# Updates on the CalNEXT Project Selection Process

September 26, 2024

CalNEXT
ENERGIZING CALIFORNIA'S FUTURE

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# Presenters

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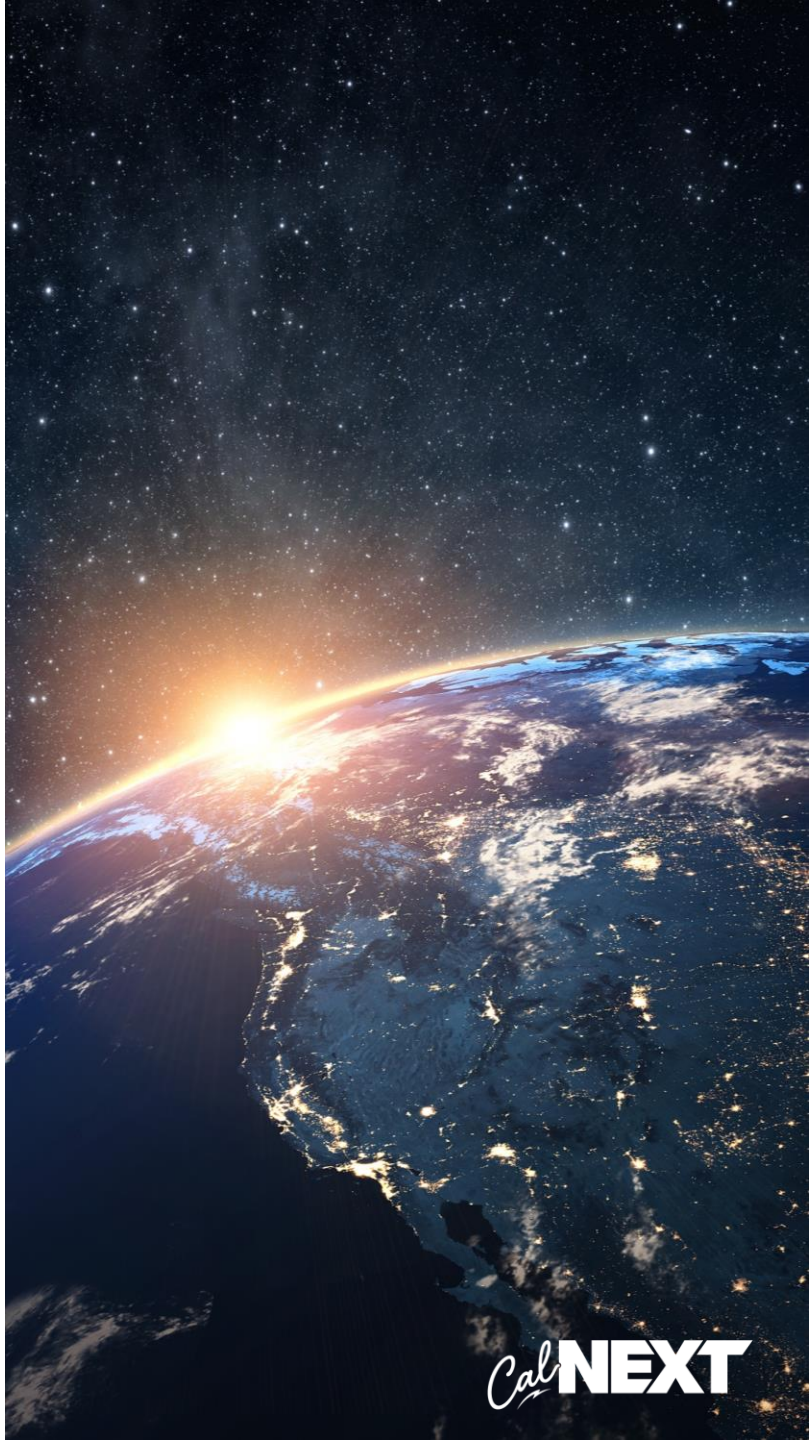
# Agenda

| | | |
|---|---|---|
| 1 | About CalNEXT | 5 Min |
| 2 | 2024 TPMs | 10 Min |
| 3 | Project Evaluation Criteria | 15 Min |
| 4 | Project Submission Examples | 15 Min |
| 5 | How to Participate | 5 Min |
| 6 | Feedback/Q&A | 10 Min |

# About CalNEXT

CalNEXT's vision is to identify emerging technology trends and bring commercially available technologies to the energy efficiency program portfolio.

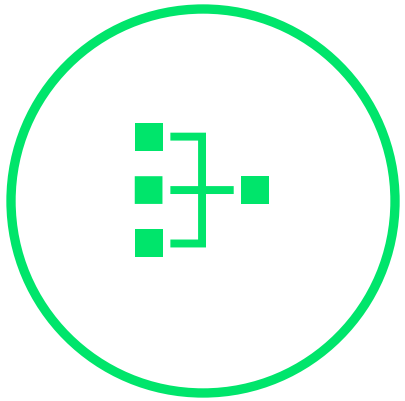


# CalNEXT Scanning and Screening Refresh

# Program Objectives

- **Communicate** program priorities to stakeholder community.
- **Scan, Prioritize, Evaluate** commercially available, emerging, or underutilized technologies and their applications to support increased adoption in the IOU EE portfolios.
- **Broadcast** results to inform stakeholders, support technology transfer, and advance industry understanding to support large-scale commercial adoption.
- **Advance** California's decarbonization, equity, and grid priorities by incorporating them into research priorities.
- **Execute** emerging technology research projects that support the IOU energy efficiency portfolios.

# What is Scanning & Screening?



**Intake Process**

Path to submit ideas for consideration

**Prioritization Method**

Evaluating submissions to prioritize projects that bring the most value to the program

**Portfolio Builder**

Process for responsibly meeting program portfolio targets, on time and within budget

# Scanning & Screening Glossary

- **Intake Form:** Refers to the webform on CalNEXT.com where anyone can submit an Idea or a Project
- **Partner:** Refers to one of the CalNEXT Partner organizations (Energy Solutions, UCD, AESC, TRC, VEIC, and the Ortiz Group)
- **Evaluator:** Person from one of the partner organization who is reviewing and scoring project submissions
- **Project Planning:** Set of activities that result in an approved Project Plan that is the scope of work for your contract
- **TPM:** Technology Priority Map is a document that describes the technologies the program is interested in exploring

# Poll #1

## Who is joining us today?

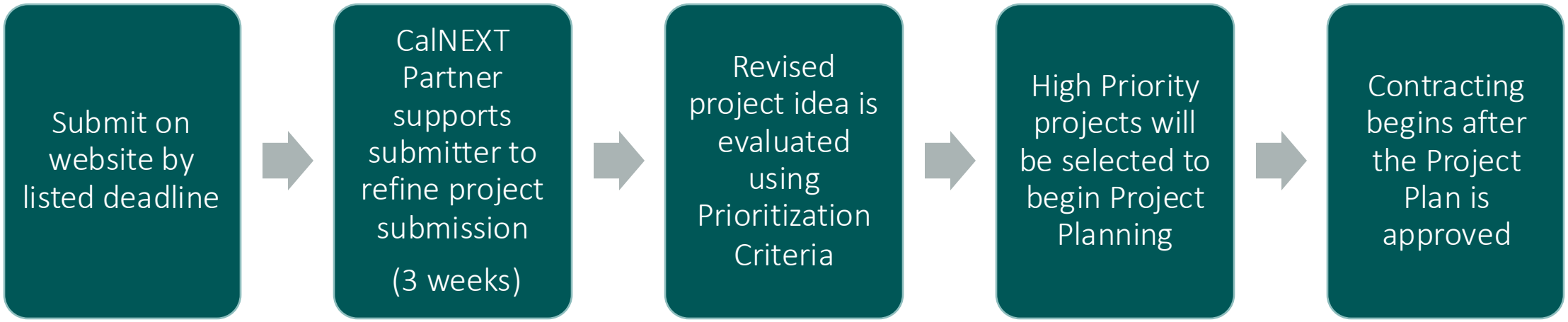
Please respond to the Zoom poll

# Desired Outcomes of Project Selection Process

- Identify enough projects to meet annual program targets within annual program budget
- Make fair, consistent, and defensible decisions
- Identify projects that have the most value to contribute to the program
- Engage industry stakeholders

| 2025 Targets | | | |
|---|---|---|---|
| Target Description | Technology Development Research | Technology Support Research | Total |
| New Contracted Projects | 10 | 32 | 42 |
| Completed Projects | 9 | 32 | 41 |

# High Level Project Selection Process



# 2024 Technology Priority Maps (TPMs)

# Goal of Changes -> Key Changes

- Improve Structural Support for Tech Transfer → New TPM content focused on Tech Transfer
- Clarify Research Priorities → Restructure TPMs through Research Initiatives
- Improve ability to tackle programmatic challenges → Launch additional TPM focused on “Portfolio Enhancements”

# Key Changes to the TPMs for 2024

Program-Wide tech family overhaul (Sunsetting Lighting TPM)

Presentation of Subgroups, Key Factors, & Knowledge Indices

Visual Change: develop and roadmap research initiatives

# Restructure Existing TPMs

| 2023 Technology Research Areas | Role | Priority |
|---|---|---|
| Connectivity, Controls & Integration | LEAD | HIGH |
| Horticultural Lighting | LEAD | HIGH |
| Advanced Approaches to Exterior Lighting | LEAD | HIGH |
| DC Lighting | COLLABORATE | MEDIUM |
| Advanced Electric Light Sources | COLLABORATE | MEDIUM |
| ~~Signage~~ | COLLABORATE | LOW |

(Sunsetting) Lighting

DC Lighting

Connectivity, Controls & Integration
Advanced Approaches to Exterior Lighting
Advanced Electric Light Sources

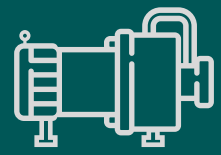
Horticultural Lighting

Whole Buildings

Water Heating

HVAC

Lighting, Plug Loads & Appliances



Process Loads

# Portfolio Enhancements TPM

Key lessons learned:

- Cover overlap between technology families
- Consolidate many technology families this year due to the overlap in previous technology families
- Consideration of the newly implemented Total System Benefit (TSB) metric, its role in emerging technology (ET), and CalNEXT's ability to support understanding of the metric in the energy efficiency (EE) landscape
- Focus on increased technology transfer broadly across the portfolio, allowing the CalNEXT team to define new measures of interest and illustrate efforts to bring them to the portfolio

# Portfolio Goals and Project Balance

2024 TPM Research Initiatives will indicate which ET aspect(s) our SMEs believe is most ripe for Project work

**Research Initiatives**

| Research Initiatives | Performance Validation | Market Analysis | Measure Development | Program Development |
|---|---|---|---|---|
| Window HPs (Room Heat Pumps) | ⌛ | 🎯 | ⚠ | ☝ |
| Portable HPs | ⌛ | 🎯 | ⚠ | ☝ |
| Through- the-wall HPs (PTHPs/SPVHP) | ⌛ | 🎯 | ⚠ | ☝ |

**KEY** 🎯 High Understanding ⌛ Research In Progress ⚠ Immediate Needs ☝ Future Research Need

- **Performance Validation**
  - Site Monitoring, data-logging
  - Performance Mapping
  - Test Procedure Creation
- **Market Analysis**
  - Market Survey
  - Market Characterization
  - Baseline / Standard Practice Study
- **Measure Development**
  - Measure Package Plan
  - Measure Data collection
  - eTRM Measure Package / Revision
  - Measure Study
- **Program Development**
  - Focused Pilots
  - Ascertaining Barriers, Testing Market Interventions

# What do the website updates look like?

| 2024 Technology Research Areas | Role | Priority |
|---|---|---|
| Micro Heat Pumps | LEAD | HIGH |

**DEFINITION**

Efficient, rapidly deployable HPs that require minimal professional installation and are suitable for compact spaces where HPs can replace electric space heaters or where traditional split-systems are too costly or onerous to deploy. They should connect with standard 110V/120V NEMA 5-15 outlets, without any field-installed refrigerant lines. They can appear in the market in several form factors such as saddle, portable, and through-the-wall. The saddle units are generally do-it-yourself (DIY), while others may require infrastructure costs. Typical uses include single-family, ADUs, multifamily, mobile homes, hospitality, assisted living facilities, and schools. The condensate in these units is managed via either drip-free melt water atomization and/or water dispersion into the internal air or outside air.

**RESEARCH INITIATIVES**

| Research Initiatives | Performance Validation | Market Analysis | Measure Development | Program Development |
|---|---|---|---|---|
| Window HPs (Room Heat Pumps) | ⏳ | 🎯 | ⚠ | 👆 |
| Portable HPs | ⏳ | 🎯 | ⚠ | 👆 |
| Through-the-wall HPs (PTHPs/SPVHP) | ⏳ | 🎯 | ⚠ | 👆 |

**OPPORTUNITIES**

Mass deployment of Micro HPs has the potential to rapidly electrify space heating and simultaneously replace existing portable space heaters and older, less efficient room air conditioners with more efficient HPs. Advancements in this technology family may be especially important for DAC and HTR customers since they are a majority renter group with limited options to improve their HVAC infrastructure. These products have the potential to provide a low up-front cost alternative, compared with traditional central heat pump systems, that are significantly more efficient than current systems (portable electric resistance heaters and gas-fired heaters). The adoption of new MHPs will bring in tangible real-world benefits, when compared with single-speed products. Prospective ET studies should investigate deployment costs of 110V/120V HPs when compared with more traditional HVAC solutions and investigate in-field heating performance of these products, to ensure they can fully displace existing electric resistance heaters, since these products have historically been optimized for their cooling performance, rather than their heating performance. Studies investigating customer usage patterns may also help inform the real-world efficiency and electrification potential of these products. Other considerations may include in-field performance of the units to validate any noise, defrost and/or dehumidification, ventilation and/or air-filtration issues, and consumer research detailing the usage patterns, ease of self-installation and customer satisfaction, as these products start to become more widely available. The research opportunities may be "inclusive" of any variant or form factors of these units.

**BARRIERS**

Most MHP products are adaptations of familiar products, such as room air conditioners or portable air conditioners. CalNEXT has made initial investments in this technology family to better understand product costs, product availability, and validate performance. Additional research can inform product usage patterns, customer sentiment, and understand overall market awareness, as these are all anticipated to be early implementation barriers. Installation practices are likely to vary on this product, but much of the appeal is that installation could be performed by end-users. Identifying common installation challenges, in turn, for different product types is needed. For example, these challenges might include the setting of the outdoor air damper position, sealing around the unit, practices related to decommissioning existing equipment, or thermostat control setting.

One major challenge has been the lack of heating performance testing and metrics. It is, however, an area that is quickly evolving as ENERGYSTAR® is continuing to develop a test procedure for window heat pumps that is expected to be released in 2024. The new standard(s) will attempt to capture the benefits of variable speed equipment and other advanced features that are not appropriately captured under current metrics. This new standard may be a template for test procedures of other equipment types. This may be particularly important for the predominately mild heating needs of California and common oversizing practices.

# Project Evaluation Criteria

# Prioritization Criteria

| Criteria | Weighting | Details |
|---|---|---|
| TPM Alignment/ Technology Transfer | 30% | How well the project aligns with the CalNEXT TPMs |
| DAC/HTR and EE/Decarb Program Benefits | 20% | Whether the project has benefits for the utilities and affects HTR/DACs |
| Quality of Idea | 45% | Clarify of scope, how innovative it is, whether it's ready for implementation, has a clear market strategy, and has a reasonable timeline |
| Cost | 5% | Estimated budget |

# TPM Alignment/Portfolio Priority

| Technology Priority Map (TPM) Priority (10%) | TPM Research Initiative Priority (10%) | Technology Transfer and Program Alignment (10%) |
|---|---|---|
| • Project aligns with the priorities described in the CalNEXT Technology Priority Maps (TPMs) | • Project aligns with high priority TPM research initiatives<br>• Project will be evaluated based on which research initiative topic most of the project work is expected | • Integration into Energy Efficiency (EE)/Demand Side Management (DSM) portfolios<br>• Establishes a market and/or a direction to increase technology adoption<br>• Real potential for energy savings<br>• Adequate market maturity |

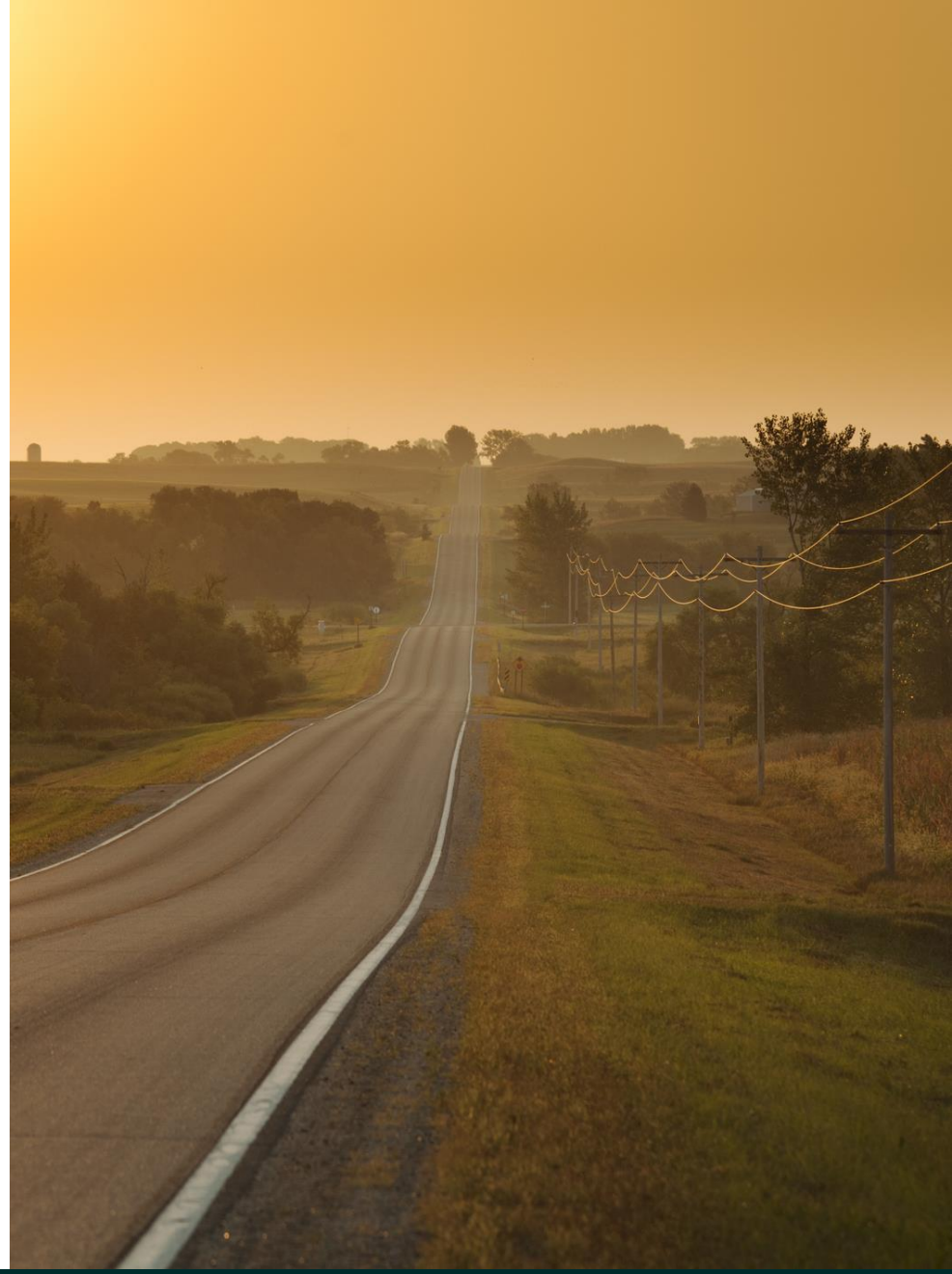
# Benefits

**Efficiency Program Alignment (10%)**

- Meeting specific energy efficiency target
- Demand reduction during peak
- Load flexibility
- Grid decarbonization
- Reducing operating costs
- Efficiency portfolios

**Disadvantaged Community (DAC) / Hard-to-Reach Community (HTR) Benefits (10%)**

- Site located in DAC CalEnviro Screen area
- Works with CBOs and/or diversity advocates
- Develops outreach materials in many languages
- Utilizes diverse contractors
- Supports/utilizes workforce development programs
- Addresses impacts on vulnerable communities
- Engages with diverse working groups for feedback/partnership

# Project Quality & Cost

## Scope & Project Clarity (10%)

- What will you do?
- How will you do it?
- What do you expect to happen?

## Justification/ Innovation (10%)

- Why is this different from work that has been done?
- What is the estimated value of the contribution?

## Stakeholder Engagement (10%)

- Who is this for?
- Who influences them?
- How do you know?
- How do you engage them?

## Readiness (10%)

- How ready are you to start research?
- What resources and partners are in place?
- Why do you think you are positioned for success?

## Timeline (5%)

- How long will it take to complete the scope?
- How does this compare to industry standards?

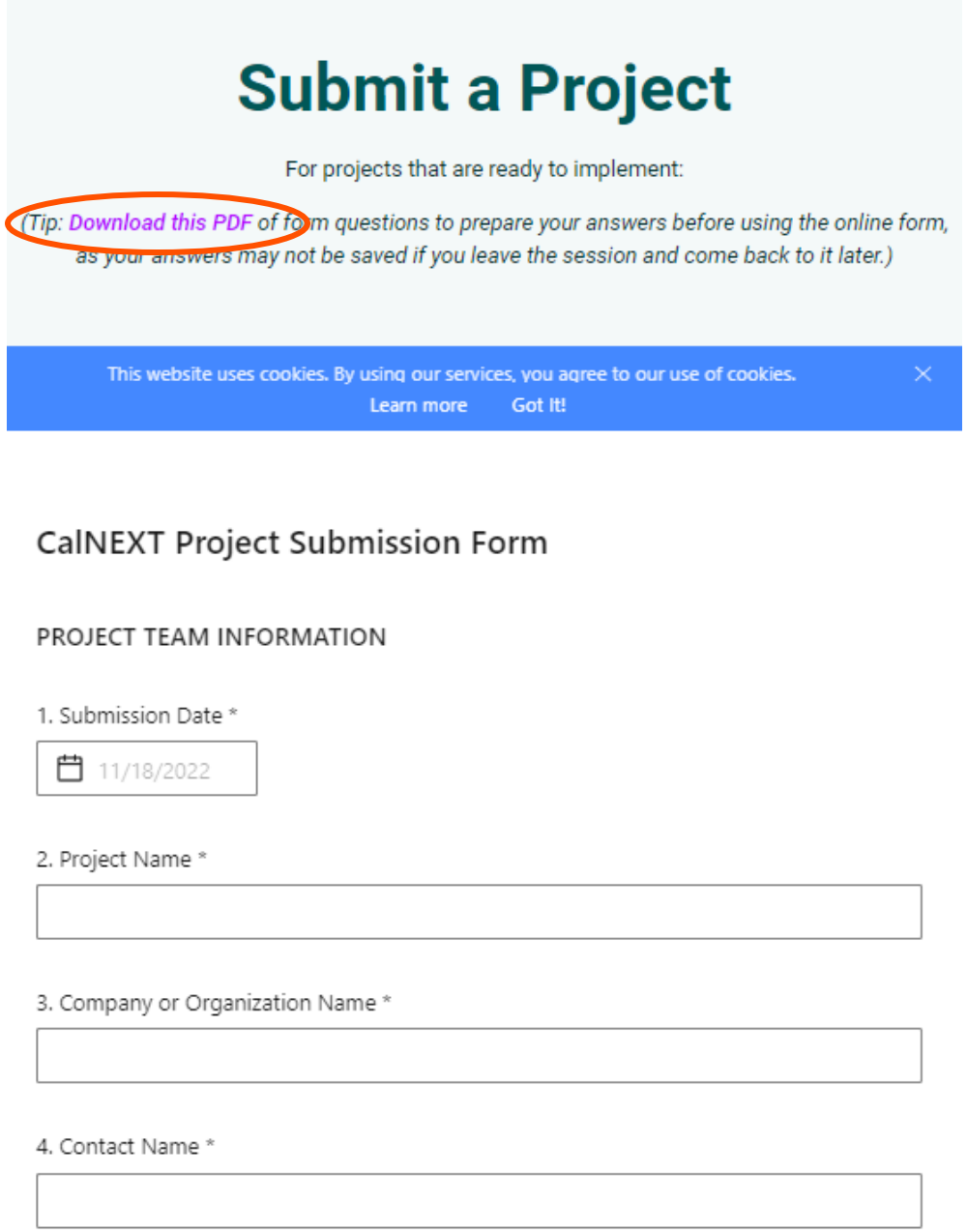
## Cost (5%)

- How much will it cost to complete the scope?
- How does this compare to industry standards?

# Project Submission Examples

# Project Submission

- 16 TPM Alignment (Research Initiatives)
- 17 Efficiency Program Alignment
- 21 Scope
- 27a Cost Breakdown



## Submit a Project

For projects that are ready to implement:

*(Tip: Download this PDF of form questions to prepare your answers before using the online form, as your answers may not be saved if you leave the session and come back to it later.)*

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### CalNEXT Project Submission Form

PROJECT TEAM INFORMATION

1. Submission Date *

11/18/2022

2. Project Name *

3. Company or Organization Name *

4. Contact Name *

# 16. TPM Alignment (Research Initiatives)

**TPM ALIGNMENT**

**16. How does the proposed project align with the Technology Priority Maps? If it does not align, please explain why this project should be a priority.**

The proposed project aligns with the Commercial-Duty Water Heater technology family under the Water Heating TPM. In particular, the project will support the adoption of central heat pump water heater systems for multi-family buildings, specifically called out as an example technology. Opportunities called out in the TPM that match this project include "system configuration options,… temperature maintenance systems,… draw patterns,… reducing the complexity of all-electric centralized HPWHs,… [and] installed cost and space requirements compressor of HPs and storage tanks." Data collection, understanding of temperature maintenance loads, and design considerations based on those data can help with all those TPM opportunities. A specific barrier called out in the TPM that aligns with this project is the "minimal documentation and empirically determined hot water load profiles for various non-res building types, important for developing sizing tools, design guidance, and regulatory updates." The study also aligns with the Alternative Design Strategies family in the Water Heating TPM which is concerned with the aspects of hot water systems outside of the water heater, itself.

Evaluator Perspective

- Refers to two relevant TPM subcategories specifically
- Acknowledges the priority level and program role from the TPMs
- Applies directly to the TPM Priority Criteria

# 17. Efficiency Program Alignment

**17. How does the project benefit utility programs with electrification, load flexibility, new measures, and savings for utility programs?**

Central heat pump water heaters are poised for adoption across a broad swath of the multifamily building sector. There is potential for 1.7 million tons of avoided greenhouse gas emissions and $350 million of total system benefits per year in the existing California multifamily sector. The proposed course of study will fill in a key information gap in the implementation of central heat pump water heaters. The recirculation load data and proposed course of action for design tool updates will help avoid oversizing of temperature maintenance systems, reduce costs, reduce footprint, and help remove a lingering design barrier. Furthermore, recirculation losses data and reliable prediction are important for the design and adoption of alternative designs such as multipass or return-to-primary temperature maintenance designs. These alternate configurations will expand product availability, feasibility, low-GWP heat pump options, and may even improve efficiency in some situations. All this will be in aid of utility electrification, load flexibility, and energy savings programs.

Evaluator Perspective

- Program Alignment: Energy Efficiency Savings
- Utility Benefits: State GHG reduction goals
- Utility Benefits: Grid Impacts
- Submissions with numerical estimates achieve the highest scores here

# 21. Scope

**21. What is the scope for the project?**

The scope of the project will include a field survey of California multifamily buildings with central hot water, analysis of collected data, discussion of implications on central heat pump water heater design, recommendations for sizing tool development, and recommendations for possible eTRM measure updates or development. These data, tasks, and results will be captured in reporting deliverables that chart an explicit path towards design guidance, sizing tool expansion, and measure development. The enhanced design tools will facilitate more cost-effective market adoption of central heat pump water heaters, including heretofore uncommon but advantageous design options.

To achieve these goals, the project team will:

1. Measurement Plan (2 month): Develop a measurement plan that can capture recirculation temperature maintenance loads and all driving factors. For instance, the measurement plan will specify the length of monitoring period per site (e.g. two weeks), measurement instrumentation (e.g. flowmeter, temperature meters), and building conditions to be documented. Building conditions to be documented will include items such as number of residences, occupants, hot water end-uses, plumbing distribution, piping insulation, hot water flow balancing, and thermal isolation (e.g. pipe hangers).
2. Site Recruitment (4 months): Recruitment of 20 multifamily sites with central hot water, leveraging the team's network of hot water designers, installers, and consultants. Sites will ideally be identified across the state and with varying building size, but it is not expected that temperature maintenance loads will be particularly dependent on climate zone – especially in comparison to other driving factors.

Evaluator Perspective

- Distinguishes major parts of study
- Discusses time to complete
- Discusses relevant location info

# 21. Scope

3. Data Collection (8 months): Data collection and measurement at each site. The data collection will comprise (1) monitoring of recirculation loads for a short time (e.g. two weeks), (2) as-built plumbing plans, and (3) a site walkthrough assessment. The team will also interview multifamily building owners, hot water system designers, and plumbers to gather information on distribution system maintenance practices (especially regarding pumping, balancing, and crossover).
4. Analysis (3 months): Analysis of the recirculation loads in relation to hypothesized driving factors. Regression analysis techniques will be used to assess the influence of individual factors on temperature maintenance loads. These loads will be quantified on a per-unit basis (e.g. Btu/hr per residence) as a function of influential factors (e.g. insulation level).
5. Impacts and Recommendations (1 months): The analysis and findings will provide a basis for recommendations on design guidance and sizing tools. The team will evaluate the results to recommend how existing sizing tools (e.g. Ecosizer) can incorporate a simple set of inputs to account for temperature maintenance loads in their sizing calculations. Additionally, the temperature maintenance loads will also be discussed in relation to different central heat pump water heater design configurations. In other words, the team will discuss how temperature maintenance loads under different conditions may or may not enable alternative system design (return-to-primary and multipass, for example). Recommendations for how the findings can be incorporated into sizing tools will separately consider three temperature maintenance design approaches (electric resistance swing tank, multipass temperature maintenance tank, and return-to-primary). The team will provide recommendations for possible updates to existing distribution and recirculation eTRM measures and the outline for possible new measures, if identified as feasible and promising (e.g. crossover correction and rebalancing).
6. The scope will also include CalNEXT reporting deliverables (preliminary, draft, and final reports). The team will also likely share the findings to industry stakeholders in the form of conference proceedings or working group presentations (such as to the Advanced Water Heating Initiative).

Evaluator Perspective

- Lists specific timeline and category of tasks

# 27a. Cost Breakdown

**27a.** Please provide a rough breakdown of cost items.

- Brand new subitem of the cost question
- Be as specific as possible with the information you have available
- Will assist evaluators with exact cost measurements to compare to scope and timeline

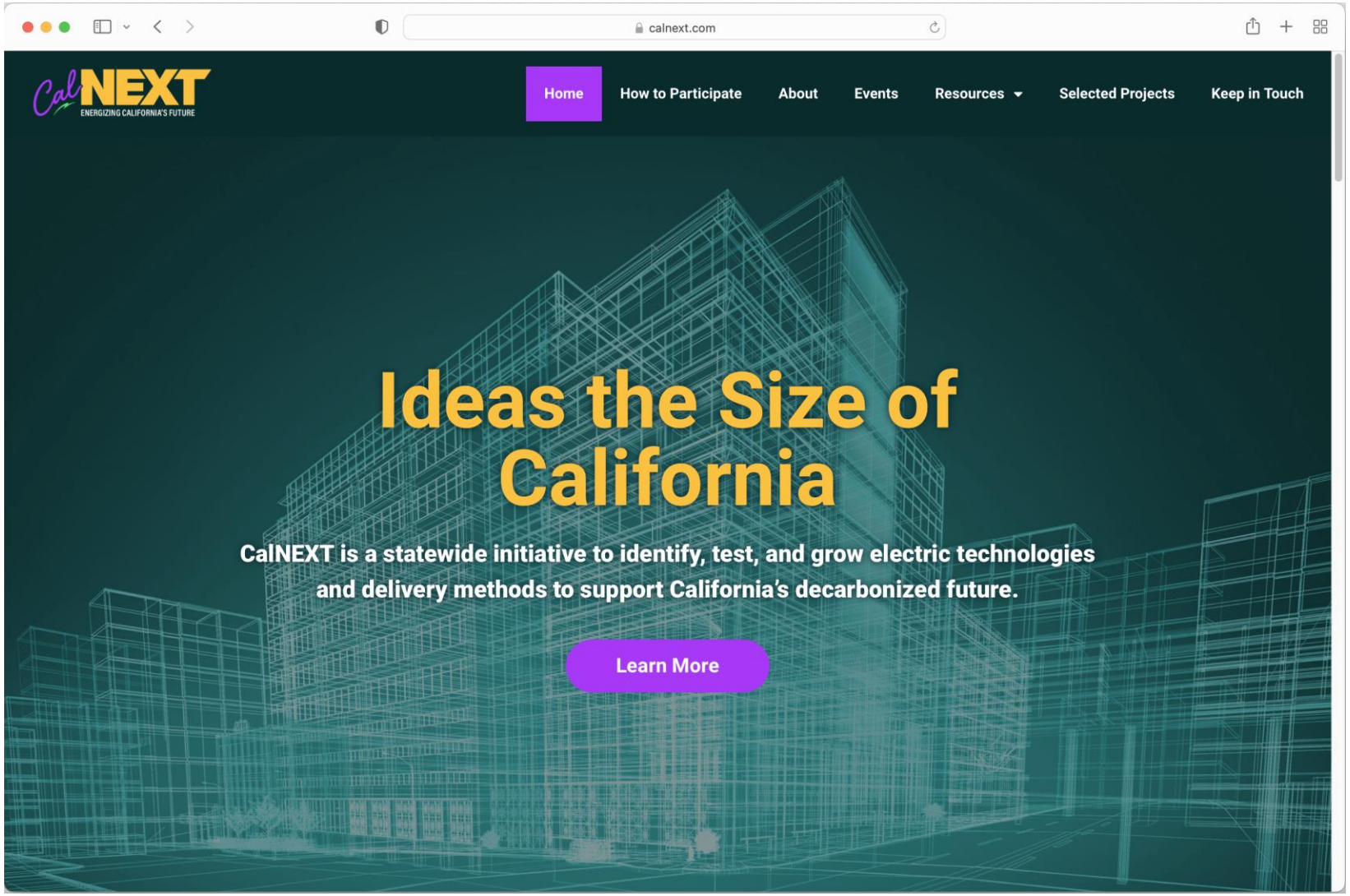
# Poll #2

## What Technology Area(s) are you interested in submitting a project idea for?

Please respond to the Zoom poll

# How to Participate

# CalNEXT.com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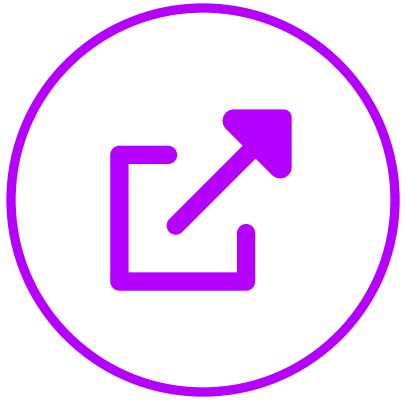
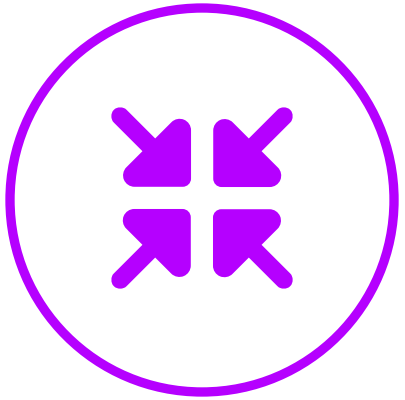
# Project Types



## Technology Support Research

Projects focused on addressing market barriers or developing the commercial capability of *market-ready technologies*.



## Technology Development Research

Projects focused on addressing market barriers or developing the commercial capability of *early-stage technologies*.

# Project Submission

**Submit an Idea**

**Submit a Project**

# Submission Next Steps

# Prioritization Framework

| Criteria | Weighting | Details |
|---|---|---|
| TPM Alignment | 30% | How well the project aligns with the CalNEXT TPMs |
| Benefits | 20% | Whether the project has benefits for the utilities and affects HTR/DACs |
| Quality of Idea | 45% | Clarify of scope, how innovative it is, whether it's ready for implementation, has a clear market strategy, and has a reasonable timeline |
| Cost | 5% | Estimated budget |

# Poll #3

**How likely are you to submit a project or idea before the October 24, 2024 deadline?**

Please respond to the poll

# Q&A

# Thank You!

**Rebecca Rothman** **Zoe Mies**

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