The Lead Locally Project

Sonoma Clean Power

Why Lead Locally?

- The Lead Locally team is to conduct a series of **applied research projects** and technology deployments, and create an **Advanced Energy Center** to increase and expedite energy savings and retrofits of residential and commercial buildings in Sonoma and Mendocino counties.
- The program provides assistance to overcome financial investment barriers through **On Bill Financing**.
- A fair and impartial selection process of the product type, manufacturer and brand, and contractor and installation is available through the use of the **Contractor Matching Tool**.
- Ability to see, touch and test new technologies onsite at the Advanced Energy Center such as the **Induction Cooktop Kitchen Demo** area
- Manufacturer and energy field expert **training, certification, and educational courses.**
- **Joint incentive programs** to help stimulate the market for innovative technologies.

Financial Structure

CEC EPIC Grant

- **$9.8M reimbursable funds from the CEC**
- **$3.3M SCP dedicated match funds**

Applied Research Funding

- **Phase 1- Pilot Home Research (Radiant Panels, PCM, minisplit heat pumps) Equipment & installation included.**
- **Phase 2- Technology Demonstration (Induction cooktops, heat pump water heaters, aerosol envelope sealing, nighttime ventilation cooling, exhaust heat recovery systems, and more. Equipment included, installation not included.**

Advanced Energy Center

- **Deployment & Marketing Stimulation. SCP (dedicated match amount) & Vendors will both provide discount and incentive plans. Installation will not be included.**
- **On Bill Financing funded by SCP.**

Roles and Responsibilities

Sonoma Clean Power- serves as the prime coordinator with the CEC, and will be responsible for identifying project sites, initial outreach to customers, and reporting progress to the CEC.

Frontier Energy Inc– management of the applied research activities, execution of laboratory and field testing, analysis of monitored data, program supports and optimal retrofit strategy development, building owner support, and stakeholder engagement.

DNV GL – provide independent Evaluation, Measurement, and Verification (EM&V) for the Project, specify required measurement points and accuracy levels for the instrumentation package, and evaluate performance relative to the metrics for success.

Deployment & Education Team– Sonoma County Energy & Sustainability Dept, RCPA, Design AVEnues, Planet Ecosystems.

Consultants assisting in the deployment of technologies in the Advanced Energy Center, training and development programs and other educational opportunities for transfer of technology knowledge.

Research Project Subcontractors– California Lighting Technology Center (CLTC), Energy Docs, Rick Chitwood, Chiltrix.

Manage the commercial daylighting project, select and evaluate daylighting technologies in both laboratory and field test settings, design and install the radiant panels, air-to-water heat pumps (AWHPs), and load reduction retrofits.

The Technical Advisory Committee Members

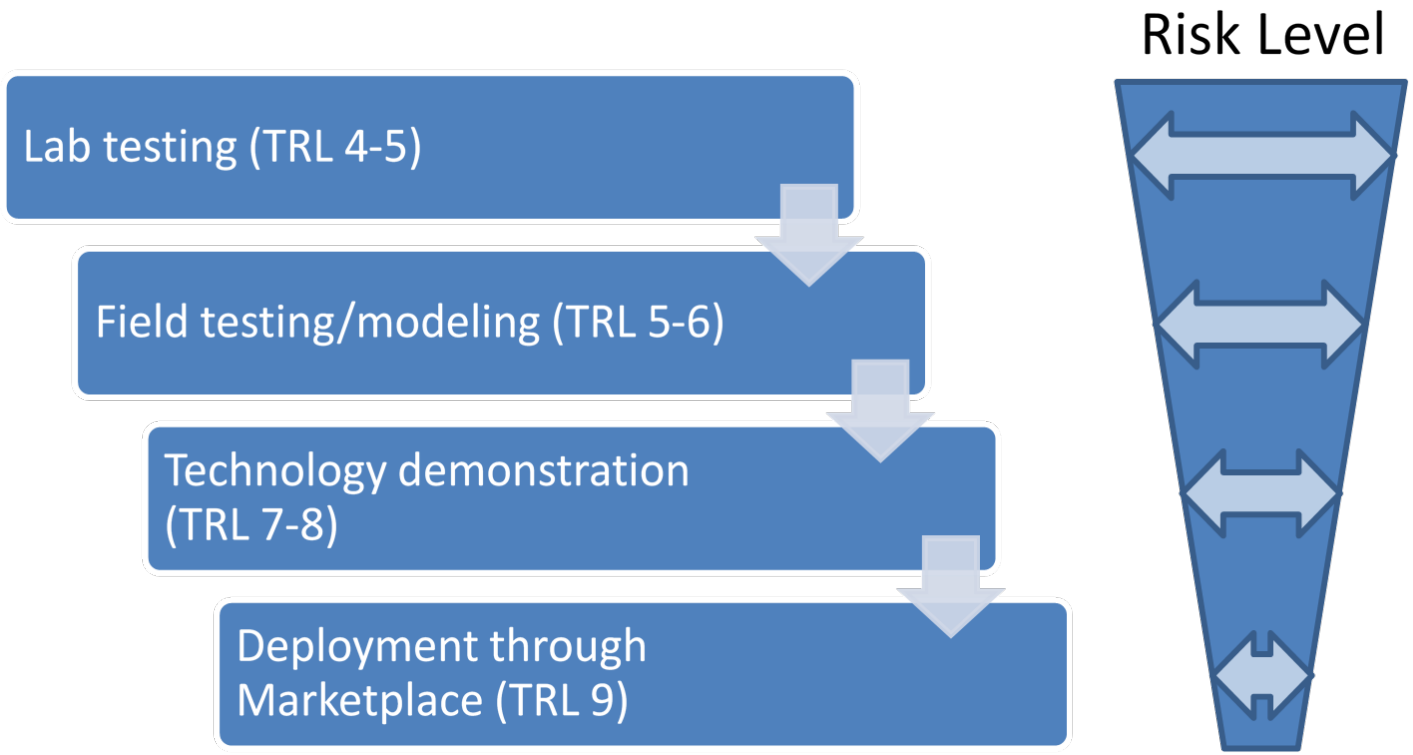
• Pierre Delforge	Natural Resources Defense Council
• Conrad Asper	PG&E
• Axum Teferra	Bay Area Quality Management
• Ram Narayanamurthy	Electric Power Research Institute
• Jennifer Berg	Metropolitan Transportation Commission
• Beckie Menten	Center for Sustainable Energy
• Jennifer West	Stopwaste
• Bruce Hodge	Carbon Free Palo Alto
• Geoff Wickes	Northwest Energy Efficiency Alliance
• Howard Merson	Vermont Energy Investment Corporation
• Garth Torvestad	Consol

• COMMISSION AGREEMENT MANAGER	DAVID HUNGERFORD
• PROJECT MANAGER	CHAD ASAY

Applied Research Project
&
Technology Demonstration

Sonoma Clean Power

Lead Locally Research Approach



Planned Laboratory Tests

Goal: Test the effectiveness of high-potential new technologies under a range of controlled operating and environmental conditions to characterize performance with a high degree of confidence.

Locations: Frontier Energy's Building Science Research Laboratory and Food Service Technology Center; California Lighting Technology Center

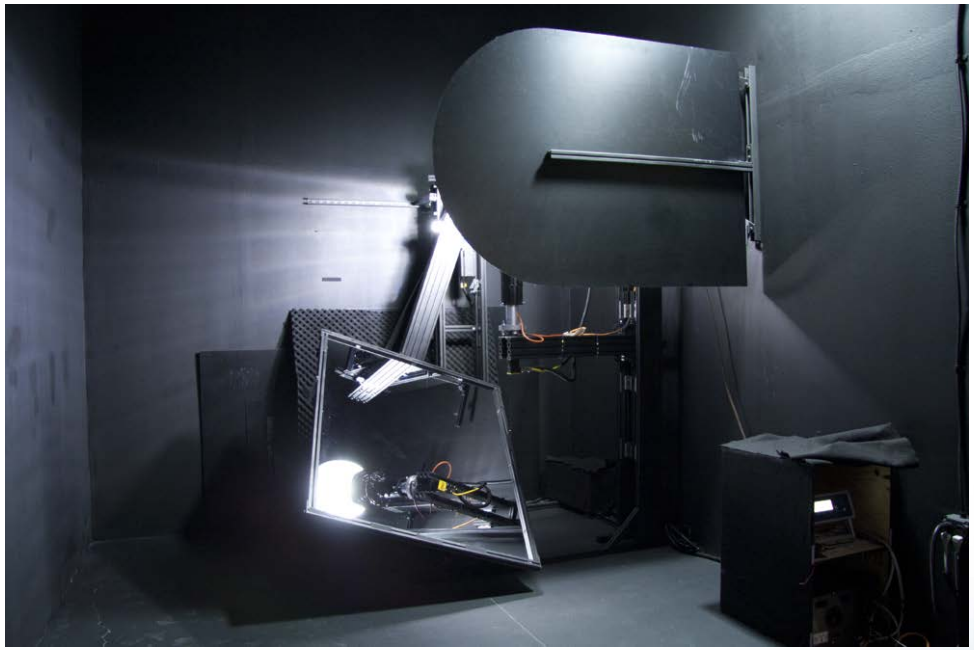


Image credit: CLTC

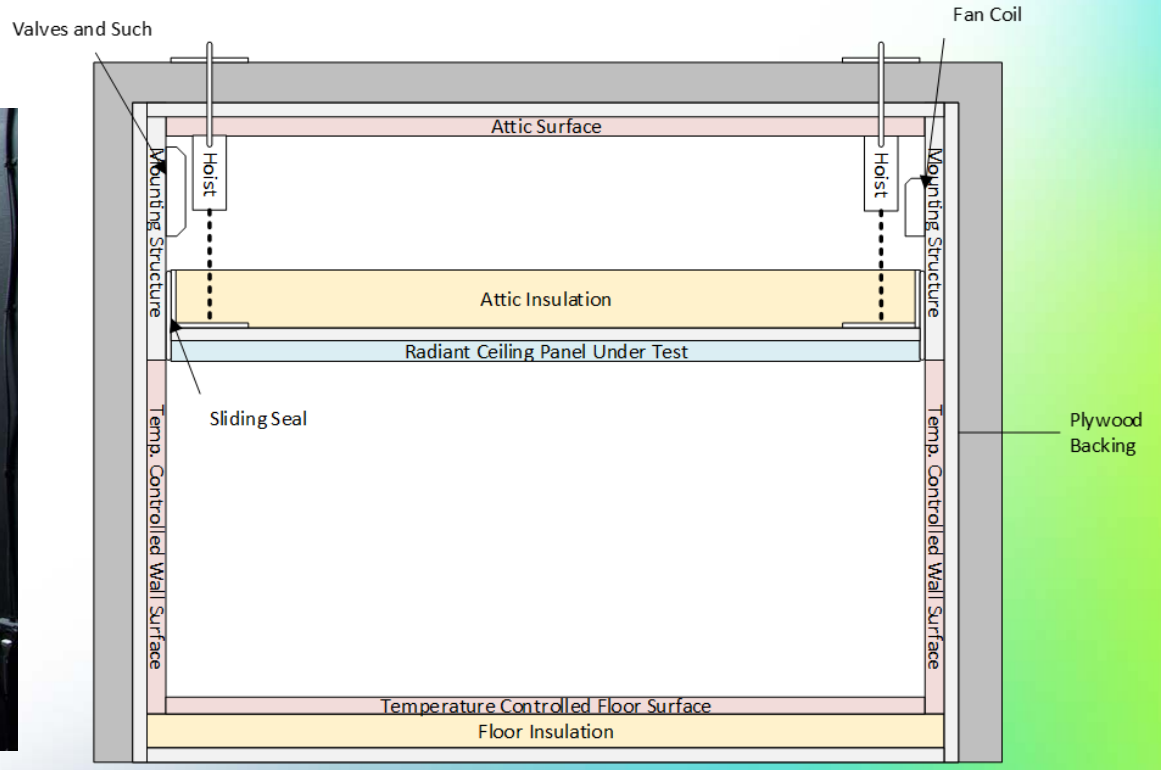


Image credit: Frontier Energy

Planned Field Tests

Goal: Further verify field performance for technologies that have demonstrated significant energy savings potential but do not see significant uptake in the market.

Locations: Occupied existing homes and businesses in Sonoma and Mendocino Counties.

Image credit: 2009 Solar Decathelon, Team California.

Image credit: James Haile

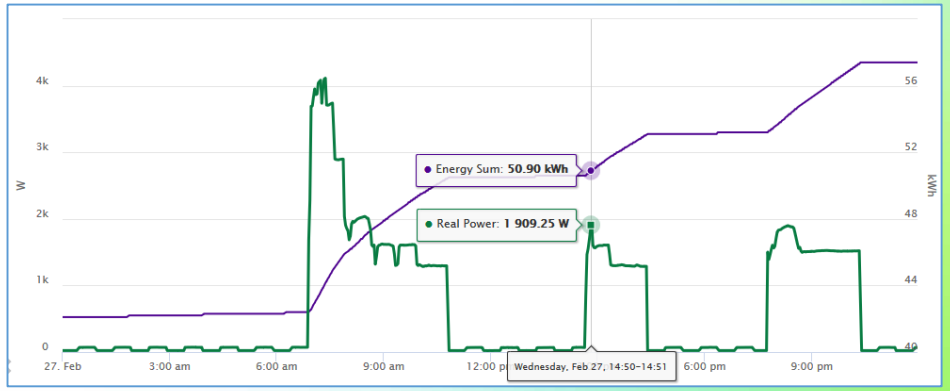


Image credit: Frontier Energy

Field Test Strategy

- Recruit occupied existing residential and commercial buildings from SCP customer base
- Customer survey/interview and site visit to confirm appropriate site conditions for technology
- Monitoring site for 3-6 months pre-retrofit; 12 months post-retrofit
- CEC/SCP incentives cover costs for Applied Research and equipment costs for Tech Demo

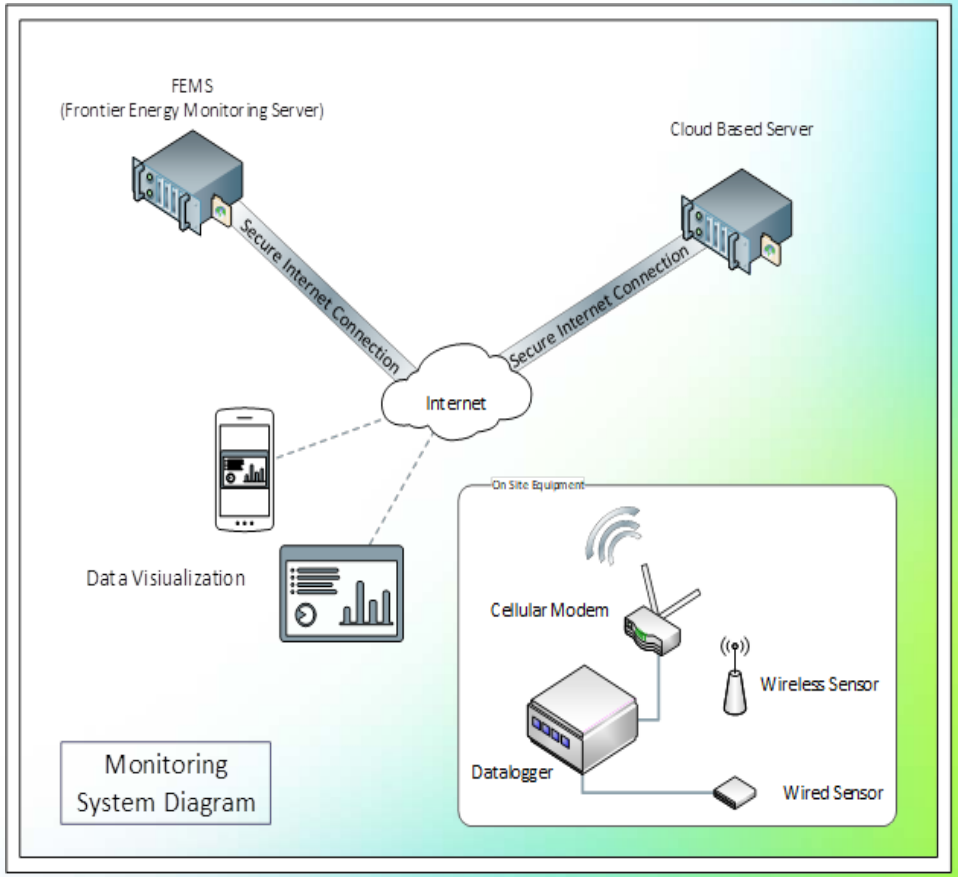


Image credit: Frontier Energy

Applied Research

Radiant Ceiling Panels with Air-to-Water Heat Pumps

5 Residential Pilot Homes

Image credit: 2009 Solar Decathelon, Team California.
Image Credit: James Haile

Phase Change Materials (PCMs)

5 Residential Pilot Homes

Image credit: InsolCorp

Commercial Daylighting

3 Commercial Pilot Sites

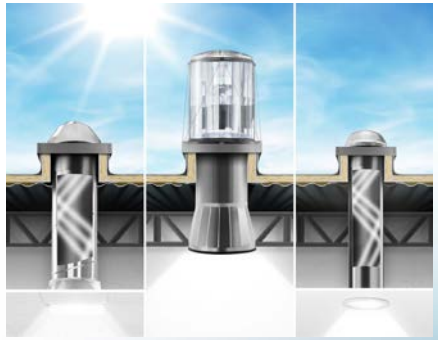


Image credit: SolaTube

Radiant Ceiling Panel Retrofits

The Problem: Significant distribution losses due to leaky ducts installed in attics reduce equipment efficiency and effectiveness for central forced-air heating and cooling systems

The Potential Solution: Using hydronic radiant ceiling panels greatly reduces leaks and distribution losses and increases thermal comfort by eliminating the need to supply conditioned air

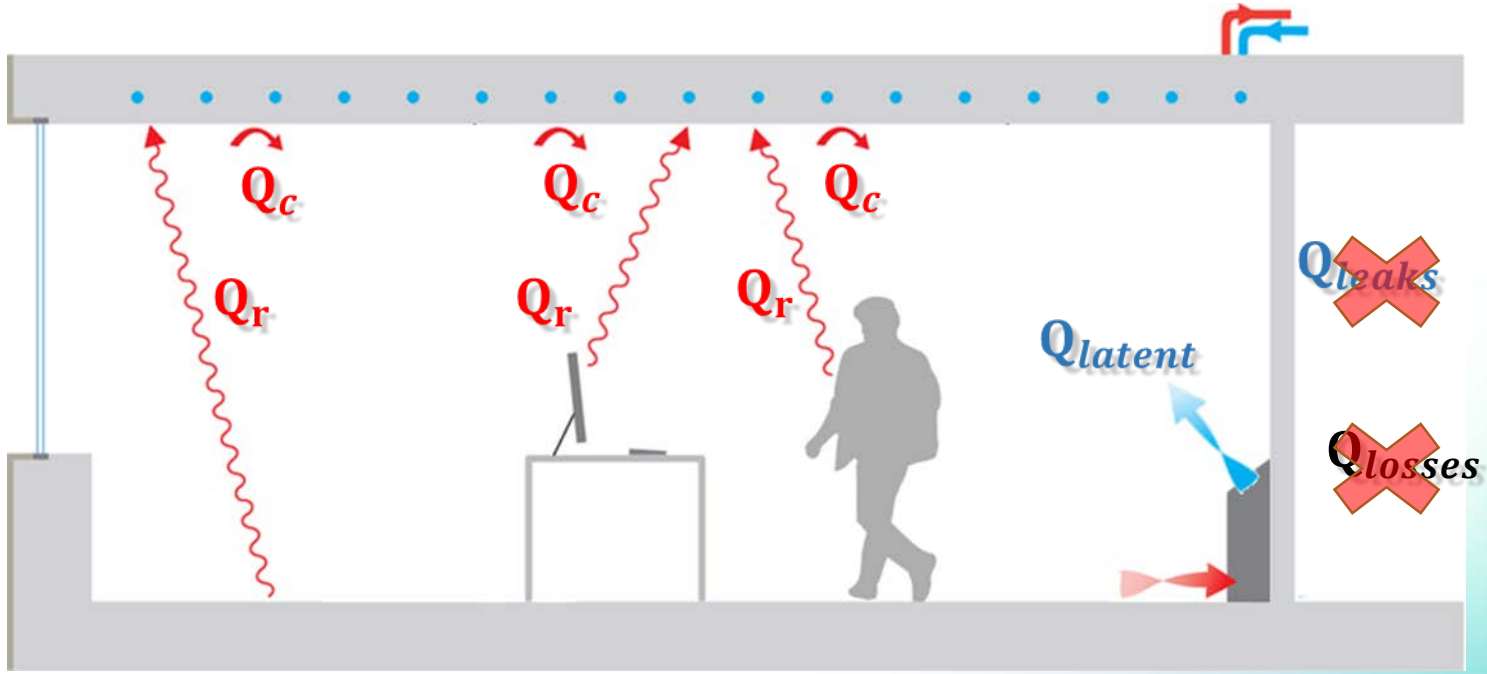


Image credit: Caroline Karmann, Center for the Built Environment at UC Berkeley.

Phase Change Materials (Residential)

The Problem: Cooling loads drive significant peak energy use during the summer. Hot attics are a major contributor of these cooling loads. As more homes adopt electric space heating to reduce natural gas use, winter peak demands will also increase.

The Potential Solution: Easy to install PCMs can offer significant energy savings and help reduce peak demand by storing energy as they melt and freeze over the course of the day.

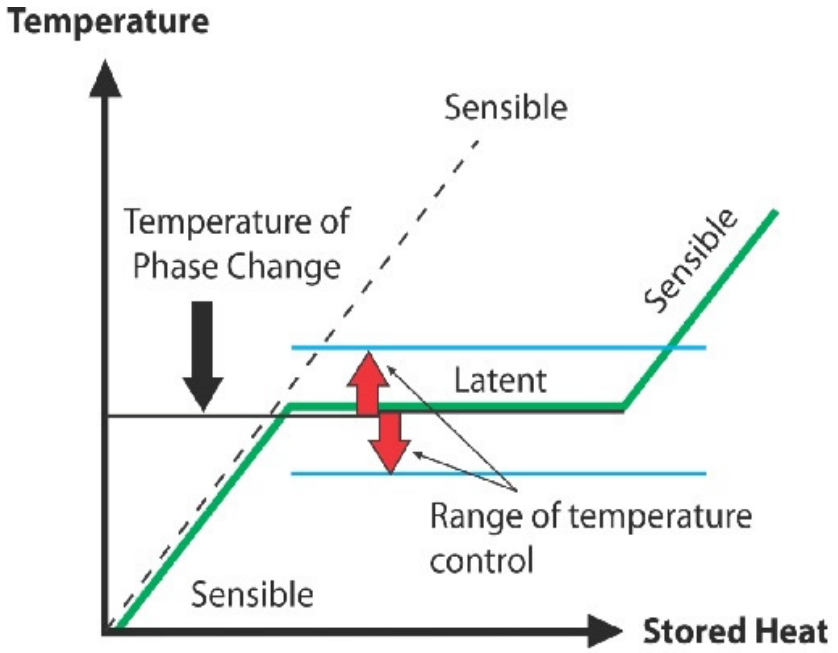


Image credit: RGEES (https://rgees.com/technology.php)

Commercial Daylighting Technologies

The Problem: Interior lighting remains a large component of electricity use in non-residential buildings. Bringing daylighting in existing buildings is challenging. Electric lighting controls for daylight harvesting face two main challenges: (1) Reliable sensing of daylight changes and (2) Control of direct sunlight penetration

The Potential Solution: Improved sensing of daylight changes using multiple photo sensors. Control of daylight penetration using automated dynamic fenestration systems to control daylight penetration. Integrated controls for lighting, fenestration & HVAC systems.

Locations with Windows

- Automated Venetian blinds
- Automated rolling shades
- Electrochromic glazing

Skylight Locations

- Ciralight Sun-tracking Skylights

Locations without windows

- Parans/ECHY fiber-optic building core system
- Automated dimmable tubular daylighting

Sensors & Controls

- Motion, photo-, and temperature sensors
- Daylight harvesting controls

Solatube

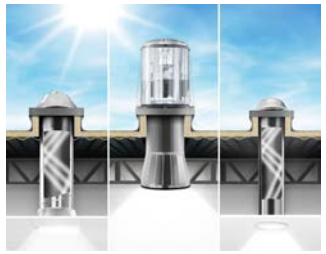


Image credit: Solatube

Ciralight

Image credit: Ciralight

Parans

Image credit: Parans Solar Lighting

Technology Demonstration

Mini-Split Heat Pumps

Residential Sites

Induction cooking

Residential & Commercial Sites for Tech Demos

Waste heat recovery for commercial dishwashing

Commercial Sites

Grid-interactive heat pump water heaters

Residential & Commercial Sites for Tech Demo

Aerosol envelope air sealing

Residential Sites

Nighttime ventilation cooling

Residential Sites

Phase Change Materials (Commercial)

Commercial Sites

Image credit: Mitsubishi

Image credit: Samsung

Image credit: AO Smith

Mini-Split Heat Pumps

The Problem: Most traditional ACs and furnaces can only operate at one speed and are sized to meet a large design-day load that results in cycling and degraded efficiency on most days.

The Potential Solution: Variable speed mini-split systems adjust their speed continuously to match the current load, resulting in increased seasonal efficiency. Compact ducts reduce energy losses from duct leakage to the attic.

Image credit: Mitsubishi

Induction Cooking

The Problem: Electric resistance heating, where a current is passed through a heating element which then transfers heat to a piece of cookware, suffers significant losses to the ambient air around it during the cooking process.

The Potential Solution: Induction cooking uses a magnetic coil to induce a current in a piece of ferromagnetic cookware. The cookware discharges this energy as heat, serving as a more efficient heating element.

Image credit: Samsung

Waste heat recovery (Commercial Dishwashing)

The Problem: A typical high-temperature door-type dishmachine will be the highest load on the building's hot water system, using up to 75% of the system's hot water.

The Potential Solution: Exhaust heat recovery (EHR) captures the energy that would otherwise be released from a dishmachine as steam, saving energy by lessening the load on the building's hot water system. Additionally, most EHR dishmachines are more water efficient and operate at lower flow rates than conventional models.

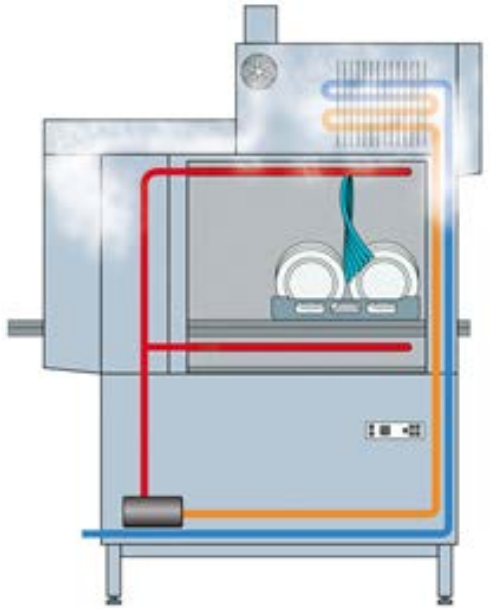


Image credit: FSTC

Grid-Interactive Heat Pump Water Heaters

The Problem: Both electric resistance and heat pump water heaters employ low efficiency electric resistance elements. Using the resistance elements during peak demand periods causes high stress on the grid and cost to homeowners with time-of-use rates.

Two Potential Solutions:

1. Grid-interactive heat pump water heaters can receive signals from the grid announcing high stress periods. The heat pump water heater then relies on the hot water in the storage tank, and avoids using the resistance elements until the stress event has ended.
2. Heat pump water heaters also employ high efficiency heat pumps. Implementing logic that learns the occupant's behavior enables control strategies that use the heat pump more and the resistance elements less. The control logic can also minimize electricity cost via load shifting.

Image credit: AO Smith

Aerosol envelope air sealing

The Problem: Leaks in walls and ceilings of existing homes makes them less comfortable and cost more to heat and air condition. Reducing air leakage using conventional caulking and sealing methods typically results in excessive labor costs and quality control problems, and leaves leaks that are neither visible nor accessible.

The Potential Solution: The Aerobarrier process briefly pressurizes a building while injecting an aerosol-based sealant “fog”. As the air escapes through leaks in the exterior shell of the building, the sealant is transported to the leaks, where it accumulates and seals the leakage path.

Image credit: Aerobarrier

Nighttime Ventilation

The Problem: Homeowners without an air conditioner struggle to find ways to beat the heat even in moderate climates. Many consider buying central air conditioning, which would dramatically increase their energy costs, and result in new peak demand requirements for the grid. As global warming has an ever greater impact on summer cooling loads, this threat is significant.

The Potential Solution: Sonoma Clean Power's climate zone benefits from cool nighttime breezes, and Nighttime Ventilation can flush the home with fresh air at night, allowing the occupants to make it through the next day, often without the need for compressor-based cooling altogether. This retrofit adds an outdoor air intake and utilizes existing central heating system fans and ductwork to serve as a distribution system for cool air at night.

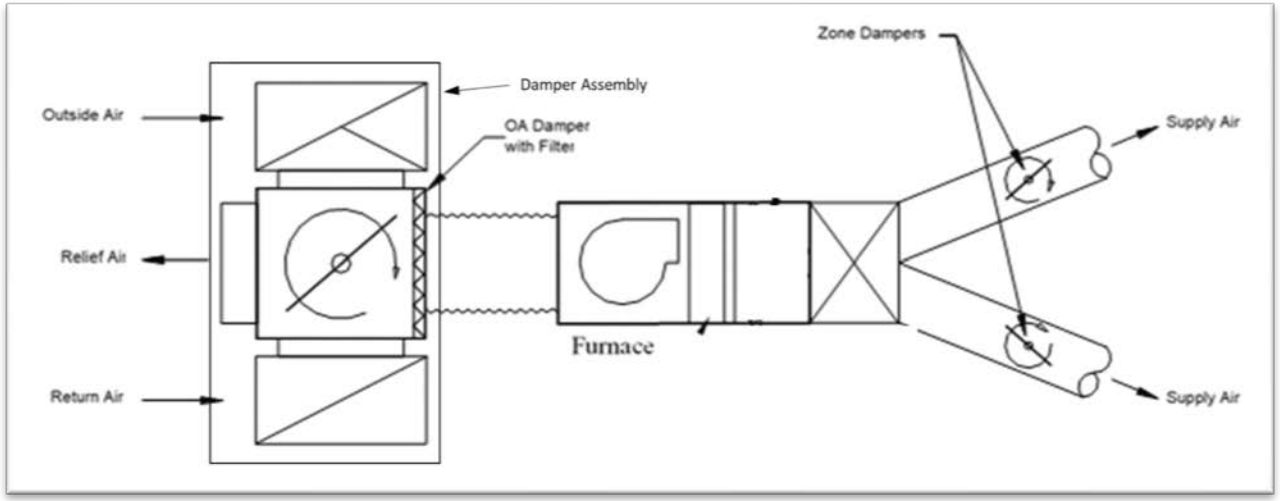


Image credit: Frontier Energy

Phase Change Materials (Commercial)

The Problem: Summer afternoon heat gains through attics contribute significantly to peak demand costs for commercial buildings, and can create uncomfortably warm work spaces that impact productivity.

The Potential Solution: PCMs in dropped ceilings can reduce or delay heat transfer into or out of conditioned space by absorbing heat as they melt and releasing heat as they freeze. In commercial buildings that don't operate at night, summer pre-cooling can further enhance the peak demand savings for PCMs.

Image credit: Insolcorp

Optimal Retrofit Packages and Markets

The Problem: Energy efficiency upgrades are rarely as cost-effective in retrofit applications as they are in new construction, and many are impractical. Cost-effectiveness is highly dependent on the starting condition of the buildings, including the efficiency of existing equipment and its remaining useful life.

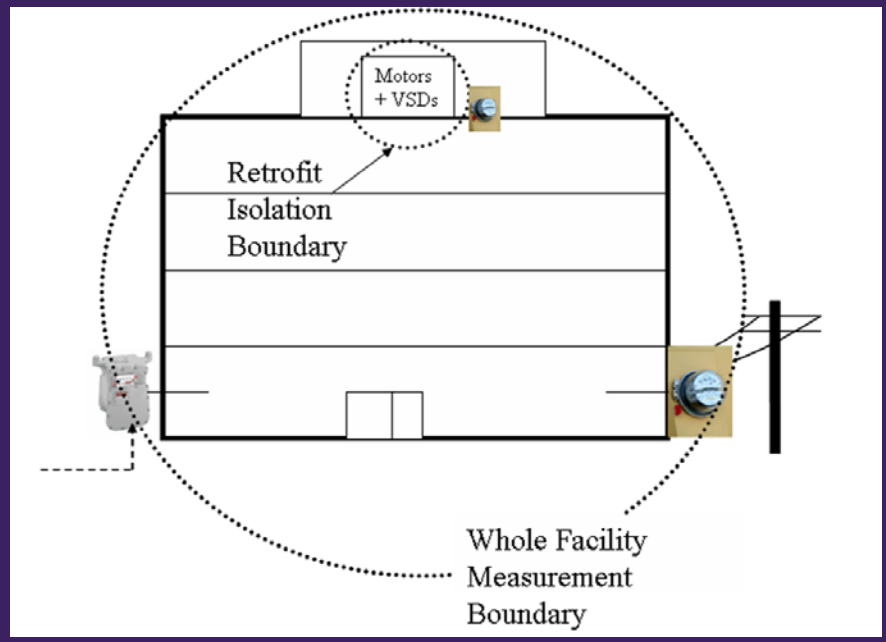
The Potential Solution: Apply the latest building simulation tools and optimization/parametric analysis techniques to identify cost-effective retrofit packages as a function of building features, vintage, climate zone, and operating conditions for single family, multifamily, and small commercial buildings.

ResStock Baseline

Image credit: NREL

EM&V Framework

- Aligned with CA EM&V protocols and IPMVP
- Saving calculations based on end-use measurement and whole building approaches
- Project ranges across residential, commercial and industrial sectors
- Impacts HVAC, lighting, water heating and cooking appliances



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Evaluation Measurement & Verification (EM&V) Process

Five major steps:

- Define evaluation objectives.
- Select an appropriate evaluation savings determination approach.
- Verify installation and conduct data collection and analysis.
- Calculate energy and demand savings.
- Calculate co-benefits

Baseline:

- Pre-existing conditions
- Building with similar characteristics in absence of a actual pre-existing conditions
- Similar Spaces in the same building
- Modeled baseline in absence of physical control case

The Advanced Energy Center

The Advanced Energy Center has the potential to speed deployment of energy efficiency, make energy efficiency programs more accessible to all customers, and increase customer knowledge of energy efficiency and energy code requirements.

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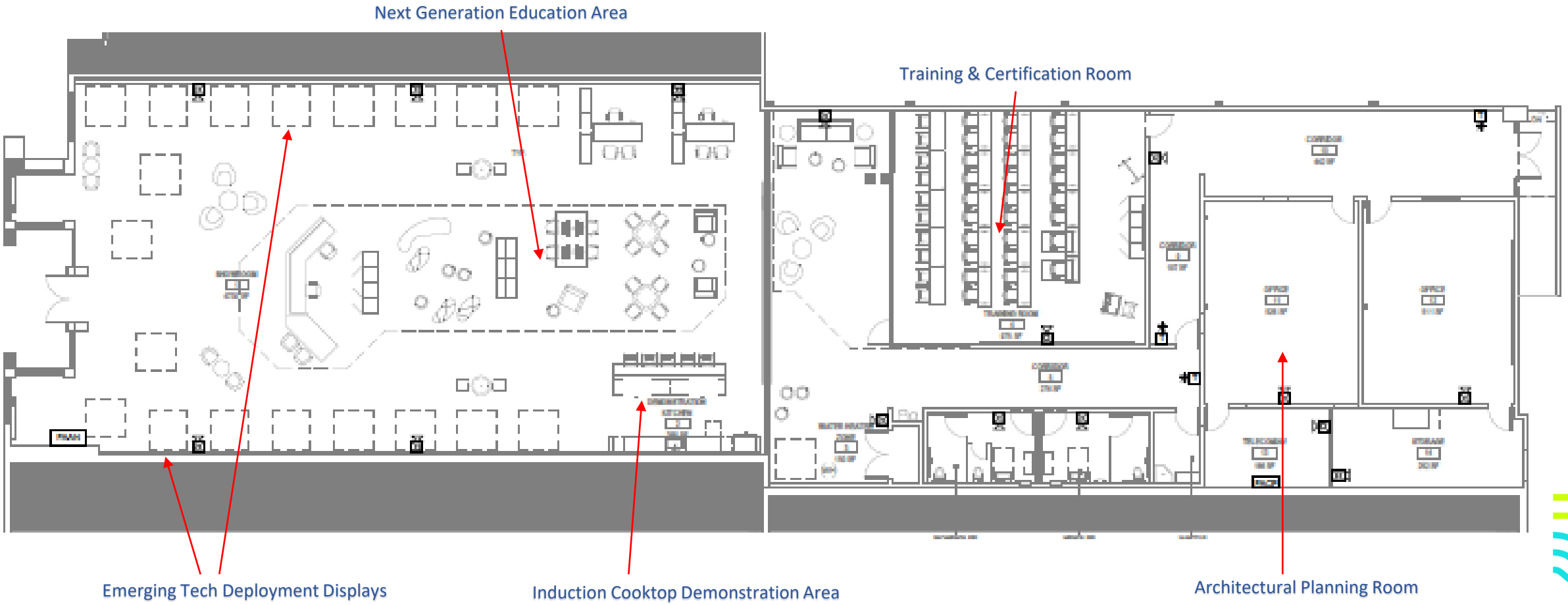
Schematic Design



Advanced Energy Center renovations timeline

Dates are not firm but goal deliverables

- Design Contract and preliminary plans January 31, 2019
- Phase 1- Programmatic & Schematic Design January 31, 2019
- Phase 2- Design Development February 2019
- Construction Documents/ Permitting Bidding March – May 2019
- Construction Administration Services May - September 2019
- Commissioning September 2019
- Soft Opening September 2019
- Grand Opening November 2019

Vendor RFP solicited publicly and will close March 29, 2019.

Contractor Matching Tool

Trust

Web Cart

VENDORS SUPPLY AT LEAST 3 CERTIFIED INSTALLERS

CUSTOMER IS FREE TO CHOOSE FROM A LIST OF TECHNOLOGIES

BUNDLES ASSOCIATED TECHNOLOGIES, INCENTIVES

SPEEDY SCHEDULING PROCESS

DATA COLLECTION TOOL FOR GRANT REQUIRED ITEMS

No steering

Certified list of professionals

PAYMENT DIRECTLY TO MANUFACTURER/ INSTALLERS

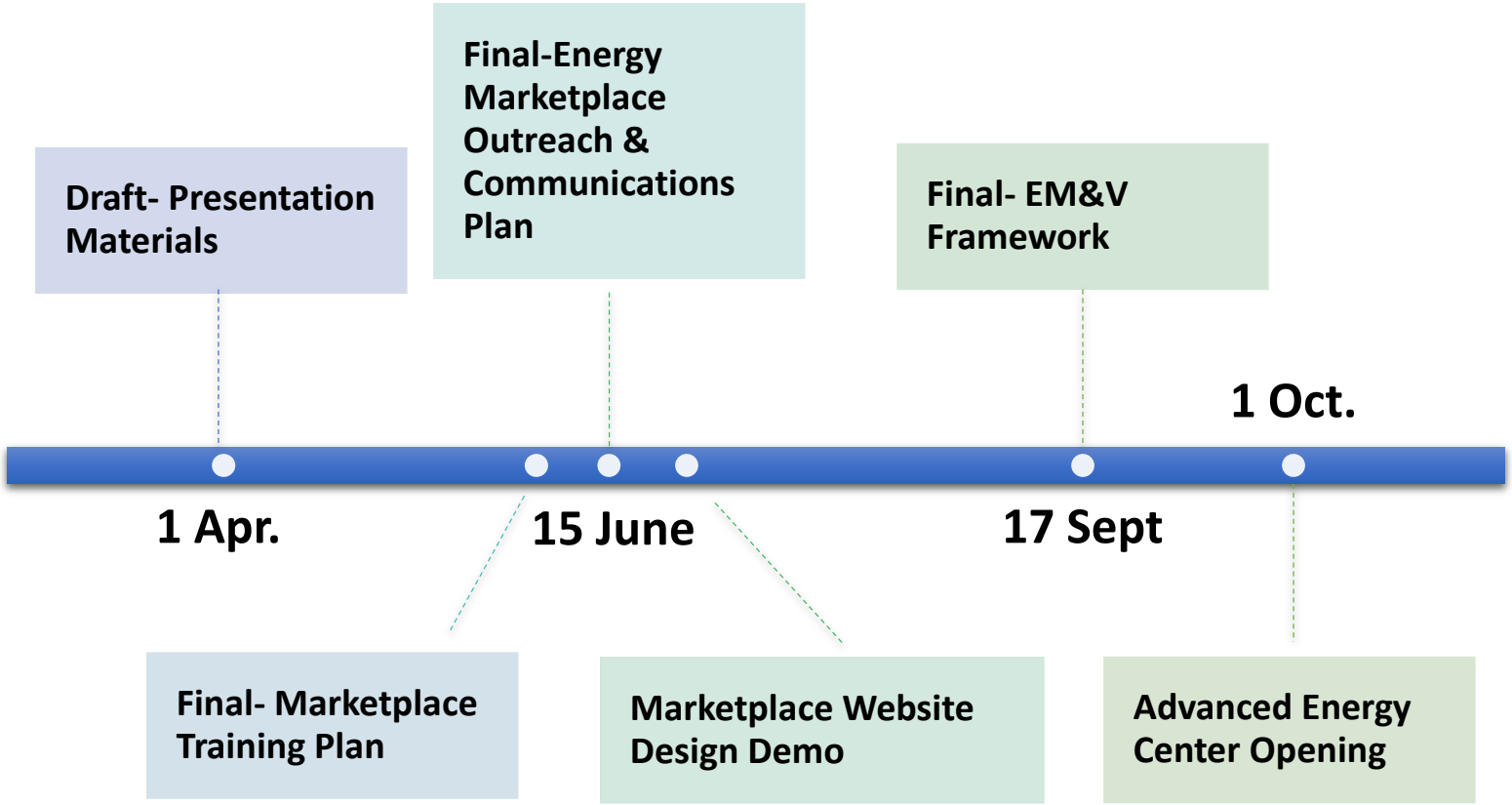
ON BILL FINANCING CAPABILITIES

Customer reviews & testimonials

Additional Project Benefits

- **Financial Assistance**
  - On-Bill financing
  - SCP incentives
  - Vendor rates/ incentives
- **In Store display**
  - Technology demonstration areas
  - Induction kitchen demonstration area
  - Contractor Matching Tool
- **Educational & Training**
  - Children’s education area
  - Library
  - Training & certification classes

2019 Project Schedule



Thank you!

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