

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-14-059 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Kiel Pratt	43	916-327-1412

Recipient's Legal Name	Federal ID Number
Trane U.S., Inc.	25-0900465

Title of Project
Laguna Subregional Wastewater Treatment Plant Advanced Microgrid

Term and Amount	Start Date	End Date	Amount
	5/8/2015	3/30/2018	\$ 4,999,804

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

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

Please select one list serve. Select

Agenda Item Subject and Description

Proposed resolution approving Agreement EPC-14-059 with Trane U.S., Inc. for a \$4,999,804 grant to demonstrate a microgrid that utilizes renewable electricity and battery energy storage at a City of Santa Rosa wastewater treatment plant. This project will also show how microgrids enable participation in ancillary services energy markets. (EPIC funding) Contact: Kiel Pratt. (Staff presentation: 5 minutes)

California Environmental Quality Act (CEQA) Compliance

- Is Agreement considered a "Project" under CEQA?
 - Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)):
 - Explain why Agreement is not considered a "Project":
 - Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because
 - If Agreement is considered a "Project" under CEQA:
 - a) Agreement **IS** exempt. (Attach draft NOE)
 - Statutory Exemption. List PRC and/or CCR section number: _____
 - Categorical Exemption. List CCR section number: 14 CCR 15301, 15303
 - Common Sense Exemption. 14 CCR 15061 (b) (3)
 - Explain reason why Agreement is exempt under the above section:
 - Class 1 - Operation, repair, maintenance, or minor alteration of existing structures or facilities not expanding existing uses.
 - Class 3 - New construction of limited small new facilities; installation of small, new equipment and facilities in small structures; and conversion of the use of small existing structures (e.g., construction of three or fewer single-family homes in urban areas)
 - 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 | |

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

Legal Company Name:	Budget
Alstom Grid, Inc.	\$ 2,100,000
Beutler Corporation	\$ 1,160,304
Lescrue Engineers	\$ 114,000
Sierra Research	\$ 100,000
Rockwood Consulting	\$ 184,500
The Regents of the University of California, Davis	\$ 25,000
City of Santa Rosa	\$ 50,000
TBD	\$ 16,500
	\$

EXHIBIT A Scope of Work

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Install Selective Catalytic Reduction Equipment
3	X	Install and Integrate Microgrid Controller and Automation
4		Install Energy Storage
5	X	Install Photovoltaic System
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
CPUC	California Public Utilities Commission
DOE	United States Department of Energy
DSM	Demand-Side Management
MGC	Microgrid Controller
PV	Solar Photovoltaic
SCR	Selective Catalytic Reduction emissions control technology
TAC	Technical Advisory Committee
WWTP	Wastewater Treatment Plant

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the deployment and testing of an integrated advanced microgrid at a wastewater treatment plant (WWTP).

B. Problem/ Solution Statement

Problem

California's electric grid must become more resilient and adaptable to climate change impacts, such as increased fires, severe storms, and heat waves. Microgrids can assist with overall grid capacity and reliability issues by being able to automatically disconnect ("island"), supply their own loads, and synchronize and reconnect. Advanced microgrid systems can also provide ancillary services to the electricity grid. The problem is that little real-world experience on the

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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operation of these systems has been developed, particularly at critical wastewater treatment facilities.

Solution

The Recipient will upgrade an existing wastewater plant to act as an advanced microgrid with the ability to provide ancillary services to the grid. The Recipient will then monitor the plant as it operates, gathering data from both standard and advanced microgrid operational capabilities.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to demonstrate that a microgrid at a WWTP can:

- Operate without compromising water quality guidelines
- Perform to microgrid standards
- Deliver reliable ancillary services to the grid

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability, and lower costs by:

- Reducing the need for new transmission and distribution capital upgrades by reducing peak demand
- Reducing the need for new “peaker” or load following generation resources by providing a load balancing ancillary service in the form of curtailable loads
- Improving grid reliability.

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 the ability of targeted advanced demand-side management (DSM) projects to meet specific grid needs, and further by demonstrating that an advanced microgrid can operate in a fashion that delivers substantial benefits to the grid without negatively affecting WWTP operation.

Advanced DSM projects to meet specific targeted applications and grid needs have been relatively rare, despite being first in California’s loading order. There are a few notable exceptions, such as the Southern California Edison Local Capacity Requirements program. Despite the fact that targeted advanced DSM practices such as advanced microgrids can be faster and lower in price than other options for applications ranging from resource adequacy to providing critical ancillary services to solving local capacity constraints, advanced DSM practices are often not even considered as an option due to a lack of perceived reliability.

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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WWTPs, while being large loads that are often perfectly located to meet specific local needs with an advanced microgrid approach, are reluctant to participate due to a perception of risk to critical processes associated with ceding some level of plant control to outsiders. This project proposes to act as a positive example to both domains. It will endeavor to show that concerns regarding the application of advanced DSM in general, and advanced microgrids in particular, while not unfounded, can be reliably mitigated through proper system design.

Agreement Objectives

The objectives of this Agreement are to:

- Demonstrate the ability of an advanced microgrid and its associated subsystems, such as man-in-the-loop day-ahead load nomination systems, to operate at a WWTP without negatively affecting plant operation
- Demonstrate the ability of a microgrid operating at a WWTP to meet the design objectives of the US Department of Energy (DOE) microgrid standard
- Demonstrate the ability of an advanced microgrid to reliably deliver ancillary services to the grid as predicted, offered, and dispatched.

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II. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

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

The Recipient shall:

For products that require a draft version

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

For products that require a final version only

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

For all products

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

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

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

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

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

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

- Terms and conditions of the Agreement;

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- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

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

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

The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

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

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The Recipient shall:

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

The CAM shall:

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

Recipient Products:

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

CAM Products:

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

Subtask 1.4 Final Meeting

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

The Recipient shall:

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

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

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

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize all Agreement activities conducted by the Recipient for the preceding month, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
 - Provide a synopsis of the project progress, including accomplishments, problems, milestones, products, schedule, fiscal status, and any evidence of progress such as photographs.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions. In addition, each invoice must document and

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verify:

- Energy Commission funds received by California-based entities;
- Energy Commission funds spent in California (*if applicable*); and
- Match fund expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

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

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM.
- Submit a draft of the outline to the CAM for review and comment.
- Once agreement has been reached on the draft, submit the final outline to the CAM. The CAM will provide written approval of the final outline within 10 days of receipt.

Recipient Products:

- Final Report Outline (draft and final)

CAM Products:

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

Subtask 1.6.2 Final Report

The Recipient shall:

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

Products:

- Final Report (draft and final)

CAM Products:

- Comments on Draft Final Report

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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.

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

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The Recipient shall:

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

Products:

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

Subtask 1.11 TAC Meetings

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

The Recipient shall:

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

Products:

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

III. TECHNICAL TASKS

The equipment installation and demonstration will occur at the Laguna Wastewater Treatment Plant in Santa Rosa.

TASK 2: INSTALL SELECTIVE CATALYTIC REDUCTION EQUIPMENT

The goal of this task is to install, commission and operate selective catalytic reduction (SCR) emissions control equipment on two gas-fired electrical generators.

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The Recipient shall:

- Produce a final design for the installation of the SCR units, and submit a *Construction-Ready Plan Set for SCR Equipment* to the CAM.
- Prepare and submit Bay Area Air Quality Management District applications for increased annual run time on upgraded units, and obtain permits for the same. Provide a *copy of the Bay Area Air Quality Management District application and permit* to the CAM.
- Install and commission operation of the SCR units, and prepare and provide a *Report on SCR Installation and Commissioning*.
- Conduct training with Laguna WWTP personnel to review operational requirements of new equipment. Prepare and provide *SCR Equipment Training Materials*.

Products:

- Copy of the Bay Area Air Quality Management District application and permit
- Construction-Ready Plan Set for SCR Equipment
- Report on SCR Installation and Commissioning
- SCR Equipment Training Materials

TASK 3: INSTALL AND INTEGRATE MICROGRID CONTROLLER AND AUTOMATION

The goal of this task is to install, commission, and operate a microgrid controller (MGC) to actively coordinate the activities of the plant loads, gas fired generators, photovoltaic system, and battery. Tasks 2, 4 and 5 will largely be completed when Task 3 begins. Task 3 will integrate the components installed in Tasks 2, 4 and 5, and provide the demonstration of the integrated system. All elements controlled by the MGC are mature technologies that are well understood, but operation of these individual elements as an integrated system is novel. Tasks 2, 4 and 5 simply procure and install the components but do not include the analysis and research for the integrated system, which will take place in Task 3. At least 12 months of operational data will be collected.

The Recipient shall:

- Produce a final design for the installation of the MGC, and submit a *Design and Installation Plan for the MGC* to the CAM.
- Prepare and submit a *Measurement and Verification Plan* covering:
 - Basic microgrid functionality in accordance with the DOE microgrid test standards promulgated as part of DE-FOA-0000997 “Microgrid Research, Development, and System Design”. Specifically, microgrid controllers developed under the referenced DOE funding opportunity announcement must at a minimum satisfy the technical functional requirements regarding the following attributes for operating and managing a microgrid system:
 - Disconnection
 - Resynchronization and reconnection
 - Steady-state frequency range, voltage range, and power quality
 - Protection
 - Dispatch
 - Enhanced resilience
 - Advanced microgrid functionality: Overall operation of the plant and of the MGC will be continuously logged at 4-second intervals throughout the test period. This periodicity was chosen to facilitate comparison with traditional generation assets

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responding to Automated Generation Signal controls typically in use by balancing authorities. In addition to the overall load that the plant is presenting to the grid, the MGC will also log data on:

- Power output from the PV system
- Power output from each of the gas fired generating sets
- Total motor load of the plant
- Current dispatched demand response
- Battery data including charge, discharge, and state of charge

This aggregated data will be able to be compared to the interval meter data for the meter for the entire facility for validation.

- Prepare and submit applications for MGC, and obtain permits for the same. Provide a *copy of the City of Santa Rosa building permit for the MGC* to the CAM.
- Design a man-in-the-loop interface for plant loads and prepare and provide a *Report on Load Nomination System*. The report should include and is not limited to the following:
 - Graphical presentations of the estimated flows the plant expects to receive over the next day
 - Minimum flows that are needed to maintain proper plant operation, and maximum flows that can be accommodated at any time
 - Documentation of the MGC's ability to use a combination of adaptive database algorithms and known plant load response to convert hour-by-hour load nomination offers into an hour-by-hour available load shed schedules, which will take into account the time lag between flow diversion and load reductions
 - Availability of distributed electrical generation and storage, and their scheduling and coordination by the MGC.
- Install and commission the MGC.
- Conduct testing to the above DOE microgrid test standards for basic MGC operation, and to the above description for advanced MGC operation, per the Measurement and Verification Plan.
- Demonstrate ability of the MGC to communicate with and control all loads and generation assets.
- Prepare and provide a *Report on MGC Integration and Operation* that will include details about MGC integration with grid operational control and with each plant component, including but not limited to the plant loads, gas fired generators, photovoltaic system, and battery.
- Demonstrate the ability of the adaptive logic functions of the MGC to reliably convert load elections to hour by hour load shedding/power operating bands.
- Collect at least 12 months of operational data from the integrated microgrid system. The partial and full data and results will be presented in meetings as appropriate, and will be presented in the Final Report per Task 1.6.
- Participate in a CPR meeting per Task 1.3

Products:

- Copy of the City of Santa Rosa building permit for the MGC
- Measurement and Verification Plan
- Design and Installation Plan for the MGC
- Report on Load Nomination System
- Report on MGC Integration and Operation
- CPR Report

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TASK 4: INSTALL ENERGY STORAGE

The goal of this task is to design, install, commission, and operate an electrical energy storage system. The planned capacity of the energy storage system is 2 megawatts.

The Recipient shall:

- Produce a final design for the installation of the energy storage system, and submit a *Construction-Ready Plan Set for the Energy Storage System* to the CAM.
- Prepare and submit applications for energy storage system, and obtain permits for the same. Submit a *copy of the City of Santa Rosa building permit for electrical energy storage system* to the CAM.
- Install and commission operation of the energy storage system. Prepare and provide a *Report on Energy Storage System Commissioning* and submit to the CAM. The report shall include and is not limited to the following:
 - Documentation of energy storage integration into the microgrid to allow the load of the plant as a whole to respond quickly to regulation up or regulation down signals from the system operator, while still accommodating the slower response capabilities of the remainder of the plant.
- Conduct training with Laguna WWTP personnel to review operational requirements of new equipment, and provide *Energy Storage Training Materials* to the CAM.

Products:

- Construction-Ready Plan Set for the Energy Storage System
- Copy of the City of Santa Rosa Building Permit for the Electrical Energy Storage System
- Report on Energy Storage System Commissioning
- Energy Storage System Training Materials

TASK 5: INSTALL PHOTOVOLTAIC SYSTEM

The goal of this task is to install, commission and operate a solar photovoltaic (PV) system at the WWTP.

The Recipient shall:

- Produce a final design for the installation of the PV system, and submit a *Construction-Ready Plan Set for the PV System* to the CAM.
- Prepare and submit applications for the PV system, and obtain permits for the same. Submit a *copy of the City of Santa Rosa Building Permit for the PV System* to the CAM.
- Install and commission operation of the PV system. Prepare and provide a *Report on PV System Commissioning* and submit to the CAM. The report should include and is not limited to the following:
 - Documentation of the PV system's integration with the smart inverter and other plant microgrid components.
- Conduct training with Laguna WWTP personnel to review operational requirements of new equipment, and provide *PV System Training Materials* to the CAM.
- Participate in a CPR meeting per Task 1.3

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Products:

- Construction-Ready Plan Set for the PV System
- Copy of City of Santa Rosa Building Permit for the PV System
- Report on PV System Commissioning
- PV System Training Materials
- CPR Report

TASK 6 EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - 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.

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- 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:

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

TASK 7 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
 - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
 - A description of the intended use(s) for and users of the project results.
 - Published documents, including date, title, and periodical name.
 - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the

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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)

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IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: TRANE U.S., 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-14-059 from PON-14-301 with **Trane U.S., Inc.** for a **\$4,999,804** grant to demonstrate a microgrid that utilizes renewable electricity and battery energy storage at a City of Santa Rosa wastewater treatment plant. This project will also show how microgrids enable participation in ancillary services energy markets; 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 April 8, 2015.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Harriet Kallemeyn,
Secretariat