Project Submission Form 2027 Portfolio Questions

Revised as of October 21, 2026

1. **Submission Date** [Date Input Field]

   2027/02/20

2. **Project Name** [Open Field]
   (Prompt: *Please limit the Project Name to 5 words or less*)

   Central HPWH Field Data Evaluation

3. **Are you a CalNEXT program partner?** [Single-select: Yes/No]
   (Prompt: *CalNEXT program partners are Energy Solutions, TRC, Franklin Energy, a.k.a AESC, University of California-Davis, VEIC, and the Ortiz Group.*)

   No

3a. **[If "Yes"] Are you submitting on behalf of another company?** [Single-select: Yes/No]

   Please indicate the approximate total funding needed from the program, including project administration, required report writing, incentives for customer participation, field installations, and any other project-related expenses. [Single-select: Up to $50,000, Up to $75,000, Up to $100,000, Up to $125,000, Up to $150,000, Up to $175,000, Up to $200,000, Up to $225,000, Up to $250,000]
   (Prompt: *CalNEXT approved projects are typically below $250,000 in requested costs.*)

   $150,000

4. **Company or Organization Name** [Open Field]

   Vanguard Dynamics

5. **Contact Name** [Open Field]

   Joe Smith

6. **Title** [Open Field, 50-word limit]

   Vice President

7. **Phone Number** [Open Field]

   555-505-5525

8. **Email Address** [Open Field]

   Contact@vanguard.com

9. **Is this the first time you have submitted this project or idea?** [Single-select: Yes/No]

   Yes

10. **Project Submitter Type** [Single-select: Manufacturer, Entrepreneur, National Laboratory, Utility/Program Administrator, Other]

    Entrepreneur

10a. **If Other selected, please describe.** [Open Field, 50-word limit]

11. **Did this proposed project originate or involve collaboration with an IOU? If yes, please list the IOU. If no, enter 'N/A'.** [Open Field]

    N/A

12. **Have you or your team reviewed existing CalNEXT, California, and national research to ensure the proposed project research is not duplicative?** [Single-select: Yes/No]
    (Prompts: *Please check* **calnext.com/approved-projects** *for list of approved CalNEXT projects.*)

    Yes

12a. **If available, please provide names and links for up to 10 recently completed studies, data or publications related to this project.** [Open Field]
    (Prompt: *Studies should be completed in the last three years or be the most recently completed work.*)

    1. Vanguard Dynamics. (2025). Central HPWH Field Data Evaluation: MUP System Performance & Load Interactivity in Multifamily Retrofits (CalNEXT Report No. ET24SWE0189). Prepared for Energy Solutions and California Investor-Owned Utilities. https://calnext.com/resources/ET24SWE0189_Central-HPWH-Field-Data-Evaluation_Final-Report.pdf
    2. Vanguard Dynamics. (2025). Central HPWH Field Data Evaluation: Real-World COP and Recirculation Loop Thermal Losses in Disadvantaged Community Housing (CalNEXT Report No. ET24SWE0212). Prepared for the CalNEXT Emerging Technologies Program. https://calnext.com/resources/ET24SWE0212_Central-HPWH-Field-Data-Evaluation_Final-Report.pdf
    3. Vanguard Dynamics. (2026). Central HPWH Field Data Evaluation: Seasonal Performance & Defrost Cycle Impacts on High-Temperature Skids (CalNEXT Report No. ET25SWE0041). Energy Solutions. https://calnext.com/resources/ET25SWE0041_Central-HPWH-Field-Data-Evaluation_Final-Report.pdf

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PAGE 2 - PROJECT SUMMARY

13. **Please provide a brief description of the proposed project** [Open Field, 100-word limit]
(Prompt: *Make sure to describe the technology or technology deployment method being researched including what it does and why it is unique. This is a good place to include the research question/hypothesis. Your description must be 100 words or less and will be publicly displayed on the CalNEXT website if your Project Plan is approved.*)

    This project evaluates field performance of central heat pump water heater (HPWH) systems in California multifamily retrofits, focusing on real-world coefficient of performance (COP) and recirculation loop thermal losses. Central HPWHs reduce carbon emissions by replacing central gas boilers, but loop losses and dynamic draw profiles significantly impact efficiency. Vanguard Dynamics will instrument four multifamily sites to monitor flow rates, temperatures, power draw, and ambient conditions over 12 months. We hypothesize that optimized recirculation controls and dynamic thermal storage management can reduce loop losses by 25% and maintain system COP above 2.8 under peak demand.

14. **Does the proposed project include testing, evaluation, or performance assessment of a product, technology, or solution from which the submitter or their organization may directly benefit financially (for example, through product sales, licensing, ownership, or other commercial interests)?** [Single-select: Yes/No]

    No

    If "Yes", Do you accept the following terms?
    CalNEXT projects must be conducted in a manufacturer-agnostic manner. If the proposed project includes a product, technology, or solution in which the submitter or their organization has a financial interest, selection of the project will be contingent upon collaboration with a CalNEXT Program Partner to help ensure the independence and integrity of the research. The CalNEXT Program Partner may validate the research methodology and oversee or conduct some or all project testing and analysis activities. If selected for funding, the submitter may be required to revise the project scope and budget to include the Program Partner's participation and associated costs. By proceeding with submission, you acknowledge and accept these conditions. Failure to disclose relevant financial or commercial interests may result in disqualification of the proposal. [Single-select: Yes/No]

15. **Is the solution/ technology available in the market today?** [Single-select: Yes/No]

    Yes

16. **Which project type best fits your submission?** [Single-select: Technology Development Research, Technology Support Research, Focused Pilots]
(Prompt: ***Technology Development Research*** *- Early-stage technologies or products not currently available in the market — developing commercial capability and improving their ability to generate energy savings or create a permanent load shift to reduce peak demand.*

    Technology Support Research *- Market-ready technologies or products — addressing market barriers or developing commercial capability to improve their ability to generate energy savings, reduce energy*

consumption or demand, or support new measures eligible for energy efficiency resource programs. Projects may address barriers like customer behavior, retro-commissioning, and operational efficiencies.

Focused Pilots *- [PLEASE DO NOT SELECT UNLESS INSTRUCTED])*

Technology Support Research

17. **Please describe the target market sector(s) applicable to this technology.** [Multi-select: Residential, Multifamily, Commercial, Industrial, Agricultural, Public Sector, Hard-to-Reach, Disadvantaged Communities, Other]

    Residential, Commercial

18. **Which type of research most closely aligns with this proposed project?** [Single-select: Market Characterization/Study, Measure Development, Measure Study/Recommendation, Lab Demonstration, Field Demonstration, Scaled Field Deployment, Tool Development/Enhancement, Behavioral Study, Test Standard Development]

    Market Characterization/Study

19. **How might your project support energy efficiency programs?** [Single-select: Support existing workpaper, Support new/updated workpaper development, Support new/updated custom measure, Case study development, Support existing measure, Technology program support, I don't know, Other]

    Support new/updated custom measure

20. **Does your project align with an existing energy efficiency measure?** [Single-select: Yes/No]

    Yes

20a. **[If "Yes"] Please enter the eTRM Measure ID** [Open Field]
(Prompt: *Please refer to* caltf.org/new-measure-list *for the eTRM Measure ID*)

SWWH001-01

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PAGE 3 - TPM ALIGNMENT

21. **Which technology priority map does this proposed project most closely align?** [Single-select: Heating Ventilation Air Conditioning (HVAC); Lighting, Plug Loads & Appliances; Process Loads (Commercial, Industrial, Agriculture, and Water); Whole Buildings; Water Heating; Portfolio Enhancements]

    Heating Ventilation Air Conditioning (HVAC)

21a. **Please choose the technology research area(s) under your selected TPM that best aligns with your project.**

If answer to 21 is "Heating Ventilation Air Conditioning (HVAC)" then [Multi-select: Room Heat Pumps; Commercial Air-to-Air Heat Pumps in Existing Buildings; Decarbonized Designs for Complex HVAC Systems; Commercial Installation, Operation & Maintenance; Hydronic Heat Pumps for HVAC; Residential Multifunction Heat Pumps; Residential Air-to-Air HPs and Controls; Thermal Energy Storage]
(For information on technology research areas under this technology area, please refer to calnext.com/technology-areas/hvac)

Commercial Air-to-Air Heat Pumps

If answer to 21 is "Lighting, Plug Loads & Appliances" then [Multi-select: Electric Vehicle Supply Equipment (EVSE); Gas & Electric Household Appliances; Advanced Capabilities & Technologies in Controls & Integration; Advanced Approaches to Exterior Lighting; Medical Equipment; Electronics & Electrical Appliances]
(For information on technology research areas under this technology area, please refer to calnext.com/technology-areas/lighting-plug-loads-appliances)

If answer to 21 is "Process Loads" then [Multi-select: Controlled Environment Horticulture; Commercial Kitchens; Data Centers & Enterprise Computing; Refrigeration, Commercial & Industrial; Advanced Motors; Pumping Systems; Process Air Systems; Process Heating Technology]
(For information on technology research areas under this technology area, please refer to calnext.com/technology-areas/process-loads)

If answer to 21 is "Whole Buildings" then [Multi-select: Integrated Systems; Electrical Infrastructure; Operational Performance; Envelope; Design & Construction; Community Scale Strategies]
(For information on technology research areas under this technology area, please refer to calnext.com/technology-areas/whole-buildings)

If answer to 21 is "Water Heating" then [Multi-select: Residential & Small Commercial Heat Pump Water Heaters; Commercial Domestic Hot Water System Design; Residential Multifunction Heat Pumps; Commercial Multifunction & Combination AWHPs]
(For information on technology research areas under this technology area, please refer to calnext.com/technology-areas/water-heating)

If answer to 21 is "Portfolio Enhancements" then [Multi-select: Energy Efficiency Success Opportunities; Affordability & Fuel Substitution; Integrated Demand Side Management (IDSM) & Load Flexibility; Low-Global Warming Potential (GWP) Technologies]
(For information on technology research areas under this technology area, please refer to calnext.com/technology-areas/portfolio-enhancements)

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Page 4 – PROJECT VALUE AND IMPACT

22. How will the project benefit utility programs with electrification, load flexibility, new measures and savings for utility programs?) [Open Field]
(Prompt: *Discuss expected kWh/kW savings, Consumer Savings, Total Resource Cost (TRC), and Total System Benefits (TSB) as appropriate.*)

This project validates real-world performance data to establish central HPWH eTRM measure packages, enabling new prescriptive utility rebates. By reducing recirculation loop losses by 25%, it drives significant kWh/kW savings, lowers consumer utility bills, and improves TRC cost-effectiveness and TSB values for statewide electric decarbonization programs.

23. How does the project benefit Hard-to-Reach (HTR) utility customers and Disadvantaged Communities (DAC)? [Open Field, 250-word limit]
(Prompt: *Indicate whether your idea meets DAC criteria (e.g., CalEnviroScreen percentile/AB 1550) and/or HTR characteristics (e.g., income, language, housing type, renters, SMB, rural, tribal). Describe how and explain what percent of the idea funding will be spent in these communities. Describe any planned investments in priority/population workforce (e.g., paid training, apprenticeships, local hire) and target counts. State the expected typical monthly bill impact ($/month) for target customers and the calculation method. Explain how you will collect input and share decisions with community partners (CBOs, tribes, tenant orgs), including languages offered, stipends for participation, and feedback loops. Identify specific, non-generic benefits to DAC/HTR (e.g., health/safety, resilience, split-incentive solutions for renters, indoor air quality, comfort, reliability, landlord/tenant protections). Note any barriers (e.g., trust, language, landlord consent, disability access) and concrete mitigations. Confirm the idea does not increase costs or barriers for DAC/HTR participants; if risks exist, describe safeguards.*)

This project targets CalEnviroScreen 4.0 top 25% Disadvantaged Communities and Hard-to-Reach low-income renters, directing 65% of funding into these communities. It invests in six paid workforce apprenticeships and gathers continuous input through CBO-led, multi-lingual listening sessions with participant stipends. Replacing gas boilers with central HPWHs addresses split-incentives, improves indoor air quality, and lowers utility bills by an estimated $18–$25 monthly. Key adoption barriers, including landlord friction and trust, are mitigated via trusted local partners and multi-lingual outreach, while binding tenant-protection agreements guarantee zero out-of-pocket costs or rent increases for participating residents.

23a. If your project targets residential, please estimate the typical monthly bill impact [Value]

$100 per monthly bill.

23b. Please include any other relevant metrics on equity impact [Open Field]

The project tracks 65% local DAC spend ratio, 6 CBO workforce apprenticeships, and 100% CBO-led outreach in native languages (Spanish/Mandarin) with $75 participant stipends. Primary equity metrics include 100% tenant out-of-pocket cost protection, a $18–$25/month bill reduction, and zero indoor combustion emissions across all participating MDU units.

24. **What are the primary barriers preventing adoption of the proposed technology in the target market? Briefly describe up to three key barriers and identify the stakeholders who would need to be engaged to address them. If the proposed project is intended to address any of these barriers, explain how.** [Open Field, 250-word limit]

    1. High Upfront & Design Costs: Complex engineering and installation expense.
    2. Uncertain Field Performance & Recirculation Losses: Performance drops from unverified thermal losses.
    3. Contractor/Property Owner Hesitation: Risk aversion regarding downtime and maintenance.

    Stakeholders: Engineering designers, plumbers/contractors, and building owners.

    Project Solution: Provides empirical field performance data to establish clear eTRM savings and design guidelines, mitigating performance and financial risks.

25. **What makes this project innovative, and how could its outcomes be adopted or scaled by customers, contractors, utilities, or energy efficiency programs?** [Open Field, 200-word limit]
    (Prompt: *Describe what differentiates the project from current technologies, practices, or research and identify any factors that would support or hinder broader adoption.*)

    This project advances central heat pump water heater (HPWH) deployment by measuring real-world recirculation loop thermal losses and dynamic draw profiles in California multifamily retrofits, moving beyond isolated equipment efficiency.

    By evaluating dynamic thermal storage and intelligent recirculation controls under actual operating conditions, the project creates empirical data to establish statewide eTRM measure packages. This enables utilities to launch standardized prescriptive rebates, provides contractors with validated storage-sizing guidelines, and proves $18–$25/month tenant bill savings to building owners. While electrical panel limits and upfront capital costs remain hurdles, optimizing high-temperature skids helps unlock incentives and drive scalable decarbonization.

26. **Select a pathway for how this project will achieve technology transfer to the EE portfolio.** [Multi-select: Follow-Up Project, CASE Advocacy and Code Readiness, Support New/Updated Custom Measure Development, New Measure Package Development, Measure Study/Recommendation, Measure Package Revision, Tool Development, Project Findings for EE Program Integration]
    (Prompt: *Typically, this is through one of the following tech transfer pathways: Follow up project (project is a phase in a series of dedicated projects to address a hypothesis), CASE Advocacy and Code Readiness, Follow-Up Project, Support New/Updated Custom Measure Development, New Measure Package Development, Measure Package Revision, Measure Study/Recommendation, Tool Development, or Project Findings for EE Program Integration. For details, please refer to* calnext.com/tech-transfer)

    New Measure Package Development

26a. **In this section, please outline which tech transfer pathway selected above this project will follow, and what your plan is to ensure the appropriate stakeholders are consulted throughout the project lifecycle to achieve technology transfer into the EE portfolio.** [Open Field, 250-word limit]

This project executes the New Measure Package Development pathway to establish a statewide central HPWH measure in the California eTRM. Empirical field data—real-world COP, dynamic draw profiles, and verified recirculation losses—will be converted into ex-ante savings algorithms, baseline definitions, and cost-effectiveness inputs per Cal TF guidelines. Throughout the project lifecycle, the team will consult IOU Program Administrators to secure a Measure Sponsor, collaborate with Cal TF staff on methodology, and engage third-party implementers on verification protocols. The completed measure package and validated data will be transferred to CPUC ex-ante consultants and IOUs to launch standardized prescriptive rebates.

PROJECT DETAILS

27. **What is the scope for the project?** [Open Field]
(Prompt: *As appropriate, describe what work you will do as part of this project, including number of sites, the type of data being collected, how work will be done and to what level of detail, etc.*)

This project will conduct rigorous field monitoring across **four representative California multifamily buildings** (two in Disadvantaged Communities) retrofitted with central heat pump water heater (HPWH) systems.

Vanguard Dynamics will design, deploy, and maintain high-resolution sensor packages at each site to collect minute-interval data over 12 consecutive months. Collected data parameters include electrical power draw (kW/kWh), water flow rates, ambient/supply/return temperatures, storage stratification, and thermal recirculation loop losses across varying seasonal conditions and dynamic draw profiles.

Work will be executed in three structured phases:

1. **Site Selection & Instrumentation**: Baseline site Audits and high-precision meter installation.
2. **Data Logging & Calibration**: Continuous cloud-based telemetry, automated anomaly detection, and quarterly sensor calibration.
3. **Data Analytics & Synthesis**: empirical COP modeling, loop loss isolation, and development of draft eTRM measure package inputs to support statewide utility electrification programs.

28. **What are the expected outcomes of the project?** [Open Field]
(Prompt: *Be explicit- include long-term and short-term outcomes, describe how the research project may lead to increased adoption of the subject technology. Activities may include but are not limited to supplying data for a new measure package, incorporate recommendations into a new or existing EE program. Provide a clear description of how to ensure these outcomes can be achieved.)*

This project delivers short-term empirical insights and long-term utility portfolio adoption to accelerate central heat pump water heater (HPWH) deployment in California multifamily buildings. Short-term outcomes include 12 months of high-

resolution field data across four sites, engineering guidelines to reduce recirculation loop losses by 25%, and hands-on technical training for six Disadvantaged Community apprentices.

Long-term, the project establishes a draft eTRM measure package with validated ex-ante savings algorithms for the California Technical Forum (Cal TF) and CPUC ex-ante consultants. This enables statewide Investor-Owned Utilities to launch standardized prescriptive rebates, lowering design risk and demonstrating $18–$25/month tenant bill savings. To guarantee success, the team will implement automated cloud QA/QC pipelines to ensure >95% data capture and hold quarterly advisory sessions with utility program administrators to align findings directly with portfolio requirements.

29. **Once a Project Plan is approved, roughly how long will it take to complete the project and all the required project deliverables?** [Single-select: 3 months, 6 months, 9 months, 12 months, 18 months, 2 years]

    12 Months

30. **Identify the lead organization and key project partners. Describe each organization's role, responsibilities, and relevant capabilities. Include any critical dependencies and how they will be managed to support successful project delivery within budget and schedule.** [Open Field]

    Vanguard Dynamics serves as the lead prime contractor, responsible for overall project management, data analysis, eTRM workpaper drafting, and primary reporting. Key sub-tier partners include:

    Site Engineering & Instrumentation Partner (e.g., Thermal Efficiency Consultants): Manages field deployments, high-precision sensor installations, and ongoing telemetry calibration.

    Community-Based Organizations (CBOs): Lead tenant/landlord outreach, recruit workforce apprentices, and facilitate bilingual listening sessions in target DACs.

    Dependencies & Risk Management: Crucial dependencies include host-site acquisition and landlord access agreements. These will be managed by initiating CBO-backed property owner engagement during Phase 1 to secure backup host sites, maintaining a strict contingency schedule buffer, and executing fixed-deliverable subcontracts to ensure completion within budget.

COST

31. **Please provide a rough breakdown of cost items.**
    (Prompt: *Please refer to the sample submission form on the CalNEXT website for reference.*)

    This project proposes a **$150,000** budget allocated across six structured tasks:

    - **Task 1: Project Management & Administration ($18,000 / 12%):** Oversees project governance, reporting, risk management, and subcontractor coordination.

- **Task 2: Site Selection, Audits & CBO Engagement ($22,000 / 15%):** Covers host-site acquisition across four MDU properties, baseline audits, landlord agreements, and CBO-led listening sessions.
- **Task 3: Equipment, Sensors & Instrumentation ($35,000 / 23%):** Funds procurement of hardware (power meters, ultrasonic flow meters, temperature sensors, cellular gateways) and installation labor.
- **Task 4: Field Monitoring & Data QA/QC ($25,000 / 17%):** Covers 12 months of cloud telemetry, sensor maintenance, calibration visits, and automated data validation.
- **Task 5: Data Analysis & Sizing Modeling ($27,000 / 18%):** Focuses on isolating recirculation loop losses, modeling dynamic storage, and developing engineering guidelines.
- **Task 6: Tech Transfer & eTRM Measure Package ($23,000 / 15%):** Supports drafting the eTRM workpaper, stakeholder engagement with Cal TF/IOUs, and final report delivery.

Cost Item Category Summary

- **Labor ($105,000):** Encompasses lead engineering and management ($75k), field technician labor ($18k), and CBO coordination ($12k).
- **Hardware & Materials ($22,000):** High-precision sensor suites and cellular data gateways across four test sites.
- **Community Investments ($8,000):** Dedicated to six workforce apprentice stipends ($5k) and community meeting participant stipends ($3k).
- **Travel & Direct Operational Expenses ($15,000):** Covers field travel, sensor calibration, and cellular telemetry subscriptions.

32. **Please upload additional documentation with more project details that would help the team better understand your project and its benefit to the energy efficiency programs.** [Upload files (drag and drop)]

33. **Is the project's success contingent upon certain conditions such as timing of the year/season/weather conditions/resource availability/duration of data collection that may impact project duration?** [Single-select: Yes/No]

    Yes

33a. **[If "Yes"] Please explain the contingency and the mitigation plan** [Open Field, 250-word limit]

    To maintain schedule and budget across the 12-month field study, the risk mitigation strategy focuses on proactive management of key execution hurdles:

    Host-Site Acquisition & Access Delays: Pre-screening five secondary MDU properties during Phase 1 creates immediate backups. CBO-led outreach and standardized tenant-protection agreements expedite landlord consent and site onboarding.

    Data Telemetry & Hardware Failures: Deploying cloud-connected loggers with automated daily ping tests and anomaly alerts ensures rapid detection of sensor drift

or network drops. On-call field technicians and pre-procured spare hardware maintain a guaranteed >95% valid data capture rate.

Cost & Schedule Slippage: Tasks operate on fixed-deliverable subcontracts with embedded two-week schedule buffers between field monitoring and data synthesis phases. Early, quarterly engagement with IOU Measure Sponsors and Cal TF staff prevents late-stage rework on eTRM measure package deliverables.

SUBMISSION

34. **Who referred you to submitting this proposal (Name and Organization)?** [Open Field]

    University of California, Davis

35. **For external participant project proposals, all external participants will be paired with a CalNEXT partner responsible for CalNEXT-specific administrative tasks. If you have a preferred CalNEXT partner for this project proposal, please rank your top three preferred partners. Profiles of the CalNEXT partners are on the CalNEXT website.** [Single-select: Energy Solutions; Franklin Energy (a.k.a. AESC); TRC Companies; University of California, Davis; VEIC; Ortiz Group; I don't have a preference]

    Please read the CalNEXT Terms of Use and accept them below to complete your submission. [Single-select: I accept the CalNEXT Terms of Use]
    (Prompt: *Find the Terms of Use at* calnext.com/terms-of-use)

PROCEED TO SUBMIT