California Energy Commission
October 08, 2025 Business Meeting
Backup Materials for Community Energy Labs, Inc.

The following backup materials for the above-referenced agenda item are available in this PDF packet as listed below:

1. Proposed Resolution
2. Grant Request Form
3. Scope of Work

[PROPOSED]

RESOLUTION NO: 25-1008-XX

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: Community Energy Labs, Inc.

RESOLVED, that the State Energy Resources Conservation and Development Commission (CEC) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the CEC approves agreement EPC-25-023 with Community Energy Labs, Inc. for a $1,662,421 grant. This project involves the deployment of a system that integrates the Internet of Things, hardware, and software as a service using machine learning to drive down the cost of powerful Model Predictive Control (MPC) in 10–50 K-12 school sites across the state. The goal is to demonstrate a scalable, affordable solution for communities needing to manage changing utility rates, heating, ventilation, and air conditioning electrification, as well as energy codes. Widespread adoption of low-cost MPC in commercial buildings can collectively reduce peak energy demand, improve grid stability, and lower blackout risks; and

FURTHER BE IT RESOLVED, that the Executive Director or their designee shall execute the same on behalf of the CEC.

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the CEC held on October 08, 2025.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

_____
Kim Todd
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 01/2024)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

IMPORTANT: New Agreement # to be completed by Contracts, Grants, and Loans Office.

New Agreement Number: EPC-25-023

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Molly Mahoney
3. MS-:None
4. Phone Number: 916-776-0790

C. Recipient's Information

1. Recipient's Legal Name: Community Energy Labs, Inc.
2. Federal ID Number: 84-4242106

D. Title of Project

Title of project: Smart Control Automation and Learning for Energy (SCALE)

E. Term and Amount

1. Start Date: 10/8/2025
2. End Date: 3/31/2030
3. Amount: $1,662,421.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 10/8/2025 .
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Ayat Osman
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: EPIC (Electric Program Investment Charge).

Agenda Item Subject and Description:

Community Energy Labs, Inc. Proposed resolution approving agreement EPC-25-023 with Community Energy Labs, Inc. for a $1,662,421 grant and adopting staff's recommendation that this action is exempt from CEQA. This project involves the deployment of a system that integrates the Internet of Things, hardware, and software as a service using machine learning to drive down the cost of powerful Model Predictive Control (MPC) in 10–50 K-12 school sites across the state. The goal is to demonstrate a scalable, affordable solution for communities needing to manage changing utility rates, heating, ventilation, and air conditioning electrification, as well as energy codes. Widespread adoption of low-cost MPC in commercial buildings can collectively reduce peak energy demand, improve grid stability, and lower blackout risks. (EPIC funding) Contact: Ayat Osman

G. California Environmental Quality Act (CEQA) Compliance

1. **Is Agreement considered a "Project" under CEQA?**
   Yes

If yes, skip to question 2.

If no, complete the following (PRC 21065 and 14 CCR 15378) and explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because:

2. If Agreement is considered a "Project" under CEQA answer the following questions.

a) Agreement **IS** exempt?

Yes

Statutory Exemption?
No

If yes, list PRC and/or CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

PRC section number: None

CCR section number: None

Categorical Exemption?
Yes

If yes, list CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

CCR section number: Cal. Code Regs., tit. 14, § 15301 ;

Common Sense Exemption? 14 CCR 15061 (b) (3)
No

If yes, explain reason why Agreement is exempt under the above section. If no, enter "Not applicable" and go to the next section.

This project will involve the deployment of an integrated Internet of Things, hardware, and software as a service control that uses machine learning to drive down the cost of utility costs in 10-50 existing K-12 schools in California. There are no planned expansions of the site, and there will be no excessive generation of noise or odors anticipated, with no hazardous waste involved. For these reasons, the proposed work will not have any significant effect on the environment and is exempt under Cal. Code Regs., tit. 14, Section 15301.

Cal. Code Regs., tit. 14, Section 15306, provides that projects which consist of data collection, research, experimental management, and resource evaluation activities, and which do not result in a serious or major disturbance to environmental resources, are categorically exempt from CEQA. In this project, data and information will be collected on the performance of heating, ventilation, and air conditioning energy load. For this reason, the proposed work will not have any significant impact on the environment and is exempt from CEQA under Cal. Code Regs., tit. 14, Section 15306.

Additionally, the project will not impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant

to law by federal, state, or local agencies; does not involve any cumulative impacts of successive projects of the same type in the same place that might be considered significant; does not involve unusual circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project site is not included on any list compiled pursuant to Government Code section 65962.5; and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project, and this project will not have a significant effect on the environment.

b) Agreement **IS NOT** exempt.

IMPORTANT: consult with the legal office to determine next steps.

No

If yes, answer yes or no to all that applies. If no, list all as "no" and "None" as "yes".

Additional Documents	Applies
Initial Study	No
Negative Declaration	No
Mitigated Negative Declaration	No
Environmental Impact Report	No
Statement of Overriding Considerations	No
None	Yes

H. Is this project considered "Infrastructure"?

No

I. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter "No subcontractors to report" and "0" to funds. **Delete** any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
Alder & Co. (200422410111)	$	**$** 49,920
Lawrence Berkeley National Laboratory	$	**$**400,000

J. Vendors and Sellers for Equipment and Materials/Miscellaneous

List all Vendors and Sellers listed in Budget(s) for Equipment and Materials/Miscellaneous. Insert additional rows if needed. If no vendors or sellers to report, enter "No vendors or sellers to report" and "0" to funds. **Delete** any unused rows from the table.

Vendor/Seller Legal Company Name	CEC Funds	Match Funds
No vendors to report	**$**	**$**

K. Key Partners

List all key partner(s). Insert additional rows if needed. If no key partners to report, enter "No key partners to report." **Delete** any unused rows from the table.

Key Partner Legal Company Name
No key partners to report

L. Budget Information

Include all budget information. Insert additional rows if needed. If no budget information to report, enter "N/A" for "Not Applicable" and "0" to Amount. **Delete** any unused rows from the table.

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	24-25	301.001L	$ 1,662,421

TOTAL Amount: $ 1,662,421

R&D Program Area: TIEB: EDMF

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: 101

M. Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Tanya Barham

Address: 401 Ne 19Th Ave

City, State, Zip: Portland, OR 97232-4800

Phone:

E-Mail: tanyab@communityenergylabs.com

2. Recipient's Project Manager

Name: Tanya Barham

Address: 401 Ne 19Th Ave

City, State, Zip: Portland, OR 97232-4800

Phone:

E-Mail: tanyab@communityenergylabs.com

N. Selection Process Used

There are three types of selection process. List the one used for this GRF.

Selection Process	Additional Information
Competitive Solicitation #	GFO-23-318
First Come First Served Solicitation #	Not applicable
Other	Not applicable

O. Attached Items

1. List all items that should be attached to this GRF by entering “Yes” or “No”.

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes
4	Recipient Resolution	No
5	Awardee CEQA Documentation	No

Approved By

Individuals who approve this form must enter their full name and approval date in the MS Word version.

Agreement Manager: Molly Mahoney

Approval Date: 8/12/2025

Branch Manager: Anthony Ng

Approval Date: 08/26/2025

Director: Jonah Steinbuck delegated to Branch Manager

Approval Date: 08/26/2025

Exhibit A
Scope of Work
Community Energy Labs, Inc.

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Define Users, Assumptions & Systems Requirements
3	X	Test System Performance in the Field
4		Tune Product for Commercialization
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
API	Application Programming Interface
BAS	Building Automation Systems
BEM	Building Energy Model(S)
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
EMS	Energy Management System(S)
GHG	Greenhouse Gas
HVAC	Heating, Ventilation and Air Conditioning
IoT	Internet Of Things
IOU	Investor-Owned Utility
LBNL	Lawrence Berkeley National Lab
ML	Machine Learning
MPC	Model Predictive Control
NREL	National Renewable Energy Lab
PG&E	Pacific Gas & Electric
PK/TK	Pre-Kindergarten / Transitional Kindergarten
PNNL	Pacific Northwest National Lab
SaaS	Software As A Service
SBIR	Small Business Innovation Research grant
SCALE	Smart Control Automation and Learning for Energy
SCE	Southern California Edison
SMSCB	Small And Mid-Sized Commercial Buildings
TAC	Technical Advisory Committee
TRL	Technology Readiness Level
TOU	Time Of Use

[1] Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

Exhibit A
Scope of Work
Community Energy Labs, Inc.

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the deployment of an integrated Internet of Things (IoT), hardware, and software as a service control that uses machine learning to drive down the cost of powerful Model Predictive Control (MPC) in 10–50 K-12 school sites across the state. The goal is to demonstrate the commercial scalability of an affordable solution for communities needing to keep up with changing utility rates, heating, ventilation, and air conditioning (HVAC) electrification, and energy codes. When numerous commercial buildings can affordably adopt MPC, a collective reduction in energy demand during peak times can enhance grid stability, reducing the risk of blackouts or brownouts. This benefits all ratepayers by ensuring a more reliable energy supply.

B. Problem / Solution Statement

Problem

Building Automation Systems (BAS) can centrally monitor HVAC across multiple locations using a central/remote server or over Cloud IoT. MPC can be layered on top of BAS to more flexibly manage complex optimization problems (such as comfort, air quality, and electricity price) and reduce energy use as much as 28% beyond standard practice.[2] However, MPC requires a predictive building energy model (BEM). Programming and tuning the BAS using the BEM to accomplish MPC could cost an additional $150-300k in fees and would have to be redone if building use changes significantly through renovation.[3]

In the Recipient's niche market, the Government, University, and Schools subsegment of the small and mid-sized commercial buildings (SMSCB) market, customers typically do not have the expertise or budget to use traditional approaches to MPC. They are unable to collect the data, establish, or cost-effectively calibrate the BEM without the assistance of a specialist. Customers interviewed during CleanTech Open cited emerging energy prices and building standards as a burden on their leanly staffed maintenance crews. They described spending 13% of their workers' time adjusting thermostat setpoints on thousands of HVAC units to save money, yet still struggled to keep occupants comfortable. They need energy reduction technology with the efficacy of MPC that is more affordable and easier to operate.

Solution

The Recipient will deliver a solution by combining IoT hardware and Software as a Service (SaaS) control platform with MPC, then using machine learning (ML) to simplify model setup and tuning. Host sites can use legacy BAS, or cheaper off-the-shelf smart thermostats, combined with the Recipient's MPC+ML innovation to set up and run the system at a significantly lower cost, realizing payback in months, not years.

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[2] Drgoňa, Ján, et al. "All You Need to Know about Model Predictive Control for Buildings." Annual Reviews in Control, vol. 50, 2020, pp. 190–232. doi:10.1016/j.arcontrol.2020.09.001.

[3] Blum, D.H., et al. "Practical Factors of Envelope Model Setup and Their Effects on the Performance of Model Predictive Control for Building Heating, Ventilating, and Air Conditioning Systems." Applied Energy, vol. 236, 2019, pp. 410–425.

The purpose of this project is to deliver a marketable integrated solution that will offer a quick, affordable, and effective energy management tool to late-adopter sections of the commercial building market that are short-staffed and sensitive to upfront cost, helping meet California energy efficiency and carbon reduction goals. According to Department of Energy's 2021 National Roadmap for Grid-Interactive Efficient Buildings (GEB), "GEBs could decrease CO2 emissions by 80 million tons per year by 2030, or 6% of total power sector CO2 emissions. That is more than the annual emissions of 50 medium-sized coal plants." At scale, the electrification and flexible coordination of operational electrical end loads could provide 1393 petajoule's (1.32 quads) of energy efficiency and 200 GW of peak energy flexibility to the grid, a benefit of $15 billion per year to US ratepayers.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to develop and deploy an integrated IoT, hardware, and software as a service control that uses ML to drive down the cost of powerful Model Predictive Control in 10–50 K-12 sites across the state. The goal is to demonstrate the capability of a novel MPC+ML to:

- Achieve an installation speed of under one week (as opposed to months or years);
- Reach a one-time install fee averaging under $20k (as opposed to $250-700k);
- Demonstrate a payback period of up to one year (as opposed to several years);
- Demonstrate minimal site host intervention and require fewer than 25 hours of specialized technical expertise for onboarding to the platform's back end.
- MPC+ML will achieve convergence on optimal policies for energy savings of 5-10% in kWh or demand reductions of 20-40% in kW from HVAC-related loads, utilizing less than six weeks of low-cost sensor data.

Ratepayer Benefits:[4] This Agreement will result in the ratepayer benefits of increasing reliability, improving environmental sustainability, increasing affordability, and improving equity by leveraging the Recipient's advanced energy management technology. **Increasing reliability** is achieved as widespread adoption of MPC reduces energy demand during peak times, enhancing grid stability and mitigating the risk of blackouts or brownouts. The Recipient's trials demonstrate a 16% shift in kWh from peak to off-peak periods, alleviating grid pressure during demand spikes caused by severe weather. Additionally, the technology supports resilience by optimizing load management, enhancing the economic viability of battery backup systems, and integrating renewable energy into microgrids at emergency sheltering school sites.
Improving environmental sustainability is realized through significant CO2 emissions reductions, with the Recipient's system potentially saving 73,795 tons annually across gas and electrical HVAC systems. Increasing affordability stems from CEL's ability to deliver cutting-edge energy management solutions at a fraction of traditional costs. While traditional energy management system (EMS) installations range from $250,000 to $750,000, the Recipient offers solutions for under $20,000—a 90% cost reduction. Moreover, their technology contributes to savings on

[4] California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

electrical bills, with LBNL reporting that "15 to 20 GWh of daily load shift could provide 'upwards $500 million in value to California ratepayers.'"[5]

Finally, the Recipient aims to improve equity by addressing the lack of energy programs tailored to public commercial buildings, such as K-12 schools. By utilizing EPIC funds, the Recipient simplifies the implementation of advanced technology, enabling underserved communities to participate in innovative rate designs and decarbonization efforts. This ensures that all ratepayers, regardless of resources, can access the benefits of energy efficiency and sustainability.

Technological Advancement and Breakthroughs:[6] This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by increasing the use of renewable energy resources (SB 100), reducing greenhouse gas emissions (SB-32), and accelerating the adoption of electrical tariffs that promote grid reliability (CPUC Rulemaking 22-07-005) in the State. In addition, the Recipient's integrated solution will be the first of its kind to provide a fully integrated IoT, hardware, and software solution that makes MPC affordable to smaller, non-residential customers to autonomously manage peak load from HVAC, increase integration of renewables through better responding to price signals, and save ratepayers on energy bills while maintaining comfort.

Agreement Objectives

The objectives of this Agreement are to:

- Define users, assumptions, and system requirements for an alpha version of the platform that corresponds with typical California non-residential customers (particularly K-12 schools).
- Test and validate that the alpha successfully supports data ingest, processing, and running MPC+ML strategies for 30 simulated, concurrent site hosts.
- Recruit, onboard, and execute user agreements with 10-50 K-12 school field demonstration host sites, at least half of which are in disadvantaged communities.
- Deliver a plan and measurement, and verification schedule for a subset of at least 10 sites during heating or cooling seasons.
- Revise tools and procedures to minimize the backend software onboarding process, ensuring it requires fewer than 25 hours of specialized technical knowledge.
- Conduct at least four system design review checkpoints, ensuring a consistent agenda and action plan that incorporates contributions from product, engineering, and customer success, including field operations.
- Convert 70% of pilot host sites into paying customers.
- Validate that performance in the field meets target technical specifications outline in the Agreement goals.

[5] Walton, Robert. "Shape, Shimmy, Shed: Renewables Are Revamping DR's Future Value in California." Utility Dive, 1 Feb. 2017, link.

[6] California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations**.** All technical tasks should include product(s). Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following:

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**
  - Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the California Energy Commission's (CEC) software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick.

The following describes the accepted formats for electronic data and documents provided to the CEC as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**
  Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open-source programs:
  - Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - Visual Studio.NET (version 2008 and up). Recommend 2010.
  - C# Programming Language with Presentation (UI), Business Object and Data Layers.
  - SQL (Structured Query Language).
  - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
  - Microsoft SQL Reporting Services. Recommend 2008 R2.
  - XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the CEC's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, and other CEC staff relevant to the Agreement. The Recipient's Project Manager and any other individuals deemed necessary by the CAM or the Project Manager shall participate in this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., Teams, Zoom), with approval of the CAM.

  The Kick-off meeting will include discussion of the following:
  - The CAM's expectations for accomplishing tasks described in the Scope of Work;
  - An updated Project Schedule;
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Travel;

- Equipment purchases;
- Administrative and Technical products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Monthly Calls (subtask 1.5)
- Quarterly Progress reports (subtask 1.6)
- Final Report (subtask 1.7)
- Match funds (subtask 1.8);
- Permit documentation (subtask 1.9);
- Subawards(subtask 1.10);
- Technical Advisory Committee meetings (subtasks 1.11 and 1.12);
- Agreement changes;
- Performance Evaluations; and
- Any other relevant topics.

- Provide *Kick-off Meeting Presentation* to include but not limited to:
  - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
  - Project schedule that identifies milestones
  - List of potential risk factors and hurdles, and mitigation strategy

- Provide an *Updated Project Schedule, Match Funds Status Letter,* and *Permit Status Letter*, as needed to reflect any changes in the documents.

The CAM shall:
- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:
- Kick-off Meeting Presentation
- Updated Project Schedule *(if applicable)*
- Match Funds Status Letter (subtask 1.7) *(if applicable)*
- Permit Status Letter (subtask 1.8) *(if applicable)*

CAM Product:
- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings
The goal of this subtask is to determine if the project should continue to receive CEC funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the CEC and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient and may include the CAO and any other individuals selected by the CAM to provide support to the CEC.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit.

However, the CAM may schedule additional CPR meetings as necessary. The budget may be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the CEC, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare and submit a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda may include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. A determination of unsatisfactory progress This may result in project delays, including a potential Stop Work Order, while the CEC determines whether the project should continue.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda(s)
- Progress Determination

Subtask 1.4 Final Meeting
The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM of the following Agreement closeout items:
    - Disposition of any procured equipment.
    - The CEC's request for specific "generated" data (not already provided in Agreement products).
    - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
    - "Surviving" Agreement provisions such as repayment provisions and confidential products.
    - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* organized by the tasks in the Agreement.

Products:
- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Final Products

MONTHLY CALLS, REPORTS AND INVOICES

Subtask 1.5 Monthly Calls

The goal of this task is to have calls at least monthly between the CAM and Recipient to verify that satisfactory and continued progress is made towards achieving the objectives of this Agreement on time and within budget.

The objectives of this task are to verbally summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, to verify match funds are being proportionally spent concurrently or in advance of CEC funds or are being spent in accordance with an approved Match Funding Spending Plan, to form the basis for determining whether invoices are consistent with work performed, and to answer any other questions from the CAM. Monthly calls might not be held on those months when a quarterly progress report is submitted or the CAM determines that a monthly call is unnecessary.

The CAM shall:
- Schedule monthly calls.
- Provide questions to the Recipient prior to the monthly call.
- Provide call summary notes to Recipient of items discussed during call.

The Recipient shall:
- Review the questions provided by CAM prior to the monthly call
- Provide verbal answers to the CAM during the call.

Product:

- Email to CAM concurring with call summary notes.

Subtask 1.6 Quarterly Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a *Quarterly Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the reporting period, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Progress reports are due to the CAM the 10th day of each January, April, July, and October. The Quarterly Progress Report template can be found on the ECAMS Resources webpage available at: https://www.energy.ca.gov/media/4691
- Submit a monthly or quarterly *Invoice* on the invoice template(s) provided by the CAM.

Recipient Products:

- Quarterly Progress Reports
- Invoices

CAM Product:

- Invoice template

Subtask 1.7 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.7.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Energy Commission Style Manual* provided by the CAM.

Recipient Products:

- Final Report Outline (draft and final)

CAM Products:

- Energy Commission Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.7.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments on Draft Final Report* received on the Executive Summary. For each comment received, the Recipient will identify in the summary the following:
  - Comments the Recipient proposes to incorporate.
  - Comments the Recipient does propose to incorporate and an explanation for why.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt.
- Incorporate all CAM comments into the *Final Report*. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
- Submit the revised *Final Report* electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:

- Summary of TAC Comments on Draft Final Report
- Draft Final Report
- Written Responses to Comments *(if applicable)*
- Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBAWARDS

Subtask 1.8 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the application that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.
  If match funds were a part of the application that led to the CEC awarding this Agreement, then provide in the letter:
  - A list of the match funds that identifies:
    - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
    - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter *(if applicable)*
- Match Funds Reduction Notification Letter *(if applicable)*

Subtask 1.9 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under

this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
    - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
    - The schedule the Recipient will follow in applying for and obtaining the permits.

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

- Permit Status Letter
- Updated List of Permits *(if applicable)*
- Updated Schedule for Acquiring Permits *(if applicable)*
- Copy of Each Approved Permit *(if applicable)*

Subtask 1.10 Obtain and Execute Subawards and Agreements with Site Hosts

The goals of this subtask are to: (1) procure and execute subrecipients and site host agreements, as applicable, required to carry out the tasks under this Agreement; and (2) ensure that the subrecipients and site host agreements are consistent with the Agreement terms and conditions and the Recipient's own contracting policies and procedures.

The Recipient shall:

- Execute and manage subawards and coordinate subrecipients activities in accordance with the requirements of this Agreement.
- Execute and manage site host agreements and ensure the right to use the project sitef throughout the term of the Agreement, as applicable. A site host agreement is not required if the Recipient is the site host. [CAMs- delete this bullet-point and the one below if there is no site host. Note that these bullet-points can also be edited for unique agreements such as projects with dozens of sites where it may be administratively burdensome to require site agreements for all sites. Please work with CCO on any edits.]
- Notify the CEC in writing immediately, but no later than five calendar days, if there is a reasonable likelihood the project site cannot be acquired or can no longer be used for the project.

- Incorporate this Agreement by reference into each subaward.
- Include any required Energy Commission flow-down provisions in each subaward, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subaward terms.
- Submit a *Subaward and Site Letter* to the CAM describing the subawards and any site host agreement needed or stating that no subawards or site host agreements are required.
- If requested by the CAM, submit a draft of each *Subaward* and any *Site Host Agreement* required to conduct the work under this Agreement.
- If requested by the CAM, submit a final copy of each executed *Subaward* and any *Site Host Agreement*.
- Notify and receive written approval from the CAM prior to adding any new subrecipient (see the terms regarding subrecipient additions in the terms and conditions).

Products:

- Subaward and Site Letter
- Draft Subawards *(if requested by the CAM)*
- Draft Site Host Agreement *(if requested by the CAM)*
- Final Subawards *(if requested by the CAM)*
- Final Site Host Agreement *(if requested by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.11 Technical Advisory Committee (TAC)

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the Agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support, and relationships with a national spectrum of influential leaders.

- Ask probing questions that ensure a long-term perspective on decision-making and progress toward the project's strategic goals.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.12.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.12 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.

- Prepare *TAC Meeting Summaries* for each TAC Meeting that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that ensure a long-term perspective on decision-making and progress toward the project's strategic goals.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Subtask 1.13 Project Performance Metrics

The goal of this subtask is to finalize key performance targets for the project based on feedback from the TAC and report on final results in achieving those targets. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the project performance metrics section of the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC Performance Metrics Summary* will identify:
    - TAC comments the Recipient proposes to incorporate into the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
    - TAC comments the Recipient does not propose to incorporate with and explanation why.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the Recipient met each of the performance metrics in the *Final Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
- Discuss the *Project Performance Metrics Results* at the Final Meeting.

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

TASK 2 - DEFINE USERS, ASSUMPTIONS, & SYSTEM REQUIREMENTS

The goals of this task are to define the software components and data taxonomy supporting the Agreement objectives above while eliminating complexity and features that do not contribute to customer outcomes.

Subtask 2.1 Define Data Characteristics & Establish Governance Framework

The Recipient will lead technical and customer success teams to understand and simplify system requirements related to the customer journey.

The Recipient shall:

- Determine the minimum set of data elements required to be collected and stored to deliver accurate results.
- Prepare a *Data Source Catalog* that includes different data sources and their characteristics, including but not limited to data owners and stewards.
- Determine which modifications should be made to the MPC+ML models to improve their resilience to missing or incomplete data.
- Analyze the data accuracy through methods including, but not limited to:
    - Exploring methods for handling missing data,
    - Analyzing where deduplication, scaling, and noise reduction are needed,
    - Developing automated heuristics to validate the integrity and correctness of data collected using the data ontology.
- Create a *Missing/Incomplete Data Report* that will contain applicable graphics and figures. The report will include any non-confidential methods and descriptions of the following, but is not limited to:
    - A description of the framework,
    - A description of the plan to address missing and incomplete data,
    - Closure on corrective action plans for missing data.

Products:
- Data Source Catalog
- Missing/Incomplete Data Report

Subtask 2.2 Design Data Storage and Processing Architecture
The Recipient project team will leverage industry best practices to design and test data storage and processing architecture.

The Recipient shall:
- Design the architecture for horizontal scalability using stateless services and data clustering/sharding.
- Leverage on-demand cloud compute resources.
- Develop and provide a detailed *Software System and Data-Storage Test Plan* that is 3-10 pages, will contain applicable graphics and figures, and will have an executive summary that is written for a non-technical audience. The report will include, but is not limited to:
    - A description of the high-risk/high-criticality components, and
    - An overview of the process to ensure data returns with fewer errors and less lag time.

Products:
- Software System and Data-Storage Test Plan

Subtask 2.3 Implement V1 of Platform Components for Field Testing and Refinement
The Recipient project team will implement an initial version of the platform.

The Recipient shall:
- Validate the system's functionality, performance characteristics, and scalability.
- Validate its ability to process this data stream and run MPC+ML models for each site.
- Disable nodes within each tier of the platform to validate its reliability and failover characteristics.
- Prepare a *Software System and Data Storage Test Results* showing the alpha version of the platform successfully supporting data ingest, processing, and running at least one MPC+ML model for 30 simulated, concurrent host sites.

Products:
- Software System and Data Storage Test Results

TASK 3 - TEST SYSTEM PERFORMANCE IN THE FIELD
The goal of this task is to measure and validate performance in the field. The Recipient will use a testing protocol to monitor the accuracy of modeling and MPC+ML performance (e.g., forecast accuracy, demand and energy reduction, occupant comfort). The team will proactively communicate testing schedules and onboarding steps for host sites during semi-monthly meetings and swiftly iterate with the product and engineering teams to refine technical and experiential insights obtained from engagements with pilot sites.

Subtask 3.1 Measurement and Verification
The Recipient project team will implement the testing protocol.

The Recipient shall:
- Implement code produced by the project partners to establish a 'randomized block' testing framework during specified testing intervals.
- Confirm the schedule with the host site and contsite'sols contractor to alternate between the Recipient's integrated solution and the host sites baseline control policy.
- Communicate that the randomization process minimizes sample bias and ensures that the same number of days are assigned to control and intervention strategies for each testing period. Assure host sites that they always have the right to override.
- Queue up the switching test procedure in the Recipient software platform.
- Prepare and provide a *Measurement & Verification Plan,* including but not limited to:
    - A description of the monitoring process,
    - A description of the data being measured,
    - A description of the analysis methods to be employed,
- Verify that site testing, monitoring and communication with the customer success team is in place and will be repeated for 15 weeks.

Products:
- Measurement & Verification Plan (Draft & Final)

Subtask 3.2 Evaluate, Recruit, and Engage with Host Sites
- The Recipient project team will evaluate, recruit, and qualify pilot sites for the field trials. The chosen sites will be engaged throughout the grant term to ensure consistent and proper communication.

The Recipient shall:
- Develop a *Site Selection Criteria Memo* that identifies the criteria and their relative importance in selecting demonstration sites for the project. The criteria will include, but are not limited to:
    - Climate zone
    - Building type
    - Host site segment
    - End-use systems
    - Devices and device configurations, including:
        - Buildings that contain an existing thermostat with Application Programming Interfaces and conformity to:
            - Reading temperature resolution: 0.1°C
            - Write access for: thermostat setpoint; damper position (when applicable)
            - Readable data points: zone air temperature (minimal resolution of 0.1°C) and compressor/fan stage
            - Communication capability: 5-minute sampling time

        - Optional write access for: compressor, fan stage
    - HVAC units that can be retrofitted with a smart thermostat
    - The system is BAS-connected using an open protocol, such as building automation and control networks over the Internet Protocol.
- Evaluate a backlog of 133 waitlisted sites in the application queue for this project to identify 10-50 California schools where the technology can save energy.
- Establish a contingency plan to identify additional sites if the existing backlog can't meet the minimum target of 10 sites.
- Provide CAM a *Contingency Plan Memorandum (as applicable)* detailing the steps and actions taken to identify additional sites and confirmation of their participation under the Agreement.
- Create and execute a *Community Engagement Memorandum,* including but not limited to information on soliciting community input and sharing project details.

Products:
- Site Selection Criteria Memorandum
- Contingency Plan Memorandum (as applicable)
- Community Engagement Memorandum

Subtask 3.3 Carry Out Field Demonstrations
The Recipient project team will collaborate with host sites to field-harden prototype designs.

The Recipient shall:
- Perform audits for intended host sites.
- Select final sites based on the site selection criteria developed in task 3.2 that allow for the most robust testing and provide a *Final List of Demonstration Sites*.
- Retrofit buildings when necessary, using the Recipient's proprietary metering strategy.
- Place thermostats and energy meters only where measured performance is strictly necessary and can be generalized to multiple zones or equipment.
- Install monitoring, edge computing, and networking equipment.
- Commission the systems.
- Perform system tests to confirm the Recipient's system can receive telemetry/sensor data and send controls to host site devices.
- Perform six weeks of model training during unoccupied periods before implementing controls in occupied periods.
- Launch occupied field testing of the MPC+ML and monitor performance.
- Debug implementation, field monitoring, and networking as necessary.
- Document protocols and suggested improvements in CS/Engineering system design checkpoints.
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:
- Final List of Demonstration Sites
- CPR Report

TASK 4 - TUNE PRODUCT FOR COMMERCIALIZATION
The goal of this task is to use insights from field demonstrations (Task 3.3) to prioritize refinements during system design checkpoints (Task 4.1) and to implement updates to cloud-based infrastructure, modular design components, and scripting/automation designs originally developed in Task 2.2.

This will support up to 10 times more sites following the end of the Agreement. The refinement process will utilize essential input, data, and information derived from this project. This approach aims to decrease the cost and complexity of the technical design while improving the user experience, marketability, and maintainability of the product as a sustainable commercial offering, utilizing widely accessible programming languages and computing technologies.

Subtask 4.1 Verify System Performance in Real-World Conditions
Apply the M&V protocol developed in Task 3.1 during both peak heating and cooling seasons to confirm that the system delivers real-world energy and cost savings. The Recipient project team will monitor system performance and ensure that data collection and quality lead to an adequate sample size for analysis.

The Recipient shall:
- Analyze performance against specifications defined in Task 2.
- Assess whether aspects of the system's performance associated with the control algorithms can be adjusted to enhance computation speed or manage several performance objectives at one location
- Prioritize a list of features and enhancements with significant impact on cost (e.g., reducing setup time) and accuracy (e.g., balancing comfort and savings).
- Prepare and *Measurement & Verification Report* that is 3-10 pages, will contain graphics and figures, and will have an executive summary that is written for a non-technical audience. The report will include, but is not limited to:
    - An overview of the schedule and timeline required to successfully measure and verify performance,
    - An outline of the procedures used to verify the installation and operation of the technology when deployed,
    - A description of the methodology and equations used to calculate energy and cost savings, and
    - A summary of the field demonstration results and enhancement recommendations.

Products:
- Measurement & Verification Report

Subtask 4.2 Identify and Eliminate Areas of Inefficiency
The Recipient project team will collaborate in product development meetings to synthesize input from host sites, end users, and the engineering team to integrate into the engineering team's sprints and cadences.

The Recipient shall:

- Draft engineering scopes of work that identify opportunities for improving host site satisfaction and reducing cost by making systems simpler, less 'accident-prone,' and easier for a mid-level software engineer to understand and maintain.
- Evaluate scopes of work to ensure that they are linked to reliably and affordably delivering outcomes promised in technical specification.
- Evaluate outcomes of engineering and design sprints to ensure that the resulting product can be set up and maintained by a workforce with broadly available skills.
- Use automation and tooling to address platform inefficiencies, with a key focus on:
    - Host site data and metadata acquisition - by minimizing the metadata points the system requires, implementing bulk-data upload mechanisms, and automating data validation tasks,
    - Time-consuming modeling and operational tasks - by standardizing modeling inputs and parameters and automating model correctness verification,
    - Computational inefficiency and platform hotspots - by increasing algorithmic or data storage and retrieval, and queuing and query efficiency,
    - Scalable means for customer communication - by integrating user interface tools such as in-app alerting and self-service workflows that can be delivered through in-app video or email,
    - Investigate cost-effective control infrastructure revisions, code refactoring, value engineering, or customer outreach and user experience research to refine and simplify the commercial product design and/or improve its performance and attractiveness within the market.
- Generate and provide evidence of an *Automated Process Report/KPI Dashboard* that will monitor performance within product high/low technical specifications and trigger issues identification and resolution to be addressed in semi-monthly backlog grooming and engineering check-ins.

Products:

- Automated Process Report/KPI Dashboard

Subtask 4.3 Develop Effective Onboarding and Customer Retention Process
The Recipient project team will continue to improve the stages of customer onboarding. This includes maintaining a detailed onboarding playbook that articulates a series of tasks performed by specific team members to support customers through the onboarding funnel.

The Recipient shall:

- Track each customer, ensure task handoffs are seamless, and success criteria are complete.

- Collaborate with external marketing agencies to develop accessible *Sales and Marketing Materials* to promote and inform the public about the advantages of the technology.
- Deploy market messages in semi-monthly customer success meetings and quarterly stakeholder calls.
- Develop key performance indicators to monitor the customer pipeline.
- Identify tracking systems to improve customer velocity.
- Implement cadences, such as sprint planning and backlog grooming, where customer success and engineering cross-pollinate
- Prioritize product and service enhancements for continual improvement and customer enjoyment.
- Incorporate the above into *System Design Review Checkpoints* that result in pilot sites converting into paying customers. The checkpoints will occur quarterly and will draw on implementation timelines, user feedback, and support logs to identify recurring issues, unmet needs, or friction points. Document and rank findings by urgency, scope, and customer impact. Recommendations from these reviews will feed into the product development roadmap. Where appropriate, outputs from the checkpoints will also trigger updates to the onboarding playbook and training resources to accelerate deployment and improve customer retention.

Products:
- Sales and Marketing Materials
- System Design Review Checkpoints

TASK 5 EVALUATION OF PROJECT BENEFITS
The goal of this task is to report the benefits resulting from this project.

The Recipient shall:
- Complete *the Initial Project Benefits Questionnaire*. The Initial Project Benefits Questionnaire shall be initially completed by the Recipient with 'Kick-off' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by January 31st of each year. The Annual Survey includes but is not limited to the following information:
    - Technology commercialization progress
    - New media and publications
    - Company growth
    - Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the Energize Innovation website (www.energizeinnovation.fund), and provide *Documentation of Project Profile on EnergizeInnovation.fund*, including the profile link.

- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the Energize Innovation website (www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

Products:
- Initial Project Benefits Questionnaire
- Annual Survey(s)
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund

TASK 6 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to ensure the technological learning that resulted from the demonstration(s) is captured and disseminated to the range of professions that will be responsible for future deployments of this technology or similar technologies.

The Recipient Shall:
- Develop and submit a *Project Case Study Plan* that outlines how the Recipient will document the planning, construction, commissioning, and operation of the technology or system being demonstrated. The Project Case Study Plan should include:
    - An outline of the objectives, goals, and activities of the case study.
    - The organization that will be conducting the case study and the plan for conducting it.
    - A list of professions and practitioners involved in the technology's deployment.
    - Specific activities the recipient will take to ensure the learning that results from the project is disseminated to those professions and practitioners.
    - Presentations/webinars/training events to disseminate the results of the case study.
- Present the draft *Project Case Study Plan* to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the draft *Project Case Study Plan*. This document will identify:
    - TAC comments the Recipient proposes to incorporate into the final *Technology Transfer Plan*.
    - TAC comments the Recipient does not propose to incorporate with and explanation why.
- Submit the final *Project Case Study Plan* to the CAM for approval.
- Execute the final Project Case Study Plan and develop and submit a Project Case Study.
- When directed by the CAM, develop presentation materials for a CEC sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California CEC.

- Provide at least (6) six High Quality Digital Photographs (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

- Project Case Study Plan (draft and final)
- Summary of TAC Comments
- Project Case Study (draft and final)
- High Quality Digital Photographs

PROJECT SCHEDULE

Please see the attached Excel spreadsheet Exhibit A-1.