

EXHIBIT A Scope of Work

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Confirm Deployment sites and Conduct the Design and Installation of the Deployment Systems
3	x	Operation of the Deployment Systems
4		Performance Analysis of Deployment Systems
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
BOD	biochemical oxygen demand
BWR	Backwash Reject Water
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CDF	Cloth Depth Filtration
CPR	Critical Project Review
CPUC	California Public Utilities Commission
EPIC	Electric Program Investment Charge
FOG	fats, oils, and grease
gpd	gallons per day
IIS	Internet Information Services
M&V	measurement and verification
mg	million gallons
MGD	million gallons per day
MS	Microsoft
RRWRD	Rock River Water Reclamation District
SCADA	Supervisory Control and Data Acquisition
SQL	Structured Query Language
TAC	Technical Advisory Committee
TSS	total suspended solids
VSS	volatile suspended solids
WWTPs	wastewater treatment plants

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

A. Purpose of Agreement

The purpose of this Agreement is to fund technology deployment of raw wastewater filtration as a technically viable and commercially attractive technology for achieving significant electrical energy savings at wastewater treatment plants (WWTPs).

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

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B. Problem/Solution Statement

Problem

The secondary biological treatment process is usually the most energy intensive unit process in WWTPs. Most common secondary biological treatment method in California WWTPs, typically called “activated sludge process”, is accomplished by aerating wastewater. The activated sludge process accounts for 40 to 60 percent of total WWTP electricity energy consumption. The aeration electricity demand is proportional to the organic amount entering the aerated activated sludge process. Major users of energy in secondary treatment are the aeration blowers and mixers. Conventional wastewater treatment technology includes a primary clarification step before the aerated activated sludge treatment step to reduce the organic amount entering the aerated activated sludge basins. The organic load reduction achieved by the primary clarification step is typically between 20 and 30 percent. Achieving a higher degree removal of organic amount before the aerated activated sludge process provides a breakthrough opportunity to significantly reduce the electrical power demand at WWTPs. Even though it is commonly recognized that wastewater filtration provides superior removal efficiency compared to primary clarification, filtration of raw wastewater has not yet been implemented at WWTPs mainly due to lack of knowledge and the unsuitable conditions of raw wastewater for conventional filtration technologies (*i.e.*, granular medium filters).

Solution

Filtration of (screened) raw wastewater is an emerging application which has not yet been implemented at WWTPs. The use of cloth depth filtration (CDF) for raw wastewater filtration to increase the organic removal efficiency is a promising technology emerging from a 7 month pilot project conducted at Rock River Water Reclamation District (RRWRD) in Rockford, IL. In this unique application, raw wastewater is filtered before the aerated activated sludge treatment step. The filter backwash reject water containing the solids captured from the raw wastewater is diverted to the anaerobic digester after thickening. This promising technology targets the maximum electricity energy savings possible *via* carbon diversion compared to the conventional wastewater treatment configuration. Conventional wastewater treatment technology typically includes a primary clarification step before the aerated activated sludge treatment step. The proposed raw wastewater filtration concept replaces the current technology of primary clarification by offering the following two major advantages: (1) Substantially higher removal of organic load resulting in significantly lower aeration electricity consumption (in the downstream aerated activated sludge basins), and (2) smaller footprint requirements both for primary and secondary treatment steps.

By reducing the organic loading, the existing secondary treatment capacity will be increased (*i.e.*, future WWTP expansion may not be necessary) or the size of new secondary biological treatment units will be decreased, thus saving additional electrical energy and capital cost. As envisioned, the emerging technology would replace primary clarification with filtration to provide better removal of organic load, thus reducing electrical energy consumption at downstream aerated activated sludge basins. Also, avoiding the considerable costs and land usage of primary clarifiers (compared to raw wastewater filtration) provides a significant economic incentive to implement an energy saving process step.

C. Goals and Objectives of the Agreement

Agreement Goal

The goal of this Agreement is to deploy CDF at multiple sites for raw wastewater filtration, and conduct independent measurement and verification to prove the technology is a technically

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viable and commercially attractive approach for achieving significant electrical energy savings at WWTPs.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability and lower costs by implementing filtration of raw wastewater at WWTPs in California. Raw wastewater filtration for carbon diversion will provide significant energy cost savings at WWTPs. Based on the RRWRD pilot study results and wastewater process modelling, the aeration power requirement in the downstream aerated activated sludge process is estimated to decrease by approximately 30 to 45 percent compared to conventional primary clarification. Assuming an ultimate 50 percent implementation of the technology (within California), it is estimated that the annual electrical energy and associated cost savings for the ratepayers in California will be 171,200,000 kW-h and \$18,060,000 per year, respectively. The resultant reduction in annual greenhouse gas emissions is anticipated to be approximately 100,700,000 lbs CO₂e. Another inherent potential benefit of this emerging technology is peak load reduction in WWTPs resulting in more reliable and effective treatment while further increasing electrical cost savings. The proposed technology would also reduce the production cost of recycled water which should assist the State in reaching its goals for increasing use of recycled water.

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 demonstrating that raw wastewater filtration is a technically viable and commercially attractive approach for achieving significant electrical energy savings at WWTPs.

Raw wastewater filtration is an important breakthrough in the wastewater treatment industry. Minimization of WWTPs' aeration electrical power requirements results from maximizing the amount of organic matter in wastewater that is diverted from the activated sludge aeration basins to anaerobic sludge digestion system. This breakthrough wastewater treatment energy savings method has never been tested nor implemented at WWTPs. A collaborative effort between academia, municipal wastewater utilities, engineers, and the technology manufacturers is essential for technology verification, industry acceptance, and realization of this aforementioned breakthrough with successful market penetration. The project team is formed by various stakeholders including engineering consultants, academia, manufacturing companies, and end user utilities to help overcome barriers for market acceptance of raw wastewater filtration for carbon diversion. Technology acceptance in wastewater treatment industry is best achieved when all of the above work together in a project.

Agreement Objectives

The objectives of this Agreement are to:

- Quantify the reduction in electrical power required for aeration in the activated sludge process, due to raw wastewater filtration.
- Determine the decrease in electrical power required for mixing due to the reduced activated sludge volume requirements.

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.

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- Establish further reduction of aeration electrical power demand (*i.e.*, beyond what is realized from carbon diversion) by implementing an oxygen control strategy based on simultaneous nitrification/denitrification processes which are possible due to the favorable alterations in wastewater characteristics obtained with raw wastewater filtration (smaller particle size distribution, more readily biodegradable organics fraction).
- Determine the overall capital and electrical energy savings resulting from the increased secondary treatment capacity.
- Validate the performance of modifications to the CDF system needed to address higher solids; fats, oils and grease (FOG) content (compared to primary clarifier effluent).
- Demonstrate filter removal efficiencies for biological oxygen demand (BOD), volatile suspended solids (VSS), and total suspended solids (TSS).
- Confirm the increase in biological treatment efficiency resulting from particle size modification *via* raw wastewater filtration.
- Identify and resolve any operational and/or maintenance issues.
- Develop operational and design criteria for full-scale installations.
- Conduct a third party measurement and verification (M&V) process.
- Implement a structured marketing and technology transfer activity plan to reach out to a wider audience in the wastewater treatment industry.

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.

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- 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.

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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.

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

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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.
- 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.

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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.

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- 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

Subtask 1.6.2 Final Report

The Recipient shall:

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

Products:

- Final Report (draft and final)

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MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

The Recipient shall:

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

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

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

Products:

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

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Subtask 1.8 Permits

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

The Recipient shall:

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

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

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

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

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

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

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.

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- 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

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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 CONFIRM DEPLOYMENT SITES AND CONDUCT THE DESIGN AND INSTALLATION OF THE DEPLOYMENT SYSTEMS

The goal of this task is to confirm or select new deployment site(s), to design and install the raw wastewater filtration demonstration systems at each confirmed deployment sites. At a minimum, there will be three deployment sites for the raw wastewater filtration systems.

The Recipient shall:

- Reach agreement with the Authorized Representative(s) of the selected deployment sites regarding the project timeline, space reserved for the project, equipment installation, permit and insurance, indemnity, and the Recipients use of support staff and installation and removal of equipment.
- If the selected deployment site(s) becomes unavailable during the project term (or to add additional deployment sites), work with the CAM to select new deployments site(s).
- Execute a *Contract with each Deployment Site* that confirms the agreement reached above and provide a copy to the CAM.
- Prepare and submit to CAM, Individual *Deployment System Design Plans, Schedule and Specifications Report* for each of the deployment systems. The report shall include but not be limited to:
 - Site-specific piping, mechanical, structural, and electrical requirements
 - Raw wastewater filtration systems and operational control systems
 - Identifying all required site-specific modifications necessary for deployment of CDF unit(s) and all associated support hardware(s) and software(s)
 - Flow splits between primary clarifier and raw wastewater filtration system and site specific raw wastewater flow diversions requirements. The raw wastewater filtration system planned for the first site will be sized to treat average flow rate of approximately 1.25 MGD. The raw wastewater filtration systems for the second and third sites will be rated for an average flow rate of approximately 100,000 gpd. (Work with CAM as needed to determine flow splits)
- Enter into subcontracts (per Task 1.9) with Project General Contractor(s) for all required construction/installation/site-specific modifications for the deployment of CDF at each deployment site.
- Prepare and provide individual *Letter of Acceptance and Deployment* to be signed by each deployment site Authorized Representative that includes but is not limited to:
 - Written documentation that installation of the deployment system is complete
 - Verification of system inspection and acceptance, and the date such inspection occurred
 - Verification that deployment system is ready for start-up and long term operation (with raw wastewater) and monitoring and verification

Products:

- Copy of Contract with each Deployment Site
- Deployment System Design Plans, Schedule and Specifications Report
- Signed Letter(s) of Acceptance and Deployment

EXHIBIT A Scope of Work

TASK 3 OPERATION OF THE DEPLOYMENT SYSTEMS

The goals of this task are to start-up and operate the deployment systems by conveying: (1) raw wastewater flow (after screens) to the filtration systems, (2) filter effluent to the secondary aerated activate sludge basin, and (3) filter backwash reject water to the thickener and then to the anaerobic digester.

The Recipient shall:

- Prepare and provide a *Deployment System Test Plans* for each deployment site. The Deployment System Test Plans will include but is not limited to the following:
 - Description of testing systems
 - Test plan objectives
 - Roles and responsibilities for involved parties
 - Testing schedule for 24 hour composite samples
 - Sampling types, frequency, and schedule for 24 hour composite samples
 - Operation and download data from inline continuous monitoring equipment
 - Quarterly updates to the test plan to reflect necessary changes observed from operation of the deployment systems
- Start-up and test the demonstration system for a period of one month to identify and implement early operational and maintenance improvements, if necessary.
- Operate the deployment system in six periods, each approximately 6 months in duration. Update the test plan after the end of each period, if necessary (to implement the identified necessary operational and maintenance changes in the following period).
- Operation of the deployment activities will include the following: operation, maintenance, troubleshooting, performance improvement and optimization,
- Conduct inline continuous field measurements related to wastewater treatment performance and electrical power consumption such as filtration and backwash flow rates and durations, turbidity and/or Total suspended solids concentration, pressure development (through the filter medium).
- Conduct sampling for offsite laboratory analyses. Wastewater quality tests will be conducted for the following main two reasons: (1) correlate and confirm electricity savings with the industry operating parameters such as biochemical and chemical oxygen demand, (2) ensure that the overall wastewater treatment processes are not negatively impacted by raw wastewater filtration and necessary measurements/actions are taken on time if necessary.
- Prepare *Deployment Operational Progress Reports* for each site at the conclusion of each approximately 6 month durations (reports numbered as Phase No. 1, 2, 3, 4, 5, and 6). The report will include but is not limited to the following:
 - Test Plan Update
 - Summary of Operational and Maintenance activities, operation and photographs of system
 - Preliminary inline field measurements
 - Results of offsite laboratory analyses
- Participate in CPR per Task 1.3 and prepare CPR report

Products:

- Deployment System Test Plans
- Deployment Operational Progress Reports

EXHIBIT A Scope of Work

- CPR Report

TASK 4 PERFORMANCE ANALYSIS OF THE DEPLOYMENT SYSTEMS

The goal of this task is to conduct a detailed performance analysis based on the results obtained from the operation of the deployment systems.

The Recipient shall:

- Compile all of the deployment performance data including inline field measurements and offsite laboratory sampling results.
- Review and evaluate all of the performance data obtained from deployment phase 1, 2, 3, 4, 5, and 6.
- Establish, calibrate, and use a computer process model (using raw wastewater effluent filtration for carbon diversion) for the each deployment WWTPs to simulate performance and benefits for full flow rates.
- Establish, calibrate, and use a computer process model (using raw wastewater effluent filtration for carbon diversion) for other WWTP in California.
- Prepare *Performance Analysis Progress Reports* for deployment phases 1- 6 for each deployment site. Report will include but is not limited to:
 - Analysis of inline field measurements and offsite laboratory sampling results,
 - Analysis of treatment and hydraulic performance results
- Prepare *Process Computer Model Reports* for each deployment site, to simulate performance and benefits for full flow treatment.
- Prepare *General California WWTP Process Computer Model Report* for using raw wastewater effluent filtration for carbon diversion for other typical WWTPs in California of various sizes and potential energy savings statewide. A total of 6 computer models will be generated to investigate small size (e.g., less than 5 MGD), medium size (e.g., between 5 and 20 MGD), and large size (e.g., more than 20 MGD) WWTPs. Two computer models are planned for each of these size categories.

Products:

- Performance Analysis Progress Reports
- Process Computer Model Reports
- General California WWTP Process Computer Model Report

TASK 5 EVALUATION OF PROJECT BENEFITS

The goal of this task is to conduct third party measurement and verification (M&V) process to confirm electrical energy savings associated with raw wastewater filtration for carbon diversion. This task will also report the benefits resulting from this project.

The Recipient shall:

- Enter into agreement with M&V vendor per Task 1.9
- Coordinate site visits with the M&V firm at the deployment sites identified in Task 2.
- Supply WWTP data for the:
 - Flow for raw wastewater
 - BOD of raw wastewater, effluent from filters and effluent from secondary treatment
 - Solid stream flow and VSS content in BWR

EXHIBIT A Scope of Work

- Develop M&V protocol for **pre-install** measurement of:
 - Electrical energy consumed by secondary treatment system through plant supervisory control and data acquisition (SCADA) or data logging
- Perform pre-install measurements based on the M&V protocol for pre-install
- Analyze pre-install electrical energy consumption of secondary treatment system based on normalized wastewater flow and loading conditions.
- Develop M&V protocol for **post-install** measurement of:
 - Electrical energy consumed by secondary treatment system through plant SCADA or data logging
 - Energy consumed by raw wastewater filtration system (e.g., backwash blowers and pumps involved with filtration system)
- Perform post-install measurements based on M&V protocol for post-install
- Analyze post-install electrical energy consumption of secondary treatment system based on normalized wastewater flow and loading conditions.
- Prepare *M&V Findings Reports* for each deployment site that includes M&V protocol, pre and post install measurements, analysis, and results performed in this task.
- 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.

EXHIBIT A Scope of Work

- ◆ Patent numbers and applications, along with dates and brief descriptions.
- Additional Information for Product Demonstrations:
 - ◆ Outcome of demonstrations and status of technology.
 - ◆ Number of similar installations.
 - ◆ Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
 - ◆ Outcome of project.
 - ◆ Published documents, including date, title, and periodical name.
 - ◆ A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - ◆ The number of website downloads.
 - ◆ An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - ◆ An estimate of energy and non-energy benefits.
 - ◆ Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - ◆ 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:

- M&V Findings Reports
- 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.

EXHIBIT A

Scope of Work

- 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)

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: KENNEDY/JENKS CONSULTANTS, 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-14-076 from PON-14-304 with **Kennedy/Jenks Consultants, Inc.** for a **\$3,476,085** grant to deploy the use of cloth depth filtration for raw wastewater filtration to increase the organic removal efficiency and reduce secondary treatment electrical energy demand; 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