



# GRANT REQUEST FORM (GRF)

### A) New Agreement # EPC-19-043 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Bradley Meister	51	916-327-1722

C) Recipient's Legal Name	Federal ID Number
Institute of Gas Technology dba Gas Technology Institute	36-2170137

D) Title of Project
Advanced Energy-efficient and Fire-resistive Envelope Systems Utilizing Vacuum Insulation for Manufactured Homes

### E) Term and Amount

Start Date	End Date	Amount
6/30/2020	3/31/2024	\$ 2,000,000

### F) Business Meeting Information

ARFVTP agreements \$75K and under delegated to Executive Director

Proposed Business Meeting Date 6/10/2020  Consent  Discussion

Business Meeting Presenter Jackson Thach Time Needed: 5 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

#### Agenda Item Subject and Description:

#### Institute of Gas Technology dba Gas Technology Institute

INSTITUTE OF GAS TECHNOLOGY DBA GAS TECHNOLOGY INSTITUTE. Proposed resolution approving agreement EPC-19-043 with the Institute of Gas Technology dba Gas Technology Institute for a \$2,000,000 grant to Advance Energy-efficient and Fire-resistive Envelope Systems Utilizing Vacuum Insulation for Manufactured Homes, and adopting staff's determination that this action is exempt from CEQA. (EPIC funding) Contact: Jackson Thach.

### G) 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: Cal. Code Regs., tit 14, § 15303 ; Cal. Code Regs., tit 14, § 15306

Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:



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This project will design, build, and install three prototype manufactured, single-family homes and temporarily measure the energy efficiency of them. The grant recipient will use vacuum insulation panel based prefabricated envelope systems and state-of-the-art air sealing methods. Two of the manufactured homes will be placed in “urbanized areas” as defined in 14 CCR 15387: Loma Linda (adjacent to San Bernardino) and Santa Rosa. The third will be in Woodland, California, in Yolo County on agricultural land on which a single-family residence is allowed to be placed.

14 CCR 15303 in part exempts “construction and location of limited numbers of new, small facilities or structures.” It applies because it allows “One single-family residence...” and in “urbanized” areas it allows “up to three single-family residences may be constructed or converted under this exemption.” Here two of the homes are being installed in “urbanized areas” and one in a non-urbanized area, which are within the limits allowed under this exemption.

14 CCR 15306 excludes basic data collection and research. The research portion of this work to design the prototype mobile homes will occur in existing offices. The manufacturing of the homes will be done in businesses already established and permitted to do such work. The data collection phase will use temporary measuring devices to collect and assess the energy efficiency of the new homes. For these reasons, this project is also exempt under this section.

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

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

<b>Legal Company Name:</b>	<b>Budget</b>
Dvele, Inc.	\$ 497,992
Purple Box Homes, LLC	\$ 229,400
Lawrence Berkeley National Laboratory	\$ 250,000
Frontier Energy, Inc.	\$ 249,922
TBD - Construction Contractor	\$ 20,607
Intertek Testing Services NA Inc.	\$ 65,000
Reliable Crane & Rigging	\$ 15,720
Wnn Transport Inc.	\$ 67,050
	\$
	\$



# GRANT REQUEST FORM (GRF)

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

<b>Legal Company Name:</b>

### J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	\$2,000,000
			\$
			\$
			\$
			\$
			\$

R&D Program Area: EERO: Buildings

TOTAL: \$ 2,000,000

Explanation for "Other" selection

Reimbursement Contract #:      Federal Agreement #:

### K) Recipient's Contact Information

#### 1. Recipient's Administrator/Officer

Name: Kaushik Biswas

Address: 412 F St

City, State, Zip: Davis, CA 95616-4112

Phone: 530-324-6059

E-Mail: kbiswas@gti.energy

#### 2. Recipient's Project Manager

Name: Kaushik Biswas

Address: 412 F St

City, State, Zip: Davis, CA 95616-4112

Phone: 530-324-6059

E-Mail: kbiswas@gti.energy

### L) Selection Process Used

Competitive Solicitation      Solicitation #: GFO-19-307

First Come First Served Solicitation Solicitation #:

### M) The following items should be attached to this GRF

- |   |                              |          |
|---|------------------------------|----------|
| 1. Exhibit A, Scope of Work                         | <input type="checkbox"/>     | Attached |
| 2. Exhibit B, Budget Detail                         | <input type="checkbox"/>     | Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts | <input type="checkbox"/>     | Attached |
| 4. Recipient Resolution                             | <input type="checkbox"/> N/A | Attached |
| 5. CEQA Documentation                               | <input type="checkbox"/> N/A | Attached |



STATE OF CALIFORNIA

# GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

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**Agreement Manager**

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**Date**

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**Office Manager**

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**Date**

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**Deputy Director**

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**Date**

## EXHIBIT A Scope of Work

### I. TASK ACRONYM/TERM LISTS

#### A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		General Project Tasks
2	X	Design Specifications of Prototype Manufactured Homes
3		Fabrication and Testing of Envelope Prototypes
4	X	Development and Demonstration of Prototype Manufactured Homes
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities
7		Production Readiness Plan

#### B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
CCR	California Code of Regulations
HUD	US Department of Housing and Urban Development
HVAC	Heating, Ventilating and Air Conditioning
TAC	Technical Advisory Committee
VIP	Vacuum Insulation Panel

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

#### A. Purpose of Agreement

The purpose of this Agreement is to fund development and demonstration of energy-efficient and fire-resistive building envelope systems in manufactured homes to reduce their heating, ventilating, and air conditioning (HVAC) energy use and increase their fire resistance.

#### A. Problem/ Solution Statement

##### **Problem**

While site-built residential buildings are governed by newer and more stringent codes, such as California Code of Regulations (CCR) Title 24, manufactured homes are lagging in terms of energy efficiency requirements because they are built to national U.S Department of Housing and Urban Development standards which are less stringent than Title 24 requirements. Thus, the energy consumption of and associated greenhouse gas emissions from manufactured homes are expected to be much higher than current residential buildings. Consequently, the monthly energy bills for manufactured home residents could be higher than standard site-built homes. This is an important issue because the buyers and occupants of manufactured homes tend to be low income

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

## EXHIBIT A Scope of Work

and low income residents spend a higher percentage of their income on energy than wealthier Californians.

### Solution

The solution is to incorporate cost-effective energy efficiency measures, such as upgraded envelope insulation and air sealing, which can dramatically reduce the HVAC energy consumption of manufactured homes. Additional improvements could include high performance window and HVAC technologies to further reduce the energy consumption of the prototype manufactured homes.

The recipient will use vacuum insulation panel (VIP) based prefabricated envelope systems and state-of-the-art air sealing methods. Silica VIPs are highly fire resistant and can increase the overall fire resistance of homes that are located in wildfire prone areas.

### **B. Goals and Objectives of the Agreement**

#### Agreement Goals

The goal of this Agreement is to develop and demonstrate VIP-based envelope systems that are energy-efficient and fire-resistive for manufactured homes via laboratory testing and field demonstration.

Ratepayer Benefits: This Agreement will result in the ratepayer benefits of reduced electricity consumption and energy costs as well as increased fire resistance for manufactured homes.

Site-level benefits – Table 1 lists the estimated average annual energy and cost benefits for a representative 24' by 54' double-wide manufactured home across California Climate Zones 1-16. The Envelope upgrade column includes VIP wall and roof upgrades as well as air tightness measures. The Envelope + HVAC upgrade column also includes an upgrade to a low-capacity, high-efficiency mini-split heat pump from a baseline heat pump.

**Table 1: Site savings**

	<b>Baseline</b>	<b>Envelope upgrade</b>	<b>Envelope + HVAC upgrade</b>
Average energy use (kWh)	2,024	1,042	466
% Savings	-	49%	77%
Annual cost savings	-	\$167	\$265
CO2e avoided/year (lbs.)		494	783

State-wide benefits – Table 2 shows cumulative statewide benefits after 10 years for the proposed retrofit solutions. For estimating statewide benefits, more conservative savings from the proposed envelope upgrades were used without assuming HVAC upgrades, and projected unit shipments based on ramping market share for advanced manufactured homes from one percent to 20 percent over 10 years.

**Table 2: Statewide Benefits**

<b>Statewide 2024-2032</b>	<b>10-Year Benefits</b>
Units Shipped	4,200
Square Footage Shipped	6 million
Electricity Savings	4.6 GWh
Avoided CO2e	1,041 metric tons

## EXHIBIT A Scope of Work

Technological Advancement and Breakthroughs:<sup>2</sup> 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:

- Enabling integration of VIPs into envelope systems for manufactured homes. VIPs are proven technologies in terms of thermal performance but so far have seen limited adoption in buildings. The integration of VIPs into the manufactured home envelope and performance verification are the key research tasks within this project.
- Demonstration of the feasibility of drastically reducing the energy consumption of manufactured through the envelope upgrades.
- Demonstration of increased fire resistance through use of VIPs and fire-resistant design of manufactured homes.

### Agreement Objectives

The objectives of this Agreement are to:

- Build prototype envelope systems containing VIPs and verify their thermal and fire performance by laboratory testing and modeling;
- Develop and demonstrate the advanced envelope systems in manufactured homes and evaluate their performance using measurements and calibrated building simulations; and
- Conduct market outreach and technology transfer with manufacturing partners, property owners, installers, and utilities to accelerate the adoption of advanced envelope construction as standard practice.
- Move the Technology Readiness Level for the VIPS from 4 to 6.
- Achieve the site savings in Table 1 and the performance metrics in Table 3

Table 3 Performance Metrics

Technology/Metric	Baseline	Research Goal
Characteristics of pre-fabricated homes	Dual fuel homes with Energy Design Rating (EDR) of 100 (this score meets the 2016 International Energy Conservation Code).	All electric mobile homes designed to have an EDR of 0.
Performance	Energy use per square foot using HUD Manufactured Homes Construction Standards published in Code of Federal Regulations under 24 CFR Part 3280 <sup>3</sup>	Energy use per square foot using 2019 Building Energy Efficiency Standards for Residential Buildings – Title 24 <sup>4</sup>
Fire Resiliency	HUD Standards	Construction practices and techniques to result in a fire resistance rating of at least 2 hours for roofs and exteriors,

<sup>2</sup> 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.

<sup>3</sup> HUD – Manufactured Housing and Standards. <https://www.ecfr.gov/cgi-bin/text-idx?SID=a2c5655a37054c584f7dd6a0ed240fb8&node=pt24.5.3282&rgn=div5>

<sup>4</sup>California Energy Commission - 2019 Building Energy Efficiency Standards for Residential and NonResidential Buildings. <https://ww2.energy.ca.gov/2018publications/CEC-400-2018-020/CEC-400-2018-020-CMF.pdf>

## EXHIBIT A Scope of Work

Technology/Metric	Baseline	Research Goal
		tempered windows, and back-draft dampers
Envelope	HUD Standards	Vacuum insulation panel (VIP) Walls: R-26 to R-29 Roof: R-49 Air change: 1-2 ACH 50
HVAC Energy Use (Table 1)	1.6 kWh/SF	0.80 kWh/SF
Cost for manufactured home	Construction cost approximately \$300/sf	Construction cost approximately \$125 to \$175/sf

### 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)**. 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:

## **EXHIBIT A**

### **Scope of Work**

#### ○ **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 Energy Commission's 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 or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission 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.
- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.
- 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 Energy Commission'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 Energy Commission 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.

## **EXHIBIT A**

### **Scope of Work**

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;
- 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 and invoices (subtask 1.5);
  - Final Report (subtask 1.6);
  - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
  - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, 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:**

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*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 Energy Commission 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 Energy Commission 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 Energy Commission.

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 Energy Commission, but they may take place at another

## **EXHIBIT A**

### **Scope of Work**

location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

#### **The Recipient shall:**

- Prepare 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.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- 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* and 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)
- Task Products (draft and/or final as specified in the task)

#### **CAM Products:**

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- 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 Energy Commission 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.

## EXHIBIT A Scope of Work

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 state-owned equipment.
  - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
  - The Energy Commission'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 *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

### Products:

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

## REPORTS AND INVOICES

### Subtask 1.5 Progress Reports and Invoices

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

### The Recipient shall:

- Submit a 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.
- 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 Fund and in-state expenditures.

### Products:

- Progress Reports
- Invoices

## EXHIBIT A Scope of Work

### 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. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

#### Subtask 1.6.1 Final Report Outline

##### The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)

##### Recipient Products:

- Final Report Outline (draft and final)

##### CAM Product:

- 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, 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)
  - Ensure that the document is written in the third person.
  - Ensure that the Executive Summary is understandable to the lay public.
    - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
    - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.

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- If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- 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
- Consider incorporating all CAM comments into the Final Report. 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 Final Report 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.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

### Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft 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 Energy Commission 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 Energy Commission 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 Energy Commission 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

## EXHIBIT A Scope of Work

(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 1.8 Permits

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

### The Recipient shall:

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

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

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

## **EXHIBIT A**

### **Scope of Work**

#### **Products:**

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

#### **Subtask 1.9 Subcontracts**

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

#### **The Recipient shall:**

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

#### **Products:**

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

### **TECHNICAL ADVISORY COMMITTEE**

#### **Subtask 1.10 Technical Advisory Committee (TAC)**

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

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

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

- Researchers knowledgeable about the project subject matter;

## **EXHIBIT A**

### **Scope of Work**

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

#### **The Recipient shall:**

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

#### **Products:**

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

#### **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.

## **EXHIBIT A**

### **Scope of Work**

- 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.

#### **Products:**

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

#### **IV. TECHNICAL TASKS**

##### **TASK 2: DESIGN SPECIFICATIONS OF PROTOTYPE MANUFACTURED HOMES**

The goal of this task is to develop the designs of the three prototype manufactured homes for field demonstrations. The designs will include specifications of the envelope upgrades, including VIPs and air-tightness measures, needed to meet the energy usage targets in Tables 1 and 3.

#### **The Recipient shall:**

- Develop *Preliminary Manufactured Home Envelope Specifications* containing initial designs of wall and roof components containing VIPs, for prototyping and testing.
- Revise the envelope designs as needed to ensure the target performances of thermal resistance and fire rating are being met (based on Task 3 outputs) and develop the *Final Manufactured Home Specifications, including Envelope Components*.
- Develop preliminary energy models of the manufactured homes.
- Perform preliminary cost analysis to include capital costs of the envelope upgrades and operational cost savings due to increased energy efficiency.
- Prepare *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
  - The CPR report will contain the final specifications of the manufactured homes and will be guided by the testing and modeling to be performed under Task 3 so that the energy efficiency goals stated in Tables 1 and 3 can be met.
- Participate in a CPR meeting.

#### **Products:**

- Preliminary Manufactured Home Envelope Specifications
- Final Manufactured Home Specifications, including Envelope Components
- CPR #1 Report

##### **TASK 3: FABRICATION AND TESTING OF ENVELOPE PROTOTYPES**

The goals of this task are to develop and evaluate the VIP-based envelope prototypes following typical standard test methods combined with numerical modeling, and to verify fire resistance rating of prototype envelope systems.

## **EXHIBIT A**

### **Scope of Work**

#### **The Recipient shall:**

- Develop a *Test Plan* for small and full-scale envelope prototypes to include properties such as R-value, fire test rating of selected envelope components, and hygrothermal measurements.
- Develop small-scale, 24" x 24" foam-VIP systems to measure thermal performance using heat flow meters and following ASTM C518 principles. The samples contain different VIP configurations, so the heat flow through different sections – VIP center, VIP-VIP interfaces and VIP-foam interfaces – can be measured.
- Calibrate finite element numerical models of the VIP systems using test data from the small-scale VIP systems.
- Extrapolate the calibrated finite element numerical models to design full-scale envelope systems containing VIPs and foam insulation. The full-scale models would consider the edge effects of the VIPs and the impact of the foam-filled gaps on the overall R-value of the VIP systems applied to the walls and roofs of the manufactured homes.
- Create large-scale envelope prototypes with VIPs and verify their thermal performance to be R26-29 for wall systems and R49 for roof systems via laboratory testing.
- Perform fire testing of representative envelope systems at an accredited test facility following NFPA 285 (Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components).
- Perform hygrothermal modeling to verify adequate moisture durability:
  - WUFI modeling can indicate locations that might be vulnerable to moisture accumulation and appropriate remedial action can be implemented in the final envelope designs.
- The results of this task will be provided in two reports: (1) *Testing and Analysis Report – Small Scale Systems*, and (2) *Testing and Analysis Report – Full-Scale Envelope Prototypes*. These reports will include:
  - Analysis results of small-scale VIP composites;
  - Full-scale prototype designs for testing and verification;
  - Laboratory test results verifying the thermal resistance of prototype roof and wall systems and the corresponding R-values for walls and roof;
  - WUFI modeling results verifying adequate moisture durability of prototype roof and wall systems containing VIPs;
  - Fire testing of selected envelope components according to NFPA 285 to verify fire rating of at least two hours; and
  - Discussion of permits needed to implement from regulatory agencies, such as HUD.

#### **Products:**

- Test Plan
- Testing and Analysis Report – Small-Scale Systems
- Testing and Analysis Report – Full-Scale Envelope Prototypes

#### **TASK 4: DEVELOPMENT AND DEMONSTRATION OF PROTOTYPE MANUFACTURED HOMES**

The goals of this task are to fabricate at least three manufactured homes with advanced envelope features, install the manufactured homes for field testing, perform measurement and verification (M&V) of the upgraded manufactured homes, and estimate and verify the energy savings of the upgraded manufactured homes using simulations and field test data.

## EXHIBIT A Scope of Work

### The Recipient shall:

- Develop three all-electric manufactured homes for in-field installation and demonstration that will include the following:
  - Manufactured homes will include the upgraded envelope featuring VIPs and advanced air sealing methods.
  - Consider energy efficient glazing and high-efficiency HVAC systems following an evaluation of their energy benefits and cost-effectiveness.
- Develop a detailed two-phase *M&V plan* for field evaluation of the manufactured homes including:
  - Perform Phase I of field evaluation by performing the following:
    - This phase will characterize the specific performance attributes of the building envelope under unoccupied conditions, allowing well-calibrated models to be developed for each home.
    - The three prototype homes will undergo a battery of short-term tests of approximately 5 days, including:
      - Blower door test of envelope leakage at 50 Pascals in accordance with ASTM E779;
      - Duct blaster test of duct leakage at 25 Pascals;
      - Co-heating test to measure total building envelope thermal conductance (U-factor), and heating load as a function of weather conditions; and
      - Co-heating test with windows covered and insulated to measure opaque envelope U-factor independent of windows.
    - These short-term measurements, along with specifications of major equipment, will be used to create calibrated building models.
    - The calibrated models will be used to evaluate energy savings and cost-effectiveness of the energy efficiency upgrades for a variety of manufactured home applications in the 16 California climate zones.
  - Perform Phase II of field evaluation by conducting the following:
    - The three prototype manufactured homes will be installed in their final locations and monitored for 12 months once they become occupied (simulated and real occupancy):
      - The Recipient will pursue both simulated and real occupancy in this project; at least one home with real occupancy and at least one with simulated occupancy.
    - Monitored data will include the following:
      - Electricity used for indoor and outdoor heat pump units;
      - Temperatures in key interior locations near the thermostat;
      - Outdoor temperature and relative humidity (using a portable weather station);
      - Attic/roof temperature;
      - Heat flux through VIP panels at multiple locations; and
      - Relative humidity sensors at selected envelope locations.
- Develop a *Manufactured Homes Installation Report* describing site installation of three prototype manufactured homes with energy efficient envelope features.
- Prepare *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.
- Perform data analysis and numerical simulations will be performed to evaluate energy benefits of the advanced envelope technologies and will include:

## **EXHIBIT A**

### **Scope of Work**

- Estimation and verification of energy savings of the upgraded manufactured homes over baseline homes.
- Perform survey of home occupants to determine their satisfaction with the energy efficiency upgrades.
- *Field Test and Techno-Economic Analysis Report* to be generated, which would include:
  - Detailed descriptions of the fabrication of the manufactured homes.
  - Results of the pre- and post-M&V.
  - Challenges and lessons learned with respect to integration of VIPs in the building envelope, including results of discussions with manufactured home manufacturers.
  - Simulated and measured performance of the upgraded manufactured homes including results of data analysis and numerical simulations and estimation and verification of energy savings and cost effectiveness (e.g., simple payback, return on investment) by climate zone, and whether the performance metrics in Tables 1 and 2 were achieved.
  - Techno-economic analysis evaluating the potential of the upgraded manufactured homes to be cost-effective and the feasibility of broad adoption by manufactured home manufacturers, including identification of next steps needed to increase adoption.
  - Results home occupant surveys.
  - Discuss decommissioning plans (remove the data system and instrumentation) of the test homes and final disposition.

#### **Products:**

- M&V plan (draft and final)
- Manufactured Homes Installation Report
- CPR Report #2
- Field Test and Techno-economic Analysis Report

#### **TASK 5: 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*.
- 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.
    - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.

## **EXHIBIT A**

### **Scope of Work**

- 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.
- Additional Information for Product Demonstrations:
  - Outcome of demonstrations and status of technology.
  - Number of similar installations.
  - Jobs created/retained as a result of the Agreement.
- 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 Energy Commission 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

## **EXHIBIT A**

### **Scope of Work**

#### **TASK 6: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES**

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

##### **The Recipient shall:**

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
  - A description of the intended use(s) for and users of the project results.
  - Published documents, including date, title, and periodical name.
  - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
  - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
  - The number of website downloads or public requests for project results.
  - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- 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.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

##### **Products:**

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

#### **TASK 7: PRODUCTION READINESS PLAN**

The goal of this task is to determine the steps that will lead to the manufacturing of technologies developed in this project or to the commercialization of the project's results.

##### **The Recipient shall:**

- Prepare a *Production Readiness Plan*. The degree of detail in the plan should be

## **EXHIBIT A**

### **Scope of Work**

proportional to the complexity of producing or commercializing the proposed product, and to its state of development. As appropriate, the plan will discuss the following:

- Critical production processes, equipment, facilities, personnel resources, and support systems needed to produce a commercially viable product.
- Internal manufacturing facilities, supplier technologies, capacity constraints imposed by the design under consideration, design-critical elements, and the use of hazardous or non-recyclable materials. The product manufacturing effort may include “proof of production processes.”
- The estimated cost of production.
- The expected investment threshold needed to launch the commercial product.
- An implementation plan to ramp up to full production.
- The outcome of product development efforts, such as copyrights and license agreements.
- Patent numbers and applications, along with dates and brief descriptions.
- Other areas as determined by the CAM.

#### **Products:**

- Production Readiness Plan (draft and final)

#### **V. PROJECT SCHEDULE**

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: INSTITUTE OF GAS TECHNOLOGY DBA GAS  
TECHNOLOGYINSTITUTE.

**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-19-043 with the Institute of Gas Technology dba Gas Technology Institute for a \$2,000,000 grant to develop and test advanced energy-efficient and fire-resistive envelope systems using vacuum insulation for manufactured homes. These advances will be installed in new manufactured homes located in Northern and Southern California, with one site being in a disadvantaged community; and

**FURTHER BE IT RESOLVED**, that the Executive Director or his/her designee shall execute the same on behalf of the CEC.

**CERTIFICATION**

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on June 10, 2020.

AYE:

NAY:

ABSENT:

ABSTAIN:

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Cody Goldthrite  
Secretariat