



**CALIFORNIA
ENERGY COMMISSION**



**California Energy Commission
May 8, 2024 Business Meeting
Backup Materials for The Regents of the University of California, on behalf of the
Berkeley Campus**

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: 24-0508-15e

**STATE OF CALIFORNIA
STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION**

**RESOLUTION: The Regents of the University of California, on behalf of the
Berkeley Campus**

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-23-033 with The Regents of the University of California, on behalf of the Berkeley Campus, for a \$1,999,140 grant to develop and test new personal comfort devices (PCD) and a personal control hub (PC Hub) and network. The recipient will create and test the customizable Personal Control Ecosystem that integrates the PC Hub with other personal comfort devices and/or building management systems, in addition to creating a web based PCD guidebook for architects, engineers, facilities personnel, and real estate managers to specify the best PCD for their application and context; 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 May 8, 2024.

AYE:

NAY:

ABSENT:

ABSTAIN:

Dated:

Kristine Banaag
Secretariat



GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: EPC-23-033

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Harrison Reynolds
3. MS-:None
4. Phone Number: 916-776-0692

C. Recipient's Information

1. Recipient's Legal Name: The Regents of the University of California on behalf of the Berkeley campus
2. Federal ID Number: 94-6002123

D. Title of Project

Title of project: Mainstreaming Personal Comfort Devices: Enabling Modular Personal Controls for a Wide Range of Energy and Comfort Applications

E. Term and Amount

1. Start Date: 6/3/2024
2. End Date: 3/31/2029
3. Amount: \$1,999,140

F. Business Meeting Information

1. Are the ARFVTP agreements \$75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 5/8/2024 .
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Bradley Meister
5. Time Needed for Business Meeting: 10 minutes.
6. The email subscription topic is: EPIC (Electric Program Investment Charge).

Agenda Item Subject and Description:

The Regents of the University of California, on behalf of the Berkeley Campus. Proposed resolution approving agreement EPC-23-033 with The Regents of the University of California, on behalf of the Berkeley Campus, for a \$1,999,140 grant to develop and test new personal comfort devices (PCD) and a personal control hub (PC Hub) and network and adopting staff's determination that the project is exempt from CEQA. The recipient will create and test the customizable Personal Control Ecosystem that integrates the PC Hub with other personal comfort devices and/or building management systems, in addition to creating a web based PCD guidebook for architects, engineers, facilities personnel, and real estate managers to specify the best PCD for their application and context. (EPIC funding) Contact: Bradley Meister



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”:

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; Cal. Code Regs., tit. 14, § 15306

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.

California Code of Regulations, title 14, section 15301 provides that projects which consist of the operation, repair, maintenance, permitting, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of existing or former use, are categorically exempt from the provisions of CEQA. This project involves operating or conducting lab work and creating small appliance prototypes, testing building control software, web-based content development, all of which is conducted and resides inside existing buildings used for these types of activities. There will be no expansion of the existing use of the facilities. Therefore, the project is exempt from CEQA under section 15301.

California Code of Regulations, title 14, section 15306 provides that projects which consist of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an



environmental resource are categorically exempt from the provisions of CEQA. This project involves conducting thorough literature reviews to gather insights from existing research and technological advancements. This will help identify best practices and potential areas for innovation in heating and cooling device design. Additionally, devices will be optimized with a Person Control Ecosystem that integrates with building management systems. This project also involves conducting market assessments along with literature reviews to design a Personal Control Device guidebook. Through stakeholder interviews, from industry experts, potential users, and other relevant parties feedback will be used to refine design approach. Rigorous lab testing will be conducted to validate the performance and efficiency of the devices under various conditions. This work will not result in a serious or major disturbance to an environmental resource. Therefore, the project is exempt from CEQA under Section 15306.

This project does not involve impacts on any particularly sensitive environment; 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. 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.

See attached Subcontractors list.



I. 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	\$	\$

J. 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
United States Department of Energy

K. 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	22-23	301.001J	\$ 1,999,140

TOTAL Amount: \$1,999,140

R&D Program Area: ICMB: Buildings

Explanation for “Other” selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

L. Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Jessie Brown

Address: Sponsored Projects Office 1608 Fourth Street, Suite 220

City, State, Zip: BERKELEY, CA 94710-1749

Phone: 510-642-8120

E-Mail: jwbrown@berkeley.edu

3. Recipient’s Project Manager

Name: Therese Peffer

Address: 2150 Allston Way #280

City, State, Zip: Berkeley, CA 94704-1268



STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

Grant Request Form
CEC-270 (Revised 9/2022)

Phone: 510-289-4278

E-Mail: tpeffer@berkeley.edu

M. Selection Process Used

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

Selection Process	Additional Information
Competitive Solicitation #	GFO-22-308
First Come First Served Solicitation #	Not applicable
Other	Not applicable

N. 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: Harrison Reynolds

Approval Date: 3/22/24

Branch Manager: Anthony Ng

Approval Date: 3/22/24

Director: (delegated to Manager)

Approval Date: 3/22/24

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
DOE- Lawrence Berkeley National Laboratory	\$ 250,000	\$ 125,000
TRC Energy Services, Inc.	\$ 226,186	\$ 0
Arup US, Inc.	\$ 99,000	\$ 60,000
University of Notre Dame	\$ 20,000	\$ 20,000
Normal Software, Inc.*	\$ 19,000	\$ 41,000

* Contingent upon successful registration with the Secretary of State.

Exhibit A
Scope of Work
Regents of the University of California, Berkeley

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Use Case Identification and Design Planning for PCDs
3	x	Ecosystem Development for PCD, PC Hub and PCs
4	x	Lab and Field Testing
5		Market Assessment and Transformation
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
BMS	Building Management System
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
PCD	Personal Comfort Device
PC Ecosystem	Personal Control Ecosystem
PC Hub	Personal Control Hub
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this agreement is to fund *Mainstreaming Personal Comfort Devices: Enabling Modular Personal Controls for a Wide Range of Energy and Comfort Applications*, a project that 1) develops and tests at least two novel personal comfort devices (PCDs), 2) develops and tests a personal deskpace hub called the personal control hub (PC Hub), 3) create and test the customizable personal control ecosystem that integrates the PC Hub with other PCDs, other devices, and/or building management system, and 4) creates a web-based PCD Design Guidebook for HVAC engineers and real estate managers to choose and specify the best PCD for their application and context.

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.

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B. Problem/ Solution Statement

Problem

While PCDs have a very positive pilot-scale track record ensuring individual environmental comfort, increasing resilience, and reducing HVAC energy consumption, they have not gained much traction in the market. Barriers include limited availability of efficient PCDs that are convenient for office use, lack of knowledge about how to specify PCDs in commercial buildings, the need to involve various stakeholders in accepting, adopting, and maintaining PCDs (e.g., manufacturers, standards organizations, design professionals, and estate and facilities operators), and lack of integration with building controls. Although PCD's are generally understood to increase occupant comfort, it is not widely realized how the presence of PCDs can enable energy savings through expanded setpoint ranges. Coordinating PCDs with plug loads and building control systems can further reduce energy use and shift loads in response to grid needs.

The increasing frequency and intensity of climate events such as heat waves, wildfires, droughts and floods in California compel a new look at PCDs to decrease greenhouse gas pollution in heating and cooling buildings, to improve resilience by shifting demand peaks and providing low-energy thermal comfort, and to address a wide variety of contexts in commercial buildings: zones with different heating/cooling needs, low and varied occupancy, tenant improvement turn-over/churn (where the office layout may not match the existing HVAC system), and variety of work types (sitting, standing, cold rooms, and so on). In addition, while PCDs were introduced a few decades ago, the ability to create embedded devices that communicate with other devices and systems is now mature enough to warrant a fresh approach.

Solution

The Recipient will leverage their experience prototyping, testing, and analyzing PCDs for over 25 years to develop novel PCDs and an opensource PC Hub with sensors and control algorithms. The PC Hub enables a personal control ecosystem, with the PC Hub networked to other PCDs, plug load devices, and with the Building Management System (BMS), that is building automation system or IoT system like a smart thermostat). The project will incorporate a typical PCD—a desktop fan—with occupancy and temperature sensors and microcomputer, creating a local PC Hub to provide a flexible and extensible solution to a variety of contexts and applications. The team will develop a PCD Modular Framework mapping common PCDs with appropriate goals and building contexts and ownership models. The team will work with manufacturers, architects, researchers, standards committees, and building software developers to understand market barriers and create a specification PCD Design Guidebook. The Guidebook will enable architects, engineers, facility managers, and real estate managers to identify and specify the appropriate PCD—whether a heating/cooling chair, desktop fan, leg/foot warmer, wearable such as a wrist band, or ceiling fan—that suits the organizational application and context.

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C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Empower office workers to control their comfort enabled by novel PCDs and a local control hub;
- Enable facilities managers to easily reduce or shift energy consumption and reduce comfort complaints through PCD-energy management coordination;
- Facilitate architects or engineers in specifying PCDs in new or retrofit applications, and facilities managers in identifying PCDs to improve comfort, reduce energy, and increase resilience.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of lower costs, greater electricity reliability, and increased safety. A PCD provides a much lower energy-intensive solution to personal comfort—3-30 watts of power for fans and efficient nanofabric heaters and thermoelectric devices, compared to thousands of watts of traditional whole building air conditioning and boiler systems. When PCDs and sensors are coordinated with building HVAC systems, the overall HVAC setpoints can be relaxed to reduce HVAC energy consumption (thereby reducing energy costs). Integrating PCDs with BMS can also shift peak HVAC energy consumption while maintaining comfort, thus improving grid and personal resilience. Finally, PCDs can provide emergency thermal comfort when building HVAC systems fail, providing increased safety and personal resilience during extended heat waves or cold spells.

Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals in three ways. The key advancement is coordinating PCDs with building controls to reduce and shift energy consumption. First, the project will develop and test novel PCD systems: such as, a nanofabric heating pad and a thermoelectric deskpad, which provides a pathway to lower energy-intensive thermal comfort that can lower costs. Secondly, the project will develop an opensource means of managing one or more PCDs through a PC Hub with embedded sensors and computation. This PC Hub creates a modular PC Ecosystem that integrates a variety of devices as well as the building control system using open standards and protocols for communication. The integration enables both reduced peak energy consumption and demand flexibility. Finally, the project will develop a web-based PCD Design Guidebook that will inform architects, engineers, facilities personnel, and real estate managers of the possible PCD options, and map the appropriate solution with the goals and objectives of the organization.

² 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).

³ 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.

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Agreement Objectives

The objectives of this Agreement are to:

- Develop a PCD Framework, a matrix which identifies common PCDs, use cases for which PCDs can reduce emissions and energy consumption while improving thermal comfort, and other considerations, such as ownership models. This framework will drive design of two novel PCDs and will be incorporated in the Design Guidebook.
 - Expected use cases include, but are not limited to non-stationary occupants, low-occupancy building zones, conflicting thermal needs within/among zones, “rogue” zones, and use of PCDs to shift or shape demand.
- Identify, design and prototype at least two novel heating and two novel cooling PCDs. Develop the hardware and software components of:
 - One novel heating PCD and one novel cooling PCD,
 - An opensource desktop Personal Control Hub (PC Hub), with local sensors, control interface, and microcomputer for computation and network communication, and at least one PCD—a desktop fan. The integration of multiple PCDs, plug load devices, and building controls is referred to as the Personal Control Ecosystem.
 - Integration with the building control system to save energy by extending setpoint range.
- Test the PCDs, PC Hub, and PC Ecosystem, including integration with the building control systems in the specially designed Comfort Chamber Laboratory; test various control schemes (load reduction, load shifting, greenhouse gas pollution reduction, optimization of HVAC operation and comfort within zone/among zones, and so on). Test in the field in a small pilot study, if practical.
- Conduct a market assessment and develop a PCD Design Guidebook. The market assessment will work with stakeholders to identify barriers to adoption. The Guidebook will map various PCDs and configurations to the organizational goals (such as emission reduction or reduced occupant complaints), context (new construction, retrofit) and ownership (such as a leased space with high occupant turnover) to enable engineers and managers to specify the most appropriate PCD for their application.

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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.

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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, the Commission Agreement Officer (CAO), and any other CEC staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to 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., WebEx), with approval of the CAM.

The administrative portion of the meeting will include discussion of the following:

- Terms and conditions of the Agreement;
- Invoicing and auditing procedures;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);

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- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
 - An updated Project Schedule;
 - Technical products (subtask 1.1);
 - Progress reports (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); 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.

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However, the CAM may schedule additional CPR meetings as necessary. The budget will 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 will 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. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- 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.

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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 and the CAO 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* on a USB memory stick, organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 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 preceding month, 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. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Funds and in-state expenditures.

Products:

- Progress Reports
- Invoices

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Subtask 1.6 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 1.6.1 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 Product:

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

Subtask 1.6.2 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 Technical Advisory Committee (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.

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- 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 SUBCONTRACTS

Subtask 1.7 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. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. 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 proposal 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 proposal 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

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- 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 1.8 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.

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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 1.9 Subcontracts

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of each executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts (*draft if required by the CAM*)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 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.

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- 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 insure 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 1.11.
- 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

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Subtask 1.11 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* 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 insure 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 1.12 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.

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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

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IV. TECHNICAL TASKS

*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. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

TASK 2: USE CASE IDENTIFICATION AND DESIGN PLANNING FOR PCDs

The goal of this task is to identify use cases to apply PCDs in buildings, evaluate commercially available and experimental PCDs, understand the barriers to the adoption of PCDs, and formalize a PCD framework and design plan for novel devices.

The Recipient shall:

- Outline commonly available PCDs on the market and prototyped in applied research and categorize (such as by modality (heating, cooling), cost, interface, power consumption/interface, network capability).
- Perform a literature review and interview/surveys with stakeholders, and develop real-world use cases of PCD applications (with focus on those that address the project goals (reducing energy, shifting peak loads, reducing greenhouse gas pollution (turning boiler down), putting building to sleep), different contexts (no windows, maintaining comfort when building HVAC systems are unable to, low-occupancy building zones, conflicting thermal needs within/among zones, “rogue” zones,) and autonomy (independent PCD, semi- or full-autonomous integration with thermostats or BMS)).
- Draft an *Interview Memo* describing the above literature review and interviews/surveys and development of use cases, and the control algorithms needed to achieve the use cases and highlighting lessons learned.
- Draft a *PCD Framework Report* that describes the mapping of individual and combinations of PCDs to use cases, control mechanisms and requirements for design of novel systems.

Products:

- Interview Memo
- PCD Framework Report

TASK 3: ECOSYSTEM DEVELOPMENT FOR PCD AND PC HUB

The goals of this task are to develop at least two PCDs, create a desktop PC Hub that connects to additional modules within the Ecosystem, including integrating to the BMS.

Subtask 3.1: Novel PCD Design

The Recipient shall:

- Develop an *Initial PCD Design Memo* that describes the development of conceptual designs for at least two novel heating and two novel cooling PCDs based on design requirements defined in Task 2, such as a nanofabric foot/leg/hand warmer, InfraRed LED heater, thermoelectric heated and cooled desktop pad, and desktop fan. Include a summary of cost appraisals for components, method of construction, power consumption, interest from manufacturers, and other industrial design considerations.
- Develop a *Final PCD Design Memo* that documents the process of down-selecting from the preliminary designs and developing the hardware and software components of at least one novel heating PCD and one novel cooling PCD. Include a summary of the

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development of low fidelity mock-ups, test, and design iteration. Full-scale models will have machined and painted enclosures and functional electronic components, including network capability.

Subtask 3.2: Additional PCDs Selection

The Recipient shall:

- Select potential additional PCDs, such as lights, heat pads, or air filters.
- Provide an *Additional PCDs Selection Memo* that documents the development of software integration with smart plug loads or other hardware devices to control appropriate low-energy devices, such as existing commercially heating devices (heated mat), chairs, and/or portable air cleaners.

Subtask 3.3: Personal Control Hub Proof of Concept

The Recipient shall:

- Provide a *Personal Control Hub Memo* that documents the use of an existing PCD (e.g., a desktop fan) to develop an opensource desktop Personal Control Hub, with a temperature sensor, occupancy sensor (such as low-cost IR camera), control interface (such as a knob), and microcomputer for computation and network communication.
- Provide a *PC Hub Controls Memo* that describes the development of control algorithms, including automated comfort control and preference learning with just the fan, and those that integrate other PCDs via smart plugs or other controllers: those that leverage occupancy sensing (to turn off devices or reduce standby plugload during vacancy periods), load shifting using laptop battery, or aggregated control of portable air cleaners.
- Document the development of the Personal Control Ecosystem, that is the combination of a Personal Control Hub and a set of PCDs and conduct a proof-of-concept bench test, in a *Personal Control Ecosystem Memo*.
- Prepare *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings) and participate in a CPR meeting.

Subtask 3.4: Building Management System Integration

The Recipient shall:

- Based on requirements Task 2 and the prototype implementation of the Personal Control Hub (Task 3.3), define the integration strategy with the BMS. Integration covers the networking layer (e.g., BACnet or device API) as well as the semantic layer (e.g., using Brick or ASHRAE standard 223).
- Develop semantic models to represent the PCDs being developed during the projects as well as their features and interaction with users. The models will use and extend relevant semantic schemas, such as Brick and ASHARE 223p. The models will be used to streamline the integration process of the PCDs and hub with the building automation system.
- Develop software to improve ease of integration.
- Define and document potential *Zone-level Control Algorithms* (such as expand temperature setpoint band to reduce energy, shifting load or other demand flexibility (load following supply), dynamic occupant-based minimum ventilation rates, ignoring problematic rogue zones that drives whole building heating/cooling).
- Bench-test the integration of the Personal Control Hub with a BMS including the algorithms developed in Task 3.3 and Task 3.4.

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- Engage with maintainers of the semantic schemas and standards to propose an extension that includes PCDs.
- Draft a *Personal Control Hub-BMS Semantic Model and Integration Memo* that documents each of Recipient's tasks or activities under this Subtask 3.4 .

Products:

- Initial PCD Design Memo
- Final PCD Design Memo
- Additional PCDs Selection Memo
- Personal Control Hub Memo
- PC Hub Controls Memo
- Personal Control Ecosystem Memo
- CPR Report #1
- Zone Level Control Algorithms
- Personal Control Hub-BMS Semantic Model and Integration Memo

TASK 4: LAB TESTING

The goals of this task are to test the individual PCDs and other devices in the Personal Control Ecosystem and integration with these devices and with the BMS in the UCB-CBE Comfort Chamber Laboratory and, if practical, in a pilot field test.

Subtask 4.1: Personal Control Ecosystem Laboratory Testing

The Recipient shall:

- Establish verification and testing methods to demonstrate ability of PCD to provide thermal comfort and reduce energy consumption based on technical spec targets. Document in *PCD Measurement & Verification Plan Memo*
- Prepare a *PCDs, Hub and Ecosystem Lab Test Memo* that describes, but is not limited to:
 - Testing of novel PCDs: components, power level, communication.
 - Testing of Personal Control Hub and Ecosystem components, communication, closed loop control.

Subtask 4.2: Personal Control Hub+BMS Laboratory Testing

The Recipient shall:

- Establish verification and testing methods to demonstrate ability of PCDs integrated with BMS to shed or shift energy while providing comfort.
- Develop a *Personal Control Hub+BMS Measurement & Verification Plan Memo*
- Implement control sequences in BMS including interfaces for the Personal Control Hub communication with BMS.
 - Test at least four control algorithms. Document in *Personal Control Hub + BMS Lab Test Memo*
 - Test in field if practical
- Prepare a *CPR Report #4* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- PCD Measurement & Verification Plan Memo
- PCDs, Hub, and Ecosystem Lab Test Memo

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- Personal Control Hub + BMS Measurement & Verification Plan Memo
- Personal Control Hub + BMS Lab Test Memo
- CPR Report #4

TASK 5: MARKET ASSESSMENT AND TRANSFORMATION

The goal of this task is to assess the market for PCDs, identify barriers to adoption of PCDs, develop specifications to guide the inclusion of PCDs in HVAC design.

The Recipient shall:

- Identify barriers to the adoption and application of PCDs, such as costs, owner/tenant challenges, and other contexts.
- Develop market assessment. Evaluate ASHRAE comfort classifications for controlling buildings with PCD+building controls. Develop draft incentive program (beyond behavior), Evaluate other standards and codes.
- Prepare a *Market Assessment Report*.
- Develop methodology for specifying PCDs based on applications/use cases; conduct user experience interviews to inform process and leverage PCD Framework from Task 2.
- Outline the components of the PCD Design Guidebook: solution architecture, goals, contexts, available PCDs, communication and interface standards and specifications.
- Develop user interface mock-up for PCD Guidebook. This will be reviewed and modified with feedback from the project team and will serve as the basis for the UI of the web application.
- Deploy web-based *PCD Design Guidebook*

Products:

- Market Assessment Report
- PCD Design Guidebook

TASK 6: 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 \(www.energizeinnovation.fund\)](http://www.energizeinnovation.fund), and

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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](http://www.energizeinnovation.fund) (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 7 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.

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- 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
- Technology Transfer Plan
- Project Case Study (draft and final)
- High Quality Digital Photographs