

**GRANT REQUEST FORM (GRF)**New Agreement PIR-14-001 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Michael Lozano	51	916-327-1425

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

Title of Project
High Efficiency Indirect-Fired Rotary Dryer with Advanced Heat Pump for Bulk Foods Processing

Term and Amount	Start Date	End Date	Amount
	7/31/2014	3/31/2019	\$ 2,600,000

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

Proposed Business Meeting Date	7/22/2014	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
--------------------------------	-----------	----------------------------------	--

Business Meeting Presenter	Michael Lozano	Time Needed:	5 minutes
----------------------------	----------------	--------------	-----------

Please select one list serve. Research (Energy RDD / PIER program)

**Agenda Item Subject and Description**

Proposed resolution approving Agreement PIR-14-001 with the Gas Technology Institute for a \$2,600,000 grant to demonstrate a high efficiency rotary dryer integrated with heat pump technology to reduce energy consumption for drying of bulk foods or other materials. (PIER natural gas funding) Contact: Michael Lozano

**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":

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: 14 CCR 15301, 15302
 Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:

The project modifies the heat source for an existing rotary dryer and will result in a new, more efficient drying operation in a facility currently zoned for this type of work. The existing tunnel dryers use steam or hot air, which are less efficient. This project will fabricate a new tunnel dryer (looks very similar to current technology) with a new integrated ribbon flame burner system (the heating element). This product line will replace a current product line.

Cal. Code Regs., tit. 14, §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. The project falls within §15301 because the site houses an existing walnut drying operation and the proposed project modifies the heat source for the existing rotary dryer which will not significantly expand the use beyond that already existing.

Cal. Code Regs., tit. 14, §15302 provides that projects which consist of replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced are categorically exempt from the provisions of the California Environmental Quality Act. The project falls within §15302 because the project will replace the existing tunnel dryer and current product line with new, more efficient dryer technology.

- 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)

**GRANT REQUEST FORM (GRF)**

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION



Legal Company Name:	Budget
Tetra Tech, Inc.	\$ 95,000
Bedrosian & Associates	\$ 75,000
Coast Machinery Movers	\$ 1,647,769
GL&V USA Inc.	\$ 297,231
	\$

<b>List all key partners:</b> (attach additional sheets as necessary)
Legal Company Name:

<b>Budget Information</b>			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
NG Subaccount, PIERDD	13-14	501.001H	\$2,600,000
			\$
			\$
			\$
			\$
R&D Program Area:	EERO: IAW	TOTAL:	\$2,600,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

<b>Recipient's Administrator/ Officer</b>				<b>Recipient's Project Manager</b>			
Name:	Kate Kaiser			Name:	Yaroslav Chudnovsky		
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:	- -	Phone:	847-768-0536 /	Fax:	- -
E-Mail:	kate.kaiser@gastechnology.org			E-Mail:	yaroslav.chudnovsky@gastechnology.org		

<b>Selection Process Used</b>	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: PON-13-501
<input type="checkbox"/> First Come First Served Solicitation	

<b>The following items should be attached to this GRF</b>	
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

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

#### I. TASK AND ACRONYM/TERM LISTS

##### A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		Project Administration
2		Contract Execution
3	X	Layout Refinement and System Analysis
4		Design and Engineering
5		Demonstration and Data Collection Plan Development
6		Fabrication and Purchasing of the System Components
7		Assembly, Procurement and Installation
8		Startup, Shakedown, Data Collection, Processing and Analysis
9		Evaluation of Project Benefits
10		Technology/Knowledge Transfer Activities

##### B. Acronym/Term List

Acronym/Term	Meaning
ASME	American Society of Mechanical Engineers
BFE	Binary Fluid Ejector
BOM	Bill of Materials
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CFD	Computational Fluid Dynamics
CPR	Critical Project Review
FTA	Field Test Agreement
GTI	Gas Technology Institute
GFDD	Gas-Fired Drum Drying
GFRD	Gas-Fired Rotary Dryer
HP	Heat Pump
IAW	Industrial, Agricultural and Water
M&V	Measurement and Verification
MRT	May-Ruben Technologies

<sup>1</sup> Please see subtask 1.3 in Part III of the Scope of Work (Project Administration) for a description of Critical Project Review (CPR) Meetings.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

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

### A. Purpose of Agreement

The purpose of this Agreement is to fund the development and demonstration of an integrated high-efficiency indirect-fired rotary dryer with advanced heat pump for bulk foods processing at a participating California food processing host site.

### B. Problem/ Solution Statement

#### **Problem**

In California, dried and dehydrated fruits/vegetables processing consumes over 6.2 TBtu per year (Report No. GRI-03/0075). Beyond the traditional low-efficient tunnel dryers, the drying processes use conventional metal cylinders, which are heated from the inside by condensing steam or direct-fired air heating. Additionally, drum drying or drum heating is used in a variety of other industrial processes such as pharmaceuticals, chemicals, and textiles. The use of steam requires the drums to meet American Society of Mechanical Engineers (ASME) codes for pressure vessels, which limits the steam pressure and consequently, the shell temperature that reduces their drying capacity. Direct-fired heating is limited by food safety requirements due to direct contact of the combustion product with the processed foods. In most cases, drying is the most energy-intensive and temperature-critical aspect of food, chemical and pharmaceutical products processing.

#### **Solution**

The recipient has developed an innovative high-efficiency Gas-Fired Drum Drying (GFDD) concept based on combination of ribbon flame and advanced heat transfer enhancement technique (US Patent 6,877,979). The concept has been successfully proven in pilot-scale production environment for paper drying and onion powder toasting applications where heat is supplied from the inside of the drum while dried product is applied from the outside. It is proposed to develop and demonstrate a high efficient and low-emission Gas-Fired Rotary Dryer (GFRD) for bulk foods processing in California-based Industrial, Agricultural and Water (IAW ) applications. The recipient together with its partners and Sponsors have already invested over \$2,000,000 in successful development of the GFDD technology to work out the key components of the combustion system, drum drive, and measurement controls. The proposed system will be developed per selected California food processor's specification and field demonstrated in a production environment. The GFRD will be integrated with advanced Heat Pump (HP) technology based on Binary Fluid Ejector (BFE). Significant investment has been made by May-Ruben Technologies (MRT) for the working fluids properties selection and optimization of BFE heat pump. The BFE heat pump technology has been successfully proven via Computational Fluid Dynamics (CFD) modeling and in laboratory-scale controlled environment. An industry acceptable scale of the demonstration will be

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

determined in the course of the project jointly with the participating host site. Successful development and demonstration of the GFRD/HP technology, followed by technology transfer, commercialization, and marketing activities will result in significant energy savings for the State's IAW industrial market.

#### C. Goals and Objectives of the Agreement

##### Agreement Goals

The goal of this Agreement is to demonstrate and bring to the California market, a natural gas-fired drying technology that provides both cost and environmental benefits in a broad range of agricultural and industrial applications. The proposed effort is targeted to develop and demonstrate an advanced high efficient drying technology that integrates the recipient's patented gas-fired rotary dryer with an innovative heat pump technology.

##### Agreement Objectives

The major objectives of this Agreement are to:

- Improve energy efficiency of bulk foods drying operations by over 75% and reduce natural gas consumption for the same throughput by at least 60%
- Reduce primary energy consumption by 10-15%
- Prove the cost-effective feasibility of gas fired rotary dryer with advanced heat pump technology into IAW industrial drying operations
- Prove the benefits and facilitate the transformation of the drying market through demonstration

### III. TASK 1 PROJECT ADMINISTRATION

#### **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

- 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

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- **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.

#### 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);

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

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

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

#### 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

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

## 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 research 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 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.

#### 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- 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 Product:

- Style Manual

#### 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)

## 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

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 reimbursable under this Agreement. 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

#### 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- 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 research direction. The guidance may include research scope and methodologies, timing, and coordination with other research. 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 research (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 project research 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 research 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;

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

#### 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.

#### TASK 2 CONTRACT EXECUTION

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

#### Subtask 2.1 Execute a Contract with the Selected Demonstration Site

##### The Recipient shall:

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

##### Products:

- Contract with the Demonstration Site

#### Subtask 2.2 Execute 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- If the selected M&V contractor becomes unavailable during the project term, the Recipient shall work with the CAM to select a new M&V contractor.
- Execute a *Contract with the M&V Contractor* to secure the contractor's services during the project term and confirm the contractor will follow M&V protocol and prepare the detailed analytical report.

#### Products:

- Contract with the M&V Contractor
- M&V Analytical Report

### TASK 3 LAYOUT REFINEMENT AND SYSTEM ANALYSIS

The goal of this task is to refine the proposed system layout per host site specification. The scale of the demonstration system, drum-pump integration approach and draft control scheme will be developed in this task.

#### The Recipient shall:

- Obtain the application and product specification from the participating host site and prepare an *Application Memo Report* that describes the drying process curve for the selected product.
- Refine the demonstration system layout and decide on its scale and prepare a *Schematic of the System Layout*
- Develop the integration approach and control scheme
- Perform system analysis and preliminary benefits estimate and provide a *System Analysis and Benefits Memo Report* that describes the analysis and benefits
- Participate in a CPR meeting and prepare a *CPR Report* consistent with Task 1.3.

#### Products:

- Application Memo Report
- Copy of Schematic of the System Layout
- System Analysis and Benefits Memo Report
- CPR Report (draft and final)

### TASK 4 DESIGN AND ENGINEERING

The goal of this task is to design and engineer the GFRD/HP system per refined layout. The preliminary manufacturing review of critical components will be undertaken under this task.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

#### The Recipient shall:

- Design the critical components of the GFRD/HP system per drying system layout refined in Task 3 for manufacturing review
- Perform detailed engineering of the GFRD/HP system critical components for host site review and approval
- Complete design drawings and Bill of Materials (BOM) of the GFRD/HP system
- Develop control and measurement diagram of the demonstration and data collection
- Perform field engineering and assess demonstration system installation requirements
- Prepare a *Design and Engineering Report* that includes a summary of the design and engineering requirements for the GFRD/HP system, to include, but not be limited to, final design requirements, list of critical components, bill of materials, data collection requirements, and assessment of the demonstration system installation requirements.

#### Products:

- Design and Engineering Report

#### TASK 5 DEMONSTRATION AND DATA COLLECTION PLAN DEVELOPMENT

The goal of this task is to develop the plan and matrix for the startup, shakedown and data collection of the GFRD/HP system. The field test agreement between project partners that will participate in the demonstration will be executed during this task.

#### The Recipient shall:

- Prepare a *draft GFRD/HP System Operating Procedures and Protocols* that discusses the system startup, drying process and shut down procedures to ensure a safety of operation during the system demonstration and data collection
- Develop and prepare a *data collection plan and matrix* jointly with the host site and industrial partners, prepare the list of measured and controlled parameters with the host site and industrial partners
- Execute Field Test Agreement (FTA) between the GFRD/HP demonstration and data collection participants

#### Products:

- Draft GFRD/HP System Operating Procedures and Protocols
- Copy of data collection plan and matrix
- Copy of field test agreement(s)

#### TASK 6 FABRICATION AND PURCHASING OF THE SYSTEM COMPONENTS

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

The goal of this task is to place the fabrication and purchasing orders for the GFRD/HP system components with selected vendors. The fabricated and purchased components of the demonstration system will be delivered directly to the host site for preliminary assembling followed by the system installation.

#### The Recipient shall:

- Prepare a list of vendors and develop specifications for the necessary components to be purchased including motor drives, blowers, piping, product handling the industrial controls and measurement sensors; obtain quotes and bids for final vendor selection
- Execute the purchase and fabrication orders with the pre-qualified vendors per drawings and BOMs developed in Task 4
- Take pictures of the key GFRD/HP system components delivered to the host site

#### Products:

- List of vendors and component specifications
- Pictures of the key GFRD/HP system components

### TASK 7 ASSEMBLY, PROCUREMENT AND INSTALLATION

The goal of this task is to assemble the fabricated and purchased components and install the GFRD/HP system for startup and shakedown. The procurement and installation will be performed by a qualified millrights contractor approved by the host site.

#### The Recipient shall:

- Provide the technical and administrative support to the host site's approved installation contractor, and efficiently and timely resolve issues that may occur during the assembling process or system installation
- With concurrence from the host site, prepare the *Final GFRD/HP System Operating Procedures and Required Protocols* document which will include information on system startup, drying process and shut down to ensure safety of operation during the system demonstration and data collection
- Take pictures of the GFRD/HP system installation

#### Products:

- Pictures of the GFRD/HP system installed
- Final GFRD/HP System Operating Procedures and Required Protocols

### TASK 8 STARTUP, SHAKEDOWN, DATA COLLECTION AND ANALYSIS

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

The goal of this task is to startup/shut down and shakedown the system per operating procedures and protocols developed in Task 5 to ensure safe system operation and performance.

#### The Recipient shall:

- Start up and shut down the GFRD/HP system per approved operating procedures and protocols (function check with no drying product charged)
- Adjust the system parameters (operating and minor design), if necessary
- Perform data collection per approved plan and matrix (Task 5)
- Collect the GFRD/HP system performance data for the follow on analysis and benefits evaluation
- Prepare a *Data Collection Summary Report* that includes the methodology and procedures for data collection, evaluation of the results of the collected data and the preliminary analysis of the technical and economic benefits of the GFRD/HP system
- Prepare an *M&V Report* that provides the analytical details of the M&V activity and verifies energy consumption and engineering calculations for energy and cost savings

#### Products:

- Data Collection Summary Report
- M&V Report

## TASK 9 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:
  - For Product Development Projects and Project Demonstrations:
    - Published documents, including date, title, and periodical name.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- 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.
- 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 research 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 research.
  - Published documents, including date, title, and periodical name.
  - A discussion of policy development. State if the research 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 information and research have 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 research.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- A discussion of research 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
- Final Meeting Benefits Questionnaire

#### TASK 10 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 research. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses research 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 research 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 research 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.

# ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS

## Exhibit A

### SCOPE OF WORK

PIR-14-001, Gas Technology Institute

- 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)
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

## V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.