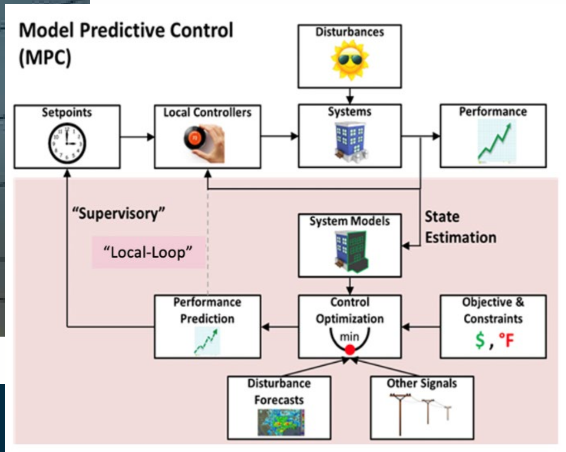
# B59: Communication Architecture

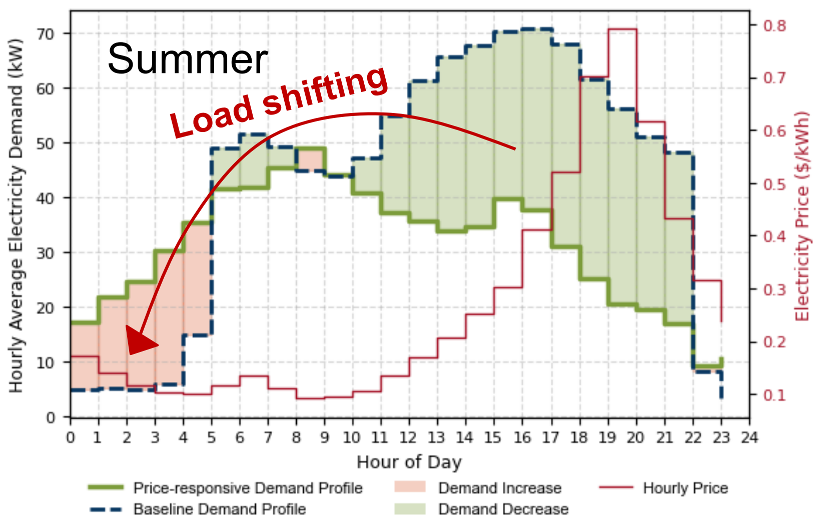


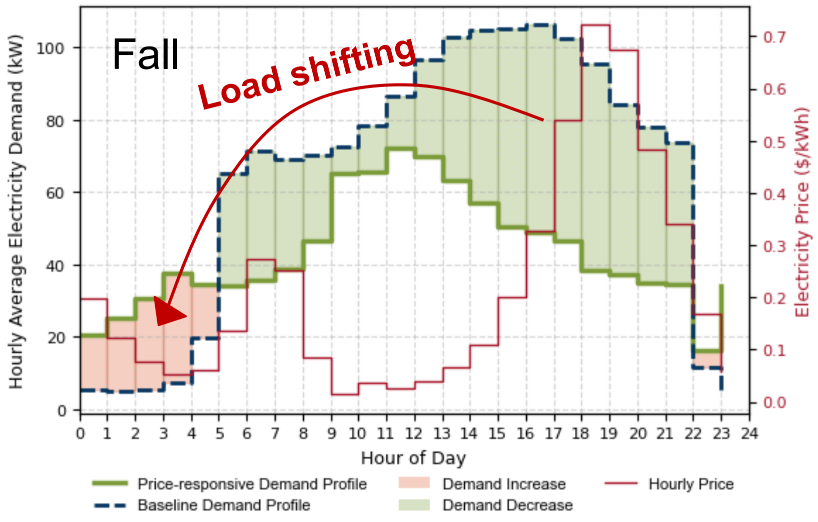
# B59: Field Results

**Tested in medium office building with average reduction in bill costs by 52% due to simultaneous increase in efficiency and shift of load out of high prices:**

- Works in more complex larger buildings
- Consistent performance across seasons
- Improves thermal comfort
- Respond to CFH/MIDAS price signals



# Campus/District Systems

# Campus-wide Field Demonstration of Load-shifting, Peak Reduction, and Full Renewable Utilization

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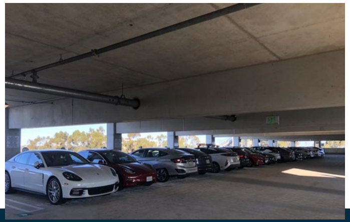
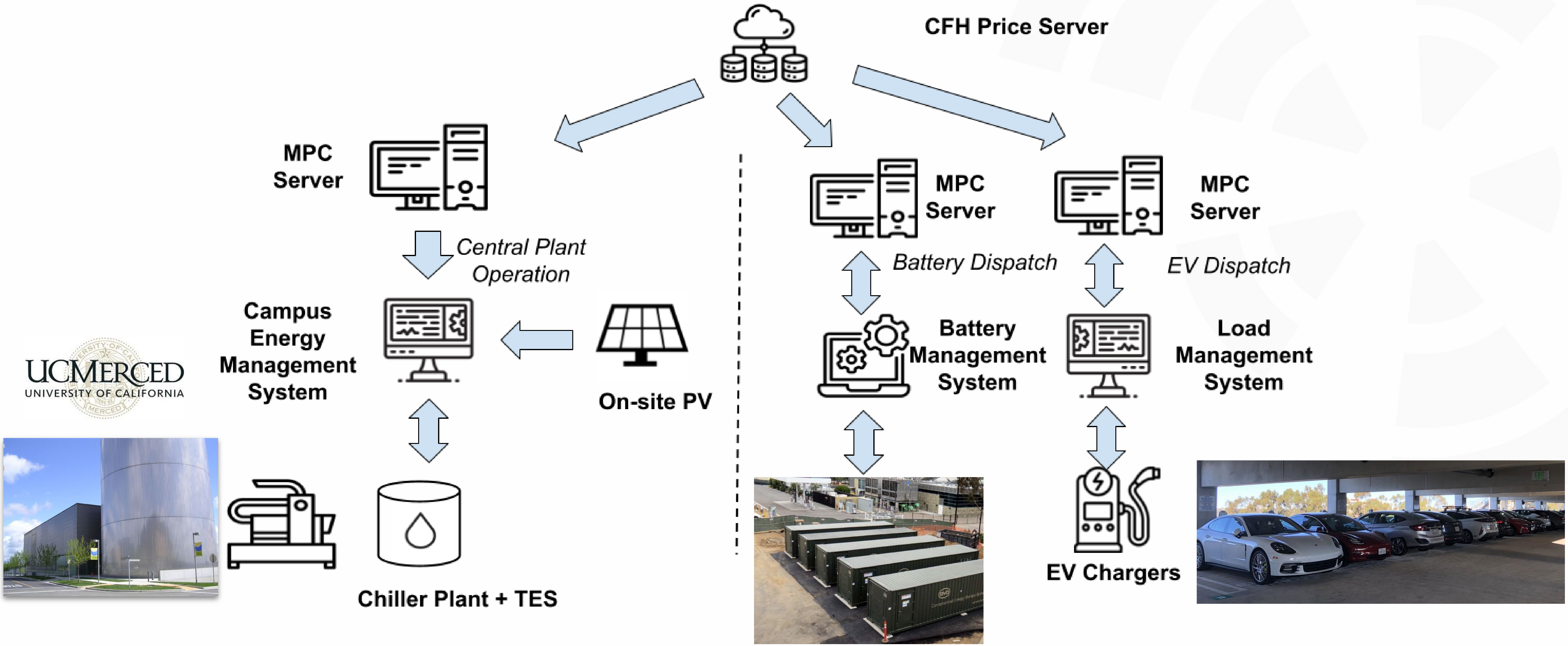
UC San Diego

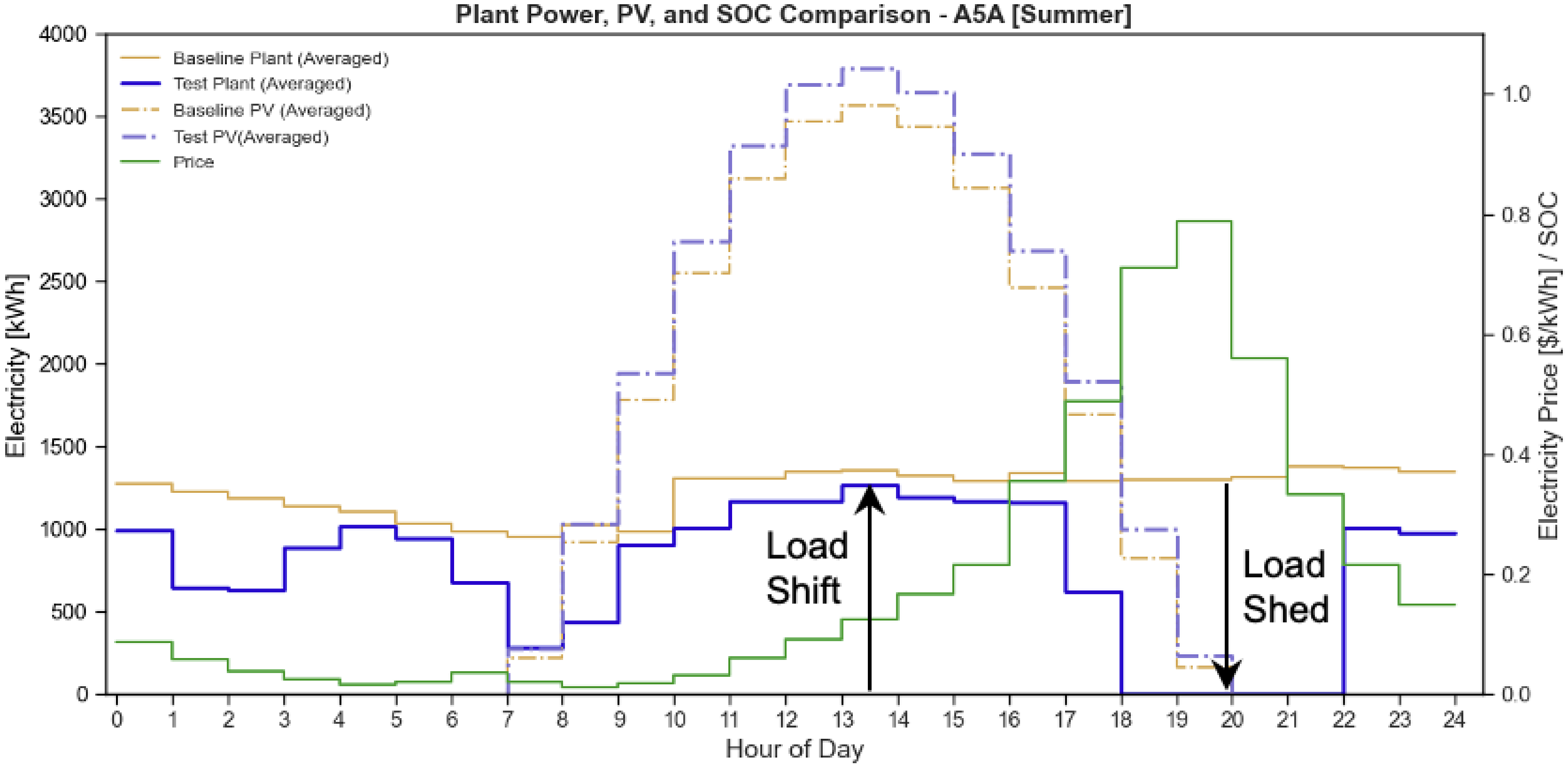


# Control and Communication Architecture



# Field Test Result Summary & Takeaways: District Cooling Systems

**Field test results with a highly dynamic pricing signal**




- The single control deployment achieved a **5 MWh load shift (1.25 MW x 4 hours)**, which demonstrates great effectiveness.

- Using CFH price signals, MPC provides **~$200k of energy savings per month**

- District Energy Systems would provide a highly cost-effective solution to economically securing demand response (DR) capacity and load flexibility for the grid.

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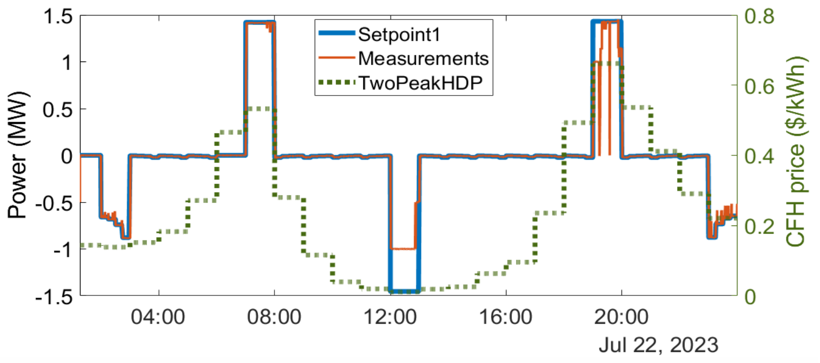
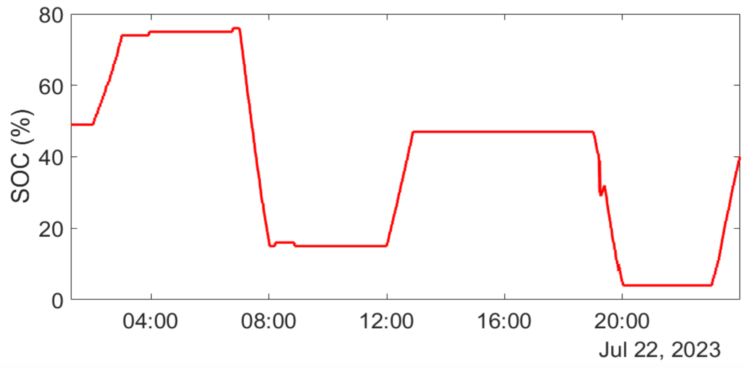
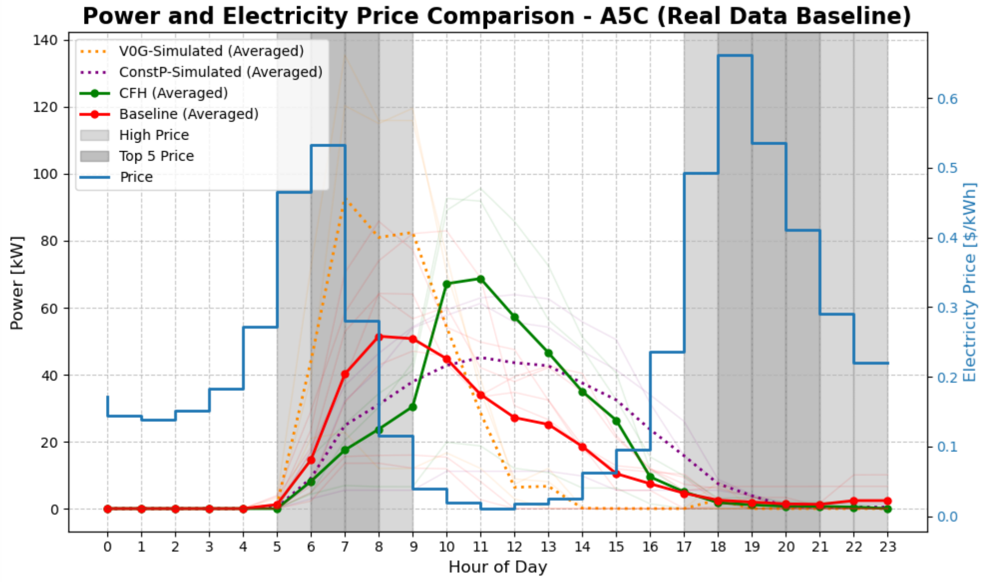
# Field Test Result Summary & Takeaways: BESS & EV Charging




- **~$1,000 daily revenue opportunity from arbitrage**
- Higher arbitrage opportunity with two peak pricing




- **More than 40% reduction in cost compared to benchmark cases**
- Optimized (delayed) workplace charging is well-suited for cost reductions

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# Key Learning & Vision

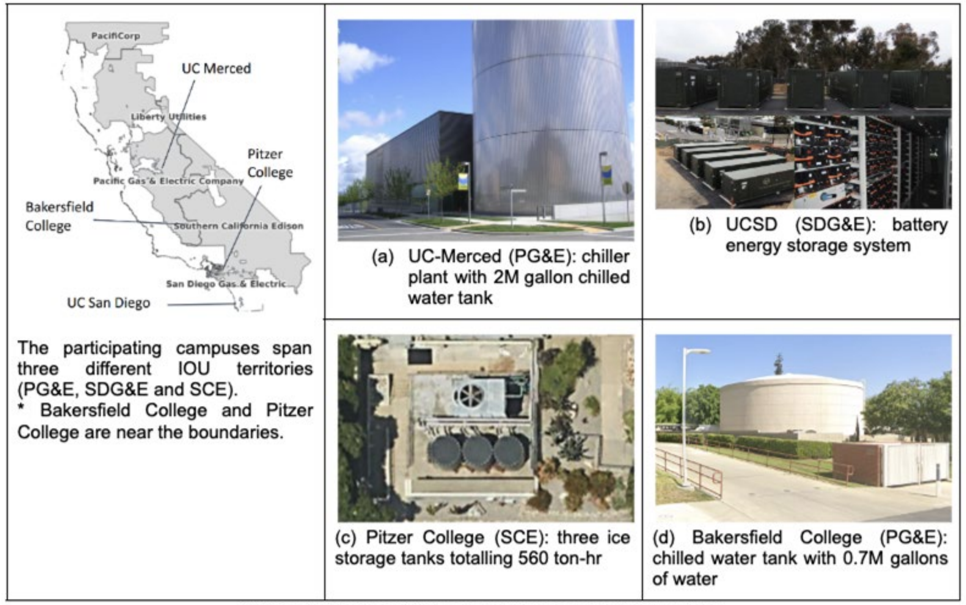
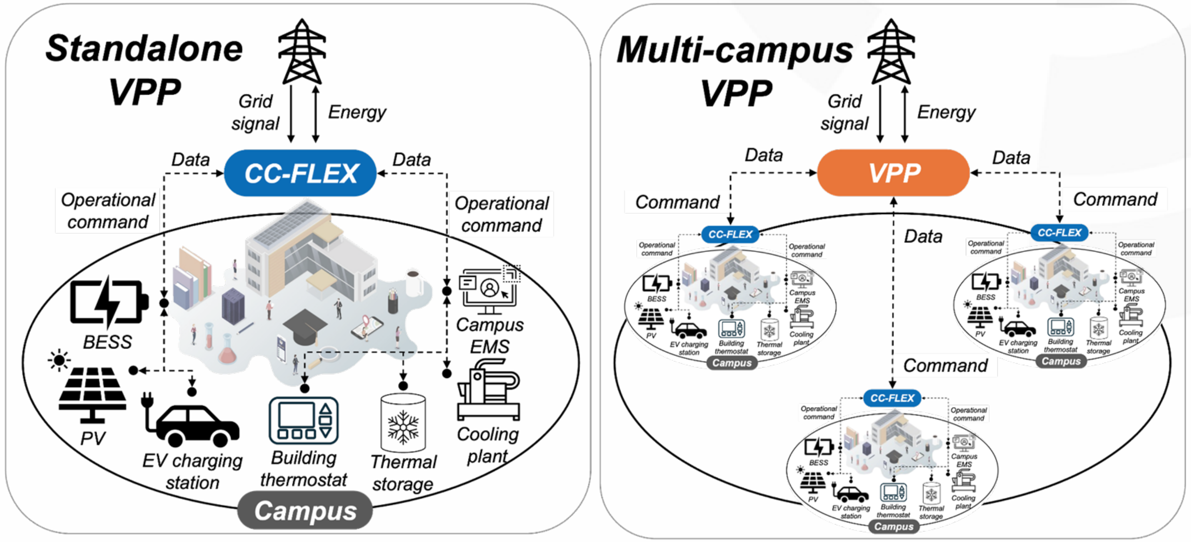



**Figure 2: Sample DERs of our four demonstration sites**

- Many higher education campuses **already** have MW-scale central chiller plants, MW-hr scale thermal energy storage, and rapidly expanding EV charging stations, along with other large distributed energy resources (DERs).
- Significantly greater effectiveness (i.e., $ savings or load shifting capacity per deployment) can be achieved for district energy systems compared to SMCBs if MPC is successfully deployed.
- **Awarded ~$3M Campus-VPP proposal from CEC EPIC GFO 23-309 VPP-FLEX**



# Q&A Discussion

Take a moment to take our survey: https://forms.gle/YW8SMwPsPS8Ltp1L7

# What's Next for CalFlexHub, California and You

- ❖ Engage with your utility pilots, education, and support offerings
  - SCE and PG&E dynamic rate pilots
- ❖ Industrial, Agricultural, and Water Load Flexibility Hub for continued research in new sectors
- ❖ Visit Calflexhub.lbl.gov for final reporting and upcoming events

# Resources

- SCE Dynamic Rate Pilot: https://www.sce.com/sce-expanded-flexible-pricing-rate-pilot
- PG&E Dynamic Rate Pilot: https://www.pge.com/en/account/rate-plans/hourly-flex-pricing.html
- State of California Energy Programs Resource Directory
- CalFlexHub Website: Calflexhub.lbl.gov
- IAW FlexHub Website: iawflexhub.org

# LUNCH BREAK

# Integrated Demand Side Management for Commercial Customers

## Silicon Valley Clean Energy

Quinn Cherf
Load Management Programs

10/15/2025

ICF

**Global** advisory, technology services provider

**50+ years** in the energy business

**Over 1,100** energy experts across North America, UK, India, China, and Ghana

**250+** energy programs and **$3.1B** in energy efficiency rebates

**Top 60** utilities in North America

Supports **all major energy NGOs, federal agencies, and state DOEs** on energy issues

**Largest implementer of electrification programs** in the U.S

**Carbon Neutral** since 2006

**51%** Female Leaders

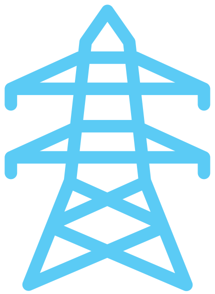
FORTUNE
statista
AMERICA'S MOST INNOVATIVE COMPANIES | 2025

Forbes 2024
AMERICA'S BEST MANAGEMENT CONSULTING FIRMS
POWERED BY STATISTA

Forbes 2024
BEST EMPLOYERS FOR DIVERSITY
POWERED BY STATISTA

Forbes 2024
THE BEST EMPLOYERS FOR WOMEN
POWERED BY STATISTA

# Agenda



- Fundamentals of IDSM, Energy Efficiency, and Demand Response Programs
- Program Types
- Program Structure and Stakeholder Roles
- Participation Benefits
- What’s on the horizon

# Fundamentals of IDSM, Energy Efficiency, and Demand Response Programs

# Definition and Goals of Integrated Demand Side Management (IDSM)

Integrated Demand Side Management is a unified strategy to optimize grid operations, reduce energy consumption, support decarbonization, improve flexibility, enable beneficial load growth

- Reduce Peak Demand
  IDSM aims to lower peak electricity demand to prevent grid overload and reduce costs
- Improve Energy Efficiency
  Promotes efficient energy use through targeted programs and consumer engagement
- Promote Sustainability
  Encourages sustainable energy use by integrating renewable sources and coordinated efforts

# What is Energy Efficiency

- Energy efficiency means using less energy to perform the same task.
- Using less energy…
  - Reduces waste and lowers utility bills
  - Improves efficiency which helps conserve natural resources
  - Decreases greenhouse gas emissions and environmental impact
- Examples of energy-efficient technologies include
  - Energy Management Software (EMS)
  - HVAC controls
  - Building Automation Systems (BAS)

# Energy Efficiency (EE) Ongoing Conservation

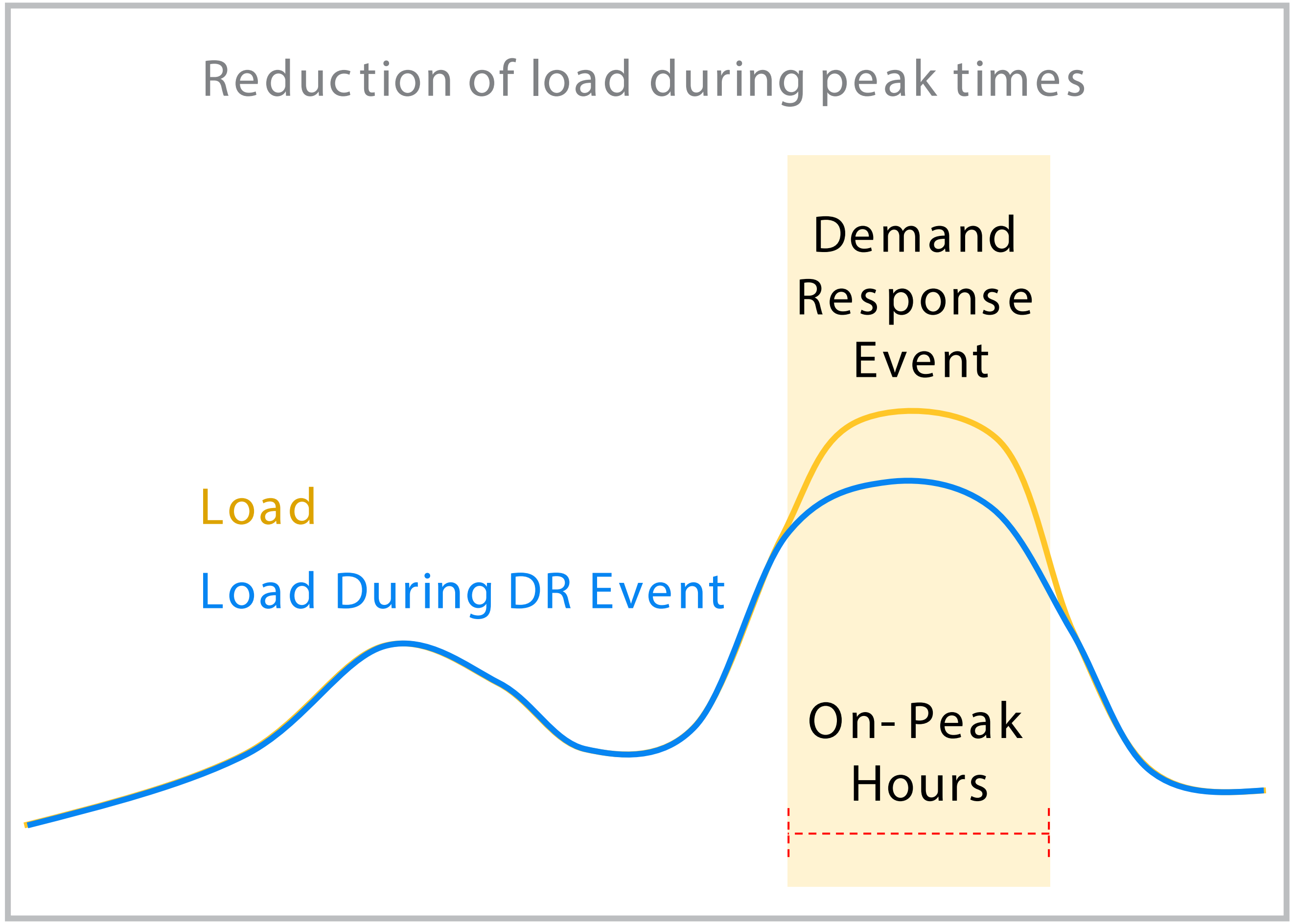
- **Long-Term Energy Improvements**
  Continuous EE conservation targets sustainable, long-term improvements in energy usage across systems

- **Upgrades and Retrofits**
  Implementing upgrades and retrofits to existing equipment reduces energy consumption effectively

- **Behavioral Changes**
  Behavioral changes complement technical solutions by promoting mindful energy use and conservation habits

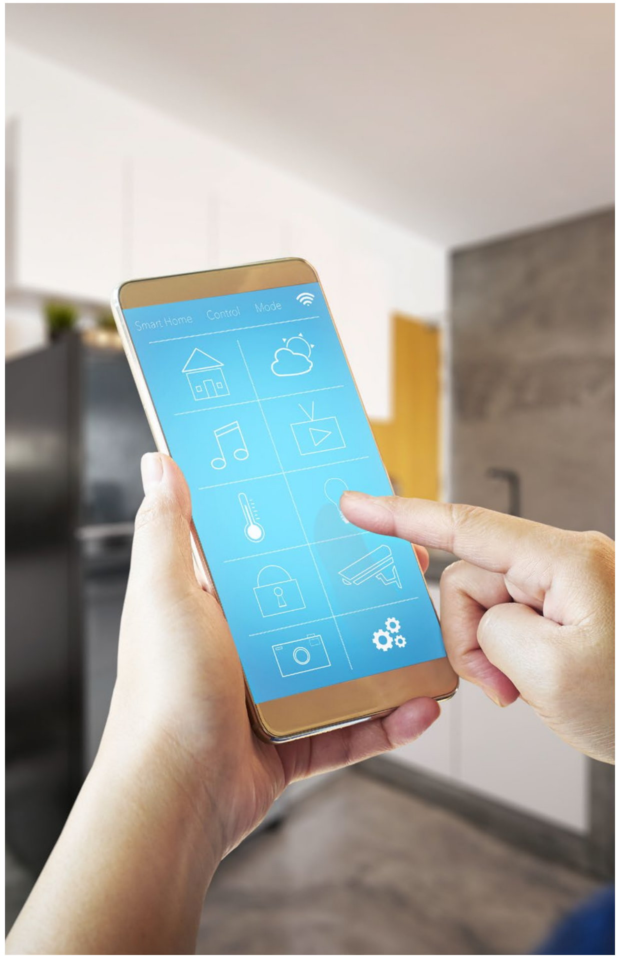
# What is demand response?

Demand Response (DR) allows a utility and/or customers to manage energy loads through "reducing or shifting their electricity usage during peak periods in response to time-based rates or other forms of financial incentives"[1]




[1] United States Department of Energy Demand Response: https://www.energy.gov/oe/demand-response

# What is demand response? (continued)

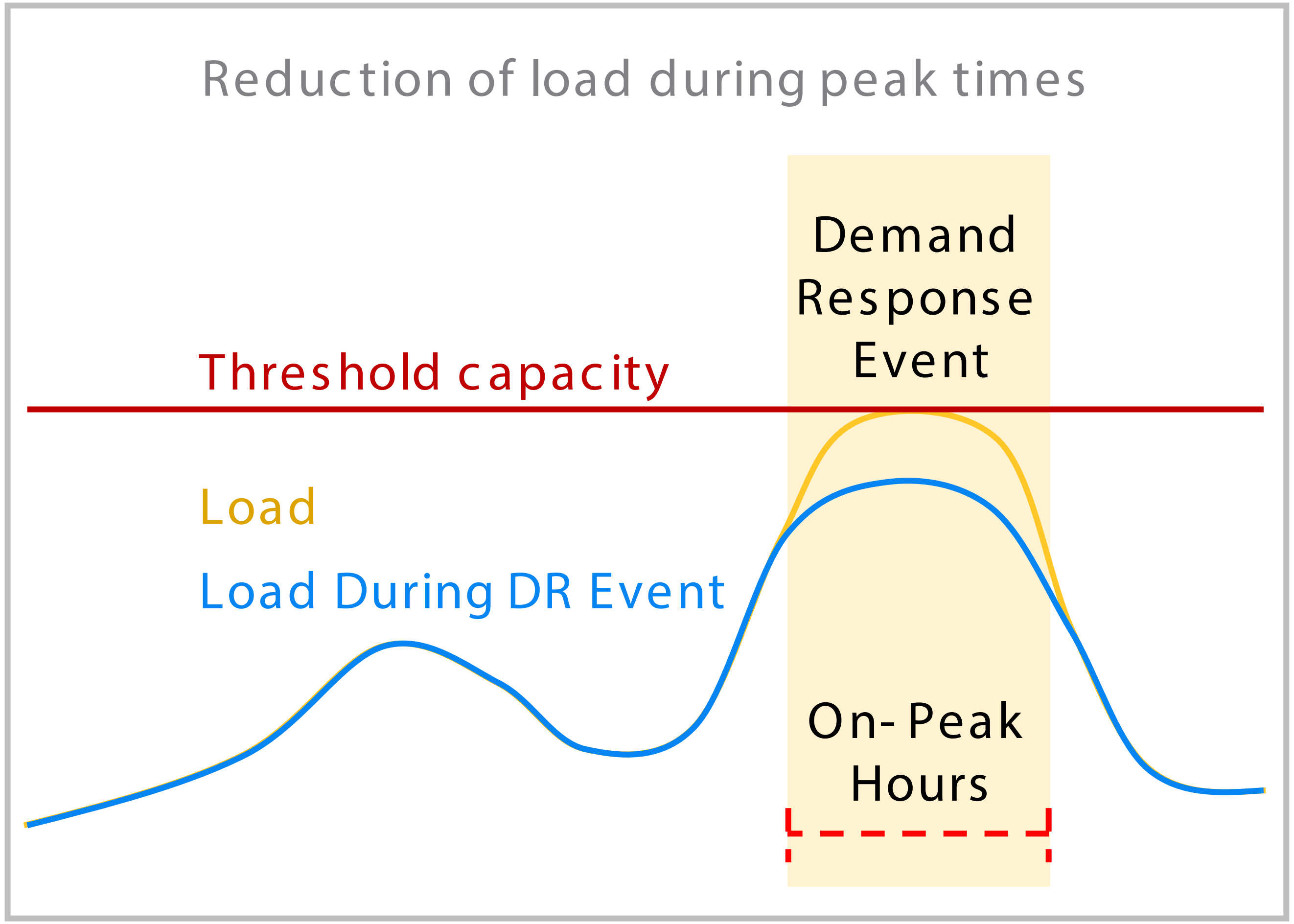



Passive load control - The customer shifts their energy usage habits because of cheaper rates during off-peak times, and more expensive rates during on-peak times.

Direct Load Control - The utility manages customer power usage through connection to a software platform (Distributed Energy Resource Management System – "DERMS"). Customer is often given an incentive for participation.

# How does DLC demand response work?

1. The utility anticipates needed support: Capacity, locational relief, high market prices, etc.
2. Demand Response event is called: DERMS platform sends signal to connected devices to control loads
3. Event Begins: Participants devices are adjusted according to event parameters to meet goals. Energy usage is decreased
4. Events Ends: Participants devices return to initial settings



# Comparison

- IDSM
  - DSM combines EE and DR strategies for comprehensive and holistic energy demand management
  - Incorporates all energy management value streams to benefit customers and grid
- Energy Efficiency (EE)
  - EE aims for long-term reduction of energy consumption through improved technologies and practices
- Demand Response (DR)
  - DR manages targeted load adjustments during peak demand periods to reduce customer costs while providing reliability

# Program Types

# Contributing to Shared Goals

- Silicon Valley Clean Energy's goal is to "to reduce dependence on fossil fuels by providing carbon-free, affordable, and reliable electricity and innovative programs for the SVCE community."

- By taking part in these initiatives, you can actively contribute to SVCE's mission through:
  - **Reducing overall energy consumption**, which lowers the need for fossil fuel-based energy sources
  - **Adopting strategies** to cut both operational and consumer costs, resulting in more competitive rates
  - **Strengthening grid reliability** through load shifting and effective demand management
  - **Promoting energy-efficient habits** that support long-term sustainability

# Existing SV Clean Energy Commercial Programs

## C&I Decarbonization Program

A holistic, whole-facility carbon reduction program tailored to meet your unique needs and priorities

- Technical support: access tools, coaching, structure and resources for identifying and quantifying impacts from energy and carbon savings projects
- Hands on training: training sessions, site assessments, and the development of energy models to optimize your results
- No costs, no obligations, and customer incentives to support the implementation of decarbonization projects. Customer incentives range from $150/MT to $1750/MT of savings.
- Measure types:
  - Behavioral, retro-commissioning, operational
  - Refrigeration, steam, compressed air systems
  - HVAC upgrades and replacement
  - Electrification of existing gas equipment

# Existing SV Clean Energy Commercial Programs (continued)

## Business Rebates

- Switch to safer, energy-efficient electric heat pumps and induction cooktops
- Eligible businesses, schools, and municipalities can apply for rebates on heat pump water heaters, HVAC systems, and induction stoves.
- Businesses may receive up to $40,000 in rebates.
- Non-profits, schools, and municipalities may receive up to $15,000 in addition to the base rebate amount.

## Demand Response Programs

- In development – to be launched Q120216

# Program Structure and Stakeholder Roles

# Program participation process

## Commercial projects are complex and require meeting a number of stage gates to ensure accuracy and safety for everyone.

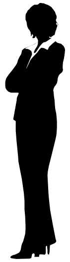
**Need identified** – Facility manager identifies a need or opportunity.

**Scoping & eligibility** – Site assessment conducted, contractor installer verifies site eligibility

**Application** – Customer completes reservation/ application

**Permits & project installation** – Customer/ contractor pull permits and project installation is completed

**Verification** – Implementer facilitates audit and project is verified



**Approval** – Application is reviewed and approved

**Incentives** – Rebate is issued or new rate is applied to customer account/bill

# Customer Value

# Participation benefits

- Financial incentives & cost savings
- Operational cost reduction
- Price volatility protection
- Real-time energy monitoring
- Energy management improvement
- Environmental benefits

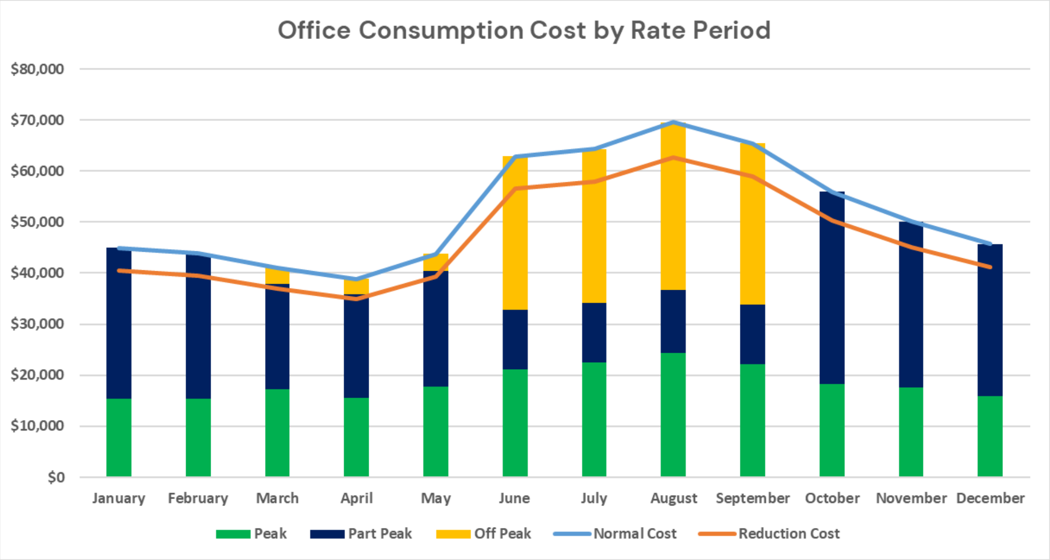
# Impacts of reducing annual electricity consumption by 10%

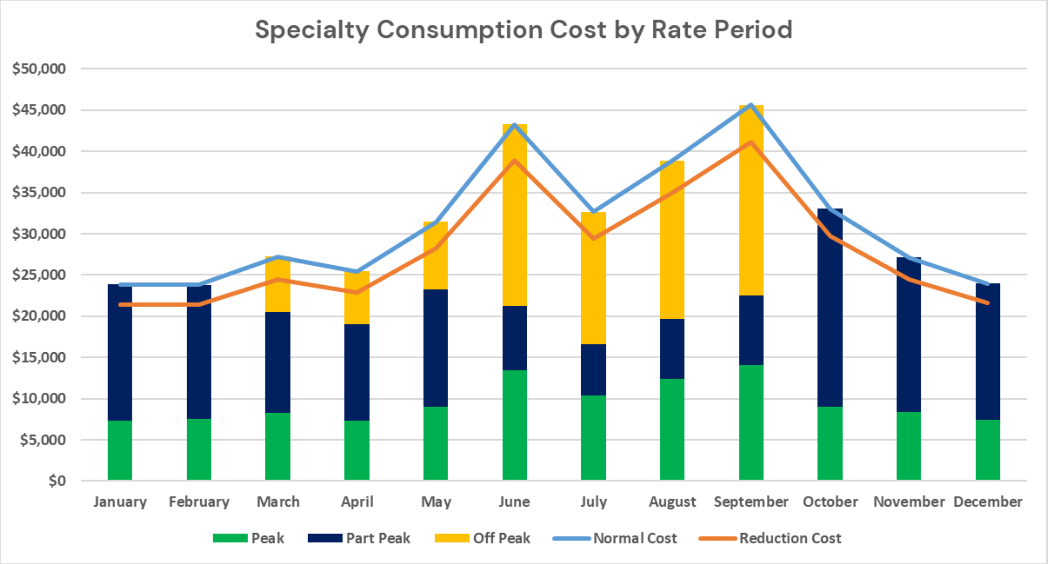
| | Annual Electricity Costs | Annual Costs Savings Example | $CO_2$ Emissions Avoided (metric tons)* | $CO_2$ Equivalent (homes electricity use for one year)* |
|---|---|---|---|---|
| Office | $ 626,285 | $ 62,629 | 118 | 25 |
| Specialty | $ 376,253 | $ 37,625 | 53 | 11 |
| Hospitality | $ 345,385 | $ 34,539 | 48 | 10 |
| Retail | $ 228,773 | $ 22,877 | 32 | 7 |

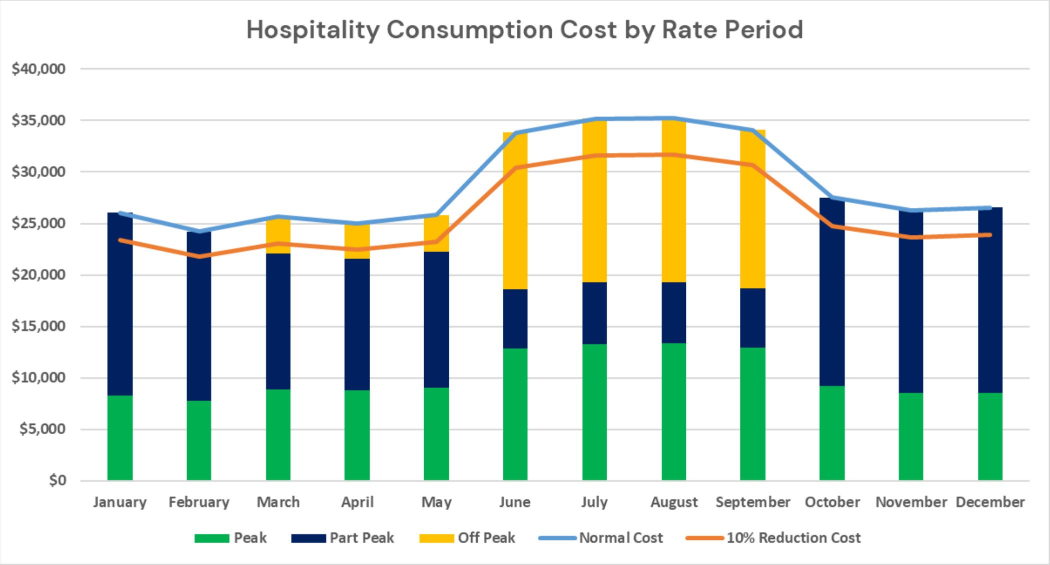
** https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*

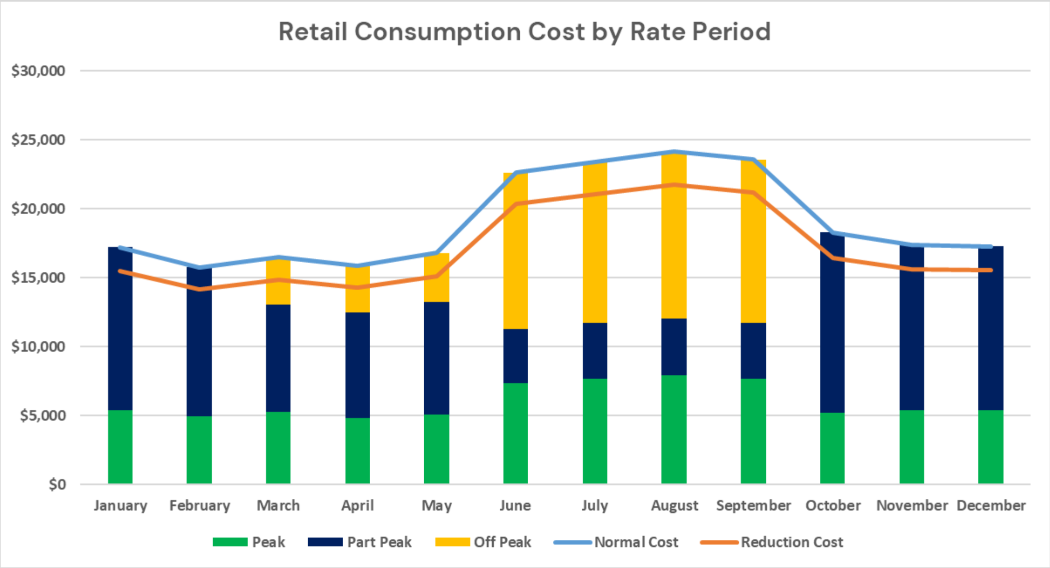
ICF

# Monthly consumption and cost by rate period



# What's next: Program execution

Together with SV Clean Energy, we're designing a demand flexibility program specifically for commercial customers

**Deploy, analyze, and forecast**

- Install controls gateways, map data, analyze, and identify load flexibility

**Virtual building tune-up**

- Recommend low/ no-cost energy conservation measures to improve efficiency

**Automate load optimizatio n**

- Optimize energy and demand in response to grid signals by time of use or continuously

**Support settlement and reporting**

- Provide data and performance reporting to support settlement and M&V

# Get in touch with us:

## Quinn Cherf

Load Management Programs
Quinn.Cherf@icf.com

### About ICF

About ICF ICF (NASDAQ:ICFI) is a global consulting and technology services company with approximately 9,000 employees, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future.

EPRI

ELECTRIFICATION & SUSTAINABLE ENERGY STRATEGY

# Demand Flexibility in Industrial Facilities

## Opportunities via Demonstration Projects

Ammi Amarnath
Principal Technical Executive

SVCE’s Watts for Lunch Event
October 15, 2025

# Agenda

- About EPRI
- Demand Flexibility (DF) in California
- Few EPRI Projects
  - Industrial Refrigerated Warehouse in Mira Loma (Lineage)
  - Industrial Refrigerated Warehouse in South Gate (KPAC General)
  - DC Flex (EPRI Initiative)
- The IAW FlexHub
- Questions?

# About EPRI (aka Electric Power Research Institute)...

## Independent
Objective, scientifically based results address reliability, efficiency, affordability, health, safety and the environment

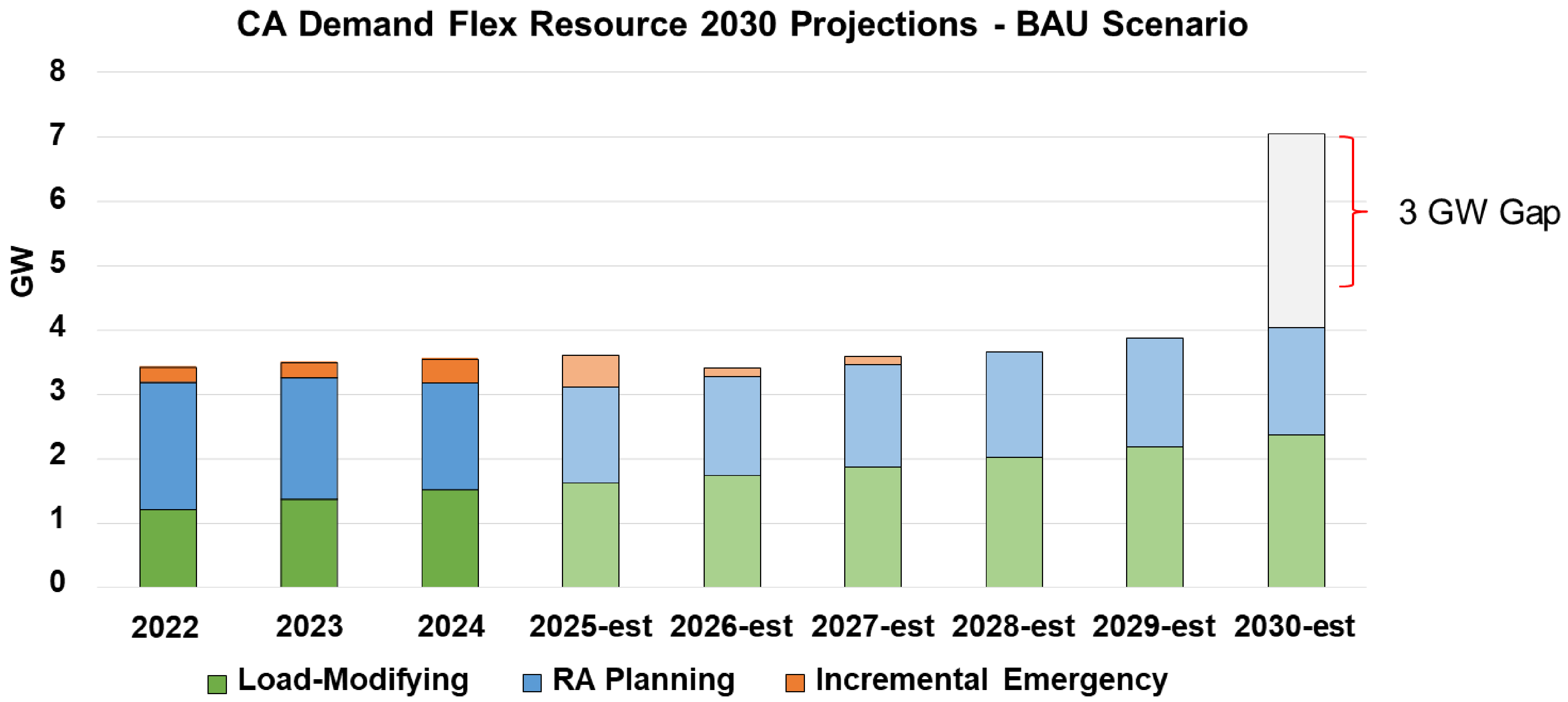
## Nonprofit
Chartered to serve the public benefit

## Collaborative
Bring together scientists, engineers, academic researchers, industry experts


- Completed 53 years on April 5, 2025!
- 450+ participants in more than 30 countries
- EPRI members generate approximately 90% of the electricity in the United States
- International funding of nearly 25% of EPRI's research, development and demonstrations

**www.epri.com**

# California's Demand Flexibility (DF) Projections

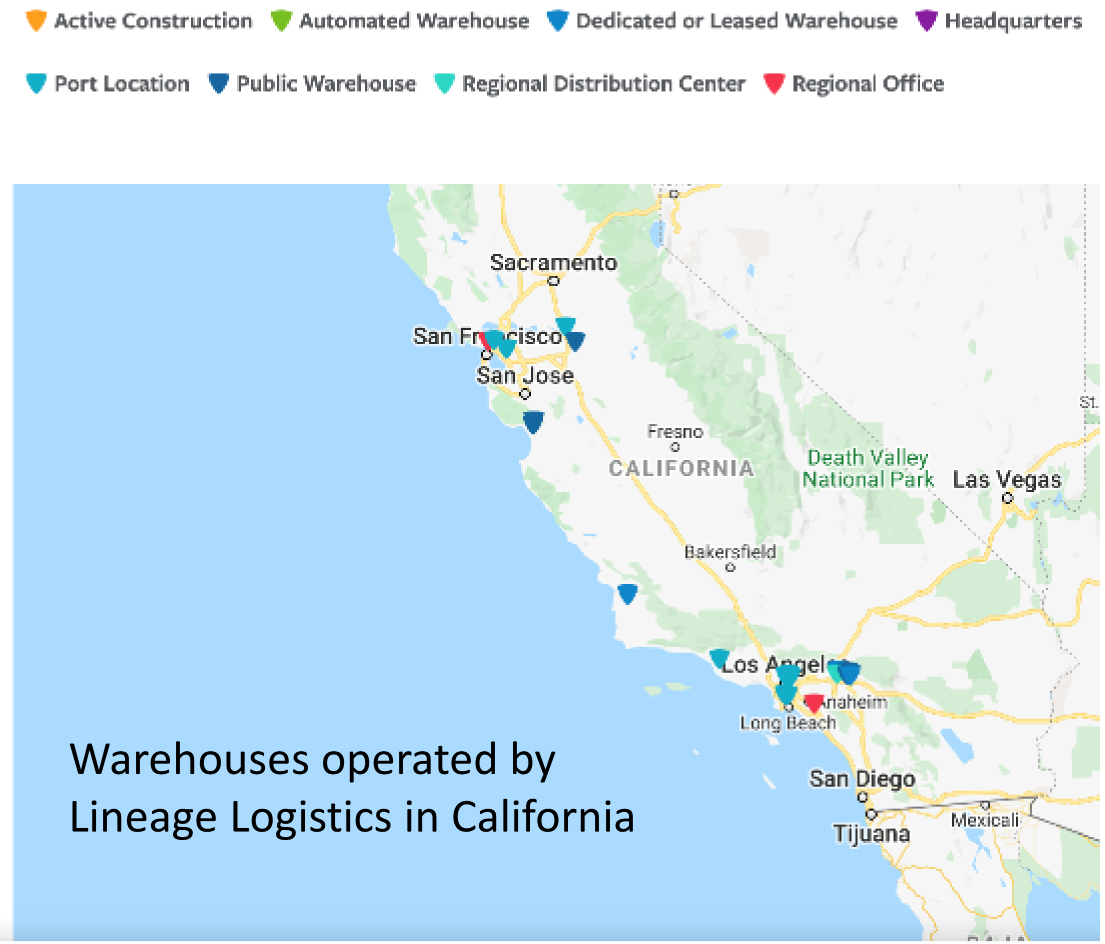



Source: California Energy Commission

**Industrial Customers can Support California's DF Programs**

# Opportunities in Refrigerated Warehouses

- 11 million $m^3$ of industrial refrigerated volume in 2019
- Currently ~112 warehouses in CA, with maximum demand 250 kW to 4MW
- This is a refrigeration load of about 23,100 tons of refrigeration (TR)
- A total electric power consumption of about 46 MW




Warehouses operated by Lineage Logistics in California

**Good Potential for Demand Flexibility**

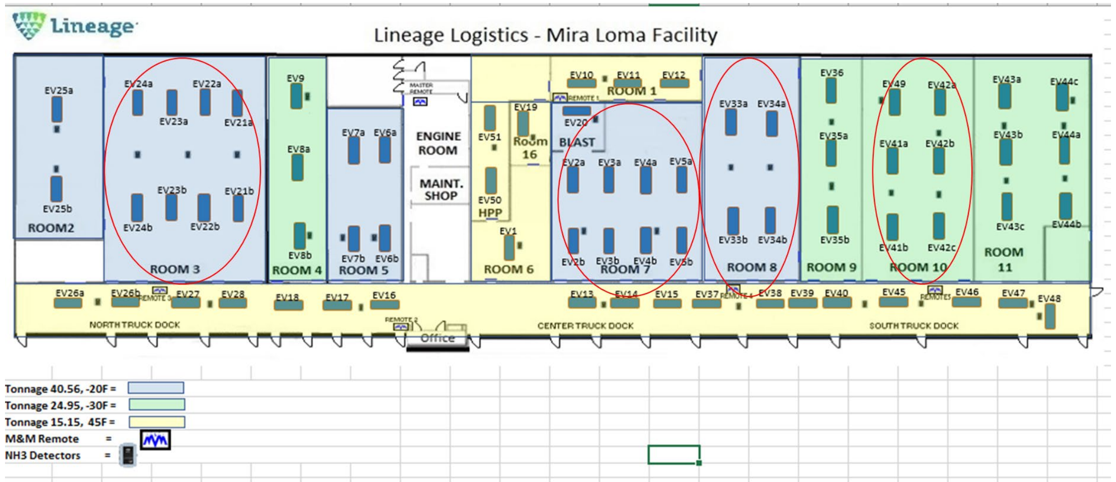
# DF in Industrial Refrigeration – CEC Funded Project

## Primary Goal

- Achieve 20% Demand adjustment in both directions – up and down

## Our approach

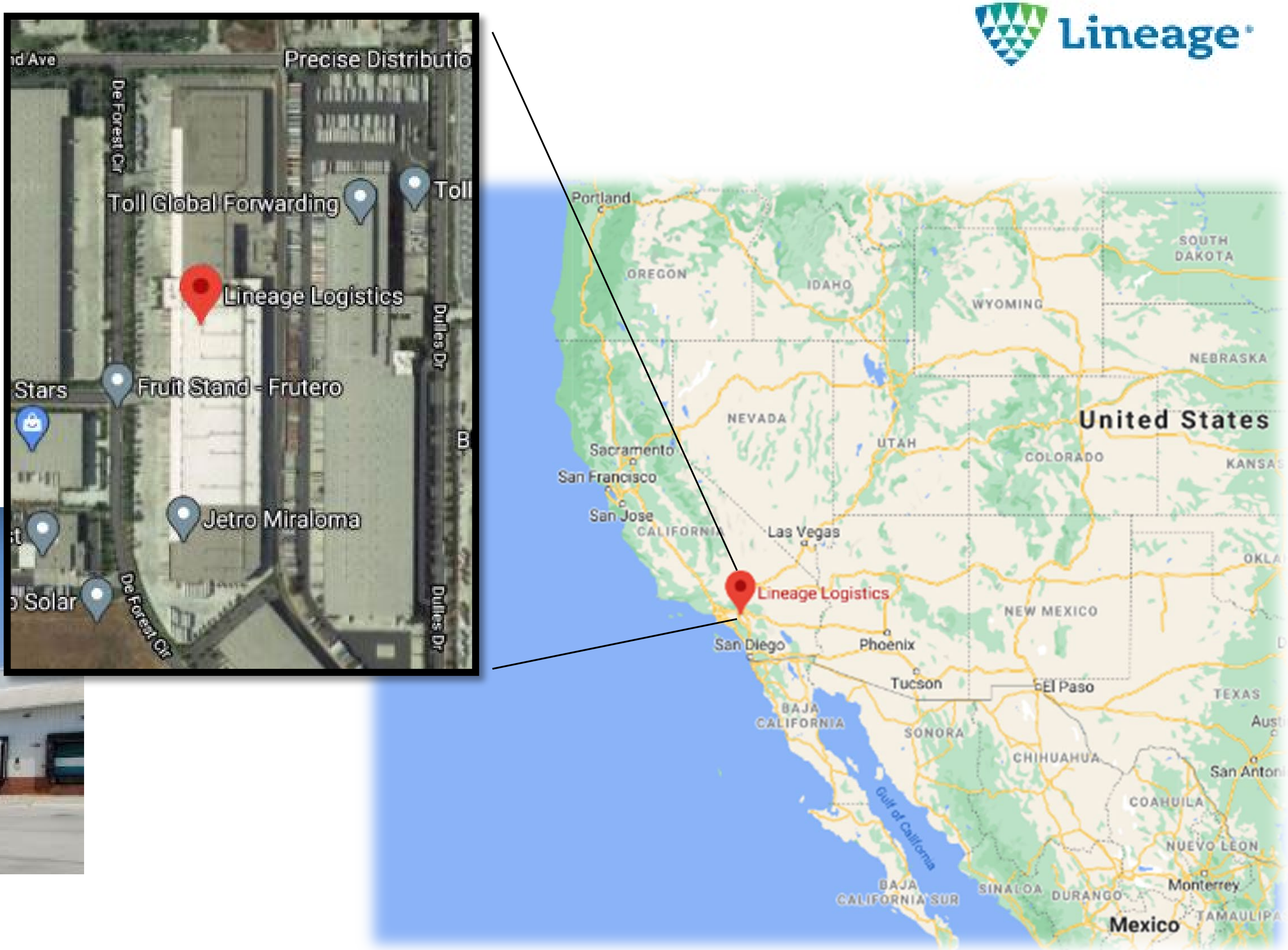
- Use frozen rooms as thermal batteries
- Control compressors that serve the frozen rooms
- Use OpenADR 2.0b to send DR signals and receive feedback
- Power up events – reduce temperature setpoint & adjust number of rooms to control magnitude of response
- Power down events – pre-cool frozen rooms prior to event, return temperature setpoint to original value at event



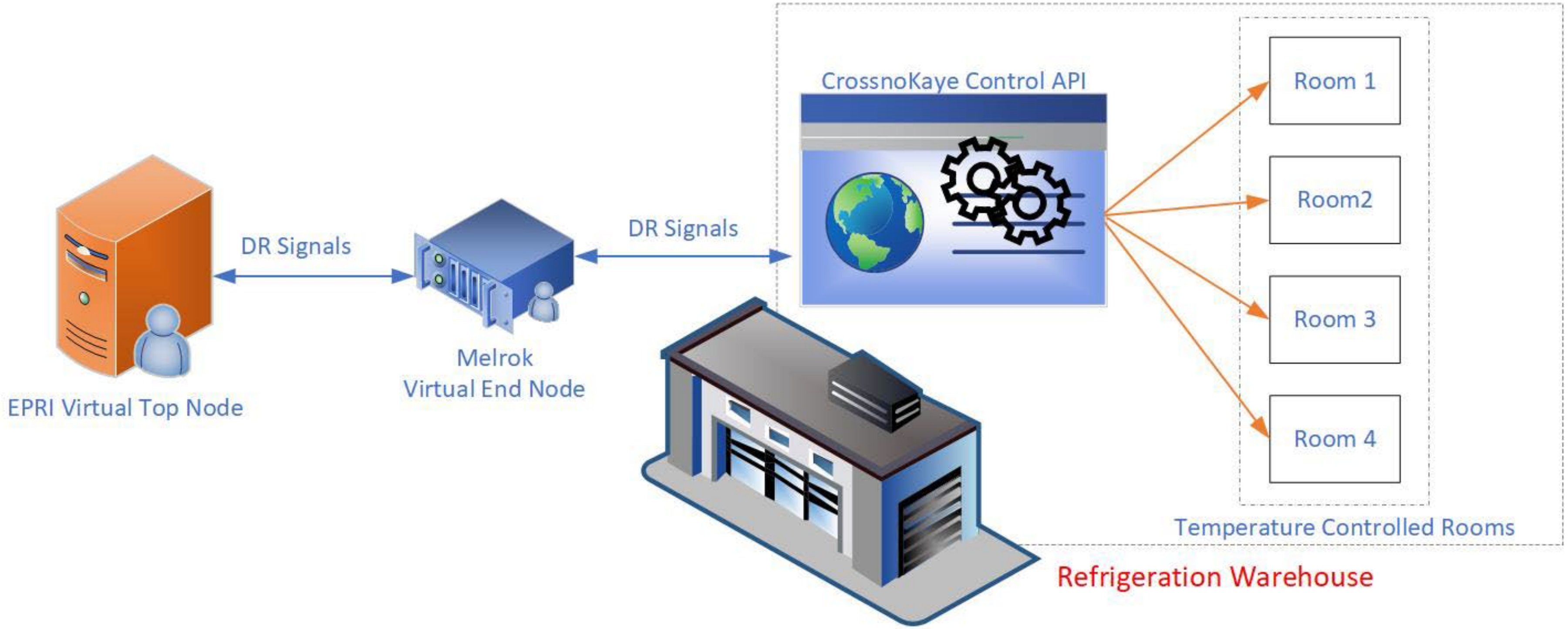

Ref: Project EPC-16-026

# Demonstration Site – Lineage in Mira Loma

- Regional Distribution Site: Mira Loma, CA
  - 700,000 sq.ft. 24/7 facility
  - **$1M+** annual energy cost
  - **Cold Storage,** High Pressure Processing, Cross-Docking, Internet Fulfillment, Co-pack, Repack & Packaging, other distribution services, etc.
  - **~4MW** maximum demand

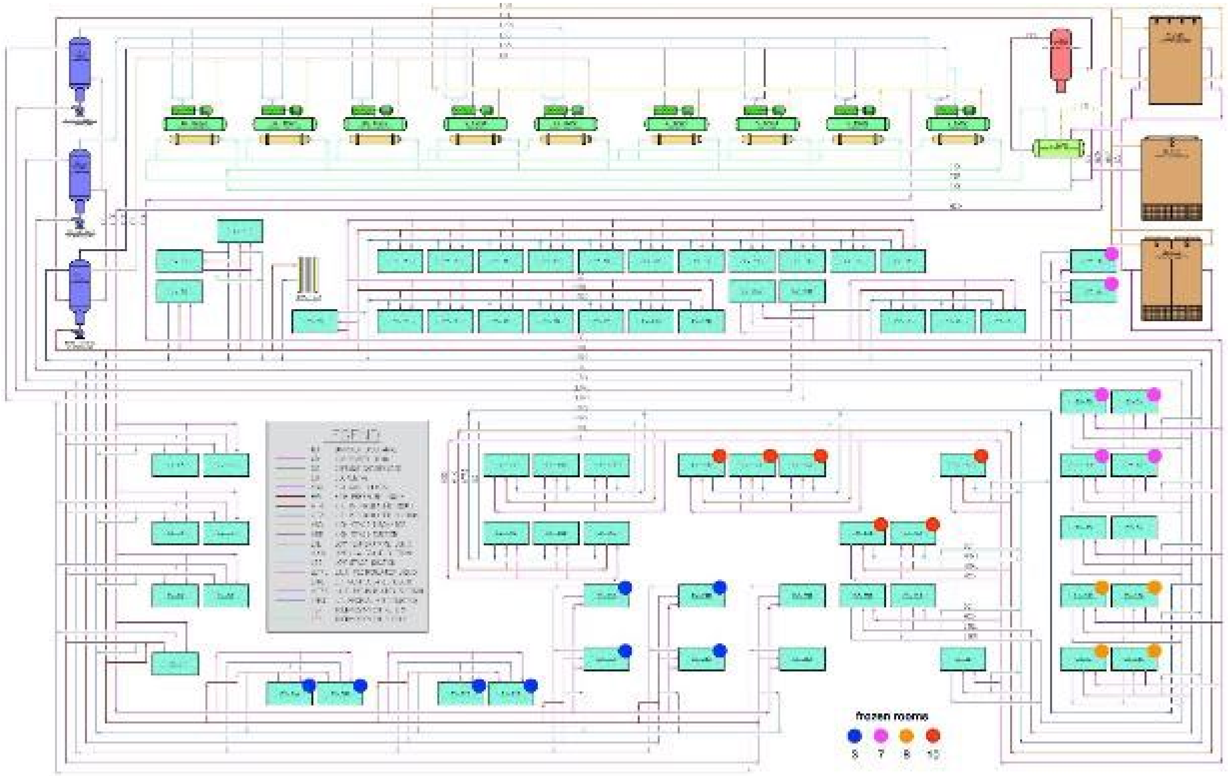


# Demand Flexibility Control Schema




- We used OpenADR 2.0b signals from our test Virtual Top Node (VTN) to a Virtual End Node (VEN) in the Cloud
- VEN was integrated with the facility controls platform via an API
- Our solution required a custom integration with legacy scheduling and controls system
- It is representative of most refrigerated warehouses in California and nationwide

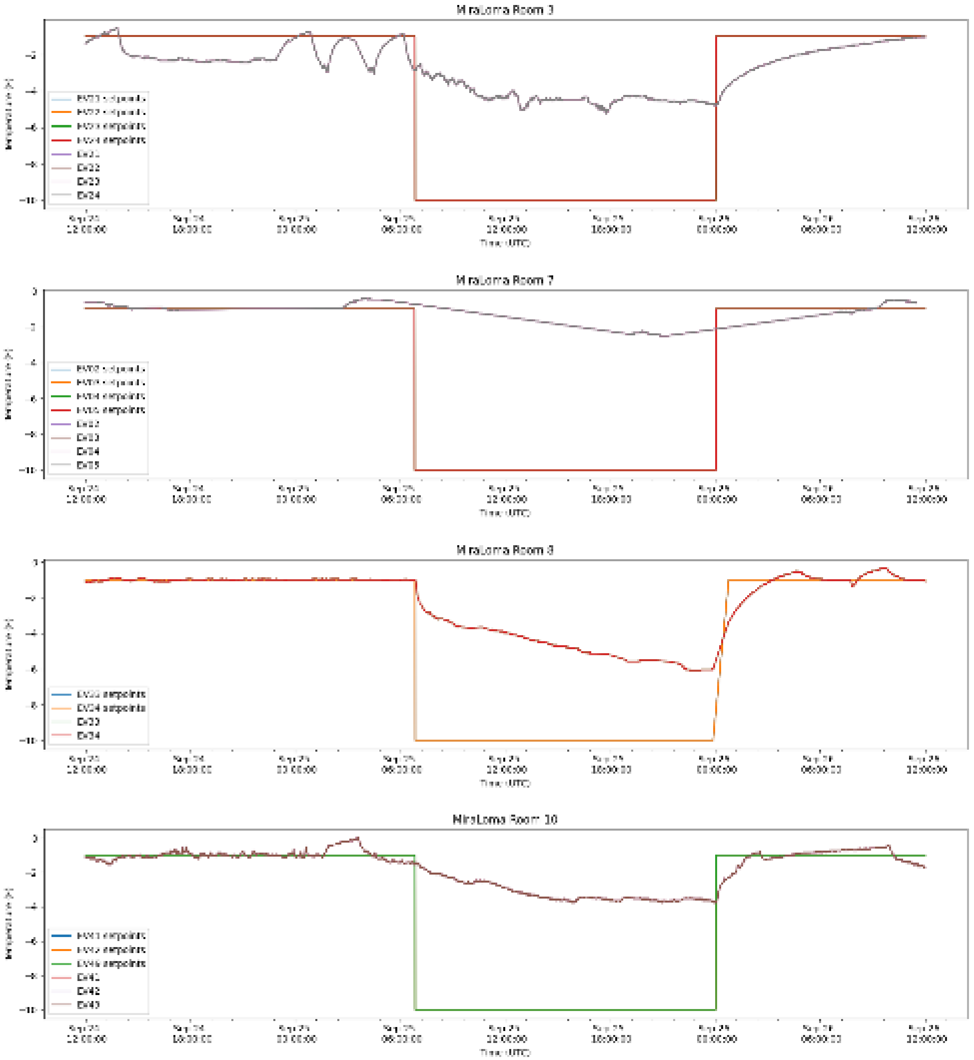
# Observation: Compressor Loops are Highly Interlinked

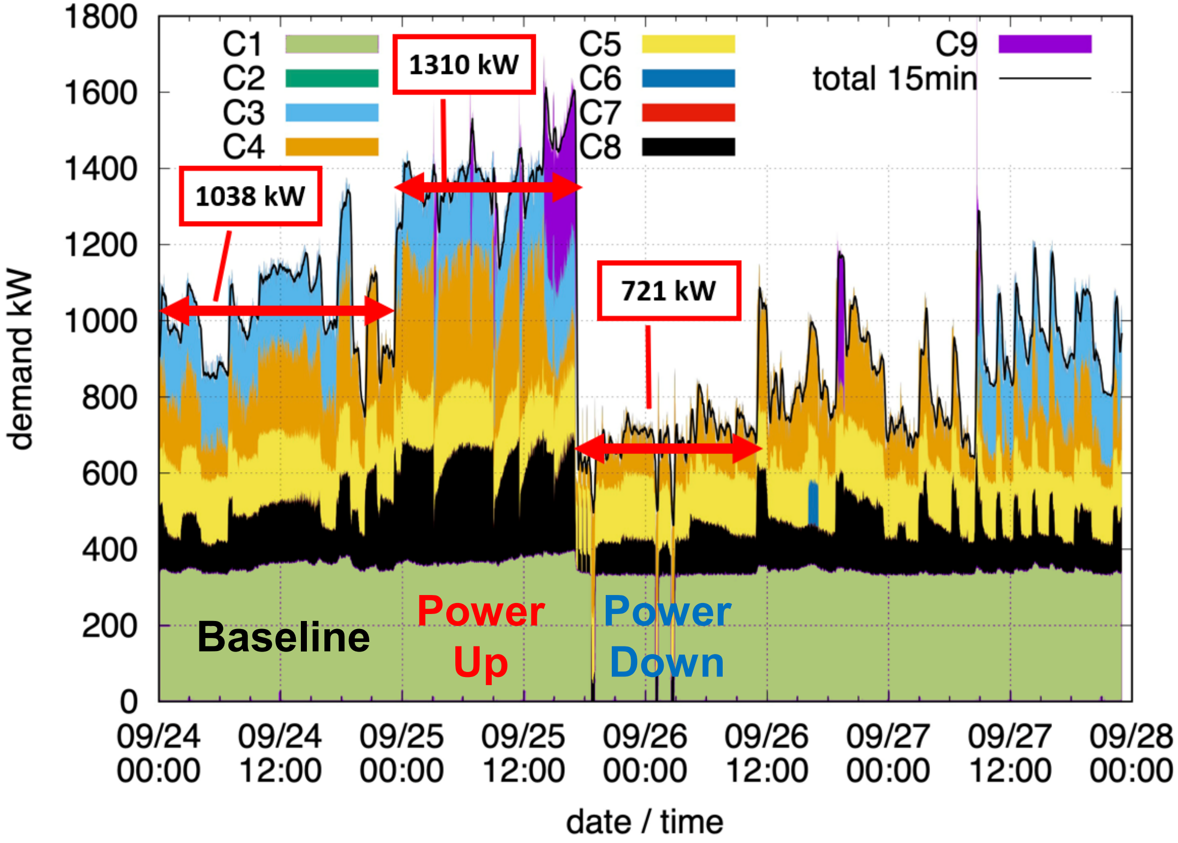




**Control is NOT straightforward**

# The Results of our Improved Control Scheme




**Baseline: 1038 kW**

Up: +272 kW (+26.2%)

Down: -317 kW (-30.5%)

# What we have Learned from this Demonstration

- OpenADR is a reliable tool for sending Flexible DR signals and monitoring response
- Sustained response of ±30% is achievable
- The thermal and mechanical interactions must be thoroughly understood to obtain response that matches request
- Non-compressor loads (floor heaters, forklift chargers) are large and can also participate in Demand Flexibility
- Demand Flexibility solutions should be evaluated individually

Ref: Report CEC-500-2023-060

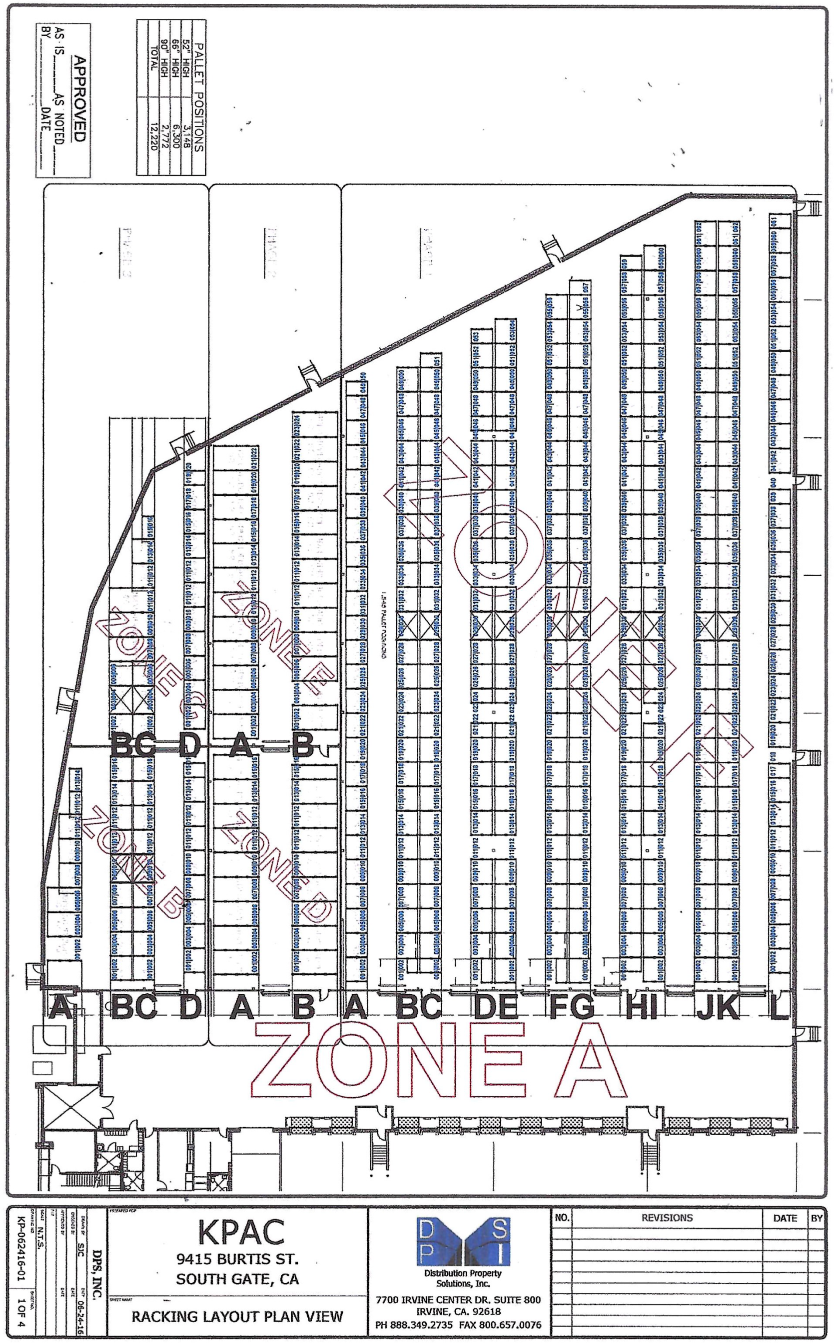
**Understanding Plant Operations is Important**



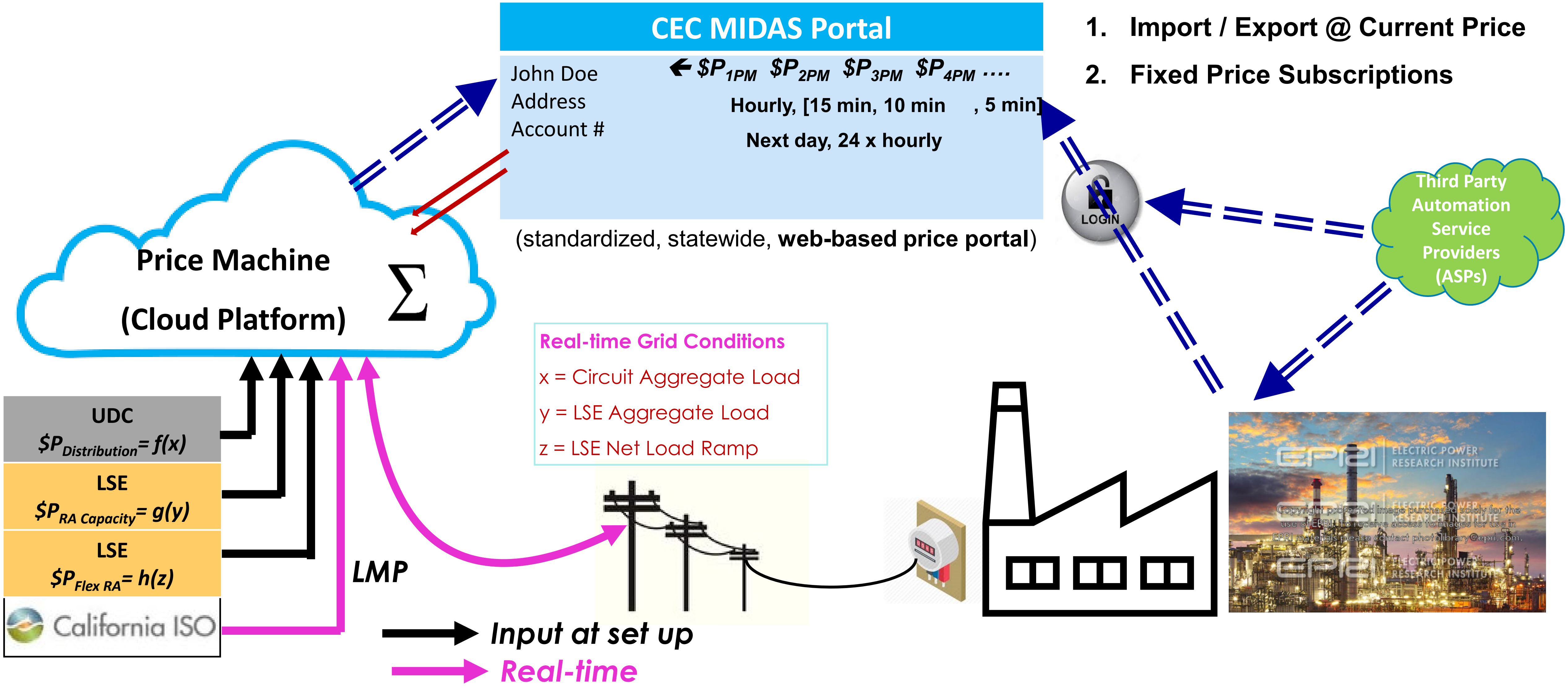
EPRI

# Current DF Demonstration Project

- Konoike-General, Inc. (or KPAC General)
- Located in South Gate, CA

# Expand DF Opportunity via Dynamic Pricing



# Demand Flexibility in Data Centers

| | |
|---|---|
| Backup generators | • Limited by local emissions regulations in some jurisdictions |
| UPS | • Li-ion UPS can provide grid services (frequency response)<br>• Voltage ride-through and ramp rate control |
| Load flexibility | • Some processes can be scheduled for off-peak hours (backups, updates, etc.)<br>• Dynamic load transfer to another data center |
| Opportunity in AI? | • How much flexibility offered by AI model training? |

*Microsoft's Dublin DC uses Li-ion batteries to support growth of renewables on the grid*

*Texas crypto miner Riot Platforms made $32M from DR participation in August 2023*

*(~3.5x the bitcoin mined)*


**Objective:** Demonstrate how data centers can support and stabilize the grid while improving interconnection and efficiency.

## WS1: Flexible Data Center Designs

Enabling future data centers to become grid resources through flexible & efficient designs and operational practices

## WS2: Transformational Utility Programs

Explore market & program structures that advance data center flexibility

## WS3: Grid Planning for Operational Flexibility

Equip the utility industry planning practices to embrace large flexible loads

## WS4: Data Center Informed Energy Supply

Inform energy supply portfolio needs and readiness



EPRI

# The IAW FlexHub

# Core Activities (1 of 2)

FUNDING AGENCY

STATE OF CALIFORNIA ENERGY COMMISSION

GRANT RECIPIENT

MOMENTUM

BUILDMOMENTUM.IO

| TASK | TASK LEADS |
|---|---|
| 3 IAW Market Assessment | BERKELEY LAB |
| 4 Community Framework | PSE Bringing science to energy policy |
| 5 Measurement & Verification | DNV |
| 8 Technology/Knowledge Transfer | MOMENTUM; EPRI; BERKELEY LAB; UC DAVIS UNIVERSITY OF CALIFORNIA |



EPRI

# Core Activities (2 of 2)

## TASK 6 Demonstration Projects

- Demonstrate and deploy signal responsive demand flexibility technologies in at least **5 IAW subsectors** across **10 demonstration sites**
- Demonstrate at least **5% reduction in annual energy costs** from DF and **5 year or shorter payback period** for each site
- Demonstrate pre-commercial technologies with **TRL 5-9** and advance at least 1 level

# Thank You!

Ammi Amarnath
aamarnath@epri.com
(650) 575-2819

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