EXHIBIT A
Scope of Work

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I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Microgrid Design
3	X	Microgrid Construction
4		Operation and Maintenance
5		Field Testing and Evaluation
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
BMcD	Burns & McDonnell
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
District	San Diego Unified Port District
GHG	Greenhouse Gas
HPS	High Pressure Sodium
LED	Light Emitting Diode
PPA	Power Purchase Agreement
PV	Photovoltaic
Recipient	San Diego Unified Port District
SDG&E	San Diego Gas and Electric
TAC	Technical Advisory Committee
TAMT	Tenth Avenue Marine Terminal

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of a replicable model for renewable-based microgrids at California ports and other goods movement facilities.

The Energy Commission issued solicitation GFO-17-302 Demonstrate Business Case for Advanced Microgrids in Support of California's Energy and GHG Policies to Demonstration of Standardized High-DER Penetration, Renewable-Based, Resilient and Commercially Viable Microgrids Located at California Military Bases, Ports, and Native American Tribes within IOU Service Territories. In response to GFO-17-302, San Diego Unified Port District (Recipient) submitted application #04, which was proposed for funding in the Energy Commission's Notice of Proposed Awards dated March 14, 2018. The Recipient's

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

EXHIBIT A
Scope of Work

application and the Notice of Proposed Award issued are incorporated by reference to this Agreement in their entirety.

In the event of any conflict or inconsistency between the terms of the Solicitation and the terms of the Recipient's Application, the Solicitation shall control. In the event of any conflict or inconsistency between the Recipient's Application and the terms of the Energy Commission's Award, the Commission's Award shall control. Similarly, in the event of any conflict or inconsistency between the terms of this Agreement and the Recipient's Application, the terms of this Agreement shall control.

B. Problem/Solution Statement

Problem

California ports are electrifying their operations to move toward zero emission operations, which dramatically increases their reliance and impact on the local electric grid. The migration to all-electric terminals will result in many terminals at least tripling their peak power consumption, while becoming more susceptible to operational disruptions due to losses of grid power[2]. Renewable microgrids provide a potential path to a carbon-free, resilient, and sustainable energy solution while reducing the effects on San Diego Gas and Electric's (SDG&E's) distribution system; however, the costs and operational uncertainties of microgrids at seaports present a barrier to adoption. Demonstration projects are needed to identify and overcome implementation challenges, while validating the operational and financial viability of microgrids at goods movement facilities.

Solution

The recipient will develop a solar + battery storage microgrid at the Port of San Diego's Tenth Avenue Marine Terminal (TAMT) to demonstrate the viability of a renewable-powered microgrid to seaport and goods movement industrial facilities. This project is also designed to demonstrate and evaluate innovative funding approaches to pay for key elements of the construction, operation, and maintenance of the microgrid using a power purchase agreement (PPA). This addresses a key issue with many industrial facilities that want the benefits of a renewable microgrid but cannot fund the capital expenses and are concerned about the additional maintenance of the equipment. The TAMT is an ideal demonstration facility because (1) it is located adjacent to the disadvantaged community of Barrio Logan; (2) it is an omni terminal that moves a wide range of goods; and (3) it supports critical maritime, military, and airport operations, serving as a U.S. Department of Defense Strategic Port. The TAMT Renewable Microgrid Project will serve as a repeatable technical, operational, and financial model for microgrid deployment at California goods movement facilities and beyond.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to:

- Goal 1: Demonstrate a repeatable model for renewable-based microgrids at seaport terminals, goods movement centers, and industrial facilities
- Goal 2: Operate with renewable energy in island mode
- Goal 3: Reduce greenhouse gas emissions
- Goal 4: Increase penetration of renewable electricity

[2] Port of Los Angeles Energy Management Action Plan, July 2014. https://www.portoflosangeles.org/DOC/DRAFT%20POLA%20E-MAP_July%202014.pdf

EXHIBIT A
Scope of Work

- Goal 5: Reduce electricity costs
- Goal 6: Demonstrate a standardized commercial microgrid system

Ratepayer Benefits:[3] This Agreement will result in the ratepayer benefits of greater electricity reliability, lower costs, and increased safety. The TAMT Renewable Microgrid Project will increase electric reliability by using solar + storage to provide local and reliable capacity and energy in one of San Diego Gas & Electric's highest density load centers, while mitigating the duck curve[4]. The project will lower ratepayer costs by reducing the need for electric utility infrastructure improvement through consistent management of peak demand, in conjunction with other microgrid and energy storage projects. The evaluation of multiple funding options, including Power Purchase Agreements (PPAs), to construct, maintain, and operate a microgrid will demonstrate the effectiveness of various financial model options for reducing upfront capital investments for infrastructure, while providing reduced ongoing energy costs to ratepayers implementing similar projects. Since the PPA provider is contracted for the operation and maintenance of the system, this approach also helps to ensure that the microgrid is properly maintained throughout its life without placing an additional burden on the recipient's personnel. The proposed project will increase knowledge of microgrid safety by performing cyber security assessments of vulnerabilities and developing mitigation strategies. On a regional scale, the increase in energy resiliency at TAMT will benefit San Diego ratepayers, and citizens of the region, including the adjacent disadvantaged community of Barrio Logan, who rely on the recipient for emergency relief, supplies, and fuel in the event of a natural or manmade disaster that caused a disruption to the electrical grid.

Technological Advancement and Breakthroughs:[5] 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 operational and financial viability of a renewable + storage microgrid at a marine cargo omni terminal that delivers cargo that economically benefits the region, supports military operations, and supplies the San Diego International Airport with jet fuel. Following the appropriate public selection process, a PPA will be structured to install and maintain solar panels for the purpose of generating renewable energy, for solar and for the operation and maintenance of the microgrid at a rate that is anticipated to provide net monthly and annual savings for the District. It is the financial structure and the application of a microgrid at a marine terminal that are the main components of the proposed TAMT Renewable Microgrid Project, helping to advance the deployment and adoption of microgrids.

Agreement Objectives

The objectives of this Agreement are to:

- Demonstrate the operational and financial viability of a solar + storage microgrid at TAMT, a marine omni terminal.

[3] 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).

[4] https://www.caiso.com/documents/flexibleresourceshelprenewables_fastfacts.pdf

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

EXHIBIT A
Scope of Work

- Assess islanding capabilities under various battery storage system states of charge and solar generation scenarios to provide 12 hours of operation independent of the grid.
- Reduce greenhouse gas (GHG) emissions from electric power use by 100% relative to baseline conditions.
- Implement energy efficiency measures to reduce electricity use by greater than 20%.
- Use solar + storage microgrid to reduce annual energy costs by more than $250,000.
- Ratepayer cost savings, environmental benefits to the community, and benefits to the utility through demand response.
- Develop an approach, lessons learned, and business case to support replicability at other facilities.

EXHIBIT A
Scope of Work

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

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

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

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

  The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
  - Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
  - Text documents will be in MS Word file format, version 2007 or later.

EXHIBIT A
Scope of Work

- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

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

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

MEETINGS

Subtask 1.2 Kick-off Meeting
The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

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

  The administrative portion of the meeting will include discussion of the following:
  - Terms and conditions of the Agreement;
  - Administrative products (subtask 1.1);
  - CPR meetings (subtask 1.3);
  - Match fund documentation (subtask 1.7);
  - Permit documentation (subtask 1.8);
  - Subcontracts (subtask 1.9); and
  - Any other relevant topics.

EXHIBIT A
Scope of Work

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);
- Technology/Knowledge Transfer (Task 7*); and* Any other relevant topics.

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

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

Recipient Products:
- Updated Project Schedule (if applicable)
- Updated List of Match Funds (if applicable)
- Updated List of Permits (if applicable)

CAM Product:
- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings
The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

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

The Recipient shall:
- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- 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.

EXHIBIT A
Scope of Work

The CAM shall:

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

Recipient Products:

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

CAM Products:

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

Subtask 1.4 Final Meeting

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

The Recipient shall:

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

  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
    - Disposition of any state-owned equipment.
    - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
    - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
    - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.

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EXHIBIT A
Scope of Work

  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities.*
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices
The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

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

Products:
- Progress Reports
- Invoices

Subtask 1.6 Final Report
The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement 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)

EXHIBIT A
Scope of Work

CAM Product:

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

Subtask 1.6.2 Final Report
The Recipient shall:

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

EXHIBIT A
Scope of Work

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

CAM Product:
- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds
The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

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

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

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

EXHIBIT A
Scope of Work

Products:

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

Subtask 1.8 Permits

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

The Recipient shall:

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

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

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

EXHIBIT A
Scope of Work

- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts (draft if required by the CAM)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

EXHIBIT A
Scope of Work

- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

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

Subtask 1.11 TAC Meetings
The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

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

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

EXHIBIT A
Scope of Work

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 MICROGRID DESIGN

The goal of this task is to design the microgrid. This includes preliminary assessment and design, as well as (1) system design modeling; (2) completion of final designs for lighting conversion, roof retrofits, electrical infrastructure upgrades, solar photovoltaic (PV) system, and battery storage system; (3) microgrid integration; (4) third party review of designs; and (5) obtain necessary permits from the City of San Diego and SDG&E for Rule 21 compliance.

The Recipient shall:

- Prepare and provide a *System Modeling and Optimization Presentation* to include, but not be limited to:
  - Identification of system loads
  - Identification of different DER mixes and battery sizes to optimize interruption, investment, and utility costs
  - Identification of different battery operation strategies
  - Identification of reliability benefits during power outages
  - Modeling results
- Prepare and provide a *Cyber Security Architecture Assessment* to include:
  - Cyber security architecture for the microgrid based on a high-level risk assessment. The risk assessment process will involve: identifying key assets, characterizing potential threats, assessing vulnerabilities and their impact, assessing threat likelihood, determining risk, and recommending security controls. Key findings will be documented in a *Cyber Security Architecture Assessment*.
- Prepare and provide a *Microgrid Design and Engineering Presentation* to include a summary of the 100% design documents. Designs will include but not be limited to:
  - High mast lighting conversion from high pressure sodium (HPS) to light emitting diode (LED) fixtures.
  - Roof retrofits to support a solar PV system with a design life of 25 years.
  - Upgrades to the 12-kV distribution system required to support microgrid functionality, including:
    - The primary switchgear at the point of interconnection with SDG&E will be modified to provide the necessary protection schemes for SDG&E's Rule 21 interconnection requirements.
    - An existing, vault-mounted sectionalizing switch will be replaced to provide a connection point to the 12-kV distribution system.
    - A new, 480V switchboard will be provided to connect the solar PV and energy storage systems.
  - Microgrid component integration, including:
    - Rooftop solar PV system to meet lighting, security, warehouse, dry bulk, and fuel storage facility loads.
    - Battery storage system.
    - Centralized microgrid controller that will monitor the state of the 12-kV system.
    - Complete microgrid integration to meet needs for grid-tied and islanded modes of operation.

EXHIBIT A
Scope of Work

- Prepare and produce a *Microgrid Design Review Presentation* to summarize:
  - Independent third-party reviews of the microgrid design to confirm that the microgrid designs are optimized for use cases.
- Prepare a CPR Report #1 in accordance with subtask 1.3 (CPR Meetings)
- Participate in a CPR Meeting #1.

Products:
- System Modeling and Optimization Presentation
- Cyber Security Architecture Assessment (draft and final)
- Microgrid Design and Engineering Presentation
- Microgrid Design Review Presentation
- CPR Report #1

TASK 3 MICROGRID CONSTRUCTION
The goal of this task is to construct the microgrid, inclusive of energy efficiency upgrades and improvements to supporting infrastructure, as well as to install and commission the microgrid. Construction contracts may be entered following the appropriate public selection process(es).

The Recipient shall:
- Install the microgrid per the final engineering documentation completed in Task 2, including the *System Modeling and Optimization Presentation, Cyber Security Architecture Assessment, Microgrid Design and Engineering Presentation, and Microgrid Design Review Presentation*.
- . The microgrid installation will include, but is not limited to:
  - Convert lights from HPS to LED.
  - Retrofit and reroof warehouse to provide a roof capable of supporting a PV system, with a minimum life of 25 years.
  - Upgrade the following electrical infrastructure serving the District's 12-kV system:
    - The primary switchgear at the point of interconnection with SDG&E will be modified to provide the necessary protection schemes for SDG&E's Rule 21 interconnection requirements.
    - An existing, vault-mounted sectionalizing switch will be replaced to provide a connection point to the 12-kV distribution system.
    - A new, 480 V switchboard will be provided to connect the solar PV and energy storage systems.
    - A new 1,000-kVA pad-mounted transformer will be installed.
    - New duct bank will be installed to provide connection point to the 12-kV distribution system.
  - Enter into a PPA to purchase energy generated by the solar PV system.
  - Install solar PV system on the warehouse.
  - Install battery storage system adjacent to the warehouse.
  - Install a centralized microgrid controller.
- Provide CAM *Pictures of Installed Microgrid Equipment* with name plate capacities in *Progress Report*.
- Prepare and provide a *Commissioning Presentation* to summarize the commissioning of the microgrid in both grid-tied and islanded modes of operation. The commissioning will include:

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EXHIBIT A
Scope of Work

- Conduct a final walkthrough to ensure the installation is in accordance with a licensed engineer's final design, and any documentation to ensure that the installed system meets all federal, state, local, and any applicable code requirements.
- Work with the PPA provider to test the desired sequences of operation for the electrical monitoring and control system.
- Optimization of load shifting/peak shaving, demand response, and islanded operations. The results of the commissioning effort will be documented in the *Commissioning Presentation*.

- Obtain *Rule 21 Permit to Operate* from SDG&E to demonstrate interconnection approval and provide a copy to the CAM
- Prepare a CPR Report #2 in accordance with subtask 1.3 (CPR Meetings)
- Participate in a CPR Meeting #2.

Products:

- Commissioning Presentation
- Copy of Rule 21 Permit to Operate
- CPR Report #2

TASK 4 OPERATION AND MAINTENANCE

The goal of this task is to arrange for and coordinate the long-term operation and maintenance of the microgrid system to maximize the benefits the District receives from the microgrid.

The Recipient shall:

- Operate and maintain the microgrid system. This includes establishment of operational and performance metrics under grid-tied and islanded modes of operation.
- Develop an *Operations and Maintenance Manual* containing relevant information for each microgrid component.
- Train facilities staff and first responders on system operations and safety features.
- Maintain all other components of the terminal's electrical infrastructure to support terminal and microgrid operations.

Products:

- Operation and Maintenance Manual (draft and final)

TASK 5 FIELD TESTING AND EVALUATION

The goal of this task is to perform field testing and evaluation of the microgrid functionality with a focus on the project's four DER elements.

The Recipient shall:

- Develop a *Measurement and Verification Plan*. The plan will assess: (1) energy efficiency savings, (2) solar + storage operational and financial performance, (3) islanded operations performance, (4) demand response financial performance, and (5) installation issues, microgrid performance and operational constraints, and ability of the system to respond to grid emergencies. The plan will include, but is not limited to:
  - Description of the systems to be tested
  - Description of the data collection methodology, including:
    - Data collection protocols

EXHIBIT A
Scope of Work

- Data collection schedule

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  - Field demonstration of islanded operations, including:
    - Duration of simulated islanded operation
    - Environmental conditions
    - Target operational loads
  - Justification for the tests
  - Information storage and retention plan
  - Expected performance
  - Plans for documentation of technical, environmental and economic data, including, but not limited to:
    - Installation issues
    - Operational constraints
    - Operational performance, including duration of islanded mode capability
    - Response to grid emergencies.
    - Parameters that will measure and document successes, lessons learned, and best practices for the above.
  - Description of a measurement and verification plan that includes, but is not limited to:
    - Energy Efficiency (EE) to measure before and after EE for the quantification of actual kW/kWh saved.
    - Demand Response (DR) including, but is not limited to:
      - kW/kWh provided when DR is used
      - Definition of how the DR is used; the services provided by the microgrid; and the proposed value provided for these microgrid load services
      - The values of integrated services and how the services can be verified, measured and valued
      - DR event performance information from the IOU or CA ISO for any DR services provided

- Collect data on the operational benefits of the microgrid monthly over the 12-month demonstration period, or other term approved by CAM in writing, per the *Measurement and Verification Plan,* including:
  - **Annual electricity savings*:*** The primary driver of end user energy reductions at the terminal will be the conversion of lighting from HPS to LED fixtures. Baseline annual energy usage prior to lighting conversion will be compared to usage following conversion and optimization.
  - **GHG emission reductions*:*** GHG emissions reductions will be calculated based on reductions in energy use from efficiency measures as well as the difference in the percentage of renewable energy powering the terminal from the solar PV and energy storage system as compared to that of SDG&E provided power.
  - **Energy cost reductions*:*** Modeled projections of energy costs will be compared to the Port's actual utility bills and PPA costs. The PPA provider will perform this assessment and provide a report to the Port monthly to document energy cost reductions.
  - **Peak load reduction and shifting*:*** Financial benefits of energy storage use optimization will be evaluated under peak shaving and load shifting scenarios.
  - **Net load shape (duck curve mitigation):** Net load shape will be modeled for a solar PV only installation and for solar + storage installation to assess the potential for the project to mitigate the duck curve. This baseline analysis will be

EXHIBIT A
Scope of Work

used to evaluate actual performance and usage of the system during the evaluation period.

- **Security and safety:** Although the primary purpose of the microgrid is energy security, it is critical that the microgrid not introduce new vulnerabilities to the terminal. A cyber security assessment in collaboration with the District's Information Technology team will be conducted.

- Provide monthly *Microgrid Data Reports* to the CAM on field data collected for the one-year testing and evaluation period, or the term approved by the CAM in writing, that includes, but is not limited to:
  - Technical data
  - Operational data
  - Economic data
  - Environmental data
  - Other areas as determined by the CAM
- Provide a *Final Measurement and Verification Report* at the conclusion of the one-year testing and evaluation period.
- Perform ongoing monitoring of system performance, including solar output, battery state of charge, and cost reductions, using an automated system to quantify expected microgrid benefits for the life of the PPA.
- For 3 years beyond the term end date of this Agreement, deliver the following to the Energy Commission annually:
  - A confirmation that the microgrid system is operating
  - Any available summary performance data, benefits, or other relevant summary data reports that can be easily provided based on the data collecting systems installed.

Products:

- Measurement and Verification Plan (draft and final)
- Microgrid Data Reports
- Final Measurement and Verification Report (draft and final)

TASK 6 EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete four Project Benefits Questionnaires that correspond to four main intervals in the Agreement: (1) Kick-off Meeting Benefits Questionnaire; (2) Mid-term Benefits Questionnaire; (3) Final Meeting Benefits Questionnaire; and (4) Three Years Beyond the Term End Date 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, but not limited to:
  - Reliability, resiliency and sustainability improvements as provided by the microgrid.
  - Net impacts on the larger grid's load and load shape as provided by the microgrid.

EXHIBIT A
Scope of Work

- GHG reductions as provided by the microgrid, compared to using the utility grid for the electricity and also GHG reductions as provided by any new energy efficiency capabilities of the microgrid project.
- The dollar value of energy savings as provided by the microgrid, each year.
- The dollar value of any co-benefits that may accrue to the project, each year.
- Cost savings or increments compared to business as usual, as provided by the microgrid, including but not limited to technology and installation costs, operations and maintenance, and energy use.
- Benefit metrics for each of the different DER separated by the specific DER element (e.g., the value energy storage provides to the microgrid owner/operator, the value renewables provide to the microgrid owner/operator, the value demand response services provide to the microgrid owner/operator).
- Benefit of services as provided by the microgrid to the utility grid.

- 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.

EXHIBIT A
Scope of Work

- 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.

- Prepare a *Business Case Report*. As appropriate, the report will discuss the following:
  - How the microgrid system meets the critical needs of the intended end user/operator.
  - Define why the specific configuration has a high probability of being replicated in the future without EPIC funds.
  - Other areas as determined by the CAM.

Products:
- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire
- Business Case Report (draft and final)

TASK 7 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES
The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

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

EXHIBIT A
Scope of Work

- 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. Presentation materials must be approved by the CAM in writing prior to the conference/workshop(s).
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least six (6) *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 (Attachment Project Schedule).