California Energy Commission
March 12, 2026 Business Meeting
Backup Materials for Association for Energy Affordability, Inc.

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

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

CALIFORNIA ENERGY COMMISSION

PROPOSED RESOLUTION: Association for Energy Affordability, Inc.

RESOLUTION NO: 26-0312-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 Agreement EPC-25-046 with Association for Energy Affordability for a $1,985,004 grant. The project will design, test, and commercialize integrated, spray-applied robotic and aerosol-based attic and wall retrofit solutions, that make it faster, safer, and more affordable to improve the envelopes of existing California homes; 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 12th day of March 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 March 12, 2026.

Kim Todd
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 01/2024)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: EPC-25-046

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Felix Villanueva
3. MS-:51
4. Phone Number: 916-776-0822

C. Recipient's Information

1. Recipient's Legal Name: Association for Energy Affordability, Inc.

D. Title of Project

Title of project: Integrating Emerging Spray-applied Envelope Retrofit Solutions for Rapid Deployment

E. Term and Amount

1. Start Date: 4/01/2026
2. End Date: 9/30/2030
3. Amount: $1,985,004.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 3/12/2026
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Jeanie Mar
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: Electric Program Investment Charge (EPIC) Program

Project Description:

Proposed resolution approving agreement EPC-25-046 with Association for Energy Affordability, Inc. for a $1,985,004 grant and adopting staff's recommendation that this action is exempt from CEQA. This project will demonstrate an integrated, rapidly deployable building envelope retrofit solution that combines advanced air sealing, robotic attic preparation, and spray-applied exterior insulation to significantly reduce energy use and emissions. By improving airtightness and thermal performance, the project enables cost-effective building electrification without increasing peak electrical demand or requiring major structural modifications. Field demonstrations will be conducted in low-income and disadvantaged multifamily communities to validate performance, affordability, and minimal resident disruption. The project also addresses worker safety and scalability through automation and streamlined installation practices. Results will inform utility programs and market adoption pathways to support widespread building decarbonization across California.

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.

      Cal. Code Regs., tit. 14, sec. 15301 provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of use beyond that existing at the time of the lead agency's determination, are categorically exempt from the provisions of the California Environmental Quality Act. The project would include developing and commercialize easily deployable spray-applied thermal and air sealing retrofit solutions for walls and attics in existing residential buildings, especially, residential buildings. The equipment and materials would include but may not be limited to insulation; weatherstripping; paint; and evaluation, measurement, and verification equipment (e.g., power meters, flow meters, sensors, and data loggers). The physical work would consist of installing the specified equipment and utilizing the identified materials. The project would not involve the addition of residential units or any substantial expansion of existing buildings. All work would be conducted within existing laboratory and residential buildings, with the residential sites expected to be primarily multifamily properties.Therefore, the project falls within section 15301 and will not have a significant effect on the environment.

Cal. Code Regs., tit. 14, sect. 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 environmental resources are categorically exempt from the provisions of CEQA. The project will gather data through a structured measurement and verification (M&V) plan that includes baseline modeling, pre-retrofit monitoring, in-field performance tracking, and post-retrofit evaluation. Prior to installation, the team will conduct building science modeling and 12 months of pre-retrofit monitoring to establish baseline energy use, air leakage, emissions, and hygrothermal performance. During installation, technologies will provide real-time leakage reduction data and quality control documentation. Following installation, the project will include 12 months of post-retrofit monitoring to quantify energy savings, air leakage reductions, indoor environmental impacts, and overall project benefits, with results used to validate performance and inform commercialization pathways. Thus, the project falls within section 15306 and will not have a significant effect on the environment. For these reasons, the proposed work will not have any significant effect on the environment and falls under sections 15301 and 15306.

Additionally, the project will not impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies; does not involve any cumulative impacts of successive projects of the same type in the same place that might be considered significant; does not involve unusual circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project is not included on any list compiled pursuant to Government Code section 659625.5; and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exemptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project and will not have a significant effect on the environment.

b) Agreement **IS NOT** exempt.
IMPORTANT: consult with the legal office to determine next steps.

No

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

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

H. Is this project considered "Infrastructure"?

No

I. Subcontractors

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

Subcontractor Legal Company Name	CEC Funds	Match Funds
The Regents of the University of California on behalf of the Davis campus	$ 524,988	**$**0
Signetron, Inc.	$ 500,000	**$**100,000
RDH Building Science Inc.	$ 70,000	**$**0
David Baker, an Architectural Corporation	$ 80,000	**$**0
Self-Help Enterprises	$ 10,000	**$**0
National Community Renaissance	$ 10,000	**$**0

J. Vendors and Sellers for Equipment and Materials/Miscellaneous

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

Vendor/Seller Legal Company Name	CEC Funds	Match Funds
Aeroseal, LLC	$175,000	$125,000
Atticare Construction	$188,400	$0
TBD	$5,000	$0

K. Key Partners

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

Key Partner Legal Company Name
No key partners to report

L. Budget Information

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

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	25-26	301.001M	$ 1,985,004

TOTAL Amount: $ 1,985,004

R&D Program Area: ICMB: Buildings

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not Applicable

M. Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Andrew Brooks

Address: 5900 Hollis St Ste R2

City, State, Zip: Emeryville, CA 94608-2098

Phone: 510-431-1791

E-Mail: abrooks@aea.us.org

2. Recipient's Project Manager

Name: G.G. Merkel

Address: 5900 Hollis St Ste R2

City, State, Zip: Emeryville, CA 94608-2098

Phone: 510-431-1795

E-Mail: gmerkel@aea.us.org

N. Selection Process Used

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

Selection Process	Additional Information
Competitive Solicitation #	GFO-24-310
First Come First Served Solicitation #	Not applicable
Other	Not applicable

O. Attached Items

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

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes.
4	Recipient Resolution	Yes.
5	Awardee CEQA Documentation	Yes.

Approved By

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

Agreement Manager: Felix Villanueva

Approval Date: 1/22/26

Branch Manager: Anthony Ng

Approval Date: 1/29/2026

Director: Jonah Steinbuck *(delegated to Manager)*

Approval Date: N/A

Exhibit A
Scope of Work
Association For Energy Affordability, Inc.

I. TASK AND ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Building Science Performance Modeling
3	X	Design Development
4		Demonstration System Installation
5	X	Demonstration Site Performance Measurement and Verification (M&V)
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
Aeroseal	A patented, non-toxic aerosol technology that seals leaks in HVAC ductwork
CAM	Commission Agreement Manager
CEC	California Energy Commission
CPR	Critical Project Review
EIFS	Exterior Insulation Finish Systems
HVAC	Heating, Ventilating, and Air Conditioning
Recipient	Association for Energy Affordability, Inc.
TAC	Technical Advisory Committee
WUFI	Wärme Und Feuchte Instationär (German for “Transient Heat and Moisture”), a software suite for simulating transient heat and moisture transfer in building components

[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.

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the design, hardware development, and in-field procedures to commercialize easily deployable spray-applied thermal and air sealing retrofit solutions for walls and attics in existing residential buildings. The Recipient, Association for Energy Affordability, Inc., will demonstrate technologies that include a robotic system for automated cleaning and preparation processes, aerosol sealing and a spray-applied cork, and an exterior insulation finishing system that is applied like stucco over the existing wall. These technologies have a high potential for integrating seamlessly with existing delivery systems at low cost and are thus poised to overcome critical market barriers to achieving California's statutory energy goals for the existing building stock.

B. Problem/ Solution Statement

The decarbonization of California's building sector has fostered the need for innovative envelope retrofit technologies, yet significant barriers prevent widespread implementation at scale. Many building retrofits exclude envelope improvements due to complexity, cost, and relatively long payback periods. California's light-weight building stock and seismic challenges constrain the problem of envelope retrofits to a limited set of possible solutions. At the same time, California's mild climate creates unique opportunities for targeted, spray-applied attic and wall solutions that don't require waiting for cost compression of pre-fabricated envelope retrofit products, and they offer a non-invasive point of access that can address performance of the whole building with little industry disruption.

Current market conditions, supply chain inefficiencies, and lack of affordable emerging technological solutions have made advancements in industrialized envelope retrofits costly due to demolition, asbestos abatement, and structural repairs. Current envelope retrofit delivery requires complex coordination between multiple contractors and trades, creating delays, quality control issues, and increased costs. This exacerbates construction timelines for industrialized or prefabricated approaches and instead owners turn to standard drill and fill insulation or foam-based rigid exterior insulation finish systems (EIFS) retrofits that rely on carbon-intensive materials or invasive methods, that require displacement for residents during construction. These conventional approaches still often result in thermal bridging, inconsistent coverage, and moisture management issues that compromise performance or durability. Attic retrofit methods include attic preparation, air sealing and insulation and still face barriers to scale in California. Traditional attic retrofits require workers to enter dangerous environments with

temperatures reaching 120-140°F, creating safety hazards and limiting access to critical air leakage areas. Manual air sealing techniques are invasive, time-consuming, and achieve limited leakage reduction compared to a new generation of automated technologies that are practical and available today. Air sealing retrofits are significantly under incentivized due to outdated assumptions in energy simulations that fail to capture the performance of advanced sealing technologies.

Solution

To address this critical gap in rapidly deployable retrofit solutions, this project advances three complementary technologies that overcome fundamental market barriers: 1. a robot with autonomous navigation and cleaning in attic spaces, eliminating worker safety risks while accessing previously unreachable areas; 2. a retrofit application using aerosol sealant injection from attics rather than occupied spaces, achieving 30-50% envelope leakage reduction for the whole building non-invasively in less than a day per unit; 3. a spray-applied exterior insulation finishing system that is applied like stucco over the existing wall. It is composed of a mixture of cork and lime, offering an R-value of 3.8 per inch and flexibility in applied thickness.

By combining all three technologies under a single contracting entity, the solution eliminates complicated trade coordination and provides streamlined delivery that reduces project timelines while improving quality control and customer experience.

The integrated approach targets attics as the most cost-effective envelope intervention point, delivering whole-building infiltration reductions of 50%. This avoids the high costs and invasiveness of other envelope interventions while providing sufficient thermal improvements for California's mild climate conditions.

These automated systems serve as proof of concept to manufacturers, project owners, and contractors illustrating what is possible and what types of products are needed as California's retrofit industry scales to meet decarbonization goals over the coming years.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Design, develop, and test a pre-commercial robotic application product to clean and prepare existing attics for air sealing, and address attic envelope leakage prior to attic insulation installation.
- Demonstrate an integrated attic and exterior wall thermal retrofit approach achieving 50% building infiltration reduction and adding R-7 min (nominal) of added insulation.
- Validate system performance across five or more multifamily buildings in disadvantaged communities.

- Develop, document, and test field-application protocols, either individually or in combination, for automated cleaning of existing attic spaces, sealing technology with re-insulation, and EIFS applied over an existing stucco substrate (that has been treated and sealed)
- Evaluate the .037 cork EIFS as a durable, low-cost, low-global warming potential and easy-to-install alternative to conventional EIFS through a full-scale mock-up and field demonstration.
- Generate detailed performance maps from the field testing to provide input data for building energy simulations across California's climate zones.
- Evaluate the environmental, grid, and cost implications of the integrated solution, including emissions reductions and ratepayer impacts.
- Generate field performance data to inform California incentive program workpapers for advanced air sealing methods

Ratepayer Benefits:[2] This Agreement will result in ratepayer benefits of greater electricity reliability, lower costs, and increased safety by reducing thermal loads of buildings through advanced envelope improvements. State analyses—the California Building Decarbonization Assessment, the Building Decarbonization Coalition's Roadmap to Decarbonize Buildings, and the CPUC's Building-Decarbonization proceeding (R.19-01-011)—all conclude that achieving AB 3232 goals will require widespread deeper efficiency. Our project advances building envelope technology that directly supports these critical elements. The Agreement advances technologies for comprehensive building envelope retrofitting that dramatically reduces thermal loads through advanced air sealing and insulation systems. These improvements reduce 50% of heating energy and 10-15% cooling energy, and reduce heating and cooling costs for tenants, while increasing hours of maintained comfort during power outages providing better thermal comfort that helps residents during extreme climate events. Reducing thermal loads through envelope improvements will control electricity costs and support grid stability as buildings electrify and aid in achieving SB100's renewable integration goals by creating buildings that require less energy during peak demand periods when renewable generation may be limited.

Streamlining attic retrofits and minimizing uncontrolled air infiltration enables widespread envelope improvements at significantly lower costs than traditional methods. By expanding the total addressable market for deep efficiency retrofits rather than merely improving individual building performance, the project helps close the

[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).

current efficiency gap and put California back on pace to meet its 2030 emissions reductions, energy-savings, and renewable-integration targets. The infiltration control and thermal load reduction achieved through comprehensive envelope retrofitting creates a foundation for successful building electrification and decarbonization across California's diverse building stock.

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 by furthering the development of automated retrofit systems optimized for California's unique climates and building stock. The project commercializes autonomous robotics for residential retrofit applications and adapts aerosol sealing technology for non-invasive retrofit implementation, overcoming primary barriers of worker safety, access limitations, and installation invasiveness that have prevented scaling of envelope retrofits. The automated systems will meet California's need for rapidly deployable retrofit solutions and provide lessons learned to enable workforce development of future retrofit technologies. Field-validated performance data will align incentive programs with breakthrough technology capabilities, accelerating market transformation.

Agreement Objectives

The objectives of this Agreement are to:

- Deploy commercialization-ready robotic cleaning systems achieving 2-3x faster attic preparation compared to manual methods
- Design, develop, and test commercialization-ready products to enter the residential market to clean and prepare existing attics for air sealing and address envelope leakage in attics
- Demonstrate Aeroseal, a patented, non-toxic aerosol technology that seals leaks in heating, ventilating, and air conditioning (HVAC) ductwork, ability to achieve 50% building infiltration reduction from baseline through field validation.
- Demonstrate commercial-ready improvements for robot applications achieving 50% cleaning of existing attic conditions
- Validate automated systems performance across five or more multifamily buildings in disadvantaged communities
- Generate detailed performance maps from field testing to provide input data for building energy simulations to inform California incentive program workpapers for advanced air sealing methods.
- Establish integrated contractor workflows combining robotic preparation with automated air sealing for single-entity deployment

[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.

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:

<u>For products that require a draft version, including the Final Report Outline and Final Report</u>

- 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.

<u>For products that require a final version only</u>

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

<u>For all products</u>

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

<u>Instructions for Submitting Electronic Files and Developing Software</u>:

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

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

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

- **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

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

MEETINGS

Subtask 1.2 Kick-off Meeting
The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

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

  The Kick-off meeting will include discussion of the following:
  - The CAM's expectations for accomplishing tasks described in the Scope of Work;
  - An updated Project Schedule;
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Travel;
  - Equipment purchases;
  - Administrative and Technical products (subtask 1.1);
  - CPR meetings (subtask 1.3);
  - Monthly Calls (subtask 1.5)
  - Quarterly Progress reports (subtask 1.6)
  - Final Report (subtask 1.7)
  - Match funds (subtask 1.8);
  - Permit documentation (subtask 1.9);
  - Subawards (subtask 1.10);
  - Technical Advisory Committee meetings (subtasks 1.11 and 1.12);
  - Agreement changes;
  - Performance Evaluations; and
  - Any other relevant topics.

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

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

The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget may be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the CEC, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

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

The CAM shall:

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

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda(s)
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

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

  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM of the following Agreement closeout items:
    - Disposition of any procured equipment.

  - The CEC's request for specific "generated" data (not already provided in Agreement products).
  - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* organized by the tasks in the Agreement.

Products:

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

MONTHLY CALLS, REPORTS AND INVOICES

Subtask 1.5 Monthly Calls

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

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

The CAM shall:

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

The Recipient shall:

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

Product:

- Email to CAM concurring with call summary notes.

Subtask 1.6 Quarterly Progress Reports and Invoices

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

The Recipient shall:

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

Recipient Products:

- Quarterly Progress Reports
- Invoices

CAM Product:

- Invoice template

Subtask 1.7 Final Report

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

Subtask 1.7.1 Final Report Outline

The Recipient shall:

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

Recipient Products:

- Final Report Outline (draft and final)

CAM Products:

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

Subtask 1.7.2 Final Report

The Recipient shall:

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

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

Products:

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

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBAWARDS

Subtask 1.8 Match Funds

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

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

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the application that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

  If match funds were a part of the application that led to the CEC awarding this Agreement, then provide in the letter:
  - A list of the match funds that identifies:
    - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.

    - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

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

Subtask 1.9 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

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

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

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

Subtask 1.10 Obtain and Execute Subawards and Agreements with Site Hosts

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

The Recipient shall:

- Execute and manage subawards and coordinate subrecipients activities in accordance with the requirements of this Agreement.
- Execute and manage site host agreements and ensure the right to use the project 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.
- Incorporate this Agreement by reference into each subaward.
- Include any required CEC flow-down provisions in each subaward, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subaward terms.
- Submit a *Subaward and Site Letter* to the CAM describing the subawards and any site host agreement needed or stating that no subawards or site host agreements are required.
- If requested by the CAM, submit a draft of each *Subaward* and any *Site Host Agreement* required to conduct the work under this Agreement.
- If requested by the CAM, submit a final copy of each executed *Subaward* and any *Site Host Agreement*.

- Notify and receive written approval from the CAM prior to adding any new subrecipient (see the terms regarding subrecipient additions in the terms and conditions).

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.11 Technical Advisory Committee (TAC)

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

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

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

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

The Recipient shall:

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

Products:

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

Subtask 1.12 TAC Meetings

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

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.

- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* for each TAC Meeting that include any recommended resolutions of major TAC issues.

The TAC shall:

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

Products:

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

Subtask 1.13 Project Performance Metrics

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

The Recipient shall:

- Complete and submit the project performance metrics section of the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics at the first TAC meeting to solicit input and comments from the TAC members.

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

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

*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: Building Science Performance Modeling

The goal of this task is to model and optimize the thermal, hygrothermal, air barrier, constructability, and waterproofing performance of the thermal and air sealing envelope retrofit and evaluate operational energy, costs, greenhouse emissions, and thermal comfort. Modeling will occur pre-demonstration and will be updated post-demonstration for accurate real-world conditions.

Subtask 2.1 Building Performance Modeling

The first goal of this task is to conduct a preliminary energy analysis calculating baseline whole building and energy end use profiles, which will be updated in association with Task 5. Disaggregate space conditioning (heating, cooling, and ventilation), lighting, appliances, electrical plug loads, water heating end uses.

The second goal of this task is to model the economics and carbon impacts of thermal load and air sealing investments, in parallel with Task 3.1. Results may also optimize for, but are not limited to, passive resilience, thermal comfort, indoor air quality, peak demand shift, or minimizing HVAC sizing needs.

The Recipient shall:

- Collect building design and operation information needed to simulate a baseline model
- Develop a whole building model using EnergyPlus (and other tools as needed) that represents the target retrofit market, working with team members on specific design, and selection of specific components of the model.

If beneficial, for each retrofit technology, simulate at least three representative years of weather and grid emissions data (e.g., the most recent historical year, 2050 mid-point scenario estimate)

- As needed, evaluate, and propose solutions for potential thermal, hygrothermal, air barrier, constructability, and waterproofing issues to the team.
- For each simulation, disaggregate results at the whole building level, at the end-use level (heating, cooling, domestic hot water, lighting, etc.), and at the level of a representative sample of apartments.
- Each simulation may result in the suggested outputs:
    - Thermal comfort metrics
    - Indoor air quality metrics
    - Resilience metrics by modeling the effect of adverse events such as power outages of differing lengths on thermal comfort
    - Utility bill costs
- Prepare and develop content for the *Building Science Performance Report*, to include the following at a minimum:
    - Summarize the performance of the final model compared to the baseline.
    - Summarize the findings of the modeling effort
    - Define the envelope technologies and strategies selected and why they were chosen, identifying findings that are specific to the demonstration site as well as those that may be more generally applicable to other projects.

Products:

- Building Science Performance Report (Draft and Final)

Subtask 2.2 Existing Conditions Assessment and Hygrothermal Modeling

The goal of this subtask is for the Recipient to collaborate with RDH Building Science Inc. to assess pre-retrofit conditions to determine unanticipated conditions prior to retrofit and model the interaction between the sealed envelope and attic ventilation to ensure proper moisture management post-retrofit. Identify opportunities for additional attic vents to reduce moisture risk, as well as methods of retrofitting existing attic vents to harden against ember transport in the event of wildfires. This assessment will also identify areas that require specific details or sequencing during design development of the EIFS retrofit.

The Recipient shall:

- Identify attic irregularities such as irregular joist spacing, existing insulation conditions, access constraints, and non-standard mechanical penetrations. This will define the attic preparation procedures and priority air sealing areas, verified in coordination with an insulation contractor's manual inspection.
- Create a hygrothermal model using Wärme Und Feuchte Instationär (WUFI) to confirm condensation and mold risk, pay attention to vapor transport and moisture accumulation patterns when air leakage is reduced in the attic. WUFI translates to German for Transient Heat and Moisture. WUFI numerically models how temperature and moisture evolve over time within building assemblies such as walls, roofs, and floors by solving coupled heat- and moisture-balance equations.
- Evaluate solutions for potential thermal, hygrothermal, and waterproofing issues.
- Document findings and recommendations in an *Existing Conditions and Moisture Risk Report*

Products:

- Existing Conditions and Moisture Risk Report

TASK 3: Design Development

The goal of this task is to review engineering and performance specifications to fully prepare final hardware for the attic demonstration, with the goal of scaling for commercialization, and evaluation of a cork-based stucco for demonstration. This task will evaluate material compatibility, installation workflows, code compliance requirements, and cost implications to ensure successful demonstration and future commercialization pathways in the California market. Coordination will occur across disciplines for a complete cost estimate and revised performance model evaluation and incorporate findings from Task 3.1. Each subtask will involve contractor engagement to understand deployment constraints, laboratory or controlled testing to validate performance, development of field demonstration protocols, and preparation of technical documentation including construction drawings and specifications.

Subtask 3.1 Site Requirement and Use Case Development

The goal of this subtask is to gather practitioner insights on proposed emerging technology design, future workflow requirements, current deployment constraints and implementation best practices for attic retrofits in California housing. Findings should inform design (Task 3), mock-up design (Task 4), and technology transfer activities (Task 7).

The Recipient shall:

- Evaluate contractor experience as it relates to technology, design, construction and operation of deployment hardware. Document findings in a *Draft Contractor Engagement Report.*
- Engage input, including but not limited to general, insulation and window contractors to identify existing limitations, pain points, and inefficiencies in current affordable multifamily housing construction and retrofit processes that may impact demonstration technology design or scale.
- Present developed workflows and hardware solutions to contractors for feedback on feasibility, installation complexity, and maintenance considerations. Capture contractor identified modifications needed for successful field implementation.
- Work with contractors or industry experts to establish building typologies and site conditions that are optimal for each demonstrated technology. Develop clear site selection criteria and building assessment protocols to guide large-scale deployment decisions.
- Document contractor concerns regarding training needs, equipment requirements, timeline impacts and cost implications of construction. Develop recommendations for addressing these barriers in future deployment strategies, either incorporated into design development requirements or in market transformation activities. Document all final findings in a *Final Contractor Engagement Report*

Products:

- Contractor Engagement Report (Draft and Final)

Subtask 3.2 Aerobarrier Hardware Design Improvement

The goal of this subtask is to incorporate the findings of previous Subtasks 3.1 for the vendor Aeroseal, LLC to revise and reduce the amount of equipment needed by contractors to deliver Aerobarrier air sealing in attic or crawlspace applications.

The Recipient shall:

- Produce an *Attic Aerobarrier – Air Sealing Prototype Design Report* including manufacturer specifications, incorporating the lessons learned shared by insulation and air sealing contractors as part of Task 3.1. The report should delineate issues, changes, and revisions from current practice to the final prototype design for demonstration.
- Document all testing procedures, results, and performance metrics.
- Evaluate air sealing performance improvements under controlled conditions, if necessary.
- For new hardware, develop *Attic Aerobarrier – Air Sealing Protocol for In-Field Demonstration* to optimally operate new hardware in the field for demonstration.

Products:

- Attic Aerobarrier – Air Sealing Prototype Design Report
- Attic Aerobarrier – Air Sealing Protocol for In-Field Demonstration

Subtask 3.3 Signetron Robo-Attic Design Improvement and Lab Testing

The goal of this subtask is for the Recipient in collaboration with subrecipient Signetron, Inc. to improve Robo-Attic to autonomously vacuum and prepare conditions for air sealing improvements. Aim to incorporate findings from contractor interviews conducted in Subtasks 3.1.

The Recipient shall:

- Produce a *Signetron - Prototype Performance Report* including issues, changes and revisions related to Robo-Attic autonomy or cleaning improvements.
- Evaluate insulation vacuum system performance improvements under controlled conditions in Signetron's laboratory facility.
- Document all testing procedures, results, and performance metrics. The report may result in the suggested findings:
    - Computer vision algorithm updates resulting in a % improvement of attic cleaning abilities
    - Robo-Attic movement updates enabling easier abilities to traverse joist structures.
    - Updates regarding the types of insulation or debris able to be removed safely
- Develop and produce *Signetron- Attic Preparation Protocol for In-Field Demonstration* to optimally operate Robo-Attic.

Products:

- Signetron –Prototype Performance Report
- Signetron – Attic Preparation Protocol for In-Field Demonstration

Subtask 3.4 Spray-Applied EIFS Schematic Design and Construction Documents

The goal of this subtask is to fully coordinate the basic components, physical constraints, and architectural impact of Diasen's Thermactive spray-applied EIFS retrofit demonstration. Fully coordinate components across disciplines and prepare drawing documents for a complete cost estimate. The design should aim to reduce permit documentation as much as possible and account for the findings from Task 3.1.

The Recipient shall:

- Develop installation guidance and construction details in collaboration with Diasen to consider transitions and interfaces, including base of wall, wall-to-roof connections, and penetrations.

- Review architectural implementation considerations and address potential drainage system requirements (including drain mat installation, sequencing, and flashing coordination) based on hygrothermal modeling results from Task 3.1.
- Prepare *Spray-Applied EIFS Construction Drawing Set and Specifications* that fully describes the retrofit design package specifications for cost estimating and review by city building officials. Prepare construction plans, elevations and details as needed to show intent.
- Consult with City inspection authorities to determine special code or permitting requirements.
- Develop a 3D digital mock-up visualizations, diagrams, renderings to describe the final building result for team communication and marketing materials
- Assist waterproofing consultant in identifying and finalizing roof, window and exterior penetration details, coordinated with owner standards.
- Participate in regular meetings with Owner/Design team (assume 2 per month)
- Ensure drawings and specifications of components conform to previous Subtask 3.1, funding needs, site constraints (e.g., asbestos, structural needs), and owner project requirements.
- Identify if any certification and testing is needed to produce and deliver products to meet California codes and standards.
- Develop attic preparation protocols to optimally operate Robo-Attic in the field for demonstration.
- Prepare a CPR Report #1 and participate in a CPR meeting in accordance with the subtask 1.3 (CPR Meetings)

Products:

- Spray-Applied EIFS - Construction Drawing Set and Specifications
- CPR Report

Task 4: Demonstration Systems Installation

The goal of this task is to fabricate and install variations of retrofit technologies in the demonstration buildings.

Task 4.1 Initial Testing

The goal of this subtask is to conduct testing of prototype systems in the field prior to full demonstration. Validate updated hardware and software performance, optimize deployment protocols for full demonstration and evaluate any moisture risk

The Recipient shall:

- Complete a phased in-field test of final Aerobarrier hardware prototypes, Robo-attic insulation vacuum system performance improvements under field conditions, and hygrothermal risk of spray-applied cork product.
- Identify contractor transition points and involvement for each technology

- Document results to modify in-field protocols or technology as needed before proceeding to full demonstration on buildings in *Automated Spray-Applied Retrofit Mock-up Report*

Products:

- Automated Spray-Applied Retrofit Mock-Up Report

Task 4.2 Perform Field Demonstration

The goal of this subtask is to complete remaining retrofit demonstrations and verify proper operation of the newly installed air sealing and thermal retrofit components according to Task 3 and 4.1.

The Recipient shall:

- As needed, coordinate demonstration, construction and installation of retrofit components according to Task 3 activities, if relevant, including, but not limited to:
  - clean and prepare existing attics for air sealing
  - address envelope leakage without insulation
  - Re-insulate attics with Title 24 compliant component
  - Add airsealing and thermal insulation barrier to exterior walls of the building
- Incorporate actual specifications into our predicted whole building energy models, as needed. Revised results will be referenced during Monitoring & Verification reporting.
- Assist in preparation of *Construction Memo* to document the completion of system installation, includes pre, mid and post construction field reports and site visit documentation
- Support the preparation of a *System Commissioning Report,* which will, at a minimum, describe the results of the commissioning process and highlight any unique challenges or complications with bringing systems online.
- Develop an *Operational Plan* to guide the operation of systems after the end of this project. Retrieve bids to calculate the value of a maintenance fund to reliably maintain grant-funded systems

Products:

- Construction Memo
- System Commissioning Report
- Operational Plan

Task 5: Demonstration Site Performance Measurement and Verification

The goal of this task is to monitor and verify the predicted performance of our demonstration for pre and post construction in a timeline that is pre-approved by the CAM.

Task 5.1 Measurement and Verification Plan

The goal of this subtask is to develop a measurement and verification plan for all aspects of the project, including but not limited to energy consumption, air leakage, moisture, effectiveness of installation and digital workflow performance on envelope package approaches.

The Recipient shall:

- Develop a *Stakeholder Engagement Plan* documenting the strategy for soliciting input for retrofit performance post-occupancy. The goals of this plan are:
    - To document lessons learned and concerns from the owner, residents and contractors related specifically to technology adoption.
- Develop a *Measurement and Verification (M&V)* Plan for grant-funded technologies and whole building performance. The M&V Plan will include details regarding approach to instrumentation, data collection, and data analysis and will include:
    - Monitoring Equipment budgets
    - Schedule of metering/monitoring equipment to be used and how it will be installed (where not already included as part of the construction scope)
    - Instrumentation calibration methodology
    - Data logging and acquisition methodology and schedule (minimum 12 months of pre and post construction (minimum 12 months pre- and post-installation, including summer, winter, and shoulder seasons)
    - Description of the data analysis and quality assurance procedures
    - Data format protocols, data collection process
    - Description of the methods (e.g. protocols, practices) that will be performed, to manage and protect Person Information and to comply with the Information Practices Act
    - Monitoring plan must include measurement of:
        - % of attic's cleaned with robotic components
        - Whole Building air leakage reduction relative to baseline
        - Heating and cooling building energy consumption compared to both the existing conditions and the Title 24 compliant requirements
        - The cost of each measure (e.g., per unit), installation time, occupant disturbance, and comfort compared to current measures.
        - Measurement and assessment of the retrofit on air quality (e.g., CO2, PM, NOX):
            - Either Continuous or point measurements of in-apartment IAQ sensors in a representative sample of apartments.
            - Quantify IAQ differences between demonstrated technologies and typical current practice.
        - If relevant, speak to a Building Enclosure Validation that:

- Outlines the process to validate the thermal, air leakage, moisture, impacts on retrofitted facades, performance, effectiveness of installation and attachment method performance of windows or exterior EIFs post-installation.
- More closely tracks how long it took, what the costs were relative to current/earlier multifamily demonstrations, including with and without stud detection systems.

▪ Attic Air Leakage Validation

- Perform air leakage testing to quantify in-unit, attic or whole building air leakage tests in general conformance with the methods described in ASTM E779 to validate assumed air leakage rates in the design energy models.
- Perform qualitative air leakage testing in general conformance with the methods described in ASTM E1186 which includes visualization of leakage paths using theatrical smoke and infrared thermography. Qualitative air leakage testing will be used to improve perimeter detailing.
- More closely track how long it took, what the costs were relative to current/earlier multifamily demonstrations
- Water Testing
- Perform water testing to include at least one test in general conformance with the methods described in ASTM E1105 to validate window and rough opening flashing performance.

Products:

- Stakeholder Engagement Plan
- Measurement and Verification (M&V) Plan

Task 5.2 Pre-Retrofit Performance

The goal of this subtask is to ensure that performance of envelope retrofit systems in demonstration buildings is documented in accordance with the M&V plan from subtask 5.1. The team will utilize monitoring to report on whole building and discrete technology performance prior to attic retrofit.

The Recipient shall:

- Develop a *Pre-Retrofit Performance Report* to document results gathered from implementing the M&V Plan

Products:

- Pre-Retrofit Performance Report

Task 5.3 Post-Retrofit Performance

The goal of this subtask is to ensure that performance of envelope retrofit systems in demonstration buildings is documented in accordance with the M&V plan from subtask 5.1. The team will utilize monitoring to report on whole building and discrete technology performance after attic retrofit activities occur.

The Recipient shall:

- Develop a *Post-Retrofit Performance Report* to document results gathered from implementing the M&V Plan.
- Evaluate the performance and value of the thermal and air sealing benefits of attic or wall retrofit independently.
- Prepare a *CPR Report #2* and participate in a CPR meeting in accordance with subtask 1.3 (CPR Meetings)

Products:

- Post-Retrofit Performance Report
- CPR Report #2

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

provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

Products:

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

TASK 7: 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.
- Development of standardized contractor procedures for multifamily use-case.
- Market research, business plan development, and cost-performance modeling.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan* that identifies the proposed activities the recipient will conduct to accelerate the successful commercial adoption of the technology.
- 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 *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)
- Summary of TAC Comments
- Technology Transfer Summary Report (draft and final)
- High Quality Digital Photographs

I. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.