

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-079 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Michael Lozano	51	916-327-1425

Recipient's Legal Name	Federal ID Number
Victor Valley Wastewater Reclamation Authority (VWVRA)	95-3200665

Title of Project
Advanced Renewable Energy Storage and Recycled Water Project

Term and Amount	Start Date	End Date	Amount
	6/13/2016	3/31/2020	\$ 1,734,059

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

Proposed Business Meeting Date	5/17/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
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Business Meeting Presenter	Kevin Mori	Time Needed:	5 minutes
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Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY. Proposed resolution approving Agreement EPC-15-079 with Victor Valley Wastewater Reclamation Authority (VWVRA) for a \$1,734,059 grant to demonstrate an advanced, pre-commercial flow battery storage and control system at VWVRA's facility in Victorville, California that will improve efficiency, reduce the price of recycled water and increase its availability.

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: Cal. Code Regs., tit 14, § 15301, 15303
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why Agreement is exempt under the above section:
 This project consists of a minor alteration to an existing private facility through the installation of small new equipment. Specifically, ten lithium ion battery units along with supporting equipment such as inverters, a transformer and electrical panels and connections will be installed on a new concrete pad and connected to the existing electrical grid inside of a facility. The battery units and supporting equipment are collectively designed to fit in a standard sized shipping container, approximately 8 feet by 8 and a half feet by 40 inches. The concrete pad will be approximately 16 feet by 40 feet. The project will not result in an increase of the floor area of the facility and will not expand the existing use of the facility. Therefore, the project falls within section 15301 and 15303 and will not have a significant effect on the environment.

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

Check all that apply

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

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List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)	
Legal Company Name:	Budget
The Regents of the University of California on behalf of the Riverside	\$ 439,497
Primus Power Corporation	\$ 954,092
Anaergia Services	\$ 142,120
Apple Valley Construction Co. Inc.	\$ 78,860
Masters Electric	\$ 88,800
	\$

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	14-15	301.001B	\$1,734,059
			\$
			\$
R&D Program Area:	EERO: IAW	TOTAL:	\$1,734,059
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Alton Anderson			Name:	Logan Olds		
Address:	20111 Shay Rd			Address:	20111 Shay Rd		
City, State, Zip:	Victorville, CA 92394-8539			City, State, Zip:	Victorville, CA 92394-8539		
Phone:	760-246-8638 /	Fax:	- -	Phone:	760-246-8638 /	Fax:	- -
E-Mail:	AAnderson@vwwra.com			E-Mail:	lolds@vwwra.com		

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-317
<input type="checkbox"/> First Come First Served Solicitation	

The following items should be attached to this GRF			
1. Exhibit A, Scope of Work		<input checked="" type="checkbox"/>	Attached
2. Exhibit B, Budget Detail		<input checked="" type="checkbox"/>	Attached
3. CEC 105, Questionnaire for Identifying Conflicts		<input checked="" type="checkbox"/>	Attached
4. Recipient Resolution		<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
5. CEQA Documentation		<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

EXHIBIT A Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Project Design & Installation
3		Evaluation of Project Benefits
4		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
IIS	Internet Information Service
MS	Microsoft
SQL	Structured Query Language
TAC	Technical Advisory Committee
UCR	University of California Riverside

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the installation of an innovative power control system that will increase the energy efficiency of the Recipient's water treatment facility and reduce the price of recycled water and simultaneously increase its availability. This will be accomplished by incorporating controllers and batteries to the site's electrical infrastructure to improve the electrical efficiency of generators, maximize the generation of renewable energy and reduce the demand on non-renewable energy sources, thereby reducing the Recipient's water treatment facility's energy costs.

B. Problem/ Solution Statement

Problem

California's ongoing drought has forced the state to turn increased attention to the importance of reducing water consumption, increasing the enforcement of water standards, and developing new technologies that not only increase California's resilience to drought, but also address the state's aggressive climate change goals through delivering dramatic reductions in electricity consumption.

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

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The proposed project will address the inability of the recipient's existing power generation system to respond to variable onsite electrical loads. The resulting shut downs of the onsite power generation system result in energy inefficiencies associated with generators and other equipment, increased power costs and reliance on non-renewable power from the electric utility and reduced ability to produce recycled water. This project will utilize existing technologies in a new way and enable the recipient to operate equipment energy efficiently, demonstrate the reliability of biogas as a means to achieve carbon neutrality while also reducing the cost and increasing the availability of recycled water for the community.

Solution

The Recipient and Project Team will demonstrate an advanced, pre-commercial flow battery storage and control system at the recipient's existing Regional Wastewater Treatment Plant, located outside of Victorville, California. When complete, the project will deploy the ENERGYPOD flow battery system in a 240 kW/1,200 kWh configuration managed by a University of California Riverside UCR-designed controller system that is optimized specifically for management and storage of renewable power generated under a utility no-export agreement. The proposed battery storage will allow the project to collect and store excess renewable electricity generated on site, rather than turning down generator engines or installing dead-load banks and also improve the energy efficiency of the generators and other related plant equipment.

Stored power will be used to meet peak demand on site with 100% renewable energy, rather than relying on grid power, over the project's 25-year lifetime. The project will provide electrical efficiency savings associated with improved energy management and control, while also providing significant water savings. Under existing conditions, rapid fluctuations in the wastewater treatment plant's power demand—for example when a bank of electric motors turns on or off—can trip off a portion of the facility's wastewater treatment equipment, resulting in effluent exceeding California's strict Title 22 recycled water requirements. Currently, the recipient must dispose of this water without beneficial use.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of the project are to:

- Help California reduce the consumption of potable water;
- Demonstrate a pre-commercial, integrated energy management and control system that will result in both energy and water savings; and
- Deploy a cost-competitive system that water treatment facilities throughout California can use when deploying their own water- and energy-saving systems.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefit[s] of greater electricity reliability and lower costs. The proposed project will deploy an advanced battery and controller

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

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system that will enable peak power shaving and reducing system shutdowns, while increasing renewable electricity generation on site, reducing existing flaring, and increasing wastewater treatment process reliability. The project would also benefit IOU ratepayers by providing

(1) **Greater Reliability:** the project would reduce grid power demand overall, including during peak periods. Especially during peak grid consumption, high levels of power demand can cause grid bottlenecks, and cause the utility to rely on more expensive peak power production sources. Excessively high demand can also contribute to power reliability and power quality issues.

(2) **Lower Costs:** By reducing peak period power consumption, the project would help to alleviate the need for infrastructure investment to address grid bottlenecks, which could include distribution and transmission line upgrades, distribution level storage, or new peak power generation sources. Additionally, by reducing peak power consumption, the project will reduce dependence on costly peak power generation, which will help alleviate utility upward price pressures, and may help to delay utility rate hikes. Lastly, improved energy management controls will improve electrical efficiency of equipment at the plant, thus lowering operating costs.

(3) **Increased Safety.** Increased safety will contribute to an incrementally safer grid that is less prone to failure. Additionally, the project would deploy and demonstrate an emerging, safe, and long-lasting battery storage system incorporates several safety elements that prevent thermal runaway, avoid membrane degradation, reduce failure due to dendrite damage, avoid impedance changes from graphite components and graphite felt clogging, and eliminate catastrophic failure due to high temperature precipitation. The system also maintains a very low fire hazard, low chemical hazard in comparison to most flow batteries, low air pollution hazard from gas releases, and recyclability.

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 increasing energy efficiency of equipment, and reliability and output of on-site renewable energy. Most facilities that generate electricity from biofuel using reciprocating engines must enter into an interconnection agreement to produce power onsite. These agreements protect the utility grid, but are also difficult to manage: power output and is typically limited by the agreement, rendering the facility as either an "inadvertent export," "non-export," or "minimum export" system. These requirements curtail the ability to generate power onsite. If these boundaries are violated for brief periods of time (seconds), the entire generation system is shut down and the production of renewable energy is stopped until the system can be reset and restarted. As a result, many of these facilities operate with very conservative power production buffers to maintain ample distance from the power barriers to decrease the frequency at which these shutdowns occur. These power production buffers and shutdowns together work to decrease the output and reliability of these grid-connected renewable energy generators.

One solution to the problem has been to incorporate load banks to "burn off" excess power that would potentially violate the power barrier at the specific location. This has a considerable drawback of wasting renewable energy. Instead, this project would use a battery storage system combined with an advanced controller to enable the recipient to accommodate variable loads,

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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increase onsite renewable power production, and substantially reduce its reliance on grid power. The project would redirect excess electricity to a battery system, and then would draw on this stored power later, to satisfy plant loads during high demand, rather than drawing upon grid power. The potential to avoid shutdowns and re-starts on plant equipment will improve the electrical efficiency of these units.

Agreement Objectives

To achieve these goals, the project team will pursue the following objectives:

- Design, install, integrate, and operate an advanced energy management system;
- Refine, optimize, and integrate an innovative software control system into the energy management system;
- Operate the proposed integrated system for up to 12 months;
- Increase the existing wastewater treatment facility's renewable energy production and utilization;
- Save millions of gallons of water per year by minimizing recycled water system shutdowns and increasing the production of Title 22 recycled water for beneficial use;
- Increase the energy efficiency of plant equipment, such as generators;
- Decrease the amount of biogas wasted by on-site flaring;
- Reduce electrical demand charges incurred by the facility;
- Appraise the operational and performance characteristics and financial risks of the proposed demonstration system by:
 - investigating and documenting benefits and barriers associated with large-scale deployment;
 - investigating the role of end-user behavior, to help identify ways to ensure sustainable, long-term, actual energy and water savings in the demonstration facilities;
 - monitoring and verifying energy and water savings benefits and the persistence and sustainability; and
 - identifying the critical market players, including regulatory agencies, water and electric utilities, and their role in commercial deployment of the technology.

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III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

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

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**

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

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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.

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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 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

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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.

The Recipient shall:

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

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

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

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

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

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Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

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

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)
 - Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)
 - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
 - Executive summary (**required**)
 - Body of the report (**required**)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)

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- Appendices (if applicable) (Create a separate volume if very large.)
- Attachments (if applicable)
- Ensure that the document is written in the third person.
- Ensure that the Executive Summary is understandable to the lay public.
 - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
 - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
 - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

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

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

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

Products:

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

Subtask 1.8 Permits

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

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:

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- 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:

- 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,

EXHIBIT A

Scope of Work

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

EXHIBIT A Scope of Work

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

IV. 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 PROJECT DESIGN & INSTALLATION

The goals of this task are to 1) complete design of the energy management system; 2) complete design of the control system; 3) install and integrate the energy management and control systems; 4) startup and commission the integrated system; and 5) operate the facility for up to a 12-month data collection period.

SUBTASK 2.1 STORAGE SYSTEM DESIGN

The goal of this task is complete the design for the energy storage system to be installed at the recipient's treatment facility.

The Recipient shall:

- Perform an energy facility analysis and develop a load generation profile for the treatment facility.
- Prepare a detailed engineering design, and provide *Electrical Engineering Drawings of System* what will include but not be limited to electrical schematics of system.
- Use results of the engineering design process to specify the following:
 - Battery type

EXHIBIT A

Scope of Work

- Control Parameters, including those to increase energy efficiency on water treatment equipment
- Predictive abilities
- Operator adjustable set points
- Inverters
- Switch gear
- Share Electrical Engineering Drawings with electrical contractor, who will produce *Installation Contractor Drawings* that will include but not be limited to the specifications for the items listed above as well as installation blueprints specific to the site location.
- Prepare and provide an *Equipment and Materials List* of what is required for the proposed system. This will include but not be limited to, parts and materials invoiced to the Energy Commission.
- Conduct internal review of the permitting requirements to ensure compliance.
- Obtain final *Installation Contractor Drawings* approved by the facility and included in *Written Notice of Completion of System Design*.
- Prepare and provide a *Written Notice of Completion of System Design* to include, final system design, load generation profile for the facility, installation drawings approved by the facility and copies of all permits received for the project.

Product:

- Electrical Engineering Drawings
- Installation Contractor Drawings (draft and final)
- Equipment and Materials List
- Written Notice of Completion of System Design

SUBTASK 2.2 CONTROL SYSTEM DESIGN

The goal of this task is design the control system to be integrated with the energy storage system at the treatment facility.

The Recipient shall:

- Evaluate data obtained from the energy analysis in Task 2.1 to better understand the energy management needs of the system, including any energy efficiency improvements to treatment facility equipment.
- Define infrastructure requirements to support the controller and overall project; outside of the battery requirements.
- Define materials, hardware, and programming necessary to support the controller and overall project outside of the battery requirements and provide a *List of Points to Control* and *List of Controller Data Inputs*.
- Develop power management algorithms that will meet the needs of the facility and complete *Description of Control Philosophy* Including description of power management algorithms.
- Prepare and provide *Simulation Test Plan* that will include but not be limited to protocols for startup, operation and shutdown.
- Test and refine the algorithm in a series of simulations designed to mimic actual operating conditions at the treatment facility.
- Prepare and provide a *Simulation Test Report* that will include but not be limited to the results and findings of the simulation test.

EXHIBIT A Scope of Work

Product:

- List of Points to Control
- List of Controller Data Inputs
- Description of Control Philosophy
- Simulation Test Plan (Draft and Final)
- Simulation Test Report (Draft and Final)

SUBTASK 2.3 INSTALLATION & INTEGRATION

The goal of this task is install the energy storage system and hardware components of the control system in preparation for Task 2.4, Startup & Commissioning.

The Recipient shall:

- Perform site analysis.
- Perform all necessary site preparation, including:
 - Clearing and grubbing
 - Demolition and grading
 - Define location of existing facilities
- Procure all required equipment and materials, using the *Equipment and Materials List* developed in Task 2.1.
- Install the energy storage system and all associated equipment, including:
 - Flow DC battery energy storage system (BESS) and power distribution system
 - Switch gear
 - Conductors
- Install all hardware components of the energy management system, including:
 - Controller
 - Control wiring
 - Programmable logic controller integration
- Perform initial system integration, including interconnecting battery system to grid power.
- Participate in Critical Project Review as described in Task 1.3 and prepare *Critical Project Review Report*. This report will also summarize any needed modifications to the tasks, products, schedule, or budget, as determined in the CPR Meeting with the Energy Commission.

Product:

- Critical Project Review Report

SUBTASK 2.4 STARTUP & COMMISSIONING

The goals of this task are to startup and commission the integrated energy storage and management system, to validate system operations and integrity, and to ready the system for full pre-commercial operations.

The Recipient shall:

- Prepare and provide *System Startup Test Plan*. This plan will discuss a variety of activities to be performed, including:
 - Execute System Startup Test Plan. Verify all point-to-point equipment connections.
 - Label all system wiring.
 - Test and validate the installed functionality of all installed equipment, including:
 - Control system hardware

EXHIBIT A

Scope of Work

- Rate of the control output to system components
- Operator adjustable set-points
- System response to component failures
- System Alarms
- System trips
- System re-sets
- Test all system inputs and outputs to ensure that they meet required specifications:
 - Each battery's ability to charge, discharge and hold charge
 - All breakers, disconnects, and overloads
- Bring software control system online and test, validate, and refine in real-world operating conditions.
- Prepare and provide a *System Startup Test Report* that will include but not be limited to all information resulting from System Startup Test Plan.
- Perform final refinements to control system algorithm.
- Conduct final system inspection.
- Start-up and commission entire integrated system with required support (plant operations, electricians, electrical engineers, utility, etc.).
- Prepare *Written Notification of Readiness to Commence Operations*. At a minimum this will include a written letter certifying readiness to commence operations.

Product:

- System Startup Test Plan (Draft and Final)
- System Startup Test Report (Draft and Final)
- Written Notification of Readiness to Commence Operations

SUBTASK 2.5 OPERATIONS

The goals of this subtask are to train project personnel, operate the updated facility for the 12-month operations period and to include students from a local high school to participate in project deployment

The Recipient shall:

- Complete training and orientation of operations personnel. Training shall include:
 - Environmental health and safety training
 - Hygiene and housekeeping requirements
 - Basic process & instrumentation
 - Sampling and data collection plan
 - Maintenance procedures
- Prepare and provide system documentation that details standard operating procedures and non-standard operating procedures in a *Facility Operations Manual*.
- Prepare *Data Collection Test Plan*. This plan will detail the data to be collected, including:
 - Facility power loads, draw from grid, onsite generation, peak power demand
 - Battery system state including charge status and kWh charged to and discharged from the battery system
 - Project cost savings based on applicable utility rates for each type (energy, water)
 - Determine energy savings associated with the project, including improved energy efficiency savings for specified water treatment facility equipment.

EXHIBIT A

Scope of Work

- Estimate water savings associated with the project by calculating applicable water savings associated with reduced grid electricity consumption
- Document increased production of recycled water
- Equipment faults and shutdowns, as relevant
- UCR to input anticipated data (variables, set points, etc.)
- Operate the integrated facility for the 12-month operations period unless a shorter timeframe is approved in writing by the CAM
- Execute Data Collection Test Plan.
- Include data from Data Collection Test Plan in Final Report.
- Train students in supervisory control and data acquisition (SCADA) programming as it relates to wastewater treatment plant operations at the Victor Valley Wastewater Reclamation Authority facility.
 - Complete two project-related educational sessions/seminars for high school students, facilitated by UCR
 - Prepare *Training Results* in Monthly Progress Report and Final Report

Product:

- Facility Operations Manual
- Data Collection Test Plan (Draft and Final)

SUBTASK 2.6 REPORTING

The goals of this task are to collect and organize data and other information collected in support of the project to facilitate project reporting,

The Recipient shall:

- Collect information regarding benefits and barriers associated with the project, and discuss potential applicability of those benefits and barriers under large-scale deployment
- Assess water and energy savings data collected under Task 2.5, including energy efficiency savings due to improved water treatment plant equipment.
- Evaluate end-user behavior/use of the system and potential to alter energy or water savings
- Based on data collected under Task 2.5, monitor and verify energy and water savings, and persistence and sustainability of such benefits
- Identify critical market players with potential interest in deploying or supporting the storage and control technologies deployed under this project; key critical players may include regulatory agencies and water/electric utilities. Identify the anticipated roles of critical market players in support of the commercial deployment of the proposed technology.
- Consolidate information in this task in monthly report(s) and in the final report.

TASK 3 EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

EXHIBIT A Scope of Work

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
 - 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.

EXHIBIT A

Scope of Work

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

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

Products:

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

TASK 4 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES (*Mandatory task*)

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(s) on the project.

EXHIBIT A

Scope of Work

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

Products:

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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY

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

RESOLVED, that the Energy Commission approves Agreement EPC-15-079 from GFO-15-317 with Victor Valley Wastewater Reclamation Authority (VWVRA) for a \$1,734,059 grant to demonstrate an advanced, pre-commercial flow battery storage and control system at VWVRA's facility in Victorville, California that will improve efficiency, reduce the price of recycled water and increase its availability; 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 17, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat