



California
ENERGY COMMISSION



**California Energy Commission
October 19, 2026 Business Meeting
Backup Materials for Rocky Mountain Institute**

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

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

CALIFORNIA ENERGY COMMISSION
PROPOSED RESOLUTION: Rocky Mountain Institute
RESOLUTION NO: 26-1019-XX

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 amendment 3 to agreement EPC-20-23 with Rocky Mountain Institute. This amendment will modify the SOW from working toward demonstrating an integrated multi-function mechanical system pod to an ultra-low global warming potential (GWP) multi-function heat pump system utilizing R-290 or another low-GWP refrigerant for both space conditioning and domestic hot water applications. This amendment also includes a no-cost time extension, a site change, and adding the Electric Program Investment Charge (EPIC) Program Terms and Conditions; and

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

APPROVED AND ADOPTED this 19 day of October 2026, by the following vote:

AYE:

NAY:

ABSENT:

ABSTAIN:

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 approved and adopted by affirmative vote of the CEC at a meeting held on October 19, 2026.

Kim Todd
Secretariat



STATE OF CALIFORNIA

GRANT AMENDMENT REQUEST FORM (GARF)

CEC-277 (Revised 01/2026)

CALIFORNIA ENERGY COMMISSION

Original Agreement # EPC-20-023 Amendment # 3

Division	Agreement Manager:	MS-	Phone
ERDD	Felix Villanueva	51	916-232-8997

Recipient's Legal Name
Rocky Mountain Institute

Revisions: (check all that apply)	Additional Requirements
☒ Term Extension New End Date: 09/30/2029	Include revised schedule and complete items A through G below (as applicable).
☐ Budget Augmentation Amendment Amount: \$ 0	Include revised budget and complete items A through G below (as applicable)
☐ Budget Reallocation	Include revised budget and complete items A through G below (as applicable)
☒ Scope of Work Revision	Include revised scope of work and complete items A through G below (as applicable)
☒ Change in Project Location or Demonstration Site	Include revised scope of work and complete items A through G below (as applicable)
☐ Novation/Name Change of Prime Recipient	Include novation documentation and complete items A through G below (as applicable)
☒ Terms and Conditions Modification	Include applicable exhibits with bold/underline/ strikeout and complete items A through G below (as applicable)

A) Business Meeting Information**Business Meeting approval is not required for the following types of Agreements:**☐ Minor amendments delegated to Executive Director per December 2013 ResolutionProposed Business Meeting Date 10/19/2026 ☒ Consent ☐ Discussion

Business Meeting Presenter Felix Villanueva Time Needed: N/A

Please select one list serve. Select

Project Description:**Rocky Mountain Institute**

Propose resolution approving amendment 3 to agreement EPC-20-23 with Rocky Mountain Institute, and adopting staff's recommendation that this action is exempt from CEQA. This amendment will modify the purpose of the Scope of Work from working toward demonstrating an integrated multi-function mechanical system pod (IMSP) to an ultra-low global warming potential (GWP) multi-function heat pump system utilizing R-290 or another low-GWP



STATE OF CALIFORNIA

GRANT AMENDMENT REQUEST FORM (GARF)

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CALIFORNIA ENERGY COMMISSION

refrigerant for both space conditioning and domestic hot water applications. This amendment also includes a no-cost time extension, a site change, and adding the EPIC Terms and Conditions. EPIC Funding Contact: Felix Villanueva

B) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	Budget
Association for Energy Affordability, Inc.	\$ 1,546
Staengl Engineering	\$ 30,000
Aris Hydronics Inc	\$ 120,000
The Regents of the University of California on behalf of the Davis campus	\$ 50,000
	\$
	\$
	\$

C) List all key partners: (attach additional sheets as necessary)

Legal Company Name:
Rocky Mountain Institute

D) Budget Information (only include amendment amount information)

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
			\$
			\$

R&D Program Area: ICMB: Buildings

TOTAL: \$ 0

Explanation for "Other" selection

Federal Agreement #:

E) California Environmental Quality Act (CEQA) Compliance

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

☒ Yes (skip to question 2)☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:

a) ☒ Agreement **IS** exempt.☐ Statutory Exemption. List PRC and/or CCR section number:☒ Categorical Exemption. List CCR section number: 15301,15306☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:



The amendment to this project adds on-site demonstration and M&V data analysis. These activities are exempt from CEQA under 14 CCR section 15301, existing facilities because the work will involve retrofitting existing single-family housing to replace existing heating and cooling systems with multi-functional heat pump system for space conditioning and domestic hot water. The activities are also exempt from CEQA under 14 CCR section 15306, data collection because it will include limited data collection. The work involves no changes to existing uses of the existing buildings and fits within the scope of listed examples of both exemptions.

15301: Existing Facilities

To fit within this exemption, a project must meet all of the following criteria:

- 1) Consist of operation, repair, maintenance, permitting, leasing, licensing, or minor alteration
- 2) of existing structure, facilities, mechanical equipment, or topographical features,
- 3) which involves negligible or no expansion of use beyond that existing at the time of the lead agency's CEQA determination.

This Agreement is exempt under 14 CCR section 15301: Existing Facilities because it will design and pilot test a multi-functional heat pump system in existing facilities and does not constitute use beyond that existing at the time of the lead agency's CEQA determination. There will be no alterations to a building structure or site.

15306: Information Collection

To fit within this exemption, a project must meet all of the following criteria:

- 1) Consist of basic data collection, research, experimental management, and resource evaluation activities
- 2) Which do not result in a serious or major disturbance to an environmental resource.

This Agreement is exempt under 14 CCR section 15306: Information Collection because activities are strictly limited to data collection, technical research, and market analysis that do not cause a serious or major disturbance to any environmental resource. Core tasks outlined in the Scope of Work focus on non-invasive activities such as pre- and post-retrofit energy monitoring, and site assessment inspections.

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

**GRANT AMENDMENT REQUEST FORM (GARF)**

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.

This amendment poses no risk to the environment beyond what was previously approved on the April 14, 2021 Business Meeting.

- b) ☐ Agreement **IS NOT** exempt. (consult with the legal office to determine next steps)

Check all that apply

- ☐ Initial Study
☐ Negative Declaration
☐ Mitigated Negative Declaration
☐ Environmental Impact Report
☐ Statement of Overriding Considerations

F) Is this project considered “Infrastructure”? Yes

G) The following items should be attached to this GARF (as applicable)

- | | | |
|---|---|--|
| 1. Schedule of Products | ☐ N/A | ☒ Attached |
| 2. Exhibit A, Scope of Work | ☐ N/A | ☒ Attached |
| 3. Exhibit B, Budget Detail | ☒ N/A | ☐ Attached |
| 4. CEQA Documentation | ☐ N/A | ☒ Attached |
| 5. Novation Documentation | ☒ N/A | ☐ Attached |
| 6. CEC 105, Questionnaire for Identifying Conflicts | | ☒ Attached |
| 7. Terms and Conditions | ☐ N/A | ☒ Attached |

Felix Villanueva

Agreement Manager

08/28/2026

Date

Anthony Ng

Branch Manager

08/28/2026

Date

Jonah Steinbuck
(Delegated to Branch Manager)

08/28/2026



STATE OF CALIFORNIA
GRANT AMENDMENT REQUEST FORM (GARF)
CEC-277 (Revised 01/2026)

CALIFORNIA ENERGY COMMISSION

Director

Date

EXHIBIT A

Scope of Work

Rocky Mountain Institute

I. MTASK ACRONYM/TERM LISTS

A. Task Lists

Task #	CPR ¹	Task Name
1		General Project Tasks

ADVANCED BUILDING CONSTRUCTION COLLABORATIVE

Task #	CPR	Task Name
2A	x	Collaborative Operations
3A	x	Analysis and Technical Documents
4A		Technology Scaling
5A		Market Scaling
6A		Evaluation of Project Benefits
7A		Technology/Knowledge Transfer Activities

INTEGRATED MECHANICAL SYSTEM POD MULTI-FUNCTION HEAT PUMP SYSTEM

Task #	CPR	Task Name
2B	x	Market Research and Conceptual Design
3B	x	Prototype Fabrication and Testing
4B		Design for Manufacturing and Commercialization
5B		Phase 1 Technical Reporting
6B	X	Prototype Iteration and Product Literature Development Demonstration Site Assessment, Monitoring, Design and Engineering
7B	X	Demonstration Site Assessment, Monitoring, Design and Engineering Demonstration Project Implementation and Evaluation
8B		Demonstration Project Implementation and Evaluation Evaluation of Project Benefits
9B		Technology/Knowledge Transfer Activities
10B		Evaluation of Project Benefits
11B		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
ABC	Advanced Building Construction
CEC	California Energy Commission
CPR	Critical Project Review
DHW	Domestic Hot Water

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

EXHIBIT A
Scope of Work
Rocky Mountain Institute

Acronym/Term	Meaning
DOE	U.S. Department of Energy
EPIC	Electric Program Investment Charge
GWP	Global Warming Potential
HVAC	Heating, Ventilation, Air-Conditioning
IMSP	Integrated Mechanical System Pod (Tasks 2B to 5B completed under this technology prior to Amendment #3)
PV	Photovoltaic
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 do the following:

- Establish a national Advanced Building Construction Collaborative (ABC Collaborative) comprised of building stakeholders to accelerate the uptake of innovative high-performance construction technologies that achieve superior energy and carbon performance, enable rapid onsite construction timelines, are affordable to building owners and developers, and are desirable to building owners and users.
- **Demonstrate** a prefabricated Integrated multi-function **modular air-to water** heat pump **system** Mechanical System (IMSP) **that uses low or ultra-low global warming potential (GWP) refrigerant**. ~~includes an~~ **The** all-electric mechanical system **will** consisting of a high efficiency heat pumps for space conditioning, domestic hot water, ventilation, **and will incorporate thermal energy storage**, advanced controls. ~~The IMSP's performance will be field validated as part of a DOE funded whole building retrofit.~~

B. Problem / Solution Statement

Problem

California's goal to decarbonize the building sector creates a need for emerging technologies. One of the most significant barriers to retrofitting a building is that it is often time-consuming, disruptive, and costly. Heating, ventilation, air-conditioning (HVAC) systems are often difficult to retrofit due to the location of the existing system components, which are often not easily accessible. Significant advances are needed to scale the market, reduce the cost, and increase the demand for all electric retrofits.

Solution

To scale the uptake of deep energy retrofits, two core activities will be undertaken:

- 1) Build a nation-wide collaborative of stakeholders to scale high performance, prefabricated, off-site construction technologies, facilitate demand, and lower costs in the supply chain. This effort will engage California stakeholders and promote

EXHIBIT A Scope of Work Rocky Mountain Institute

California-based manufacturing and expand the statewide pipeline of supply and demand by connecting these stakeholders to the national market.

- 2) Demonstrate a prefabricated an integrated mechanical pod prototype multi-function modular air-water heat pump system using a low or ultra low GWP refrigerant, to provide heating, cooling, ventilation, domestic hot water, and grid interactive controls thermal storage for a retrofit-in-place, high performance, and mass-producible product for multi-family residential buildings. ~~The prefabricated prototype aims to remove many of the time-consuming and costly barriers associated with deep energy retrofits.~~

Goals and Objectives of the Agreement

To achieve the agreement goals for the ABC Collaborative and IMSP low or ultra-low GWP-multi-function-heat pump system, the CEC's Electric Program Investment Charge (EPIC) will provide grant funding up to \$1,312,500. CEC will provide the following funding:

- \$656,250 toward the ABC Collaborative ~~\$62,500 for the design, building and testing for the IMSP as part of DOE's Phase 1 award, and~~ \$656,250 toward the field demonstration and evaluation of the pods as part of a retrofit package funded by the DOE's Phase 2 award low or ultra low-GWP multi-function heat pump system.

1) ABC COLLABORATIVE GOALS

The goal is to create a broad-based National collaborative aimed at accelerating market demand for innovative, high-performance construction technologies for both retrofit and new construction. The aim is to facilitate a broad based collaborative comprised of building sector stakeholders to develop, demonstrate, and scale high-performance, energy efficient building solutions, including pre-fabricated and off-site construction. Additionally, the collaborative efforts will specifically engage stakeholders in California, to help promote California-based manufacturing and expand the statewide pipeline of supply and demand by connecting them to the national market.

2) ~~IMSP GOALS~~ MULTI-FUNCTION HEAT PUMP SYSTEM GOALS

The goals are to demonstrate a prefabricated modular air-to-water multi-function heat pump system to advance the adoption of heat pumps that are able to use low or ultra-low GWP refrigerants. The system will aim to install a low or ultra-low GWP unit in an occupied dwelling (with low GWP version of the same system as the contingency plan) to be monitored and evaluated for system performance, benefits to end users include cost effective installation, safety, and efficiency. ~~commercialize IMSP for low-rise multi-family buildings and to facilitate rapid deployment of deep energy retrofits. The IMSP prototype will be manufactured and tested to meet performance and design targets necessary to achieve 75% energy savings in thermal loads for existing buildings when combined with envelope upgrades.~~

EXHIBIT A

Scope of Work

Rocky Mountain Institute

Ratepayer Benefits:²

The successful development and commercialization of the IMSP— low or **ultra-low GWP multi-function-heat pump system**, and the launch of the ABC Collaborative could accelerate net-zero carbon retrofits for the state's single-family and multi-family housing units. This **multi-function heat pump system** could reduce the cost and time associated with retrofits, ~~reduce the time associated with retrofits,~~ and reduce energy use and costs for building occupants.

Technological Advancement and Breakthroughs:³

This Agreement will lead to technological advancements in the development of innovative low and **or** ultra-low GWP multi-function **heat pump** ~~mechanical~~ systems that **is** ~~are~~ all-electric and assembled from readily available components to provide space heating and cooling, ~~ventilation,~~ domestic hot water, and controls for residential buildings. ~~and to integrate with on-site photovoltaic (PV) systems and energy storage systems. A range of system sizes will also be investigated as proofs of concept beyond pilot building requirements so that the IMSP can be deployed across all California's climate zones.~~

The ABC Collaborative will have a feedback loop between industry and a research and development engine, coordinated by the U.S. Department of Energy. Research and Development (R&D) will be informed by building owners and the construction sector, ensuring that innovation, research, and development efforts are guided by market.

Agreement Objectives

ADVANCED BUILDING CONSTRUCTION COLLABORATIVE

The objectives are to:

- Plan and launch operations and support activities.
- Convene collaborative stakeholders and members annually to strategically align and ensure coordination across sectors especially around demand aggregation, research and product development, demonstrations and deployment, and ultimately product commercialization and scaling.
- Provide supporting services including but not limited to:
 - Developing and disseminating technology performance standards and cost targets for both retrofit and new construction products and packages.
 - Surveying and engaging owners, manufacturers and suppliers to identify major market gaps and research needs.
 - Guiding and supporting the development and demonstration of other ABC technologies.

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).

EXHIBIT A Scope of Work Rocky Mountain Institute

- Supporting technology deployment through commercialization support, technical assistance, and capacity building.
- Working with DOE-funded demonstration teams of ABC technologies to provide non-privileged performance data to engage various market actors, especially the finance and product development industries.
- Aggregate large volumes of committed retrofit and new construction demand for high-performance advanced building construction technologies.

~~INTEGRATED MECHANICAL SYSTEM POD~~ **MULTI-FUNCTION HEAT PUMP SYSTEM**

The objectives are to:

- ~~Prepare performance and design targets with input from building owners and retrofit panel manufacturers.~~
- ~~Produce design drawings that meet the specified product requirements.~~
- ~~Fabricate the prototype with integrated monitoring and controls.~~
- ~~Integrate the prototype designs into comprehensive retrofit packages for the Phase II pilot demonstration.~~
- ~~Perform product testing and validation of the prototype.~~
- ~~Develop a *Commercialization Plan* for manufacturer scale up and cost compression.~~
- **Demonstrate the low or ultra-low GWP multi-function heat pump system as a retrofit to an occupied single-family home**
- **Perform evaluation of product costs and performance**

~~If the recipient receives the Phase II award from the U.S. DOE, the recipient will continue to demonstrate and field validate the performance of the IMSP in a California multi-family building in conjunction with a whole-building retrofit package.~~

The Scope of Work has been amended to reflect the transition from Integrated Mechanical System Pod (IMSP) to the new multi-function heat pump system. Tasks 2B to 5B, which were completed as part of the IMSP development, are documented in the Technical Tasks below for completeness but are no longer active. The amendment focuses on subsequent tasks aligned with the new technology.

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

EXHIBIT A Scope of Work Rocky Mountain Institute

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

EXHIBIT A

Scope of Work

Rocky Mountain Institute

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;

EXHIBIT A

Scope of Work

Rocky Mountain Institute

- Invoicing and auditing procedures;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- 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. When directed by the CAM, establish one TAC for the ABC

EXHIBIT A

Scope of Work

Rocky Mountain Institute

Collaborative and another for the **multi-function heat pump system** IMSP-projects. 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 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)

EXHIBIT A

Scope of Work

Rocky Mountain Institute

CAM Products:

- CPR Agenda
- 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 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

EXHIBIT A Scope of Work Rocky Mountain Institute

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 monthly *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.
 - In lieu of the monthly progress report and with the CAM's approval, submit one or more progress reports submitted to the awarding federal agency. The federal report(s) must contain information similar to that required in the Energy Commission monthly progress reports.
- 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

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. The Final Report will include the ABC Collaborative and the multi-function heat pump system ~~IMSP~~ projects.

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)

EXHIBIT A
Scope of Work
Rocky Mountain Institute

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 TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* 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

EXHIBIT A

Scope of Work

Rocky Mountain Institute

Report, unless the CAM specifies a longer time period or approves a request for additional time.

- If a Final Federal Report is required by the federal agency **for the ABC project (only)**:
 - Submit a Federal Agency Report (draft and final) to the CAM on the date the draft is due to the federal agency (subject to the federal agency's approval).
 - Submit the approved final version of the report and Written Confirmation of the Federal Agency's Approval of the Final Federal Report (e.g., email or letter), upon receipt of the written confirmation.

Products:

- Summary of TAC Comments
- Federal Agency Report (draft and final) **for the ABC project (only)**
- Written Confirmation of the Federal Agency's Approval of the Final Federal Report **for the ABC project (only)**
- 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

EXHIBIT A

Scope of Work

Rocky Mountain Institute

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 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.

EXHIBIT A

Scope of Work

Rocky Mountain Institute

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 1.9 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.~~
- ~~• 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~~

EXHIBIT A
Scope of Work
Rocky Mountain Institute

Subtask 1.9 Obtain and Execute Subawards and Agreements with Site Hosts

The goal of this task is to ensure quality products and to execute subrecipients and site host agreements, as applicable, required to carry out the tasks under this Agreement consistent with the Agreement Terms and Conditions and the Recipient's own procurement and contracting policies and procedures.

The Recipient shall:

- **Execute and manage subawards and coordinate subrecipient activities.**
- **Execute and manage site host agreements and ensure the right to use the project site throughout the term of the Agreement, as applicable. A site host agreement is not required if the Recipient is the site host.**
- **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.**
- **Submit a 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 to the CAM for review.**
- **If requested by the CAM, submit a final copy of each executed subaward and any site host agreement**
- **If Recipient intends to add new subrecipients or change subrecipients, then the Recipient shall notify the CAM.**

Products:

- **Subaward and Site Letter (*describing the subawards needed, or stating that no subawards are required*)**
- **Draft Subawards (*if requested*)**
- **Final Subawards (*if requested*)**
- **Draft Site Host Agreement (*if requested*)**
- **Final Site Host Agreement (*if requested*)**

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

The goal of this subtask is to create advisory committee(s) for this Agreement. When directed by the CAM, establish a TAC for the ABC Collaborative and another for the **multi-function heat pump system** IMSP projects. 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:

EXHIBIT A

Scope of Work

Rocky Mountain Institute

- 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 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.

EXHIBIT A

Scope of Work

Rocky Mountain Institute

- 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 1.11 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)

EXHIBIT A
Scope of Work
Rocky Mountain Institute

- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to identify key performance targets for the projects to include a target for the ABC Collaborative and another for the ~~IMSP~~ **multi-function heat pump system** project. 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 draft *Project Performance Metrics Questionnaire* to the CAM prior to the Kick-off Meeting.
- Present the draft *Project Performance Metrics Questionnaire* 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 final *Project Performance Metrics Questionnaire*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit a final *Project Performance Metrics Questionnaire* with incorporated TAC feedback.
- 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 Performance Metrics Questionnaire*.
- Discuss the final *Project Performance Metrics Questionnaire* and *Project Performance Metrics Results* at the Final Meeting.

Products:

- Project Performance Metrics Questionnaire (draft and final)
- TAC Performance Metrics Summary
- Project Performance Metrics Results

TECHNICAL TASKS: ABC COLLABORATIVE

The following tasks are associated with the ABC Collaborative:

TASK 2A: The goal of this task is to develop the resources required to structure and operationalize the Collaborative.

The Recipient shall:

- Conduct communications and outreach.

EXHIBIT A

Scope of Work

Rocky Mountain Institute

- Create a *Collaborative Stakeholder Engagement Plan* to discuss the plan for stakeholder outreach and engagement.
- Create a *Collaborative Communications Plan* to discuss the plan to raise awareness, attract members, and create momentum for the Collaborative as it recruits members and participants.
- Develop and manage the Collaborative.
- Convene collaborative members.
- Develop a formal *Collaborative Membership Agreement* for participating stakeholders. The agreement will outline the Collaborative goals, and benefits and commitments for different categories of membership, including roles and responsibilities in the context of the Collaborative's goals.
- Define and create the governance structure and operations of the Collaborative as defined in a *Collaborative Operational Charter* to guide the ongoing operations of the Collaborative.
- Prepare and publish a five-year *Collaborative Strategic Plan*, a public document, to outline the activities, timeline, roles and responsibilities for the Collaborative and its Members. It will reflect input from the Inaugural Collaborative Convening, ABC Initiative strategic planning, ABC R&D Area planning and course-plotting discussions with DOE, and other outreach activities and research.
- Prepare for the ongoing operations of the Collaborative beyond the award period.
- Prepare *CPR Report 2A* and participate in Critical Project Review Meeting per subtask 1.3.

Products:

- Collaborative Stakeholder Engagement Plan
- Collaborative Communications Plan
- Collaborative Membership Agreement
- Collaborative Operational Charter
- Collaborative Strategic Plan
- CPR Report 2A

TASK 3A: ANALYSIS AND TECHNICAL DOCUMENTS

The goal of this task is to develop a robust measurement, verification, and dissemination plan for all ABC-related research, such that research and technology performance results are consistently captured, analyzed and available to the public domain for informing a range of activities including ongoing R&D, policy, financing, building applications, and other market enabling activities.

The Recipient shall:

- Support the creation of a high-level *Measurement and Verification Plan* to be developed by DOE technical researchers (e.g., national laboratories).
- Support *ABC 2019 FOA Topic 1 Phase I Report* highlighting DOE 2019 ABC FOA Topic 1 Phase 1 team's project results. Support *ABC 2019 FOA Topic 1 Phase 2 & Topic 2 Final Report*, summarizing all DOE 2019 ABC FOA Topic 1 and 2

EXHIBIT A

Scope of Work

Rocky Mountain Institute

awardees' project results. Broadly promote findings and feature them on collaborative website.

- Prepare a *Market Insights White Paper* in coordination with the ABC Initiative Analysis & Tools Area Lead to include market analysis to explain how market factors may contribute to the overall viability of ABC technologies and processes, and to help prioritize ABC efforts given favorable market conditions, etc. This analysis will include an owner/developer "wish list" and a list of major barriers to adopting ABC technologies and approaches. It will describe challenges that the relevant industries face in providing high performance ABC technologies and approaches to retrofits and new construction.
- Complete the *ABC Industry Guidance Report* to discuss performance standards and cost guidelines (including technologies and specifications) and include critical ABC technology cost targets.
- Prepare *CPR Report 3A* and participate in Critical Project Review Meeting per subtask 1.3.

Products:

- Measurement and Verification Plan
- ABC 2019 FOA, Topic 1 Phase 1 Report
- ABC 2019 FOA, Topic 1 Phase 2 & Topic 2 Final Report
- Market Insights White Paper
- ABC Industry Guidance Report
- CPR Report 3A

TASK 4A: TECHNOLOGY SCALING

The goal of this task is to provide ongoing consulting support to all ABC 2019 FOA Topic 1 and Topic 2 awardees and other identified high potential ABC technologies to ensure their project work remains market relevant and sensitive to the needs of building owners and industry while ensuring the highest chances of success for the project teams and technologies.

The Recipient shall:

- Assist Topic 1 project teams in securing demonstration sites for Phase II whole building retrofit systems and create *List of Secured Demonstration Sites*.
- Review Topic 1 & Topic 2 project presentations at Second Collaborative Convening, or other review time to be arranged by DOE, with findings to be formally submitted in an *ABC FOA Topic 1 & Topic 2 Presentations Review Report*.
- Develop an *ABC Technologies Commercialization and Support Plan*, to include target market segments for specific technology categories, potential commercialization paths innovators and entrepreneurs can follow, potential incubation resources, and appropriate capitalization categories and resources.

Products:

- List of Secured Demonstration Sites

EXHIBIT A Scope of Work Rocky Mountain Institute

- ABC FOA Topic 1 & Topic 2 Presentations Review Report
- ABC Technologies Commercialization and Support Plan

TASK 5A: MARKET SCALING

The goal of this task is to execute a series of matchmaking and negotiation activities between building owners and developers and ABC technology manufacturers and installers to generate large commitments for the adoption of ABC technologies and processes in a large volume of retrofit and new construction projects.

The Recipient shall:

- Prepare a *Demand Aggregation Plan* to develop a target outreach list with large portfolio owners and developers, required communications material, and a shared timeline for assigned outreach, demand aggregation, and signing of charter agreements.
- *Prepare* Facilitated Demand Commitments. The Facilitated Demand Commitments will include the lead entity or portfolio owner, the mechanism or program through which ABC has engaged with the owner, the building segment and construction approach (including new construction or retrofit), the approximate square footage of the portfolio / project, and an overview of ABC's support and engagement with the project.
- Prepare and execute *Facilitated Demand Convenings*. The Facilitated Demand Convenings will include a minimum of four virtual and/or in-person convenings with demand stakeholders to provide targeted education on, promote socialization of, and stimulate interest in ABC approaches and technologies and build foundations for robust demand. These will be significant, demand-focused events that are market-segment and/or regionally specific to support demand coordination and aggregation for ABC relevant project activities. Notwithstanding the above, if robust demand is demonstrated in the near term by owners/developers indicating commitments amounting to an additional 8 million square feet of building floor area of ABC-relevant projects motivated or supported by the Collaborative, the Project Team may elect to reduce the number of demand convenings.

Products:

- Demand Aggregation Plan
- Facilitated Demand Commitments
- Facilitated Demand Convenings

TASK 6A: EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.

EXHIBIT A

Scope of Work

Rocky Mountain Institute

- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The CEC may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 7A: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement.

Eligible Collaborative activities include, but are not limited to, the following:

- Provide consultations to promising innovative building technologies and research teams located in or applicable to California. Consultations may cover issues but are not limited to technology implementation, partnerships, customer and needs assessment, and scale-up considerations.
- Market research, business plan development, and guidance on potential commercialization paths.

EXHIBIT A
Scope of Work
Rocky Mountain Institute

- Support of promising technologies' entry into a California incubator or accelerator program.
- Facilitation of feedback exchange between R&D teams and industry stakeholders to help developed technologies that are responsive to real-world gaps and needs.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan* (Draft/Final) that identifies the proposed activities the recipient will conduct to support the successful commercial adoption of promising and innovative building technology/technologies.
- Present the *Draft Technology Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the Draft Technology Transfer 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 Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in Final Technology Transfer Plan.
- Develop and submit a *Draft Technology Transfer Summary Report* and a *Final Technology Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the Final Technology Transfer Plan. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the 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:

- Draft Technology Transfer Plan
- Final Technology Transfer Plan
- Summary of TAC Comments
- Draft Technology Transfer Summary Report
- Final Technology Transfer Summary Report
- High Quality Digital Photographs

EXHIBIT A
Scope of Work
Rocky Mountain Institute

TECHNICAL TASKS: ~~INTEGRATED MECHANICAL SYSTEM POD~~ MULTI-FUNCTION HEAT PUMP SYSTEM

The following tasks are associated with the Integrated Mechanical Pod System Multi-function Heat Pump System

Note: Tasks 2B (Market Research and Conceptual Design), 3B (Prototype Fabrication and Testing), 4B (Design for Manufacturing and Commercialization), and 5B (Phase 1 Technical Reporting) were completed under the original Scope of Work (EPC-20-023-02) prior to the adoption of the new multi-function heat pump system as reflected in this amendment (EPC-20-023-03). These tasks are retained for historical reference and are not part of the current amendment scope.

TASK 2B: MARKET RESEARCH AND CONCEPTUAL DESIGN

The goal of this task is to conduct market and product research to provide conceptual designs for the mechanical module prototype to effectively address mechanical systems needs in targeted California climate zones.

The Recipient shall:

- Identify performance and design criteria.
 - Conduct design meetings, consult with manufacturers, and engage stakeholders to inform the design and requirements.
 - Determine viability of products for California's multi-family buildings.
 - Produce a high-level *Product Requirements Plan* for the prototype that includes the results of meetings with building owners and envelope panel manufacturers to inform requirements.
 - Determine viability of ~~IMSP~~ **system** capacity requirements in targeted CA climate zones.
- Evaluate CAD drawings and produce *Test Plan for Product Validation* that includes testing protocols and appropriate test facility procedures.
- Follow established National test standards and California Residential Building Energy Efficiency Standards (Title 24, Part 6) where applicable.
- Prepare *CPR Report 2B* and participate in Critical Project Review Meeting per Subtask 1.3.

Products:

- Product Requirements Plan
- Test Plan for Product Validation
- CPR Report 2B

TASK 3B: PROTOTYPE FABRICATION AND TESTING *The goals of this task are to fabricate and test the prototype to validate and finalize product design.*

EXHIBIT A
Scope of Work
Rocky Mountain Institute

The Recipient shall:

- Fabricate the prototype according to design drawings and description. Test operation and integration of individual components in a laboratory setting. Test air sealing and weatherproofing to determine system performance and validate control system and discuss the results in a *Product Validation Report*.
- Prepare *CPR Report 3B* and participate in Critical Project Review Meeting per Subtask 1.3.

Products:

- Product Validation Report
- CPR Report 3B

TASK 4B: DESIGN FOR MANUFACTURING AND COMMERCIALIZATION

The goal of this task is to develop sustainable and achievable plans to both manufacture the IMSP on a large scale and provide product commercialization and an initial business plan for scaling demand.

The Recipient shall:

- Incorporate manufacturing techniques for lean production, inventory management, delivery methods and efficiency of fabrication at scale (initial target of approximately 500 IMSP/yr. after 2 years; approximately 1000 IMSP/yr. after 4 years).
- Determine throughput required for profitability and ability to sustain the business model. Prepare *Design for Manufacturing and Commercialization Plan* to include the process for production, distribution, marketing, sales, and customer support required to achieve commercial success beyond the demonstration phase to sustain the business model.

Products:

- Design for Manufacturing and Commercialization Plan

TASK 5B: PHASE 1 TECHNICAL REPORTING

The goal of this task is to develop and submit the Phase 1 Technical report as required by DOE.

The Recipient shall:

Develop the *Phase 1 Technical Report* that will provide a retrospective project overview and energy-savings, and a discussion on whether the goals, objectives and ratepayer benefits identified in Section II.B. of this agreement and DOE's Statement of Project Objectives for Phase 2 application process were achieved.

Products

- Phase 1 Technical Report

EXHIBIT A Scope of Work Rocky Mountain Institute

~~TASK 6B: PROTOTYPE ITERATION AND PRODUCT LITERATURE DEVELOPMENT~~

The goal of this task is to update the prototype design based on findings in Phase 1 Technical Report, and fabricate and test it in a laboratory setting.

The Recipient shall:

- ~~Update the IMSP design and fabricate the updated prototype.~~
- ~~Test the prototype in a laboratory, and obtain a *UL/ETL Certification Report*~~
- ~~Prepare an *Installation, Operations and Maintenance Manual* that instructs contractors and property managers on the installation and maintenance of the IMSP~~

Products

- ~~UL/ETL Certification Report~~
- ~~Installation, Operations and Maintenance Manual~~

~~TASK 7B-6B: DEMONSTRATION SITE ASSESMENT, MONITORING, DESIGN AND ENGINEERING~~

The goal of this task is to 1) evaluate the site existing conditions and the engineering feasibility of the demonstration site; 2) Develop a monitoring and verification plan to evaluate costs and performance **and** 3) develop a schematic design package, ~~collect the existing building energy use as part of the pre-retrofit monitoring for at least 9 months.~~ The CAM may, in writing, approve a reduction in the length of data collection.

The Recipient shall:

- Perform site assessment to evaluate the existing conditions of the demonstration site. Activities include, ~~pre-retrofit monitoring, blower door testing, electrical infrastructure inspections,~~ **existing plumbing lines, mechanical distribution, and site conditions** ~~baseline energy modeling for the demonstration site.~~
- Prepare *Existing Conditions Report* based on site assessment, and ~~create as-built drawings that includes a basic floor plan, roof plan,~~ location of existing mechanical equipment, and photographs
- ~~Collect at least 9 months of pre-retrofit data of the existing building energy use to be compared with post-retrofit data.~~
- Establish the ~~deep~~ energy retrofit design that lays out the mechanical system including the IMSP-C **prototype** in detail in the *Schematic Design Package*.
- ~~Participate in a Critical Project Review Meeting and prepare CPR Report #4B per subtask 4.3.~~
- **Develop a Measurement and Verification Plan addressing system modifications, defines test objectives, quantitative performance targets, safety requirements, measurement approaches, and instrumentation. The Plan will define monitoring and instrumentation required to evaluate system performance and ensure safety. The plan will include evaluation of:**
 - **Seasonal efficiency for heating, cooling, and hot water heating**

EXHIBIT A
Scope of Work
Rocky Mountain Institute

- Thermal comfort of the building occupants
- Peak power draw and delivered capacity
- Load shifting capability and interaction with thermal storage
- Project costs
- Prepare *CPR Report 3B* and participate in Critical Project Review Meeting per Subtask 1.3.

Products

- Existing Conditions Report
- Schematic Design Package
- Measurement and Verification Plan
- CPR report #4B-6B

TASK 8B-7B: DEMONSTRATION PROJECT IMPLEMENTATION AND EVALUATION

~~The goals of this task are to prepare and submit final design, engineering drawings, submit permit applications, and complete demonstration project..~~

The goals of this task are to install, commission, and evaluate the performance of a multi-function heat pump system and collect at least 9 months of high-resolution data on the performance of the low or ultra-low GWP heat pump. The CAM may, in writing, approve a reduction in the length of data collection.

The Recipient shall:

- Purchase and assemble all required components, including heat pump modules, thermal storage, piping, electrical, additional components
- and control connections.
- Coordinate with local permitting authorities to obtain all required installation approvals.
- Transport, install and commission the multi-function heat pump system
- Conduct functional performance testing to confirm safe operation and user responsiveness.
- Collect and monitor the post-retrofit performance according to the Monitoring and Verification Plan, and provide lessons learned in the *System Performance Report (draft and final)*. The report shall include: an assessment of the installation process; observations on the demeanor and reliability of the equipment; a log of any system failures, troubleshooting steps, and repair actions; evaluation of general system functionality and integration; analysis of energy usage, summary of all costs, estimate of GHG emissions; and performance reporting against the metrics defined in the Measurement and Verification Plan. It shall summarize monitored data, distill key performance results, document lessons learned, and describe implications for future design refinement, scaling, and commercialization.

EXHIBIT A

Scope of Work

Rocky Mountain Institute

Products

- System Performance Report (draft and final)

~~TASK 9B: FIELD MEASUREMENT & VERIFICATION~~

~~The goal of this task is to field validate the performance of the retrofitted building system and collect at least 9 months of high-resolution data on the performance of the whole building retrofit package, including the IMSP. The CAM may, in writing, approve a reduction in the length of data collection.~~

- ~~• post-retrofit energy consumption and indoor environmental quality of the retrofitted building, including the performance of the IMSP, and summarize the data compared to the pre-retrofit data.~~
- ~~• Prepare a *Demonstration Project Evaluation* whole building retrofit package including the IMSP based on the data collected. The report shall include: an assessment of the installation process and permitting experience; observations on the demeanor and reliability of the equipment; a log of any system failures, troubleshooting steps, and repair actions; evaluation of general system functionality and integration; analysis of energy usage, summary of all costs, estimate of GHG emissions; and performance reporting against the metrics defined in the *Measurement and Verification Plan*. It shall summarize monitored data, distill key performance results, document lessons learned, and describe implications for future design refinement, scaling, and commercialization.~~

~~TASK 10B-8B: EVALUATION OF PROJECT BENEFITS~~

~~The goal of this task is to report the benefits resulting from this project.~~

The Recipient shall:

- Complete two Project Benefits Questionnaires that correspond to the main intervals in the Agreement: *Kick-off Meeting Benefits Questionnaire*; and *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.

EXHIBIT A

Scope of Work

Rocky Mountain Institute

- Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
-
- Respond to CAM questions regarding responses to the questionnaires.
 - **Complete and update the project 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 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.**

The CEC may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Final Meeting Benefits Questionnaire
- **Documentation of Project Profile on EnergizeInnovation.fund**
- **Documentation of Organization Profile on EnergizeInnovation.fund**

EXHIBIT A
Scope of Work
Rocky Mountain Institute

TASK 11 9B: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement. Eligible activities include, but are not limited to, the following:

- Scale-up analysis including manufacturing analysis, ~~independent design verification~~, and process improvement efforts.
- ~~Technology verification testing, or application to a test bed program located in California.~~
- Market research, business plan development, and cost-performance modeling.
- Research identifying regulatory and policy pathways
- ~~Entry into an incubator or accelerator program located in California.~~

The Recipient Shall:

Develop and submit a Technology Transfer Plan (Draft/Final) that identifies the proposed activities the recipient ~~will conduct to accelerate the successful commercial adoption of the technology that~~ **will aim to outline as next steps for commercialization based on project experience and results. In addition, the recipient will identify a cost evaluation that includes:**

- **Installed costs (materials and labor)**
- **Operating costs and utility bill impacts**
- **Maintenance requirements**
- **Comparative total cost assessment relative to other common single-family heat pump and heat pump water heaters**
- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in Final Technology Transfer Plan.
- Develop and submit a *Technology Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the Final Technology Transfer Plan. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the 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:

- Technology Transfer Plan (draft and final)
- Technology Transfer Summary Report (draft and final)

EXHIBIT A
Scope of Work
Rocky Mountain Institute

- High Quality Digital Photographs

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.