



Project Submission Form Questions

Prepare your answers in advance, then fill out the form online at calnext.com/how-to-participate/#project

Please note, all fields are required.

PROJECT TEAM INFORMATION

1. Submission Date

January 1, 2022

2. Project Name

Market Study of Electric Infrastructure Upgrade Alternatives

3. Company or Organization Name

Phoenix Electric, LLC

4. Contact Name

Edith Clarke

5. Title

Owner

6. Phone Number

555-555-5555

7. Email Address

eclarke@phoenixelectric.org

8. Project submitter type:

Entrepreneur ▼

8a. If Other selected, please describe.

n/a

9. Have you or your team reviewed available websites and resources to ensure the proposed project research is not duplicative?

Yes ▼

9a. If available, please provide names and links of recently completed studies related to this project.

Studies should be completed in the last three years or be the most recently completed work.

The project team has identified many resources to utilize during the project. Our research will complement existing work and build out areas that have not been addressed in the California market through other projects. Please see below for a list of resources which the project team reviewed to ensure the proposed project is not duplicative. These resources provide clear documentation of the barrier to adoption, and they offer some technologies which might mitigate it, but they do not include a comprehensive overview of all relevant technologies. This project will leverage and expand on these resources to develop a comprehensive overview of all known technologies (including key characteristics such as cost, target end-use, and interoperability) which serve as alternatives to traditional electric infrastructure upgrades associated with residential electrification in California.

1. "Service Upgrades for Electrification Retrofits Study Draft Report" completed by NV5 Inc. and Redwood Energy <https://pda.energydataweb.com/#!/documents/2602/view>

2. "Addressing an Electrification Roadblock: Residential Electric Panel Capacity" by Pecan Street

<https://www.pecanstreet.org/2021/08/panel-size/>

3. "A Pocket Guide to All-Electric Retrofits of Single-Family Homes" by Redwood Energy <https://www.sanjoseca.gov/home/showpublisheddocument?id=69602>

4. "Electrification won't break the grid, it will make it smarter" by Rewiring America <https://www.rewiringamerica.org/circuit-breakers-the-grid>

5. "Electric Vehicle Infrastructure Cost Analysis Report for Peninsula Clean Energy (PCE) & Silicon ValleyClean Energy (SVCE)" by Energy Solutions

https://bayareareachcodes.org/wp-content/uploads/2020/03/PCE_SCVE-EV-Infrastructure-Report-2019.11.05.pdf

6. "New tools and tech to prep your electrical panel for an all-electric home" by Canary Media

<https://www.canarymedia.com/articles/electrification/new-tools-and-tech-to-prep-your-electric-panel-for-an-all-electric-home>

7. "Smart electric panels in homes could prevent overtaxing the grid" by Canary Media

<https://www.canarymedia.com/articles/grid-edge/smart-electric-panels-in-homes-could-prevent-overtaxing-the-grid>

8. "Electric Vehicle Energy Management Systems" by CSA Group

https://www.csagroup.org/wp-content/uploads/CSA-RR_ElectricVehicle_WebRes.pdf

Includes a thorough list of completed and ongoing studies. If available, past emerging tech studies are valuable. Links are beneficial compared to generally referencing studies by name.

10. Please provide a brief description of the proposed project that will serve as the public description of the project.

Additionally, make sure to describe the technology such as what it does and why it is different. Target your brief description to 500 words.

Phoenix Electric, LLC proposes to conduct a market study which will include a product assessment of technologies which can minimize or completely avoid the need for an electric panel upgrade or other infrastructure work associated with residential electrification projects. Electrifying home appliances – such as space and water heating, cooking, clothes drying, and EV charging – may require more electric capacity than is currently available. Increasing that capacity may involve upgrading residential electric infrastructure such as the electric panel or could involve more involved utility service upgrades. There are a host of emerging technologies such as smart panels, circuits, switches, and plugs which can be used to minimize or avoid this household electric infrastructure work. This project will include the development of a simple, public facing reference document to help customers and contractors assess alternative solutions to minimize residential electrification project cost and time. Phoenix Electric, LLC will review literature and conduct secondary research to inventory research to date on this topic. Once we identify gaps, Phoenix Electric, LLC will conduct primary research focused on collecting insights from key stakeholders such as electrical and installation contractors, technology providers, and manufacturers, utility program managers, residential homeowners, and property managers.

The answer is concise and to-the-point. Answers should not include confidential or customer information.

11. Is the solution/technology available in the market today?

Which best describes the current state of the solution? Check all that apply.

- ☒ It is commercially available
- ☐ It has finished conducting field demonstration(s)
- ☐ It has finished conducting lab demonstration(s)
- ☐ It has completed prototype development
- ☐ Not Sure

CalNEXT is for projects that are commercially available today or can be in 1 to 5 years.

12. Please describe the target market sector applicable to this project.

For example, Residential, Multifamily, Commercial, Hard to Reach (HTR) customers, Disadvantaged Communities (DAC), Commercial, Industrial, Agricultural, Other

Residential (single-family and multifamily) with an important focus on solutions which are best positioned to mitigate household electric infrastructure barriers for HTR customers and DACs.

13. Which type of research most closely aligns with this proposed project?

Market Characterization/Study



14. Which technology area does this proposed project most closely align?

Whole Buildings



TPM / PORTFOLIO PRIORITY

- 15.** 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.

For more information and to review the TPMs, please visit:

calnext.com/wp-content/uploads/2022/06/CA_Electric_TPMs.pdf

This technology area aligns with the Whole Buildings (Residential) Technology Family, within the Whole Buildings Technology Category. Electrified HVAC and service hot water is a leading technology. This project will address the following barriers noted in the Whole Buildings (Residential) Technology Family: "Existing buildings, infrastructure upgrade costs, technology adaptation barriers" and "Initial cost barriers." The ETP Priority for the Whole Buildings (Residential) Technology Family is High, and the Market Knowledge Index and Program Interventions Indexes are Low. This project would serve to increase market knowledge on a key Whole Buildings barrier to electrification and may result in Program Interventions such as pilots or demonstrations of promising technologies, or to prove out the ability to maintain loads below installed household and utility capacity thresholds. Additionally, the Energy Savings Potential, Decarbonization Potential, C&S Alignment and Demand Flexibility Potential all rank as "High" for the identified technology family.

Here the submitter clearly explains why their project aligns with the TPMs and to what degree

BENEFITS

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

This proposed project is directly aimed at reducing barriers to electrification and all the associated utility benefits from electrified customers including the potential for load flexibility, new measures and savings, and widespread adoption of electrification technologies such as high efficiency heat pumps. Certain alternatives to traditional panel upgrades and other household electric infrastructure include smart technologies which can communicate across devices and with software platforms which aggregate loads and can provide load flexibility to the IOUs.

Be precise and to the point.

17. How does the project advance state priorities for decarbonization by reaching Hard-to-Reach(HTR) customers and Disadvantaged Communities (DAC)?

If the project supports HTR and DAC, describe how and explain what percent of the project funding will be spent in these communities. Is there project funding for disadvantaged workers?

Traditional electric panel or other household electric infrastructure which may be required to electrify can cost customers upwards of a thousand dollars. To assess alternatives and communicate them in a way that works for all California residents, this project will place an important focus on addressing electric infrastructure upgrade barriers for HTR customers and DACs. Through this project, the team will engage with electric and installation contractors serving HTR customers and DACs to surface unique barriers related to household electrical infrastructure upgrades and highlight in the Final Report products which may be best positioned to mitigate those barriers.

This field should explain both how the implementation of the project will directly benefit HTR/DAC communities (ex. Demonstration site is in a [CalEnviroScreen](#) designated area) AND how the results of the project may benefit HTR/DAC communities after the project is over

18. What is the scope for the project?

This project will conduct a market assessment of technologies which minimize, or altogether eliminate, the need for potential household and/or utility infrastructure upgrades required to electrify households. This assessment will focus on commercially available products but will also include insights on emerging technologies in pilot or research phase which plan for commercial deployment in the short-term. The assessment will be done for technologies which serve single-family and multi-family residential applications. An important focus will be on identifying products which are best positioned to mitigate barriers to adoption for HTR customers or DACs.

The scope of this project includes the following tasks:

- 1. Review literature and conduct secondary research to inventory technologies and products which may allow customers to avoid household and/or utility infrastructure work associated with residential electrification.*
- 2. Categorize those technologies into meaningful groups (i.e., smart panels, smart plugs or switches, smart circuits, and/or other), and document key characteristics of each category and technology (i.e., range of costs, ideal use-case(s) such as electric space and water heating, EV charging, induction cooking, electric clothes dryers, or heat pump clothes dryers), level of sophistication such as advanced control vs. simple on/off, and/or product maturity).*
- 3. Once gaps are identified, conduct primary research such as interviews and surveys with relevant stakeholders to collect insights and surface barriers related to electric infrastructure upgrades associated with whole building electrification. Relevant stakeholders*

A strong scope of work will include a succinct overview of the proposed project, including which market(s) will be focused on. The scope will include major tasks/milestones along with deliverables which will incorporate short term outcomes (what is expected immediately after the project is complete) and long term outcomes (how the work translates to energy efficiency programs, codes & standards, market transformation programs, and stakeholder benefit).

Answer continued on next page ↓

may include electrical and installation contractors, technology providers, manufacturers, utility program managers (such as the Kings Utility District and West Coast Power), residential homeowners, and property managers (specifically for multi-family dwellings). As part of this task, we will include representation from DAC/HTR communities to ensure unique barriers are identified.

4. Develop a simple public-facing resource which synthesizes the findings in Tasks 1-3. Provide this resource and recommendations related to outreach and education to the IOUs for their use in engaging with their customers and contractors in reducing barriers to electrification. Recommendations may include technologies for the IOUs to consider adding to the incentive programs and/or project marketplaces.

19. What are the expected outcomes of the project?

The expected project outcomes include:

1. Provide primary and secondary market research to categorizes and highlights key characteristics of emerging technology that avoid the need for traditional electric infrastructure upgrades associated with whole home electrification.
2. Produce actionable recommendations for CA IOU (EE, Electrification, Workforce Education/Training), C & S for:
 - a. Energy savings,
 - b. cost impacts and emissions savings
 - c. Program design measure development
 - d. HTD and DAC-specific considerations
3. Deliver in the Final Report the results of the research in a simple public facing document for program administration use in engaging with key stakeholders such as consumers and contractors, with a special focus on engaging HTR and DAC communities.

Outcomes should describe the direct expected outcomes of the project in the short and longer term. The expected outcome should tie into the what was described in the scope.

20. What is the time frame to complete the project and all the required project deliverables?

Project should start within 6 months of submitting this form; if not possible, please email info@calnext.com

7 months to 1 year

Provide a realistic time frame for completion.

21. Please explain the business case and justification for the project. If the project will include measure/savings research and/or testing, please explain how.

Include why this is different from incumbent technology, what benefits there will be to customers, and any energy, carbon or demand reduction estimates. Include calculation/justification for estimates.

According to the California Air Resources Board (CARB), the residential sector produced 8% of the state's emissions from 2000-2019. To achieve California's ambitious climate goals (i.e., 40% GHG reduction by 2030, and 80% GHG reduction by 2050 – based on 1990 levels), the adoption of residential electrification must increase, at an accelerated pace. One barrier to residential electrification is the electric panel – from both a cost and schedule perspective. If not mitigated, this barrier will impact the ability for the State to achieve its electrification goals such as establishing 3 million climate-ready homes and 6 million heat pumps by 2030.

Electrifying home appliances – such as space and water heating, cooking, clothes drying, and EV charging – may require more electric capacity than is currently available. Increasing that capacity can be expensive, logistically challenging, and require a long lead time if utility-sided work is required. There are a host of emerging technologies such as smart panels, circuits, switches, and plugs which can communicate with electric devices to optimize consumption to meet certain constraints. One key constraint, which is a barrier to electrification, is the capacity of the installed electrical panel. These smart technologies may ensure that the load at any given time does not exceed the installed panel capacity, avoiding the need for expensive panel upgrades, or more expensive and impactful utility upgrades. Estimated costs to increase electrical capacity in residential homes varies, but a recent analysis by leading experts estimate that cost may range “between approximately \$2,000 to well over \$30,000” and may require a “lead time up to 6 months” if utility work is required.

Rewiring America estimates that within the US, “50-60 million single-family homes (or approximately 60-70 percent) have electrical panels with ratings less than 200 amps” which would likely require a panel upgrade to electrify. To increase the adoption of whole home electrification, and ultimately achieve California's ambitious decarbonization goals, it will be critical to address the electric panel as a barrier to whole home electrification in retrofits. This project aims to support that.

The short-term benefits of this project are that it will provide California residents and electrical contractors with insight into alternatives which may reduce a barrier to residential electrification, and result in increased adoption of electrified devices in single-family and multi-family homes.

With increased residential electrification, the long-term benefits may include progress towards the State's climate and clean energy deployment goals and reduced greenhouse gas emissions. If this project leads to a pilot or field demonstration, another long-term benefit may be proving out the ability of these technologies to maintain load given installed capacity constraints, which utilities may consider incorporating into their planning or demand-side management programs.

This is a great place to discuss what sets your research, product, or deployment method apart from what has already been done. Consider specifying what energy programs or codes & standards you would like the results of your project to inform.

22. Please describe what you know about the market landscape, potential barriers, and paths to engage the market. Does the project include research to address these items? If so, how?

Please reference sources of market scan or research and share methodology of these assumptions.

Much of the work done to date on formally assessing the market landscape and potential barriers has been reviewing the resources listed in Question 9. The major barrier that this project aims to address is the lack of knowledge of homeowners and contractors of alternatives to traditional panel upgrades and infrastructure work. This barrier is noted throughout the resources listed in Question 9 but is perhaps most clear in the first key finding of the recent Watts Inc. and Greenwave Energy [source: www.study.com] study which found that "Most customers and contractors are unaware of available options to mitigate the need for a panel upgrade that would trigger a Service Upgrade." This project would inventory and characterize those options and develop public facing materials for homeowners and contractors to reference those options when planning projects.

This is where you can tell us what you know about the potential demand for the project technology, what the barriers are for meeting or expanding that demand, and how your project can address some of those barriers.

23. Explain how you are delivering the project. Who are the critical project partners that you will be including to support you with the work?

For example, identify the manufacturer, another consulting firm, lab or local California-based customer(s) you might use for a demonstration or deployment project, etc. Share as much as you can to help us understand how you will deliver this project cost effectively and within the time frame.

Preliminary Schedule

- (Month 1-2) Scope, Schedule, and Budget Finalization - The final project scope, schedule, budget approach, and research and modeling details will be refined based on available secondary research and initial research gaps identified. Primary research participants will be identified. Stakeholders to provide project guidance and feedback will be identified.
- (Month 3-6) Market Study – Review product literature, provide primary and secondary research, inventory research, gather insights on customer needs and product testing.
- (Month 5 – 12) Analysis and Reporting. Identify and detail low-cost, readily available solutions for adoption, especially those that would be successful in disadvantaged communities (DACs). Develop public facing document and draft and finalize Reports.

Collaborators, Subcontractors, and Advisors

- Phoenix Electric, LLC – Project management, planning, reporting, lead market researcher and analyst, technical evaluation, and stakeholder engagement support with primary focus on complementing national initiatives
- Infinity Group – If this project is accepted, Phoenix Electric, LLC will engage with Infinity Group to support and enhance the DAC elements of the project, and support field work (such as outreach) associated with it.

Bullet points are suitable with monthly timelines.

Highlight partnerships and explain how the project would benefit as a result.

COST

24. If funding is requested for your proposed project, please indicate the approximate funding needed from the program, including any incentives for customer participation and field installations.

\$--- / --- (please choose your anticipated range) ▼

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 ↑

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