



Technology Early Deployment

# Community Energy Labs

## AI Powered Clean Building Energy Management System for Small to Mid-Sized Commercial Buildings



Community Energy Labs (CEL) is building an IoT & Software as a Service control platform for building operators to meet new building energy goals. Wireless sensors, equipment controllers and user-friendly software are powered by machine learning to autonomously predict and efficiently control building loads to assist with renewable integration and reduce energy consumption and peak demand.

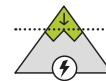
### TECHNOLOGY BENEFITS



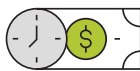
**10-20%**  
ENERGY SAVINGS



**5-25%**  
COST SAVINGS



**20-40%**  
PEAK DEMAND REDUCTION



**10-50%**  
DEMAND CHARGE REDUCTION



**5-50%**  
INCREASE  
in solar self-consumption.



**\$5-15K**  
AVERAGE  
low installation cost.

**Disclaimer:** Community Energy Labs' Clean Building Energy Management System was chosen for TED because it supports **California's clean energy goals** of increased energy efficiency, reduced GHG emissions, and peak demand reduction. This document does not constitute or imply endorsement, recommendation, or favoring by EPRI or SCE of the product or company described herein. This publication is funded and administered by Southern California Edison's Emerging Technologies Program.

#### TED SPONSORSHIP:

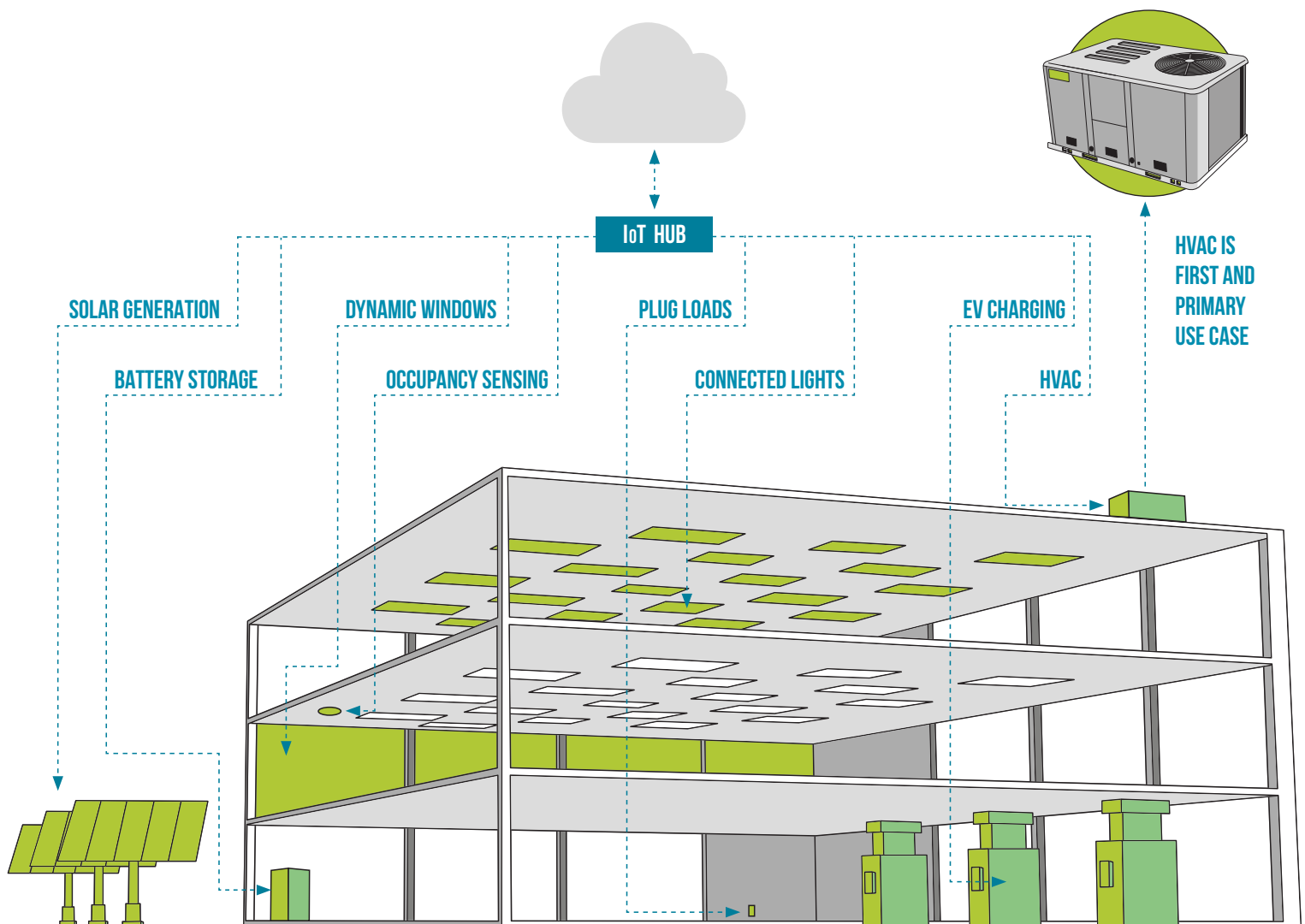
Electric Power Research Institute | Southern California Edison

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# Community Energy Lab's Clean Building Energy Management System (BEMS)

CEL leverages its DOE funded Easy Does It™ technology to reduce the time, cost, and expertise necessary to set up and calibrate the building model at the core of their prediction and control functions. CEL enables users in the field to gather inputs through simplified software user interfaces and automation workflows called 'wizards'. These can quickly and accurately gather required model parameter data from human inputs, reducing the time, expertise, and input variability necessary to set up the model for predictive controls. This requires less training data from sensors, controllers and devices to quickly and accurately converge on optimal control solutions without violating occupant preferences such as comfort or air quality. Once installed, a building owner selects operating preferences and goals, like reducing greenhouse gas and saving money.



## TARGET CUSTOMERS

- ✓ Small to mid-sized commercial building owners.
- ✓ Municipal, University and School (MUSH) buildings.
- ✓ New construction or retrofit buildings.
- ✓ Electric utilities that offer energy efficiency, demand response programs, and real-time or time-varying prices.

## HARDWARE COMPATIBILITY

CEL's gateway speaks to hardware and applications through proprietary APIs and open-source building data exchange protocols such as wired protocols (BACnet, Modbus) and wireless radio frequency (Zigbee, Zwave, Bluetooth and Bluetooth Low Energy). CEL uses BRICK schema for building metadata and communicates through MQTT natively although the system can respond to requests using the following protocols: IEEE 2030.5, OpenADR, Sunspec, and CTA 2045.

## SYSTEM FEATURES



LOW INSTALLATION COST



LOW SERVICE COST



USER FRIENDLY SOFTWARE DESIGN

## California's decarbonization challenge

California's executive order B-55-18 mandates that the state achieve carbon neutrality by 2045. Additional legislation supports this goal through multiple strategies that include double energy savings by 2030 (SB 350), increased demand flexibility (19-OIR-01), advanced energy storage and 100 percent of all retail electricity from renewable energy (SB 100). Applying these strategies to new construction and upgrades to existing buildings provides a path to achieving carbon neutrality but also comes with a new set of challenges:

**1.**

### **New technologies for buildings**

must support desired outcomes for CA.

**2.**

### **Testing, compliance & standards**

including utility participation and enabled workforce.

**3.**

### **Establishing trust**

that replacement of old systems will meet/exceed performance expectations.

## COMMUNITY ENERGY LABS SUPPORTS CALIFORNIA'S DECARBONIZATION GOALS



**10-20% SAVINGS**  
in energy use.



**UP TO 40%**  
peak demand reduction.



**5-50% INCREASE**  
in solar self-consumption.



## Challenges to adoption of BEMS in commercial buildings

As with many disruptive technologies deployed into fragmented markets, Grid-Interactive Efficient Building (GEB) technology faces both challenges and opportunities

### BARRIERS STILL EXIST IN SEVERAL AREAS:

#### Barriers

##### CURRENT

- ✓ Lack of widely adopted open standards and interoperability behind the meter.
- ✓ Utility specific use cases.
- ✓ Customer familiarity with technologies and value propositions.

##### FUTURE

- ✓ Poor data quality.
- ✓ Workforce training.
- ✓ Customer adoption.
- ✓ Development of distribution and service relationships.

### CREATING A PATH TO COMMERCIALIZATION THROUGH THE FOLLOWING ACTIVITIES:

#### Opportunities

##### LEVERAGE POINTS

- ✓ Regional winner of CleanTech Open's 2020 international accelerator and overall winner 2020 Madrona Venture Labs Go Vertical challenge.
- ✓ Developed by Portland Energy Conservation Inc. as a nimble social enterprise, resulting in nearly \$1.5M in intellectual property value, market research and project development.
- ✓ Secured \$10M in public/private investments and won the Smart Electric Power Alliance's Visionary of the Year award.
- ✓ Collaborating with EPRI through the Incubate Energy Labs Challenge 2021.
- ✓ Working with SCE and other California IOUs.
- ✓ Active projects with Silicon Valley Clean Energy, Tacoma Power, Energy Northwest and more than 30 municipal, university and school campuses.

## Market readiness



5

**TECHNOLOGY  
READINESS LEVEL  
SCORE**

- Additional scale up and application development needed.
- TRL expected to increase after utility field demonstrations, M&V and app development.



2-4

**YEARS  
TO MARKET**

- Scalable business model with low installation cost.



7

**MANUFACTURER  
READINESS  
LEVEL SCORE**

- Software product is compatible with hardware sources.
- Scalable and deployable when technology is ready.



3

**KEY  
OUTCOMES**

- Up to 20% building energy savings.
- Up to 40% peak demand reduction.
- 5-50% increase in solar self-consumption.

## Supporting utility goals for decarbonization

1.

### Energy Savings

Reduces energy consumption by up to 20%.

2.

### Decarbonization

Promotes renewable consumption (5-50% Increase in Solar Self-Consumption).

3.

### C&S Alignment

Supports California Title 24 building energy efficiency standards.

4.

### Demand flexibility

Up to 40% peak demand reduction.

#### ACTIVE PILOTS

### **Silicon Valley Clean Energy + Tacoma Power + Energy Northwest - K12 electrification, decarb & grid integration**

These WA and CA projects will look at integrating building energy management smart controls within a broader suite of fleet, building electrification and resilience technologies. These projects are funded by SVCE, the Washington Department of Commerce and the utilities. The intent from the utilities is to create a statewide roadmap for smart fleet and building electrification and connectivity with the grid. Many of these districts are also participating in the DOE SBIR project. Learn more [here](#).

### **DOE SBIR - making advanced control, modeling and data collection more accessible to lean organizations**

This project is advancing a methodology to collect building modeling data in way that lowers the cost of advanced real time controls for lean organizations - especially schools. There are currently 10 districts participating throughout the West Coast. CEL was one of only 3 companies nationwide called out by the Department of Energy specifically in their press release. Learn more [here](#).

### **CalTestBed & Lawrence Berkeley National Lab**

This project is working with up to 7 California K12 field test sites to run a demand charge reduction algorithm in collaboration with LBNL. Through a CalTestBed voucher, University of California Berkeley Center for the Built Environment will measure and verify that the savings match projections (5-25% of energy; 20-40% savings on peak demand) in the pilot facilities through 2022. In 2023, CEL will begin testing and introducing algorithms that also attempt to reduce carbon emissions in response to a real time carbon price and cost based on grid signals and dynamic pricing. Learn more [here](#).



# Community Energy Labs Utility Opportunity Assessment



## TECHNOLOGY CATEGORY

**Whole Buildings Energy Management Systems (BEMS)**

**Whole Buildings (non-residential)**



## ETP PRIORITIES

### DEMAND FLEXIBILITY

Up to 40% peak demand reduction.

### ENERGY SAVINGS

Reduces consumption by up to 20%.

### DECARBONIZATION

Promotes 5-50% more solar self-consumption.

Future iterations will respond to real time Marginal Operating Emissions Rates (MOERs) for carbon.

### C&S ALIGNMENT

Supports California Title 24 Building Energy Efficiency Standards.



## KNOWLEDGE INDEXES

### TECHNICAL PERFORMANCE

High

### MARKET KNOWLEDGE

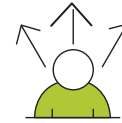
High

### PROGRAM INTERVENTION

Medium

### UTILITY VALUE

Streamlines Commercial BMS for energy efficiency, renewable energy integration and peak demand reduction, serving as a Grid-Innovation Technology.



## OPPORTUNITIES

### COMPANY GOALS

- Technology/ software enhancements.
- Partnerships and pilots.
- Distribution and sales growth.
- Brand loyalty.

### LEVERAGE POINTS

- CEC, DOE funding.
- VentureLab Incubator.
- Cleantech San Diego.
- EPRI collaboration.
- Electrification & residential DR.
- Patent pending technology.
- Utility validation in progress.
- SCE DAC pilot and utility rebate programs.
- CPUC Go 156 certified Woman Business Enterprise (WBE)



## BARRIERS

### GAPS TO FILL

- Advanced scheduling function.
- DR, Load Aggregation, and Clean Energy Synchronization.

### IN PROGRESS

- Prototype in development.
- Software enhancements.
- Pilot demonstrations.

### FUTURE

- Scale production, distribution and partnerships.



## NEXT STEPS

### COMPANY

- Complete next prototype.
- Launch pilots.
- Scale production.

### UTILITY

- Demonstration projects to validate technology use case and saving potentials.
- Reliable commercial partners and customer adoption channels.
- Pathway into Utility Programs (Non-wires alternatives; DER; Energy Efficiency as a Service).
- Time-varying tariffs; automated DR.



TED is a process where innovative technologies are selected for assessment and review based on the technology application, team strength, and alignment with the Technology Priority Maps, to fulfill the California decarbonization challenge.

## FOR MORE INFORMATION

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