



**California Energy Commission
July 26, 2023 Business Meeting
Backup Materials for Agenda Item No
09b: DNV Energy Insights USA Inc.**

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

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

STATE OF CALIFORNIA
STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: DNV Energy Insights USA Inc.

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 PIR-23-002 with DNV Energy Insights USA, Inc. for a \$238,160 grant to evaluate residential fireplace air leakage and recommend cost-effective actions to mitigate while improving building energy efficiency and indoor air quality; 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 July 26, 2023.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

Kristina Banaag
Secretariat



GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: PIR-23-002

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Karen Perrin
3. MS-:None
4. Phone Number: 916-776-0803

C. Recipient's Information

1. Recipient's Legal Name: DNV Energy Insights USA Inc.
2. Federal ID Number: 54-1067916

D. Title of Project

Title of project: Strategies to Reduce Fireplace Air Leaks in Residential Buildings.

E. Term and Amount

1. Start Date: 7/30/2023
2. End Date: 3/29/2027
3. Amount: \$238,160.00

F. Business Meeting Information

1. Are the ARFVTP agreements \$75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 7/26/2023 .
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Jeanie Mar
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: NaturalGas (NG Research Program).

Agenda Item Subject and Description:

DNV Energy Insights USA Inc.

Proposed resolution approving Agreement PIR-23-002 with DNV Energy Insights USA, Inc. for a \$238,160 grant to evaluate residential fireplace air leakage and recommend cost-effective actions to mitigate while improving building energy efficiency and indoor air quality, and adopting staff's determination that this action is exempt from CEQA.

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, § 15301 ; Cal. Code Regs., tit. 14, § 15306 ;

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

No

If yes, explain reason why Agreement is exempt under the above section. If no, enter “Not applicable” and go to the next section.

The project fits within Cal. Code. Regs. tit. 14, § 15301 because it would only involve the operation and minor alteration of existing private structures involving negligible or no expansion of existing or former use. The minor alterations may include installation of inflatable and/or bolt-on apparatuses on residential chimneys located in California, plus air quality monitoring equipment, for the purpose of blocking air flow through the chimney (only) during periods of disuse and no expansion of capacity. All of the installations would be temporary and for research purposes only and would not require a federal, state, or local permit. Therefore, the proposed project falls within section 15301 of minor alterations to existing structures involving negligible or no expansion of existing or former use and is exempt from CEQA.

Additionally, Cal. Code Regs. tit. 14, § 15306 applies because this project also involves basic data collection, research, experimental management, and resource evaluation activities which do not result in serious or major disturbance to an environmental resource.

This proposed project does not involve impacts on any particularly sensitive environment; 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
No subcontractors to report	\$	\$

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
NG Subaccount, PIERDD	20-21	501.001O	\$ 238,160

TOTAL Amount: \$ 238,160

R&D Program Area: EERB: Buildings

Explanation for “Other” selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

L. Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Madeline Horne

Address: 155 Grand Ave Ste 600

City, State, Zip: Oakland, CA 94612-3758

Phone: 720-668-7780

E-Mail: madeline.horne@dnv.com

3. Recipient’s Project Manager

Name: Varuna Gopalan

Address: 155 Grand Ave Ste 600

City, State, Zip: Oakland, CA 94612-3758

Phone: 346-455-4644

E-Mail: varuna.gopalan@dnv.com

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-22-501
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: Karen Perrin

Approval Date: 6/2/2023

Branch Manager: Virginia Lew

Approval Date: 6/2/2023

Director: Delegated to the Branch Manager

Approval Date: 6/2/2023

**Exhibit A
Scope of Work
DNV Energy Insights USA Inc.**

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Characterization and Web Survey
3	X	Participant Selection
4	X	Field Installation and Measurement
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
F _{INF}	Infiltration factor
GHG	Greenhouse Gas
HVAC	Heating, Ventilation, and Air Conditioning
NO _x	Nitrogen Oxide
PM _{2.5}	Fine Particulate Matter
RASS	Residential Appliance Saturation Study
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to research and evaluate air leakage from existing residential wood-burning and gas fireplaces, the associated energy loss, and the infiltration of particulate matter and oxides of nitrogen with outside air and the resulting implications on indoor air quality.

B. Problem/ Solution Statement

Problem

Fireplace air leakage and the consequent energy loss and diminished indoor air quality has not been extensively studied despite estimated large proportions of air leakage from fireplaces without inserts. Interest in understanding and controlling infiltration of exterior air pollution has

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.

Exhibit A Scope of Work DNV Energy Insights USA Inc.

increased due to wildfire events. Testing of whole house leakage and recommendation of measures like fireplace dampers are regularly included in home energy assessments, however fireplace leakage is often addressed through dampers that can be installed loosely and allow air infiltration when the chimney is not in use.

Solution

The research study will collect primary data, including building characterization, fireplace leakage, and air quality measurements, to refine estimations of fireplace leakage with and without leakage reduction measures. The project will contribute to the state's energy efficiency goals by providing recommendations to inform state energy code and energy efficiency retrofit program updates. Further, the project will contribute to California's current greenhouse gas (GHG) emissions reduction targets by identifying the extent to which fireplace leakage contributes to heating and cooling energy losses, and creating a pathway for mitigation.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Provide an inventory of California residential buildings with gas or wood burning fireplaces
- Identify data on the air leakage rates and report the implications to energy and health (e.g., indoor air quality)
- Identify solutions and their effectiveness to minimize air leakage from fireplaces
- Recommend possible updates to building energy efficiency codes and standards (e.g., Title 24, part 6) and future energy efficiency programs (e.g., IOUs, CCAs and others)

Ratepayer Benefits: This Agreement will result in the ratepayer benefits of lower costs and increased safety by better defining the energy loss resulting from fireplace air leakage and the relationship to infiltration of indoor air pollutants that can be detrimental to health. The research project will identify actions that residents can take to mitigate the problems, reduce energy cost and reduce infiltration of air pollutants. The project will provide recommendations and information in an easily understood format for ratepayers. Finally, the project could aid in the development of new standards and/or incentive programs that could reduce energy cost burdens on residential homeowners, particularly in areas that are highly affected by poor outdoor air quality.

Technological Advancement and Breakthroughs: 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 identifying untapped opportunities for low-cost energy reduction strategies, potentially identifying additions and updates to California's energy code, or justifying an IOU/CCA pilot efficiency program. The pilot program could then inform a deemed measure package to allow the installation of fireplace retrofit measures to claim savings through ratepayer-funded programs.

Agreement Objectives

The objectives of this Agreement are to:

- Develop a survey to identify and characterize fireplaces in California.

Exhibit A

Scope of Work

DNV Energy Insights USA Inc.

- Estimate the fireplace contribution to building shell air leakage in California residential homes.
- Estimate the extent to which fireplaces can be sealed with dampers, glass doors, temporary chimney balloons, or other devices.
- Estimate the infiltration factor (F_{INF}) using long-term measurements of (fine particulate matter) $PM_{2.5}$.
- Estimate the energy impact of air leakage for homes in California.
- Estimate the greenhouse gas impact of air leakage for homes in California
- Produce educational material to inform California residents of the problem and provide solutions they can implement.
- Recommend possible updates to building energy efficiency codes and standards and future energy efficiency programs.

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.

Exhibit A Scope of Work DNV Energy Insights USA Inc.

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.

Exhibit A Scope of Work DNV Energy Insights USA Inc.

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.
 - Submit signed Information Security Program Plan Attestation that Recipient has an Information Security Program Plan (ISPP) that meets the minimum requirements as stated in SAM 5300 and any other applicable law. CAM will provide ISPP Attestation form.
 - Submit signed Non-Disclosure Agreements (NDAs) from Recipient and Subcontractor employees prior to the sharing of confidential information with the employees. CAM will provide NDA form.

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- Recipient shall ensure that all individuals employed by Recipient or a Subcontractor who will have access to confidential information take an annual security awareness training and submit the Employee Security Awareness Training Certificates.

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*)
- Signed non-disclosure agreement from Recipient and Subcontractor employees
- Signed Information Security Program Plan Attestation Form
- Employee Security Awareness Training Certificates

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.

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.

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- 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
- 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.

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- 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.
- Submit verification that confidential information and personal information is destroyed at agreement end (or when work is completed).

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Final Products
- Verification of destruction of confidential information and personal information

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:

Exhibit A Scope of Work DNV Energy Insights USA Inc.

- 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

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- 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:

Exhibit A Scope of Work DNV Energy Insights USA Inc.

- 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.

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- 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 ensure a long-term perspective on decision-making and progress toward the project's strategic goals.

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

- Researchers knowledgeable about the project subject matter;

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- 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.

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The TAC shall:

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

Products:

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

Subtask 1.12 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

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- Project Performance Metrics Results

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IV. TECHNICAL TASKS

TASK 2: CHARACTERIZATION AND WEB SURVEY

The goals of this task are to characterize the number of residential California residential buildings with gas or wood-burning fireplaces and evaluate and characterize the data.

The Recipient shall:

- Develop existing residential fireplace characterization data
 - Use a web-scraping Application Programming Interface to identify homes with fireplaces to obtain address, vintage, floor area, and heating system type / fuel (if not possible, then recommend an alternate method for CAM consideration)
 - Use Residential Appliance Saturation Study (RASS) database to identify homes that have reported fireplace use for heating
- Survey California residents for additional residential fireplace characterization data
 - Develop a *Residential Survey* with questions that fully characterize the residential building stock with fireplaces in California. For homes with fireplaces, collect the following information:
 - Building type (single family, multi-family, mobile home)
 - Building vintage
 - Climate zone
 - Fireplace fuel type and ignition type
 - Presence of glass doors, damper, gas igniter, etc.
 - How the fireplace is used: frequency and damper closing habits
 - Foundation type (to estimate building shell leakage)
 - Heating system type and fuel type
 - Duct location
 - Number of stories
 - Interest in participating in the field portion of the study
 - Site visit screening question: “Do you have any plans to move in the next year?”
 - Submit a *Draft Residential Survey* 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 Residential Survey*. Where CAM comments or recommendations have not been incorporated, provide comment responses in-line with CAM comments.
 - Add Residential Survey into web-based survey
 - Email RASS participants with a small incentive² to complete the survey.
 - Email a set of responding participants respondents follow-up surveys related to requirements for the site work including accessibility, comfort and behavior related to fireplace operation.
 - Compare benchmark results against responses from the 2019 California RASS for characterization of fireplace types used for primary or secondary heating.
 - Evaluate the surveys and benchmark results and submit a *Summary of Survey Findings Report* that summarizes the steps taken to identify the participants.

² Recipient will determine how the incentive will be allocated. All incentives will be paid for by the recipient.

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Products:

- Residential Survey (Draft and Final)
- Summary of Survey Findings Report

TASK 3: PARTICIPANT SELECTION

The goals of this task are to finalize the list of participants for testing consistent with the agreement objectives and create a testing timeline.

- Select homes for onsite testing
 - Secure the final homes for on-site testing from among pre-qualified survey respondents.
 - Participant homes will be selected according to the following criteria:
 - Preferred location in wildfire prone areas and nearby other PM_{2.5} pollution sources such as freeways.
 - Homes with gas furnaces must be in PG&E, SDG&E or SCG territory
 - Fireplace exhaust gasses must be vented through a chimney
 - At least 70% of homes must have wood burning fireplaces
 - At least 50% of the homes must be pre-1978
 - At least 25% of the fireplaces must have glass or other type of doors
- Secure any permits needed for installation at each site consistent with Task 1.8.
 - Prepare a *Testing Plan* that shall include, but not limited to, a summary of the selected homes criteria, utility providers, climate zones, testing installation timeline. No permits are required for this project.
 - Prepare *CPR Report #1* and participate in CPR meeting in accordance with subtask 1.3.

Products:

- Testing Plan
- CPR Report #1

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TASK 4: FIELD INSTALLATION AND MEASUREMENT

The goals of this task are to develop a measurement and verification (M&V) plan, install all proposed measurement and data collection testing equipment, measure and report the energy use and performance resulting from the installation of the testing equipment including the effect on energy performance and air quality.

The Recipient shall:

- Develop M&V protocol for measurements and strategies for air leakage reduction to be tested in onsite procedures.
- Prepare and submit an *M&V Test Plan* to include, but not be limited to:
 - A description of the monitoring equipment and instrumentation which will be used.
 - A description of the key input parameters and output metrics which will be measured.
 - A description of the analysis methods to be employed and onsite testing objectives.
- Install the Measurement and Verification testing equipment.
- Perform monitoring of air quality covering both summer and winter seasons to include:
 - Initial diagnostic tests (safety review and Confirmation of operational readiness
 - NOx spot measurements:
 - Install Blower door and differential pressure gauge to perform a multi-point air tightness test (with the Heating, Ventilation, and Air Conditioning (HVAC) system off) in each of the following fireplace configurations:
 - Fireplace glass doors open, damper closed
 - Fireplace glass doors closed, damper open
 - Fireplace damper closed and glass doors closed
 - Fireplace balloon inserted
 - Fireplace completely blocked with cardboard
 - Measure the pressure across the building envelope when the HVAC fan is in operation to see if duct leakage pressurizes or depressurizes the building envelope.
 - Test the air tightness of dampers and glass doors that are already installed in the test houses
 - Install and test a removable chimney balloon in each of the test houses.
 - Install continuous passive monitoring devices of PM_{2.5} (at all homes) and NO_x (at one home) concentration levels both indoors and outdoors.
- Provide a summary of M&V progress in Progress Report(s) (see subtask 1.5) which shall include but not be limited to:
 - A narrative on operational highlights from the reporting period, including any stoppages in operation and why; and
- Prepare *CPR Report #2* and participate in CPR meeting in accordance with subtask 1.

Products:

- M&V Test Plan (Draft and Final)
- CPR Report #2

Subtask 4.1: Field Data Analysis and Evaluation

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The goal of this task is to complete all analysis of collected primary and secondary data to estimate fireplace leakage to gain a better understanding of the consequent energy loss and diminished indoor air quality, in accordance with the goals

The Recipient shall:

- Conduct site-level analysis to determine:
 - the relationship between indoor and outdoor pollution concentration through air exchange rate and $PM_{2.5} F_{INF}$;
 - annual convective heat losses and heating and cooling energy to compensate for the hot air lost through the chimney during the heating season and the electricity required to cool the hot air brought in through the chimney during the cooling season.
- Conduct analysis to produce California statewide estimates of residential fireplace air leakage impacts, including:
 - natural gas and electricity costs and GHG emissions caused by fireplace air leakage
 - energy and GHG emissions savings that could potentially be curtailed or avoided through tested efficient technologies; and
 - the fireplace contribution to building shell air leakage in California homes.
- Estimate the extent to which fireplaces can be sealed with dampers, glass doors, and temporary chimney balloons.
- Estimate the penetration efficiency and deposition rate of $PM_{2.5}$ using long-term measurements of $PM_{2.5}$.
- Prepare and provide a *M&V Findings Report* that includes M&V protocol, measurements and calculations, analysis, and results performed in this task

Products:

- Measurement & Verification Findings 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 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 December 15th of each year. The Annual Survey includes but is not limited to the following information:
 - Technology commercialization progress
 - News media and publications
 - Company growth
 - Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the [Energize Innovation website \(www.energizeinnovation.fund\)](http://www.energizeinnovation.fund), and

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

- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the [Energize Innovation website \(www.energizeinnovation.fund\)](http://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 6: Technology/Knowledge Transfer Activities

The goal of this task is to ensure the scientific and techno-economic analysis and tools developed under this agreement are utilized in the energy policy, and/or planning decisions at the state and/or local levels, academic community and/or commercial sector.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan* that identifies the proposed activities the recipient will conduct to meet the goal of the task. The *Technology Transfer Plan* should include at a minimum:
 - Specific policy and planning efforts this project is expected to inform.
 - Specific stakeholder groups and energy policy and planning practitioners who will utilize the results of this project.
 - Proposed activities the recipient will conduct to ensure the tools and results from this project are utilized and adopted by the groups identified above.
- Present the *Draft Knowledge Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Knowledge Transfer Plan*. This document will identify:
 - TAC comments the recipient proposes to incorporate into the *Final Knowledge Transfer Plan*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement the activities as described in the final *Technology Transfer Plan*.
- Develop a *Technology Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project. Provide at least (6) six *High Quality Digital*

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Photographs (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

- Develop and submit educational materials to inform California ratepayers with solutions and estimated payback which can be implemented for energy saving strategies.

Products:

- Technology Transfer Plan (draft and final)
- Summary of TAC Comments
- Technology Transfer Summary Report (draft and final)
- High Quality Digital Photographs
- Educational Materials

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.