California Energy Commission
November 08, 2023 Business Meeting
Backup Materials for Agenda Item No 08a:
Institute of Gas Technology dba GTI Energy

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

RESOLUTION NO: 23-1108-08a

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: **Institute of Gas Technology dba GTI Energy**

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

RESOLVED, that the CEC approves agreement EPC-23-018 with Institute of Gas Technology dba GTI Energy for a $2,775,570 grant to develop energy-efficient and grid-interactive zero carbon manufactured homes, and adopting staff's determination that this action is exempt from CEQA. These homes will meet the 2022 Title 24 Building Energy Efficiency Standards, exceeding the current U.S. Department of Housing and Urban Development standards that apply to manufactured homes. The homes will incorporate insulation and sealing technologies to create a highly efficient envelope, utilize building materials with enhanced fire resistance, and implement on-site PV generation and battery energy storage; and

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

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the CEC held on November 08, 2023.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

_____
Kristine Banaag
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 9/2022)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: EPC-23-018

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Bradley Meister
3. MS-:51
4. Phone Number: 916-776-0792

C. Recipient's Information

1. Recipient's Legal Name: Institute of Gas Technology dba GTI Energy
2. Federal ID Number: 36-2170137

D. Title of Project

Title of project: Energy-efficient and Grid-interactive Zero Carbon Manufactured Homes

E. Term and Amount

1. Start Date: 12/15/2023
2. End Date: 3/29/2027
3. Amount: $2,775,570.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 11/8/2023
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Jason Tancher
5. Time Needed for Business Meeting: 10 minutes.
6. The email subscription topic is: EPIC (Electric Program Investment Charge).

Agenda Item Subject and Description:

Institute of Gas Technology dba GTI Energy. Proposed resolution approving agreement EPC-23-018 with Institute of Gas Technology dba GTI Energy for a $2,775,570 grant to develop energy-efficient and grid-interactive zero carbon manufactured homes, and adopting staff's determination that this action is exempt from CEQA. These homes will meet the 2022 Title 24 Standards, far exceeding the current U.S. Department of Housing and Urban Development standards that apply to manufactured homes. The homes will incorporate insulation and sealing technologies to create a highly efficient envelope, utilize building materials with enhanced fire resistance, and implement on-site PV generation, and battery energy storage. (EPIC funding) Contact: Jason Tancher

G. California Environmental Quality Act (CEQA) Compliance

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

   If yes, skip to question 2.

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

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

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

a) Agreement **IS** exempt?

Yes

Statutory Exemption?
No

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

PRC section number: None

CCR section number: None

Categorical Exemption?
Yes

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

CCR section number: Cal. Code Regs., tit. 14, § 15303 ; 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.

This project will design, build, and install two prototype manufactured, single-family homes and temporarily measure the energy efficiency of them. The grant recipient will use innovative insulation panel based prefabricated envelope systems and state-of-the-art air sealing methods. The two manufactured homes will be placed in Lemon Grove and Ben Lomond.

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."

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.

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

b) Agreement **IS NOT** exempt.

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

No

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

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

H. 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
Dvele	$ 751,650	**$**73,987
Rocky Mountain Institute	$ 487,102	**$**0
Frontier Energy, Inc.	$ 504,738	**$**0
Civicwell	$ 97,500	**$**0
WattTime	$ 75,000	**$**0
Four Waters Media	$ 99,000	**$**0

I. Vendors and Sellers for Equipment and Materials/Miscellaneous

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

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

J. Key Partners

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

Key Partner Legal Company Name
No key partners to report

K. Budget Information

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

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	21-22	301.001I	$ 2,775,570

TOTAL Amount: $ 2,775,570.00

R&D Program Area: EDMFB: EDMF

Explanation for “Other” selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

L. Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Kate Jauridez

Address: 1700 S Mount Prospect Rd

City, State, Zip: Des Plaines, IL 60018-1804

Phone: 847-768-0905

E-Mail: kate.jauridez@gastechnology.org

3. 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

M. Selection Process Used

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

Selection Process	Additional Information
Competitive Solicitation #	GFO-22-305
First Come First Served Solicitation #	Not applicable
Other	Not applicable

N. Attached Items

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

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

Approved By

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

Agreement Manager: Bradley Meister

Approval Date: 10/2/2023

Branch Manager: Anthony Ng

Approval Date: 10/3/2023

Director: Anthony Ng for Jonah Steinbuck

Approval Date: 10/3/2023

Exhibit A
Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Design Manufactured Homes for Zero Carbon Operation and Affordability
3	X	Building and Commissioning of Advanced Manufactured Homes
4		Field Validation of Zero Carbon Operation and Techno-Economic Assessment
5		Community Engagement and Economic and Workforce Development
6		Path to Market
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CBECC - Res	California's Building Energy Code Compliance Software – Residential
CEC	California Energy Commission
CPR	Critical Project Review
COMBI	Heat Pump that can meet all thermal loads (space heating and cooling, as well as water heating)
HUD	Housing and Urban Development
HVAC	Heating Ventilation and Air Conditioning
GWP	Global Warming Potential
IOU	Investor Owned Utility
LGS	Light Gauge Steel
M&V	Measurement and Verification
PII	Personal Identifiable Information
PV	Photovoltaic
TAC	Technical Advisory Committee
TEA	Technoeconomic Analysis / Assessment
TES	Thermal Energy Storage

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of advanced, highly-efficient and all-electric manufactured homes that can achieve Zero Carbon operation with on-site photovoltaic (PV) power generation and battery energy storage. These manufactured homes will meet the

[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.

2022 Title 24 Building Energy Efficiency Standards and result in drastically lower energy bills for the occupants.

B. Problem/ Solution Statement

Problem

Manufactured homes are built quickly and more affordably in a factory setting compared to standard construction. However, manufactured homes are built to meet the U.S. Housing and Urban Development's (HUD) efficiency standards, which are less energy efficient than the Title 24 Building Energy Efficiency Standards. As a result, ratepayers in this sector, who are often low-income, pay more in energy costs than those who live in homes built to current Title 24 Standards.

Research and innovation are needed to demonstrate how manufactured homes can be made energy efficient and to develop pathways to cost-effectively integrate various energy efficiency measures. Education and stakeholder engagement are needed to enable broad adoption of manufactured homes.

Solution

Building on past expertise and ongoing projects, the recipient will develop and commission highly-efficient all-electric manufactured homes that can achieve Zero Carbon Operation. These homes will meet the 2022 Title 24 Standards; far exceeding the current HUD standards that apply to manufactured homes. The homes will incorporate state-of-the-art insulation and spray-applied air sealing technologies to create a highly efficient envelope. Building on prior work, the recipient will utilize building materials with enhanced fire resistance, for example, magnesium oxide sheathing and Kooltherm exterior insulation (a thermosetting foam insulation, which chars and hardens when exposed to fire). The Recipient will investigate packaged high-efficiency heat pumps using low global warming potential (GWP) refrigerants for space conditioning and water heating.

On-site PV generation, battery energy storage, and potentially thermal energy storage (TES) will be implemented for demand response and providing back-up power to critical loads during grid outages, including the ability to operate the homes in islanded mode. The Recipient will implement load flexible controls to shift electrical usage to benefit the grid and reduce energy costs for the homeowners. The Recipient will perform system-level modeling using a cutting-edge optimization platform to design and size the PV and energy storage systems, utilize real-time and forecasted marginal emissions data for the California grid, and identify optimal dispatch strategies to achieve Zero Carbon Operation. Building-level resilience, emissions, grid-interactivity, and cost will be priority objectives in these investigations. This modelling effort will then inform that actual controls architecture and logic that is deployed in the homes.

The manufactured homes will be built using industrialized construction practices to reduce construction time and costs. The construction of the homes will utilize automation machines, which use building information modelling software files to create light gauge steel (LGS) members to the exact specifications (i.e., no waste) and with pre-drilled holes for electrical cables, plumbing, etc. In a recent fabrication demonstration, the automation assisted LGS walls took about 45% less time to build than a similar wood framed wall.

Two all-electric manufactured homes will be built and installed in low-income communities. Affordability will be a key attribute. Grid flexibility and peak load shifting capabilities of the PV-battery system will minimize the energy costs based on time-of-use rates. Community and

stakeholder engagement will be performed to seek inputs, disseminate information, and enable adoption of advanced, energy efficient manufactured housing.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Demonstrate Zero Carbon Operation of advanced, all-electric manufactured homes with integrated PV and battery energy storage in low-income communities.
- Show the benefits of the advanced manufactured in drastically reducing electric utility costs and lowering emissions.
- Evaluate affordability with respect to first cost and 10-year cost of ownership, considering operational energy costs.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater electricity reliability, lower energy costs, lower emissions, increased resilience, and increased safety. These benefits will result from the energy efficient design of the manufactured homes, PV and energy storage for grid flexibility and backup power during outages, and use of building materials with enhanced fire resistance. Combination of energy efficiency, PV and energy storage will enable lower energy demand and drastically lower energy bills via time-of-use rates.

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 reducing energy consumption in and emissions from manufactured homes by implementing various energy efficiency and demand response measures. Highly efficient envelope technologies and high efficiency heat pumps will be implemented. PV and battery energy storage, with optimal discharge strategies based on real-time and forecasted marginal emissions data for the California grid, will enable significant emission reductions.

Agreement Objectives

The objectives of this Agreement are to:

- Build and commission energy efficient, all-electric manufactured homes with integrated PV and battery energy storage.
- Perform field validation of Zero Carbon Operation.
- Perform techno-economic analysis using as-built advanced home costs within this project as well as scaled future costs assuming broad adoption of energy efficiency and demand response technologies.
- Evaluate affordability and demonstrate a pathway to a 10-year cost of ownership of the energy efficient manufactured homes to be equal to or lower than HUD homes, considering operational energy cost savings.

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

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

- Solicit and consolidate the input of community and regional leaders and to build capacity with planning and permitting authorities throughout investor-owned utility (IOU) areas to enable advanced, energy efficient manufactured housing.

Exhibit A
Scope of Work

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

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

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

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

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

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

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

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

MEETINGS

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

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other CEC staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The administrative portion of the meeting will include discussion of the following:
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Administrative products (subtask 1.1);
  - CPR meetings (subtask 1.3);
  - Match fund documentation (subtask 1.7);
  - Permit documentation (subtask 1.8);
  - Subcontracts (subtask 1.9); and
  - Any other relevant topics.

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

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

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

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

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

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

CAM Product:
- Kick-off Meeting Agenda

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

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

Exhibit A
Scope of Work

The Recipient shall:

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

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda(s)
- Progress Determination

Subtask 1.4 Final Meeting

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

The Recipient shall:

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

  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
    - Disposition of any procured equipment.
    - The CEC's request for specific "generated" data (not already provided in Agreement products).
    - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.

  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:
- Submit a 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 Funds and in-state expenditures.

Products:
- Progress Reports
- Invoices

Subtask 1.6 Final Report

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

Subtask 1.6.1 Final Report Outline

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

Recipient Products:
- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
- Submit a draft of the Executive Summary to the 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 SUBCONTRACTS

Subtask 1.7 Match Funds

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

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

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

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

Products:

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

Subtask 1.9 Subcontracts
The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of each executed subcontract.

- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

- Members of relevant technical society committees.

The Recipient shall:

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

Products:

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

Subtask 1.11 TAC Meetings

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

The Recipient shall:

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

The TAC shall:

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

Products:

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

Subtask 1.12 Project Performance Metrics

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

The Recipient shall:

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

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

TASK 2 DESIGN MANUFACTURED HOMES FOR ZERO CARBON OPERATION AND AFFORDABILITY

The goal of this task is to develop the design specifications of the advanced, energy efficient and all-electric manufactured homes to meet the technical goals of this project. The Recipient will perform energy modeling to specify the HVAC, PV and battery energy storage systems and develop a least cost pathway to Zero Carbon Operation. Initial estimates of capital and operating costs, energy usage and emissions were developed and compared to HUD manufactured homes.

Exhibit A
Scope of Work

The Recipient shall:

- Design all-electric manufactured homes to meet or exceed the 2022 Title 24 Building Energy Efficiency Standards, including envelope, HVAC, and heat pump water heater. Produce the *Advanced Manufactured Homes Design Specifications* document.
- Perform *CBECC-Res modeling to verify Title 24 compliance and develop CBECC-Res Modeling Report* Showing Title 24 Code Compliance
- Develop a detailed *Energy Modeling Report Showing Path to Zero Carbon Operation*
- Develop a *report Comparing First and Operational Costs of Advanced Home Designs Compared to HUD Manufactured Homes*
- Perform energy modeling using EnergyPlus of the advanced homes to estimate peak HVAC and whole-building electric loads as well as hourly energy consumption by end use. The HVAC will be optimally sized to meet the reduced peak loads of the energy efficient advanced homes.
- Using hourly load estimates from the whole building energy model, perform detailed techno-economic analysis of PV and battery energy storage, to identify the least cost pathway to zero carbon operation for the advanced manufactured homes.
    - Identify optimal PV and storage system sizes and dispatch strategies
    - Using granular electricity emissions-intensity data from WattTime, evaluate operational carbon on an hourly or sub-hourly basis
    - Model load shifting (eg. with a heat pump water heater) and the interactions with PV and battery energy storage
    - Evaluate the lifecycle cost implications of various system and design decisions
    - Evaluate applicable utility rate structures to understand the implications for resident utility bills
    - Evaluate the revenue potential from demand response participation
    - Evaluate power outage scenarios and the resilience that the PV and battery systems can provide
    - Identify the control strategies needed to operate the home's energy systems to achieve Zero Carbon Operation while minimizing resident utility bills and ensuring resident comfort and health
- Integration of gird and emission signals, predictive modeling, and controls with Dvele's current home automation software for implementation in the advanced homes.
- Explore the incorporation of a low-GWP combi heat pump with integrated TES. The combi heat pump can meet all thermal loads – space heating and cooling as well as water heating. The integrated TES can provide additional grid flexibility, beyond PV and battery energy storage. Evaluate the cost and emissions impacts of integrated TES alongside solar PV and battery energy storage.
- Estimate capital and operating costs of the advanced manufactured home. Compare performance metrics and costs with similar sized HUD manufactured homes. Estimate annual electric use of the HUD home and the advanced manufactured home. Determine impact on increased home loan costs and ROI from energy savings. Estimate annual greenhouse gas savings from the advanced manufactured homes.
- Integrate the recommended PV and battery configuration into the home design.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Advanced Manufactured Homes Design Specifications
- CBECC-Res Modeling Report Showing Title 24 Code Compliance
- Detailed Energy Modeling Report Showing Path to Zero Carbon Operation

- Report Comparing First and Operational Costs of Advanced Home Designs Compared to HUD Manufactured Homes
- CPR Report #1

TASK 3 BUILDING AND COMMISSIONING OF ADVANCED MANUFACTURED HOMES

The goals of this task are to build and commission the advanced manufactures homes, perform on-site short-term testing to characterize the key features of the homes, and test the homes for operation in islanded mode during simulated outages.

The Recipient shall:

- Evaluate manufacturing facility advancements to reduce construction labor and costs for implementation in the home production process. For example, using robotic assistance in lifting and installing heavy envelope components.
- Implement the control strategies identified in Task 2 into Dvele's home automation platform to achieve zero carbon operation.
    - Integrate a real-time and forecasted electricity emissions signal from WattTime
    - Based on the dispatch strategies identified in Task 2, implement control algorithms for load shifting (eg.HVAC, water heating), battery dispatch, and solar PV that balance emissions and cost.
    - Implement resident feedback and monitoring to help manage behavioral risk in achieving zero carbon operation.
- Develop a measurement and verification (M&V) plan for the advanced manufactured homes. *M&V Plans* will be produced.
    - As part of this sub-task, the instrumentation and monitoring equipment will be procured.
- Build, install and commission the advanced manufactured homes at the selected low-income community sites. *Commissioning Report and Documentation* will be produced.
- As part of the commissioning, we will perform short-term field testing of key features of the homes, including overall envelope U-value (thermal conductance), air leakage, duct leakage (if ducts are present), ventilation rate, equipment efficiency, and operation of certain features of the home automation system under partially-controlled conditions (weather cannot be controlled, and many plug loads will not be installed).
    - The short-term field testing will characterize the specific performance attributes of the manufactured homes under unoccupied conditions, allowing well-calibrated energy models to be developed for each home. The characterization will include the building envelope and all major equipment.
    - The short-term field testing will include:
        - Blower door test of envelope leakage at 50 Pascals in accordance with ASTM E779
        - Tracer gas testing using CO2 or similar gas, which will be used to track rate of decay of concentration over time and provide a weather dependent air leakage rate under various operating conditions (with and without HVAC operation, registers covered and uncovered, and mechanical ventilation on and off)
        - Duct blaster test of duct leakage at 25 Pascals, if applicable.
        - Co-heating test to measure total building envelope thermal conductance (U-factor), and heating load as a function of weather conditions
        - 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 in EnergyPlus.
  - In addition, we operate the advanced homes in islanded mode during simulated outages to verify operation of all critical loads, and proper charging and discharging of the battery. This simulated islanded operation will be performed either during the initial unoccupied period, with all critical loads being operated remotely, or in coordination with the homeowners.
  - *Short-Term Test Reports* will be produced, which will include details and results of the islanded mode operation.
- Perform CBECC-Res modeling of the commissioned advanced homes to show 2022 Title 24 compliance and produce a *CBECC-Res Title 24 Compliance Documentation*.
- Provide education and guidance to homeowners on energy usage and operation of equipment, appliances, etc., to 1) Support the Zero Operational Carbon goal, 2) Create an "energy budget" in outage events, and 3) Prioritize critical loads in anticipation of outages.
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- M&V Plan (Draft and Final)
- Commissioning Report and Documentation
- Short-Term Test Report, Including Islanded Mode Operation (Draft and Final)
- CBECC-Res Title 24 Compliance Documentation
- CPR Report #2

TASK 4 FIELD VALIDATION OF ZERO CARBON OPERATION AND TECHNO-ECONOMIC ASSESSMENT

The goals of this task are to demonstrate Zero Carbon Operation of the advanced manufactured homes in the field and perform techno-economic assessments to evaluate affordability and a pathway to the 10-year cost of ownership of the advanced manufactured homes to be equal to or lower than HUD manufactured homes.

The Recipient shall:

- Install sensors and monitoring equipment as described in Final M&V Plan from Task 3.
  - The monitoring will include various sensors (door, windows, plug loads, etc.) to identify any anomalous behavior and trigger mitigation measures. These would include notifications to homeowners (via cell phone message or email),
  - Utilize Dvele's software platform to minimize behavioral risks and explore inclusion of capabilities to implement corrective actions, for example, turning off HVAC or water heating during periods of extended non-occupancy, turning off energy recovery ventilators if doors or windows are open for natural ventilation.
  - Include capabilities to notify homeowners about shutting down non-essential loads during anticipated outages.
- Monitor the real-time energy consumption, PV generation, energy storage dispatch, and marginal emissions rate (via WattTime data) to verify Zero Carbon operation.
  - Evaluate based on the net energy consumption of the home at hourly or sub-hourly timesteps, multiplied by the grid emissions intensity during that timestep.
  - Evaluate interaction with the grid and backup power during any outages that may occur during the test period. Verify any specified load reductions occur during an

outage, and that the PV and energy storage systems provide seamless backup power and eventual reconnection with the grid.

- Perform independent measurement and verification of the performance of the advanced manufactured using International Performance Measurement & Verification Protocol[4] Options B, C, and D. *Draft and Final Field Validation M&V Report* will be produced. Evaluation will be performed for 12 months following occupancy, and include the following elements:
    - Instrumentation of both manufactured homes to monitor whole-house energy use along with submetering of key systems (PV, battery, grid exports, HVAC, appliances, outlets), temperature and relative humidity in several rooms, heat flux measurements of wall and ceiling heat transfer.
    - Monitoring of occupant behavior including occupancy, hot water use, thermostat settings, window/door operation, system overrides, reprogramming, and turning off devices following signals from the home automation system.
    - Effectiveness of control strategies to reduce energy use and peak electricity.
    - Response of PV and battery system and continued operation of critical loads following potential power outages and restoration of power.
    - Overall energy, cost, and greenhouse gas emission reductions with the advanced manufactured homes using calibrated modeling.
    - Cost-effectiveness of efficiency and control measures.
- Perform technoeconomic analysis (TEA) to evaluate costs both at end of project and future costs if the energy efficiency and demand response technologies are broadly implemented. This will include calibrated energy modeling across CA climate zones, including zones 10-14, to estimate the operational energy and cost savings statewide and in regions that can particularly benefit low-income and disadvantaged communities.
    - Document the as-built costs of the advanced manufactured homes to be built and commissioned within this project.
    - Generate estimates of initial cost and 10-year cost of ownership, assuming cost compression with widespread adoption, and show how it can be equal to or lower than baseline HUD homes.
    - A *TEA Report* Detailing Pathway to 10-year Cost of Ownership That is Equal to or Lower Than Baseline HUD Homes will be produced.
- Develop *Long term Field Evaluation Report Demonstrating Zero C Operation*

Products:

- Field Validation M&V Report (Draft and Final)
- Long term Field Evaluation Report Demonstrating Zero C Operation (Draft and Final)
- TEA Report

TASK 5 COMMUNITY ENGAGEMENT AND ECONOMIC AND WORKFORCE DEVELOPMENT

The goals of this task are to solicit and consolidate the input of community and regional leaders in project design and in the path to a long-term market, and to build capacity with planning and permitting authorities throughout IOU areas to enable advanced, energy efficient manufactured housing.

[4] https://www.nrel.gov/docs/fy02osti/31505.pdf

Exhibit A
Scope of Work

Subtask 5.1: Community Input

The goal of this subtask is to engage with community members to identify potential areas of concern directly related with the project and affiliated issue-areas, understand community project-connected perceptions, and tune project goals to address community priorities. The recipient shall:

- Identify residents living in the surrounding project installation areas, and in (up to) four similar communities, employ an outreach strategy to engage the community and secure feedback.
- Conduct up to four Focus Groups to identify needs, priorities and concerns surrounding energy use, energy costs, energy stability, manufactured housing, housing costs, workforce needs and opportunities, and other points relevant to the project. Develop a *list of focus group attendees with Personal Identifiable Information (PII) omitted*
- Provide *Summary of input from focus groups with PII omitted*
- Create messaging and *Educational Materials* about energy efficiency and manufactured housing to disseminate via local organizations. Develop materials (including but not limited to power point presentation, handouts, and agendas) as well as materials developed based on the feedback/outcomes of the focus group.
- Develop a *Website (including survey) and utilize established outreach mechanisms* in order to provide project updates to community members and Project housing development corporations.

Products:

- List of focus group attendees with Personal Identifiable Information (PII) omitted
- Summary of input from focus groups with PII omitted
- Educational Materials
- Project website

Subtask 5.2: Civic Feasibility Study

The goal of this subtask is to engage with local government officials and planning commissioners to streamline the zoning of and permitting of advanced energy manufactured housing. The recipient shall:

- Create a *Presentation and Virtual Model* of the advanced energy homes that demonstrates the advantages to the community.
- Meet with local officials in up to six small cities to review State and Local zoning codes and permitting practices and provide a *summary of project meetings*
- Develop *Template Language* for updating zoning codes to allow for multifamily manufactured housing and advanced energy manufactured housing to be installed on non-traditional property.

Products:

- Presentation and Virtual Model
- Summary of Project Meetings
- Template Language for zoning codes

Subtask 5.3: Workforce and Economic Development

The goal of this subtask is to identify workforce gaps and opportunities for manufacturing and installation of advanced energy manufactured housing. The recipient shall:

- Use the California Mobility Center Workforce Framework to identify the jobs needed and skills required.
- Collaborate with local Workforce Innovation and Opportunities Act providers and schools to identify existing training programs
- Develop a *Workforce gaps and opportunities for manufacturing and installation of advanced energy manufactured housing Report* that estimates the potential job and economic impact from deploying advanced energy manufactured housing in the target area.

Products:

- Workforce gaps and opportunities for manufacturing and installation of advanced energy manufactured housing report

TASK 6 PATH TO MARKET

The goal of this task is to describe the market potential for advanced energy manufactured housing based on data collected from other tasks. The recipient shall:

Subtask 6.1 Deployment timeframe and benefits calculation

The goal of this subtask is to estimate the costs and benefits of a mature market. The recipient shall:

- Evaluate and document the timeframe, assumptions, and calculations of the estimated benefits of large-scale adoption of energy efficient and grid flexible manufactured homes. This will include a comparison of energy consumption and emissions with the baseline or “business as usual” scenario over the same timeframe.
- Explore specific programs, through TAC and stakeholder interactions, that can be leverages to accelerate the market growth of energy efficient manufactured homes. For example, feed-in tariffs, IOU rebates, demand response, storage procurement, and extent to which technology meets program requirements.
- Produce a *Deployment Timeframe and Benefits Report*.

Subtask 6.2 Market Strategy

The goal of this subtask is to estimate the future penetration of advanced energy manufactured housing in various scenarios. The recipient shall:

- Identify the initial target markets by geography, housing type, and resident demographics.
- Identify up to three deployment scenarios based on utility rates, housing costs, and zoning for manufactured housing.
- Develop a *Market Projection Report* that estimates near-term, mid-term, and long-term market size and deployment rates for each scenario.

Products:

- Deployment Timeframe and Benefits Report
- Market Projection Report

TASK 7 EVALUATION OF PROJECT BENEFITS

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

Exhibit A
Scope of Work

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 8 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

The Recipient Shall:

- Develop and submit a *Project Case Study Plan* that outlines how the Recipient will document the planning, construction, commissioning, and operation of the technology or system being demonstrated. The Project Case Study Plan should include:
    - An outline of the objectives, goals, and activities of the case study.
    - The organization that will be conducting the case study and the plan for conducting it.
    - A list of professions and practitioners involved in the technology's deployment.
    - Specific activities the recipient will take to ensure the learning that results from the project is disseminated to those professions and practitioners.
    - Presentations/webinars/training events to disseminate the results of the case study.
- Present the draft *Project Case Study Plan* to the TAC for review and comment.

- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the draft *Project Case Study Plan*. This document will identify:
    - TAC comments the recipient proposes to incorporate into the final *Technology Transfer Plan*.
    - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the final *Project Case Study Plan* to the CAM for approval.
- Execute the final Project Case Study Plan and develop and submit a Project Case Study.
- When directed by the CAM, develop presentation materials for a CEC sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California CEC.
- Provide at least (6) six High Quality Digital Photographs (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.