STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13) CALIFORNIA ENERGY COMMISSION

New Agreement EPC-14-065 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Kevin Mori		

Recipient's Legal Name	Federal ID Number
Porifera Inc.	26-2704998

Title of Project
Demonstration of Forward Osmosis to Produce Juice Concentrate, Purify and Reuse Wastewater and Reduce

Term and Amount	Start Date	End Date	Amount
	6/30/2015	3/29/2019	$ 2,499,289

Business Meeting Information

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

Proposed Business Meeting Date	5/13/2015	☒ Consent	☐ Discussion
Business Meeting Presenter	Kevin Mori	Time Needed:	5 minutes

Please select one list serve. Select

Agenda Item Subject and Description

PORIFERA, INC. Proposed resolution agreement EPC-14-065 with Porifera,Inc. for a $2,499,289 grant to demonstrate Porifera's Forward Osmosis (PFO) Concentrator. The PFO Concentrator uses unique membrane technology to make juice concentrates, and purifies wastewater for on-site reuse. The demonstration will quantify the energy savings and increase water reuse at selected sites.

California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?

☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

Explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because

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

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

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

☒ Categorical Exemption. List CCR section number: 14 CCR 15301, 15306

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

Explain reason why Agreement is exempt under the above section:

Cal. Code Regs., tit. 14, sect. 15301 provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of use beyond that existing at the time of the lead agency's determination, are categorically exempt from the provisions of the California Environmental Quality Act. This project will involve the installation of two forward osmosis concentrator systems at three different existing industrial facilities (Ale Industries, Los Gatos Tomato Products, and Anheuser Busch, addresses listed above). Specifically, at each demonstration site forward osmosis concentrators will be installed at existing factories. The forward osmosis concentrator is constructed on skids, approximately the size of a small trailer, for easy installation. The demonstration at Anheuser-Busch will reuse the forward osmosis concentrator unit from the Ale Industries site demonstration to save on costs. There will be modifications to the facility plumbing to accommodate the water purifying equipment. There will also be some modifications to the water pipeline to reroute the water flow within the demonstration facility.

Cal. Code Regs., tit. 14, sect. 15306 provides that projects which consist of basic data collection, research, and resource evaluation activities, which do not result in a serious or major disturbance to an environmental resource, are categorically exempt. The proposed project will also conduct a paper study that will include calculations of the energy and water savings performed in each demonstration. The purpose of these demonstrations are to gather data and evaluate performance.

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

Check all that apply

☐ Initial Study ☐ Environmental Impact Report

☐ Negative Declaration ☐ Statement of Overriding Considerations

☐ Mitigated Negative Declaration

List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)	
Legal Company Name:	Budget
CDM Smith, Inc.	$ 88,965
	$
	$
	$
	$
	$
	$
	$
	$

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	$2,499,289
			$
			$
			$
			$
			$
R&D Program Area: EERO: IAW		TOTAL:	$2,499,289
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				**Recipient's Project Manager**			
Name:	Jeffrey Mendelssohn			Name:	Olgica Bakajin		
Address:	3502 Breakwater Ct.			Address:	3502 Breakwater Ct.		
City, State, Zip:	Hayward, CA 94545			City, State, Zip:	Hayward, CA 94545		
Phone:	510-999-5189 /	Fax:	- -	Phone:	510 695 2777 /	Fax:	- -
E-Mail:	Jeffrey.mendelssohn@poriferanano.com			E-Mail:	olgica@poriferanano.com		

Selection Process Used

☒ Competitive Solicitation — Solicitation #: PON-14-304
☐ First Come First Served Solicitation

The following items should be attached to this GRF

1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4. Recipient Resolution	☒ N/A	☐ Attached
5. CEQA Documentation	☐ N/A	☒ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
Scope of Work Template

PORIFERA, INC.

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Demonstration Preparations
3	X	Demonstration at Ale Industries
4	X	Demonstration at Los Gatos Tomato Products
5		Demonstration at Anheuser-Busch
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities
8		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
F&B	Food and Beverage
FO	Forward Osmosis
M&V	Measurement & Verification
PFO	Porifera Forward Osmosis
Recipient	Porifera, Inc.
RO	Reverse Osmosis
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 demonstrations of the Recipient's forward osmosis ("Porifera Forward Osmosis, or "PFO") concentrator system for juice and wastewater concentration in the food & beverage (F&B) industry. The PFO Concentrator draws nutrients and other desired contents into a concentration and dewaters the concentration for possible reuse of the water.

B. Problem/ Solution Statement

Problem

While juice and wastewater concentration is commonly performed in the F&B industry, currently available technologies using reverse osmosis (RO) are limited to achieving a relatively low final product concentration. Other technologies are currently using energy-intensive heating

[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.

processes, which can achieve a high product concentration via evaporators, but using this heating process destroys the nutrients and flavors in the juices, resulting in a less nutritious concentrate. The use of either of these conventional technologies, RO or evaporators, is also limited due to the equipment accumulating unwanted materials, causing a reduction in performance.

Forward osmosis (FO) technology can be a feasible alternative to this problem. FO is the process of concentrating a solution by extracting solutes from the waste solution using a membrane. The most developed FO products in the market today are too expensive and bulky for adoption across industry. The Recipient's PFO Concentrator could overcome such barriers, but must be demonstrated and validated before widespread adoption. The technology must prove itself, such as demonstrating a two-to-three-year return on investment, for a customer to justify investment.

Solution
The Recipient will demonstrate to the demonstration site representatives the advantages of the PFO concentrator system in two ways:

- Juice dewatering, such as tomato for production of food and beverage concentrates and purees, in an energy saving process without loss of nutrients and flavors.
- Purification and concentration of challenging wastewater containing high levels of sugars and organics to allow reuse of water onsite and beneficiary use of the concentrated organics (e.g., for feedstock). Typically, these waste streams are discharged to the sewer and create high biological oxygen demand loading spikes at the local wastewater treatment plant.

Successful demonstrations with key customers could accelerate adoption of this technology across the F&B industry. It could also reduce water and energy use by the F&B industry, resulting in an economical and environmentally sound solution for concentration processing.

C. Goals and Objectives of the Agreement

Agreement Goals
The goals of this Agreement are to:

- Conduct demonstration in the F&B industry;
- Demonstrate the benefits of the Recipient's technology; and
- Demonstrate energy savings and increased water reuse, at a sufficient scale for commercial adoption.

Ratepayer Benefits:[2] If successful, this demonstration will result in the ratepayer benefits of greater electricity reliability, lower costs of energy through the replacement of energy-intensive thermal evaporators with the PFO Concentrator System, and improvement of ground and surface water availability through the increase of reused water onsite. The PFO Concentrator System can potentially save an average of 81% of combined thermal and electrical energy for each concentrator system that utilizes this technology. Evaporators require massive amounts of

[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).

steam created from boilers to produce concentrate, and boilers use massive amounts of fuel to create that steam. Assuming 25% of evaporators are replaced, the reduction in fuel usage could reduce 1.8 million metric tons of carbon dioxide emissions per year. This is comparable to permanently removing over 410,000 cars from California's roadways. In addition, reducing energy demand will improve the reliability of the state's electrical grid and reduce costs associated with energy production and transmission. Along with energy and water savings, the PFO Concentrator System may also result in improved product processing, yielding more nutritious and better tasting products. This will give California processors a competitive advantage in creating healthier and lower cost food products.

Technological Advancement and Breakthroughs:[3] If successful, this demonstration will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by demonstrating the advantages of Recipient's technology and accelerating its adoption.

The Recipient's PFO Concentrator can:

- Operate reliably on challenging liquids with high solids, pulp, sugars, fiber, etc. The Recipient provides FO elements that are less prone to clogging and suited for these applications.
- Achieve higher membrane flow rate, rejection, and efficiencies than competing FO technologies using the same "draw solution" chemistry. A draw solution is a liquid that absorbs chemical energy in the FO process.
- Operate at high rejection and high efficiencies using a "draw solution" that is easily recyclable using RO. Competing FO technologies require toxic draw solutions or allow too much leakage of the draw salt into the product.
- Operate at temperatures up to 80°C. Standard FO & RO membranes cannot exceed 45°C, which negates a significant amount of potential energy savings in F&B applications when some heating is needed for sterilization or finishing.
- Operate in neutral, acidic, or basic conditions (pH range 2-11), expanding the applicability of FO-based solutions, which in the past could not operate at low pH.

The advantages of PFO technology allow the Recipient to combine FO and RO in a new way that can concentrate juices to very high sugar concentrations that RO cannot achieve alone. In addition, PFO technology requires significantly less energy than evaporators, which are the only competing systems that can achieve the same sugar concentration targets.

Agreement Objectives

The objectives of this Agreement are to:

- Demonstrate the Recipient's system as a reliable, cost effective technology to dewater and concentrate food and beverage products, while maintaining high quality and flavors.
- Demonstrate energy savings and increased water volumes for reuse.
- Provide product samples to demonstration site representatives to confirm acceptable or improved taste and quality compared to existing systems.
- Demonstrate that the water produced from this process has high purity, and can be reused for various onsite processes (e.g., washdown, sterilization, boiler feed, etc.).

[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 Template

II. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products
The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version

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

For products that require a final version only

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

For all products

- Submit all data and documents required as products in accordance with the following Instructions for Submitting Electronic Files and Developing Software:

    - **Electronic File Format**
      Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

      The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
        - Data sets will be in MS Access or MS Excel file format

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

- ***Software Application Development***
  Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
  - Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - 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 <u>administrative portion</u> of the meeting will include discussion of the following:
  - Terms and conditions of the Agreement;
  - Administrative products (subtask 1.1);

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

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

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports and invoices (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide an *Updated Project Schedule, List of Match Funds,* and *List of Permits*, as needed to reflect any changes in the documents.

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.

Exhibit A
Scope of Work Template

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.

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

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:

- Draft Final Report
- Final Report

CAM Product:

- **Comments on Draft Final Report Outline**

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 <u>no match funds</u> 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.

Exhibit A
Scope of Work Template

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

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

- Members of relevant technical society committees.

The Recipient shall:

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

Products:

- 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 Template

III. TECHNICAL TASKS

*Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

TASK 2 DEMONSTRATION PREPARATIONS

The goal of this task is to upgrade manufacturing equipment at the Recipient's facility to achieve faster and cheaper production of PFO elements through automation in order to meet demands of the proposed project and prepare for full commercialization. There will be two PFO concentrator units made for the three demonstration sites. The sites identified as of the commencement date of this grant are:

1. Ale Industries, 3096 E. 10th Street, Oakland, CA 94601.
2. Los Gatos Tomato Products, 19800 Gale Avenue, Huron, CA 93234.
3. Anheuser-Busch, 3101 Bush Drive, Fairfield, CA 94534.

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

The Recipient shall:

- Increase automation of the PFO element manufacturing process for improved speed of production and cost reduction.
- Develop injection-molding capability for parts of the PFO elements in addition to the spacer plates that are currently injection molded.
- Prepare an ***Interim Report*** that includes but is not limited to the following:
  - Summary of the manufacturing process improvements achieved.
- Conduct CPR and prepare ***CPR Report 1*** per Subtask 1.3.
  - Include site readiness verification (via contract, memorandum of understanding, etc.).

Products:

- Interim Report (draft and final)
- CPR Report 1

TASK 3 Demonstration at Ale Industries

The goal of this task is to demonstrate benefits of the PFO Concentrator System at Ale Industries, 3096 E. 10th Street, Oakland, CA 94601.

The Recipient shall:

- Perform process optimization to achieve the following:
  - Select operating parameters optimized for the customer site (e.g., draw chemistry, flow parameters, recovery rates, chemical requirements such as antiscalants, etc.). This subtask will involve laboratory testing and process modeling.

  - Verify that the quality of the product water is acceptable by performing laboratory tests. Determine if concentrated waste can be used for other purposes (e.g., ethanol production).
- Perform site preparation to achieve the following:
  - Determine the best location for the system.
  - Perform planning, and engineering work for required site modifications while minimizing costs. The site modifications may include items such as piping, installation of electrical hookup, installation of tanks etc.
- Perform equipment customization, and include but not limited to, quality assurance and performance evaluation.
- Install and perform necessary modifications to the system.
- Develop ***M & V Plan 1*** for CAM review that includes, but not limited to:
  - An overview of M & V procedures.
  - Methods for obtaining independently verified measurements of energy and water savings and emission reductions.
- Execute M & V Plan 1 for a minimum of six months.
- Perform demonstration site cleanup and closeout that includes but not limited to:
  - Removal of equipment and materials.
  - Conduct clean up and disposal operations as required by local, state, etc.
- Prepare a ***M &V Report 1*** that includes but is not limited to the following:
  - Summary of the application including site preparation, modifications and discussion of process optimization achieved.
  - Description of the equipment used.
  - List of the operating parameters and description of the monitoring and verification methodology.
  - Calculation of energy consumption of the system and other benefits when compared to current technologies including energy savings and on site water reuse that were demonstrated.
  - Site report to include the measurement and verification results from an independent entity in accordance with M & V Plan 1.
- Conduct CPR and prepare ***CPR Report 2*** per Subtask 1.3.
  - Include site readiness verification (via contract, memorandum of understanding, etc.).

Products:

- M&V Plan 1 (draft and final)
- M&V Report 1 (draft and final)
- CPR Report 2

TASK 4 Demonstration at Los Gatos Tomato Products

The goal of this task is to demonstrate benefits of the PFO Concentrator System at Los Gatos Tomato Products, 19800 Gale Avenue, Huron, CA 93234.

The Recipient shall:

- Perform process optimization to achieve the following:
  - Select operating parameters optimized for the customer site (i.e. draw chemistry, flow parameters, recovery rates, chemical requirements such as antiscalants, etc.). This subtask will involve laboratory testing and process modeling.

  - Verify that the quality of the product (i.e., Brix, taste etc.) produced is acceptable by performing laboratory tests.
- Perform site preparation to achieve the following:
  - Determine the best location for the system.
  - Perform planning, and engineering work for required site modifications while minimizing costs. The site modifications may include items such as piping, building a concrete pad, installation of electrical hookup, installation of tanks etc.
- Perform equipment customization, and include but not limited to, quality assurance and performance evaluation.
- Install and perform necessary modifications to the system. (Note that the demonstration may be split over two seasons.)
- Develop ***M & V Plan 2*** that provides an overview of M & V procedures and methods for determining energy and water savings and emission reductions for CAM review.
- Execute M & V Plan 2 for a minimum of six months.
- Perform demonstration site cleanup and closeout that includes but not limited to:
  - Removal of equipment and materials.
  - Conduct clean up and disposal operations as required by local, state, etc.
- Prepare a ***M &V Report 2*** that includes but is not limited to the following:
  - Summary of the application including site preparation, modifications and discussion of process optimization captured.
  - A description of the equipment used.
  - List of the operating parameters and description of the monitoring and verification methodology.
  - Calculation of energy consumption of the system and other benefits when compared to current technologies including energy savings and on site water reuse that were demonstrated.
  - Site report to include the measurement and verification results from an independent entity in accordance with M & V Plan 2.
- Conduct CPR and prepare ***CPR Report 3*** per Subtask 1.3.
  - Include site readiness verification (via contract, memorandum of understanding, etc.).

Products:

- M&V Plan 2 (draft and final)
- M&V Report 2 (draft and final)
- CPR Report 3

TASK 5 Demonstration at Anheuser-Busch

The goal of this task is to demonstrate benefits of the PFO Concentrator System at Anheuser-Busch, 3101 Bush Drive, Fairfield, CA 94534.

The Recipient shall:

- Perform process optimization to achieve the following:
  - Select operating parameters optimized for the customer site (i.e. draw chemistry, flow parameters, recovery rates, chemical requirements such as antiscalants, etc.). This subtask will involve laboratory testing and process modeling.
  - Verify that the quality of the product produced is acceptable by performing laboratory tests.

- Perform site preparation to achieve the following:
  - Determine the best location for the system.
  - Perform planning, and engineering work for required site modifications while minimizing costs. The site modifications may include items such piping, building a concrete pad, installation of electrical hookup, installation of tanks etc.
- Perform equipment customization, and include but not limited to, quality assurance and performance evaluation.
- Install and perform necessary modifications to the system.
- Develop ***M & V Plan 3*** that provides an overview of M & V procedures and methods for determining energy and water savings and emission reductions for CAM review.
- Execute M & V Plan 3 for a minimum of six months.
- Perform demonstration site cleanup and closeout that includes but not limited to:
  - Removal of equipment and materials.
  - Conduct clean up and disposal operations as required by local, state, etc.
- Prepare a ***M &V Report 3*** that includes but is not limited to the following:
  - Summary of the application including site preparation, modifications and discussion of process optimization captured.
  - A description of the equipment used.
  - List of the operating parameters and description of the monitoring and verification methodology.
  - Calculation of energy consumption of the system and other benefits when compared to current technologies including energy savings and on site water reuse that were demonstrated.
  - Site report to include the measurement and verification results from an independent entity in accordance with M & V Plan 3.

Products:

- M&V Plan 3 (draft and final)
- M&V Report 3 (draft and final)

TASK 6 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:

  - <u>For Product Development Projects and Project Demonstrations:</u>
    - 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.

o 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 7 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

The Recipient shall:

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

Products:

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

TASK 8 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)

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 15-0513

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 Request Form; and

RESOLVED, that the Energy Commission approves Agreement EPC-14-065 from PON-14-304 with the **Porifera Inc.** for a **$2,499,289** grant to deploy Porifera's Forward Osmosis (PFO) Concentrator in the food and beverage industry. The PFO Concentrator uses unique membrane technology to make high quality juice concentrates, and purifies wastewater for on-site reuse. The demonstration will quantify the energy savings and increase water reuse at selected sites; 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 May 13, 2015.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

_____
Harriet Kallemeyn,
Secretariat