



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-19-051 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Mike Gravely	51	916-327-1370

C) Recipient's Legal Name	Federal ID Number
Indian Energy LLC	27-1375128

D) Title of Project
Hybrid Modular Storage System (HMSS) as a long-duration energy storage technology Demonstration

E) Term and Amount

Start Date	End Date	Amount
7/31/2020	3/31/2024	\$ 5,002,334

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:**Indian Energy LLC**

INDIAN ENERGY LLC. Proposed resolution approving agreement EPC-19-051 with Indian Energy LLC for a \$5,002,334 grant to demonstrate a long duration energy storage solution based on mixed integration of energy storage technologies, including vanadium redox flow battery, zinc hybrid cathode battery, and mechanical flywheel, at Camp Pendleton and adopting staff's determination that this action is exempt from CEQA. (EPIC funding) Contact: Chie Yee Yang.

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 CCR 15301

☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section: Cal. Code Regs., tit 14, § 15301 exempts the operation, repair, maintenance, permitting, and minor alteration of existing structures, facilities, mechanical equipment, or topographical features involving negligible or no expansion of use. This project

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will consist of the installation, connection, and demonstration of modular long duration energy storage technologies at an existing military facility. Minor alteration of existing facilities and mechanical equipment in the form of reconfiguration of existing electrical infrastructure will take place before location of skid mounted modular energy storage units are brought into the existing facilities. Additional minor alterations to topographical features include minor grading and/or trenching for concrete pads. This project will result in negligible or no expansion of use and is also subject to a National Environmental Policy Act (NEPA) categorical exclusion related to existing federal facilities.

- 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
Webcor Construction LP (Match Funding \$1,500,000)	\$ 1,940,566
Energy Consulting Services	\$75,000
NOVA Engineering, Inc.	\$7,500
Michael Wall Engineering	\$8,800
NV5 (Match Funding Only)	
Elen Consulting (Match Funding Only)	
Chula Vista Electric (Match Funding Only)	
Consolidated Energy Distributors (Match Funding Only)	
Agile Fractal Grid	\$101,500
Alain P. Steven	\$58,250
Dale Garrett	\$39,750
Chuck Richter	\$84,000
Adje Mensah	\$46,706
Chris Hamilton	\$98,615
Bruce Modick	\$97,115
Drew Adams	\$99,064
KE Storage Corporation	\$184,165
Oakland Machine Works	\$30,500
Yuhas Machining	\$12,000
Wilcox Machining	\$16,000
Eos Energy Storage	\$983,590



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Legal Company Name:	Budget
Electric Power Research Institute	\$399,874
Avalon Energy	\$624,339

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

Legal Company Name:
NONE

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	19-20	301.001G	\$5,002,334
			\$
			\$

R&D Program Area: ESRO: ETSI

TOTAL: \$ 5,002,334

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information**1. Recipient's Administrator/Officer**

Name: Henry Boulley

Address: 7991 E Altair Ln

City, State, Zip: Anaheim, CA
92808-2201

Phone: 541-698-0153

E-Mail:

hjboulley@indianenergy.com

2. Recipient's Project Manager

Name: Allen Cadreau

Address: 7991 E Altair Ln

City, State, Zip: Anaheim, CA
92808-2201

Phone: 714-686 -9792

E-Mail:

acadreau@indianenergyllc.com

L) Selection Process Used☒ Competitive Solicitation Solicitation #: GFO-19-306☐ First Come First Served Solicitation Solicitation #:



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M) The following items should be attached to this GRF

- | | |
|---|--|
| 1. Exhibit A, Scope of Work | <input checked="" type="checkbox"/> Attached |
| 2. Exhibit B, Budget Detail | <input checked="" type="checkbox"/> Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts | <input checked="" type="checkbox"/> Attached |
| 4. Recipient Resolution <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Attached |
| 5. CEQA Documentation <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Attached |

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

EXHIBIT A
Scope of Work
Indian Energy LLC

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR¹	Task Name
1		General Project Tasks
2	x	Design and Develop Hybrid Modular Storage System (HMSS) Controller and Select HMSS Modules for Testing
3	x	Install and Test 3 HMSS Modules at the R-ICU multiple energy storage devices integrated to grid and/or renewable sources at the R-ICU
4	x	Scale HMSS Solution and Certify System for Use Cases
5		Metrics Development, Monitoring and Verification, and Data Analyses
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities
8		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
ATO	Authorization to Operate
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
Energy Storage Test Harness	System of sensors, controls, and connections for use in testing the performance of energy storage technologies to characterize and optimize their reliability, economic viability, security, and functional performance
HMSS	Hybrid Modular Storage System
R-ICU	Rapid Integration and Certification Unit
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 develop and demonstrate a behind-the-meter combination of energy storage technologies to create a 400 kW minimum power rated system with minimum 10 hour duration. This will be accomplished by testing three different combinations of non-lithium technologies, Hybrid Modular Storage System (HMSS) modules, in the R-ICU test center at a smaller scale (50kW) and selecting the best combination for the 400 kW minimum 10 hour HMSS.

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

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B. Problem/ Solution Statement

Problem

Large scale energy storage is a critical success factor in the widespread de-carbonization of the nation's electric power generation and delivery capability. To date single technology solutions do not offer the required capacity, are expensive, have short duty lives, and much of their approach is harmful to the environment when decommissioning occurs.

Solution

This project will develop three HMSS modules, that comprise different combinations of flow batteries, supercapacitors, fast responding mechanical energy storage and alternate chemistry (e.g., non-lithium) batteries in an integrated test platform at the R-ICU. Developed using a proven system of systems approach, the HMSS modules will also include an innovative hybrid controller which will ensure that each technology will be controlled optimally. In this fashion, long duration discharge is achieved without sacrificing other functions required of a renewables-based application. After rigorous validation and testing, the best HMSS configuration will then be scaled to create a minimum rating 400kW HMSS with minimum 10 hours in duration.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Create an HMSS energy storage system that will manage multiple selectable options for batteries, supercapacitors, and flywheels in tandem to supply stored power
- Advance, TRL 6 level systems, through testing and validation, an HMSS to manage multiple non-lithium-ion energy storage solutions, such as supercapacitors, and kinetic energy storage flow batteries, and alternative chemistry batteries (e.g., zinc cathode)
- Validate the optimal combination for larger long-duration HMSS modules and create a minimum 400 kW rating, minimum 10 hour duration HMSS. Develop an innovative controller to coordinate the operation of different energy storage systems as a single HMSS unit.
- Advance HMSS to at least TRL-7 by the end of the agreement.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability, lower costs, and increased safety by creating a template for sophisticated deployment of a diverse set of energy storage technologies in a modern platform for scalable microgrids that can collectively behave as a generation or storage system capable of providing grid reliability services in addition to their core function of generating and storing electricity.

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).

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Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs by deploying an innovative energy storage controller with the capability to coordinate and optimize the operation of a diverse portfolio of energy storage technologies, such as kinetic energy storage, alternative battery chemistries, flow batteries, and supercapacitors. This approach takes the system of systems method to develop a solution that is able to meet continuous and long duration power requirements of the site host.

Agreement Objectives

The objectives of this Agreement are to:

- Meet the challenge of a non-lithium, long duration energy storage solution that is scalable and capable of meeting the \$250/kWh price point with a 30 year system life.
- Meet or exceed 2 kWh/square foot energy footprint for the complete HMSS module
- Characterize the performance of three different HMSS modules (i.e., combinations of energy storage technologies) at the 50 kW scale.
- Deploy a 400 kW/ 4000 kWh HMSS module
- Demonstrate controller's ability to operate and communicate with different energy storage systems

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)**.

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.

³ California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

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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.

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

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

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

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

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

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports and invoices (subtask 1.5);

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- 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.

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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).

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- 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.

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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.

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- 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.

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- 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.

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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.

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- 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.

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- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

Products:

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

IV. TECHNICAL TASKS

TASK 2: Design and Develop Hybrid Modular Storage System (HMSS) Controller and Select HMSS Modules for Testing

The goal of this task is to design and develop a controller that will oversee and optimize the state of charge of an array of selected HMSS modules, which will be configured to meet Agreement objectives.

The Recipient shall:

- Perform hardware design and specification for the HMSS controller
- Conduct a TAC Meeting per subtask 1.10 to receive feedback from industry experts on the proposed design and the status of the technology development
- Perform firmware programming and interface for the circuit board
- Select HMSS modules for testing based on, but not limited to, the following factors: energy stored, system response time, roundtrip electrical efficiency, system availability, as a minimum.
- Test the developed controller on the HMSS modules selected for the project
- Prepare a *Technology Selection Report* which includes:
 - Evaluation process and criteria for selection of energy storage technology that will be used in the HMSS modules
 - Summary of key elements measured when the integration of the HMSS modules with the controller is to be tested.
 - Summary of final three HMSS module selected based on the key elements to be tested mentioned above.
- Demonstrate the use of the hardware level algorithms that will govern the interaction among the storage systems, the battery management system, the inverters and the outside communication infrastructure.
- Perform integration and testing with energy storage technologies and inverters that are expected to be included in the HMSS.
- Participate in CPR Meeting #1 per subtask 1.3
- Prepare *CPR Report #1* per subtask 1.3
- Prepare a *HMSS Controller Design Report* which will include but not limited to:
 - Schematic, Bill of Materials, data entry requirements
 - Electrical design
 - Schematic symbol definition, data entry types

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- Documentation on Battery Management System capabilities
- System documentation

Products:

- Technology Selection Report (draft and final)
- HMSS Controller Design Report (draft and Final)
- CPR Report #1

Subtask 2.1: Integration of the Hybrid Modular Storage System Controller into the Rapid Integration and Certification Unit (R-ICU)

The goal of this subtask is to integrate the HMSS controller with the R-ICU. The R-ICU interfaces with the energy markets and utilities and provides the high-level signals to the HMSS controller, based on the maximizing economic benefits associated with grid reliability services available.

The Recipient shall:

- Integrate the HMSS controller into the R-ICU
- Document lessons learned and summarize process for integrating HMSS controller into the R-ICU
- Capture and summarize high level cybersecurity challenges and practices, which includes compliance with military cybersecurity standards.
- Prepare a *Controller Integration Memo*, which includes but is not limited to:
 - Summary of high level cybersecurity challenges and practices, including compliance with military cybersecurity standards
 - Results of the HMSS controller integration process with the R-ICU
 - Waveform charts, as attachments, that show successful integration of HMSS controller with optimizer

Products:

- Controller Integration Memo

TASK 3: INSTALL AND TEST 3 HMSS MODULES INTEGRATED TO GRID AND/OR RENEWABLE SOURCES AT THE R-ICU

The goal of this task is to procure, assemble, install, and test the 3 HMSS modules at the R-ICU to achieve a minimum of 50 kW for 10 hours for each HMSS. Each HMSS module will be tested for performance to design the larger 400 kW system in Task 4.

The Recipient shall:

- Procure equipment and materials for assembly and installation of the HMSS modules
- Install HMSS modules at the R-ICU using the Energy Storage Test Harness.
- Interconnection to the grid shall meet California Rule 21 requirements or military base electrical requirements as defined by military standards and specifications.
- Demonstration site shall meet all of the following requirements:
 - Located in an IOU electric service territory and on a site that is an IOU customer site;

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- Located in a Tier 2 or 3 High Fire-Threat District as defined by the CPUC (see <https://www.cpuc.ca.gov/FireThreatMaps/>);
 - Located in and benefits a Low-Income Community.⁴
- Prepare a *Systems Test Plan* which will include:
 - A summary of signals and communications tests that will be conducted to ensure each component is functional and meets the expected performance
 - A list of the test variables and the key expected outcomes to be measured
 - A schedule and test sequence for each configuration
- Validate and update the design, including interaction with contract manufacturers, to incorporate “lessons learned” into the manufacturing and build instructions.
- Test the HMSS modules which will include the following use cases:
 - Peak Shaving
 - Long Duration Discharge
 - Cycling to Full Depth-of-discharge in both grid-facing and islanded microgrid modes
- Develop *Integration Test for HMSS Report* which will include:
 - Summary of test results from tests described above
 - Lessons learned and best practices from the HMSS module installation process
 - Photographs of various stages of installation and testing
 - Selection and selection criteria for HMSS Module selected for Task 4
- Participate in CPR Meeting #2 per subtask 1.3.
- Prepare *CPR Report #2* per subtask 1.3.

Products:

- Integration Test for HMSS Report (Draft and Final)
- Systems Test Plan
- CPR Report #2

TASK 4: SCALE HMSS SOLUTION AND CERTIFY SYSTEM FOR USE CASES

The goal of this task is to scale the HMSS module selected pursuant to Task 3 to provide a minimum of 400 kW power delivery over a period of at least 10 hours at Marine Corp Air Station Camp Pendleton and connected to the local grid and renewable generation. The performance of the entire system will be evaluated to inform manufacturing process and commercialization readiness.

⁴ Low-Income Communities are defined as communities within census tracts with median household incomes either at or below 80 percent of the statewide median income, or at or below the applicable low-income threshold listed in the state income limits updated by the California Department of Housing and Community Development (HCD). Visit the California Department of Housing & Community Development site for the current HCD State Income Limits: <http://www.hcd.ca.gov/grants-funding/income-limits/index.shtml>.

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The Recipient shall:

- Install the selected HMSS module at scale and the remaining kinetic energy storage units and flow battery units.
- Demonstrate entire system interfacing, through simulations, with energy markets and utilities
- Quantify the revenue mechanisms that can be leveraged for this entire system and define each revenue mechanism, and how each will be measured and accounted.
- Set up two use cases for certification testing
- Prepare *Use Case Test Plan* which will include:
 - Use case definition
 - Testing parameters
 - Expected outcomes for each use case
- Conduct certification testing of the HMSS module
- Participate in CPR Meeting #3 per subtask 1.3
- Prepare *CPR Report #3* per subtask 1.3
- Prepare *Certification of the HMSS*.
- The selected HMSS module must be installed, commissioned, and operated for at least one year.
- Prepare a *Use Case Summary Presentation* which will include:
 - Block diagram of the test configuration used for certification
 - Summary of test results and comparison to expected results
 - Certification process that can be applied to future deployments

Products:

- Use Case Test Plan
- Use Case Summary Presentation
- Certification of the HMSS
- CPR Report #3

TASK 5: METRICS DEVELOPMENT, MONITORING AND VERIFICATION AND DATA ANALYSES

The goals of this task are to conduct thorough monitoring and verification of the newly installed Hybrid Modular Storage System and perform various cost benefit and performance analyses.

The Recipient shall:

- Develop a *Measurement and Verification Plan*, prior to initiating measurement period, that includes:
 - Set up of measurement devices and data collection platform
 - Length of measurement and verification period. The one year operational period referenced in Task 4 above must be completed at least 6 months prior to the end of the Agreement term so that adequate data on the performance and capability of the system can be collected and analyzed for system performance validation. The Recipient must receive prior approval from the CAM if this schedule cannot be met and the CAM must approve in writing the new proposed schedule.
 - Parameters that will be measured and metrics that will be used validate cost effectiveness and performance. Metrics shall address value that longer-duration energy storage provides with specific information on impact on resiliency,

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reliability, cost savings from peak load reductions, load shifting, and increased services to the electric grid during times of grid stability challenges or other energy service capability that is appropriate. At least one metric shall address the value of the longer duration storage when compared to the normal 2-4 hours of storage current systems provide.

- Definition of analytical methods for processing data
- Expected results prior to measurement period
- Document, send, and discuss this task's lessons learned with the TAC and the CAM.
- Participate in a final TAC meeting that will disseminate the information learned from the project and summarize the next key steps for the technology
- Prepare a *Measurement and Verification Report* which will include:
 - Summary of data collected and period of data collection
 - Results of the measurement and verification period
 - Comparison of predicted results and actual results
 - Discussion of lessons learned and future adjustments

Products:

- Measurement and Verification Plan (Draft and Final)
- Measurement and Verification Report (Draft and Final)

TASK 6: Evaluation of Project Benefits

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

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue because of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.

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- 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 because of the Agreement.
- Respond to CAM questions regarding responses to the questionnaires.

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

Products:

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

TASK 7: Technology/Knowledge Transfer Activities

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

The Recipient shall:

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

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- 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 8: 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)

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: INDIAN ENERGY LLC

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-19-051 with Indian Energy LLC for a \$5,002,334 grant to demonstrate a long duration energy storage solution based on mixed integration of energy storage technologies, including vanadium redox flow battery, zinc hybrid cathode battery, and mechanical flywheel, at Camp Pendleton; 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