



**CALIFORNIA
ENERGY COMMISSION**



**California Energy Commission
November 13, 2024 Business Meeting
Backup Materials for Lawrence Berkeley National Laboratory**

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

[PROPOSED]

RESOLUTION NO: 24-1113-9a

STATE OF CALIFORNIA

**STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION**

RESOLUTION: Lawrence Berkeley National Laboratory

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-24-001 with Lawrence Berkeley National Laboratory for a \$2,000,000 grant. This agreement will conduct a field study and data analysis to quantify and characterize exposure to indoor air pollutants generated from cooking with gas, electric, or induction ranges in multifamily homes in low-income or disadvantaged communities; 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 13, 2024.

AYE:

NAY:

ABSENT:

ABSTAIN:

Dated:

Kristine 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-24-001

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Aryana Sherzai
3. MS-:51
4. Phone Number: 916-633-0623

C. Recipient's Information

1. Recipient's Legal Name: DOE- Lawrence Berkeley National Laboratory
2. Federal ID Number: 94-2951741

D. Title of Project

Title of project: Cooking and Clean Air in California Homes Study

E. Term and Amount

1. Start Date: 11/27/2024
2. End Date: 3/31/2028
3. Amount: \$2,000,000.00

F. Business Meeting Information

1. Are the ARFVTP agreements \$75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 11/13/2024 .
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Maninder Thind
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: NaturalGas (NG Research Program).

Agenda Item Subject and Description:

Lawrence Berkeley National Laboratory. a. Lawrence Berkeley National Laboratory. Proposed resolution approving agreement PIR-24-001 with Lawrence Berkeley National Laboratory for a \$2,000,000 grant, and adopting staff's recommendation that this action is exempt from CEQA. This agreement will conduct a field study and data analysis to quantify and characterize exposure to indoor air pollutants generated from cooking with gas, electric, or induction ranges in multifamily homes in low-income or disadvantaged communities. (PIER NG funding) Contact: Aryana Sherzai (Staff presentation: 5 minutes)

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 ;

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.

Consistent with CEQA Guidelines Section 15301, the Project would involve operation "of existing public and private structures, facilities, and mechanical equipment" in a manner which is consistent with their designed and on-going use. All applicable health, safety, and environmental rules and regulations would be followed; activities would be conducted by appropriately trained and qualified researchers and technicians. CEQA Guidelines Section 15300.2 describes a number of exceptions to categorical exemptions, which include the following: location, cumulative impact, significant effect, scenic highway, hazardous waste sites, and historical resources. These exceptions have been determined not to apply to the project. This Categorical Exemption would not be used in cases where research activities might trigger one or more of the Section 15300.2 exceptions.

b) Agreement **IS NOT** exempt.

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

Yes or 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	Yes or No
Negative Declaration	Yes or No
Mitigated Negative Declaration	Yes or No
Environmental Impact Report	Yes or No



Statement of Overriding Considerations	Yes or No
None	Yes or No

H. Is this project considered “Infrastructure”?

No

I. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter “No subcontractors to report” and “0” to funds.

Delete any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
Central California Asthma Collaborative	\$ 268,016	\$0
Association for Energy Affordability, Inc.	\$ 65,000	\$0
University of California, Berkeley	\$ 581,200	\$20,750

J. Vendors and Sellers for Equipment and Materials/Miscellaneous

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

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

K. Key Partners

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

Key Partner Legal Company Name
No key partners to report

L. Budget Information

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

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
NG Subaccount, PIERDD	21-22	501.001	\$ 2,000,000

TOTAL Amount: \$ 2,000,000



STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

Grant Request Form
CEC-270 (Revised 01/2024)

R&D Program Area: ESB: EA

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: 601 Program Continuous Appropriation

M. Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Joanna Santoro

Address: 1 Cyclotron Rd

City, State, Zip: Berkeley, CA 94720-0001

Phone: 510 486-6824

E-Mail: jlsantoro@lbl.gov

3. Recipient's Project Manager

Name: Brett Singer

Address: 1 Cyclotron Rd MS 56A-0120

City, State, Zip: Berkeley, CA 94720-0001

Phone: 510-486-4779

E-Mail: BCSinger@lbl.gov

N. Selection Process Used

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

Selection Process	Additional Information
Competitive Solicitation #	GFO-23-501
First Come First Served Solicitation #	Not applicable
Other	Not applicable

O. Attached Items

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

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



STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

Grant Request Form
CEC-270 (Revised 01/2024)

Item Number	Item Name	Attached
5	Awardee CEQA Documentation	Yes

Approved By

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

Agreement Manager: Aryana Sherzai

Approval Date: 10/1/24

Branch Manager: Alex Horangic

Approval Date: 10/3/2024

Director: Alex Horangic for Angela Gould

Approval Date: 10/3/2024

EXHIBIT A

Scope of Work

Lawrence Berkeley National Laboratory

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Prepare Survey, Equipment and Field Protocols
3	X	Recruitment and Data Collection
4		Dataset, Analysis, and Reporting
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
CCAC	Central California Asthma Collaborative
CO	Carbon monoxide, an air pollutant that interferes with the oxygen-carrying capacity of the bloodstream. Exposures at levels above health-based standards can cause dull headache, weakness, dizziness. Higher exposures can cause nausea or vomiting, shortness of breath, confusion, blurred vision. Very high exposures can result in loss of consciousness or death.
CEC	California Energy Commission
CPR	Critical Project Review
Disadvantaged Community	These are communities designated pursuant to Health and Safety Code section 39711 as representing the top 25% scoring census tracts from CalEnviroScreen along with other areas with high amounts of pollution and low populations as identified by the California Environmental Protection Agency (https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)
IAQ	Indoor Air Quality
Intervention	Strategy to improve health outcomes or affect health-promoting behavior changes among individuals or population. An intervention can take the form of deployment of new or proven technologies, educational campaigns, and other strategies.
IRB	Institutional Review Board, a federally registered body that oversees research involving human subjects.
NO ₂	Nitrogen dioxide, a health-damaging gaseous pollutant produced by combustion of gas fuels such as natural gas in stoves.

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.

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NO _x	Nitrogen oxides, a group of chemicals produced by combustion.
PM _{2.5} , PM ₁₀	PM _{2.5} is a regulated pollutant that is composed of airborne particles with aerodynamic diameters less than 2.5 µm (also called fine particles); a health-damaging pollutant produced by combustion processes and cooking. PM ₁₀ is particulate matter less than 10 µm in diameter.
Principal Investigator (PI)	The technical lead for the applicant's project, who is responsible for overseeing the project; in some instances, the Principal Investigator and Project Manager may be the same person.
REDCap	A secure web application for building and managing online surveys and databases, used for data collected in studies with human subjects.
TAC	Technical Advisory Committee
Ultrafine particles (UFP)	Airborne particles with diameters smaller than 100 nm.
VOCs	Volatile organic compounds; carbon-based chemicals that are predominantly in the gaseous state at room temperatures. Some VOCs present health hazards at concentrations that occur in some homes.

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

A. Purpose of Agreement

The purpose of this Agreement is to fund an applied research and development project that supports a field study and data analysis to quantify and characterize exposure to indoor air pollutants generated from cooking with gas, electric, or induction ranges in multifamily homes in low-income or disadvantaged areas. The study will capture information about the homes, cooking equipment, cooking practices and use of mitigations including ventilation, and will thus provide an empirically grounded framework to guide intervention policies including electrification, ventilation standards, and improvements to installed ventilation equipment.

B. Problem/ Solution Statement

Problem

Many indoor air pollutants are generated by chemical reactions that occur from both the cooking of food and from the use of cooking burners. Prior CEC-supported research has shown that combustion pollutants emitted by natural gas cooking burners—including NO₂—can reach levels that are hazardous to sensitive individuals, with higher short-term levels occurring in apartments. Some forms of cooking can emit quantities of fine particulate matter and specific volatile organic compounds that also exceed the thresholds of guidelines or standards set for public health protection.

For all pollutants produced by cooking burners and cooking food itself, the likelihood of high concentrations and exposures—especially to peak levels during and after cooking—is higher in smaller homes because they have a smaller volume of air to dilute the emissions. Newly constructed multi-family homes in California are required to have kitchen exhaust ventilation that meets strict performance standards designed to mitigate cooking-related pollutants exposures, as well as a mechanical system that ensures an adequate amount of ventilation for the dwelling

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unit. Many existing homes have ineffective or no cooking area exhaust ventilation and few have a general mechanical ventilation system, leading at times to unacceptable dwelling unit ventilation. When there is a lack of effective kitchen ventilation equipment or use either in smaller apartments or in apartments where there is frequent cooking – or both, which is common for low-income households – the risk of hazardous exposures increases. However, insufficient data currently exists to accurately quantify exposures among this population, nor the benefits of using extant control equipment including mechanical and natural ventilation and air filtration.

Solution

This project will quantify air pollutant concentrations and exposures in apartments with low-income households that cook frequently to inform the need for interventions. It will collect data from homes that use gas, conventional electric, and induction technologies, and homes with varying qualities of kitchen ventilation to inform the potential benefits of mitigations including education campaigns to use available kitchen ventilation, cooking electrification, and retrofits to add kitchen ventilation. Surveys of cooking and ventilation practices among households in disadvantaged communities will provide additional, important context about the frequency of hazardous exposures and potentially also enable targeting of interventions to households and buildings with the greatest need.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to quantify air pollutant exposures resulting from cooking with gas or electric burner technologies, identifying the separate and synergistic impacts of appliance field and cooking style, and the impacts of various controls, in apartments and manufactured homes in disadvantaged communities in California.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefit of increased safety by reducing in-home exposures to air pollutants generated by natural gas cooking burners and also by cooking, irrespective of the burner fuel. The project will focus on quantifying factors that are most predictive of hazardous exposures and on the potential effectiveness of controls that can be implemented in apartments throughout the state. Since low-income households in apartments and other small dwellings are disproportionately impacted by burner- and cooking related pollutants, the project will also advance state goals related to equitable decarbonization.

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 quantifying the benefits of recent improvements to kitchen ventilation standards; the benefits of dwelling unit mechanical ventilation in apartments that are airtight for energy efficiency; and the potential benefits of cooking electrification, installing

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

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kitchen ventilation in existing buildings, and/or increased use of available ventilation and filtration equipment. Findings from the project will be translated to policy and practice via technical manuscripts submitted to scientific journals, presentations to key stakeholders and to the public, and targeted coordination with community-based organizations.

Agreement Objectives

The objectives of this Agreement are to:

- Collect data on air pollutant concentrations and exposures in a meaningful sample of occupied apartments and/or manufactured homes in disadvantaged communities, capturing wide diversity in cooking and ventilation practices.
- Quantify the impact of cooking with gas or alternatively fueled appliances on exposures to ultrafine particles having diameters smaller than 100 nanometers (UFP), particles smaller than 2.5 and 10 micrometers (PM_{2.5} and PM₁₀), and combustion pollutants including nitrogen dioxide (NO₂) and carbon monoxide (CO).
- Quantify differences in ultrafine particle emissions from gas, electric resistance, and induction cooktop burners and between gas and electric ovens.
- Measure concentrations of volatile organic compounds including benzene, acrolein, and other hazardous chemicals resulting from commonly prepared meals in study homes.
- Collect data on cooking and ventilation practices from larger samples of households in the study communities to provide context for the intensive in-home measurements.
- Collect data to inform the benefits of controls including cooking area ventilation, dwelling unit ventilation, and filtration to reduce exposure and risk from pollutants that will continue to be emitted from cooking even if combustion-related pollutants are eliminated by switching from gas to electricity.

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.

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- 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).

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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.

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- 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.

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.

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- 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

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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:

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- 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

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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:

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- 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,

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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.

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- 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

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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 PREPARE SURVEY, EQUIPMENT AND FIELD PROTOCOLS

The goal of this task is to prepare the survey and all equipment, and protocols required to conduct the survey and field data collection activities in Task 3.

The Recipient shall:

- Develop a *Draft Online Survey* to collect information on cooking and ventilation practices, cooking and ventilation equipment, housing and household characteristics, impressions of the air pollutant risks associated with using cooking burners and cooking, energy insecurity, and other factors that will provide context for data collected in the field study.
- Develop and submit all required materials, then make revisions as needed to obtain approval for a human subject's protocol for the online survey tool.
- Procure ultrafine particle monitors that are suitable for use in the field study and conduct validation testing with representative cooking and other indoor sources.
- Check and service existing equipment and procure new equipment for field monitoring packages as needed.

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- Specify all the data that will be collected in the home (e.g., characterization of house and kitchen, equipment specifications, etc.) and the mechanism for obtaining each piece of data. Specify *Home and Equipment Characterization Data Objectives*.
- Construct instrument packages.
- Submit the *Draft Online Survey* and *Home and Equipment Characterization Data Objectives* to the CAM for feedback and incorporate changes as warranted before submission to the LBNL IRB.
- Participate in a CPR meeting.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Develop detailed in-home data collection protocols for equipment characterization, measurements of air pollutant concentrations, and recording of cooking activities.
- Develop and submit all required materials, then make revisions as needed to complete an *Approved Human Subjects Protocol* for recruitment and in-home data collection.
- Develop procedures for handling and analysis of particulate matter filters and VOC samples and conduct quality assurance validation tests.
- Conduct pilot implementations of the field protocols.
- Submit and obtain approval for revisions to the human subject's protocol as needed.
- Set up a server to receive data from instrument packages in the field.

Products:

- Draft Online Survey
- Home and Equipment Characterization Data Objectives
- CPR Report #1
- Approved Human Subjects Protocol Documentation

TASK 3 RECRUITMENT AND DATA COLLECTION

The first goal of this task is to recruit a diverse sample of low-income households living in multifamily housing to complete the online survey with a subset also agreeing to participate in the in-home data collection study. Additional goals are to implement the in-home data collection protocols in participating homes, and to analyze all samples collected in the field.

The Recipient shall:

- Identify multifamily housing properties that are in disadvantaged communities and/or house low-income residents, are equipped with dwelling unit mechanical ventilation and kitchen exhaust ventilation consistent with California Building Standards that have been in place since 2009, and which have owners or managers that are willing to facilitate outreach and recruitment for the survey and in-home data collection study.
- Conduct outreach and recruitment to obtain hundreds of responses to the online survey.
- Conduct outreach and recruitment to achieve the target sample of 140 total participants (or fewer, as approved in writing by the CAM) for the in-home data collection study, with at least 80% of the sites located in a disadvantaged and/or low-income community.
- Conduct outreach and recruitment to achieve the target sample of 60 participating households (or fewer, as approved in writing by the CAM) living in apartments with dwelling unit mechanical ventilation.
- Implement in-home data collection procedures for 10–14-day intervals in all study homes.
- Recruit participants and collect VOC samples to determine concentrations during an interval that is impacted by current/recent cooking and another that is not impacted by

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recent cooking in a subsample of 30 homes (or fewer, as approved in writing by the CAM).

- Analyze the VOC samples to determine concentrations of acrolein, benzene, aldehydes and other organic gasses of interest during both cooking periods and background conditions of no recent cooking.
- Recruit and collect personal exposure data for at least 20 participants (or fewer, as approved in writing by the CAM).
- Determine pre- and post-sampling weights of filters to determine gravimetric PM_{2.5} concentrations at each location during each sampling interval.
- Analyze personal exposure samples for NO₂ and NO_x.
- Collect and analyze samples for quality assurance including field blanks, co-located (duplicate or triplicate) sampling in the field and side-by-side sampling of all devices.
- Participate in a CPR meeting.
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Prepare *Data Collection Summary Presentation* and share with CAM and TAC.

Products:

- CPR Report #2
- Data Collection Summary Presentation

TASK 4: DATASET, ANALYSIS AND REPORTING

The goals of this task are to compile the collected data into a dataset, conduct analysis, and report results via scientific manuscripts and presentations to both scientific and general audiences.

The Recipient shall:

- Prepare a *Statistical Analysis Plan* prior to conducting the analysis and post the plan on Open Science Framework or similar platform.
- Compile all data into a consolidated dataset with no personally identifiable data.
- Conduct analyses as specified in the analysis plan.
- Prepare a *Preliminary Study Results Presentation* and provide to the CAM and the TAC.
- Prepare at least three (or fewer with CAM approval) Technical Manuscripts reporting the core scientific results of the study and submit for publication in peer-reviewed archival journals. The anticipated focus of the first manuscript will be emissions and concentrations of ultrafine particles resulting from a scripted burner use activity on gas and electric cooking burners on as-found cooking appliances in low-income apartments. The anticipated focus of the second manuscript will be a comparison of particulate matter and combustion pollutant concentrations and exposures resulting from unscripted use of gas versus electric cooking burners in low-income apartments. The anticipated focus of the third manuscript will be the effect of dwelling unit mechanical ventilation on exposures to burner and cooking-related pollutants. An additional manuscript may be prepared to focus on the results of the VOC sampling during cooking events.
- Prepare a data guide and publish the *Consolidated Dataset with Data Guide* on an archived, searchable, open access forum such as Dryad.

Products:

- Statistical Analysis Plan
- Preliminary Study Results Presentation

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- Consolidated Dataset with Data Guide

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 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 \(www.energizeinnovation.fund\)](http://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 \(www.energizeinnovation.fund\)](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 *Knowledge Transfer Plan* that identifies the proposed activities the recipient will conduct to meet the goal of the task. The *Knowledge Transfer Plan* should include at a minimum:
 - Specific policy and planning efforts this project is expected to inform.

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- 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 will be 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 an explanation why.
- Submit the *Final Knowledge Transfer Plan* to the CAM for approval.
- Implement the activities as described in the *Final Knowledge Transfer Plan*.
- Develop a *Knowledge Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the Final Technology Transfer Plan. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the 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:

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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.