STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

New Agreement EPC-18-011 (To be completed by CGL Office)

ERDD	James Friedrich	51	916-445-5299

Zero Net Energy Alliance, Inc. 47-5562137

Lancaster Advanced Energy Community (AEC) Project

	6/01/2019	3/31/2023	$ 4,999,060

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

Proposed Business Meeting Date	6/12/2019	☐ Consent	☒ Discussion
Business Meeting Presenter	James Friedrich	Time Needed:	5 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description

ZERO NET ENERGY ALLIANCE, INC. Proposed resolution approving Agreement EPC-18-011 with Zero Net Energy Alliance, Inc. for a $4,999,060 grant to deploy two master-metered all-electric zero net energy residential microgrids and three renewable microgrids at Lancaster schools, and to provide funding to support scale-up of the Lancaster Green District Program. This agreement will also deploy a virtual power plant to integrate and manage these distributed energy resources.

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):
   Explain why Agreement is not considered a "Project":
   Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because

2. If Agreement is considered a "Project" under CEQA:
   ☒ a) Agreement **IS** exempt. (Attach draft NOE)
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit 14, § 15301 ; Cal. Code Regs., tit 14, § 15303
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

   Explain reason why Agreement is exempt under the above section:
   The proposed project is a net zero project that involves three components. The first component modifies existing solar systems within the Lancaster School District to incorporate microgrid equipment and batteries. The second component involves installation of battery storage systems at existing commercial and industrial facilities. The third component involves installation of microgrid equipment and battery storage at a low-income housing development. The school, commercial, and industrial sites are already developed and are not located in environmentally sensitive areas. All utilities exist and are serving the sites and no exceptions exist (cumulative impacts, scenic highways, hazardous materials, etc.) that would prevent the use of these exemptions.

   The residential development was approved by the Lancaster Planning Commission in May 2018 and is covered under an initial study/mitigated negative declaration prepared for the project. The installation of the microgrid system and battery storage is covered under the initial study/mitigated negative declaration as part of the construction of the housing development and under Section 15303, New Construction. This exemption specifically allows for the "installation of small new equipment" and utilities to serve new construction. The project site is not located within an environmentally sensitive area, utilities are immediately adjacent to the project site, and no exceptions exist that would prevent the use of the exemption.

   ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study
   ☐ Negative Declaration
   ☐ Mitigated Negative Declaration
   ☐ Environmental Impact Report
   ☐ Statement of Overriding Considerations

Legal Company Name:	Budget
Energy Solutions International	$ 798,477
Olivine, Inc.	$ 1,650,000
Gridscape Solutions	$ 1,223,320
Blue Strike Environmental, Inc.	$ 200,209
TerraVerde Energy LLC	$ 239,792
TRC Engineers, Inc.	$ 200,043
	$
	$
	$

STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

Legal Company Name:
City of Lancaster
Lancaster School District
Amber Kinetics, Inc.

Funding Source		Funding Year of Appropriation	Budget List No.	Amount
EPIC		17-18	301.001E	$3,738,300
EPIC		18-19	301.001F	$1,260,760
				$
				$
				$
				$
R&D Program Area:	EDMFO: EDMF			$4,999,060
Explanation for “Other” selection				
Reimbursement Contract #:			Federal Agreement #:	

Name:	Sharon Tobar			Name:	Richard Schorske		
Address:	744 Eureka Ave			Address:	744 Eureka Ave		
City, State, Zip:	Davis, CA 95616-3647			City, State, Zip:	Davis, CA 95616-3647		
Phone:	916-869-7211 /	Fax:	- -	Phone:	415-310-2407 /	Fax:	- -
E-Mail:	SharonT@znealliance.net			E-Mail:	richards@znealliance.net		

☒ Competitive Solicitation Solicitation #: GFO-15-312p2

☐ First Come First Served Solicitation

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

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Residential Microgrids for Affordable Housing Developments
3	X	Resilient Schools Network
4		Green Energy District
5		Community-Based Virtual Power Plant
6		Independent Measurement and Verification
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
AEC	Advanced Energy Community
API	Application Programming Interface
CAISO	California Independent System Operator
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CCA	Community Choice Aggregator
CEC	California Energy Commission
CPR	Critical Project Review
CPUC	California Public Utilities Commission
DERA	Distributed Energy Resource Aggregation
DERMs	Distributed Energy Resource Management System
DERs	Distributed Energy Resources
EE	Energy Efficiency
EPIC	Electric Program Investment Charge
EV	Electric Vehicle
IOUs	Investor-Owned Utilities
IRR	Internal Rate of Return
kW	Kilowatt
LCE	Lancaster Choice Energy
M&V	Measurement and Verification
MS	Microsoft
MW	Megawatt
NILM	Nonintrusive Load Monitoring
NWAs	Non-Wires Alternatives
O&M	Operations and Maintenance
PG&E	Pacific Gas and Electric
PPA	Power Purchase Agreement

[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

Acronym/Term	Meaning
PV	Photovoltaic
REC	Renewable Energy Credit
SCE	Southern California Edison
SOW	Scope of Work
TAC	Technical Advisory Committee
TOU	Time of Use
VPP	Virtual Power Plant
ZNE	Zero Net Energy

Exhibit A
Scope of Work

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

A. Purpose of Agreement

Purpose

The purpose of this Agreement is to fund the deployment of distributed energy resources (DERs) in stand-alone and microgrid applications, and integrate them into a community-based virtual power plant (VPP). The VPP optimizes the DERs for cost savings, revenue generation, and grid resiliency to maximize DER value. The microgrid applications include two master-metered, zero net energy (ZNE), residential microgrids (including a demonstration of a flywheel energy storage system), as well as three renewable energy microgrids at three Lancaster city schools. Additionally, this agreement will fund the Lancaster Green District Program, an innovative financing and public-private partnership model to deploy battery storage assets in commercial and industrial facilities.

Background

In 2011, the City of Lancaster set a goal to become the first zero-net-energy city in California. Regulatory and pricing issues, including high upfront costs for renewable resources, burdensome interconnection applications for energy storage, and unproven business models for leading-edge clean energy technologies such as microgrids are significant barriers to advancing energy technologies at the scale Lancaster requires. Phase I of this project was funded under EPIC grant EPC-15-069 titled “Lancaster Advanced Energy Community (AEC) Project”. The project start date was 7/13/2016 and end date was 3/30/2018 with a total grant amount of $1,469,779. Phase I of the Lancaster Advanced Energy Community project planned a ZNE microgrid connected to an affordable housing project that enables cost-effective deployment of advanced technologies. The project team also developed a community DER valuation framework that assesses the value of DERs on an aggregated and integrated network basis from multiple stakeholder perspectives by combining various value streams and evaluating evolving revenue and market participation opportunities. This framework was used to inform the shared services model behind the Green District Program that integrates storage, solar, and smart building technology as a service for large commercial and industrial customers. The main lessons learned were (1) how to make zero-net-energy residential communities possible from a financial and technical perspective, and (2) how to capture the value of distributed energy resources in a standardized and reliable manner to develop scalable business models and attract the financial investment necessary to support widespread use of clean energy resources.

B. Problem/Solution Statement

Problem

As cities increase their renewable energy mix to meet California’s aggressive renewable energy targets, they face increasing challenges from temporal imbalances in power production and peak demand. Additionally, developers face cost challenges in developing zero-net-energy (ZNE) subdivisions, as ZNE homes typically carry a significant up-front cost to either the developer or the customer due to the added cost of photovoltaic (PV) and energy storage. There is urgent need for new business models that enable cost-effective implementation of solar plus storage and other DER non-wires alternatives (NWAs) to traditional generation. Finally, growing climate impacts, especially intensifying wildfires, have underscored the need and opportunity to increase local

resilience by accelerating deployment of renewable microgrids. Lancaster is located directly over the San Andreas Fault at the end of a long feeder line, which creates exceptional risk of long-term outages in the event of an earthquake, fire, or other emergency.

Solution

As Lancaster increases its reliance on distributed solar PV as a base load resource, the deployment of the microgrids and additional battery storage deployments, as well as the integration of these resources into a VPP, will increase grid reliability and substantially mitigate reliability issues with increased PV generation. Master-metering new residential subdivisions reduces interconnection costs and better enables these communities to participate in grid services markets. In addition, the deployment of battery storage through the Green District Program utilizes innovative, stationary storage business models that minimize up-front capital costs and the capture multiple value streams. These improvements allow high penetrations of solar PV generation to be more affordable and feasible for both the utility and its customers. This model can scale across the state once demonstrated. In addition, the residential community and resilient school microgrids will have islanding and anti-islanding capabilities and will maintain critical community services and act as shelters during emergencies while preventing back feeding energy onto the grid.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

1. Demonstrate the costs and benefits of diverse renewable microgrid technologies and configurations in ZNE residential communities and schools.
2. Demonstrate approaches to improving community energy resilience, including strengthening back-up power capabilities.
3. Optimize the value of clean energy assets through launch of a DER-based VPP, demonstrating proof-of-concept of aggregating multiple DER resource types across all customer segments within an electric service territory.
4. Capture stacked value streams to optimize participants' energy savings, demand charge savings, revenue generation from grid services market participation, all while increasing grid resiliency, reducing carbon emissions, and offsetting procurement costs for the electric service provider through the Green District Program.
5. Streamline the process for other communities to deploy Advanced Energy Community solutions proven to be technically and economically viable.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater electricity reliability, lower costs, and increased safety. Microgrid and battery deployments will enable distributed solar PV to serve as a base load resource to Lancaster, substantially mitigating reliability issues with PV generation while stabilizing the grid and indirectly lowering costs to ratepayers through reduced infrastructure investments. The master-metered design of the residential microgrids reduces interconnection costs. Deployments integrated with the VPP allow customers to benefit from participation in grid service markets.

[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).

Increased safety will be achieved by the microgrid's islanding/anti-islanding capabilities and battery storage at key sites throughout the city, allowing these sites to maintain critical community services and act as shelters during emergencies while preventing back feeding energy onto the grid.

Technological Advancement and Breakthroughs:[3] This Agreement will support the development and commercialization of technological advancements and breakthroughs that overcome barriers to the achievement of the State of California's statutory energy goals by demonstrating promising new business models that will harness power of the smart, "edge-centric" grid, including the deployment of a VPP, the Green District Program's public-private storage ownership models, ZNE residential microgrids, and innovative rate designs. In addition, the agreement will act as a demonstration for promising technical solutions that will lower costs and provide superior operational value, including a side-by-side demonstration of flywheel and lithium-ion storage systems.

Agreement Objectives

The objectives of this Agreement are to:

- For the Residential Microgrid:
  - Construct two renewable microgrids totaling 857 kilowatts (kW) of solar and 2950 kWh of energy storage (lithium-ion and flywheel) to help power 245 ZNE homes.
  - Pilot a new residential rate design that supports community-scale microgrid development, captures diverse, currently untapped DER value streams, and shares value with residents of the affordable housing community.
- For the VPP:
  - Aggregate 5 MW of solar PV, 10 MWh of energy storage, and another 5 MW of managed flexible load within the LCE service area, as applicable.
  - Include VPP participants from groups such as industrial customers targeted from the top 50 largest customers in the service area, LCE customers participating in LCE's battery hosting program, EV charging stations, including opportunities for both public and commercial charging facilities, LCE Customers participating in the "Green District" DER program, and microgrids external to this project, as applicable.
- For the Resilient Schools:
  - Construct three renewable microgrids for the Lancaster School District with a total of 1.2 megawatts (MWs) of solar and 540 kWh of storage that is integrated with the Lancaster VPP.
- For the Green District Program:
  - Install and commission 2.5 MWh of energy storage systems using a novel public-private finance model to overcome barriers of upfront costs while meeting customer, LCE, and other partner requirements for return on investment and internal rate of return (IRR).
- Develop user-friendly guides for: a) Residential Microgrid Designs; b) DER Valuation and Deployment; c) Community Clean Energy Networks and VPPs; d) Community Resiliency Centers; and e) ZNE and Zero Net Carbon Goal Setting

[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.

- Demonstrate ratepayer benefits resulting from microgrid and battery deployment including greater reliability, lower costs, increased safety, and customer access to grid services markets.

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

- 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.
- 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.

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.

The Recipient shall:

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

The CAM shall:

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

Recipient Products:

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

CAM Products:

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

Subtask 1.4 Final Meeting

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

The Recipient shall:

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

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

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

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
    - Summarize 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. In addition, each invoice must document and verify:
    - Energy Commission funds received by California-based entities;
    - Energy Commission funds spent in California *(if applicable)*; and
    - Match fund expenditures.

Exhibit A
Scope of Work

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 a Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

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

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Approvalof 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.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

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

CAM Product:
- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

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

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request 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, a copy of a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.

- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

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

Subtask 1.8 Permits

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

The Recipient shall:

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

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

Products:

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

Subtask 1.9 Subcontracts
The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)
The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

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

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

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;

- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- 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

TASK 2 RESIDENTIAL MICROGRIDS FOR AFFORDABLE HOUSING DEVELOPMENTS

The goal of this task is to develop two distinct community microgrids in public housing developments that demonstrate highly scalable examples of residential microgrids.

Subtask 2.1 Planning and Procurement

The goal of this subtask is to update the design and planning work completed in Phase I and prepare each community microgrid site for interconnection and operation.

The Recipient shall:

- Develop a *Residential Microgrid Component Specification and System Engineering Report*, which will include but not be limited to:
    - Specific vendors, models, and costs, of all microgrid system components, as well as electrical diagrams detailing where the components are to be installed, and how they integrate with the distribution infrastructure and DERs within the community. Components will include microgrid central controller, interconnection switch package, grid-forming inverters, and telemetry devices.
    - Procurement details and installation plan for long duration flywheel energy storage.
    - Operating strategy of virtual microgrid including autonomous host-site microgrid.
    - Emergency response communications architecture.
- Provide interconnection support to the City of Lancaster. Support will include but is not limited to:
    - Submission of a Rule 21 Pre-Application Support Request.
    - Negotiations with Southern California Edison (SCE) around islanding configuration and benefits.
    - Submission of the Interconnection Application.

  These activities will be summarized in the *Interconnection Report and Recommendations* described in Subtask 2.4.
- Use the load forecasts, building models, generation, and dispatch simulations completed in Phase I to propose a new rate schedule for LCE and the residential microgrid customers. The *Residential Microgrid Rate Schedule Report* will include a summary of the rate design, detailed modelling results, revenue forecasts, and sensitivity analysis.

Products:

- Residential Microgrid Component Specification and System Engineering Report
- Residential Microgrid Rate Schedule Report (Draft and Final)

Subtask 2.2: Implementation and Commissioning

The goal of this subtask is to deploy the system components identified in subtask 2.1 into two community microgrid configurations.

The Recipient shall:

- Install microgrid components in line with specification in the *Residential Microgrid Component Specification and System Engineering Report.*
- Integrate the DER elements at each host site to:
    - Verify the microgrid works in grid-tied mode with no interruption to ongoing site operations.
    - Verify performance of the integrated system

  - Verify value-added grid services use cases, including demand response, energy efficiency, demand management, and EV charging
- Verify and validate data collection from telemetry devices installed at each home. Data validation will include solar generation data, energy storage throughput and state of charge data, and dynamic load data in each home.
- Complete *Residential Microgrid Site Completion Report* - a comprehensive check of all components (hardware, software, etc.) to ensure the site configuration and all equipment components are complete and tallied. This will include but not be limited to:
  - A checklist to ensure that all equipment and services required to install and configure the microgrid at the proposed sites has been procured, installed, and configured correctly per manufacturer and safety guidelines.
  - A full system end-to-end integration test report (i.e., solar is working, storage is working, all meters are working, and end-to-end system tests are satisfied).
  - A checklist to ensure all microgrid components are properly reporting data and control information to the DERMS system.
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:
- Residential Microgrid Site Completion Report
- CPR Report

Subtask 2.3: Operations and Maintenance
The goal of this task is to perform tests and assess the performance of the residential microgrids. Essential testing data for all valuable scenarios will be collected and an in-depth performance evaluation process will be performed to verify the projected benefits.

The Recipient shall:
- Apply advanced data integration, management, visualization, and security practices to ensure that all project stakeholders have secure access to relevant data streams relating to operation and optimization of the microgrids and VPP functionalities, that could include, but not be limited to:
  - Load forecasts.
  - Advanced Metering Infrastructure metering data (i.e., Green Button).
  - Asset telemetry data (i.e., state of charge, generation, on-site loads).
  - California Independent System Operator market Locational Marginal Pricing.
  - Weather station data.
  - Grid congestion data.
  - CAISO invoices.
  - Market settlement data.
- Implement retail billing process and complete *Residential Microgrid Retail Billing Report* that will detail a replicable methodology for implementing a cost-effective billing process in a CCA (or other load serving entity) setting and include challenges and mitigation measures.
- Prepare and deliver *Staff Training Materials for Microgrid Operators* designed to instruct key LCE staff in the day-to-day operations of the microgrid, including: data management, software and controls, system monitoring, billing and settlement procedures, microgrid customer interactions, and accessing technical support. Materials will include written

documentation (i.e., user manuals, standard operating procedures), as well as other appropriate media (i.e., video tutorials, slide decks, web-based materials).
- Perform microgrid test in defined scenarios/use cases specific to each of the sites.
- Collect and organize data collection and analysis for the period of six months after commissioning microgrids at each site and implement systems to continue data collection and analysis beyond CEC agreement end date.
- Complete *Residential Microgrid Data Collection Reports*. This report will describe all the energy usage, solar production, storage charge/discharge and resulting net energy savings, and greenhouse gas reduction. It will provide historical data on a daily, weekly, and monthly basis. The site data collection reports will be generated from the DERMS system for each site.
- Complete *Microgrid Operations Test Report*: A series of tests will be conducted at each microgrid site after it is commissioned and brought into service. The results of these test over a period of 4-6 months will be provided in a comprehensive *Microgrid Operations Test Report*. We will conduct both on-grid performance and off-grid performance tests.
- Complete *Operations and Maintenance Manual,* a document describing overall operation of the microgrid as well as periodic and ad-hoc maintenance activities that need to be performed by the personnel onsite. It will document all events and faults with suggested causes, troubleshooting steps, as well as procedure to resolve the faults.

Products:
- Residential Microgrid Retail Billing Reports (Draft and Final)
- Staff Training Materials for Microgrid Operators
- Residential Microgrid Data Collection Reports
- Microgrid Operations Test Report
- Operations and Maintenance Manual (Draft and Final)

Subtask 2.4: Toolkit for Scalability
The goal of this task is to synthesize the lessons learned through participation in the deployment of two residential microgrid deployments and to create a toolkit for CCAs, utilities, and local governments that will outline the benefits and challenges associated with these projects and help inform a roadmap to scale this type of development.

The Recipient shall:
- Create a *Microgrid Toolkit for CCAs, Utilities and Local Governments.* This document will take learnings from the two communities in Lancaster and create a set of practical, useful tools for scaling up additional developments. Contents will include the full life-cycle of residential microgrid deployment including: final design, interconnection, data integration and management, rate design, retail billing and settlement procedures, implementation, operation and maintenance, and performance validation and evaluation. The toolkit will include several major subchapters:
    - **Residential Microgrid Design** will discuss the design process and the additional benefits to be gained by an integrated and holistic approach to building and microgrid system design in public housing developments.
    - **Interconnection Report and Recommendations** will synthesize information into two types of recommendations: 1) Recommendations for cities, CCAs, and developers to streamline interconnection. 2) Policy recommendations for California

Public Utilities Commission (CPUC) and Investor Owned Utilities surrounding the interconnection of residential community microgrids.

- **DER Rate Design in a CCA Setting** will address the process and associated costs and benefits by which CCAs can implement innovative rate designs to help accelerate the adoption and maximize the value of DER assets in their service territories.
- **Retail Billing Procedures to Enable Innovative DER and Demand Side Management Programs in a CCA Setting** will discuss strategies by which increased data organization and transparency can help CCAs understand the impacts of increased DER and DSM Programs in their service territories.

Products:

- Microgrid Toolkit for CCAs, Utilities and Local Governments (Draft and Final)

TASK 3: RESILIENT SCHOOLS NETWORK

The goal of this task is to construct three renewable microgrids for the Lancaster School District and integrate them with the VPP.

Subtask 3.1: Battery Storage Project Development and Pairing with Existing PV, Implementation and Asset Performance

The goal of this subtask is to ensure the battery storage projects included in this proposal meet the highest standards of underwriting, implementation, and asset performance.

Subtask 3.1.1 Project Development

The Recipient shall:

- Review project plans, financials, and performance to ensure value optimization of energy storage.
- Review updated site operations, and operating profiles (monthly electricity use/cost for all applicable utility accounts/meters) and identify initial utility accounts to include in the project development scope.
- Acquire and review updated 12 to 24 months of 15-minute interval electricity use and billing data for all utility accounts to be evaluated.
- Perform quality control checks on all data received and prepare data for loading into an energy profile modeling tool.
- Identify utility meters to include in the final battery storage project scoping.
- Collect and conduct final review of all available site-specific information for all sites under consideration through onsite inspection of site conditions such as potential locations for equipment and electrical service capacity.
- Finalize engineering audits of site conditions and electrical infrastructure for each site under consideration.
- Finalize net metering credit opportunities..
- Scope interconnection cost estimates for each site and finalize interconnection process.
- Conduct final assessment of sites for land use issues, environmental sensitivities, structural issues, and/or major logistical limitations.
- Confirm all applicable project approval and/or permit approval authorities for each site, and their project review/approval requirements.

- Validate assumptions for project costs inclusive of: project design/build costs, estimated site preparation, operations and maintenance (O&M) costs, estimated interconnection scope, current market data for labor, equipment, materials, and cost of capital.
- Provide updated guidance on financial analysis including:
    - Renewable Energy Credit pricing/value considerations and include in cash flow pro-formas.
    - System maintenance requirements and costsincluding guidance on Performance Guarantee terms.
    - All assumptions and inputs for net savings and 25-year cash flow analysis.
- Perform a sensitivity analysis for the changes in time of use (TOU) period schedules that have occurred since Phase 1 (i.e., compare project cash flows for current TOU periods to project cash flows with the implementation of the proposed TOU periods).
- Finalize financial model for each proposed site/project, confirm economic viability.
- Create a *Project Scoping Report* for each deployment. The *Project Scoping Report* will include the deployment layout and the full financial model for each proposed site.

Products:

- Project Scoping Reports

Subtask 3.1.2. Implementation of Energy Storage Systems and Pairing with Existing Solar PV

The Recipient shall:

- Provide project implementation oversight, guidance, and incentive management. Produce *Project Implementation Plans* summarizing this information.
- Provide project procurement support, including negotiation assistance, code resolution support, and contract administration
- Provide schedule management, Rule 21 interconnection process, site preparation, system commissioning, and performance validation oversight.
- Complete *Project Completion Reports* - a comprehensive checklist of all components (hardware, software, etc.) to ensure the project configuration and all equipment components are complete and tallied.

Products:

- Project Implementation Plans
- Project Completion Reports

Subtask 3.1.3 Asset Management, M&V and Reporting

- Prepare the *Facility Operations Plan*, including description of system, equipment and manufacturer lists, site plans/as-built drawings, installers O&M manual reference guide, roles and responsibilities of stakeholders, performance monitoring and reporting system guide, emergency shutdown/restart procedures, emergency contact list / location of keys, and insurance coverage and claim procedure.
- Monitor system performance, including inverter, weather station, revenue meter operation verification, and validation of actual production versus predicted production.
- Assess and respond to system alerts, including contacting relevant parties as necessary (contractor if under contractor warranty; technician if not under warranty).

- Manage system warranties, including acting as a liaison with contractor/manufacturers (as applicable) to enforce system warranty claim and issuing warranty claims and work orders to contractor/manufacturer to resolve deficiencies found during the annual system inspection.
- Prepare *Quarterly Memos*, including analysis of electricity usage, system performance, and comparison against baselines.
- Prepare *Annual Savings Reports*, including annual savings, revenue from REC sales, revenue from Self Generation Incentive Program, costs, system alerts, maintenance/warranties, etc.
- Conduct system inspections annually.
- Register RECs on Western Renewable Energy Generation Information System and manage sale of RECs to maximize system owner's revenue.
- Manage corrective maintenance (contingency) budget, including PV maintenance like washing, soil stabilization, and the like.

Products:

- Facility Operations Plan
- Quarterly Memos
- Annual Savings Reports

Subtask 3.2: Microgrid Design and System Engineering

The goal of this task is to design and document the deployment and operating strategies of the microgrids based on "as-built" site drawings and detailed configuration analysis. It also includes defining use cases and test plans for the deployed microgrids.

The Recipient shall:

- Analyze and design microgrid configurations for each of the host sites.
- Prepare *System Engineering Report for School Microgrids*, a document describing overall technical design of the system, its operating parameters, and expected performance of the system once it is fully deployed and commissioned.
- Define and design grid integration strategy including interconnection with distribution system feeders and coordinating microgrid interconnection requirements with VPP requirements.
- Design operating strategy of virtual microgrid including autonomous host-site microgrid.
- Define system test plan to verify performance and value.
- Define emergency response communications architecture.
- Define operational use cases for performance and value-added grid services.
- Initiate field engineering process involving local planning and building departments.
- Prepare a CPR Report in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- System Engineering Report for School Microgrids
- CPR report

Subtask 3.3: Procure and Deploy Microgrids at Host Sites

The goal of this task is to procure and deploy major equipment including solar PV, energy storage, EV chargers (if any), microgrid controller and software in line with the system engineering report to fully implement the microgrid infrastructure at the school host sites in Lancaster AEC.

The Recipient shall:

- Procure and deploy:
  - PV for school and emergency shelter microgrids.
  - Storage for school and emergency shelter microgrids.
  - Microgrid controller for school and emergency shelter microgrids.
  - EV charging infrastructure for school and emergency shelter microgrids.
- Complete installation and commissioning of each site.
- Complete *Equipment and Services Procurement Report*, a checklist to ensure that all equipment and services required to install and configure the microgrid at the proposed host sites has been procured, installed, and configured correctly as per manufacturer and safety guidelines.
- Complete *Site Completion Reports* - a comprehensive checklist of all components (hardware, software, etc.) to ensure the site configuration and all equipment components are complete and tallied.

Products:

- Equipment and Services Procurement Report
- Site Completion Reports

Subtask 3.4: Initiate Integration and Test Activity to Verify Performance and Value

The goal of this task is to integrate, test, and evaluate the DER elements of the advanced microgrid, separately and together, to verify performance and capabilities in various operating scenarios.

The Recipient shall:

- Integrate each host site DER elements to work in grid-tied mode with no interruption to ongoing site operations.
- Integrate and operate each host site DER elements to verify performance of the integrated system.
- Integrate and operate each host site DER elements to verify value-added grid services use cases, including DR, EE, demand management and EV charging.
- Integrate and verify the performance and operation of the individual microgrids.
- Produce a *System Integration Test Report* for each deployment, a full system end-to-end integration test report. i.e. solar is working, storage is working, all meters are working and end to end system testing
- Produce a *Commissioning Report* for each deployment, which includes a step by step process checklist to ensure all parts are properly configured and reporting data and control information properly to the DERMS system
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- System Integration Test Report
- Commissioning Report
- CPR Report

Subtask 3.5: Operate Microgrids for Data Collection and Performance Assessment

The goal of this task is perform tests and assess the performance of the school microgrids in the AEC. Essential testing data for all valuable scenarios will be collected, and an in-depth performance evaluation process will be performed to verify the projected benefits. Lessons learned will also be summarized in this task.

The Recipient shall:

- Establish baseline performance prior to implementing the microgrids.
- Identify essential data for each microgrid test scenario.
- Perform microgrid test in defined scenarios/use cases specific to each of the site location.
- Produce an *Operations and Maintenance Manual* for each site. The *Operations and Maintenance Manual* will describe the detailed procedures on how to operate and maintain the microgrids at each site. It will show step-by-step procedures on how to start, shutdown, and perform basic maintenance activities at each host site.
- Analyze collected data and compare against the projected benefits.
- Collect and organize data collection and analysis. Produce *Site Data Collection Reports* describing all the energy usage, solar production, storage charge/discharge and resulting net energy savings and GHG reduction. It will provide historical data on a daily, weekly, and monthly basis. The site data collection reports will be generated from the DERMS system for each site in the project.
- A series of tests will be conducted at each microgrid site after it is commissioned and brought into service. The results of these tests over a period of 4-6 months will be provided in a comprehensive *Microgrid Operations Test Report*. The project teamwill conduct both on-grid performance and off-grid performance tests.

- Continue collection and analysis of data for an extended period, beyond CEC agreement end date, as long as the system is under commercial agreement with the site host.
- Develop a *Lessons Learned and Best Practices Memo*. This memo will detail various lessons learned during the installation and configuration of these microgrids. It will also provide best practice scenarios for future reference based on experience of this project.

Products:

- Operations and Maintenance Manual for each site
- Site Data Collection Reports
- Microgrid Operations Test Report
- Lessons Learned and Best Practices Memo

Subtask 3.6: Integrate DERMS with Community-based VPP

The goal of this task is to design, develop, integrate, and test a standards compliant Application Programming Interface (API) interface from DERMS with the VPP platform.

The Recipient shall:

- Review and provide feedback on the VPP platform's API Interface Specification in the *API Interface Specification Report.*
- Develop and implement the API Interface as per VPP specification.
- Test the API interface with the VPP platform on simulated as well as real data. Develop *Integration Test Report.* The *Integration Test Report* will describe the use cases, test cases and test results of the API interface from DERMS with the VPP Platform.
- Perform and document end to end tests on integrated solution.

Products:

- API Interface Specification Report
- Integration Test Report

TASK 4: GREEN ENERGY DISTRICT

The goal of this task is to provide program design and deployment support to LCE as it rolls out its Green District Program, initially to large commercial, industrial, and municipal electricity customers within LCE's service area. The Green District Program is a new and innovative program for deploying DERs within customer facilities, with the first phase of technology rollout focused on battery energy storage systems.

Subtask 4.1: Support Green Energy District Program Design

The purpose of this subtask is to support LCE in scaling the Green District Program. This task will leverage analyses of public-private partnership structures developed in Phase I, as well as Phase I value analyses to develop materials that LCE can use to market the Green District program and to evaluate each customer's potential.

The Recipient shall:

- Develop *Green District Marketing Materials* and work with LCE to distribute to relevant customers.

- Develop *Green District Business Model and Cashflow Tool*, to enable LCE and future Program Sponsors to project the value and identify appropriate shared savings rate for each customer.

Products:

- Green District Marketing Materials
- Green District Business Model and Cashflow Tool

Subtask 4.2: Support Green Energy District Program Outreach and Scaling
The goal of this subtask is to provide support to LCE to bring the Green District Program to scale. The Green District will initially target the largest 50 electricity users in the City of Lancaster, expand to the top 250 largest customers in the service area as applicable, with a goal of over 2.5 MWh of storage deployed over the course of the project.

The Recipient shall:

- Continue to analyze value proposition of project opportunities and support customer outreach with LCE.
- Conduct quarterly audits and produce *Quarterly Performance Reports* beginning after installations at first customers are implemented and continuing through project period, identifying:
    - Actual vs projected revenue.
    - Total revenue to that point.
    - Total customer savings, inclusive of program enrollment cost.
    - Evaluation of whether DERs delivering the savings expected or if program implementers need to renegotiate with DER provider.

Products:

- Quarterly Performance Reports

TASK 5: COMMUNITY-BASED VIRTUAL POWER PLANT
The goal of this task is to create and operate a community-based VPP comprised of aggregated DERs developed under Tasks 2 through 4 to provide additional value to LCE and its customers. The VPP will serve as an umbrella for the operations of DERs within the LCE service area to optimize both behind the meter customer savings and values from grid services market participation. To accomplish this goal, in this task we will design, develop, deploy, operate, manage, enhance, evaluate, and scale up a community-based VPP comprised of aggregations of various DERs. DERs operating within the VPP will be comprised of solar PV, energy storage, DR, EVs, and electric vehicle supply equipment located at large commercial, industrial, municipal, and school district facilities, small- and medium-sized businesses, and residential microgrids.

Subtask 5.1: Develop VPP Infrastructure and Systems
The purpose of this subtask is to build upon the DER use cases and DER program plan recommendations developed in Phase I to incorporate specific capabilities and functionality into the VPP infrastructure.

The Recipient shall:

- Produce a *VPP Use Case and Technical Requirements Report* containing the following:
    - A use case roadmap to characterize the resource potential, optimization strategies, market opportunities and participation requirements, and stacked revenue streams over time as the VPP grows in size, complexity and capability over time.
    - Requirements for integrating participants' resources with the VPP platform including technical specifications for APIs, communications protocols, metering, telemetry, cost curve development, interaction sequences, and dispatch notifications.

    - A VPP test plan describing the plan for testing the use cases before production release of the VPP platform.
    - VPP production launch release notes to describe testing of VPP system components, the process of identifying and resolving any remaining technical issues, and deploying the production-ready VPP for market operations.
- Develop, test, and integrate advanced forecasting functionality incorporating analyses of ongoing data streams to determine future capacity availability within the VPP's DER portfolio.
- Develop, test, and integrate VPP resource optimization strategies, utilizing DER cost curves costs, grid services market opportunities, and forecasting capabilities for maximizing energy cost savings, demand charge savings, grid services revenues, and other benefits of VPP resources.

Products:
- VPP Use Case and Technical Requirements Report

Subtask 5.2: Design & Implement VPP subprograms
The goal of this subtask is to develop and implement VPP subprograms to support the integration of DERs into the community-based VPP. Subprograms will be customized for individual customer segments and technical and operational capabilities of behind-the-meter DERs.

The Recipient shall:
- Ensure that all regulatory requirements are met to enable full use of the community-based VPP for local and overall grid reliability and wholesale market participation. This includes conducting regulatory reviews, securing regulatory agreements, and obtaining required authorizations.
- Document DER resource capabilities, including site controls equipment and local operational requirements and constraints.
- Create *VPP Participation Guide* to define requirements for VPP participation based on capabilities to enable grid market participation, site/individual community member responsibilities, and terms and conditions.
- Analyze initial VPP participant loads and other data for facilities and resources, individually and in aggregate, to characterize the baseline resource capability available to the VPP on an hourly, weekend versus weekday, and seasonal basis.
- Work with VPP participants on the technical integration of resources into the VPP platform, providing troubleshooting and problem-solving support to ensure seamless integration of resources.
- Enroll participants in the VPP, including verifications and data collection through SCE, registration with the CAISO as appropriate, market certifications, bonding, and ensuring all other regulatory requirements are met.
- Conduct and complete testing with VPP participants. Test events will be scheduled and executed to assess capabilities before transitioning participants into ongoing operations.
- Produce a *VPP Onboarding Report*, reporting on results of onboarding participants identified through grant partnerships.

Products:
- VPP Participation Guide
- VPP Onboarding Report

Subtask 5.3: Operate, Enhance, and Scale the Community-Based VPP
The purpose of this subtask is to launch and provide ongoing O&M support of the VPP, enhance the subprogram offerings over time, and scale the VPP with new capabilities and service offerings.

The Recipient shall:

- Provide ongoing operations support to the community-based VPP platform. This support will include bid management services to optimize the value of the managed clean energy portfolio. These management services will include ongoing coordination with VPP participants to achieve and maintain a high level of satisfaction in terms of energy savings, revenue generation, minimal disruption to operations, and financial risk tolerance. Provide *Quarterly Progress Reports* on Key Performance Indicators of the community-based VPP
- Provide VPP participants with timely and accurate information to support their behind-the-meter optimization strategies to maximize the value of energy cost savings, demand charge savings, grid services market revenues, and other stacked value streams. This resource optimization support will increase participants' ability to provide the required level of energy or capacity to the managed clean energy portfolio and grid services markets, and minimize the risk of underperformance in response to dispatch notifications.
- Provide notifications to participants of upcoming market dispatches. Depending on the participant's capabilities, dispatch notifications will be sent via connected APIs, text, phone call, or app.
- Provide M&V services of dispatches and other resource management events within the community-based VPP. This will include settlement calculations within the DER platform, which will be used to verify resource performance, as well as to facilitate processing of payments for performance in grid services markets.
- Upgrade software and technology functionality over time. Upgrades and functionality enhancements will be required over time to adapt to changing grid services market regulations and new grid services market opportunities, as well as to continually improve the platform's functionality as the VPP's resources grow, resource management requirements change, and participants' technical capabilities improve.
- Provide ongoing customer service support to VPP participants by maintaining a customer support center to answer any technical, market, or program questions they may have, troubleshoot any technical issues they may be having, or to support adjustments in their resource availability levels due to changes in operations or upgrades to equipment within their facilities.
- Facilitate the deployment of new electrical equipment, such as energy storage systems, grid-enabled devices, energy management controls, microgrid controls, and/or advanced telemetry equipment. This includes working with VPP participants deploying new or upgraded equipment, whether funded by this grant or from other sources, to ensure a seamless technical integration of resources and systems into the VPP.
- Conduct ongoing outreach and onboarding of new VPP participant resources.
- Manage the VPP participants' energy journey to increase their use of DERs, and increase the value of existing DERs through integration into new grid service market opportunities over time. Create *Annual Summary Reports* summarizing the enhanced program offers and impacts resulting from managed customer energy journeys
- Integrate and/or simulate new market offerings over time, and as applicable. These may include transactive energy initiatives, and participation of DERA in wholesale markets,

development of new business models for new product offerings and assessment of their technical and financial viability in the VPP, and simulating the product offering in the marketplace to test the viability of new product offerings under consideration. If new products are determined to be technically and financially viable, they will be added to the VPP portfolio of service offerings. These efforts will be summarized in the *Annual Report* and will document any new product/market business models, simulation results, and assessments of new market opportunities.

Products:

- Quarterly Progress Reports
- Annual Report

TASK 6: INDEPENDENT MEASUREMENT & VERIFICATION

The purpose of this task is to evaluate the performance of Tasks 2, 3, 4, and 5 in terms of the predicted versus actual energy use, cost, and GHG emissions.

Subtask 6.1 Measurement and Verification Plan

The goal of this task is to establish a detailed methodology for M&V of the project components.

The Recipient shall:

- Establish a detailed *Measurement and Verification Plan* identifying data sources and analytical methodology to be used in the evaluation of all three project components: residential microgrids, municipal microgrids, and community-based VPP.
- Methodology will evaluate energy use and GHG emissions compared to baseline scenarios described in the subtasks below. Costs and benefits will be evaluated from the perspective of ratepayers as well as LCE.

Products:

- Measurement and Verification Plan (Draft and Final)

Subtask 6.2 Residential Microgrid M&V

The purpose of this task is to evaluate the energy, cost, and GHG emissions performance of the deployments described in Task 2. Data used in the evaluation will be collected for at least one year following the completion of each deployment.

The Recipient shall:

- Establish a non-microgrid baseline based on building models, load, and generation forecast completed in Phase I. Baseline will include energy consumption of the homes with associated utility costs and GHG emissions at both residential communities.
- Establish a microgrid baseline based on predicted energy performance across the microgrid boundary from Task 2 with the associated utility costs and GHG emissions. This baseline will be established both with and without the residential microgrid rate schedule implemented in Task 2.
- Evaluate actual energy performance across the microgrid boundary at both residential communities with the associated utility costs and GHG emissions obtained from the central master-meter associated with the microgrid. Actual home performance will be obtained from utility smart electric sub meters at each home and/or nonintrusive load monitoring (NILM) devices. The associated GHG emissions will be calculated based on

the GHG composition at the community level. Measurements used in evaluation will include at least one year of data from:

- Whole building electricity – utility smart meter and/or data from NILM devices with access through leasing/sales agreement
- PV Array – generation meter with access established as part of Task 2
- Battery Storage – status meter with access established as part of Task 2
- Flywheel Storage – status meter with access established as part of Task 2
- Microgrid status – direction and magnitude of flow across the microgrid boundary as measured by the community master-meter
- Microgrid controller – desired status of the microgrid
- Costs associated with microgrid resident utility bills, DER installations, microgrid system components, LCE revenues.

- Compare baseline scenarios to actual performance and compile results into a *ZNE Residential Microgrid Performance Report.* This report will include a discussion of reasons why the project performed either as expected or differently, and the magnitude of these differences.

Products:

- Residential Microgrid Performance Report

Subtask 6.3 Resilient School Network M&V

The goal of this task is to evaluate the energy, cost, and GHG emissions performance of Task 3: the solar, storage, and microgrid deployments at Lancaster school sites. Data used in the evaluation will be collected for at least 1 year following the completion of each project.

The Recipient shall:

- Establish a historical baseline based on the available meter data and associated utility bills. Note: This baseline will be established as part of Task 3 and verified by the M&V team.
- Establish microgrid baseline based on predicted energy performance across the microgrid boundary from Task 3 with the associated utility costs and GHG emissions.
- Evaluate actual energy performance across the microgrid boundary with the associated utility costs and GHG emissions obtained from electric meters associated with the microgrid. Measurements used in evaluation will include at least one year of data from:
  - Facility electricity (all) – utility smart meters with access established as part of Task 4
  - PV array (all) – generation meter with access established as part of Task 4
  - Battery storage (all) – status meter with access established as part of Task 4
  - DR signal – magnitude of load shed
  - Microgrid status – direction and magnitude of flow across the microgrid boundary
  - Microgrid controller – desired status of the microgrid
- Compare baseline scenarios to actual performance and discuss reasons in differences in a *Resilient School Network Performance Report*

Products:

- Resilient School Network Performance Report

Subtask 6.4 Community-based Virtual Power Plant M&V

Exhibit A
Scope of Work

The goal of this subtask is to evaluate the energy, cost, and GHG emissions performance of Task 5: The Community-based Virtual Power Plant. Data used in the evaluation will be collected for at least 1 year following the completion of each project.

The Recipient shall:

- Establish a VPP baseline based on predicted energy performance across the community-based VPP boundary from Task 5 with the associated utility costs and GHG emissions.
- Evaluate actual energy performance across the community DER Community-based VPP boundary from Task 5 with the associated utility costs and GHG emissions. Measurements used in evaluation will include at least one year of data from:
    - Facility electricity (all) – Facility load data established as part of Task 5
    - PV array (all) – generation meter with access established as part of Task 4 or Task 5
    - Battery storage (all) – status meter with access established as part of Task 4 or Task 5
    - DR signal – magnitude of load shed
    - Community-based VPP status – direction and magnitude of flow across the community VPP boundary
    - Community-based VPP controller(s) – desired status of the community-based VPP
- Evaluate cost effectiveness of the Green District Program in terms of implementation and procurement costs and revenues generated from the VPP.
- Compare baseline scenarios to actual performance and discuss reasons in differences in a *Community-based Virtual Power Plant M&V Performance Report*

Products:

- Community-based Virtual Power Plant M&V Performance Report

Exhibit A
Scope of Work

TASK 7: 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:

    - o <u>For Product Development Projects and Project Demonstrations:</u>
        - Published documents, including date, title, and periodical name.
        - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
        - GHG 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.
        - <u>Additional Information for Product Development Projects</u>:
            - 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.
        - <u>Additional Information for Product Demonstrations</u>:
            - Outcome of demonstrations and status of technology.
            - Number of similar installations.
            - Jobs created/retained as a result of the Agreement.

    - o <u>For Information/Tools and Other Research Studies:</u>
        - 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 8: 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:
  - 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.
  - 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.
  - 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.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

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)
- High Quality Digital Photographs

PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 2019-0515-8

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ZERO NET ENERGY ALLIANCE, INC.

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

RESOLVED, that the Energy Commission approves Agreement EPC-18-011 with Zero Net Energy Alliance, Inc. for a $4,999,060 grant to deploy two master-metered all-electric zero net energy residential microgrids and three renewable microgrids at Lancaster schools, and to provide funding to support scale-up of the Lancaster Green District Program. This agreement will also deploy a virtual power plant to integrate and manage these distributed energy resources; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on May 15, 2019.

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

Cody Goldthrite,
Secretariat