



**CALIFORNIA
ENERGY COMMISSION**



**California Energy Commission
April 10, 2025 Business Meeting
Backup Materials for Power Environmental Energy Research Institute**

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
4. CEQA Materials

STATE OF CALIFORNIA
STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: Power Environmental Energy Research Institute

WHEREAS, County of Imperial is the Lead Agency for the Hell's Kitchen Power & Lithium Project, proposed by Controlled Thermal Resources (US) Inc. via its subsidiaries, to build a geothermal power plant that will produce up to 49.9 megawatts of net geothermal energy and develop mineral extraction and processing facilities capable of producing lithium hydroxide, silica, and polymetallic products. The project will be located in the Salton Sea Known Geothermal Resource Area; and

WHEREAS, The Imperial County Planning and Development Services, prepared an Environmental Impact Report (EIR) for the Hell's Kitchen Project (SCH# 2022030704), Findings of Fact and Statement of Overriding Considerations (FOFSOC), a Mitigation Monitoring and Reporting Program (MMRP); and Conditional Use Permits (CUP) # 21-0020, for the construction, operation, maintenance, and decommissioning of a geothermal power plant facility, and # 21-0021, for the construction, operation, maintenance, and decommissioning of a mineral extraction and production facility adjacent to a proposed geothermal flash power plant; and

WHEREAS, The Imperial County Board of Supervisors considered and filed the EIR on January 24, 2024, making mitigation measures a condition of approval. The EIR, FOFSOC, MMRP, and CUPs are located at the Imperial County Website. The CEC has provided links to the documents in the backup material; and

WHEREAS, The Energy Commission has reviewed and considered the County's EIR, FOFSOC, MMRP, Resolutions approving the CUPs and the findings contained therein, the filed Notices of Determinations, and the Energy Commission Staff's Findings, which are contained in the Staff Memorandum and CEQA analysis of EPC-24-048, which is included in the backup materials; and

WHEREAS, the Energy Commission is considering the proposed agreement EPC-24-048, High-Efficiency Mineral Recovery System with Reduced Waste Output, a grant to allow Power Environmental Energy Research Institute to design, construct, and demonstrate a pilot scale geothermal brine treatment and metal recovery system, at the Hell's Kitchen Site in the Salton Sea Known Geothermal Resource Area; and

WHEREAS, Prior to acting on the Agreement EPC-24-048, the Energy Commission desires to make certain findings pursuant to the CEQA Guidelines, title 14, sections 15093 and 15096;

THEREFORE, BE IT RESOLVED,

1. The Energy Commission has reviewed the information contained in the EIR, FOFSOC, MMRP, and resolutions approving the EIR and CUPs relevant to its approval of EPC-24-048, and has reviewed the CEQA findings contained in the County's EIR, FOFSOC, MMRP, and the CUPs, which are adopted to the extent that they are relevant to the Energy Commission's decision to approve EPC-24-048, and has reviewed the Staff Memorandum identified above.
2. The County has already adopted the mitigation measures recommended in the EIR, FOFSOC, MMRP, and the CUPs, and has authority to implement the mitigation measures or to seek any required approvals for the mitigation measures and the Energy Commission has no direct authority to implement the mitigation measures.
3. The Energy Commission has reviewed and considered the EIR, FOFSOC, MMRP, Resolutions approving the CUPs, and the Staff memorandum, and finds that these documents are adequate for its use as the decision-making body for its consideration of EPC-24-048.
4. Approval of EPC-24-048 is within the scope of Conditional Use Permits 21-0020 and 21-0021 approved by the County, and within the activities evaluated in the EIR and CUPs.
5. Because the EIR was finalized and filed on January 24, 2024, and because the CUPs were approved and filed on January 24, 2024, none of the circumstances within CCR, title 14, section 15162 are present and there have been no substantial project changes and no substantial changes in the project circumstances that would require major revisions to the EIR or CUPs, either due to the involvement of new significant environmental effects, or to an increase in the severity of previously identified significant impacts, and there is no new information of substantial importance that would change the conclusions set forth in the EIR.
6. The Energy Commission has not identified any feasible alternative of additional feasible mitigation measures withing its power that would substantially lessen or avoid any significant effect the Project would have on the environment.

FURTHER BE IT RESOLVED, that the Energy Commission finds, on the basis of the entire record before it, that the mitigation measures incorporated in the EIR will prevent EPC-24-048 from having any significant environmental impacts; and

FURTHER BE IT RESOLVED, that the Energy Commission approves EPC-24-048 with Power Environmental Energy Research Institute for \$4,428,021.00.

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 April 10, 2025.

AYE:

NAY:

ABSENT:

ABSTAIN:

Dated:

Kristine Banaag
Secretariat



GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: EPC-24-048

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Katherine Greenwald
3. MS-:None
4. Phone Number: 279-226-1147

C. Recipient's Information

1. Recipient's Legal Name: Power Environmental Energy Research Institute
2. Federal ID Number: 26-2880388

D. Title of Project

Title of project: High-Efficiency Mineral Recovery System with Reduced Waste Output

E. Term and Amount

1. Start Date: 5/1/2025
2. End Date: 12/31/2028
3. Amount: \$4,428,021.00

F. Business Meeting Information

1. Are the ARFVTP agreements \$75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 4/10/2025.
3. Consent or Discussion? Consent
4. Business Meeting Presenter Name: Katherine Greenwald
5. Time Needed for Business Meeting: N/A
6. The email subscription topic is: EPIC (Electric Program Investment Charge).

Agenda Item Subject and Description:

POWER ENVIRONMENTAL ENERGY RESEARCH INSTITUTE. Proposed resolution adopting CEQA findings for Power Environmental Energy Research Institute's High-Efficiency Mineral Recovery System with Reduced Waste Output project, and approving grant agreement EPC-24-048 with Power Environmental Energy Research Institute. (EPIC Funding) Contact: Katherine Greenwald

- i. CEQA Findings. Findings that, based on the lead agency Imperial County's Final Environmental Impact Report (EIR) and Notice of Determination filed for the Hell's Kitchen geothermal power plant and mineral extraction and processing facility, the work under the proposed agreement presents no new significant or substantially more severe environmental impacts beyond those already considered and mitigated by the lead agency.
- ii. Power Environmental Energy Research Institute. Proposed approval of agreement EPC-24-048 for a \$4,428,021 grant to design, construct, and test a foam fractionation technology system to extract high-purity manganese and



zinc as valuable metals from geothermal brine in the Salton Sea region, while simultaneously acting as a pre-treatment to remove interfering ions prior to direct lithium extraction.

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”:

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

a) Agreement **IS** exempt?

No

Statutory Exemption?

Yes or 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:

CCR section number: CCR section number 1, CCR section number 2. Or, None

Categorical Exemption?

Yes or No

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:

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.

b) Agreement **IS NOT** exempt.

IMPORTANT: consult with the legal office to determine next steps.

Yes

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	Yes or No
Negative Declaration	Yes or No
Mitigated Negative Declaration	Yes or No
Environmental Impact Report	Yes
Statement of Overriding Considerations	Yes or No



None	Yes or No
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H. Is this project considered “Infrastructure”?

No

I. 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
Hell's Kitchen Geothermal LLC	\$ 0	\$100,000

J. 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
TBD – Chemical Waste Disposal Service	\$116,400	\$

K. 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

L. 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	23-24	301.001K	\$ 4,428,021

TOTAL Amount: \$ 4,428,021

R&D Program Area: ESB: Renewables

Explanation for “Other” selection Not applicable



Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

M. Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Qisheng Ma
Address: 738 Arrow Grand Cir
City, State, Zip: Covina, CA, 91722
Phone: (909) 510-7816
E-Mail: qim2@peeri.org

2. Recipient’s Project Manager

Name: Yongchun Tang
Address: 738 Arrow Grand Cir
City, State, Zip: Covina, CA, 91722
Phone: (626) 695-4539
E-Mail: tang@peeri.org

N. Selection Process Used

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

Selection Process	Additional Information
Competitive Solicitation #	GFO-23-304
First Come First Served Solicitation #	Not applicable
Other	Not applicable

O. 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



STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

Grant Request Form
CEC-270 (Revised 01/2024)

Item Number	Item Name	Attached
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: Katherine Greenwald

Approval Date: 2/27/2025

Branch Manager: Kevin Uy

Approval Date: 2/28/2025

Director: Jonah Steinbuck (*delegated to Manager*)

Approval Date: N/A

Exhibit A
Scope of Work
Power Environmental Energy Research Institute

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Identify The Optimized Surfactants and Extractants
3	X	Design, Construct, and Lab Test a Semi-Continuous Foam Fractionation Apparatus
4	X	On-Site Field Test for Semi-Continuous Foam Fractionation Apparatus
5		Techno-Economic Analysis
6		Evaluation of Project Benefits
7		Technology 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
DLE	Direct Lithium Extraction
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 the process development for producing high-purity manganese and zinc as valuable metals from geothermal brine and removing interfering ions prior to the direct lithium extraction (DLE) system.

B. Problem/ Solution Statement

While the Salton Sea Geothermal Field contains a high concentration of lithium in the brine which can greatly improve the economics of geothermal energy development, high levels of other minerals in the brine significantly interfere with the DLE process. Valuable minerals such as manganese and zinc are mostly re-injected back into underground wells without being harvested.

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.

Exhibit A

Scope of Work

Power Environmental Energy Research Institute

Conventional solvent extraction methods for recovering manganese and zinc from geothermal brines are complicated and require toxic organic solvents. As a result, these methods are not economically viable and often have adverse environmental impacts. These issues must be addressed and methods improved in order to maximize the economic and environmental benefits of geothermal energy development in California. A previous zinc recovery project was attempted but was not deemed economically viable at that time. However, zinc and manganese are critical minerals for battery systems essential to meet state climate and energy goals. This highlights the importance of developing a novel, highly efficient technology for metal extraction from geothermal brine.

Solution

The Recipient has developed a unique and innovative metal extraction system that is based on foam technology. This system can fractionate each target metal using a highly efficient, highly selective, simplified process absent of organic solvents resulting in an economically and environmentally friendly process.

Manganese and zinc are produced as valuable metals, potentially yielding profits upon sale. Furthermore, it is expected that lithium productivity will improve by removing transition metals such as iron, manganese, and zinc, which hinder DLE system performance.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Produce manganese and zinc from geothermal brines with high purity for profit through sales.
- Prepare pretreatment brine that removes transition metals such as iron, zinc, and manganese to enhance lithium productivity and reduce the costs of DLE.
- Reduce solid waste generation by recycling iron, manganese, and zinc.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability and lower costs by 1) significantly reducing energy consumption and operational costs in geothermal brine treatment, which can be passed on to ratepayers through lower utility bills; and 2) streamlining operations of the geothermal facility to increase supply reliability and reduce disruptions compared to other complex, energy-intensive processes.

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 significantly reducing energy consumption compared with

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).

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

Exhibit A

Scope of Work

Power Environmental Energy Research Institute

conventional solvent extraction methods leading to improved energy efficiency and reduced greenhouse gas emission in the geothermal brine treatment process. The foam fractionation system will also produce high-purity zinc and manganese while improving lithium production from geothermal brine by removing interfering minerals. This will promote local battery production and consequently, the deployment of energy storage systems to enhance grid reliability and resilience. The system will greatly improve the economics of geothermal energy development and potentially increase geothermal energy utilization.

Agreement Objectives

The objectives of this Agreement are to:

- Design and construct a semi-continuous foam fractionation apparatus that increases efficiency and throughput by modifying the current batch process setup by making certain steps in the process continuous.
- Produce zinc over 95 percent purity using a foam extraction system from geothermal brine.
- Produce manganese over 95 percent purity using a foam extraction system from geothermal brine.
- Prepare pretreatment brine that removes over 90 percent of iron, zinc, and manganese from the field brine for use in DLE processes.

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.

Exhibit A Scope of Work

Power Environmental Energy Research Institute

- 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.

Exhibit A
Scope of Work
Power Environmental Energy Research Institute

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, and other CEC staff relevant to the Agreement. The Recipient’s Project Manager and any other individuals deemed necessary by the CAM, or the Project Manager shall participate in 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., Teams, Zoom), with approval of the CAM.

The Kick-off meeting will include discussion of the following:

- The CAM’s expectations for accomplishing tasks described in the Scope of Work;
 - An updated Project Schedule;
 - Terms and conditions of the Agreement;
 - Invoicing and auditing procedures;
 - Travel;
 - Equipment purchases;
 - Administrative and Technical products (subtask 1.1);
 - CPR meetings (subtask 1.3);
 - Monthly Calls (subtask 1.5)
 - Quarterly Progress reports (subtask 1.6)
 - Final Report (subtask 1.7)
 - Match funds (subtask 1.8);
 - Permit documentation (subtask 1.9);
 - Subawards(subtask 1.10);
 - Technical Advisory Committee meetings (subtasks 1.11 and 1.12);
 - Agreement changes;
 - Performance Evaluations; 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*.

Exhibit A
Scope of Work
Power Environmental Energy Research Institute

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 may 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 may 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. A determination of unsatisfactory progress may result in project delays, including a potential Stop Work Order, while the CEC determines whether the project should continue.

Exhibit A

Scope of Work

Power Environmental Energy Research Institute

- 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 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* organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Final Products

Exhibit A
Scope of Work
Power Environmental Energy Research Institute

MONTHLY CALLS, REPORTS AND INVOICES

Subtask 1.5 Monthly Calls

The goal of this task is to have calls at least monthly between the CAM and Recipient to verify that satisfactory and continued progress is made towards achieving the objectives of this Agreement on time and within budget.

The objectives of this task are to verbally summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, to verify match funds are being proportionally spent concurrently or in advance of CEC funds or are being spent in accordance with an approved Match Funding Spending Plan, to form the basis for determining whether invoices are consistent with work performed, and to answer any other questions from the CAM. Monthly calls might not be held on those months when a quarterly progress report is submitted or the CAM determines that a monthly call is unnecessary.

The CAM shall:

- Schedule monthly calls.
- Provide questions to the Recipient prior to the monthly call.
- Provide call summary notes to Recipient of items discussed during call.

The Recipient shall:

- Review the questions provided by CAM prior to the monthly call
- Provide verbal answers to the CAM during the call.

Product:

- Email to CAM concurring with call summary notes.

Subtask 1.6 Quarterly 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 *Quarterly 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 reporting period, 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. Progress reports are due to the CAM the 10th day of each January, April, July, and October. The Quarterly Progress Report template can be found on the ECAMS Resources webpage available at: <https://www.energy.ca.gov/media/4691>
- Submit a monthly or quarterly *Invoice* on the invoice template(s) provided by the CAM.

Recipient Products:

- Quarterly Progress Reports
- Invoices

Exhibit A

Scope of Work

Power Environmental Energy Research Institute

CAM Product:

- Invoice template

Subtask 1.7 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 1.7.1 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 Products:

- Energy Commission Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.7.2 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.

Exhibit A
Scope of Work
Power Environmental Energy Research Institute

- 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 SUBAWARDS

Subtask 1.8 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. 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 application 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 application 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)

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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 1.9 Permits

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

The Recipient shall:

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

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

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

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Products:

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

Subtask 1.10 Obtain and Execute Subawards and Agreements with Site Hosts

The goals of this subtask are to: (1) procure and execute subrecipients and site host agreements, as applicable, required to carry out the tasks under this Agreement; and (2) ensure that the subrecipients and site host agreements are consistent with the Agreement terms and conditions and the Recipient's own contracting policies and procedures.

The Recipient shall:

- Execute and manage subawards and coordinate subrecipients activities in accordance with the requirements of this Agreement.
- Execute and manage site host agreements and ensure the right to use the project site throughout the term of the Agreement, as applicable. A site host agreement is not required if the Recipient is the site host.
- Notify the CEC in writing immediately, but no later than five calendar days, if there is a reasonable likelihood the project site cannot be acquired or can no longer be used for the project.
- Incorporate this Agreement by reference into each subaward.
- Include any required Energy Commission flow-down provisions in each subaward, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subaward terms.
- Submit a *Subaward and Site Letter* to the CAM describing the subawards and any site host agreement needed or stating that no subawards or site host agreements are required.
- If requested by the CAM, submit a draft of each *Subaward* and any *Site Host Agreement* required to conduct the work under this Agreement.
- If requested by the CAM, submit a final copy of each executed *Subaward* and any *Site Host Agreement*.
- Notify and receive written approval from the CAM prior to adding any new subrecipient (see the terms regarding subrecipient additions in the terms and conditions).

Products:

- Subaward and Site Letter
- Draft Subawards (*if requested by the CAM*)
- Draft Site Host Agreement (*if requested by the CAM*)
- Final Subawards (*if requested by the CAM*)
- Final Site Host Agreement (*if requested by the CAM*)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.11 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,

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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 1.12.

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- 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

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Subtask 1.12 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 1.13 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.

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The Recipient shall:

- Complete and submit the project performance metrics section of 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: IDENTIFY THE OPTIMIZED SURFACTANTS AND EXTRACTANTS

The goals of this task are to identify the surfactants and extractants for optimized separation efficiency of iron, zinc, and manganese under the Salton Sea geothermal brine conditions (synthetic and field brine) in batch operation mode by developing and implementing a verification plan for the selected surfactants and extractants to determine which is most suitable for the foam fractionation process to ensure high purity brine is produced.

The Recipient shall:

- Identify the optimized surfactants and extractants:
 - Screen commercially available surfactants and extractants suitable for base metal extractions.
- Assess quality of extracted metals by evaluating their purity levels. Prepare a *Surfactant/Extractant Verification Plan* that includes, but is not limited to a description of:
 - Which surfactant and extractants are being tested;
 - The tests being conducted;
 - Critical metrics being validated;
 - Measurement tools for verification;
 - Desired certifications.

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- Conduct benchtop laboratory testing according to details of the *Surfactant/Extractant Verification Plan*.
- Prepare a draft *Surfactant/Extractant Verification Report* which includes, but is not limited to:
 - Procedure and results of the demonstration;
 - Test method;
 - Technical issues encountered;
 - Lessons learned for this phase in the project.

Products:

- Surfactant/Extractant Verification Plan
- Surfactant/Extractant Verification Report (draft and final)

TASK 3: DESIGN, CONSTRUCT, AND LAB TEST A SEMI-CONTINUOUS FOAM FRACTIONATION APPARATUS

The goal of this task is to design and construct a semi-continuous foam fractionation apparatus and optimize the operational conditions to individually recover iron, zinc, and manganese through laboratory testing.

The Recipient shall:

- Design and build a semi-continuous foam fractionation apparatus based on product quality assessment and base metals separation results from bench scale setup in Task 2.
 - Update the design of the current lab-scale apparatus, scaling up to handle larger volumes of brine during Task 4 (on-site field testing).
 - Build the larger apparatus using some procured off-the-shelf components, but most parts will be custom built to accommodate the size difference.
- Prepare a *Lab Test Plan* that includes but is not limited to:
 - Specifications on the design and construction of apparatus;
 - The tests being conducted;
 - Critical metrics being validated;
 - Measurement tools for verification;
 - Desired certifications;
 - Production targets.
- Execute the *Lab Test Plan*.
 - Conduct extraction experiments using the constructed apparatus.
 - Test the purity of the extracted metals.
 - Evaluate the overall process and make necessary modification to the apparatus and/or the chemicals used in the extraction process.
 - Measure the water chemistry after extraction process.
- Prepare a draft *Lab Test Verification Report* which includes, but is not limited to:
 - Process and results of the demonstration;
 - Technical issues encountered;
 - Lessons learned for this phase in the project.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings) and participate in a CPR meeting, per subtask 1.3.

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Products:

- Lab Test Plan
- Lab Test Verification Report (draft and final)
- CPR Report #1

TASK 4: ON-SITE FIELD TEST FOR SEMI-CONTINUOUS FOAM FRACTIONATION APPARATUS

The goal of this task is to troubleshoot and demonstrate continuous fractionation of iron, zinc, and manganese from actual geothermal brine in the Salton Sea geothermal field. A test method will be developed during this task to ensure an acceptable processing rate and replicable product quality for the three products to be recovered, meeting initial production targets.

The Recipient shall:

- Create a *Field Test Plan* that includes but is not limited to:
 - Apparatus transport and field-site installation requirements;
 - Details of the tests being conducted;
 - Critical metrics being validated;
 - Measurement tools for verification;
 - Desired certifications;
 - Production targets.
- Execute the *Field Test Plan*.
 - Conduct on-site extraction using the newly constructed apparatus.
 - Test the purity of the extracted metals.
 - Evaluate the overall process and make necessary modification to the apparatus and/or the chemicals used in the extraction process.
 - Measure the water chemistry following extraction process.
- Prepare a draft *Field Test Verification Report* which includes but is not limited to:
 - Process and results of the final demonstration;
 - Testing of the product;
 - Technical issues;
 - Lessons learned for this phase in the project.
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings) and participate in a CPR meeting, per subtask 1.3.

Products:

- Field Test Plan
- Field Test Verification Report (draft and final)
- CPR Report #2

TASK 5: TECHNO-ECONOMIC ANALYSIS

The goal of this task is to analyze cost, revenue potential, scalability, and environmental factors to guide the decision-making regarding further development and commercialization.

The Recipient shall:

- Prepare a draft *Techno-Economic Analysis Report* which includes but is not limited to:
 - Analysis of how techno-economic factors change utilizing apparatus test results;

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- Comparison of apparatus test results with the “status quo” or “do nothing approach” discussing:
 - Cost;
 - Scalability;
 - Revenue potential;
 - Environmental factors.
- A summary of the Techno-Economic Analysis Report will be included as part of the final report.

Products:

- Techno-Economic Analysis Report (draft and final)

TASK 6: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete 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 7: TECHNOLOGY TRANSFER ACTIVITIES

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The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan* that identifies the proposed activities the recipient will conduct to accelerate the successful commercial adoption of the technology. Eligible activities include, but are not limited to, the following:
 - Scale-up analysis including manufacturing analysis, independent design verification, and process improvement efforts.
 - Technology verification testing, or application to a test bed program located in California.
 - Legal services or licensing to secure necessary intellectual property to further develop the technology.
 - Market research, business plan development, and cost-performance modeling.
 - Entry into an incubator or accelerator program located in California.
- Present the draft *Technology Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the Draft Technology Transfer 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 with and explanation why.
- Submit the final *Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in final *Technology Transfer Plan*.
- Develop and submit a *Technology Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the Final Technology Transfer Plan. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an 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:

- Technology Transfer Plan (draft and final)
- Summary of TAC Comments
- Technology Transfer Summary Report (draft and final)
- High Quality Digital Photographs

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V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.



MEMORANDUM

TO: David Hochschild
Andrew McAllister
Siva Gunda
Noemí Gallardo
Nancy Skinner

FROM: Katherine Greenwald
Renewable Generation Specialist, Energy Research and Development Division

SUBJECT: California Environmental Quality Act Analysis for EPC-24-048, Power Environmental Energy Research Institute's High-Efficiency Mineral Recovery System with Reduced Waste Output

DATE: March 25, 2025

I am a Renewable Generation Specialist in the Research and Development Division, California Energy Commission (CEC), and the CEC's Agreement Manager for proposed Agreement EPC-24-048 (Agreement).

This memo analyzes the environmental impacts of the proposed grant Agreement, which is part of a separate, but overlapping Project, considered and approved by the lead agency, Imperial County (County). The County evaluated Conditional Use Permit Application No. 21-0020 and 21-0021, for the Hell's Kitchen PowerCo 1 and LithiumCo 1 Project (Project), proposed by Controlled Thermal Resources (US) Inc. via its subsidiaries, which is described in the County's California Environmental Quality Act (CEQA) documentation as a project to develop and operate a 49.9 MW geothermal power plant and a mineral extraction and processing facility on land currently owned by the Imperial Irrigation District in the unincorporated area of Imperial County. The approximately 1881.72 acre geothermal leasing area borders the Salton Sea, and is within the area known as the Salton Sea Known Geothermal Resource Area. The Project involves construction and operation of a geothermal power plant, a mineral-extraction facility, well pads with geothermal production and injection wells, pipelines between facilities, mineral handling and packaging facilities, and a 230-kV gen-tie line. The Project also includes the construction of shared administrative facilities, offices, repair facilities, shipping and receiving facilities, ingress and egress to the Project site from Davis Road, and the paving of Davis Road from McDonald Road to Noffsinger Road. The estimated area of disturbance for the Project is approximately 68 acres.

The proposed Agreement will allow the grantee, Power Environmental Energy Research Institute, to design, construct, and demonstrate a pilot scale geothermal brine treatment and metal recovery system at the Salton Sea Known Geothermal Resource Area, which relates to the Hell's Kitchen LithiumCo1 portion of the Project.

Pursuant to my work on the Agreement, including the scope of work for the Agreement, I have reviewed the County's CEQA documents relevant to the Agreement. These CEQA documents include: (1) the Final Environmental Impact Report (FEIR) for the Hell's Kitchen PowerCo 1 and LithiumCo 1 Project; (2) the Findings of Fact and Statement of Overriding Consideration for the FEIR; (3) Board of Supervisors Resolution certifying the FEIR and CEQA Findings; (4) Mitigation Monitoring and Reporting Program; (5) Board of Supervisors Resolution approving the Mitigation, Monitoring, and Reporting Program; (6) Board of Supervisors Resolution approving the Conditional Use Permit #21-0020; (7) Board of Supervisors Resolution approving the Conditional Use Permit #21-0021; (8) Board of Supervisors Resolution approving the Variance #21-0004; (9) Board of Supervisors Resolution approving the Variance #21-0005; (10) the Notice of Determination for the FEIR; (11) Judgment for Case No. ECU003425.

The County's Findings of Fact and Statement of Overriding Considerations, states that the inclusion of mitigation measures will reduce most potential significant effects to a less than significant level, and no impacts will remain Significant and Unavoidable.

Following the County's approval of Hell's Kitchen's geothermal power plant and lithium extraction plant, Comitè Civico Del Valle (Petitioners) challenged the Project's approvals on various violations of the California Environmental Quality Act. A hearing was held and a judgment was issued denying the Petition for Writ of Mandate.

Based on my review and consideration of the above documents, it is my independent and professional opinion that, there have been no new Project changes since the above CEQA documents have been finalized, and no new, additional, or increased significant environmental impacts have occurred. There are no substantial changes in the proposed project, or with respect to the circumstances under which the project will be undertaken, which would have required a subsequent EIR. Furthermore, I have not identified any new information which would change the conclusions of the County's CEQA documents or render those conclusions inadequate.

It is also my independent and professional opinion that the work to be performed under the proposed Agreement falls within the scope of the County's CEQA documents, and that the Agreement will not result in any new significant environmental impacts beyond those already considered. Finally, I have not identified any new mitigation measures, within the CEC's authority, that would lessen or further mitigate the impacts of the Project.

The reasons for my conclusions are as follows:

The proposed agreement includes developing and demonstrating a new brine treatment process based on foam technology. This process will not only remove interfering minerals to enable direct lithium extraction but will also allow the recovery of salable critical minerals zinc and manganese from the geothermal brine while also reducing solid waste generated during brine pretreatment. The extraction apparatus will be demonstrated at the site using brine from the Hell's Kitchen Project under Conditional Use Permits #21-0020 and #21-0021. Geothermal brine that has undergone a silica control process (about 15 gallons per day) will be provided to the apparatus for metal extraction and remaining brine will be returned to the facility.

All of the construction, operation, and other activities described in the scope of work of the proposed Agreement fall within the activities evaluated by the County's CEQA documents identified above. The scope of work of the proposed Agreement has no conflicts of information with the County's FEIR.

Aesthetics

The EIR found that the Project is located in a vacant, non-urbanized area characterized by agricultural and open space uses, near the Salton Sea. The EIR found the Project's impacts on Aesthetics would be less than significant. The proposed Agreement will not have any impact on aesthetics, and will not change the impacts identified in the County's CEQA documents.

Agriculture and Forest Resources

The EIR found that the Project would have no impact on Agriculture and Forest Resources. The proposed Agreement will not have any impact on agricultural resources, and will not change the impacts identified in the County's CEQA documents.

Air Quality

The EIR found that with the implementation of the mitigation measures, the Project's impacts to air quality would be reduced to a level less than significant. The proposed Agreement will not have any impact on air quality, and will not change the impacts identified in the County's CEQA documents.

Biological Resources

The EIR found that with the implementation of the mitigation measures, the Project's impacts to biological resources would be reduced to a less than significant level. The proposed Agreement will not have any impact on biological resources, and will not change the impacts identified in the County's CEQA documents.

Cultural Resources

The EIR found that with the implementation of the mitigation measures the Project's potential impacts related to cultural resources would remain less than significant. The proposed Agreement will not have any impact on cultural resources, and will not change the impacts identified in the County's CEQA documents.

Energy

The EIR found the Project's impacts related to energy are less than significant. The proposed Agreement will not have any impact on energy, and will not change the impacts identified in the County's CEQA documents.

Geology and Soils

The EIR found that with the implementation of the mitigation measures, the Project's potential impacts related to geology and soils would be reduced to less than significant. The proposed Agreement will not have any impact on geology and soils, and will not change the impacts identified in the County's CEQA documents.

Greenhouse Gases

The EIR found that the Project would result in less than significant impacts related to Greenhouse Gas issues. The proposed Agreement will not have any impact on greenhouse gases, and will not change the impacts identified in the County's CEQA documents.

Hazards and Hazardous Materials

The EIR found that with the implementation of mitigation measures, the Project's impacts related to hazards and hazardous materials would be less than significant. The proposed Agreement will not have any impact

on hazards and hazardous materials, and will not change the impacts identified in the County's CEQA documents.

Hydrology and Water Quality

The EIR found that with the implementation of mitigation measures and best management practices that the Project's impacts on the surface water quality would be reduced to less than significant and potential water quality impact from discharges would be reduced to less than significant. The proposed Agreement will not have any impact on hydrology and water quality, and will not change the impacts identified in the County's CEQA documents.

Land Use and Planning

The EIR found that the Project would result in less than significant impacts relating to land use and planning. The proposed Agreement will not have any impact on land use and planning, and will not change the impacts identified in the County's CEQA documents.

Mineral Resources

The EIR found the Project would have no impact on mineral resources. The proposed Agreement will not have any impact on mineral resources, and will not change the impacts identified in the County's CEQA documents.

Noise

The EIR found the Project impacts would have no impact on noise. The proposed Agreement will not have any impact on noise, and will not change the impacts identified in the County's CEQA documents.

Population and Housing

The EIR found the Project 's impacts on population and housing would be less than significant. The proposed Agreement will not have any impact on population and housing, and will not change the impacts identified in the County's CEQA documents.

Public Services

The EIR found the Project would have less than significant impacts relating to Public Services. The proposed Agreement will not have any impact on public services, and will not change the impacts identified in the County's CEQA documents.

Recreation

The EIR found the Project would have no impact on recreation. The proposed Agreement will not have any impact on recreation, and will not change the impacts identified in the County's CEQA documents.

Transportation

The EIR found that the Project's impacts on transportation would be less than significant. The proposed Agreement will not have any impact on transportation, and will not change the impacts identified in the County's CEQA documents.

Tribal Cultural resources

The EIR found that with the implementation of mitigation measures, the Project's impacts would be less than significant. The proposed Agreement will not have any impact on tribal cultural resources, and will not change the impacts identified in the County's CEQA documents.

Utilities and Service Systems

The EIR found that with the implementation of mitigation measures, the Project's impacts would be less than significant. The proposed Agreement will not have any impact on utilities and service systems, and will not change the impacts identified in the County's CEQA documents.

Wildfire

The EIR found that the Project's impact on wildfires are less than significant. The proposed Agreement will not have any impact on wildfire, and will not change the impacts identified in the County's CEQA documents.

The full California Environmental Quality Act (CEQA) supporting documentation for EPC-24-048 can be obtained at:

Draft EIR, State Clearinghouse No. 2022030704:

<https://ceqanet.opr.ca.gov/2022030704/3>

Final EIR:

<https://www.icpds.com/planning/environmental-impact-reports/final-eirs/cup21-0020-21-hell-s-kitchen-power-and-lithium-feir>

Findings of Fact and Statement of Overriding Consideration:

<https://www.icpds.com/assets/hearings/APP23-0004-Hell's-Kitchen-Complete-Board-PKG--01-23-24.pdf>

Resolution certifying the FEIR and CEQA Findings:

<https://www.icpds.com/assets/hearings/APP23-0004-Hell's-Kitchen-Complete-Board-PKG--01-23-24.pdf>

Mitigation Monitoring and Reporting Program (MMRP):

<https://www.icpds.com/assets/hearings/APP23-0004-Hell's-Kitchen-Complete-Board-PKG--01-23-24.pdf>

Resolutions approving MMRP, CUP #21-0020, CUP #21-0021, Variance #21-0004, Variance #21-0005:

<https://www.icpds.com/assets/hearings/APP23-0004-Hell's-Kitchen-Complete-Board-PKG--01-23-24.pdf>

Notice of Determination available at:

<https://ceqanet.opr.ca.gov/2022030704/5>