

GRANT REQUEST FORM (GRF)New Agreement EPC-14-034 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Abolghasem Edalati	43	916-327-1499

Recipient's Legal Name	Federal ID Number
Interra Energy, Inc.	90-0716067

Title of Project
Interra Reciprocating Reactor for Low-Cost & Carbon Negative Bioenergy

Term and Amount	Start Date	End Date	Amount
	5/15/2015	3/29/2019	\$ 2,000,000

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

Proposed Business Meeting Date	4/8/2015	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Abolghasem Edalati	Time Needed:	5 minutes

Please select one list serve. Select

Agenda Item Subject and Description

Possible approval of proposed resolution approving agreement EPC-14-034 with Interra Energy, Inc. for a \$2,000,000.00 grant to fund the research, installation, and pilot-scale demonstration of an advanced modular bioenergy technology developed by Interra Energy. The first phase of the project involves design, test plan development, R&D activities, and minor physical upgrades on an existing reactor. After consideration of the first phase results, the Energy Commission may approve the second phase, which will include installation and pilot-scale demonstration of the technology. (EPIC Funding) Contact: Ghasem Edalati

California Environmental Quality Act (CEQA) Compliance

- Is Agreement considered a "Project" under CEQA?
 - Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)): Explain why Agreement is not considered a "Project": Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because
- If Agreement is considered a "Project" under CEQA:
 - a) Agreement **IS** exempt. (Attach draft NOE)
 - Statutory Exemption. List PRC and/or CCR section number: _____
 - Categorical Exemption. List CCR section number: 14 CCR 15303 "New Construction or Conversion of Small Structures"
14 CCR 15306 "Information Collection"
 - Common Sense Exemption. 14 CCR 15061 (b) (3)
Explain reason why Agreement is exempt under the above section:
The activities funded under this agreement include design, test plan development, other R&D activities, and modifying the existing bioenergy technology. There will be installation of an upgraded reactor heat exchange wall to the existing technology. This project will not have a significant effect on the environment because the modifications are minor and consist of conversion of an existing small structure, and the research and development activities consist of basic research and data collection activities that do not result in a major disturbance to an environmental resource.
 - b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
Check all that apply
 - Initial Study
 - Negative Declaration
 - Mitigated Negative Declaration
 - Environmental Impact Report
 - Statement of Overriding Considerations

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

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION



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

Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	13-14	301.001A	\$2,000,000
			\$
			\$
			\$
			\$
			\$
R&D Program Area: EGRO: Renewables		TOTAL:	\$2,000,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer		Recipient's Project Manager	
Name:	Kenny Key	Name:	Thomas Del Monte
Address:	6456 OSLER ST	Address:	6456 OSLER ST
City, State, Zip:	SAN DIEGO, CA 92111-5412	City, State, Zip:	SAN DIEGO, CA 92111-5412
Phone:	925-642-9028 /	Fax:	- -
E-Mail:	kenny@interraenergy.us	E-Mail:	thomas@interraenergy.us

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: PON-14-303
<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 ¹	Task Name
1		General Project Tasks
2		Equipment Integration & Fabrication
3	X	Applied R&D
4		Performance Enhancement Experiments
5		Site Preparation
6		Pilot-Scale Demonstration
7	X	Demonstrate Air Emissions Profile
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities
10		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
DG	Distributed Generation
Energy Commission	California Energy Commission
ICE	Internal Combustion Engine
MW	Megawatt
SCAQMD	South Coast Air Quality Management District
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 the installation and pilot-scale demonstration of an advanced modular bioenergy technology developed by Recipient. The pilot-scale demonstration will help determine if the performance of the Recipient's technology along with biomass co-product value creation enhancement strategy is sufficiently powerful to overcome the affordability burdens that currently block the feasibility of distributed generation (DG) bioenergy projects in California.

B. Problem/ Solution Statement

Problem

This project seeks to address the affordability gap currently precluding sub-20 megawatt (MW) distributed power bioenergy systems in California. The affordability gap is affected by a confluence of three interrelated economic and technical forces. The first force is a backdrop to

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

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the rest and stems from the fact that ratepayers or, more precisely, the institutions that protect them, insist that the energy ratepayers purchase be reasonably priced. This force sets a price ceiling on the sale of bioenergy. The second force relates to the insistence by the majority of traditional private funding sources that biomass-to-energy projects employ low-risk technologies such as anaerobic digestion, traditional combustion, traditional gasification, or traditional pyrolysis. Unfortunately, history has demonstrated that these available low-risk technologies offer particularly unattractive returns at small scales. Due to this economic reality, traditional private funding sources primarily fund only large scale projects that limit achievement of California's policy goals related to the development of widespread distributed bioenergy. It is important to add that large biomass projects compound the difficulties of expanding distributed bioenergy projects due to each large project's regional monopolization of the finite biomass resources. The third force, further compounding the previous economic based problems, is that the available low-risk technologies are considered, by performance standards, very mature. From a performance standpoint, the more mature a technology is the less impact innovation can have on advancing the technology and the higher the cost per incremental gain. Thus, investment made to improve the traditional technologies are relatively more costly and result in only small incremental gains in performance. These three forces cause an affordability gap that precludes the development of sub-20MW distributed power bioenergy systems in California.

Solution

This Agreement would provide the development support necessary to bring an advanced bioenergy technology solution to the point where technology can show economic feasibility. So long as there is a need for cleaner energy generation, water purification, food production, and reducing emissions to address climate change, bioenergy and biochar co-production seem to have a secure future.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Determine the performance of the bioenergy technology including its ability to handle increased volume of feedstock while maintaining acceptable fuel gas quality.
- Demonstrate technology mobility & evaluate further modularly designed enhancements
- Evaluate performance enhancement upgrades
- Demonstrate ability to meet South Coast Air Quality Management District (SCAQMD) Rule 1110.2 with the fuel gases created by Recipient's reactor (Emissions from Gaseous and Liquid Fueled Engines)

Ratepayer Benefits:² This Agreement will result in the ratepayer benefit of lower electricity costs due to the ability of the co-produced bioenergy/biochar to internally cross-subsidize the ratepayer electricity purchase price. In addition, the technology does not require expensive gas upgrading equipment, which will further reduce the cost of distributed bioenergy to ratepayers. Further, the Agreement will result in the ratepayer benefit of greater reliability as the technology

² California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

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is designed to provide baseload generation to help balance the load from the integration of intermittent technologies.

Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by facilitating the ability to provide a technology and business model to potential project developers that can be deployed profitably in the small-scale DG biomass project industry.

Agreement Objectives

The objectives of this Agreement are to:

- Determine the performance of the bioenergy technology including the upper bounds of the system's throughput rate while maintaining the minimum bioenergy fuel gas quality for power generation
- Demonstrate the bioenergy technology at the pilot-scale and determine at least two potential design changes to enhance modularity of future Recipient systems.
- Implement and evaluate the proposed system performance enhancements. Compare the top most favorable operational condition permutations based on results of tests.
- Determine the most appropriate power generation technology options based upon both quantitative and qualitative data collected .Demonstrate the ability to operate a small-scale power generation unit using Recipient's biomass fuel gas. Collect and analyze the power generator flue gas emissions and use the data to develop a plan to ensure compliance with California's air emission regulations.

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

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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:

- Data sets will be in MS Access or MS Excel file format

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- (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format. The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

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

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

MEETINGS

Subtask 1.2 Kick-off Meeting

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

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);

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- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

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

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

The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

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

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The Recipient shall:

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

The CAM shall:

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

Recipient Products:

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

CAM Products:

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

SUBTASK 1.4 FINAL MEETING

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

The Recipient shall:

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

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

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

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

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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.
- 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
- Comments on Draft Final Report Outline
- Approval of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

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

Recipient Products:

- Final Report (draft and final)

CAM Product:

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- Comments on Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

The Recipient shall:

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

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

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

Products:

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

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Subtask 1.8 Permits

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

The Recipient shall:

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

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

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

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.

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- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

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The Recipient shall:

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

Products:

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

Subtask 1.11 TAC Meetings

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

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Exhibit A Scope of Work

II. TECHNICAL TASKS

2-Phased Project and California Environmental Quality Act (CEQA)

This project is being conducted in two phases. The first phase involves tasks 2, 3, and 4 and the administrative tasks occurring within the time frame of these technical tasks (hereinafter "Phase I"). In general, these are the design, test plan development, and initial R&D. The second phase refers to the remaining work in Agreement (hereinafter "Phase II"). In general, Phase II involves the construction and demonstration of the advanced modular bioenergy technology at the pilot site.

The work in Phase I needs to be completed in order to provide sufficient information to comply with CEQA for Phase II. Because of this, neither the Recipient nor any of its subcontractors are authorized to expend funds or perform any work on any Phase II activities until further approval by the Energy Commission that the Recipient has completed its CEQA obligations. The Energy Commission has only approved Phase I activities.

During Phase I, the Recipient shall prepare all documents necessary to comply with CEQA for Phase II, which may include but is not limited to, preparation of an appropriate environmental document. The Energy Commission will consider approval of Phase II funding at an Energy Commission Business Meeting. The Energy Commission reserves the right not to authorize Phase II. Only if the Energy Commission so authorizes after verification of completion of CEQA requirements can the Recipient perform Phase II; neither party is bound under this Agreement regarding Phase II work until the Recipient has completed its CEQA process and the Energy Commission has authorized the Recipient to perform the work. The cost of all CEQA compliance will be at the sole expense of the Recipient and not reimbursable under this Agreement. However, the Recipient may consider its cost as match under this Agreement.

TASK 2 - EQUIPMENT INTEGRATION & FABRICATION

The goal of this task is to procure, fabricate, and integrate the equipment needed to operate the bioenergy technology for the test schedule in this agreement.

The Recipient shall:

- Perform parts procurement activities, including the following:
 - Reciprocating reactor equipment procurement
 - Ancillary equipment procurement (including, but not limited to, hydraulic, pneumatic, and conveyor)
 - Gas analyzing equipment
 - Mechanical & electrical Integration hardware procurement
 - Control system procurement
- Perform fabrication and subsystem assembly activities, including the following:
 - Reactor equipment welding
 - Reactor equipment machining & fabrication
 - Structure assembly
 - Reactor Assembly
- Perform system installations & commissioning
- Produce a written *Integration and Fabrication Report*, which summarizes the procurement, fabrication, and installation activities performed in Task 3.

Products:

Exhibit A Scope of Work

- Integration and Fabrication Report (Draft and Final)

TASK 3 - APPLIED R&D

The goal of this task is to evaluate a promising performance enhancement strategy for the bioenergy technology that involves adding air injection to the reactor to boost system throughput while maintaining usable fuel gas (defined as 350 btu/scf). Research will be conducted running different operational condition permutations varying the reaction temperature (low, medium, high), reaction pressure (low, medium, high), and feedstock particle size specification (small, medium, large).

The Recipient shall:

- Develop a *Bioenergy Technology Test Plan* and submit to the CAM for review. This Test Plan will define the operational conditions to be tested and the standard testing protocols to be followed as applicable.
- Procure testing supplies (including, but not limited to woodchips and gas containers)
- Conduct a performance test schedule according to the approved Bioenergy Technology Test Plan. The test, "Throughput Rate Hot Tests", will include at least 27 different operational condition permutations using air injection to boost throughput under each operational condition, and will be compared with the results of comparable tests from previous research.
- Install upgraded reactor heat exchange wall.
- Conduct second round of 27 operational condition permutations after heat exchange upgrade and compare results.
- Produce a *Bioenergy Performance Report* that documents the results and recommendations from the conduct of performance tests.
- Participate in *CPR Meeting* per Task 1.3.

Products:

- Bioenergy Technology Test Plan (Draft and Final)
- Bioenergy Performance Report (Draft and Final)
- CPR Report

TASK 4 – PERFORMANCE ENHANCEMENT EXPERIMENTS

The goal of this task is to implement and evaluate a second throughput enhancement strategy involving the upgrading of the heat exchange wall material to determine if it enhances heat recycling inside the bioenergy technology's reciprocating reactor. After installing the upgraded heat exchange wall, the 27 permutations described in Task 4 will be run again including the air injection boosting strategy. The results pre- and post-heat exchange wall upgrade will be compared to assess the material upgrade's performance enhancement value.

The Recipient Shall:

- Upgrade the inner reactor heat exchange pipe material.
- Conduct testing with the new inner reactor heat exchange pipe.
- Produce a *Test Results Matrix Report* comparing old and new inner reactor pipe materials, which includes the following:
 - Feedstock throughput potential on a per hour basis
 - Quantity and quality of gas produced

Exhibit A Scope of Work

- Quantity of biochar produced
- Levelized cost of electricity estimates
- A product yield tradeoff curve graph for each operational permutation tested
- Produce a *Throughput Maximization Report* documenting test results for the pre- and post-heat exchange wall upgrade operational condition runs, including resulting co-product yields and fuel gas/biochar yield ratios.

Products:

- Throughput Maximization Report (Draft and Final)
- Test Results Matrix Report (Draft and Final)

TASK 5 - SITE PREPARATION

The goal of this task is to prepare the pilot site for operations including ensuring there are adequate access roads, parking, power lines, concrete foundation, and work structures.

The Recipient shall:

- Finalize a procurement *Bill of Materials* which consists of a parts list of all items required for installation at the site.
- Finalize a site plan which consists of a site schematic and an assembly plan.
- Obtain a written *Construction Approval Memorandum* to proceed with construction from the site host.

Products:

- Bill of Materials
- Construction Approval Memorandum

TASK 6 - PILOT-SCALE DEMONSTRATION

The goal of this task is to demonstrate the bioenergy technology at the pilot facility, demonstrate technology mobility, and evaluate further modularly designed enhancements.

The Recipient Shall:

- Arrange for the transportation of the Reactor and the necessary ancillary equipment to the pilot facility.
- Takes photos of the Reactor once installed at the demonstration site.
- Determine and evaluate at least two potential design changes to enhance modularity of the Reactor via the production of a *Modularity Design Changes Memorandum*.
- Operate the pilot-scale system for at least 50 hours to demonstrate and determine capability.
- Produce a *Pilot-Scale Demonstrate Report* that documents the results and lessons learned from moving and operating the pilot scale system.

Products:

- Modularity Design Changes Memorandum
- Pilot-scale Demonstration Report

TASK - 7 DEMONSTRATE AIR EMISSIONS PROFILE

Exhibit A Scope of Work

The goal of this task is to physically measure the emissions from and performance of a power generator running on fuel gas produced by the Recipient's system. The power generation technology will be chosen utilizing the data gathered in the previous tasks. Areas of consideration will include the extent of gas quality variability. Low variability would favor internal combustion engine (ICE) technology due to its high efficiency and lower relative capital costs. High variability in quality would favor a choice between a single traditional gas turbine or a set of several integrated microturbines. Gas quantity is another consideration. Steady production rates would favor either an ICE or a single large turbine. High production quantity variability would eliminate the single turbine due to efficiency losses when running too far under its capacity. Recipient will analyze the data collected and make an appropriate power generation technology choice on which to conduct Task 7 testing. Upon settling upon a technology choice, Recipient will procure or rent a suitable unit and commission for use in emissions and performance testing.

The Recipient shall:

- Determine appropriate power generation technology for produced fuel gas.
- Integrate a small-scale power generation unit that will run on the fuel gas produced by the bioenergy to technology.
- Operate the power generation equipment and conduct performance and emissions monitoring according to test protocols acceptable to regional air quality management district.
- Attempt to meet the requirements of SCAQMD Rule 1110.2 with the fuel gases produced by the reactor.
- Produce a *Performance and Emissions Analysis Report* that documents the power generation performance and the fuel gas's exhaust emissions profile.
- Choose and recommend a full-scale power generation technology based upon knowledge gained during the Agreement.
- Participate in *CPR Meeting* per Task 1.3.

Products:

- Performance and Emissions Analysis Report (Draft and Final)
- CPR Report

TASK 8 - 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:

Exhibit A Scope of Work

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

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.
- 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 9 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

The Recipient shall:

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

Products:

- Initial Fact Sheet (draft and final)

Exhibit A Scope of Work

- 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)

TASK 10 PRODUCTION READINESS PLAN

The goal of this task is to determine the steps that will lead to the manufacturing of technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a *Production Readiness Plan*. The degree of detail in the plan should be proportional to the complexity of producing or commercializing the proposed product, and to its state of development. As appropriate, the plan will discuss the following:
 - Critical production processes, equipment, facilities, personnel resources, and support systems needed to produce a commercially viable product.
 - Internal manufacturing facilities, supplier technologies, capacity constraints imposed by the design under consideration, design-critical elements, and the use of hazardous or non-recyclable materials. The product manufacturing effort may include "proof of production processes."
 - The estimated cost of production.
 - The expected investment threshold needed to launch the commercial product.
 - An implementation plan to ramp up to full production.
 - The outcome of product development efforts, such as copyrights and license agreements.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Other areas as determined by the CAM.

Products:

- Production Readiness Plan (draft and final)

Exhibit A Scope of Work

III. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

**STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION**

RESOLUTION - RE: INTERRA ENERGY, INC.

WHEREAS, the State Energy Resources Conservation and Development Commission (Energy Commission) is considering whether to approve EPC-14-034 with Interra Energy, Inc.; and

WHEREAS, the Energy Commission is considering whether to authorize the use of funds for tasks 2, 3, 4, and the associated administrative tasks, which are identified as "Phase I" in the agreement's Scope of Work; and

WHEREAS, the Energy Commission requires Interra Energy, Inc. to receive Energy Commission approval for the remaining tasks and associated funding, which are identified as "Phase II" in the agreement's Scope of Work;

WHEREAS, Phase I of the project consists of design, test plan development, other R&D activities, and minor physical upgrades on an existing biomass conversion reactor, and the physical upgrade is to install an upgraded reactor heat exchange wall on the existing reactor; and

WHEREAS, the Energy Commission has reviewed the proposed project and finds that Phase I of the project consists of installation of small new equipment and conversion of existing small structures; and basic data collection, research, experimental management, and resource evaluation activities that do not result in a serious or major disturbance to an environmental resource; and

WHEREAS, the Energy Commission finds that the project is exempt from the California Environmental Quality Act (CEQA) as failing within the categorical exemption of CEQA Guidelines, California Code of Regulations, title 14, section 15303 (New Construction or Conversion of Small Structures) and section 15306 (Information Collection); and

WHEREAS, Interra Energy, Inc. is required to prepare documents in compliance with CEQA for Phase II of the project before the Energy Commission will consider approving the remaining tasks and associated funding.

RESOLVED, that the Energy Commission approves Agreement EPC-14-034 with **Interra Energy, Inc.** for **\$2,000,000.00**, to fund the research, installation, and pilot-scale demonstration of an advanced modular bioenergy technology developed by Interra Energy. Phase I involves design, test plan development, R&D activities, and minor physical upgrades on an existing reactor. After consideration of Phase I results, the Energy Commission may approve Phase II in the future, which will include installation and pilot-scale demonstration of the technology.

FURTHER BE IT RESOLVED, that the Executive Director 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 April 8, 2015.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Harriet Kallemeyn,
Secretariat