

GRANT REQUEST FORM (GRF)CEC-270 (Revised 10/2015)
COMMISSION

CALIFORNIA ENERGY

New Agreement EPC-18-010 (To be completed by CGL Office)

| | | | |
|------|----------------|----|--------------|
| ERDD | Rachel Salazar | 51 | 916-445-5316 |
|------|----------------|----|--------------|

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|----------------|------------|
| Porifera, Inc. | 26-2704998 |
|----------------|------------|

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| Energy and Water Savings in Food and Beverage Wastewater Reuse |
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| | | |
|----------|-----------|--------------|
| 4/1/2019 | 1/30/2023 | \$ 1,777,132 |
|----------|-----------|--------------|

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

| | | | |
|--------------------------------|----------------|----------------------------------|--|
| Proposed Business Meeting Date | 3/12/2019 | <input type="checkbox"/> Consent | <input checked="" type="checkbox"/> Discussion |
| Business Meeting Presenter | Rachel Salazar | Time Needed: | 5 minutes |

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description

PORIFERA, INC. Proposed resolution approving agreement EPC-18-010 with Porifera, Inc. for a \$1,777,132 grant to develop new capabilities in its Porifera Forward Osmosis (PFO) Recycler to treat and convert high-starch wastewater into clean water for onsite reuse, and adopting staff's determination that this action is exempt from the California Environmental Quality Act. If successful, the new capabilities will enable the PFO Recycler to become a viable and energy-efficient solution for market segments in California's food and beverage manufacturing sector that produce these difficult-to-treat high-starch wastewater streams from their facilities.

1. Is Agreement considered a "Project" under CEQA?
☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):
 Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:

- ☒ a) Agreement **IS** exempt. (Attach draft NOE)

☐ Statutory Exemption. List PRC and/or CCR section number: _____

☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit. 14, § 15301 ; Cal. Code Regs., tit. 14, § 15311

☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:

This project involves laboratory analysis research, equipment design and assembly, and equipment operation. All proposed activities will take place within existing, fully permitted buildings or facilities, without need for expansion or significant modification of the facilities. The new recycler system will be installed and operated at 1-3 potato chip manufacturing plants located across Southern California and the Central Valley. The system will be skid-mounted, measuring about 10 ft x 15 ft x 15 ft, and will use existing infrastructure (plumbing, electrical, water, and sewer), with little to no impact to on the facilities' operations. None of the proposed activities will cause a direct or reasonable foreseeable indirect physical change in the environment. California Code of Regulations, title 14, section 15301 exempts operation, and minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of determination. Additionally, California Code of Regulations, title 14, section 15311 exempts construction, or placement of minor structures accessory to existing commercial, industrial, or institutional facilities if the activity will not have a significant effect on the environment.

- ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)

Check all that apply

☐ Initial Study

☐ Negative Declaration

☐ Mitigated Negative Declaration

☐ Environmental Impact Report

☐ Statement of Overriding Considerations

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| | |
|---------------------|-----------|
| Legal Company Name: | Budget |
| CDM Smith, Inc. | \$ 66,000 |
| Aphinity | \$ 20,000 |
| James Coyle | \$ 50,000 |

| |
|---------------------|
| Legal Company Name: |
| Frito Lay |

| Funding Source | Funding Year of Appropriation | Budget List No. | Amount |
|-----------------------------------|-------------------------------|-----------------|-------------|
| EPIC | 17-18 | 301.001E | \$1,777,132 |
| | | | \$ |
| R&D Program Area: EERO: IAW | | | \$1,777,132 |
| Explanation for "Other" selection | | | |
| Reimbursement Contract #: | Federal Agreement #: | | |

| | | | |
|-------------------|--------------------------------------|-------------------|----------------------------|
| Name: | Jeffrey Mendelssohn | Name: | Olgica Bakajin |
| Address: | 1575 Alvarado St | Address: | 1575 Alvarado St |
| City, State, Zip: | San Leandro, CA 94577-2640 | City, State, Zip: | San Leandro, CA 94577-2640 |
| Phone: | 510-999-5189 / | Fax: | - - |
| E-Mail: | Jeffrey.mendelssohn@poriferanano.com | E-Mail: | olgica@poriferanano.com |

| | |
|---|----------------------------|
| <input checked="" type="checkbox"/> Competitive Solicitation | Solicitation #: GFO-17-308 |
| <input type="checkbox"/> First Come First Served Solicitation | |

| | |
|---|---|
| 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

**Exhibit A
Scope of Work
Porifera, Inc.**

I. TASK ACRONYM/TERM LISTS

A. Task List

| Task # | CPR ¹ | Task Name |
|--------|------------------|--|
| 1 | | General Project Tasks |
| 2 | X | Wastewater Analysis and Prototype Design |
| 3 | | Test System Design and Preparation |
| 4 | | Installation and Field Testing |
| 5 | | Evaluation of Project Benefits |
| 6 | | Technology/Knowledge Transfer Activities |
| 7 | | Production Readiness Plan |

B. Acronym/Term List

| Acronym/Term | Meaning |
|--------------|------------------------------|
| CAM | Commission Agreement Manager |
| CAO | Commission Agreement Officer |
| CPR | Critical Project Review |
| FO | Forward Osmosis |
| MS | Microsoft |
| PFO | Porifera Forward Osmosis |
| RO | Reverse Osmosis |
| TAC | Technical Advisory Committee |

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

A. Purpose of Agreement

The purpose of this Agreement is to develop and test the Porifera Forward Osmosis (PFO) Recycler, optimized for high starch content, to reduce the energy, chemicals, and maintenance required for reuse of extremely hard-to-treat industrial wastewaters.

B. Problem/ Solution Statement

Problem

Affordable water reuse is a pain-point for food and beverage manufacturers, especially in water-stressed areas like Southern and Central California. Rising waste disposal costs and water sourcing expenses further impact food and beverage manufacturers that produce difficult-to-treat high-starch wastewater streams from their facilities. Processors are looking for solutions that will help offset costs and allow them to remain market competitive.

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.

Exhibit A Scope of Work Porifera, Inc.

Solution

The PFO Recycler will make water reuse economical and energy efficient for food processors and others seeking to treat high starch wastewater. This technology will become increasingly valuable as the cost of water and waste disposal continue to rise. The Recipient will complete design optimization and testing to create a prototype for starchy wastewater. The prototype will be field tested in a small scale environment to assess the benefits to the customer and accelerate their implementation of the technology on a large scale. The system will process the customer's wastewater into clean water for reuse and a waste concentrate that will be used as a value-added product as feedstock for biogas production, therefore reducing waste disposal fees, increasing water availability and reducing energy use by 30-50 percent.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to create a prototype PFO Recycler system designed for starchy wastewater treatment and to test the system in a small scale environment. The PFO Recycler will reduce the energy, chemicals, and maintenance required for reuse of extremely hard-to-treat industrial starchy wastewaters.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability and lower costs through energy savings in challenging wastewater applications including treatment of wastewater high in starch and in the ratepayer benefits of decreased reliance on local municipalities. With 15 percent market penetration, the PFO Recycler for starchy wastewater reuse is estimated to save 237 MWh and 110 million gallons of water, per year. These water and energy savings can potentially lower drought related costs, lower costs for new water and wastewater infrastructure, and lower costs for new or expanded power plants and distribution systems.

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 evaluating the Recycler's benefits in treating the most challenging wastewater for reuse and saving energy. Outstanding innovations of the PFO Recycler include:

- The Recycler enables synergistic operation of water treatment and industrial processing where the chemical process itself may be used to power water treatment, greatly reducing energy use.

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).

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

Exhibit A

Scope of Work

Porifera, Inc.

- The forward osmosis (FO) front end of the system and reverse osmosis (RO) back end operate as independent systems. This allows the back end to be tuned to provide the ideal draw chemistry to maximize the osmotic power of the system with minimal energy cost.
- The PFO front end acts as a foulant exchange. This allows the RO back end to process only clean salts and operate at a stable pressure.
- PFO membranes reject dissolved contaminants similar to RO membranes. This creates high purity water that matches water that has been passed through RO twice.

These breakthroughs will enable low cost and low energy water reuse of starch wastewaters, which previously have been extremely difficult and expensive to reuse.

Agreement Objectives

The objectives of this Agreement are to:

- Complete design optimization and testing to create a prototype PFO Recycler for starchy wastewater.
- Install and test PFO Recycler systems for reuse of starchy wastewaters in both a lab environment and in representative commercial facility at a small scale.
- Assess the benefits of the PFO Recycler including lower energy, fewer chemicals, and less maintenance.
- Evaluate energy savings and increased water volumes for reuse.

Exhibit A
Scope of Work
Porifera, Inc.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

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

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

- Electronic File Format
 - Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission’s software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.
 - The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
 - Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
 - Text documents will be in MS Word file format, version 2007 or later.

Exhibit A Scope of Work Porifera, Inc.

- 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);
- 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.

Exhibit A Scope of Work Porifera, Inc.

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 Porifera, Inc.

- 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:

Exhibit A Scope of Work Porifera, Inc.

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

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

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

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement

Exhibit A Scope of Work Porifera, Inc.

end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

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

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (required)
 - Credits page on the reverse side of cover with legal disclaimer (required)
 - Acknowledgements page (optional)
 - Preface (required)
 - Abstract, keywords, and citation page (required)
 - Table of Contents (required, followed by List of Figures and List of Tables, if needed)
 - Executive summary (required)
 - Body of the report (required)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)
 - Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
 - Ensure that the document is written in the third person.
 - Ensure that the Executive Summary is understandable to the lay public.
 - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
 - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
 - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.

Exhibit A Scope of Work Porifera, Inc.

- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

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

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

The Recipient shall:

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

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

- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.

Exhibit A Scope of Work Porifera, Inc.

- 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.
- If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

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

Subtask 1.8 Permits

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

The Recipient shall:

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

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

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.

Exhibit A Scope of Work Porifera, Inc.

- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

Exhibit A

Scope of Work

Porifera, Inc.

- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

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

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

The Recipient shall:

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

Products:

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

Subtask 1.11 TAC Meetings

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

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.

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- 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
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IV. TECHNICAL TASKS

TASK 2: WASTEWATER ANALYSIS AND PROTOTYPE DESIGN

The goal of this task is to complete design optimization and testing necessary to create a prototype PFO Recycler for starchy wastewater and to evaluate multiple food processing plants in California, as candidates for field testing the PFO Recycler at the selected site(s). The design optimization and evaluation will research how the water quality, viscosity, and other wastewater properties impact necessary pretreatment and system parameters and configuration.

The Recipient shall:

- Create a *Prototype Design and Analysis Report* that includes, but is not limited to:
 - A high-level summary of the results from preliminary analysis and prototype design, is graphic-heavy, and points out the innovative or unique features.
 - Methods and results of wastewater evaluation, include measurements of total TDS, conductivity and other standard water parameters.
 - Findings from preliminary experiments, including but not limited to, the processing capacity, flow rates, and energy consumption.
 - Findings from process optimization research which includes, but is not limited to the evaluation of pre-screening techniques, bio-growth control, draw solutes, system flux and flowrates.
 - Prototype test results.
- Evaluate 1-3 food processing plants and conduct preliminary analysis and prototype design. This includes:
 - Evaluate the potential facilities' wastewater to understand treatment requirements. This will include taking measurements of total dissolved solids (TDS), conductivity and other standard water parameters.
 - Perform preliminary experiments and coordinate with site personnel to determine PFO Recycler system requirements for the field test site, including but not limited to, the processing capacity, flow rates, and energy consumption.
 - Perform research to understand the prefiltration requirements and select appropriate prefiltration equipment. This may include on-site testing of prefiltration equipment.
 - Perform process optimization research which includes, but is not limited to the evaluation of pre-screening techniques, bio-growth control, draw solutes, system flux and flowrates.
 - Perform preliminary experiments with the prototype and consult with site personnel to determine whether the quality of the water produced is acceptable for their intended use.
 - Determine which site(s) is(are) the best candidate(s) for field testing. If more than one site is selected for demonstration, Task 3 will be performed at each site.
- Create an *Agreement with Field Testing Partner Memo*, which shall include, at a minimum:
 - A list of the food processing plants that will participate in the project
 - A letter of agreement from each plant owner affirming their facility's participation
 - A summary of the differences between the selected facilities and how those differences will impact the field tests
- Incorporate CAM feedback and submit a *Final Prototype Design and Analysis Report*
- Prepare a *CPR Report* and participate in CPR Meeting, per subtask 1.3.

Exhibit A Scope of Work Porifera, Inc.

Products:

- Prototype Design and Analysis Report (Draft and Final)
- Agreement with Field Testing Partner Memo
- CPR Report

TASK 3: TEST SYSTEM DESIGN AND PREPARATION

The goal of this task is to design, manufacture and troubleshoot the test system(s) for the testing in a commercial environment based off previous results and in accordance to the *Agreement with Field Test Partner Memo*. The team will also prepare the field test site(s) for installation.

The Recipient shall:

- Prepare site(s) identified in Task 2 for installation of the PFO Recycler with as little impact on the plant's existing production activities, as possible. This includes, making minor facility improvements (e.g., space allocation at the field testing site, installing new piping equipment, and tank installation).
- Work with site partner to make arrangements for on-site testing.
- Perform test system design, manufacturing and troubleshooting of the PFO Recycler which includes:
 - Designing the PFO Recycler system(s) based on the analyses conducted in Task 2.
 - Sourcing parts for the PFO Recycler system and manufacture the system(s) offsite.
 - Performing startup activities at the selected facility to test for installation readiness and providing all necessary adjustments to debug the PFO Recycler system and improve overall operation.
 - Designing and integrating prefiltration test skid that may be implemented on site before the full system is implemented, if appropriate, to help select best prefiltration solution.
- Submit a *Draft Preliminary Design and Analysis Report* for TAC and CAM review. This report should include but is not limited to:
 - An executive summary section that details test system design, manufacturing and troubleshooting from a high level, is graphic-heavy, and points out the innovative or unique features.
 - Lessons learned from manufacturing, debugging activities.
 - Any changes made to the test system design.
- Incorporate appropriate TAC and CAM feedback and submit a *Final Preliminary Design and Analysis Report*

Products:

- Preliminary Design and Analysis Report (Draft and Final)

Exhibit A

Scope of Work

Porifera, Inc.

TASK 4: INSTALLATION AND FIELD TESTING

The goal of this task is to conduct field testing of the system(s) for starch recycling ability, energy consumption, and operating capabilities. The team will install, test, and maintain the system(s) while a third party will verify key performance data.

The Recipient shall:

- Install the PFO Recycler at field sites identified in Task 2. This includes:
 - Transporting the PFO Recycler system to the selected field testing site(s), accounting for safe transit and best practice for component storage.
 - Installing the PFO Recycler system according to the site design and agreement with the field test partners.
 - Performing startup activities at the site location(s) and providing all necessary adjustments to debug the system and ensure optimal site performance.
- Perform system testing and maintenance, which includes:
 - Operating the PFO system at the site(s) until the performance can be evaluated to the field testing site partner, coordinating with necessary site personnel to monitor the system's performance.
 - Determining a low-maintenance, low-cost cleaning solution for long-term operation to manage long-term fouling at each site.
 - Developing a *PFO System Maintenance and Operation Report* that outlines but is not limited to a high-level summary of lessons learned and findings of the cleaning procedure, long-term operation strategies, and maintenance schedule from a high level, and how this will impact the long-term payback and cost-effectiveness of the system.
- Develop a *Test Plan for PFO Recycler System*, that includes, but is not limited to:
 - A high level description of the measurement and verification plan, is graphic-heavy, and points out the innovative or unique features.
 - Detailed descriptions of measurements that will be performed to evaluate product quality, factors to monitor for performance optimization, and appropriate sampling procedures.
- Use an independent, third-party to conduct site visits and perform energy audits to verify the energy savings and other key performance data.
- Prepare a *Measurement and Verification Report* that includes, but is not limited to, an executive summary section that details the PFO recycler system's operation performance and how it compares to the treatment requirements in Task 2, measurements performed, the results for each site and whether agreement goals and objectives were met.
- Breakdown system and remove from site, which includes:
 - Breaking down and removing the PFO recycler system equipment and cleaning up the site(s), returning them to their original state.
 - Collaborating with site personnel to ensure testing goals were accomplished.
- Solicit feedback from the facility operators and develop a *Field Test Feedback Report*. This report should include, but is not limited to:
 - A summary of the feedback and recommendations from the field-testing site participants regarding the product quality, system operation, system maintenance and overall likelihood of the site adopting the PFO Recycler permanently

Products:

- PFO System Maintenance and Operation Report (draft and final)

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- Test Plan for PFO Recycler System (draft and final)
- Measurement and Verification Report
- Field Test Feedback Report

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 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.

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- For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

Products:

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

TASK 6: 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.

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Scope of Work

Porifera, Inc.

- 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(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

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

TASK 7: 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
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Porifera, Inc.

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: PORIFERA, INC.

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

RESOLVED, that the Energy Commission approves Agreement EPC-18-010 with Porifera, Inc. for a \$1,777,132 grant to develop new capabilities in its Porifera Forward Osmosis (PFO) Recycler to treat and convert high-starch wastewater into clean water for onsite reuse, and adopting staff's determination that this action is exempt from the CEQA. If successful, the new capabilities will enable the PFO Recycler to become a viable and energy-efficient solution for market segments in California's food and beverage manufacturing sector that produce these difficult-to-treat high-starch wastewater streams; and

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

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on March 12, 2019.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat