



GRANT REQUEST FORM (GRF)

A) New Agreement # EPC-20-012 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Pam Doughman	43	916-445-5320

C) Recipient's Legal Name	Federal ID Number
All Power Labs, Inc.	80-0845968

D) Title of Project
Development and Demonstration of Distributed Biomass CHP Microgrid Systems

E) Term and Amount

Start Date	End Date	Amount
4/19/2021	3/31/2025	\$ 3,287,890

F) Business Meeting Information

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

Proposed Business Meeting Date 3/17/2021 Consent Discussion

Business Meeting Presenter Michael Ferreira Time Needed: 5 minutes

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

Agenda Item Subject and Description:

ALL POWER LABS, INC. Proposed resolution approving Agreement EPC-20-012 with All Power Labs, Inc. for a \$3,287,890 grant to fund the development and operation of a novel dispatchable multi-modal biomass energy microgrid, and adopting staff's determination that this action is exempt from CEQA. This project will generate low-cost renewable electricity, thermal energy, and biochar with a unique scalable configuration and demonstrate its commercial viability and business case. The microgrid configuration will be highly replicable and able to quickly scale, providing substantial cost, reliability, and climate mitigation benefits to California ratepayers and the residents of disadvantaged communities, while promoting California's statutory energy goals. (EPIC funding) Contact: Michael Ferreira.

G) California Environmental Quality Act (CEQA) Compliance

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

Yes (skip to question 2)

No (complete the following (PRC 21065 and 14 CCR 15378)):

Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:

a) Agreement **IS** exempt.

Statutory Exemption. List PRC and/or CCR section number:

Categorical Exemption. List CCR section number: Cal Code Regs., 15301 and Cal Code Regs., 15329 (b)

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

Explain reason why Agreement is exempt under the above section:



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Cal. Code Regs., tit. 14, sec. 15301 Existing Facilities- This project involves development and operation of a novel dispatchable multi-modal biomass energy microgrid in an existing commercial facility. Therefore, the project falls within section 15301 and will not have a significant effect on the environment.

Small-scale co-generation at existing facilities is categorically exempt from CEQA per Cal. Code Regs., tit. 14, sec. 15329(b) and as this proposal consists of development and testing of cogeneration equipment with a capacity of 50 MW or less at existing facilities, it meets the conditions described in this section of CEQA Exemptions for cogeneration projects at existing facilities. The facility where the work will be conducted is located in a commercial industrial zone, which is generally appropriate for light industrial activities. The work will not result in an increase of noise to nearby residences in excess of the local performance standards and the equipment will not result in emissions above the thresholds established by the Bay Area Air Quality Management District. Furthermore, this project will neither involve handling hazardous materials nor any explosives.

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

Check all that apply

- Initial Study
- Negative Declaration
- Mitigated Negative Declaration
- Environmental Impact Report
- Statement of Overriding Considerations

H) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	Budget
California State University, Sacramento	\$ 99,890
Underwriters Laboratories, Inc.	\$ 50,000
Blue Sky Environmental, Inc.	\$ 20,000
TBD Electrical Contractor	\$ 20,000
TBD - Electrical Engineering Consultant	\$ 40,000
TBD - Permit Contractor	\$ 5,000

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

Legal Company Name:

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	19-20	301.001G	\$3,287,890

R&D Program Area: EDMFO: EDMF

TOTAL: \$ 3,287,890

Explanation for "Other" selection



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Justin Knapp
Address: 1010 Murray St

City, State, Zip: Berkeley, CA
94710-2816

Phone: 888-252-5324x704
E-Mail: justin.k@allpowerlabs.com

2. Recipient's Project Manager

Name: Carlos Encarnacion
Address: 1010 Murray St

City, State, Zip: Berkeley, CA
94710-2816

Phone: 888-252-5324
E-Mail: chuck@allpowerlabs.com

L) Selection Process Used

- Competitive Solicitation Solicitation #: GFO-20-301
- First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

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

Pamela Doughman 2/5/2021
Agreement Manager **Date**

Erik Stokes 2/5/2021
Office Manager **Date**

Linda Spiegel 2/5/2021
Deputy Director **Date**

**Exhibit A
Scope of Work
All Power Labs, Inc.**

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR¹	Task Name
1		General Project Tasks
2		Project Preparations
3		Development, Prototype, and Validation Testing
4	X	Underwriters Laboratories (UL) Product Evaluation
5		Full System Build, Integration, and Bench Testing
6		Pilot Demonstration Site Preparation and Equipment Installation
7		Pilot Demonstration Project Operation and Performance Testing
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
APL	All Power Labs, Inc
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CalEnviroScreen	An online mapping tool that uses environmental, health, and socioeconomic data to assign a score to each California census tract. A census tract with a high score has a higher pollution burden than other census tracts. CalEnviroScreen is available online at https://oehha.ca.gov/calenviroscreen/sb535
CBM	Containerized Biomass Microgrid
CCHP	Combined Cooling Heat and Power
CEC	California Energy Commission
CHAB	Combined Heat and Biochar
CHP	Combined Heat and Power
CPR	Critical Project Review
DAC	A census tract that scores at or above 75 percent of CalEnviroScreen
DER	Distributed Energy Resources
EVT	Engineering Validation Testing
kW	kilowatt
IOU	Investor Owned Utility

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
All Power Labs, Inc.**

MVP	Measurement and Verification Plan
NEM	Net Energy Metering
O&M	Operation and Maintenance
PP30	Power Pallet 30 (All Power Labs' 25 kW CCHP system fueled by biomass)
TAC	Technical Advisory Committee
UL	Underwriters Laboratories
UL Listing	A UL listing documents that UL has tested samples of a product and verified that the product meets safety standards required by the National Electrical Code.

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development and operation of a novel dispatchable multi-modal biomass energy microgrid that will generate low-cost renewable electricity, thermal energy, and biochar with a unique scalable configuration and demonstrate its commercial viability and business case. This microgrid configuration will be highly replicable and able to quickly scale, providing substantial cost, reliability, and climate mitigation benefits to California ratepayers and the residents of disadvantaged communities, while promoting California's statutory energy goals.

B. Problem/ Solution Statement

Problem

California continues to experience the impacts of climate change with worsening wildfires, tree mortality, and droughts, along with reductions in reliability and safety of the utility grid, represented by rolling blackouts and wildfires caused by grid infrastructure. The deployment of distributed energy resources like microgrids, which can provide reliability and resilience, while also increasing the share of renewable generation, will be critical to help overcome these challenges. However, in order to meet these challenges on a meaningful scale, microgrid technology needs to be more advanced, standardized, and cost-effective while utilizing renewable, carbon neutral fuels. Funding from commercial and regulated markets is unavailable for such capital-intensive and relatively risky projects, particularly those that involve bioenergy, and even more so for gasification.

One key gap is the issue of fossil-fueled backup generators for microgrids, which are almost universal for microgrids that have backup or baseload systems, and are the secret Achilles' heel of supposedly-renewable microgrids. A small-scale, standardized, cost-effective and scalable microgrid that serves small businesses has not yet been

Exhibit A Scope of Work All Power Labs, Inc.

developed; yet, this is the configuration that would truly provide the most benefit to disadvantaged communities (DAC), as defined by Senate Bill 535 (De León, Chapter 830, Statutes of 2012) and CalEnviroScreen. CalEnviroScreen is an online mapping tool available online at <https://oehha.ca.gov/calenviroscreen/sb535>. Finally, the integration of biomass generators into a standardized and scalable microgrid has not been accomplished, leaving a technological gap around the physical and control architecture required to carry out such a project, while also leaving a dearth of knowledge about the relevant regulatory landscape under which such projects must be implemented. No other entity or group has had the technology mix, including All Power Labs, Inc., (APL)'s Power Pallet gasifiers, the proper team, nor the appropriate level of funding to resolve these problems.

Solution

The Recipient will develop a novel dispatchable multi-model microgrid utilizing the Combined Heat and Power (CHP) and an innovative biomass combined cooling heat and power (CCHP) system—the Power Pallet 30 (PP30) Power Pallet to address a range of applications and uses cases for DAC businesses including grid resilience, wildfire mitigation, and disaster relief. The unique scalable design of this containerized microgrid allows the system to grow seamlessly by adding additional microgrid containers to the system to increase capacity and match loads to the specific application. Unless modified during completion of Subtask 2.2 Initial CBM Architecture Design Review, each Containerized Biomass Microgrid (CBM) will be sized to 50 kW of power generation and will consist of 2 (two) PP30 Power Pallets, 1 (one) L00120 Energport Battery System (consisting of 2 (two) units), 2 (two) Oztek RS40 bi-directional inverters, and an Ageto Microgrid Control System. The CBM will be grid connected, and will offset grid electricity during operating hours. In the event that the grid goes down, the microgrid will be able to island (operate while isolated from the main electric grid) as a single controllable entity under the command of an advanced controller from Ageto Energy. The microgrid controller will isolate the containers from the grid providing renewable backup power. The project will standardize a small-scale, but modular and highly scalable, low-cost microgrid configuration. This microgrid configuration will directly address the specific needs of the DAC market segment and demonstrate the configuration's commercial viability, replicability, and business case for the specific microgrid configuration.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Improve the affordability, health, equitability, and comfort of California's communities;
- Build a safer, modernized, and more resilient electricity system;
- Support California's local economies and businesses;

Exhibit A Scope of Work All Power Labs, Inc.

- Advance zero-carbon technologies for homes, businesses, and transportation;
- Expand the use of renewable energy;
- Increase grid safety and reliability, and decrease costs; and
- Implement a more decentralized electric grid.

Ratepayer Benefits:² The development, demonstration, and deployment of All Power Labs, Inc.'s microgrid-enabled, biomass-based distributed power generation solution will benefit California investor-owned utility ratepayers by increasing grid reliability, resilience, and safety, while also reducing costs. As an on-demand distributed energy resource, the CBM will increase the utility grid's resilience, reliability, and safety by reducing load peaks and avoiding centralized failure points and grid congestion by shifting generation toward load centers, while also providing power during periods of rolling blackouts and public safety power shutoff events, which have recently impacted millions of ratepayers. As an on-demand resource, CBM will support times of use that mitigate the impacts of adding intermittent renewables to the grid, thereby supporting further renewable energy deployment and reducing greenhouse gas emissions. Renewable sources such as solar cannot meet peak hour production, so on-demand solutions are a necessary complement. The CBM reduces cost by bringing generation closer to load, thereby reducing the need for new infrastructure, reduces the utility's need to run expensive peaking plants, and provides grid stabilization benefits that may otherwise come from more expensive sources.

Technological Advancement and Breakthroughs: 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 building upon the successful California Energy Commission (CEC) funded development of an innovative biomass combined cooling heat and power (CCHP) system—the PP30. The proposed work will develop a multi-modal, dispatchable distributed energy resources (DER) microgrid solution that is modular and scalable. Specific advancements include improving system's capacity by expanding feedstock flexibility, reducing operator interactions for startup and shutdown, improving ease of utility interconnection, provision of power by integrating inverter and battery technologies into a containerized system, and achieving UL compliance. The current generation PP30 v2.01 will be taken to a PP30 v3.0 release through various upgrades and utilized in a CBM Pilot unit which will also be developed and released. The system will deliver electricity, heat, and biochar which can be sequestered in agricultural soils.

² California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

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Agreement Objectives

The objectives of this Agreement are to:

- Develop and release PP30 v3.0 product, an upgraded Power Pallet system providing increased feedstock flexibility and reduced operator interactions, and therefore reduced operations and maintenance (O&M) cost and meet UL compliance requirements.
 - Related deliverables: Subtask 3.1 PP30 Gas Making Module Engineering Validation Test Results, Subtask 3.2 Automation and Controls Module Engineering Validation Test Results, and Subtask 3.3 CBM Integration Engineering Validation Test Results
- Undertake a UL Review of PP30 v3.0 system in preparation for full UL certification of the product.
 - Related deliverable: Task 4 UL Phase 2 Engineering Review and Documentation Report
- Develop CBM Pilot with bioenergy generation from PP30 v3.0 units and battery storage, with both islanding and grid-tie capability
 - Related deliverable: Subtask 5.3 In-House CBM Commissioning and Bench Testing Report
- Deploy two CBM units at a site in a DAC for demonstration, technical and economic validation, and confirmation of appropriateness for target market applications with third-party validation.
 - Related deliverable: Subtask 6.4 Site Delivery Report .
- Mitigate/reduce GHG and criteria pollutant (e.g., NOx, CO, PM) emissions and wildfire risk by using a biomass waste-to-energy system and verify through independent analysis of GHG and criteria pollution mitigation.
 - Related deliverable: Task 7 Measurement and Verification Report
- Advance the technology and knowledge of microgrids and broaden their range of applications, including transfer of knowledge regarding microgrids and demonstration of effective CBM use case.
 - Related deliverable: Task 9 Technology Transfer Summary Report
- Improve the economic, health, social, and environmental conditions in DACs, including an economic benefit analysis for demonstration site(s) .
 - Related deliverable: Subtask 1.12 Project Performance Metrics Results and Task 8 Final Project Benefits Questionnaire
- Demonstrate a valid alternative to fossil-fueled backup generation for microgrids, including a third-party techno-economic validation of CBM.
 - Related deliverable: Task 7 Measurement and Verification Report.

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III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations. All technical tasks should include product(s). Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

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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.

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MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

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

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

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

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

- The CAM’s expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.
- Provide *Kick-off Meeting Presentation* to include but not limited to:
 - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
 - Project schedule that identifies milestones
 - List of potential risk factors and hurdles, and mitigation strategy
- Provide an *Updated Project Schedule, Match Funds Status Letter, and Permit Status Letter*, as needed to reflect any changes in the documents.

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The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

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

The Recipient shall:

- Prepare and submit a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.

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- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any procured equipment.
 - The CEC's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.

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- “Surviving” Agreement provisions such as repayment provisions and confidential products.
- Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the “Payment of Funds” section of the terms and conditions, including a financial report on Match Funds and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this

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Agreement. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Energy Commission Style Manual* provided by the CAM.

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)
 - Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)
 - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
 - Executive summary (**required**)
 - Body of the report (**required**)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)
 - Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
 - Submit a draft of the Executive Summary to the TAC for review and comment.
 - Develop and submit a *Summary of TAC Comments* received on the Executive Summary. For each comment received, the Recipient will identify in the summary the following:
 - Comments the Recipient proposes to incorporate.

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- 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
- Draft Final Report
- *Written Responses to Comments (if applicable)*
- Final Report
-

CAM Product:

- *Written Comments on the Draft Final Report*

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the CEC awarding this Agreement, then provide in the letter:

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- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
 - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

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

Subtask 1.8 Permits

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

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:

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- 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 five days. Either of these events may trigger a CPR meeting.

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

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

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Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
 - Technical area expertise;
 - Knowledge of market applications; or
 - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

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

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

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- 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.

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- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

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

Subtask 1.12 Project Performance Metrics

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

The Recipient shall:

- Complete and submit the project performance metrics from the Initial Project Benefits Questionnaire, developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a TAC Performance Metrics Summary that summarizes comments received from the TAC members on the proposed project performance metrics. The TAC Performance Metrics Summary will identify:
- TAC comments the recipient proposes to incorporate into the Initial Project Benefits Questionnaire.
- TAC comments the recipient does not propose to incorporate with and explanation why.

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- 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.
- Discuss the Project Performance Metrics Results at the Final Meeting.

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

TASK 2: PROJECT PREPARATION

The goals of this task are to secure the project pilot demonstration site(s), develop a detailed Measurement and Verification Plan, and develop a UL compliance gap analysis for the CBM.

Subtask 2.1: Execute an Agreement with the Selected Pilot Demonstration Site(s)

The goals of this subtask are to: (1) confirm the availability of the project site(s); and (2) execute any agreements necessary to secure the project site(s).

The Recipient shall:

- Prepare and execute the agreement to secure the project demonstration site(s) including the project timeline, space reserved for the project, equipment installation, permit and insurance requirements, indemnity, and the Recipient's use of any support staff. For any changes in site location, Recipient must check with the CAM who will provide guidance regarding the level of Commission approval required.
- Prepare and provide *Site Readiness Verification Documents*, to include a copy of the executed agreement between the Recipient and the facility holder for use of the site(s).

Products:

- Site Readiness Verification Documents
- Executed agreement between recipient and pilot demonstration sites

Subtask 2.2: Initial CBM Architecture Design Review

The goal of this subtask is to review the CBM unit during infield operations to comprehend critical opportunities for improvement.

The Recipient shall:

- Develop a detailed *CBM Architecture in Field Audit Plan* to comprehend critical opportunities for product improvement including but not limited to:
 - Product form factor and arrangement;
 - Selection of battery type and size;

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- Selection of inverter type and size; and
- Interconnection requirements.
- Conduct field audit according to *CBM Architecture in Field Audit Plan* and provide a *CBM Infield Operations Audit Report*.

Products:

- *CBM Architecture in Field Audit Plan* (draft and final)
- *CBM Infield Operations Audit Report* (draft and final)

Subtask 2.3: Project Measurement and Verification Plan

The goal of this subtask is to develop a detailed *Measurement and Verification Plan* for each site.

The Recipient shall:

- Develop a detailed *Measurement and Verification Plan* for each site to include but not be limited to:
 - Description of the monitoring equipment and instrumentation which will be used at each site.
 - Description of the key input parameters and output metrics which will be measured.
 - Description of the analysis methods to be employed.
 - Independent, third-party measurement and verification services to be employed, if requested by the CAM.

Products:

- *Measurement and Verification Plan* (draft and final)

Subtask 2.4: UL Compliance Gap Analysis

The goal of this subtask is to develop a UL compliance gap analysis for the CBM

The Recipient shall:

- Develop a detailed *UL Compliance Gap Analysis Report* for the CBM to include but not be limited to:
 - Description of the improvements and changes required for applicable major components to reach compatibility of a UL listing (a UL listing documents that a product meets safety standards required by the National Electrical Code).

Products:

- *UL Compliance Gap Analysis Report* (draft and final)

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Subtask 2.5: Biochar Testing and Utilization

The goals of this subtask are to test and utilize the biochar produced during the extended operations of the CBM, a Combined Heat, Power and Biochar energy solution.

The Recipient shall:

- Prepare *Biochar Testing Plan* that includes, but is not limited to:
 - Goals and methods of assessing biochar production conditions; and
 - Goals and methods of assessing biochar characteristics.
- Prepare a *Biochar Utilization Plan* that includes, but is not limited to:
 - Goals and methods of assessing biochar supply chain integration and end-use strategy.
- Execute *Biochar Testing Plan*.
- Execute *Biochar Utilization Plan*.
- Prepare *Biochar Testing Report* that includes, but is not limited to:
 - Assessment of biochar production conditions;
 - Assessment of biochar characteristics;
 - Photos of biochar production and testing; and
 - Issues, concerns, and mitigation plans.
- Prepare a *Biochar Utilization Report* that includes, but is not limited to:
 - Assessment of biochar supply chain integration and end-use strategy;
 - Track location and quantity of biochar end-use;
 - Quantify climate impact metrics; and
 - Photos of biochar utilization.

Products:

- Biochar Testing Plan (draft and final)
- Biochar Utilization Plan (draft and final)
- Biochar Testing Report (draft and final)
- Biochar Utilization Report (draft and final)

TASK 3: DEVELOPMENT, PROTOTYPE, AND VALIDATION TESTING

The goals of this task are to develop the upgraded PP30 design to meet UL compliance and improved O&M and containerize the PP30 biomass generators with inverters and battery storage to create a novel renewable CMB product.

Subtask 3.1: Upgrade PP30 Gas Making Module

The goal of this subtask is to design and test the upgraded PP30 Gas Making Module to meet UL compliance and improved O&M.

The Recipient shall:

- Design and test upgraded v6.0 Gasifier with novel swirl hearth architecture to improve fuel flexibility, gas quality, and UL compliance.

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- Design and test upgraded v2.0 Feed / Drying System architecture to support new swirl hearth architecture, improved O&M, form update to fit in shipping container, and UL compliance.
- Design and test upgraded v2.0 Flare architecture to optimize for automated start up and shut down and autonomous switching between engine and flare modes, flaring in hot gas mode, and UL compliance.
- Upgrade other gas making module components to meet UL compliance.
- Prepare and provide a *PP30 Gas Making Module Design Drawings Report* that describes, but is not limited to:
 - The designs for the v6.0 gasifier in regards to O&M improvements and UL compliance;
 - The designs for the v2.0 Feed / Drying System in regards to O&M improvements and UL compliance;
 - The designs for the v2.0 Flare in regards to O&M improvements and UL compliance; and
 - The designs of the other gas making components in regards O&M improvements and UL compliance.
- Prepare and provide a *PP30 Gas Making Module Engineering Validation Test Plan* that describes, but is not limited to:
 - Methods of testing v6.0 Gasifier O&M improvements and UL compliance;
 - Methods of testing v2.0 Feed / Drying System O&M improvements and UL compliance;
 - Methods of testing v2.0 Flare O&M improvements and UL compliance; and
 - Methods of testing other gas making O&M improvements and UL compliance upgrades.
- Build the PP30 Gas Making Module Prototype.
- Iterate designs based on results of engineering validation testing.
- Prepare and provide *PP30 Gas Making Module Engineering Validation Test Results*.
- Prepare and provide *PP30 Photographs of the PP30 Gas Making Module During Build Process and After Build Completion*.

Products:

- PP30 Gas Making Module Design Drawings Report (draft and final)
- PP30 Gas Making Module Engineering Validation Test Plan (draft and final)
- PP30 Gas Making Module Engineering Validation Test Results (draft and final)
- Photographs of the PP30 Gas Making Module During Build Process and After Build Completion

Subtask 3.2: Upgrade PP30 Automation and Controls Module

The goal of this subtask is to design and test the upgraded PP30 Automation and Controls Module to meet UL compliance and improve O&M.

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The Recipient shall:

- Design and test upgraded PP30 v3.0 Automation and Controls architecture including but not limited to:
 - PLC based automation architecture;
 - Integration of new electrical cabinet;
 - New state machine control logic;
 - Support for new automated valving; and
 - UL compliance.
- Prepare and provide a *PP30 Automation and Controls Module Design Drawings Report* that describes, but is not limited to:
 - The design of the PP30 v3.0 Automation and Controls Module to UL compliance and improved O&M.
- Prepare and provide a *PP30 Automation and Controls Module Engineering Validation Test Plan* that describes, but is not limited to:
 - Methods and testing the PP30 v3.0 Automation and Controls Module in regards to UL compliance and O&M improvements.
- Build the PP30 Automation and Controls Module Prototype.
- Iterate designs based on results of engineering validation testing.
- Prepare and provide *PP30 Automation and Controls Module Engineering Validation Test Results*.
- Prepare and provide *PP30 Photographs of the PP30 Automation and Controls Module During Build Process and After Build Completion*.

Products:

- PP30 Automation and Controls Module Design Drawings Report (draft and final)
- PP30 Automation and Controls Module Engineering Validation Test Plan (draft and final)
- PP30 Automation and Controls Module Engineering Validation Test Results (draft and final)
- Photographs of the PP30 Automation and Controls Module During Build Process and after Build Completion

Subtask 3.3: Upgrade the Containerized Biomass Microgrid Integration

The goal of this subtask is to design and test the CBM integration for the PP30 System to meet UL compliance and to improve O&M.

The Recipient shall:

- Design and test the custom microgrid container for the CBM.
- Design and test the integration of the PP30 Power Pallets.
- Design and test the integrated thermal circuit.
- Design and test the inverter and battery storage.
- Design and test the grid interconnection hardware.
- Design and test the Conveyor with Integrated Drying.

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- Prepare and provide a *Containerized Biomass Microgrid Integration Design Drawings Report* that describes, but is not limited to:
 - Design of the custom microgrid container;
 - Design of the integration of the PP30 Power Pallets;
 - Design of the integrated thermal circuit;
 - Design of the integrated inverter and battery storage; and
 - Design of the conveyor with integrated drying.
- Prepare and provide a *CBM Integration Engineering Validation Test Plan* that describes, but is not limited to:
 - Methods and testing the CBM Integration in regard to UL compliance and O&M improvements.
- Build 2 Containerized Biomass Microgrid prototypes.
- Prepare a *CBM Prototype Manufacturing Report*.
- Iterate designs based on results of engineering validation testing.
- Prepare and provide *CBM Microgrid Integration Engineering Validation Test Results*.
- Prepare and provide *Photographs of the CBM Integration During Build Process and After Build Completion*.

Products:

- CBM Integration Design Drawings Report (draft and final)
- CBM Integration Engineering Validation Test Plan (draft and final)
- CBM Prototype Manufacturing Report (draft and final)
- CBM Integration Engineering Validation Test Results (draft and final)
- Photographs of the CBM Integration during build process and after build completion

TASK 4: UL PRODUCT EVALUATION

The goal of this task is to generate a UL compliance study of the PP30 v3.0 Power Pallet.

The Recipient shall:

- Submit documentation to UL to perform a review of the PP30 v3.0 Power Pallet product. The process will include, but is not limited to:
 - Prepare and provide *UL Phase 1 Engineering Review Report*;
 - Prepare and provide *UL Phase 2 Engineering Review and Documentation Report*; and
 - Respond to any document update requests from subcontractor during the UL review process.
- Iterate product designs based on UL reports.
- Prepare *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

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Products:

- UL Phase 1 Engineering Review Report
- UL Phase 2 Engineering Review and Documentation Report
- CPR Report

TASK 5: FULL SYSTEM BUILD, INTEGRATION, BENCH TESTING

The goals of this task are to plan, manufacture, integrate and bench test the full CBM for pilot demonstration site.

Subtask 5.1: Manufacturing and Supply Chain Planning

The goal of this subtask is to plan the CBM supply chain and manufacturing.

The Recipient shall:

- Finalize the CBM Bill of Materials and generate a *Bill of Materials Report* that describes the itemized materials.
- Create a *Containerized Biomass Microgrid Manufacturing & Supply Chain Plan* for all components, assemblies, and subsystems, which includes, but is not limited to:
 - Suppliers;
 - Purchases;
 - Manufacturing Orders; and
 - Issues, concerns, and mitigation plans.

Products:

- Bill of Material Report (Draft and Final)
- CBM Manufacturing and Supply Chain Plan (Draft and Final)

Subtask 5.2: Procure and Manufacture the CBM equipment

The goal of this subtask is to procure and manufacture the equipment for the CBM.

The Recipient shall:

- Manufacture two (2) CBMs.
- Procure the following equipment:
 - Battery Banks;
 - Microgrid Controller; and
 - Inverters.
- Prepare an *In-House Manufacturing and Procurement Report* that describes, but is not limited to:
 - List and description of microgrid components purchased;
 - Date of build for each assembly;
 - Date of assembly completion;
 - Assembly personnel;
 - Any issues encountered, resolutions, and recommendations for avoiding in future; and

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- Recommendations on how to standardize the process for scaling projects.

Products:

- In-House Manufacturing and Procurement Report (draft and final)

Subtask 5.3: In-House Microgrid Commissioning and Bench Testing

The goal of this subtask is to commission and bench test the CBM at the bench scale or virtually.

The Recipient shall:

- Prepare an *In-House CBM Commissioning and Bench Testing Plan* that describes, but is not limited to:
 - Commissioning personnel / partners including:
 - CBM controller testing; and
 - Battery storage testing.
 - End-Use scenario testing including:
 - Grid Resilience; and
 - Islanding.
- Prepare an *In-House CBM Commissioning and Bench Testing Report* that describes, but is not limited to:
 - The date(s) commissioning occurred.
 - Commissioning personnel / partners:
 - CBM controller testing; and
 - Battery storage testing.
 - End-Use scenario testing including:
 - Grid Resilience; and
 - Islanding.
 - An outline of any hurdles encountered and their resolution.
 - Photographs during build process and after completion of commissioning.

Products:

- In-House CBM Commissioning and Bench Testing Plan (draft and final)
- In-House CBM Commissioning and Bench Testing Report (draft and final)

TASK 6: PILOT DEMONSTRATION SITE PREPARATION AND EQUIPMENT INSTALLATION

The goals of this task are to prepare the pilot demonstration site for installation and install the CBMs at the pilot demonstration site.

Subtask 6.1: Feedstock Supply Chain Development

The goal of this subtask is to develop the feedstock supply chain.

The Recipient shall:

- Prepare *Feedstock Qualification Plan* that includes, but is not limited to:
 - Goals and methods of feedstock qualification;

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- Goals and methods of site logistics qualification related to feedstock; and
- Steps required to prepare site for feedstock handling.
- Qualify the feedstock and logistics at the pilot deployment site and confirm that they meet specifications.
- Prepare and provide a *Feedstock Supply Chain Report* that includes, but is not limited to:
 - Results of feedstock qualification;
 - Results of site logistics qualification; and
 - Issues, concerns and mitigation plans.

Products:

- Feedstock Qualification Plan (draft and final)
- Feedstock Supply Chain Report (draft and final)

Subtask 6.2: Interconnect and Net Energy Metering Permitting

The goal of this subtask is to ensure that the pilot deployment site's obtain a net energy metering (NEM) permit and to set up interconnection facilities. Please note that in accordance with Task 1.8 herein, permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement.

The Recipient shall:

- Oversee the pilot deployment site host's application for a NEM Permit.
- Prepare a *NEM Permit Status Report* once the NEM permit has been secured that includes, but is not limited to:
 - A copy of the NEM permit; and
 - A mitigation plan for any issues that may arise.
- Prepare an *Interconnection Installation Plan* that includes, but is not limited to:
 - Goals and methods for installation of interconnection equipment;
 - Interconnection schematic;
 - Contracting of licensed electrical engineer for inspection and sign off; and
 - Final interconnection approval and hookup.
- Carry out *Interconnection Installation Plan*.
- Prepare *Interconnection Installation Report* that includes, but is not limited to:
 - Results of interconnection equipment installation;
 - Final interconnection schematic;
 - Copy of the electrical engineer interconnection report;
 - Copy of utility certification of proper interconnection approval and hookup; and
 - Issues, concerns and mitigation plans.

Products:

- NEM Permit Status Report
- Interconnection Installation Plan (draft and final)
- Interconnection Installation Report (draft and final)

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Subtask 6.3: Pilot Demonstration Site Preparation

The goals of this subtask are to prepare the electrical, mechanical, and physical infrastructure of the pilot deployment site for CBM operation.

The Recipient shall:

- Prepare a *Pilot Demonstration Site Preparation Plan* that includes, but is not limited to:
 - Team kickoff meeting;
 - Electrical energy integration plan and design schematics;
 - Thermal energy integration plan and design schematics;
 - CBM siting plan and design schematics; and
 - Schedule of activities.
- Carry out preparation activities for the site as described in *Pilot Demonstration Site Preparation Plan*.
- Prepare *Pilot Demonstration Site Preparation Report* that includes, but is not limited to:
 - Team kickoff meeting minutes;
 - Photographs and written documentation of electrical and thermal energy integration;
 - Photographs and written documentation of CBM siting;
 - Electrical engineer sign-off for electrical system;
 - Mechanical engineer sign-off for thermal system; and
 - Issues, concerns and mitigation plans.

Products:

- Pilot Demonstration Site Preparation Plan (draft and final)
- Pilot Demonstration Site Preparation Report (draft and final)

Subtask 6.4: Transportation and Installation of Containerized Biomass Microgrid to the Pilot Deployment Project Site

The goals of this subtask are to transport the CBM to the project pilot deployment site and install it.

The Recipient shall:

- Prepare *Transportation and Installation Plan* that includes, but is not limited to:
 - Plan for mode of transportation of CBM;
 - Contract with commercial or private hauler for transportation of CBM;
 - Plan for unloading and installing CBM at pilot deployment site; and
 - Transport the CBM from the Recipient's facility to the project pilot deployment site and install it in accordance with Transportation and Installation Plan.
- Prepare *Site Delivery Report* which includes but is not limited to:
 - The date that delivery was completed;
 - Results of transportation and installation;

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- Description of obstacles encountered and resolutions; and
- Photographs of CBM installation including photographs taken during and after installation.

Products:

- Transportation and Installation Plan (draft and final)
- Site Delivery Report (draft and final)

Subtask 6.5: Pilot Demonstration Site Equipment Operator Training

The goal of this subtask is to train the demonstration site operators on how to operate the biomass microgrid.

The Recipient shall:

- Prepare *Equipment Operator Training Plan* that includes, but is not limited to:
 - Schedule and location of the training;
 - List of training materials; and
 - List Training objectives.
- Prepare *Equipment Operator Training Report* that includes, but is not limited to:
 - Summaries of each day of training;
 - Checklist of completed training objectives; and
 - Photos of training.

Products:

- Equipment Operator Training Plan (draft and final)
- Equipment Operator Training Report (draft and final)

TASK 7: PILOT DEMONSTRATION PROJECT OPERATION AND PERFORMANCE TESTING

The goals of this task are to commissioning the CBM in standalone mode and then conduct extended operations and performance testing at the pilot demonstration site.

Subtask 7.1: Pilot Demonstration Site Commissioning

The goal of this task is to commission the CBM at the demonstration site.

The Recipient shall:

- Prepare *CBM Pilot Demonstration Site Commissioning Plan* which includes, but is not limited to, the following:
 - Goals and methods of assessing commissioning of CBM performance in both standalone and interconnected modes.
- Execute *Pilot Demonstration Site Commissioning Plan*.
- Prepare *Pilot Demonstration Site Commissioning Report*, which includes, but is not limited to:
 - Assessment of commissioning of CBM performance in both standalone and interconnected modes;

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- Photographs of commissioning process; and
- Issues, concerns and mitigation plans.

Products:

- Pilot Demonstration Site Commissioning Plan (draft and final)
- Pilot Demonstration Site Commissioning Report (draft and final)

Subtask 7.2: Extended Operations and Testing

The goals of this subtask are to operate the CBM for an extended run time and collect performance test data.

The Recipient shall:

- Prepare an *Extended Operation Plan* that includes, but is not limited to:
 - Plan for operation and maintenance between the Recipient and pilot site personnel.
- Execute *Extended Operation Plan*.
- Execute *Measurement and Verification Plan*.
- Prepare *Extended Operation Report* that includes, but is not limited to, the following:
 - Assessment of operation and maintenance issues;
 - Assessment of extended operation of biochar supply chain;
 - Assessment of biochar produced;
 - Assessment of extended operations of biochar supply chain;
 - Any changes in testing that needed to be different than what the plan called for due to practical considerations;
 - Preliminary testing report; and
 - Third-party independent assessment and analysis of data collected from the Chartainer and CBM during execution of the *Measurement and Verification Plan*.
- Use an independent, third-party measurement and verification service, which will be employed to conduct an independent assessment and analysis of data collected from the Chartainer and CBM and prepare a *Measurement and Verification Report*.
- With CAM approval, *the Executive Summary or detailed attachments from the Measurement and Verification Report may be included in the Extended Operation and Testing Report*.

Products:

- Extended Operation Plan (draft and final)
- Extended Operation Report (draft and final)
- Measurement and Verification Report (draft and final)

TASK 8: EVALUATION OF PROJECT BENEFITS

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

Exhibit A
Scope of Work
All Power Labs, Inc.

The Recipient shall:

- Complete the *Initial Project Benefits Questionnaire*. The *Initial Project Benefits Questionnaire* shall be initially completed by the Recipient with the 'Relevant data collection period' set to 'Kickoff' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by January 31 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 the 'Relevant data collection period' set to 'Final' 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](http://www.energizeinnovation.fund) (www.energizeinnovation.fund), and provide *Documentation of Project Profile on EnergizeInnovation*, 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](http://www.energizeinnovation.fund) (www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

Products:

- Initial Project Benefits Questionnaire
- Annual Surveys
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund

TASK 9: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

Exhibit A
Scope of Work
All Power Labs, Inc.

- Market research, business plan development, and cost-performance modeling.
- Entry into an incubator or accelerator program located in California.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan (Draft/Final)* that identifies the proposed activities the Recipient will conduct to accelerate the successful commercial adoption of the technology.
- 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 an explanation.
- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in the *Final Technology Transfer Plan*.
- Develop and submit a *Technology Transfer Summary Report (Draft/Final)* 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 a CEC-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in the 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/Final)
- Summary of TAC Comments
- Technology Transfer Summary Report (Draft/Final)
- High Quality Digital Photographs

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ALL POWER LABS, INC.

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

RESOLVED, that the CEC approves Agreement EPC-20-012 with All Power Labs, Inc. for a \$3,287,890 grant to fund the development and operation of a novel dispatchable multi-modal biomass energy microgrid. This project will generate low-cost renewable electricity, thermal energy, and biochar with a unique scalable configuration, and demonstrate its commercial viability and business case. The microgrid configuration will be highly replicable and able to quickly scale, providing substantial cost, reliability, and climate mitigation benefits to California ratepayers and the residents of disadvantaged communities, while promoting California's statutory energy goals; and

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

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on April 14, 2021.

AYE:

NAY:

ABSENT:

ABSTAIN:

Patricia Carlos
Secretariat