

GRANT REQUEST FORM (GRF)New Agreement PIR-15-009 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Cecelia Golden	51	916-327-1423

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

Title of Project
Industrial Steam Boiler Heat Recovery for High-Efficiency Water Heating

Term and Amount	Start Date	End Date	Amount
	6/30/2016	06/29/2019	\$ 585,300

Business Meeting Information
 ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	3/9/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Rajesh Kapoor	Time Needed:	5 minutes

Please select one list serve. NaturalGas (NG Research Program)

Agenda Item Subject and Description

INSTITUTE OF GAS TECHNOLOGY DBA GAS TECHNOLOGY INSTITUTE (GTI). Proposed resolution approving Agreement PIR-15-009 with Institute of Gas Technology dba Gas Technology Institute (GTI) for a \$585,300.00 grant to demonstrate an emerging heat recovery technology to be installed and tested in industrial steam boilers. This project will independently document the energy efficiency, energy cost reductions, performance, and installation requirements for the heat recovery system.(PIER Natural Gas funding) Contact: Rajesh Kapoor. (Staff Presentation: 5 minutes)

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

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. Code Regs., tit 14, Sections 15301, 15303, and 15306
 Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:

This work involves minor alteration of existing structures, and does not involve expanding any existing uses, and thus the work falls within the limits of examples listed in these exemptions.

Cal. Code Regs., tit. 14, sec. 15301 provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of use beyond that existing at the time of the lead agency's determination, are categorically exempt from the provisions of the California Environmental Quality Act. This project involves the installation of predesigned modular heat exchange units configured per site-specific load requirements. The predesigned modular units, which are approximately the size of a large ice chest, will be installed at an existing meat processing facility, the Central Valley Meat Company, Inc., in Hanford, California. The modular units will be retrofitted to the existing industrial boiler installations. The installation of the units will result in no expanded capacity the Central Valley Meat Company. The heat recovery system called a "SideKick" will be integrated with the existing host facility heating lines, utility connections, and infrastructure, which requires only minor ancillary equipment (e.g., valves) and materials (e.g., fittings.) for installation. Installation of equipment necessary for M&V activities will be limited to instrumentation for data collection and analysis and will not alter existing facility equipment or operations. Therefore, the project falls within section 15301 and will not have a significant effect on the environment.

Cal. Code Regs., tit. 14, sec. 15303 provides that projects which consist of construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small



structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure, are categorically exempt from the provisions of CEQA. This project consists of installation of small new predesigned modular units retrofitted to existing industrial boilers and allow for testing and evaluation of benefits, including increased fuel efficiency, reduced greenhouse gas emissions, and reduced operating costs with favorable economic payback. Specifically, the equipment to be installed is approximately the size of a large ice chest. Therefore, the project falls within section 15303 and will not have a significant effect on the environment.

Cal. Code Regs., tit. 14, sect. 15306 provides that projects which consist of basic data collection, research, experimental management, 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. This project entails extensive data collection and performance evaluation to document energy efficiency, energy cost reductions, installation requirements, and payback period to support adoption by Industrial end-users of this innovative approach to low cost industrial heat recovery. These M&V activities require the temporary installation of instrumentation and data acquisition equipment, including computerized software, which will be tied into the integrated system for system monitoring. The results will include technical reports and presentations to disseminate the results to California industries, the California Energy Commission, and the public. This temporary installation will not alter the existing facility or its operations and will not create disturbances to the environment. 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

Negative Declaration

Mitigated Negative Declaration

Environmental Impact Report

Statement of Overriding Considerations

List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)	
Legal Company Name:	Budget
Davis Energy Group, Inc.	\$ 191,268
Tetra Tech. Inc.	\$ 40,000
	\$
	\$
	\$
	\$
	\$
	\$
	\$

List all key partners: (attach additional sheets as necessary)
Legal Company Name:
California Boiler, Inc.

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION



Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
NG Subaccount, PIERDD	14-15	501.0011	\$585,300
			\$
			\$
			\$
			\$
			\$
R&D Program Area:	EERO: IAW	TOTAL:	\$585,300
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer		Recipient's Project Manager	
Name:	Kate Jauridez	Name:	Joseph Pondo
Address:	1700 S Mount Prospect Rd	Address:	1700 S Mount Prospect Rd
City, State, Zip:	Des Plaines, IL 60018-1804	City, State, Zip:	Des Plaines, IL 60018-1804
Phone:	847-768-0905 /	Fax:	847-768-0501
E-Mail:	Kate.Jauridez@gastechnology.org	E-Mail:	joseph.pondo@gastechnology.org

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-501
<input type="checkbox"/> First Come First Served Solicitation	

The following items should be attached to this GRF	
1. Exhibit A, Scope of Work	<input checked="" type="checkbox"/> Attached
2. Exhibit B, Budget Detail	<input checked="" type="checkbox"/> Attached
3. CEC 105, Questionnaire for Identifying Conflicts	<input checked="" type="checkbox"/> Attached
4. Recipient Resolution	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached
5. CEQA Documentation	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached

Agreement Manager_____
Date_____
Office Manager_____
Date_____
Deputy Director_____
Date

Exhibit A Scope of Work

I. TASK AND ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Contract Execution
3		Measurement and Verification Plan (M&V)
4	X	Engineering, Design, and Procurement
5		Installation and Commissioning
6	X	Performance Monitoring, Evaluation, and Reporting
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
GHG	Greenhouse Gas
Recipient	Institute of Gas Technology dba Gas Technology Institute
M&V	Measurement and Verification
NOx	Nitrogen Oxides
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the demonstration of an emerging heat recovery technology called SideKick for use in steam boiler applications. The SideKick technology, developed by the project partner California Boiler, was intended for use in hot water boiler applications. This project will demonstrate the technology in a novel application for use in an industrial steam boiler application so that performance, energy efficiency gains and GHG emission benefits of this innovative application can be independently quantified. This could lead to broad market deployment and substantial gas savings for California industrial markets.

B. Problem/Solution Statement

Problem

Industrial boilers lose an estimated 16% of the fuel energy from natural gas combustion as waste heat is exhausted to the atmosphere. The exhaust gas contains both sensible heat energy and,

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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to a much greater extent, latent heat energy in the form of water vapor produced during combustion. Recovering this heat energy and putting it to use to provide hot process water results in greatly increased system fuel efficiency with proportional reductions in greenhouse gases (GHG), including nitrogen oxide (NO_x) emissions that are produced by the burning of fossil fuels.

The commercially available heat recovery products and technologies capable of recovering the majority of this waste heat have been custom-engineered and fabricated for each application site and/or process. This leads to costly, site-specific engineering and installation, making the economic payback period unattractive to the majority of industrial customers that could benefit from recovering waste heat for other uses in their production process.

Solution

The recipient will demonstrate an emerging heat recovery system, originally designed for conventional hot water boilers, in an industrial steam boiler application for industrial facilities that require both steam and additional hot water for processing (e.g., food processing, chemicals production, laundry services). The heat recovery system, trademark named “SideKick” and developed by the project partner California Boiler without proprietary issues, will be installed and tested in Industrial steam boiler application as a new application. This new application for the SideKick offers the opportunity for substantial waste heat recovery resulting in increased fuel efficiency and greenhouse gas emissions (GHGs) reduction. A unique feature of the SideKick is the predesigned modules and software to determine size and flow requirements. The predesigned modules combined with the use of the software leads to precise sizing and lower installation costs by greatly reducing application engineering costs and heat recovery hardware costs. This agreement will also provide industrial end users with a straight forward, cost effective path towards increasing facility efficiency and reducing NG consumption and can lead to mass customization.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Identify and overcome the operational and technical hurdles that may arise during a field-demonstration of the SideKick technology, and to provide valuable insight to guide decisions as the project team moves towards deployment efforts;
- Prove, via independent third-party measurement and verification (M&V), the ability of the system to achieve the stated agreement objectives under real-world conditions at an end-user facility;
- Demonstrate the benefits of the SideKick technology in providing increased fuel efficiency, reduced greenhouse gas emissions, reduced operating costs, and a favorable economic payback;
- Disseminate the findings and conduct technology/knowledge transfer activities per Task 8 to increase adoption of the SideKick technology by industrial users in California, and ultimately reduce natural gas consumption.

Ratepayer Benefits: This Agreement will result in the ratepayer benefit of decreased demand for NG at industrial sites due to fuel efficiency gains, as well as reduced gas use for steam and hot water generation. Ratepayers will also benefit from decreased emissions of GHG and NO_x. Annual energy savings for California ratepayers is estimated at over \$10.3 million with GHG and

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NOx reductions of 93,100 tons and 18,300 lbs, based on adoption by fifty percent of the addressable market.

Technological Advancement and Breakthroughs: This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by providing industrial end-users with a straightforward, cost-effective path towards increasing facility efficiency and reducing natural gas consumption. This project will demonstrate the benefits of the existing SideKick heat recovery technology in a novel application, which is an industrial steam boiler application, and document the actual energy and cost savings necessary to overcome barriers to widespread adoption. While the benefits of the SideKick technology have been shown for hydronic (hot water) boiler applications, these benefits have not been fully demonstrated for industrial steam boiler applications. The advanced technology demonstrated under this project achieves high-performance with low cost by employing a mass-customization design approach in which predesigned modular heat exchange units are configured per site-specific load requirements based upon design criteria generated by non-proprietary software. This state-of-the-art approach allows for low-cost, customized heat exchange units to be fabricated per customer requirements, enabling peak efficiency and performance, and further reducing site-specific engineering and installation costs.

Agreement Objectives

The objectives of this Agreement are to:

- Validate the ability of the technology to provide robust and reliable operation for steam boiler applications
- Achieve an increase in boiler fuel efficiency of approximately 8% by recovering exhaust energy to generate hot water
- Provide sufficient operational flexibility to match real-time variations in facility steam and hot water load demands
- Demonstrate the cost-benefits of the SideKick technology by achieving a payback period of less than four years

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

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- 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.
- Submit the final product to the CAM once agreement has been reached on the draft. The CAM will provide written approval of the final product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- If the CAM determines that the final product does not sufficiently incorporate his/her comments, submit the revised product to the CAM within 10 days of notice by the CAM, unless the CAM specifies a longer time period.

For products that require a final version only

- Submit the product to the CAM for approval.
- If the CAM determines that the product requires revision, submit the revised product to the CAM within 10 days of notice by the CAM, unless the CAM specifies a longer time period.

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.

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- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

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

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

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

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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(s).
- 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

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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.

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- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *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 all Agreement activities conducted by the Recipient for the preceding month, including 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.
 - Provide a synopsis of the project progress, including accomplishments, problems, milestones, products, schedule, fiscal status, and any evidence of progress such as photographs.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the “Payment of Funds” section of the terms and conditions. In addition, each invoice must document and verify:
 - Energy Commission funds received by California-based entities;
 - Energy Commission funds spent in California (*if applicable*); and
 - Match fund 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 and approve 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 a Style Manual provided by the CAM.

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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.
- Submit a draft of the outline to the CAM for review and comment.
- Once agreement has been reached on the draft, submit the final outline to the CAM. The CAM will provide written approval of the final outline within 10 days of receipt.

Recipient Products:

- Final Report Outline (draft and final)

CAM Products:

- Style Manual
- Comments on Draft Final Report Outline
- Approval 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 and the Style Manual provided by the CAM.
- Submit a draft of the report to the CAM for review and comment. Once agreement on the draft report has been reached, the CAM will forward the electronic version for Energy Commission internal approval. Once the CAM receives approval, he/she will provide written approval to the Recipient.
- Submit one bound copy of the Final Report to the CAM.

Products:

- Final Report (draft and final)

CAM Products:

- Comments on Draft 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)

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- 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

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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.

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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*)

Exhibit A Scope of Work

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:

Exhibit A Scope of Work

- 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

*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. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

The site identified as of the commencement date of this grant is:

1. Site 1 – Central Valley Meat Company – Hanford, CA

For any changes in site location, the Recipients must check with their Commission Agreement Manager or Commission Agreement Officer who will provide guidance regarding the level of Commission approval required.

TASK 2 Contract Execution

The goals of this task are to: (1) confirm the availability of the project demonstration site(s); (2) confirm the availability of a measurement and verification (M&V) contractor; and (3) execute any agreements necessary to secure the demonstration site and M&V contractor.

Subtask 2.1 Execution of a Contract with the Demonstration Site(s)

Exhibit A Scope of Work

The Recipient shall:

- Confirm agreement with the manager(s) of the selected demonstration site(s) regarding the project timeline, space reserved for the project, equipment installation, permit and insurance requirements, indemnity, and the Recipient's use or removal of any support staff.
- Notify the CAM If a selected demonstration site becomes unavailable during the project term and a new site must be selected.
- Execute a *Contract with the Demonstration Site* that confirms the agreement reached above on the Recipient's use of the site.

Products:

- Contract with Demonstration Site

Subtask 2.2 Execution of a Contract with the Selected M&V Contractor

The Recipient shall:

- Confirm the selected M&V contractor's ability to provide required hardware, software, and staff to conduct the required measurements during the project term.
- Confirm that the selected M&V contractor will follow utility M&V protocols, and will prepare a detailed analytical report that verifies energy consumption and engineering calculations for energy and cost savings.
- If the selected M&V contractor becomes unavailable during the project term, work with the CAM to select a new M&V contractor.
- Execute a *Contract with the M&V Contractor* that secures the contractor's services during the project term and confirms that the contractor will follow IOU M&V protocol and prepare a detailed analytical report required in Task 6.

Products:

- Contract with the M&V Contractor

TASK 3 Measurement and Verification Plan

The goal of this task is to prepare a detailed Measurement and Verification Plan (M&V Plan) to allow for field evaluation of the SideKick heat recovery system performance.

The Recipient shall:

- Prepare a detailed draft *M&V Plan*, which shall include but not be limited to: 1) Project Overview, 2) Procedure to determine and verify savings, 3) Overview of M&V activities, 4) Baseline conditions, 5) Measurements, 6) Savings calculation, 7) References. The Demonstration M&V Plan will discuss the aspects of the M&V plan.
- Evaluate the plan with the project team, as identified in Attachment 5, for appropriateness of instruments, parameters, operating conditions, duration of measurements, and procedures planned for comparing technical and economic performance.
- Prepare Final *M&V Plan* based on feedback from the CAM.

Products:

- M&V Plan (draft and final)

Exhibit A Scope of Work

TASK 4 Engineering, Design and Procurement

The goal of this task is to generate the demonstration site engineering package and prepare the host site for installation of the SideKick heat recovery system.

The Recipient shall:

- Evaluate facility load demand profiles, prepare system specifications, design the heat recovery system, and procure major equipment.
- Prepare a *Site Design Package* which shall include but is not limited to:
 - Site layout drawings that indicate system integration with existing host facility heating lines, utility connections, and infrastructure; and locations for installation of instrumentation per the M&V Plan.
 - A bill of materials identifying the ancillary equipment (pumps, valves, etc.) and materials (pipe, fittings, etc.) required for the installation.
 - Specifications for the instrumentation that requires installation in order to collect, measure, and analyze specific data per the M&V Plan.
 - Description of any other activities and/or resources required to decommission and remove pre-existing equipment, and support installation of the SideKick heat recovery system.
- Procure the ancillary equipment (pumps, valves, etc.) and materials (pipe, fittings, etc.) required for the installation, through California-based vendors.
- Procure the instrumentation required to satisfy M&V Plan through California-based vendors.
- Prepare a *CPR Report* in accordance with subtask 1.3.
- Participate in CPR Meeting per Task 1.3.

Products:

- Site Design Package (draft and final)
- CPR Report

TASK 5 Installation and Commissioning

The goal of this task is to complete the installation of the SideKick heat recovery system and commission it for continued operation by the demonstration host facility.

The Recipient shall:

- Obtain approved building applications and permits for the installation of the SideKick heat recovery at the host site.
- Remove any pre-existing equipment, if necessary.
- Install the SideKick and any ancillary equipment, electrical conduits, etc., in accordance with the system installation specifications in the Site Design Package per Task 4.
- Commission the SideKick heat recovery system for continued operation by the demonstration host facility, ensuring the primary and ancillary components are operating properly within design specifications.
- Prepare a *Notification Letter on Installation*, which will include, but not be limited to: a summary of the work done in this task and a confirmation the installation has been successfully completed.

Exhibit A Scope of Work

Products:

- Notification Letter on Installation

TASK 6 Performance Monitoring, Evaluation, and Reporting

The goal of this task is to evaluate the system performance of the SideKick heat recovery system over an extended monitoring period at the demonstration host facility, and to gather data and information on the system performance.

The Recipient shall:

- Gather and analyze data on the performance of SideKick heat recovery system as installed at the demonstration host facility over an extended monitoring period in accordance with the M&V Plan.
- Complete independent third-party testing by the selected M&V contractor in accordance with the Demonstration M&V Plan.
- Evaluate the system performance with Agreement Objectives and consider any possible improvements in performance or installation engineering that would be of benefit in future deployments.
- Provide field service and support for the SideKick heat recovery system to ensure satisfactory operation throughout the field demonstration period.
- Prepare a *Project M&V Report*, which includes a discussion of the M&V results, discussion of whether Agreement Objectives, Section II.C were met, and discussion of project performance.
- Prepare a *CPR Report* in accordance with subtask 1.3.
- Participate in CPR per Task 1.3.

Products:

- Project M&V Report (draft and final)
- CPR Report

TASK 7 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 the key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.

Exhibit A Scope of Work

- Greenhouse gas and criteria emissions reductions.
- Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
- Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
- Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

Products:

Exhibit A Scope of Work

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 8 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.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: GAS TECHNOLOGY INSTITUTE

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-15-009 from GFO-15-501 with Institute of Gas Technology dba Gas Technology Institute for a \$585,300 grant to demonstrate an emerging heat recovery technology to be installed and tested in industrial steam boilers. This project will independently document the energy efficiency, energy cost reductions, performance and installation requirements for the heat recovery system. The demonstrations for this project will be conducted in the San Joaquin Valley; 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 March 9, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Tiffani Winter,
Secretariat