STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

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

A) New Agreement # EPC-19-040

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

C) Recipient's Legal Name	Federal ID Number
Salient Energy Inc.	74-7746725

D) Title of Project
California Zinc-ion Energy Storage Development and Validation Project

E) Term and Amount

Start Date	End Date	Amount
6/30/2020	3/29/2024	$ 1,583,125

F) Business Meeting Information

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

Proposed Business Meeting Date 6/10/2020 ☐ Consent ☒ Discussion

Business Meeting Presenter Robin Goodhand Time Needed: 5 minutes

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

Agenda Item Subject and Description:

SALIENT ENERGY INC. Proposed resolution approving agreement EPC-19-040 with Salient Energy Inc. for a $1,583,125 grant to test and validate zinc-ion battery storage to advance the technology from the pre-commercial stage to the technology demonstration stage and adopting staff's determination that this action is exempt from CEQA. The integrated pilot-scale system will then be validated in a simulated residential load environment with a third party test laboratory. (EPIC funding) Contact Robin Goodhand.

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)):
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: Cal. Code Regs., tit 14, § 15301 ; Cal. Code Regs., tit 14, § 15306
     - ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section: The project involves development, testing, and validation of a zinc-ion battery prototype. The development and assembly will take place at an existing facility for hardware developers in Oakland. The testing and validation will be performed at existing laboratories at the University of

California, San Diego Campus. (Design and certification activities may also take place in Canada.) The project consists of the operation of these existing public or private facilities, involving negligible or no expansion of existing or former use. Therefore, this project is exempt under California Code of Regulations, title 14, section 15301, Existing Facilities. In addition, the project involves data collection and research, which would not result in a serious or major disturbance to an environmental resource. Therefore, this project is exempt under California Code of Regulations, title 14, section 15306, Information Collection.

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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**
Electric Applications Incorporated	$ 0
The Regents of the University of California, on behalf of the San Diego Campus	$ 79,000
CSA America Testing and Certification LLC	$ 0
	$

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

Legal Company Name:
Circuit Launch

J) Budget Information

Funding Source	**Funding Year of Appropriation**	**Budget List Number**	**Amount**
EPIC	18-19	301.001F	$1,583,125
			$
			$

R&D Program Area: ESRO: ETSI TOTAL: $ 1,583,125

Explanation for “Other” selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient’s Contact Information

1. Recipient's Administrator/Officer

Name: Ryan Brown
Address: 1 Research Dr.
City, State, Zip: Dartmouth, Nova Scotia Canada B2Y4M9
Phone: 519-994-3711
E-Mail: ryan@salientenergy.ca

2. Recipient's Project Manager

Name: Brian Adams
Address: 1 Research Dr.
City, State, Zip: Dartmouth, Nova Scotia Canada B2Y4M9
Phone: 519-572 -6428
E-Mail: brian@salientenergy.ca

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-19-305
☐ 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**

EXHIBIT A
Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Large Format Cell Design and Validation
3		Cell Production
4		Long Term Performance Testing
5	X	Energy Storage System Development
6		Safety Certification of Zinc-Ion Cell
7	X	Installation and Operation of Demonstration Units
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities
10		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
BMS	Battery Management System
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
DER	Distributed Energy Resource
IOU	Investor Owned Utility
Project	The California Zinc-Ion Energy Storage Development and Validation Project
TAC	Technical Advisory Committee
TRL	Technology Readiness Level

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the testing and validation of best-of-class zinc-ion battery storage to advance the technology from the pre-commercial stage technical readiness level four (TRL 4) to the technology demonstration stage (TRL 6).

B. Problem/ Solution Statement

Problem

To help diversify and improve the safety of energy storage technology, there is an immediate need to bring non-lithium-ion technologies that are low-cost, abundant, and safe to California and develop them for applications on the customer side of the meter. Developing non-lithium-ion solutions will help California meet important renewable energy goals to produce carbon-free

[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.

electricity by 2045, as well as help reduce costs, provide resilience, and significantly improve safety.

Solution

The project will develop, field test, and validate the recipient's rechargeable zinc-ion battery applications for the customer-side of the meter to diversify and improve battery storage technology in California. According to the Recipient, the Recipient has developed a purpose-built non-lithium-ion battery for residential applications that is cheaper, safer, longer lasting, and more efficiently produced than a lithium-ion battery. The zinc-ion energy storage battery combines high energy density, long cycle life, and the ability to quickly charge and discharge, making the technology a safer and superior energy storage solution for California customers. Following the successful completion of the project, the Recipient plans to scale cell and system manufacturing in California to help accelerate the deployment of non-lithium-ion energy storage in California and beyond.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Advance the development of a zinc-ion battery storage solution focused on safe customer-side of the meter deployment.
- Validate a cost-effective and high performing energy storage solution to support higher levels of renewables and a carbon-free future by 2045.
- Scale the Recipient's zinc-ion battery storage solution from laboratory demonstration to prototype testing in a customer side of the meter application.
- Provide greater reliability, lower costs, and increase safety for investor owned utility (IOU) ratepayers.
- Enable technological advancement to overcome barriers to achieve California's statutory energy goals, including SB 350 and SB 100.
- Demonstrate improved energy density, increased cycle performance, improved reliability and safety, better lifecycle performance, and lower costs as compared to currently fielded systems.
- Replace fossil fuel powered backup generators in response to public safety power shutoffs and other emergency power shutoffs due to infrastructure failures, natural disasters, and severe weather events.

Ratepayer Benefits:[2]

This Agreement should result in ratepayer benefits, including greater electricity reliability, lower costs, and increased safety. The zinc-ion battery systems should provide the necessary infrastructure reliability and resiliency, as well as safety, for IOU ratepayers during periods of planned and unplanned power shut offs.

In addition, the project should help reduce energy costs and address peak load reduction and shifting through robust energy storage charge and discharge, storing energy during non-peak hours to be used during expensive peak hours. The zinc-ion battery also should provide a safer

[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).

residential energy storage solution with greater longevity than lithium-ion energy storage. According to the Recipient, the baseline electrolyte for Recipient's zinc-ion battery is zinc sulfate dissolved in water, should provide benefits over lithium-ion technology, including non-flammability, an important safety factor for residential battery storage.

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 testing and validating a rechargeable zinc-ion energy storage battery. According to the Recipient, the battery will be built entirely of non-toxic components that is more cost-effective, safer, and longer lasting than a lithium-ion battery for California customers.

A key advancement is developing a novel design around the electrode, electrolyte, and separator allowing the battery to be recharged thousands of times before they need to be recycled. According the Recipient, developing a battery based on Zn2+ intercalation is a technological advancement that helps improve energy density, daily cycle capability, longevity, safety, and ultimately, helps reduce costs, as compared to conventional lithium-ion technology. This technological advancement will help California achieve the goals of SB 100, SB 350, and other important environmental and energy policies.

Agreement Objectives
The objectives of this Agreement are to:

- Advance zinc-ion battery technology from the pre-commercial stage (TRL 4) to the technology demonstration stage (TRL 6).
- Help move Recipient's testing, validation, and, outside this grant, eventually move manufacturing to California.
- Complete validation of zinc-ion battery technology in partnership with a Subcontractor.
- Design and build a residential zinc-ion energy storage system that can provide low-cost and safe energy storage to California ratepayers.
- Attain performance milestones including: produce modules with density 100 Wh/L; complete safety demonstrated across various failure modes and operating conditions (as per UL certification tests); demonstrate 10 year service life capability demonstrated through accelerated life cycle testing
- Demonstrate the performance of two 10 kWh residential zinc-ion energy storage systems at Subcontractor's distributed energy resource (DER) test lab.
- Create four new, direct living-wage jobs in California by the end of the grant term.
- Develop a Production Readiness Plan to manufacture Recipient's energy storage technology in California.

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

[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.

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.

    - **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 <u>administrative portion</u> 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 <u>technical portion</u> 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, 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

NOTE: Products to be provided to the Energy Commission should not include a level of technical detail that would inadvertently disclose Intellectual Property prematurely to the public (e.g., prior to the preparation and filing of patent applications).

EXHIBIT A
Scope of Work

TASK 2: LARGE FORMAT CELL DESIGN AND VALIDATION

The goal of this task is to design a large format (20 Ampere hour) zinc-ion cell (increased from 1 Ah cells), based on the previously validated cell components. In later tasks, this large format cell will be incorporated into a module with a battery management system (BMS) for the demonstration system.

The Recipient shall:

- Develop an *Electrode and Cell Test Plan* to validate large format electrode performance and validate large format cell performance, with consultation from the TAC on metrics to incorporate, such as electrode areal capacity, capacity retention, cell rate capability, cell internal resistance etc.
- Develop a process for creating negative and positive electrodes on an automated roll-to-roll coater.
- Validate electrode quality with three samples from five separate production runs to demonstrate that electrode performance is maintained with the automated fabrication procedure.
- Create a large format cell design that includes multiple layers of electrodes.
- Create 10 cell prototypes and validate their performance according to the Electrode and Cell Test Plan.
- Update Electrode and Cell Fabrication Procedure as necessary if electrode or cell validation test results indicate a process error.
- Describe process on how to produce electrodes, results showing electrodes meet performance targets in Electrode and Cell Test Plan, cell production procedure, and results on cell prototypes in accordance with the Electrode and Cell Test Plan, in the *Electrode and Cell Fabrication Procedure Report*
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Electrode and Cell Test Plan Report (draft and final)
- Electrode and Cell Fabrication Procedure Report (draft and final)
- CPR Report #1

TASK 3: CELL PRODUCTION

The goal of this task is to produce application-ready cells for long-term testing, certification, systems development, and, ultimately, inclusion in the final demonstration system.

The Recipient Shall:

- Develop a *Quality Control Procedure Report* to ensure electrode and cell quality is maintained throughout production runs.
- Develop a *Manufacturing Control System* (spreadsheet tool) to track the production history of each component and cell.
- Produce 50 kWh worth of cells throughout the projectto support other project tasks, including long-term performance testing, certification, systems development, and production of the final demonstration system. Summarize monthly production at the end of their production with a *Production Report,* which may include a summary of quality control procedures, manufacturing control system, and production lessons learned.

Products:

- Quality Control Procedure Report
- Manufacturing Control System
- Production Report
-

TASK 4: LONG-TERM PERFORMANCE TESTING

The goal of this task is to demonstrate the long-term cycling potential of the zinc-ion battery in accelerated life cycle testing.

- Work with cell testing Subcontractor, to develop an *Accelerated Life Cycle Testing Protocol Report* that incorporates the unique operating conditions of residential energy storage in California.
- Deliver cells to Subcontractor for testing, including cycling to pre-defined voltage limits at various current rates and temperature. Subcontractor will subject zinc-ion cells to accelerated life cycle testing and produce an *Interim Life Cycle Test Results Summary Memo* to track progress.
- At the end of testing, provide a summary of testing results findings in a *Collective Results Summary on Life Cycle Testing Report*

Products:

- Accelerated Life Cycle Testing Protocol Report
- Interim Life Cycle Test Results Summary Memo
- Collective Results Summary on Life Cycle Testing Report

TASK 5: ENERGY STORAGE SYSTEM DEVELOPMENT

The goal of this task is to build two 10 kWh energy storage systems with zinc-ion cells, a standard inverter, and integrated control and data collection electronics.

Recipient Shall:

- Develop a 2.6 kWh zinc-ion energy storage module design with integrated BMS and a Module Fabrication Procedure Report for producing the same, by completing the following:
    - Produce a module engineering drawing describing the design.
    - Model module performance in mechanical design software to ensure operational temperature limits are not exceeded while operating in expected conditions. Produce a module modeling results summary. The results from this modelling will be primarily focused on heat generation and dissipation throughout the module during normal operation and the effects this has on module level efficiency.
    - BMS needs to prevent overcharge that will lead to premature cell failure. Produce a battery management circuit schematic identifying the components of the BMS.
- Develop a module testing protocol that will validate module performance, including tolerance to abuse conditions. This testing protocol will subject the module to various current rates and ambient temperatures to validate the thermal behavior predicted from the modelling.
- Produce prototype zinc-ion modules and test according to the protocol. Produce a module testing summary demonstrating successful performance.
- Develop two 10 kWh energy storage systems that includes a commercially available inverter, zinc-ion modules, thermal controls, and an electronics control unit.
- Produce a system engineering drawing and model thermal profile during operation in a system modeling results summary.

- Describe module development in a *Module Development Report*, which may include, module engineering drawings, modeling summary results, battery management circuit schematics, system engineering drawings, and system modeling results.
- Describe module testing protocol and testing result summary in a *Module Testing Protocol and Results Report*
- Write up a *System Development Report* which may include system engineering drawings and system modeling results summary
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Module Development Report
- Module Testing Protocol and Results Report
- System Development Report
- CPR Report #2

TASK 6: SAFETY CERTIFCATION OF ZINC-ION CELL

The goal of this task is to obtain UL2054 for zinc-ion cells to demonstrate their safety.

Recipient Shall:

- Deliver 50 cells to Subcontractor to conduct safety tests and obtain *UL2054 Certification Report*

Products:

- UL2054 Certification Report

TASK 7: INSTALLATION AND OPERATION OF DEMONSTRATION UNITS

The goal of this task is to deliver two 10 kWh zinc-ion energy storage demonstration systems to Subcontractor's DER test lab to measure performance in a simulated environment.

Recipient Shall:

- Develop a *System Validation Test Protocol* detailing which tests will be run to simulate residential energy storage.
- Develop a *Demonstration System Performance Report*, summarizing all simulation testing.
- Prepare a *CPR Report #3* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- System Validation Test Protocol
- Demonstration System Performance Report
- CPR Report #3

TASK 8: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

EXHIBIT A
Scope of Work

- 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.
        - 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.
        - <u>Additional Information for Product Development Projects</u>:
            - Outcome of product development efforts, such as 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 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)

TASK 10: Production Readiness Plan

The goal of this task is to determine the steps that will lead to the manufacturing of technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a *Production Readiness Plan*. The degree of detail in the plan should be proportional to the complexity of producing or commercializing the proposed product, and to its state of development. As appropriate, the plan will discuss the following:
  - Critical production processes, equipment, facilities, personnel resources, and support systems needed to produce a commercially viable product.
  - Internal manufacturing facilities, supplier technologies, capacity constraints imposed by the design under consideration, design-critical elements, and the use of hazardous or non-recyclable materials. The product manufacturing effort may include "proof of production processes."
  - The estimated cost of production.
  - The expected investment threshold needed to launch the commercial product.
  - An implementation plan to ramp up to full production.
  - The outcome of product development efforts, such as copyrights and license agreements.
  - Patent numbers and applications, along with dates and brief descriptions.
  - Other areas as determined by the CAM.

Products:

- Production Readiness Plan (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 20-0610-9d

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: SALIENT ENERGY 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-19-040 with Salient Energy Inc. for a $1,583,125 grant to test and validate zinc-ion battery storage to advance the technology from the pre-commercial stage to the technology demonstration stage. The integrated pilot-scale system will then be validated in a simulated residential load environment with a third-party test laboratory; 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 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 CEC held on June 10, 2020.

AYE:
NAY:
ABSENT:
ABSTAIN:

_____
Cody Goldthrite
Secretariat