CalFlexHub: Flattening the Renewable Duck with Flexible Load

CalFlexHub Symposium
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#CALFLEXHUB23

Energy Technologies Area
BERKELEY LAB

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Welcome to Berkeley Lab

- > $1 Billion+ annual budget
- 1700+ scientists, researchers, joint faculty
- 16 Nobel Laureates, 16 Medals of Science, 16 new elements

Overview

BERKELEY LAB
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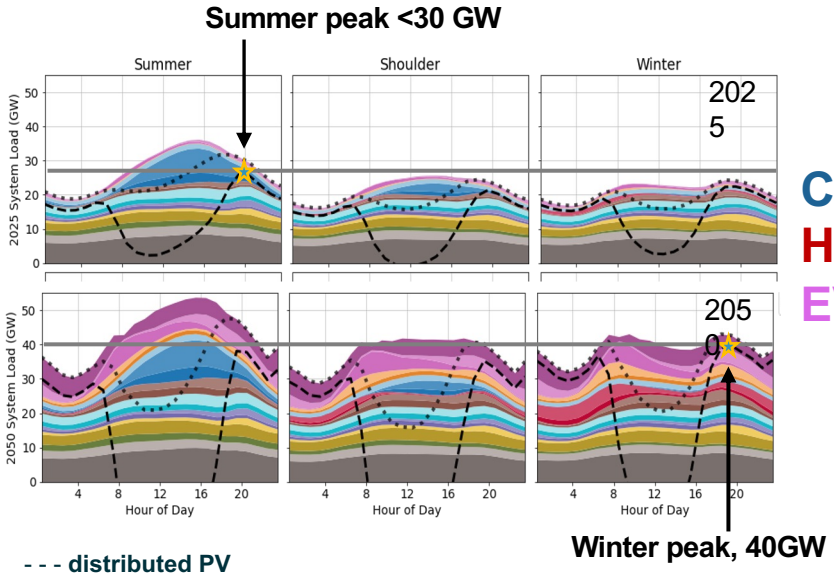
Challenges and Opportunities in Renewable Energy and Electrification

Challenges with Duck Curves



Cooling
Heating
EVs

- - - distributed PV
--- system net, after removing distributed PV, utility wind, solar

CalFlexHub will Accelerate Affordable Progress to 7 GW Load Shift Goals

Table ES-1: Proposed Statewide Load-Shift Goal

2022 Load Shift Estimate	2030 Load-Shift Goal	2030 Goal (Incremental)
3,100–3,600 MW	7,000 MW	3,400–3,900 MW

Megawatts shown are measured at the customer meter.
Source: CEC staff

Majority of > 3 GW today is manual DR

Majority of new GW expected from automated price responsive load

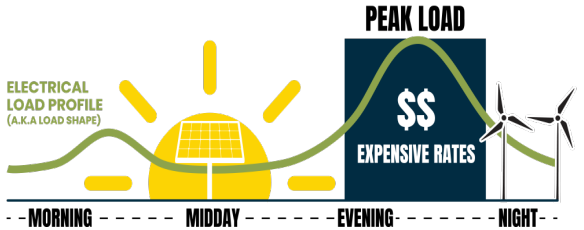
California Load Flexibility Research and Deployment Hub

Develop and demonstrate pre-commercial, load-flexible, **price-responsive technologies**

Evaluate use of standardized communication of **electricity price** and **GHG signals** and use of **MIDAS**

Evaluate **control** methods, **business** models and **value** to grid and customers

Collect user feedback and to improve **usability**, evaluate and ensure **equity**



5000 ton chiller plant, 2 M gallon TES

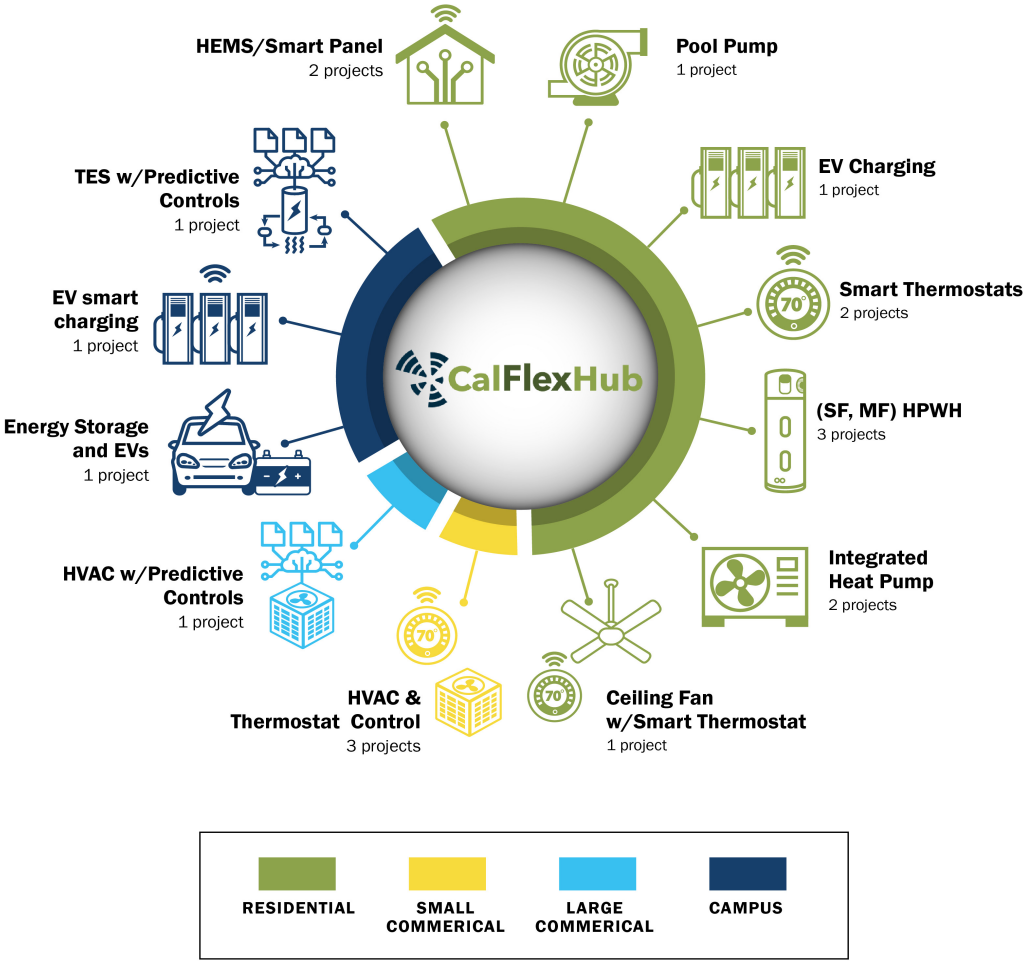
4 MW solar farm

CalFlexHub Projects

12 Technologies/Systems

19 Individual Projects

> 30 Building/Site Locations



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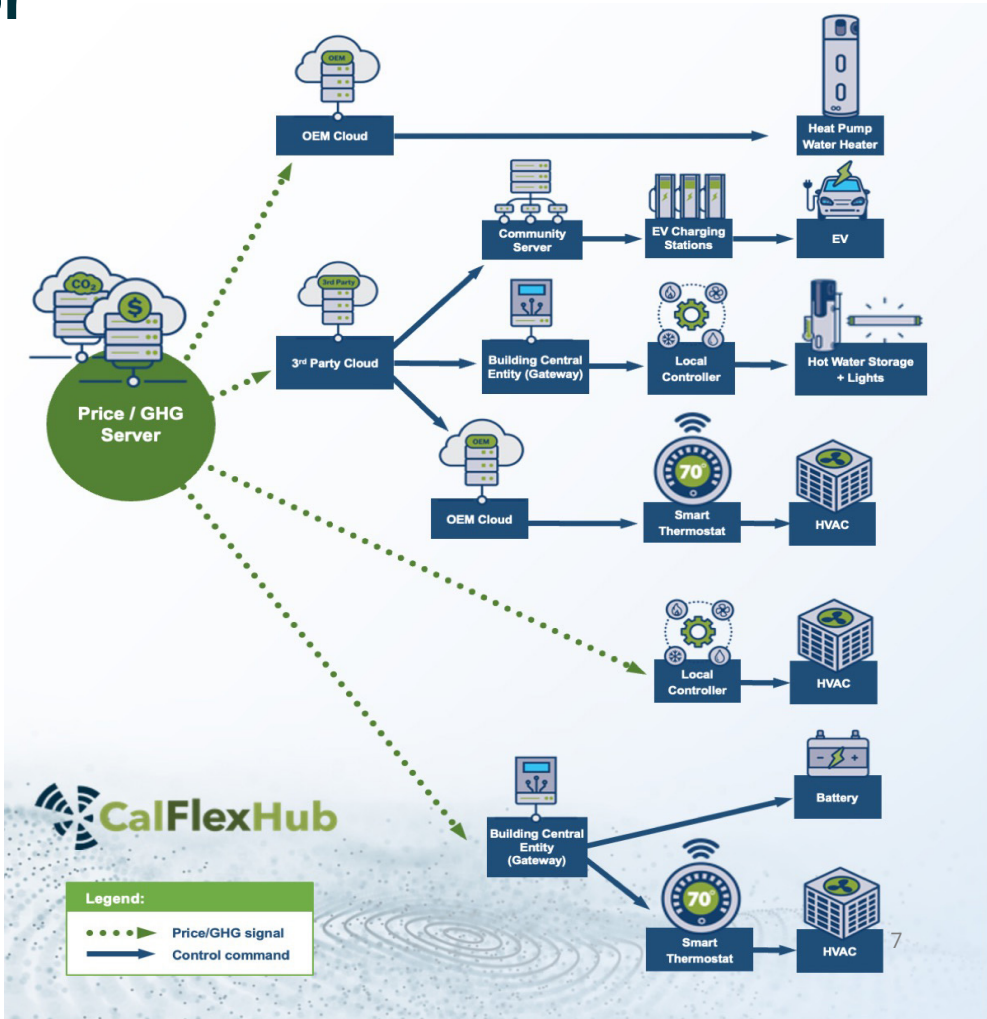
R&D to Evaluate Pathways for Price and GHG Signals

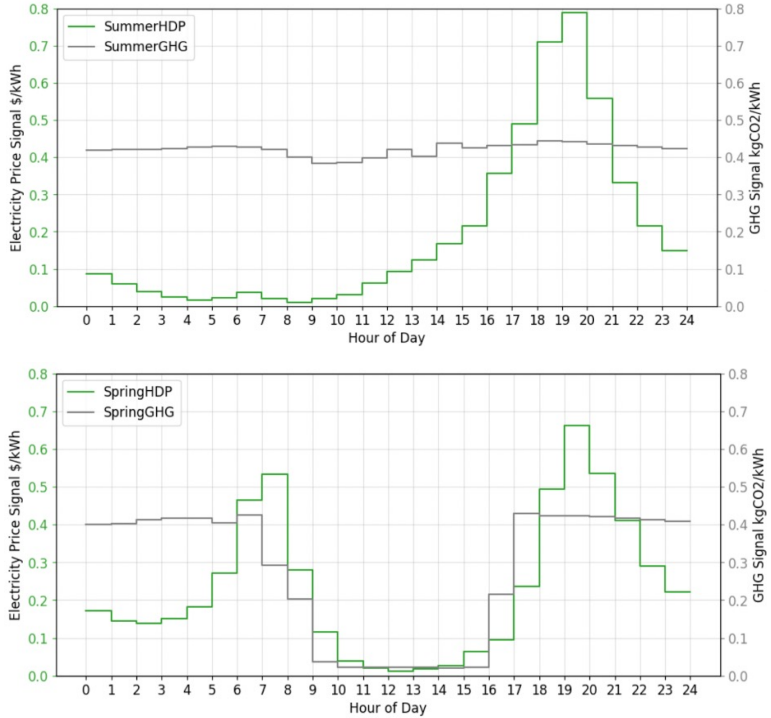
- How can devices and systems **receive** signals?
- What are pros and cons of **communication architectures**?
- Where is **control logic**, in cloud or local?
- What are **business** models and role of **utility, OEM vs 3rd Party**?



Lessons and Question

- **Technology Readiness** - Few flex technologies are ready to receive price signals and awareness of the concept limited but growing.
- **Usability and Customer Value** – Incentives from dynamic pricing may be insufficient to motivate adoption, while complexity and energy costs are other risk factors.
- **Get most value out of DERs** - Can automated retail price response co-exist and value stack with event-based DR? How to value shift?
- **Automation, Integration and AI –** Excitement around automation, integration and AI, but lack of interoperability limits innovation and customers are not sure who to trust.
- **APIs** - Some device APIs provide more access for 3rd parties for optimization, other OEMs in control of customer's experience. Approaches have pros and cons.

CalFlexHub Affiliate Pilot



Purpose: growing an ecosystem, support flexible load control technology development

What we offer: prototype dynamic price and GHG signals for participants to test on their own; support on signal integration

No endorsement or financial reward; voluntary sharing of outcome; no risk

Why participate?

- Align with CA state's vision
- Gain experience with dynamic pricing control
- Help improve functionality of MIDAS
- Get visibility
- Benefit from peer learning

Thank For Joining Us Today