

**GRANT REQUEST FORM (GRF)**CEC-270 (Revised 10/2015)  
COMMISSION

CALIFORNIA ENERGY

New Agreement EPC-18-017 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Eleanor Oliver	51	916-445-5377

Recipient's Legal Name	Federal ID Number
Sepon Technologies, Inc.	47-4950211

Title of Project
Scaling Up Pilot Production of Nanporous Membranes for Battery Storage Technologies

Term and Amount	Start Date	End Date	Amount
	6/28/2019	3/29/2024	\$ 2,675,793

**Business Meeting Information**

<input type="checkbox"/> ARFVTP agreements under \$75K delegated to Executive Director.			
Proposed Business Meeting Date	6/12/2019	<input checked="" type="checkbox"/> Consent	<input type="checkbox"/> Discussion
Business Meeting Presenter	Benson Gilbert	Time Needed:	5 minutes
Please select one list serve. EPIC (Electric Program Investment Charge)			

**Agenda Item Subject and Description**

SEPION TECHNOLOGIES, INC. Proposed resolution approving Agreement EPC-18-017 with Sepon Technologies, Inc. for a \$2,675,793 grant to scale-up production of a low-cost polymeric membrane separator, a key component in current and next-generation battery storage technologies, and adopting staff's determination that this action is exempt from CEQA. (EPIC Funding) Contact: Benson Gilbert (Staff presentation 5 minutes)

**California Environmental Quality Act (CEQA) Compliance**

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

2. If Agreement is considered a "Project" under CEQA:  
☒ a) Agreement **IS** exempt. (Attach draft NOE)  
☐ Statutory Exemption. List PRC and/or CCR section number: \_\_\_\_\_  
☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit 14, § 15301  
☐ Common Sense Exemption. 14 CCR 15061 (b) (3)  
 Explain reason why Agreement is exempt under the above section:  
 The reason for the CEQA categorical exemptions are as follows: 1. For Cal. Code Regs. (CCR), Title 14, Section 15301: This project will involve manufacturing and product testing to be performed at existing laboratory facilities and large commercial/institutional stake-holder facilities. This project will install small-scaled equipment into an existing facility, but will have no to minor alterations to the facility. The tests that will be performed are temporary in nature and will require only minor alternations to existing structures. Work under this project will result in negligible or no expansion of the existing use of facilities at which testing will occur. This project will result in no significant impact to the environment and is exempt pursuant to CCR, 14 § 15301.

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

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<b>List all subcontractors (major and minor) and equipment vendors:</b> (attach additional sheets as necessary)	
Legal Company Name:	Budget
Randy Chan	\$ 50,000
Ed Williams	\$ 25,000
Steve Pierce	\$ 25,000
Lawrence Berkeley National Laboratory - Advanced Biofuels and Bioproducts Process Development Unit	\$ 95,000
University of Washington-Clean Energy Testbeds	\$ 0
Argonne National Laboratory	\$ 0
CAMX Power LLC	\$ 0
	\$

<b>List all key partners:</b> (attach additional sheets as necessary)
Legal Company Name:

<b>Budget Information</b>			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	18-19	301.001F	\$2,675,793
			\$
			\$
			\$
R&D Program Area:	EDMFO: EDMF	TOTAL:	\$2,675,793
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

<b>Recipient's Administrator/ Officer</b>		<b>Recipient's Project Manager</b>	
Name:	Peter Frischmann	Name:	Peter Frischmann
Address:	630 Thomas L Berkley Way Apt 823	Address:	630 Thomas L Berkley Way Apt 823
City, State, Zip:	Oakland, CA 94612-1885	City, State, Zip:	Oakland, CA 94612-1885
Phone:	208-406-9888 / Fax: - -	Phone:	208-406-9888 / Fax: - -
E-Mail:	pete@sepiontechnologies.com	E-Mail:	pete@sepiontechnologies.com

<b>Selection Process Used</b>
<input checked="" type="checkbox"/> Competitive Solicitation <input type="checkbox"/> First Come First Served Solicitation
Solicitation #: GFO-18-302

<b>The following items should be attached to this GRF</b>	
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
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## **EXHIBIT A**

### **Scope of Work**

#### **I. TASK ACRONYM/TERM LISTS**

##### **A. Task List**

<b>Task #</b>	<b>CPR 1</b>	<b>Task Name</b>
1		General Project Tasks
2	X	Scale Up Battery Membrane to Pilot Production
3	X	Validate Membrane Performance
4		Membrane Market Facilitation Activities
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities
7		Production Readiness Plan

##### **B. Acronym/Term List**

<b>Acronym/Term</b>	<b>Meaning</b>
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
EPIC	Electric Program Investment Charge
EV	Electric Vehicle
Li	Lithium
LRIP	Low-Rate Initial Production
mAh	Milli-amp hour
MRL	Manufacturing Readiness Level
TAC	Technical Advisory Committee
TRL	Technology Readiness Level
ZEV	Zero-emission Electric Vehicles

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

##### **A. Purpose of Agreement**

The purpose of this Agreement is to fund the production scale-up of an advanced battery membrane platform for market facilitation of safe, low-cost, and energy-dense batteries. The funding will enable a recognized leading California clean energy entrepreneur to successfully advance an emerging best-of-class innovative technology to the low-rate initial production (LRIP) stage.

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

## **EXHIBIT A**

### **Scope of Work**

#### **B. Problem/ Solution Statement**

##### **Problem**

In advancing widespread commercialization of energy storage solutions, the Recipient has faced common startup challenges to transition from prototype to production, including: securing capital in a myopic software-centric venture capital climate, adjusting emerging technology to fit established manufacturing processes, and a lack of trained technicians with practical manufacturing experience/knowledge. Resulting low-yields produced to date and quality control expenses have also created a representation of the Recipient's coated membrane platform being less investable. To realize California's forward-thinking goals of deploying 1.5 million zero-emission electric vehicles (ZEV) and reaching 100 percent renewable energy (SB-100), market facilitation support for local manufacturing of batteries and their components must be addressed.

Removing cobalt from batteries is now seen as the biggest challenge to dropping price and securing supply chains to ramp up production of electric vehicles (EV) and grid-storage batteries. Raw materials make up 50–70 percent of the cost of a Li-ion battery; of the three most common metals in Li-ion cathodes—manganese, nickel, and cobalt—manganese is 10–100 times more abundant, 5–25 times less expensive, and exhibits minimal toxicity to humans. The long-term market shift toward more nickel- and manganese-rich cathodes is slow because of the unwanted capacity fade tied to reducing cobalt is currently a pain point for all lithium-ion battery manufacturers that are invest resources to extend the lifetime of these products.

##### **Solution**

The Recipient will scale-up production of a low-cost polymeric membrane separator, a key component of Li-ion, Li-metal, and advanced flow batteries. The Recipient's separator imparts excellent lifetime, enhanced safety, improved energy density (by 15 percent or more), drops the cost below \$100/kWh, and mitigates supply-chain risk and human rights concerns by enabling low-cost, highly abundant active materials by a California manufacturer. Integration of the Recipient's membranes in today's batteries will allow for broader deployment of low-cost renewable energy generation with the reliability and dispatchability of fossil fuels. This platform will support development of system-level long-duration storage assets meeting stringent cost and performance targets.

This critical Electric Program Investment Charge (EPIC) funding will support market facilitation enabling Recipient's novel battery membrane technology to mature from one-off prototype production and manufacturing readiness level (MRL) 7 to MRL 8, successfully demonstrating LRIP, de-risking production challenges to drop-unit economics and developing the supply chain to prepare for market entry. An optimized cost model, high-quality coating process and roll-to-roll (R2R) pilot production line will accelerate deployment, confirmed with performance and safety testing in assembled batteries. A validated supply chain, trained technicians, and production readiness plan will advance Recipient's pathway to high-volume commercialization.

#### **C. Goals and Objectives of the Agreement**

##### **Agreement Goals**

The goal of this Agreement is to demonstrate low-rate initial production of battery membrane components at MRL 8 that unlock new low-cost, long-lived energy storage solutions as an essential foundation for California to reach 1.5 million ZEVs by 2025 and 100 percent carbon-free electricity by 2045.

## EXHIBIT A

### Scope of Work

Ratepayer Benefits:<sup>2</sup> This Agreement will result in the ratepayer benefit of extended range anxiety and reduced up-front cost of electric vehicles (EVs) while paving the way to greater electricity reliability, lower costs, and increased safety by accelerating a 100 percent decarbonized electricity grid. This implementation of vehicle-to-grid controlled charging, both single- and bi-directional, can improve electricity grid efficiency by optimizing charging times to level out peak ramping and reduce the need for more conventional baseload generation. By lowering the cost of battery storage below \$100/kWh, Recipient's membrane technology for Li-batteries will lower barriers to EV adoption, helping California reach milestones of the Zero Emission Vehicle program and reducing consumer energy bills by broadening the base of ratepayers to include large EV fleets. Lowered financial burden from utility bills will ensure that all Californians can enjoy the same access to renewable and efficient energy and the commensurate health and safety benefits.

Technological Advancement and Breakthroughs:<sup>3</sup> 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 scaling up production of advanced battery membranes for market facilitation of zero emission vehicle battery packs and ultra-low-cost system-level storage that enables renewable resources to displace gasoline and natural gas assets. This innovative membrane is vital to expanding safe, energy-dense batteries capabilities to power electric vehicles beyond the normal mile range. The Recipient's membrane technology provides near-term benefits for current market Li-ion batteries and is adaptable to the evolving battery platform.

#### **Agreement Objectives**

The objectives of this Agreement are to:

- Scale up production of battery membrane meeting the cost, conductivity, and lifetime targets required for application in electric vehicles and long-duration energy storage devices from one-off prototype production to the LRIP stage;
- Validate the performance and safety of membrane in batteries meeting system-level targets (marginal energy cost  $\leq 100$  \$/kWh); and
- Conduct market facilitation activities addressing supply chain, workforce needs, and other deployment challenges to confirm high volume production readiness.

### **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.,

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<sup>2</sup> 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](http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF)).

<sup>3</sup> 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.

## EXHIBIT A

### Scope of Work

reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

#### **The Recipient shall:**

##### For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

##### For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

##### For all products

- Submit all data and documents required as products in accordance with the following:

##### Instructions for Submitting Electronic Files and Developing Software:

###### ○ **Electronic File Format**

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission’s software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.

## **EXHIBIT A**

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- Project management documents will be in Microsoft Project file format, version 2007 or later.
- **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

  - Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - Visual Studio.NET (version 2008 and up). Recommend 2010.
  - C# Programming Language with Presentation (UI), Business Object and Data Layers.
  - SQL (Structured Query Language).
  - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
  - Microsoft SQL Reporting Services. Recommend 2008 R2.
  - XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

## **MEETINGS**

### **Subtask 1.2 Kick-off Meeting**

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

#### **The Recipient shall:**

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

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

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

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

- The CAM's expectations for accomplishing tasks described in the Scope of Work;

## **EXHIBIT A**

### **Scope of Work**

- An updated Project Schedule;
  - Technical products (subtask 1.1);
  - Progress reports and invoices (subtask 1.5);
  - Final Report (subtask 1.6);
  - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
  - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, as needed to reflect any changes in the documents.

#### **The CAM shall:**

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

#### **Recipient Products:**

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*if applicable*)

#### **CAM Product:**

- Kick-off Meeting Agenda

#### **Subtask 1.3 Critical Project Review (CPR) Meetings**

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

#### **The Recipient shall:**

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



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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
- Approval 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

## EXHIBIT A

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the property is located.

- If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

#### Products:

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

#### Subtask 1.8 Permits

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

#### The Recipient shall:

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

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

#### Products:

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

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- Copy of Each Approved Permit (*if applicable*)

#### **Subtask 1.9 Subcontracts**

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

#### **The Recipient shall:**

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

#### **Products:**

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

### **TECHNICAL ADVISORY COMMITTEE**

#### **Subtask 1.10 Technical Advisory Committee (TAC)**

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

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

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

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

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- 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.

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- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

#### Products:

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

## IV. TECHNICAL TASKS

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

### TASK 2: SCALE UP BATTERY MEMBRANE TO PILOT PRODUCTION

The goal of this task is to assess and determine the production components, individually and collectively, and production processes for the battery membrane to create an in-house manufacturing scale-up to the LRIP stage. This includes potential methods of polymer synthesis, ink formulation, and roll-to-roll coating.

#### The Recipient shall:

- Test a variety of detailed reactor system designs and purification methods to decide appropriate process equipment to scale up production of polymers.  
These designs are not considered data, a product, intellectual property, or anything else under this Agreement to which the Energy Commission has any rights (e.g., access, possession, a license, etc.). The designs are included in this Scope of Work to ensure the Recipient conducts this work, but the Commission does not have any rights to the designs in order to ensure that third-parties, such as competitors, cannot use this Agreement to gain access to them, such as through the Public Records Act, and potentially harm Recipient's ability to commercialize the technology described in this Agreement.
- Test and determine the polymer batch quality metrics that show the most sensitivity for membrane processing and battery performance.
- Determine a process optimization to achieve ideal polymer targets of molecular weight, polydispersity, decomposition, and reproducible melting points for scaled-up manufacturing.
- Install reactor system design and establish process optimization in-house at the Recipient's site or identify credible path to scale up with partners.
- Create a formula to dissolve the polymer in a carrier solvent detailed system, including but not limited to water, ethanol, methyl ethyl ketone, methyl isobutyl ketone, ethyl acetate, and toluene, to create an ink to be coated into thin membranes.



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- Test the ink in a variety of roll-to-roll coating demonstrations to analyze the film thickness and uniformity.
- Pilot coating trials to develop a continuous coating process for supporting cross-linked polymer membranes on traditional polyolefin battery separators.
- Procure, assemble, and install in-house pilot coating equipment.
- Determine bulk pinhole density using scanning electron microscopy with 10 sample areas of coated membranes.
- Host CAM for a site visit demonstrating new LRIP capabilities.
- Prepare a *Membrane Production Quality Assurance/Quality Control Protocols Report* that integrates the pilot line's best practices, standards, results and lessons learned from subtask 2.1 to subtask 2.3.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR meetings).
- Participate in a CPR meeting.

#### **Products:**

- Membrane Production Quality Assurance/Quality Control Protocols Report
- CPR Report #1

### **TASK 3: VALIDATE MEMBRANE PERFORMANCE**

The goal of this task is to confirm the performance of the in-house pilot-produced battery membrane and safety of the membrane within assembled batteries.

#### **Subtask 3.1 Test Membrane for Key Performance Metrics**

The goal of this subtask is to determine the ideal metrics in performance for the in-house pilot-produced battery membrane.

#### **The Recipient shall:**

- Develop key performance metrics and test procedures for which the membranes will be assessed, which should include but is not limited to area specific resistance, transition metal diffusive permabilities, crossover rate, and effective diffusion coefficient.
- Prepare a *Membrane Performance Metrics Report* which summarizes the key performance metrics and the results of the membrane testing with data and knowledge found in assessing the coated membrane.

#### **Products:**

- Membrane Performance Metrics Report

#### **Subtask 3.2 Assemble and Test Battery with New Membranes**

The goal of this subtask is to examine and assess performance of batteries with the new in-house pilot-produced membrane. This subtask will also conduct off-site safety testing to help validate performance.

#### **The Recipient shall:**

- Assemble and test the batteries with the pilot-produced coated membrane in two different stages of setups: as a single layer battery and as a commercial formed battery.
- Validate battery performance enhancements with third-party and customer assessment by analyzing aspects including, but not limited to, cycle life and energy density.

## **EXHIBIT A**

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- Prepare a *Battery Performance Assessment Report* that incorporates the Membrane Performance Metrics from Subtask 3.1 and the comprehensive assessment from the third-party company and customers' feedback.
- Test battery safety with new membranes in preparation for regulatory approval.
- Conduct third party testing on the batteries with the in-house pilot produced membrane. Testing should include, but is not limited to:
  - Nail penetration;
  - Overcharge; and
  - Crush testing.
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

#### **Products:**

- Battery Performance Assessment Report
- CPR Report #2

### **TASK 4: MEMBRANE MARKET FACILITATION ACTIVITIES**

The goal of this task is to address membrane market barriers, supply chain risks, workforce readiness, and regulatory approvals to facilitate market entry and ramp-up.

#### **Subtask 4.1 Conduct Market Research, Assess and Optimize Cost Model**

The goal of this subtask is to broaden customer reach beyond the normal customer base to incentives future opportunities.

#### **The Recipient shall:**

- Actively engage with potential partners and customers to discuss prospective strategies to gain assurance in product.
- Conduct platform-specific market studies, including detailed producibility trade studies, risk assessments, and prioritized unit cost reduction efforts. Optimize and validate detailed design-driven engineering cost model with production data. Update cost model and yield rate analyses with pilot line results.
- Prepare a *Battery Membrane Production Risk Assessment Report* that includes, but not limited to, the results and discussion of market and trade studies, risk assessments, unit cost reduction efforts, cost model validation data, and yield rate analyses updated with pilot line results determined in Task 2 and Task 3.

#### **Products:**

- Battery Membrane Production Risk Assessment Report (draft and final)

#### **Subtask 4.2 Analyze and Track Supply Chain, Develop De-Risking Plan, and Validate**

The goal of this subtask is to determine and design supply chain to maximize scale-up production of the membrane platform.

#### **The Recipient shall:**

- Develop de-risking plan to validate and formalize suppliers in preparation for commercialization, including establishing long-lead procurement plans.

## **EXHIBIT A**

### **Scope of Work**

- Analyze and validate supply chain and supplier quality assurance by ensuring all materials, manpower, tooling, test equipment and facilities are proven on pilot line and are available to meet the planned low rate production schedule.
- Develop and complete an industrial capabilities assessment showing the supply chain is established and stable by the performance in cost effective designing, developing, producing, maintaining, and support of the program and the approach to making production rate and quantity changes in response to contingency and support objectives.
- Prepare a *Supply Chain and Industrial Capabilities Assessment Report* that includes discussion of manufacturing, sourcing processes and validation.

#### **Products:**

- Supply Chain and Industrial Capabilities Assessment Report (draft and final)

#### **Subtask 4.3 Conduct Workforce Readiness Education, Outreach, and Training**

The goal of this subtask is to organize and launch a trained staff that can achieve professional objectives that align with the goal of scaling-up to a LRIP.

#### **The Recipient shall:**

- Address workforce needs through tailored education and outreach, and by hiring and training technicians with practical manufacturing experience/knowledge.
- Prepare a *Training Schedule (per classification)* that includes, but is not limited to, off-site training by third party entities and on-site in-house company training.
- Hire and train key personnel to the project that includes, but is not limited to, Director of Quality, Supply Chain Manager, Coating Engineer, Membrane Scientist, and a Coating Technician.
- Prepare *Job Duty Description (per classification)* for each hired staff that includes, but limited to, qualifications, responsibilities, and expectations.

#### **Products:**

- Training Schedule (per classification)
- Job Duty Description (per classification)

#### **Subtask 4.4 Assist Customers with Regulatory Approvals**

The goal of this subtask is to analyze the safety testing on the in-house pilot-production battery in correlation with regulatory certification to help customers have a clear understanding the battery.

#### **The Recipient shall:**

- Demonstrate capability, empathy, and a clear understanding of the materials impact on safety certification to provide awareness of any hurdles in regulatory approval for customers.
- Prepare a *Safety Certification Analysis* that addresses the possible hurdles that could be encountered for the customer in gaining a safety certification for the pilot-produced battery.

#### **Products:**

- Safety Certification Analysis

### **TASK 5: EVALUATION OF PROJECT BENEFITS**

## **EXHIBIT A**

### **Scope of Work**

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 as a result of the project.
    - A discussion of project product downloads from websites, and publications in technical journals.
    - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
    - Additional Information for Product Development Projects:
      - Outcome of product development efforts, such copyrights and license agreements.
      - Units sold or projected to be sold in California and outside of California.
      - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
      - Investment dollars/follow-on private funding as a result of Energy Commission funding.
      - Patent numbers and applications, along with dates and brief descriptions.
    - Additional Information for Product Demonstrations:
      - Outcome of demonstrations and status of technology.
      - Number of similar installations.
      - Jobs created/retained as a result of the Agreement.
  - For Information/Tools and Other Research Studies:
    - Outcome of project.
    - Published documents, including date, title, and periodical name.
    - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
    - The number of website downloads.

## **EXHIBIT A**

### **Scope of Work**

- An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
- An estimate of energy and non-energy benefits.
- Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

#### **Products:**

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

#### **TASK 6: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES**

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

#### **The Recipient shall:**

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
  - A description of the intended use(s) for and users of the project results.
  - Published documents, including date, title, and periodical name.
  - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
  - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
  - The number of website downloads or public requests for project results.
  - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the

## **EXHIBIT A**

### **Scope of Work**

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 7: PRODUCTION READINESS PLAN**

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

#### **The Recipient shall:**

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

#### **Products:**

- Production Readiness Plan (draft and final)

#### **V. PROJECT SCHEDULE**

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: SEPION TECHNOLOGIES, INC.

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

**RESOLVED**, that the Energy Commission approves Agreement EPC-18-017 Sepion Technologies, Inc. for a \$2,675,793 grant to scale-up production of a low-cost polymeric membrane separator, a key component in current and next-generation battery storage technologies, and adopting staff's determination that this action is exempt from CEQA; and

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

**CERTIFICATION**

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on June 12, 2019.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

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Cody Goldthrite,  
Secretariat