STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

New Agreement PIR-15-017 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Yu Hou	43	916-327-1544

Recipient's Legal Name	Federal ID Number
ICF Incorporated, L.L.C.	52-0893615

Title of Project
Characterization of Fugitive Methane Emissions from Commercial Buildings in California

Term and Amount	Start Date	End Date	Amount
	6/30/2016	3/29/2019	$ 599,683

Business Meeting Information

☐ ARFVTP agreements under $75K delegated to Executive Director.

Proposed Business Meeting Date	6/14/2016	☐ Consent	☒ Discussion
Business Meeting Presenter	Yu Hou	Time Needed:	5 minutes

Please select one list serve. NaturalGas (NG Research Program

Agenda Item Subject and Description

Proposed resolution approving Agreement PIR-15-017 with ICF Incorporated, L.L.C. for a $599,683 grant to conduct sampling measurements on methane emissions from commercial buildings in California. The project will characterize fugitive methane emissions from specific appliances and system components from downstream of the customer meter in commercial buildings in California.

California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):
   Explain why Agreement is not considered a "Project":
   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:
   ☐ a) Agreement **IS** exempt. (Attach draft NOE)
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☒ Categorical Exemption. List CCR section number: Cal.CodeRegs., tit.14, § 15306
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)
   Explain reason why Agreement is exempt under the above section:
   Cal. Code Regs, tit. 14, sec. 15306 provides that projects which consist of basic data collection, research and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource are categorically exempt from the provisions of CEQA. Specifically, this project involves the use of small handheld monitoring equipment to measure methane emissions occurring within commercial buildings. All measurements will occur inside of existing buildings and the monitoring equipment used to measure the emissions will not be installed in the buildings. Therefore, the project falls within section 15306 and will not have a significant effect on the environment.
   ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study ☐ Environmental Impact Report
   ☐ Negative Declaration ☐ Statement of Overriding Considerations
   ☐ Mitigated Negative Declaration

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

Legal Company Name:	Budget
To Be Determined	$ 99,187
Southern California Gas Company	$ match only
	$

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

Legal Company Name:
Pacific Gas & Electric

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Budget Information			
Funding Source	**Funding Year of Appropriation**	**Budget List No.**	**Amount**
NG Subaccount, PIERDD	14-15	501.001I	$203,972
NG Subaccount, PIERDD	15-16	501.001J	$395,711
			$
			$
R&D Program Area: EGRO: EA		TOTAL:	$599,683
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Jodi Young			Name:	Joel Bluestein		
Address:	PO Box 654			Address:	9300 Lee Highway		
City, State, Zip:	Penngrove, CA 94951-0654			City, State, Zip:	Fairfax, VA 22031		
Phone:	707-992-0768 /	Fax:	- -	Phone:	703-934-3381 /	Fax:	- -
E-Mail:	Jodi.Young@icfi.com			E-Mail:	Joel.Bluestein@icfi.com		

Selection Process Used	
☒ Competitive Solicitation	Solicitation #: PON-14-507
☐ First Come First Served Solicitation	

The following items should be attached to this GRF		
1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4. Recipient Resolution	☒ N/A	☐ Attached
5. CEQA Documentation	☒ N/A	☐ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

EXHIBIT A
Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Sample Plan Development
3		Building Population Characterization
4		Sub-Survey of Buildings
5		Pilot Study of Methane Emissions
6	x	Revised Sampling Plan
7		Full Survey
8		Data Analysis
9		Public Dissemination
10		Evaluation of Project Benefits
11		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
Energy Commission	California Energy Commission
GHG	Green House Gas
GTI	Gas Technology Institute
LDC	Local Distribution Company
PG&E	Pacific Gas & Electric

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

A. Purpose of Agreement

The purpose of this Agreement is to better characterize fugitive methane emissions from specific appliances and system components from downstream of the customer meter in commercial buildings in California, informing energy sector policy and planning, particularly that relate to natural gas systems.

B. Problem/ Solution Statement

Problem

The current status of understanding of fugitive natural gas emissions in commercial buildings is very limited for two reasons: economic and the objective of current standards. Economic considerations apply to the quantity and value of natural gas leakage, as well as ownership of

[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.

the responsibility for minimizing these gas losses. The local distribution companies (LDC) do not have responsibility for the design and installation of indoor gas piping. They are required to inspect and approve indoor piping and connections to appliances before they can be put in service, but once in service, the assumption is that any "significant" gas leakage will be detected by the odorant, and reported to the gas company who is obligated to shut off the gas supply until the leakage is repaired and that repair inspected by the gas company experts. The problem here is that not all gas leakage occurs in detectible locations (i.e. inside building rooms).

Roof vents direct emissions to locations that are safe to operate. Safe means "well below the lower explosive limits." This is a quantity of natural gas that has been viewed as well below an economically recoverable emission. The other reason is that most LDCs do not "own" the gas that they deliver, and thereby, derive no direct economic benefit for spending labor or money to find and fix these leaks that are considered "safe." Supplemental funding makes it possible to broadly study and publicize the actual natural gas emission levels where they are below an economic and safe standard.

Solution

ICF Incorporated, L.L.C. (Recipient) in partnership with Southern California Gas Company, Pacific Gas & Electric (PG&E), and a subcontractor field survey technician will focus work on fugitive emissions in commercial buildings across northern and southern California. By building on and coordinating with several local, regional, and national efforts—both private and public—this project will further knowledge of fugitive methane emissions to a level of detail and comprehensiveness that is unprecedented.

The Recipient will use advanced leak detection and monitoring equipment to develop a clearer understanding of where methane leaks are present and to what magnitude. All of this will be driven by a detailed and robust statistical surveys/analysis methodology. The Recipient will conduct a pilot study to understand the variation in fugitive emissions from different types of commercial buildings and devise a final sample size for the full survey so as to account for all of the variability in the larger population of commercial buildings in California. The end result from this project will be an estimate of fugitive methane emissions from appliances and system components and by commercial building type for all commercial buildings in California. This work will be coordinated with an on-going study by Gas Technology Institute (GTI) under Energy Commission grant PIR-15-003 characterizing methane emissions from a subset of commercial buildings in California.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to develop an understanding of methane leaks and emissions across commercial buildings in northern and southern California at a level of detail appropriate for drawing meaningful conclusions and informing the public, energy sector policy, and planning efforts.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of: greater reliability and lower costs in the natural gas system by establishing a better understanding of fugitive natural gas leaks across commercial buildings.

[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

EXHIBIT A
Scope of Work

The Recipient anticipates the following benefits to the California natural gas investor owned utilities (IOU) and ratepayers;

1) Thorough understanding of fugitive emissions from commercial buildings that will help commercial building operators be aware of hotspots in their facilities and plan for periodic inspection to ensure minimal leak incidences. The IOU will be able to develop response plans based on the level and frequency of leaks to be expected from different types of commercial buildings. Finally, the study will allow best management practices for fugitive emissions from commercial buildings that apply to both IOUs and owners/ operators of such buildings.
2) Fugitive methane leaks can be a serious safety hazard creating an explosive environment within buildings. This project will help IOUs and building owners/ operators identify and mitigate fugitive methane emissions thereby increasing the safety of operations.
3) Reductions in fugitive methane emissions will directly translate into increased natural gas being available for end use to the commercial building, which would otherwise be released to the atmosphere.
4) Reduced cost for IOUs through cheaper planned maintenance rather than expensive emergency response from leaks that can grow hazardous if left unattended.
5) The reduction in fugitive methane emissions from commercial buildings will reduce greenhouse gas (GHG) emissions from the natural gas supply chain and will directly contribute towards the State goals of reducing GHG emissions.

Technological Advancement and Breakthroughs:[3] This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the California's statutory energy goals by helping advance standards for active surveillance of gas leaks in commercial buildings.

This project intends to study the gas piping from the customer meter to the building appliances, inside walls and how commercial buildings of different types allow the enclosed space between walls to breathe and vent. The connections outside the walls to the appliance will be inspected with instruments much more sensitive (5 ppm-meter) than the odor threshold (20% of the 3 – 4% lower explosive limit). If and where permitted, and where there is evidence of gas supply piping leaking within walls, The Recipient will explore novel techniques to find and quantify these leaks. These measures will be considered in collaboration with the building owner/operator and the gas company. For smaller buildings or few gas appliances (such as a single or few forced draft space heater(s) or water heaters) the Recipient will conduct a nitrogen pressure test from the customer meter with all the appliance shut-off valves closed with approval from customer and the Energy Commission. If directed by the CAM in writing, the Recipient will also test for uncombusted methane from combustion appliances, the survey will shed light on flue gas leakage from combustion equipment and the potential for uncombusted methane to overlap fugitive methane emissions.

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increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

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

EXHIBIT A
Scope of Work

Agreement Objectives

The objectives of this Agreement are to:

- Inform California public policy as to the volume of fugitive methane emissions and the need for potential regulation of natural gas/methane emissions from commercial buildings;
- Identify specific opportunities for commercial building owners/operators to reduce natural gas leakage;
- Improve safety from natural gas explosions or carbon monoxide poisoning;
- Increase public awareness of GHG and other air pollutant emissions; and
- Advance the science of GHG emissions detection and quantification.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

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

  The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
  - Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
  - Text documents will be in MS Word file format, version 2007 or later.
  - Documents intended for public distribution will be in PDF file format.
  - The Recipient must also provide the native Microsoft file format.
  - Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**

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

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

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

EXHIBIT A
Scope of Work

The Recipient shall:

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

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

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

- Provide an *Updated Project Schedule, List of Match Funds,* and *List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products,

schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

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

The Recipient shall:

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

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

Recipient Products:

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

CAM Products:

- CPR Agenda

- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting
The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

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

  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
    - Disposition of any state-owned equipment.
    - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
    - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
    - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
    - "Surviving" Agreement provisions such as repayment provisions and confidential products.
    - Final invoicing and release of retention.

- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices
The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report
The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

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

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report

Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:

- Ensure that the report includes the following items, in the following order:
  - Cover page (**required**)
  - Credits page on the reverse side of cover with legal disclaimer (**required**)
  - Acknowledgements page (optional)
  - Preface (**required**)
  - Abstract, keywords, and citation page (**required**)
  - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
  - Executive summary (**required**)
  - Body of the report (**required**)
  - References (if applicable)
  - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
  - Bibliography (if applicable)
  - Appendices (if applicable) (Create a separate volume if very large.)
  - Attachments (if applicable)
- Ensure that the document is written in the third person.
- Ensure that the Executive Summary is understandable to the lay public.
  - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
  - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
  - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.

- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

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

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

The Recipient shall:

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

  If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:
  - A list of the match funds that identifies:
    - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (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.
    - A copy of a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.

- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

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

Subtask 1.8 Permits
The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

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

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

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

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

The Recipient shall:

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

- Researchers knowledgeable about the project subject matter;
- 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.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)

- TAC Meeting Back-up Materials
- TAC Meeting Summaries

IV. TECHNICAL TASKS

Mutual Understanding of Information Collected Under this Agreement

It is the mutual understanding of The Energy Commission and Recipient that none of the information collected under this Agreement will be "Personal Information" as defined under the Information Practices Act (see Civil Code section 1798.3(a) for the definition of "Personal Information").

TASK 2 – SAMPLE PLAN DEVELOPMENT

The goal of this task is to develop the specific methodology to statistically characterize commercial buildings and associated appliances and system components, identify sample size and specific buildings for the field survey, emissions detection and measurement protocol, data collection requirements for field survey, and statistical methods to extrapolate sample size findings to the population of all commercial buildings in California.

The Recipient shall:

- Specify methods to characterize the commercial building population in California (discussed further in Task 3 below).
- Identify specific parameters that can be used to characterize appliance and system components across various commercial building types (discussed further in Task 4 below).
- Design a sampling survey for the pilot study and full study of fugitive methane emissions leaks detection and measurement (discussed further in Tasks 5 and 7 below).
- Identify protocols for leak identification and measurement.
- Create data collection forms and checklists to be used by field personnel to collect relevant data for the study.
- Coordinate the work under this task with on-going grant PIR-15-003 with GTI. The CAM will facilitate this coordination.
- Create logistics plan and personnel assignments for sampling.
- Identify relevant output desired from data analysis, e.g. average fugitive methane emissions from boilers in hospitals.
- Prepare and provide a *Sampling Plan* which will include but not be limited to characterization of the building and appliances, sample size, emissions detection and measurement protocol, data collection requirements and so on.

Products:

- Sampling Plan (Draft and Final)

TASK 3 - BUILDING POPULATION CHARACTERIZATION

The goals of this task are to collect information on fugitive emissions from specific appliances and system components by building type (school, hospital, etc.).

The Recipient shall:

- Develop a dataset of commercial buildings by type.

- Associate key building parameters such as number of floors, floor space, etc. with these building types
- Develop a dataset of commercial buildings by type and associated appliances and system components for all buildings in California from detailed microdata such as Commercial Buildings Energy Consumption Survey.
- Coordinate the work under this task with on-going grant PIR-15-003 with GTI. The CAM will facilitate this coordination.
- Prepare and provide a *Dataset of Commercial Buildings* by type and associated key parameters, which will include, but not be limited to, the key findings made under Task 3.

Products:

- Dataset of Commercial Buildings

TASK 4 – SUB-SURVEY OF BUILDINGS

The goal of this task is to associate specific appliances and system components with key parameters associated with commercial buildings. For example, the number of feet of natural gas pipe in a building can be associated with the number of floors or floor space from the sub-survey and then extrapolated to the entire population using the dataset developed in Task 3.

The Recipient shall:

- Obtain spatially resolved data, i.e. distribution of commercial buildings in different geographic regions, from our partners at PG&E (for Northern California) and Southern California Gas (for Southern California.)
- Select a large random sample of these buildings. The sample size will be large enough to extrapolate findings to all commercial buildings in California.
- Sub-survey to obtain data on key parameters such as their annual gas usage, building type (e.g., offices, hotels, hospitals, schools, and restaurants), geographical region, year of construction, number of appliances, and other information potentially relevant to their fugitive methane emissions levels
- Conduct this sub-survey primarily through sending data collection forms via emails and then following up with phone calls
- Calculate summaries of the joint distributions of annual gas usage, building type, geographical region, year of construction, number of appliances, and other relevant variables for the various commercial building types
- Review and compare the estimated proportions and determine which estimates will be most useful for developing the survey weights for the pilot and full samples
- Prepare a technical note entitled "*Estimates of the Estimates of the Proportions of Various Types of California Commercial Buildings and their Associated Characteristics*", which will include, but not be limited to, the key findings made under Task 4.

Products:

- Estimates of the Proportions of Various Types of California Commercial Buildings and their Associated Characteristics.

TASK 5 - PILOT STUDY OF METHANE EMISSIONS

The goal of this task is to pilot sample to help establish the variability of emissions across various types of commercial buildings and determine the stratification of sampling and corresponding sample size across various building types. Once the variability has been determined through this pilot study, the sampling size for various building types for the full study will be determined.

The Recipient shall:

- Perform a random sample of at least 30 buildings from the sampling frame that was developed in Tasks 3 and 4. The number of buildings sampled can be changed with CAM written approval.
- Stratify the sample into regions (Northern California and Southern California) and building types (e.g., offices, hospitals, restaurants, other), and sample approximately equal numbers from each combination of region and building type, so that the pilot sample contains a sufficiently wide range of buildings.
- Measure the fugitive methane emissions for each building in the pilot sample.
- If directed by the CAM in writing, the Recipient will also test for uncombusted methane from combustion appliances.
- Compute summary statistics for the pilot survey, including the mean, median, and selected percentiles together with 95% confidence intervals.
- Weigh the data using survey weights defined as the population proportion (calculated in Tasks 3 and 4) divided by the sample size for the combination of region and building type.
- Prepare and provide a technical note *Sample Size and Distribution of Commercial Buildings Across California*, which will include, but not be limited to, the key findings made under Task 5.

Products:

- Sample Size and Distribution of Commercial Buildings Across California

TASK 6 – REVISED SAMPLING PLAN

The goal of this task is to revise the *Sampling Plan* to account for findings from the pilot study and focus efforts of sampling on types of buildings and sources with highest probability and contribution to total emissions.

The Recipient shall:

- Design the full survey of at least 120 buildings. The number of buildings sampled can be changed with CAM written approval. Estimate the total sample sizes needed to achieve various overall margins of error.
- Calculate the estimated margins of error for sampling schemes where equal numbers are selected from each region and building type, as in the pilot sample, and for more efficient schemes (i.e., with lower margins of error) where the sample sizes in each stratum are proportional to the estimated number of California buildings in that stratum.
- Compute margins of error for sampling schemes where the strata are defined by additional factors such as combinations of region, building type, annual gas usage, and year of construction.
- Select the factors to be used based on which factors have the strongest association with the fugitive methane emissions measured in the pilot survey.

- Propose and implement the sampling scheme for the full survey.
- Prepare and provide technical note: *Sampling Scheme for the Full Survey* which will include but not be limited to reflect the changes in the *Sampling Plan* based on results in findings from Task 6.
- Participate in CPR Meeting (see Task 1.3)

Products:

- Sampling Scheme for the Full Survey
- CPR Report (see Task 1.3)

TASK 7- FULL SURVEY

The goal of this task is to conduct field studies of all identified sample buildings from the revised sampling plan to measure fugitive methane emissions.

The Recipient shall:

- Conduct field studies of all identified sample buildings from the revised sampling plan to measure fugitive methane emissions.
- Associate fugitive emissions with specific appliances and system components.
- Use the instruments and experienced field survey personnel of the Recipient's partners, under the oversight and data recording of the Recipient engineers.
- Measure and collect methane/natural gas airborne emissions inside the buildings as well as from wall and roof vents, taking advantage of building designs and interior wall space where gas pipes run from the customer meter(s) to the appliances.
- Prepare and provide technical note *Full Survey Results* which will include, but not be limited to, preliminary results and findings from Task 7.

Products:

- Full Survey Results

TASK 8- DATA ANALYSIS

The goal of this task is to perform the required data analysis to derive meaningful results from the sampling scheme for the full survey.

The Recipient shall:

- Compute summary statistics of the fugitive methane emissions for the full survey, including the mean, median, and selected percentiles together with 95% confidence intervals.
- Calculate these statistics for the entire state as well as for subpopulations of interest, such as Northern vs Southern California, different building types, or by specific appliances and system components.
- Prepare and provide a technical note entitled *Data Analysis Results* which will include, but not be limited to, results and findings from Task 8.

Products:

- Data Analysis Results

TASK 9- PUBLIC DISSEMINATION
The goal of this task is to complete activities related to communicating key findings and results to the public. This task will have some overlap with Task 11.

The Recipient shall:

- Develop a plan to disseminate information to the public for key findings in the final report.
- Develop an outline in collaboration with the Energy Commission before commencing the development of any public dissemination.
- Finalize the plan for public dissemination.
- If directed by CAM in writing, prepare workshop presentation and *Manuscript* regarding the findings in this project. Submit the *Manuscript* to peer-reviewed journals for possible publication.
- Conduct two webinars to communicate the findings to the public and interested parties.

Products:

- Manuscript
- Copy of Journal Article, if published

TASK 10- EVALUATION OF PROJECT BENEFITS
The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:

    - Outcome of project.
    - Published documents, including date, title, and periodical name.
    - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
    - The number of website downloads.
    - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
    - An estimate of energy and non-energy benefits.
    - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.

  - A discussion of project product downloads from websites, and publications in technical journals.
  - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:
- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Memo summarizing project benefits
- Final Meeting Benefits Questionnaire

TASK 11 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

The Recipient shall:
- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
  - A description of the intended use(s) for and users of the project results.
  - Published documents, including date, title, and periodical name.
  - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
  - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
  - The number of website downloads or public requests for project results.
  - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop on the results of the project.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

EXHIBIT A
Scope of Work

Products:

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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 16-0614-22

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ICF INCORPORATED, LLC

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

RESOLVED, that the Energy Commission approves Agreement PIR-15-017 with ICF Incorporated, LLC for a $599,683 grant to conduct sampling measurements on methane emissions from commercial buildings in California. The project will characterize fugitive methane emissions from specific appliances and system components from downstream of the customer meter in commercial buildings in California; and

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

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on June 14, 2016.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat