

**GRANT REQUEST FORM (GRF)**

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION

New Agreement PIR-14-022 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Kevin Uy	43	916-327-1533

Recipient's Legal Name	Federal ID Number
Biogas Energy Inc.	20-4461752

Title of Project
Improvements to biogas production using micronutrients, operational methodologies, and biogas processing equipment to enable pipeline injection of biomethane

Term and Amount	Start Date	End Date	Amount
	6/30/2015	11/17/2017	\$ 415,000

Business Meeting Information
<input type="checkbox"/> ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	6/10/2015	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Kevin Uy	Time Needed:	5 minutes

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

Agenda Item Subject and Description
BIOGAS ENERGY INC. Proposed resolution approving Agreement PIR-14-022 with Biogas Energy Inc. for a \$415,000 grant to fund research into food waste anaerobic digester operations, feedstock, and micronutrient management to optimize biogas production and to perform a feasibility study for pipeline injection of biomethane. (PIER natural gas funding) Contact: Kevin Uy. (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

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 and 15306  
 Common Sense Exemption. 14 CCR 15061 (b) (3)  
 Explain reason why Agreement is exempt under the above section:

Cal. Code Regs., tit. 14, sect. 15301 provides that projects consisting 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 will research food waste anaerobic digesters by conducting bench- and commercial-scale testing at a laboratory facility and a commercial food waste digester. Both digester facilities already exist and the research to be conducted will not significantly disturb the environment. This project may involve minimal construction activity at the laboratory facility including minor alterations to interior partitions, plumbing, ventilation, or electrical conveyances, and no construction will occur at the commercial food waste digester. This project will not create any additional noise, above and beyond what is typical to existing operation. This project will not increase regional traffic, and no traffic will be disrupted during operation of the project. No building expansion is planned.

Cal. Code Regs, tit. 14, sect. 15306 provides that projects consisting of basic data collection, research, and resource evaluation activities, which do not result in a serious or major disturbance to an environmental resource, are categorically exempt. The work to be performed consists of basic data collection, research, and analysis. The purpose of these demonstrations is to gather data and evaluate performance in order to achieve greater efficiency for future food waste digester operations.

b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)  
 Check all that apply

**GRANT REQUEST FORM (GRF)**



- |   |   |
|---|---|
| <input type="checkbox"/> Initial Study                  | <input type="checkbox"/> Environmental Impact Report            |
| <input type="checkbox"/> Negative Declaration           | <input type="checkbox"/> Statement of Overriding Considerations |
| <input type="checkbox"/> Mitigated Negative Declaration |   |

List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)	
Legal Company Name:	Budget
CytoCulture International, Inc	\$ 165,000
North State Rendering Co. Inc	\$ 72,000 (Match)
Springboard Biodiesel LLC	\$ 40,000 (Match)
	\$
	\$

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

Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
NG Subaccount, PIERDD	14-15	501.0011	\$415,000
			\$
			\$
			\$
			\$
			\$
R&D Program Area:	EGRO: Renewables		TOTAL: \$415,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer		Recipient's Project Manager		
Name:	Brian Gannon	Name:	Brian Gannon	
Address:	1501 Poplar Ave	Address:	1501 Poplar Ave	
City, State, Zip:	Richmond, CA 94805-1662	City, State, Zip:	Richmond, CA 94805-1662	
Phone:	510-200-3609 /	Fax:	815-301-3432	
E-Mail:	bgannon@biogas-energy.com		E-Mail:	bgannon@biogas-energy.com

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: PON-14-505
<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 type="checkbox"/> N/A <input checked="" type="checkbox"/> Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date
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## Exhibit A Scope of Work

### A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		General Project Tasks
2		Confirm Site Availability
3	X	Feedstock Testing, and Optimization of Commercial Scale Plant Operations (Lab Testing and Site Demonstration)
4		Biomethane Pipeline Injection Best Practices Manual
5		Evaluation of Project Benefits
6		Knowledge Transfer Activities

### B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
EU ISO	European Union International Organization of Standards
TAC	Technical Advisory Committee

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

### A. Purpose of Agreement

The purpose of this Agreement is to fund research into anaerobic digestion operations, feedstock, and micronutrient management with the intent of optimizing biogas production and revenue at a food waste digester facility; and to create a best practices manual for pipeline injection of biomethane at a food waste digester facility.

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

# Exhibit A

## Scope of Work

### B. Problem/ Solution Statement

#### **Problem**

California's biogas plants are not achieving targeted operations, much less optimized outputs. A dearth of research and knowledge of biogas feedstock and micronutrient management is hindering the ability of the industry to address the demand for waste-to-energy conversion. Data from Germany is proving un-portable to California, and small-scale studies have lacked the scope of a commercial-scale data source. As California shifts to organics diversion from landfill, this lack of data will stymie attempts to grow a biogas industry that meets the state's renewable energy targets.

Injection of biomethane into gas pipelines is a new challenge for all stakeholders: The California Public Utility Commission recently published biomethane pipeline standards in January 2014 for landfill, dairy and wastewater treatment gas. Utilities, project developers and regulators must now become familiar with the standards and develop processes to implement them to achieve market adoption. There is an immediate need to develop independent understanding and experience with the gas interconnection process so all stakeholders can expedite safe, cost-effective biomethane pipeline injection.

#### **Solution**

This project will combine real-world operations with laboratory investigation to generate a best practices biogas optimization protocol for California's food waste digesters. A resource manual will be published to the biogas industry outlining feedstock management and micronutrient dosing in order to enable biogas production optimization. Regardless of the anaerobic digestion technology applied, feedstock and micronutrient management are critical knowledge points that must be managed for a successful project.

An additional document will be produced with an analysis of the feasibility of the pipeline interconnection process, best practices, technology options, and recommendations for policy implementation. By documenting and standardizing the pipeline injection application process, this project will expedite and facilitate future biomethane injection projects, and achieve significant cost and time savings.

### C. Goals and Objectives of the Agreement

#### **Agreement Goals**

The goals of this Agreement are to:

- Codify effective biogas production best practices to help digester projects maximize revenue
- Create a knowledge base of feedstock analysis and micronutrient management for optimized biogas production
- Discover and share information on the gas injection application process with utilities, project developers, and regulators

#### **Ratepayer Benefits:**

This Agreement will result in the ratepayer benefit of economic and environmental improvements for biogas production by identifying optimization techniques for existing and planned biogas facilities throughout California. Economic benefits include increased biogas production per unit of feedstock, improved quality of biogas production, and lowering cost for biogas production facility construction. Environmental benefits include increase in biogas

## **Exhibit A Scope of Work**

capture, increased diversion of waste from landfill, and contribution to reduction of fossil fuel use in the state. The project will research the feasibility of biomethane pipeline injection to enable development of more projects like it and ultimately contribute to the reduction of greenhouse gas emissions in our state.

### **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 investigating and documenting optimization best practices for biogas production facilities, and by documenting the path for injecting biomethane into pipelines owned by public utilities. The optimization of biogas production will maximize revenue for projects throughout the state and capture the greatest amount of greenhouse gas emissions from the process. The testing of feedstock for nutrient management, loading rates, temperature settings, and other variables will generate a document that will be published for the biogas industry in California in order to share knowledge and enable other biogas projects to benefit from the research.

### **Agreement Objectives**

The objectives of this Agreement are to:

- Improve the production of biogas through feedstock and micronutrient management along with general good digester operation practices
- Create a best practices manual for feedstock and micronutrient management for biogas plant operators
- Create a best practices manual for the feasibility of biomethane-to-pipeline injection.

# Exhibit A

## Scope of Work

### II. 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

- 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:

## Exhibit A Scope of Work

- 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+). 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);
- Match fund documentation (subtask 1.7);

## **Exhibit A Scope of Work**

- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
  - An updated Project Schedule;
  - Technical products (subtask 1.1);
  - Progress reports and invoices (subtask 1.5);
  - Final Report (subtask 1.6);
  - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
  - Any other relevant topics.
- 
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, as needed to reflect any changes in the documents.

### **The CAM shall:**

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

### **Recipient Products:**

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

### **CAM Product:**

- Kick-off Meeting Agenda

### **Subtask 1.3 Critical Project Review (CPR) Meetings**

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

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

### **The Recipient shall:**

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.

## Exhibit A Scope of Work

- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

### The CAM shall:

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

### Recipient Products:

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

### CAM Products:

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

### Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

### The Recipient shall:

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

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
  - Disposition of any state-owned equipment.
  - Need to file a Uniform Commercial Code Financing Statement (Form

## Exhibit A Scope of Work

UCC-1) regarding the Energy Commission's interest in patented technology.

- The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
  - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- 
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
  - Prepare a *Schedule for Completing Agreement Closeout Activities*.
  - Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

### Products:

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

## REPORTS AND INVOICES

### Subtask 1.5 Progress Reports and Invoices

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

#### The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize 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

## **Exhibit A Scope of Work**

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.
- 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

## Exhibit A Scope of Work

Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
  - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
  - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
  - A copy of a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

### Products:

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

### Subtask 1.8 Permits

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

### The Recipient shall:

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

## **Exhibit A Scope of Work**

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

### **Products:**

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

### **Subtask 1.9 Subcontracts**

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

### **The Recipient shall:**

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

### **Products:**

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

## **TECHNICAL ADVISORY COMMITTEE**

### **Subtask 1.10 Technical Advisory Committee (TAC)**

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

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:

## **Exhibit A Scope of Work**

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

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

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

### **The Recipient shall:**

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

### **Products:**

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

### **Subtask 1.11 TAC Meetings**

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

## **Exhibit A**

### **Scope of Work**

#### **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

## **Exhibit A Scope of Work**

### **III. TECHNICAL TASKS**

#### **TASK 2 Confirm Site Availability**

The goals of this task are to: (1) confirm the availability of the project sites; and (2) execute any agreements necessary to secure the sites.

##### **The Recipient shall:**

- Reach agreement with the manager(s) of the selected sites regarding the project timeline, space reserved for the project, and scope of the project activities. The sites identified for Task 3 work as of the commencement date of this grant are:
  - Site 1: California State University, Chico, 400 West 1st Street, Chico, CA, 95929 for laboratory testing on pilot-scale digester.
  - Site 2: North State Rendering, 15 Shippee Road, Oroville, CA, 95965 for site demonstration on commercial-scale digester.
- For any changes in site location, Recipient must check with its CAM or CAO who will provide guidance regarding the level of Energy Commission approval required.
- Prepare a *Site Readiness Verification Document* which confirms site availability at the lab and demonstration sites.

##### **Products:**

- Site Readiness Verification Document

#### **TASK 3 Feedstock Testing, and Optimization of Commercial Scale Plant Operations (Lab Testing and Site Demonstration)**

The goals of this task are to test and document the effects of feedstock variability and micronutrient management on biogas production, and to test and document methodologies for biogas plant optimization. The lessons learned in laboratory testing on the pilot-scale digester will be applied to demonstration site testing on the commercial-scale digester. Recipient shall perform tests using the pilot-scale digester (in the lab) and on the commercial-scale digester (at the demonstration site) in each of tasks 3.2, 3.3 and 3.4.

##### **Subtask 3.1 Develop Measurement and Verification Plan**

The goal of this subtask is to develop a detailed Measurement and Verification plan for each site.

##### **The Recipient shall:**

- Develop a detailed *Measurement and Verification Plan* for each site to include but not be limited to:
  - A description of the monitoring equipment and instrumentation which will be used at each site.
  - A description of the key input parameters and output metrics which will be measured.
  - A description of the analysis methods to be employed.

##### **Products:**

- Measurement and Verification Plan (draft and final)

## Exhibit A Scope of Work

### **Subtask 3.2 Feedstock Analysis on Pilot Scale Bioreactor and Commercial Scale Digester:**

The goals of this subtask are to modify, deploy and operate pilot scale bioreactor, operate, maintain and troubleshoot commercial digester facility and document protocols and results for report to the Energy Commission.

#### **The Recipient shall:**

- Perform lab tests of multiple feedstock samples on a 250 Liter pilot scale digester (total 12 months operation of pilot-scale digester or shorter period as approved in writing by the CAM)
  - Develop a *Feedstock Analysis Test Plan* for comparing feedstock and organic loading rates at a pilot-scale: Assess at least four types of commercially available regional feedstock including rendering grease, crop residue, food waste, glycerin.
  - Define all testing protocols and parameters
  - Perform wet chemistry analysis to monitor parameters including but not be limited to sample pH, bicarbonate levels, volatile solids/biogas, suspended solids
  - Test different feedstock loading rates while monitoring parameters
  - Run tests at analytical chemistry lab on biogas samples to measure concentrations of volatile fatty acids, hydrogen, carbon dioxide and methane
  - Generate a *Feedstock Analysis Report-Pilot Scale*, to include but not be limited to:
    - Compiled data for feedstock analysis and biogas production data with chemistry and microbiology data to provide 'Best Practices' recommendations for other commercial and agricultural feedstock plants.
- Apply feedstock lab test results to commercial-scale digester (total 4 months operation of commercial-scale digester or shorter period as approved in writing by the CAM)
  - Document protocols and data collected; establish optimization strategy
  - Conduct a full scale analysis and propose recommendations based on test results
  - Generate a *Feedstock Implementation Report-Commercial Scale*, to include but not be limited to:
    - Historical record of feedstock type and description
    - Record of biogas production rates associated with feedstocks
    - Reconciliation of findings of nutrient testing with biogas production rates
- Perform daily tasks for commercial-scale digester operation (total 16 months operation of commercial-scale digester or shorter period as approved in writing by the CAM)
  - Follow operational instructions for all aspects of digester facility
  - Troubleshoot and remedy digester operations as needed
  - Monitor alarms, alerts, and production parameters of digester facility
  - Provide summary of results of digester operation into the monthly progress reports corresponding to the period of operation
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting in accordance with subtask 1.3 (CPR Meetings)

#### **Products:**

- Feedstock Analysis Test Plan
- Feedstock Analysis Report-Pilot Scale (Draft and Final)
- Feedstock Implementation Report-Commercial Scale (Draft and Final)

## Exhibit A Scope of Work

- CPR Report (Draft and Final)

### Subtask 3.3 Digester Nutrient Analysis

The goals of the subtask are to test and document nutrient management protocols

#### The Recipient shall:

- Obtain digester samples from the pilot-scale digester (site 1) and commercial-scale digester (site 2).
- Test digester (pilot and commercial scale) samples for macro and micronutrients . (total 12 months of testing on pilot- and commercial-scale digesters or shorter period as approved in writing by the CAM)
  - Analytical chemistry of suspended culture for most critical parameters; develop *Nutrient Test Plan* for analysis of suite of macro and micronutrients defining all testing protocols and parameters
  - General chemistry COD (Chemical Oxygen Demand), pH, alkalinity
  - Volatile fatty acids: acetic, propionic, butyric, iso-butyric
  - Macronutrients Nitrogen, Phosphate, Magnesium Oxide, Ammonium; Carbon:Nitrogen ratio
  - Micronutrients nickel, cobalt, manganese, molybdenum, boron, copper, zinc, selenium by European Union International Standards Organization method 11885 or equivalent standard<sup>2</sup>
- Generate *Nutrient Analysis Report*, to include but not be limited to:
  - Symptoms and known problems associated with nutrient and micronutrient deficiencies; and compiled data for nutrient and micronutrient levels associated with the four test feedstock materials at the pilot scale and effects of dosing specific nutrients at the full scale system
  - Recommended 'Best Practices' for other Agricultural feedstock plants

#### Products:

- Nutrient Test Plan
- Nutrient Analysis Report (Draft and Final)

### Subtask 3.4 Micronutrient Digester Dosing and Analysis

The goal of this subtask is to analyze and document results of digester dosing and micronutrient tests

#### The Recipient shall:

- Perform plant operations optimization testing (total 12 months of testing on pilot- and commercial-scale digesters or shorter period as approved in writing by the CAM)
  - Create and maintain baseline data points for reference
  - Establish a *Micronutrient Analysis Test Plan* for monitoring performance, defining all testing protocols and parameters
  - Document methods of optimization attempted and results
  - Monitor biogas quality and flow rates vs. organic loading rates
    - Biomethane concentration and ratio of methane and carbon dioxide
    - Hydrogen Sulfide levels and recommended control with Ferric chloride

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<sup>2</sup> [https://www.ecn.nl/docs/society/horizontal/hor19\\_ICP.pdf](https://www.ecn.nl/docs/society/horizontal/hor19_ICP.pdf)

## **Exhibit A Scope of Work**

- Dose micronutrients into digester to achieve target results (total 12 months of testing on pilot- and commercial-scale digesters or shorter period as approved in writing by the CAM)
  - Document nutrient dosing protocols developed and biogas data collected
  - Confirm changes in nutrient levels by chemical analysis
  - Compile analytical data and recommendations based on results
  - Generate *Micronutrient Implementation Report*, to include but not be limited to:
    - Assimilated data cross referencing micronutrient dosing, levels in digester, and biogas production rates
    - Comparison of multiple dosing scenarios on process stability and biogas production rates
  -

### **Products:**

- Micronutrient Analysis Test Plan
- Micronutrient Implementation Report (Draft and Final)

### **Subtask 3.5 Food Waste Digester Best Practices Manual**

The goal of this task is to utilize the results of Subtasks 3.2, 3.3, and 3.4 to create a best practices manual for food waste digester operation to optimize biomethane production.

### **The Recipient Shall:**

- Compile results and lessons learned from feedstock analysis testing (Subtask 3.2), nutrient analysis testing (Subtask 3.3) and micronutrient analysis testing (Subtask 3.4).
- Generate a *Food Waste Digester Best Practices Manual*, to include but not be limited to:
  - Summary of operating conditions and procedures for optimizing biomethane production including feedstock analysis, nutrient analysis and tracking key monitoring parameters through the course of the one year study; and
  - A primer on optimizing biogas production from diverse agricultural feedstock materials

### **Products:**

- Food Waste Digester Best Practices Manual (Draft and Final)

### **TASK 4 Biomethane Pipeline Injection Best Practices Manual**

The goal of this task is to research the feasibility of injecting biomethane into natural gas pipelines in order to develop a protocol and best practices manual for digester facility owners and operators. This task does not involve the actual application process for pipeline injection for any particular digester facility, but provides technical and financial guidance for the digester industry.

### **The Recipient shall:**

- Research the biomethane-to-pipeline application process for injecting biomethane to Pacific Gas and Electric Company natural gas pipelines.
- Document all requirements, standards, specifications, equipment, energy consumption, threats and obstacles to implementation of biomethane-to-pipeline injection.
- Compile the required data from Task 3 which will be used to inform the feasibility analysis.

## Exhibit A Scope of Work

- Analyze and assess the feasibility of biomethane-to-pipeline injection at a digester facility. Generate a *Biomethane Pipeline Injection Best Practices Manual* to include but not be limited to:
  - Summary of symptoms and known problems associated with biomethane-to-pipeline injection;
  - Data and requirements for biomethane-to-pipeline injection, including pipeline gas specifications, safety equipment, testing equipment/protocols and any other mandated technology or methods required by the utility
  - List of incentives, tax implications, and sources of funding for pipeline injection
  - List of options for pipeline-injection gas including marketing potential, current buyers, and market trend forecasts
  - List of technology providers for biogas cleaning systems, including descriptions of technology, operating costs, and installed base
  - Methods for digester owners and operators to use to determine the feasibility of biomethane-to-pipeline injection at their site.
  - Recommendations for policies and structures for the advancement of biomethane-to-pipeline injection.
  - Recommendations for 'Best Practices' for future projects and stakeholders
  - Financial model to apply to biogas-to-pipeline projects including interconnection costs and operating costs

### Products:

- Biomethane Pipeline Injection Best Practices Manual (Draft and Final)

### TASK 5 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.
    - Estimated or actual natural gas, 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.

## **Exhibit A Scope of Work**

- 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 has resulted in other non-energy benefits.
  - An estimate of energy and non-energy benefits.
  - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
  - A discussion of project product downloads from websites, and publications in technical journals.
  - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

### **Products:**

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

## **Exhibit A Scope of Work**

### **TASK 6 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)

## **Exhibit A Scope of Work**

### **IV. PROJECT SCHEDULE**

Please see attached spreadsheet

STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: BIOGAS ENERGY INC.

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

**RESOLVED**, that the Energy Commission approves Agreement PIR-14-022 from PON-14-505 with **Biogas Energy Inc.** for a **\$415,000** grant to fund research for food waste anaerobic digester operations, feedstock, and micronutrient management to optimize biogas production and to perform a feasibility study for pipeline injection of biomethane; and

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

**CERTIFICATION**

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on June 10, 2015.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

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Harriet Kallemeyn,  
Secretariat