STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-19-048 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Joseph Sit		916-327-1315

C) Recipient's Legal Name	Federal ID Number
Mission Produce, Inc.	95-3847744

D) Title of Project
Reflex Flow Battery at Mission Produce

E) Term and Amount

Start Date	End Date	Amount
7/18/2020	3/29/2024	$ 2,000,000

F) Business Meeting Information

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

Proposed Business Meeting Date 7/8/2020 ☐ Consent ☒ Discussion

Business Meeting Presenter Quenby Lum Time Needed: 5 minutes

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

Agenda Item Subject and Description:

MISSION PRODUCE, INC. Proposed resolution approving Agreement EPC-19-048 with Mission Produce, Inc. for a $2,000,000 grant to improve existing vanadium redox flow battery technology and demonstrate the improvements at scale for a refrigeration facility in a disadvantaged community, and adopting staff's determination that this action is exempt from CEQA. (EPIC funding) Contact: Joseph Sit

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2)
   ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

   Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:
   a) ☒ Agreement **IS** exempt.
      ☐ Statutory Exemption. List PRC and/or CCR section number:
      ☒ Categorical Exemption. List CCR section number: 14 C.C.R. 15303
      ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:

Cal. Code Regs., tit 14, § 15303 exempts the construction and location of limited numbers of new, small facilities or structures; the installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made tin the exterior of the structure. This project will involve the installation of a limited number of small energy storage batteries, which may require the alteration or reconstruction of an existing concrete pad. The installation will require minimal construction activity. The equipment will be placed within the existing industrial facility. It is possible additional small concrete pads will be poured or small enclosures will be built for supporting systems such as electrical support equipment. This minimal construction is well within the size limits listed in 14 C.C.R. 15303. This construction will not have a significant impact on local air quality, noise, or traffic and will not induce additional operations at the site.

For these reasons, the project will not have a significant effect on the environment and falls under the categorical exemption listed in 14 C.C.R.;15303.

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

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

Legal Company Name:	**Budget**
UniEnergy Technologies LLC	$ 1,251,463
IEC, Inc	$ 748,538

I) List all key partners: (attach additional sheets as necessary)

Legal Company Name:

J) Budget Information

Funding Source	**Funding Year of Appropriation**	**Budget List Number**	**Amount**
EPIC	18-19	301.001F	$2,000,000

R&D Program Area: ESRO: ETSI TOTAL: $ 2,000,000

Explanation for “Other” selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Charles Nelson
Address: 2901 Camino Del Sol
City, State, Zip: Oxnard, CA 93030-8989
Phone: 805-988-1613
E-Mail: cnelson@missionproduce.com

2. Recipient's Project Manager

Name: Charles Nelson
Address: 2901 Camino Del Sol
City, State, Zip: Oxnard, CA 93030-8989
Phone: 805-988-1613
E-Mail: cnelson@missionproduce.com

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-19-306
☐ First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

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**

Scope of Work
Mission Produce, Inc.

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1	N/A	General Project Tasks
2		Subcontracts and Procurement
3		Site Engineering
4	X	Product Engineering
5	X	Installation
6		Commissioning and Site Acceptance Test
7		Demonstration and Benefits Evaluation
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
AC	Alternating Current
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
Disadvantaged Community	Disadvantaged Community (DAC) is defined as an area representing census tracts scoring in the top 25 % in CalEnviroScreen 3.0. (https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30).
DC	Direct Current
ESS	Energy Storage System: A Battery, PCS and controller
High Fire-Threat District or HFTD	Area that has been designated as having a high fire threat as defined by the CPUC at https://www.cpuc.ca.gov/FireThreatMaps/.
Low-Income Community	Low-income Community is defined as a community within census tracts with median household incomes at or below 80 percent of the statewide median income, or at or below the threshold designated as low-income by the California Department of Housing and Community Development. (http://www.hcd.ca.gov/grants-funding/income-limits/index.shtml)
PCS	Power Conversion System: The system that converts DC energy to AC energy during discharge and vice versa during charge.
PSPS	Public Safety Power Shutoff
TAC	Technical Advisory Committee
TRL	Technology Readiness Level
VRFB	Vanadium Redox Flow Battery: A type of battery that uses liquid electrolyte with dissolved vanadium in the anolyte and catholyte.

[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.

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the demonstration of an outdoor-rated, pump-speed optimized, currently called the Reflex Vanadium Redox Flow Battery, as part of an Energy Storage System at a microgrid. The Energy Storage System will provide a minimum of 10 hours of energy storage capability at a minimum rating of 50 kilowatts and will be provide value Low-Income and Disadvantaged Communities.

B. Problem/ Solution Statement

Problem

Currently the Reflex Vanadium Redox Flow Battery has many advantages that are important to California and that can fill an important need for California's future electrical grid. Most notably, this non-lithium technology has unlimited cycle life which will be required when California's solar penetration passes 40-50%, and it is non-flammable. However, it has not yet been deployed and optimized for a 10-hour application. That is because today, 10-hour applications are generally harder to monetize than they are expected to be in the future. Also, an outdoor rated battery unit of this type has not been offered. These factors are limiting the ability of this technology to reach California's customers.

The recipient has a facility that is paying very high, on-peak energy costs during noon-6 pm, even though they are overproducing solar power in their mid-peak period, 8 am to noon. They would like to be able to shift the excess energy to the higher cost period. Furthermore, the recipient has a critical load from refrigerating avocados and other produce and plants. The recipient supports the California economy and the workers of the local community, whose site is surrounded on 3 sides by Tier 3 High Fire-Threat District (the 4th side is ocean) and anticipating frequent Public Safety Power Shutoffs (PSPS). This Reflex Vanadium Redox Flow Battery Energy Storage System will allow continued operation during PSPSs and other outages.

Solution

With this project, prior product solutions currently in the lab will be rescaled and validated, bringing these technologies from TRL 6 to TRL 7. By deploying the minimum 10 hour capability behind the meter 500-kW Energy Storage System at the recipient's site and testing the system for an entire year, the technological improvements will be brought to a TRL 8.

Previously developed outdoor solutions and auxiliary optimization schemes allow 10-hour applications to operate more efficiently. The recipient will deploy the improved units in a use case that relies upon all of the energy available in the system during day-to-day operations and uses a slower, 10-hour discharge in microgrid operations.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to deploy an outdoor, behind the meter, minimum 10 hour long duration, non-flammable, flow-battery-based minimum rating of 50 kilowatts ESS to support

economic use cases and microgrid capability benefiting Low-Income and Disadvantaged Communities.

Ratepayer Benefits:[2]
California Ratepayers will benefit from the project because it will enable comprehension of a technology that provides greater reliability, lower costs and increased safety compared to the current market offerings:

- Lower Costs: As the California grid moves toward 50% renewables and beyond, the cycling on a typical storage unit will increase. If the grid operators start cycling the limited cycle life assets, they will die out more quickly. Instead, flow batteries should be designated for daily cycling applications with degrading technologies jumping in during extremes. Flow batteries' capital expenditure costs are roughly 10-42% higher than the competitors, currently. However, the Reflex Vanadium Redox Flow Battery lifetime is 20 years while the solid state batteries, cycling 330 times per year, would need to be replaced every 3 years. The unlimited cycle life of the Reflex' provides a significant value proposition for applications that can benefit from increased cycling. Particular to this grant, system developers have quoted enclosures for the Reflex Vanadium Redox Flow Battery that are about 3 times higher than the price increase associated with making the modules themselves outdoor rated. This project, by advancing the outdoor enclosure will make this lower-cost option available. Finally, the planned pump optimization effort will increase the battery's round trip efficiency during long duration charges and discharges, thereby reducing operating costs.
- Increased Safety: As California moves toward the higher renewables, bulk remote storage to serve the bulk needs of the grid will become more economic. High renewable grids may still need peaker-like ESS near loads, but most of the work will be done when transmission is unconstrained. Having a large flammable system in a remote area is a very dangerous prospect. Using non-flammable technology, on the other hand will prevent such catastrophes. Likewise, load pockets often require customer-side of the meter energy storage assets. However, load pockets are located close to a high concentration of customers and protecting those people will require a non-flammable technology. The recipient's demonstration site, in particular is located among Tier 3 HFTDs and will greatly reduce fire risk by using a non-flammable technology. Specific to this grant, the outdoor module will be standardized and produced in an ISO certified factory and will not depend upon custom engineering or one-off installations. This will make the design safer as there is a lower probability of mistakes in engineering or workmanship across the various deployments.
- Greater reliability: Flow batteries have a natural chemical ability for long system life and unlimited cycle life. Those attributes make them more predictable to grid operators and thereby will increase the reliability. However, the product packaging, subcomponents, design and system design elements that make the battery system more reliable must be developed and demonstrated at this phase of the development in order to bring the reliable-by-nature chemistry to market.

[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).

The recipient will benefit directly from their energy bill savings in the short term, and the increased resiliency they will receive by having an ESS at a microgrid at their facility. The community will benefit because the recipient's demonstration site is an economic driver in the community and through the recipient's philanthropic efforts, an active participant in community improvement. The community will also benefit from the reduced diesel consumption during PSPS, when air quality is already likely to be compromised.

Technological Advancement and Breakthroughs:[3] This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by increasing the adoption of a technology well-suited to be a baseload energy storage system. As opposed to "peaker replacing" energy storage systems today, baseload energy storage systems will be required for daily cycling for long durations, a perfect match for the Reflex Vanadium Redox Flow Battery.

Market adoption will be driven by the technological advancements proposed herein:

- **Simplified Deployment:** The outdoor rated Reflex Vanadium Redox Flow Battery simplifies deployment for many customers. It reduces the number of parties involved in the battery deployment, it reduces the engineering workload and standardizes the deployment climate control decisions. Outdoor rated units are expected by many developers, especially those who have worked with solar in the past. While they are able to do the civil works such as concrete pad and fencing, and able to do electrical interconnection work, they are not used to working on building specification, procurement, permitting and installation.
- **Better matching to Microgrid needs and future grid needs:** The 10-hour duration battery is much better suited to a solar + storage microgrid or a grid where 60-90% of the generation is comprised of solar. Today, the grid at large does not have 60% solar, but microgrids like this will operate with 60-100% solar during extended outages. In this scenario, the longer duration energy storage is required.

Agreement Objectives

The objectives of this agreement are to

- Develop and validate product improvement to allow Reflex Vanadium Redox Flow Batteries to be placed outdoors. The batteries will be designed to an enhanced National Electrical Manufacturers Association (NEMA) 3R standard (3R+) that has specific design features for insect and rodent protection as well as improved water ingress protection.
- Develop and validate the Reflex Vanadium Redox Flow Battery product improvements that will provide optimized electrolyte pump speeds for a 10-hour discharge rate.
- Deploy a Reflex Vanadium Redox Flow Battery based Energy Storage system to support economic use cases and microgrid capability. The system will be able to operate across a broad range of power ratings with the specific goal of demonstrating:
    - 212 kW for a 10-hour discharge application and
    - 500 kW for a 4-hour discharge application.
- Provide one year of operational test time.

[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.

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.

- 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.

o **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:
  - o Terms and conditions of the Agreement;
  - o Administrative products (subtask 1.1);
  - o CPR meetings (subtask 1.3);
  - o Match fund documentation (subtask 1.7);
  - o Permit documentation (subtask 1.8);
  - o Subcontracts (subtask 1.9); and
  - o Any other relevant topics.

  The technical portion of the meeting will include discussion of the following:
  - o 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, 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)

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*.

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.

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 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 shall include the expertise of each proposed TAC member and the 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.
- 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.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project’s strategic goals.

Products:

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

IV. TECHNICAL TASKS

*Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

TASK 2: SYSTEM MANUFACTURING, AND DELIVERY PLANNINGS

The goal of this task is to place purchase orders, including for subcontracts designated in Task 1.9, for construction and installation of the Reflex Vanadium Redox Flow Battery based Energy Storage System including identified long lead items required for site construction.

The Recipient shall:

- Determine the required product specifications for the Reflex Vanadium Redox Flow Battery based Energy Storage System and components with a long lead time for delivery. Review Factory Acceptance Test procedure to ensure alignment with the required product specifications.
- Coordinate logistics for shipping each item to the demonstration site
- Prepare a *Manufacturing and Logistics Report*
    - Major risks in manufacturing phase such as the incorporation of the weather resistant containment and the optimization for 10-hour duration
    - Logistics Plan which will include the shipment details such as the timeline and preferred subcontractors to oversee the shipping and safe delivery to the final location
    - Lessons learned from engineering and subcontracting phase

Products:

- Manufacturing and Logistics Report

TASK 3: SITE ENGINEERING

The goal of this task is to finalize the engineering and technical design of the demonstration project site. Demonstration site shall be located in an Investor Owned Utility (IOU) electric service territory on a site that is an IOU customer that pays into the Electric Program Investment Charge (EPIC) fund.

The Recipient shall:

- Verify the mechanical and electrical plans for the DC battery and power conversion system (PCS)
- Determine the requirements of the controller for the ESS
- Select controller software
- Prepare an *Energy Storage System Preliminary Design Report*
    - Prepare a single line diagram for the ESS
    - Prepare a site layout including the battery and PCS locations

    - List the ESS refined use cases to be executed by the site controller
- Coordinate between subcontractors to ensure interoperability will be achieved
- Complete the engineering necessary to complete permitting applications as outlined in subtask 1.8
- Engineering site assessment must be completed to determine if the current pad is adequate for the load of the Reflex units. If determined to be inadequate, the existing pad may be augmented.
- Prepare a *Site Acceptance Test and Commissioning Plan* including
    - Site acceptance tests or inspections for individual components upon arrival (use inputs from component vendors)
    - AC testing of individual strings and the entire site
    - Microgrid testing
    - ESS commissioning requirements and approach
- Provide a *Measurement and Verification Plan* that will include the collection and measurement and verification (M&V) of data on the installation over the one year demonstration period. The duration of data collection may be reduced with prior CAM written approval. M&V includes plots of charge/discharge power levels, storage efficiencies, ambient temperatures, and PV output as a function of time.

Products:
- Energy Storage System Preliminary Design Report
- Site Acceptance Test and Commissioning Plan (draft and final)
- Measurement and Verification Plan (draft and final)

TASK 4: PRODUCT ENGINEERING
The goal of this task is to optimize the Reflex Vanadium Redox Flow Battery for 10-hour discharge operations and to design a weatherization package for outdoor-siting.

The Recipient shall:
- Design outdoor the Reflex Vanadium Redox Flow Battery module package
- Test and validate the Reflex Vanadium Redox Flow Battery module for outdoor use
- Develop variable speed pump optimization for 10-hour discharge
- Test and validate variable speed pumping
- Prepare a *Product Engineering Report* including, but not limited to:
    - Decision logic on including specific features from a design perspective
    - Test results from the weather resistant upgrades on the Reflex Vanadium Redox Flow Battery
    - Pump optimization test results.
- Revise the factory acceptance testing as required to reflect any specification changes
- After the Reflex Vanadium Redox Flow Battery modules have been manufactured and tested in the factory, write a *Factory Acceptance Test Report* including:
    - Results of the factory acceptance test for each of the planned number of Reflex Vanadium Redox Flow Battery modules as approved in writing by the CAM.
    - Lessons learned from manufacturing
- Submit a *CPR Report #1* and participate in a CPR Meeting per subtask 1.3

Products:

- Product Engineering Report
- Factory Acceptance Test Report
- CPR Report #1

TASK 5: INSTALLATION, ACCEPTANCE TESTING, AND COMMISSIONING
The goal of this task is to install the Reflex Vanadium Redox Flow Battery based Energy Storage System at the pre-selected CAM approved demonstration site.

The Recipient shall:

- Complete all civil works such as site alteration, clearing, grading, concrete pads (if necessary), underground conduit, etc.
- Complete the mechanical installation of the ESS per the design and local codes
- Complete the electrical connections as defined in the electrical design and per local codes
- Provide *Photos of the Installed Energy Storage System*
- Complete *Final Site Acceptance Test and Commissioning* Report (description above)
    - Lessons learned from the testing and commissioning process
    - Details the findings according to the guidelines detailed in the Site Acceptance Test and Commissioning Plan in Task 3
- Submit a *CPR Report #2* and participate in a CPR Meeting per subtask 1.3

Products:

- Photos of Installed Energy Storage System
- Site Acceptance Test and Commissioning Report
- CPR Report #2

TASK 6: SITE OPERATIONAL TESTING
The goal of this task is to perform testing of the Reflex Vanadium Redox Flow Battery based Energy Storage System at the demonstration site for at least 1 year to assess system performance to meet site operational needs.

The Recipient shall:

- With consultation from the TAC, execute the site operational tests and summarize results in a *System Performance Report* to include, but not be limited to, a discussion on the following tasks:
    - Performance characterization of the ESS during a 4 hour cycle; this will include standard characterizations for ESS such as the power, energy and efficiency profile over time
    - Performance characterization of the ESS during a 10 hour cycle; this will include standard characterizations for ESS such as the power, energy and efficiency profile over time.
    - Demonstrate Reflex Vanadium Redox Flow Battery based Energy Storage System microgrid capabilities
    - Comparison of Reflex Vanadium Redox Flow Battery based Energy Storage System operations and benefits to baseline electricity consumption and associated costs without the system

Products:

- System Performance Report (draft and final)

TASK 7: DEMONSTRATION AND BENEFITS EVALUATION
The goal of this task is to operate the Reflex Vanadium Redox Flow Battery based Energy Storage System for at least 1 year, allowing the controller to dispatch the system to maximize the economic returns and allowing the system to be used during microgrid operations benefiting Low-Income and Disadvantaged Communities.

The Recipient shall:

- Operate the Reflex Vanadium Redox Flow Battery based Energy Storage System for at least 1 year performing day-to-day money-saving exercises and microgrid activities as applicable to the situation
- Work with Low-Income and Disadvantaged Community partners to identify uses for the microgrid that may assist their most critical needs.
- Development, definition, and reporting on new metrics for value being provided to Low-Income and/or Disadvantaged Communities with CAM review and approval prior to implementation.
- Develop and propose new metrics for the value that longer-duration storage has on providing increased resiliency, higher reliability, added cost savings from peak load reductions, load shifting, providing increased services to the electric grid during times of grid stability challenges or any other energy service capability that is appropriate for such a metric.
- Prepare an *Operational Benefits Report,* to include but not be limited to:
    - Record economic use case benefits for each electric bill
    - Record narrative explanation of microgrid use-cases during year-long operations
    - Describe community usage requirements and plans
    - Results from evaluation of other metrics described above.

Products:

- Operational Benefits Report

TASK 8: 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:

    - <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.
        - 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.

o For Information/Tools and Other Research Studies:
- Outcome of project.
- Published documents, including date, title, and periodical name.
- A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
- The number of website downloads.
- An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
- An estimate of energy and non-energy benefits.
- Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.

- Respond to CAM questions regarding responses to the questionnaires.

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

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

TASK 9: 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.
  - 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.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

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

PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 20-0708-9e

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: MISSION PRODUCE, INC.

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

RESOLVED, that the CEC approves Agreement EPC-19-048 with Mission Produce, Inc. for a $2,000,000 grant to improve existing vanadium redox flow battery technology and demonstrate the improvements at scale for a refrigeration facility in a disadvantaged community; and

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

CERTIFICATION

The undersigned Secretariat to the CEC 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 CEC held on July 8, 2020.

AYE:
NAY:
ABSENT:
ABSTAIN:

Cody Goldthrite
Secretariat