California Energy Commission
June 16, 2023 Business Meeting Backup
Materials for Agenda Item No 09:
LICAP Technologies, Inc.

The following backup materials for the above-referenced agenda item are available in this PDF packet as listed below:

1. Proposed Resolution
2. Grant Request Form
3. Scope of Work

RESOLUTION NO: 23-0616-09

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: LICAP Technologies, 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-22-016 with LICAP Technologies, Inc. for a $2,927,155 grant to fund the build-out of a low-rate initial production pilot line in Sacramento for battery electrode production using LICAP's innovative Activated Dry Electrode process. LICAP's patented electrode production process offers significant advantages over the traditional "wet coating" process including lower energy consumption, reduced amount of CO2 emissions, lower manufacturing footprint, improved battery performance, and elimination of toxic solvents from electrode manufacturing; and

FURTHER BE IT RESOLVED, that the Executive Director or their 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 June 16, 2023.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

_____
Liza Lopez
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 9/2022)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

IMPORTANT: New Agreement # to be completed by Contracts, Grants, and Loans Office.

New Agreement Number: EPC-22-016

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Justin Scaccianoce
3. MS-:51
4. Phone Number: 916-931-8010

C. Recipient's Information

1. Recipient's Legal Name: LiCAP Technologies Inc.
2. Federal ID Number: 81-3947789

D. Title of Project

Title of project: CAlifornia-made Sustainable and Cost-effective Activated Dry Electrode (CASCADE)

E. Term and Amount

1. Start Date: 6/16/2023
2. End Date: 3/31/2027
3. Amount: $2,927,155.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 6/16/2023.
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Justin Scaccianoce
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: EPIC (Electric Program Investment Charge).

Agenda Item Subject and Description:

LICAP TECHNOLOGIES, INC. Proposed resolution approving agreement EPC-22-016 with LiCAP Technologies, Inc. for a $2,927,155 grant to fund the build-out of a low-rate initial production pilot line in Sacramento for battery electrode production using LICAP's innovative Activated Dry Electrode process and adopting staff's determination that this action is exempt from CEQA. LICAP's patented electrode production process offers significant advantages over the traditional "wet coating" process including lower energy consumption, reduced amount of CO2 emissions, lower manufacturing footprint, improved battery performance, and elimination of toxic solvents from electrode manufacturing. (EPIC funding) Contact: Justin Scaccianoce

G. California Environmental Quality Act (CEQA) Compliance

1. **Is Agreement considered a "Project" under CEQA?**
   Yes

If yes, skip to question 2.

If no, complete the following (PRC 21065 and 14 CCR 15378) and explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because:

2. If Agreement is considered a "Project" under CEQA answer the following questions.

a) Agreement **IS** exempt?

Yes

Statutory Exemption?
No

If yes, list PRC and/or CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

PRC section number: None

CCR section number: None

Categorical Exemption?
Yes

If yes, list CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

CCR section number: Cal. Code Regs., tit. 14, § 15301 ;

Common Sense Exemption? 14 CCR 15061 (b) (3)
No

If yes, explain reason why Agreement is exempt under the above section. If no, enter "Not applicable" and go to the next section.

14 CCR 15301 provides that activities of operation, repair, maintenance or minor alteration of existing private structures, facilities, and mechanical equipment which involves negligible or no expansion of existing or former use are exempt from the provisions of CEQA. The proposed project involves design, installation and operation of equipment for the initial production line of battery electrodes inside the existing facility in Sacramento, CA. No work will be taking place outside of the building. The existing facility is a 4000 sq ft fabrication facility that is currently used for cell testing and equipment storage and has previously been used for electrode manufacturing, electrode prototyping equipment and mask manufacturing. The proposed line will require approximately 2000 sq ft within the existing facility. The proposed project includes a rearrangement of equipment and modifications to add power outlets/branch circuits internal to the building. Therefore, the proposed project falls within § 15301 of minor alterations to an existing structure involving negligible or no expansion of existing or former use and is exempt from CEQA.

This proposed project does not involve impacts on any particularly sensitive environment; any cumulative impacts of successive projects of the same type in the same place that might be considered significant; does not involve unusual

circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project site is not included on any list compiled pursuant to Government Code section 65962.5, and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project and this project will not have a significant effect on the environment.

b) Agreement **IS NOT** exempt.
IMPORTANT: consult with the legal office to determine next steps.

No

If yes, answer yes or no to all that applies. If no, list all as "no" and "None" as "yes".

Additional Documents	Applies
Initial Study	No
Negative Declaration	No
Mitigated Negative Declaration	No
Environmental Impact Report	No
Statement of Overriding Considerations	No
None	Yes

H. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter "No subcontractors to report" and "0" to funds. **Delete** any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
No subcontractors to report	$	**$**

I. Vendors and Sellers for Equipment and Materials/Miscellaneous

List all Vendors and Sellers listed in Budget(s) for Equipment and Materials/Miscellaneous. Insert additional rows if needed. If no vendors or sellers to report, enter "No vendors or sellers to report" and "0" to funds. **Delete** any unused rows from the table.

Vendor/Seller Legal Company Name	CEC Funds	Match Funds
No vendors to report	**$**	**$**

J. Key Partners

List all key partner(s). Insert additional rows if needed. If no key partners to report, enter "No key partners to report." **Delete** any unused rows from the table.

Key Partner Legal Company Name
No key partners to report

K. Budget Information

Include all budget information. Insert additional rows if needed. If no budget information to report, enter "N/A" for "Not Applicable" and "0" to Amount. **Delete** any unused rows from the table.

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	$ 1,809,421
EPIC	21-22	301.001I	$ 1,117,734

TOTAL Amount: $ 2,927,155

R&D Program Area: EDMFB: EDMF

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

L. Recipient's Contact Information

3. Recipient's Administrator/Officer

Name: Areeb Sadiq

Address: 9795 Business Park Dr

City, State, Zip: Sacramento, CA 95827-1708

Phone: 916-329-8099

E-Mail: areeb.sadiq@licaptechnologies.com

4. Recipient's Project Manager

Name: Areeb Sadiq

Address: 9795 Business Park Dr

City, State, Zip: Sacramento, CA 95827-1708

Phone: 916-329-8099

E-Mail: areeb.sadiq@licaptechnologies.com

M. Selection Process Used

There are three types of selection process. List the one used for this GRF.

Selection Process	Additional Information
Competitive Solicitation #	GFO-21-304
First Come First Served Solicitation #	Not applicable

Other	Not applicable

N. Attached Items

1. List all items that should be attached to this GRF by entering “Yes” or “No”.

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes
4	Recipient Resolution	No
5	Awardee CEQA Documentation	No

Approved By

Individuals who approve this form must enter their full name and approval date in the MS Word version.

Agreement Manager: Justin Scaccianoce

Approval Date: 5/4/2023

Branch Manager: Anthony Ng

Approval Date: 5/5/2023

Director: Anthony Ng for Jonah Steinbuck

Approval Date: 5/5/2023

Exhibit A
Scope of Work
LiCAP Technologies, Inc.

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Finalize the Design of Activated Dry Electrode™ Low-Rate Initial Production Line Equipment.
3		Order Designed Activated Dry Electrode™ Equipment from a Competitively Selected Vendor
4	x	Install And Commission Activated Dry Electrode™ Low-Rate Initial Production Line at the Recipient's facility
5		Test Installed Activated Dry Electrode™ Equipment for at Least Three Consecutive Months.
6		Evaluate Performance of Manufactured Electrodes in Lithium-Ion Batteries.
7		Conduct A Techno-Economic Assessment of the Activated Dry Electrode™ Process And Estimate Cost Reductions, Energy-Use, And GHG Emissions Reduction Potential.
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
CO_2	Carbon dioxide
ESS	Energy storage system
EV	Electric vehicle
LRIP	Low-rate initial production
NMP	N-Methyl-2-pyrrolidone
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to fund design installation, commissioning, and testing of a low-rate initial production manufacturing line using Activated Dry Electrode™ technology. This line will prove the technical and economic feasibility of cost-effective sustainable lithium-ion battery electrode manufacturing and demonstrate energy efficiency increase by at least 75%,

[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.

CO_2 emissions decrease by 75%, manufacturing footprint reduction of at least 38%, and EV battery cost reduction by up to $500 per pack.

B. Problem/ Solution Statement

Problem

Energy storage is an exponentially growing industrial opportunity that depends on the cost-competitiveness and sustainability of manufacturing processes along the battery value chain. State-of the-art battery manufacturing methods are not energy-efficient and need to be further improved and/or replaced with the most advanced technologies. Currently, nearly 50kWh of energy is needed to produce 1kWh of lithium-ion battery energy storage. The least energy-efficient and environmentally problematic process across the battery manufacturing chain is the wet electrode coating process. Wet electrode coating is used to manufacture the most critical part of any battery, the electrode, which can be then placed into different cell formats, such as cylindrical, prismatic, or pouch and used for energy storage applications for EVs, personal electronic devices and more. However, wet electrode coating alone is associated with ≈50% of energy needs for a Gigafactory and uses toxic and explosive chemicals.

Solution

The Recipient has developed an innovative Activated Dry Electrode™ technology for cost-effective and sustainable manufacturing of energy storage devices, including lithium-ion battery, solid-state battery, ultracapacitor, and lithium-ion capacitor. This technology will eliminate the use of toxic and explosive solvents used for battery materials processing, improve the energy efficiency of electrode manufacturing by at least 75%, reduce the manufacturing footprint needed for Gigafactory operations by at least 38%, reduce CO_2 emissions associated with battery electrode manufacturing by at least 75%, and pave the path for commercial production of solid-state batteries that are currently not compatible with the NMP-based processes. In addition, the dry electrode technology could increase battery performance by doubling energy density, or tripling power density when compared to batteries using conventional wet electrode coating. Overall, this technology can reduce the cost of an average EV battery pack by $500 and help to accelerate EV adoption.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Finalize the design of Activated Dry Electrode™ LRIP line.
- Build, install, and commission Activated Dry Electrode™ LRIP line at LiCAP's site in Sacramento, CA.
- Demonstrate the production of electrode within an LRIP pilot line with consistent product quality.
- Evaluate the performance of manufactured electrodes in lithium-ion battery pouch cells.
- Demonstrate energy savings, GHG emissions reduction potential, battery cell cost reductions, and improved work safety and recyclability of the Activated Dry Electrode™ process compared with the benchmark wet electrode technology.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefit*s* of reduced GHG emissions associated with the growing battery manufacturing industry, improved energy efficiency of battery manufacturing leading to reduced grid load associated with Gigafactory operations, increased safety of operations, reduced risk of spillage of toxic NMP, reduced land-use footprint of battery manufacturing resulting in reduced need to convert public lands into enterprise zones. In addition, this Activated Dry Electrode™ process produces no electrode scrap and therefore can reduce waste stream from Gigafactories.

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 advancing the lithium-ion battery manufacturing and demonstrating cost-effective and sustainable battery electrode manufacturing using the proprietary Activated Dry Electrode™ platform. Industrialization of the Activated Dry Electrode™ technology will reduce the barriers to widespread adoption of EVs and stationary storage system through reduced battery cost, increased energy efficiency of battery manufacturing, increased manufacturing throughput, improved work safety standards at Gigafactories.

Agreement Objectives

The objectives of this Agreement are to:

- Design and build an LRIP Activated Dry Electrode™ line capable of producing 100MWh/y of high energy density lithium-ion battery electrode using the proprietary process and equipment.
- Validate proof of manufacturing quality of the Activated Dry Electrode™ by producing at least fifty 2Ah pouch cells and fifty 18650 cylindrical cells with specifications matching EV applications requirements (>1C discharge rate) and fifty 2Ah pouch cells and fifty 18650 cylindrical cells with specifications matching ESS applications requirements (>0.5C discharge rate).
- Test and validate manufacturing speed, throughput, energy consumption, and performance of installed Activated Dry Electrode™ LRIP line for at least three consecutive months and produce at least 5,000m of cathode and 5,000m of matching anode electrodes.
- Conduct a techno-economic assessment of the Activated Dry Electrode™ process and estimate cost reductions, energy-use, and GHG emissions reduction potential.

[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).

Exhibit A
Scope of Work
LiCAP Technologies, Inc.

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).** All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations**.** All technical tasks should include product(s). 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 California Energy Commission's (CEC) 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.

The following describes the accepted formats for electronic data and documents provided to the CEC 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.
- 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 CEC'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 CEC 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;
  - Invoicing and auditing procedures;
  - 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 (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide *Kick-off Meeting Presentation* to include but not limited to:
  - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
  - Project schedule that identifies milestones
  - List of potential risk factors and hurdles, and mitigation strategy

- Provide an *Updated Project Schedule, Match Funds Status Letter,* and *Permit Status Letter*, 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:

- Kick-off Meeting Presentation
- Updated Project Schedule *(if applicable)*
- Match Funds Status Letter (subtask 1.7) *(if applicable)*
- Permit Status Letter (subtask 1.8) *(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 CEC 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 CEC 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 CEC.

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 CEC, 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 and submit 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.
- 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* with 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)

CAM Products:

- CPR Agenda(s)
- 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 CEC 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 procured equipment.
    - The CEC'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 copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:
- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Final 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 Funds 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. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC 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 *Energy Commission Style Manual* provided by the CAM.

Recipient Products:
- Final Report Outline (draft and final)

CAM Product:
- Energy Commission 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, Energy Commission 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)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments on Draft Final Report* received on the Executive Summary. For each comment received, the recipient will identify in the summary the following:
  - Comments the recipient proposes to incorporate.
  - Comments the recipient does propose to incorporate and an explanation for why.

- 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.
- Incorporate all CAM comments into the *Final Report*. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.

- Submit the revised *Final Report* electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:

- Summary of TAC Comments on Draft Final Report
- Draft Final Report
- Written Responses to Comments *(if applicable)*
- 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 CEC 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 CEC 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 CEC 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 <u>no permits</u> 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 each 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.
- 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, to the extent the TAC members feel is appropriate, 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.

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

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

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

Subtask 1.11 TAC Meetings

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

The Recipient shall:

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

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.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

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

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to finalize key performance targets for the project based on feedback from the TAC and report on final results in achieving those targets. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the project performance metrics from the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics at the first TAC meeting to solicit input and comments from the TAC members.

- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC Performance Metrics Summary* will identify:
    - TAC comments the Recipient proposes to incorporate into the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
    - TAC comments the Recipient does not propose to incorporate with and explanation why.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the Recipient met each of the performance metrics in the *Final Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
- Discuss the *Project Performance Metrics Results* at the Final Meeting.

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

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

TASK 2 FINALIZE THE DESIGN OF ACTIVATED DRY ELECTRODE™ LOW-RATE INITIAL PRODUCTION LINE EQUIPMENT.

The goal of this task is to design and engineer LRIP Activated Dry Electrode™ line based on the manufacturing throughput, energy efficiency, and performance targets set for this project.

The Recipient shall:

- Identify final system / design parameters, including operating speed, electrode dimensions, and other design parameters relevant to the Activated Dry Electrode™ process
- Design and engineer the proposed LRIP Activated Dry Electrode™ line, providing for its full integration into the Recipient's facility
- Prepare and provide a *Design and Engineering Report*. This report shall include, but is not limited to:
    - Engineering Summary Documents
    - Summary of lessons learned in the design phase
    - This report will be 5-15 pages, will include graphics and figures, and will have an executive summary that is written for a non-technical audience.

Products:

- Design and Engineering Report

TASK 3 ORDER DESIGNED ACTIVATED DRY ELECTRODE™ EQUIPMENT FROM A COMPETITIVELY SELECTED VENDOR

The goal of this task is to identify equipment manufacturer to build the LRIP Activated Dry Electrode™ line.

The Recipient shall:

- Initiate vetting process for LRIP Activated Dry Electrode™ line:
    - Identify manufacturer for LRIP Activated Dry Electrode™ line based on a set of criteria, including but not limited to cost, lead time, location, performance
- Finalize order for the LRIP Activated Dry Electrode™ line:
    - Place building order for manufacturing of LRIP Activated Dry Electrode™ line
    - Travel to the manufacturer site to track the progress and to do adjustments to the design if needed
    - Test the LRIP Activated Dry Electrode™ line at the manufacturer' site before it is shipped to the Recipient's facility
- Prepare a *Equipment Procurement Report* which includes but not limited to:
    - High-level executive summary discussing:
        - Criteria considered for the vetting process
        - Issues, if any, with the execution of the equipment procurement order
        - Lessons learned for this phase in the project
    - This report will be 2-10 pages, will include graphics and figures, and will have an executive summary that is written for a non-technical audience.

- Submit the *Equipment Procurement Report* to the CAM for feedback and incorporate changes as requested in the final *Equipment Procurement Report*.

Products:

- Equipment Procurement Report (draft and final)

TASK 4 INSTALL AND COMMISSION ACTIVATED DRY ELECTRODE™ LOW-RATE INITIAL PRODUCTION LINE AT THE RECIPIENT'S FACILITY

The goal of this task is to install and commission LRIP Activated Dry Electrode™ line at the Recipient's facility.

The Recipient shall:

- Prepare and provide a *System Execution Plan* for the LRIP Activated Dry Electrode™ line that will outline the schedule for the completion of all installation activities. The System Execution Plan will include, but is not limited to:
  - List of milestones relevant to the installation process
  - Gantt chart and detailed project schedule
  - Risk mitigation strategy
- Implement the System Execution Plan.
- Prepare and provide to the CAM a *System Execution Plan Report* for the facility that will evaluate the actual installation activities compared to the System Execution Plan. The System Execution Report will include, but is not limited to:
  - Final schedule of completed milestones
  - Description of lessons learned
  - This report will be 5-15 pages, will include graphics and figures, and will have an executive summary that is written for a non-technical audience.
- Prepare and provide Written *Notification of Completion and of Installation Letter* for the entire system that will notify the CAM that the installation activities have been completed.
- Prepare and provide a *Commissioning Plan* for the project that will detail the process, deliverables, and milestones associated with the testing and commissioning of LRIP Activated Dry Electrode™ line. The *Commissioning Plan* will include:
  - List of goals and objectives for the commissioning
  - Description of the quality control and quality assurance practices
- Implement Commissioning Plan.
  Prepare and provide *Written Notification of Completion of Commissioning Letter* for the facility that will notify the CAM that commissioning activities have been completed and that the
  LRIP Activated Dry Electrode™ line is ready to commence operations.
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- System Execution Plan
- System Execution Plan Report
- Notification of Completion and of Installation Letter
- Commissioning Plan
- Notification of Completion and of Commissioning Letter
- CPR Report

TASK 5 TEST INSTALLED ACTIVATED DRY ELECTRODE™ EQUIPMENT FOR AT LEAST THREE CONSECUTIVE MONTHS

The goal of this task is to demonstrate operation of the LIRP Activated Dry Electrode™ line for at least three consecutive months.

The Recipient shall:

- Initiate operation of the LIRP Activated Dry Electrode™ line capable of manufacturing of lithium-ion battery electrodes with the active material loading ranging between 4.0 - 5.9 mAh/cm^2 at a 5-20 m/min speed.
- Provide and prepare *Written Notification of Facility Operations*.
- Operate the facility for at least three months.
- Demonstrate the conversion of lithium-ion battery materials, such as NMC and graphite into lithium-ion battery cathode and anode, and manufacture, at minimum, 5,000m of each electrode (graphite anode and NMC cathode).
- Prepare *Mechanical Properties of Activated Dry Electrode™ Report*
    - This report will be 5-15 pages, will include graphics and figures, and will have an executive summary that is written for a non-technical audience.

Products:

- Written Notification of Facility Operations.
- Mechanical Properties of Activated Dry Electrode™ Report

TASK 6 EVALUATE PERFORMANCE OF MANUFACTURED ELECTRODES IN LITHIUM-ION BATTERIES

The goal of this task is to manufacture at least fifty 2Ah pouch cells and fifty 18650 cylindrical cells with specifications matching EV applications requirements (>1C discharge rate) and fifty 2Ah pouch cells and fifty 18650 cylindrical cells with specifications matching ESS applications requirements (>0.5C discharge rate).

The Recipient shall:

- Assemble the cathode and anode manufactured in LIRP Activated Dry Electrode™ line into pouch cells (≈2Ah). At least fifty pouch cells and fifty 18650 cylindrical cells will be manufactured with specifications targeting EV applications. Another fifty pouch cells and fifty cylindrical cells will be manufactured with specifications targeting ESS applications.
- Conduct electrochemical analysis and collect performance data for cell capacity, C-rate capability, high-temperature performance (at 40°C), cycle life performance (capacity fade over time).
- Prepare *Electrochemical Performance of Activated Dry Electrode™ in Lithium-ion Battery Cells Report*.
    - This report will be 5-15 pages, will include graphics and figures, and will have an executive summary that is written for a non-technical audience.

Products:

- Electrochemical Performance of Activated Dry Electrode™ in Lithium-ion Battery Cells Report (draft and final).

TASK 7 CONDUCT A TECHNO-ECONOMIC ASSESSMENT OF THE ACTIVATED DRY ELECTRODE™ PROCESS AND ESTIMATE COST REDUCTIONS, ENERGY-USE, AND GHG EMISSIONS REDUCTION POTENTIAL

The goal of this task is to conduct a techno-economic assessment of the Activated Dry Electrode™ process and demonstrate cost reductions, energy-use, and GHG emissions reduction benefits.

The Recipient shall:

- Develop a methodology for side-by-side analysis of the wet coating technology versus Activated Dry Electrode™ process.
- Construct a techno-economic model that would include at least the cost reduction potential, energy efficiency, GHG emissions reduction potential, environmental benefits, payback period.
- Prepare *Techno-economic Analysis of Activated Dry Electrode™ Report*.
    - This report will be 2-15 pages, will include graphics and figures, and will have an executive summary that is written for a non-technical audience.

Products:

- Techno-economic Analysis of Activated Dry Electrode™ Report (draft and final)

TASK 8: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete *the Initial Project Benefits Questionnaire*. The Initial Project Benefits Questionnaire shall be initially completed by the Recipient with 'Kick-off' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by January 31st of each year. The Annual Survey includes but is not limited to the following information:
    - Technology commercialization progress
    - New media and publications
    - Company growth
    - Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the Energize Innovation website (www.energizeinnovation.fund), and provide *Documentation of Project Profile on EnergizeInnovation.fund*, including the profile link.
- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the Energize Innovation website (www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

Products:

- Initial Project Benefits Questionnaire
- Annual Survey(s)
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund

TASK 9 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to ensure the learning that resulted from this project is captured and disseminated so that similar efforts build on the lessons learned.

The Recipient shall:

- Develop and submit a *Project Case Study Plan* that outlines how the Recipient will document the planning, establishment, and operation of the project. The *Project Case Study Plan* should include:
  - An outline of the objectives, goals, and activities of the case study.
  - The organization that will be conducting the case study and the plan for conducting it.
  - A list of professions and practitioners involved in the project's development.
  - Specific activities the recipient will take to ensure the learning that results from the project is disseminated to those professions and practitioners.
  - Presentations/webinars/training events to disseminate the results of the case study.
- Present the Draft Project Case Study Plan to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the draft *Project Case Study Plan*. This document will identify:
  - TAC comments the recipient proposes to incorporate into the *Final Technology Transfer Plan*.
  - TAC comments the recipient does not propose to incorporate and explanation why.
- Submit the final *Project Case Study Plan* to the CAM for approval.
- Execute the final *Project Case Study Plan* and develop and submit a *Project Case Study (draft and final)*
- When directed by the CAM, develop presentation materials for a CEC sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the CEC.
- Provide at least (6) six High Quality Digital Photographs (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

- Project Case Study Plan (draft and final)
- Summary of TAC Comments
- Project Case Study (draft and final)
- High Quality Digital Photographs

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.