

# 2022 Projects Summit: Approved TSR and TDR Projects

November 29, 2022

# AGENDA

## **10 AM - 11:02 AM PT**

Intro to CalNEXT

Intro to HVAC and Water Heating

2022 Approved HVAC and WH TSRs and TDRs

Q&A

## **11:03 AM - 11:42 AM PT**

Intro to Whole Building and Process Loads

2022 Approved Whole Buildings and Process Loads TSRs and TDRs

Q&A

## **11:43 AM -12:15 PM PT**

Intro to Plug Loads and Appliances and Lighting

2022 Approved Plug Loads and Appliances and Lighting TSRs and TDRs

Q&A

# Presenters

## **Cassidee Kido**

Project Manager II  
Energy Solutions

## **Erin Fitzgerald**

Associate  
Energy Solutions

## **Akane Karasawa, P.E.**

Senior Engineer  
ASK Energy, Inc.

## **Irina K**

Senior Engineer  
The Ortiz Group, LLC

## **Tom Kacandes**

Senior Consultant  
VEIC

## **Amin Delagah**

Associate Director  
TRC

## **Craig Simmons**

Manager, Simulation Modeling  
VEIC

## **David Vernon**

Co-Director of Engineering  
UC Davis Western Cooling Efficiency Center

## **Paul Kuck**

Senior Project Manager  
Energy Solutions

## **Zyg Kunczynski**

Senior Project Manager  
Energy Solutions

## **Josh Chanin**

Senior Trade Ally Manager  
Energy Solutions

## **MM Valmiki**

Senior Engineer  
ASK Energy, Inc.



# What is CalNEX

CalNEX is the California IOU's Statewide Electric Emerging Technologies Program. CalNEX's vision is to identify emerging technology trends and bring commercially available technologies to the IOU's energy efficiency program portfolio.

Energy Solutions will be the prime administrator for the next five years.



# Partner Team



# Technology Priority Maps



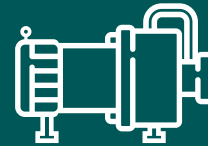
Appliances &  
Plug Loads



HVAC



Lighting



Process  
Loads



Water  
Heating

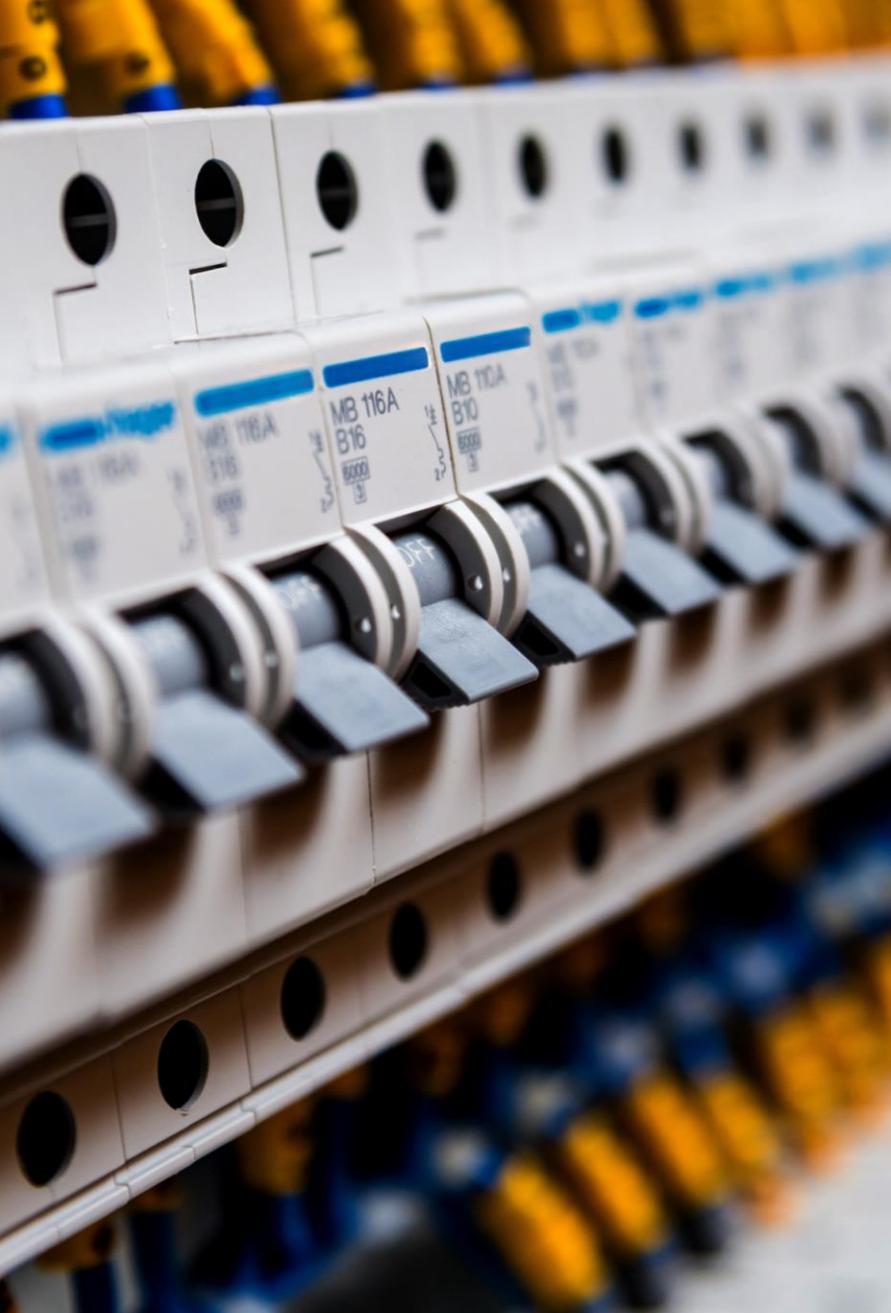


Whole  
Buildings

# Project Types

Technology Development Research (TDR): “Early Stage” technologies  
[~15%]

Technology Support Research (TSR): “Market Ready” technologies  
[~75%]



# HVAC and Water Heating

- ET22SWE0028**- Packaged Central CO2 Heat Pump Water Heater Multifamily Demonstration
- ET22SWE0017**- Commercial and MF CO2 based Heat Pump Water Heater Market Study and Field Demonstration
- ET22SWE0023**- Occupancy-based Thermostats for Commercial Offices
- ET22SWE0022**- Residential Housing Characteristics Study
- ET22SWE0020**- Variable Refrigerant Flow (VRF) Refrigerant Management Market Assessment
- ET22SWE0019**- Market Potential for Heat Pump Assisted Hot Water Systems in Food Service Facilities



# 2020 HVAC TPM

Decoupled ventilation and heating/cooling systems incorporating low energy technologies with advanced design and control features—including heat recovery ventilators, variable refrigerant flow systems, chilled beams, and radiant systems—are leading the movement for greater efficiency gains.

Advanced controls, system integration, and fault detection are gaining importance in advancing building energy efficiency and occupant comfort. Non-compressor and variable capacity compressor technologies, and sustainable refrigerants are also emerging areas of interest.

Tech Families of this group include:

- Variable Speed Compressor Systems (Commercial)
- Variable Speed Compressor Systems (Residential)
- HVAC Controls
- Decoupled HVAC Systems
- Automated fault detection and diagnostics
- Air-to-water heat pumps for space heating and cooling
- Non-compressor based HVAC
- Low- GWP refrigerants in HVAC

# 2020 Water Heating TPM

Water heating electrification using heat pump water heater (HPWH) technologies represents one of the major strategies to achieve deep greenhouse gas emission reductions from buildings. Driven by this strategic goal, active research and development efforts are underway to advance HPWH equipment, grid-interactive load control technologies, and system integration solutions.

Tech Families of this group include:

- Residential
- Commercial and large multi-family

# Occupancy-based Thermostats for Commercial Offices



**Technology Area:** HVAC



**Technology Family:** HVAC Controls



**Project Type:** Technology Support Research



**Project Lead:** AESC, Inc. / ASK Energy, Inc.



The proposed project will assess the energy savings potential of occupancy-based controls technology in small to medium offices. The technology is for HVAC systems comprising of a single HVAC unit serving multiple building zones. By installing wirelessly connected occupancy sensors in each served space of a single system, the sensors can communicate with the system thermostat to shut off the system when all served spaces are unoccupied.

# Residential Housing Characteristic Study



**Technology Area:** HVAC, Water Heating, Plug Loads & Appliances



**Technology Family:** Variable Speed Compressor Systems (commercial), Water heating (residential), White goods



**Project Type:** Technology Support Research



**Project Lead:** The Ortiz Group, LLC in collaboration with AESC



# Variable Refrigerant Flow (VRF) Refrigerant Management Market Assessment



**Technology Area:** HVAC



**Technology Family:** Variable Speed Compressor Systems (commercial), Low GWP Refrigerants in HVAC, Automated fault detection and diagnostics



**Project Type:** Technology Support Research



**Project Lead:** Tom Kacandes, VEIC

# Market Potential for Heat Pump Assisted Hot Water Systems (HPaHWS) in Food Service Facilities



**Technology Area:** Water Heating



**Technology Family:** Commercial and Large Multi-Family (Food Service)



**Project Type:** Technology Development Research







**Project Lead:** Amin Delagah (Associate Director, TRC)








**Project Type:** Market Potential Assessment

# HPaHWS in food service facilities






-  **Pain:** Peak time-of-use (TOU) electricity rates coincide with maximum food service hot water load
-  **Solution:** A heat-pump-assisted hot water system offers load flexibility and lower operating costs for the restaurant owner along with electrification, grid management, and decarbonization benefits for the utility.
-  **Research Question:** How large is the potential market for HPaHWS in food service in California?
-  **Scope of Work:**
  - Literature search
  - Interviews with subject matter experts and food service market participants
  - Evaluation of market barriers including electrical upgrades, health dept. sizing regulations, space constraints, and first costs, and operating cost

# Commercial and Multifamily CO2-based HPWH Market Study and Field Demonstration

-  **Technology Area:** Water Heating, Whole Building
-  **Technology Family:** Commercial and Large Multi-Family, Whole buildings (non-residential)
-  **Project Type:** Technology Support Research
-  **Project Lead:** AESC (with ASK Energy and Ecotope)
-  Field test of custom central CO2 HPWH at two existing buildings in San Francisco.  
A demonstration will include load shift testing critical to electrification efforts.  
Assessment of energy, demand, cost, and GHG impacts as well as technology transfer.



# Packaged Central CO2 HPWH Multifamily Demonstration

-  **Technology Area:** Water Heating, Whole Building
-  **Technology Family:** Commercial and Large Multi-Family, Whole buildings (non-residential)
-  **Project Type:** Technology Support Research
-  **Project Lead:** AESC (ASK Energy and Ecotope)
-  Package central CO2 HPWH at two new affordable housing buildings in Menlo Park. Similar M&V goals and load shift testing as ET22SWE0017. Assessment of packaged system market and adoption benefits.

## Poll #1

**Please help us improve for future  
events**

Please respond to the Zoom poll

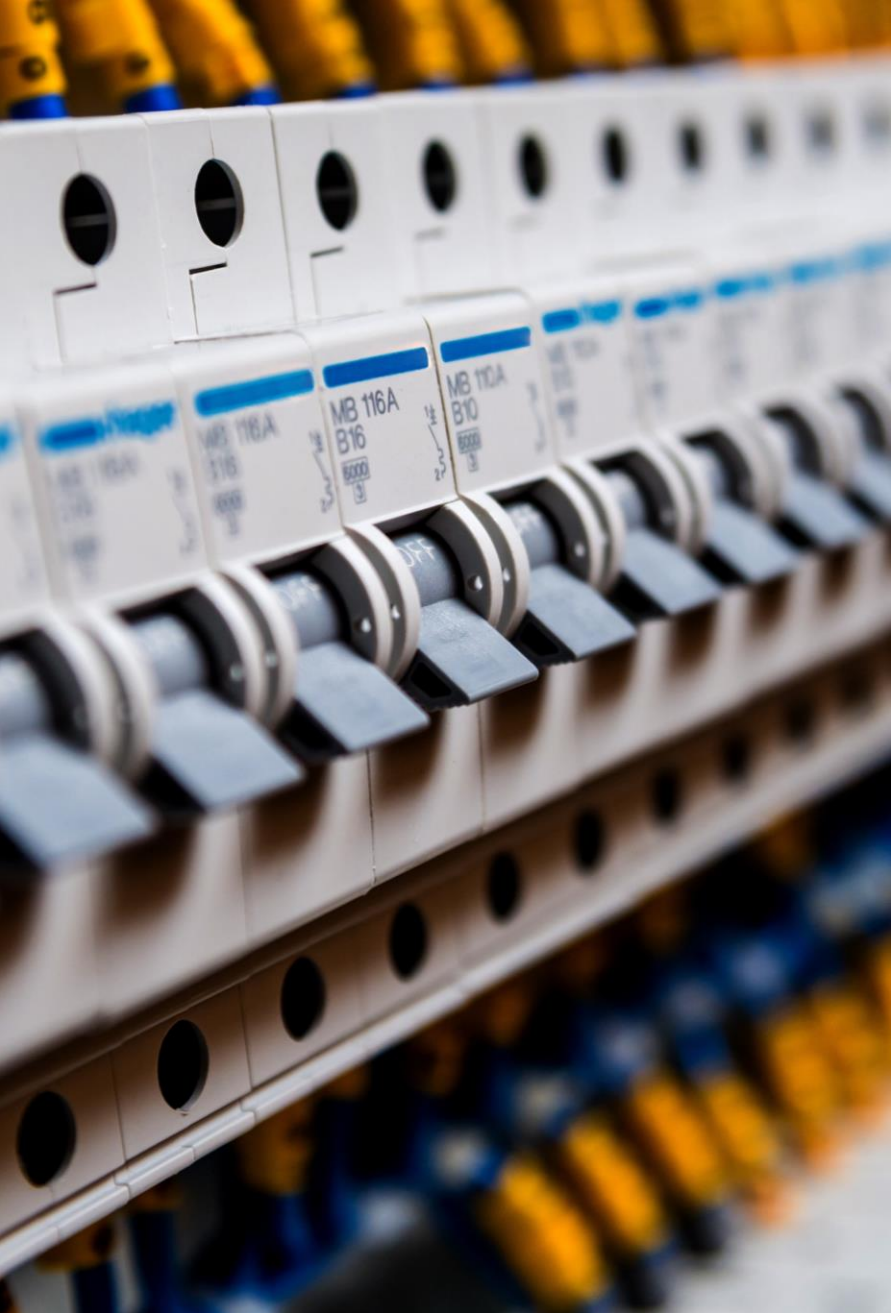


# HVAC and Water Heating Q&A

**We are on a break between sessions**

Please join us for Whole Building and  
Process Loads at 11:03 PT





# Whole Building and Process Loads

- ET22SWE0021**- Residential Multi-Function Heat Pumps: Product Search
- ET22SWE0025**- Next Generation Refrigeration Analysis Tool Proof of Concept
- ET22SWE0010**- All-Electric Commercial Kitchen Electrical Requirements Study Evaluation

# 2020 Whole Buildings TPM

The continued expansion of energy storage and other distributed energy resources (DERs), as well as the emergence of building demand flexibility as an important design attribute, help support California's legislation and decarbonization goals. Maintaining building performance and integrating systems to achieve ongoing energy management information systems.

Tech Families of this group include:

- Whole Buildings (Residential)
- Whole Buildings (Non-Residential)
- Distributed energy resource to reduce GHGs

# 2020 Process Loads TPM

Advanced controls, variable speed compressors and fans, and hybrid condensing units provide flexibility and load management opportunities that have not previously been available.





Employing sensors to gather data and leveraging existing data collection sources with advanced data analytics will provide cost-effective opportunities for efficiency improvements in wastewater and water treatment, water delivery, and water use processes.

New applications of heat recovery technologies in the food processing industry have the potential to reduce energy and water consumption.

Tech Families of this group include:

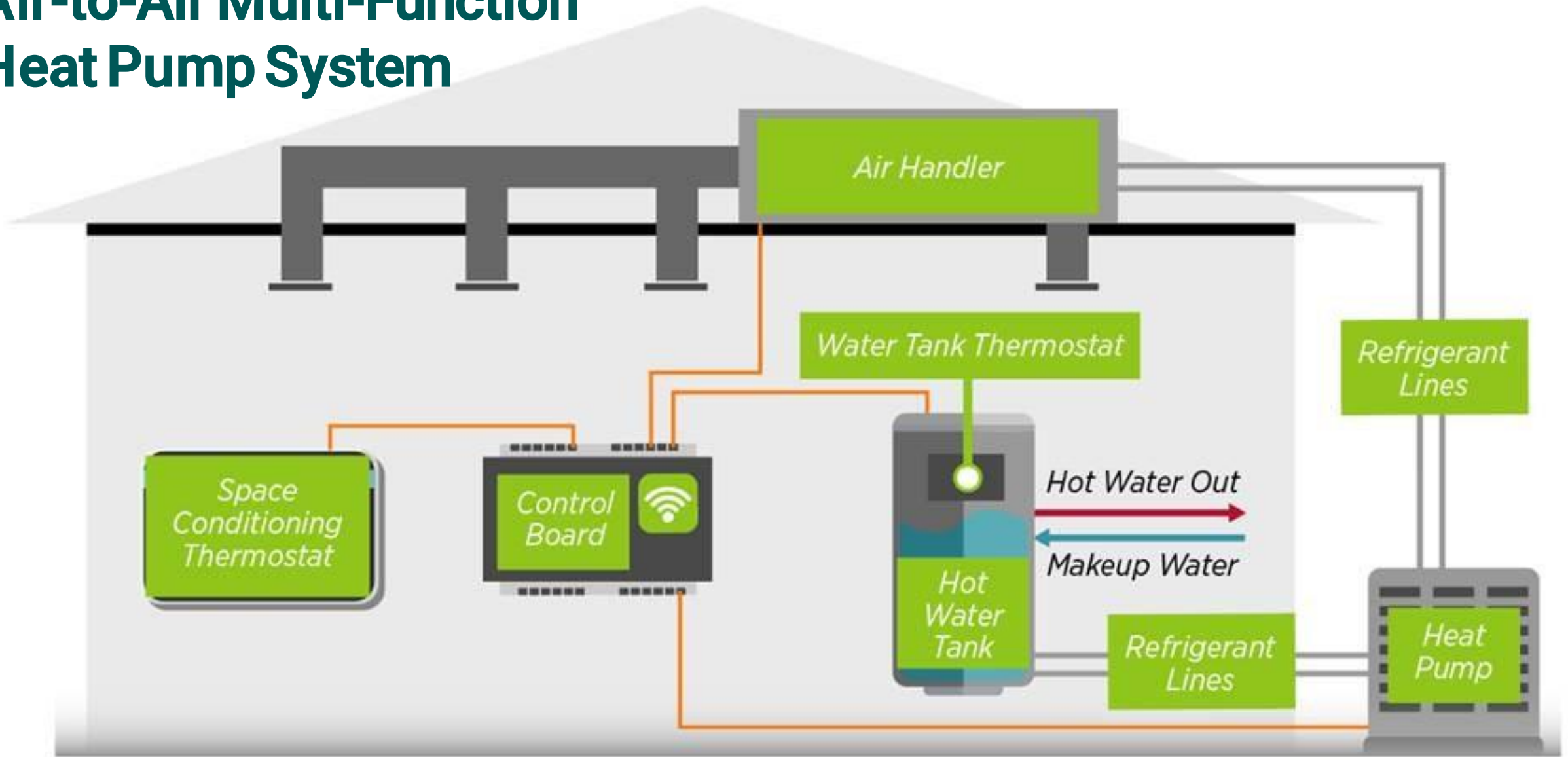
- Food Service Equipment
- Food Processing
- Refrigeration (Industrial)
- Refrigeration (Commercial)
- Data Rooms and Data Closets
- Laboratories
- Supermarket Systems
- Pools
- Transport refrigeration units
- Off-road fleet charging
- Hospitals
- Agricultural Water Conveyance
- Wastewater Treatment and Water Treatment
- Water Use Controls
- Industrial Water Process Management

# Residential Multi-Function Heat Pumps: Product Search




-  **Technology Area:** Whole Buildings
-  **Technology Family:** Whole Buildings (Residential) – Combination Systems (water heating + space conditioning)
-  **Project Type:** Technology Development Research
-  **Project Lead:** David Vernon, UC Davis Western Cooling Efficiency Center







# Air-to-Air Multi-Function Heat Pump System








# Residential Multi-Function Heat Pump - Product Search

-  Surveying manufacturers to identify and collect specifications for MFHP products that are soon to be commercially available.
-  **Outcomes:** Recommend MFHP products for future laboratory and field demonstration projects to measure equipment performance and efficiency so that energy savings can be calculated
-  **Broad Goals:** Reduce cost of residential heat pump retrofits for energy savings and electrification

# Next Generation Refrigeration Analysis Tool Proof of Concept

-  **Technology Area:** Process Loads
-  **Technology Family:** Refrigeration (commercial), Supermarket Systems
-  **Project Type:** Technology Support Research
-  **Project Lead:** Craig Simmons, VEIC
-  The proposed project is to develop an energy modeling framework based on OpenStudio, EnergyPlus, and ancillary analysis tools that solves previously identified shortcomings of existing grocery refrigeration analysis tools.

# All-Electric Commercial Kitchen Electrical Requirements Study

-  **Technology Area:** Process Loads
-  **Technology Family:** Foodservice equipment
-  **Project Type:** Technology Support Research
-  **Project Lead:** Paul Kuck
-  **Description:** Identify the electrical service requirements for various sizes of foodservice facilities to understand the load requirements, electrical service upgrade costs, and potential electrical load growth for commercial foodservice facilities in CA in converting to all-electric kitchen designs.

## Poll #2

**Please help us improve for future  
events**

Please respond to the Zoom poll



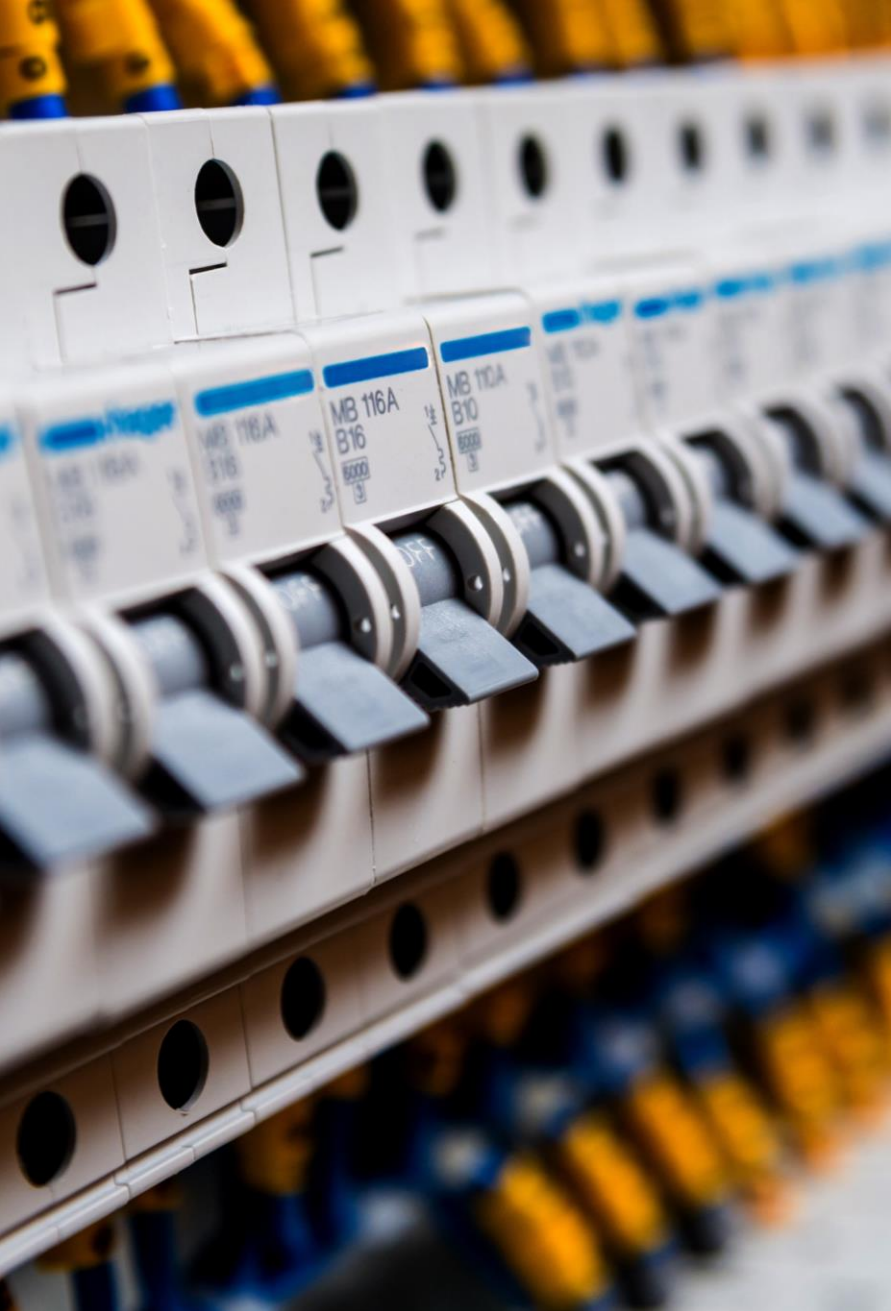


# Whole Buildings and Process Loads Q&A



# **We are on a break between sessions**

Please join us for Plug Loads and  
Appliance and Lighting at 11:43 PT



# Plug Loads and Appliances and Lighting

- ET22SWE0027**- Greenhouse Lighting Controls
- ET22SWE0026**- Advanced Multifamily EV Load Management System

# 2020 Plug Loads & Appliances TPM

This broad category includes electric vehicle supply equipment (EVSE), white good appliances, home entertainment and office equipment, medical equipment, and miscellaneous plug loads.

Tech Families of this group include:

- Electric Vehicle Supply Equipment
- White Goods
- Home Entertainment, Networking, Office, and Security Equipment
- Medical Equipment (Residential and Assisted Living)
- Medical Equipment (Health Care Facilities and Clinics)
- Mobile Charging Devices
- Miscellaneous Plug Load (Residential)
- Miscellaneous Plug Load (Commercial)

# 2020 Lighting TPM

LEDs and related controls have demonstrated the ability to achieve high efficacies and connectivity between lighting, window shades, and other building systems. New research into the role lighting plays on physical well-being of occupants may push requests for increases in total installed lighting power, making continued development in easily installed, programmed, and tested lighting controls imperative to prevent achieved lighting demand reductions from backsliding. Organic Light-Emitting Diode (OLED) hardware remains an immature but advancing technology. LEDs and connected lighting controls continue to draw consumer and operator interest for their non-energy benefits.

Signage and indoor agricultural lighting have emerged as practical energy-saving opportunities.

Tech Families of this group include:

- Integrated Controls
- Advanced Lamps
- Centralized DC Power Conversion Systems
- Daylighting
- Signage

# Greenhouse Lighting Controls



**Technology Area:** Lighting



**Technology Family:** Integrated Controls



**Project Type:** Technology Support Research



**Project Lead:** Zyg Kunczynski

# Advanced Multifamily EV Load Management System

- ⚡ **Technology Area:** Plug Loads and Appliances
- ⚡ **Technology Family:** Electric Vehicle Supply Equipment
- ⚡ **Project Type:** Technology Development Research
- ⚡ **Project Lead:** Ryan Bird





## Poll #3

**Please help us improve for future  
events**

Please respond to the Zoom poll



# Plug Loads and Appliances and Lighting Q&A





# Thank You!

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