



# GRANT REQUEST FORM (GRF)

## A) New Agreement # EPC-19-041 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Joseph Sit	51	916-327-1315

C) Recipient's Legal Name	Federal ID Number
Form Energy, Inc.	82-2266384

D) Title of Project
Demonstrating an Aqueous Air-Breathing Energy Storage System for Multi-Day Resiliency

## E) Term and Amount

Start Date	End Date	Amount
6/30/2020	3/31/2024	\$ 1,998,215

## F) Business Meeting Information

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

Proposed Business Meeting Date 6/10/2020  Consent  Discussion

Business Meeting Presenter Robin Goodhand Time Needed: 5 minutes

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

### Agenda Item Subject and Description:

FORM ENERGY, INC.

Proposed resolution approving Agreement EPC-19-041 with Form Energy, Inc. for a \$1,998,215 grant for the advanced development of an aqueous, air-breathing battery energy storage system, and adopting staff's determination that the project is exempt from CEQA. The project will result in the recipient's first fielded demonstration and independent measurement and verification of a 10 kW / 1,000 kWh (100-hour) prototype energy storage system operating under relevant customer use conditions.

## 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., tit 14, § 15301; Cal. Code Regs., tit 14, § 15306

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



# GRANT REQUEST FORM (GRF)

Explain reason why Agreement is exempt under the above section:

The project involves design, further development, manufacturing, and testing of an aqueous, air-breathing, battery energy storage system. The development and manufacturing will take place at an existing laboratory operated by Form Energy. The pilot-testing will be performed at existing laboratories at the University of California, Irvine Campus. The project consists of the operation of these existing public or private facilities, involving negligible or no expansion of existing or former use. Therefore, this project is exempt under California Code of Regulations, title 14, section 15301, Existing Facilities. In addition, the project involves data collection and research, which would not result in a serious or major disturbance to an environmental resource. Therefore, this project is exempt under California Code of Regulations, title 14, section 15306, Information Collection. The Regents of the University of California on behalf of the Irvine Campus (UC Irvine) is the Lead Agency under CEQA for the pilot test site. UC Irvine prepared a Notice of Exemption for its portion of the project on May 19, 2020, on the basis of the same two CEQA exemptions cited above.

- 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
Electric Power Research Institute, Inc.	\$ 70,000
The Regents of the University of California, Irvine Campus	\$ 305,899
MGA Research Corporation (vendor)	\$ 30,000 (match only)

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

Legal Company Name:
Peninsula Clean Energy
Southern California Edison Company

**J) Budget Information**

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	\$ 1,998,215



# GRANT REQUEST FORM (GRF)

Explanation for "Other" selection

Reimbursement Contract #:      Federal Agreement #:

### K) Recipient's Contact Information

#### 1. Recipient's Administrator/Officer

Name: Rachel Smedley  
Address: 444 Somerville Ave  
City, State, Zip: Somerville, MA  
02143-3260  
Phone: 914-255-6718  
E-Mail: rsmmedley@formenergy.com

#### 2. Recipient's Project Manager

Name: Rachel Smedley  
Address: 444 Somerville Ave  
City, State, Zip: Somerville, MA  
02143-3260  
Phone: 914-255-6718  
E-Mail: rsmmedley@formenergy.com

### L) Selection Process Used

- Competitive Solicitation      Solicitation #: GFO-19-305
- 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 |

\_\_\_\_\_  
**Agreement Manager**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Office Manager**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Deputy Director**

\_\_\_\_\_  
**Date**

# Exhibit A Scope of Work Form Energy, Inc.

## TASK ACRONYM/TERM LISTS

### A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		General Project Tasks
2	x	Safety Codes and Standards Evaluation and Testing
3	x	Design and Build a Weatherized kW-Scale Module for Field Deployment
4		DC Battery Performance and Testing, AC Interface Modeling, and Verification
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities
7		Production Readiness Plan

### B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
FMEA	Failure Mode and Effects Analysis
FSC	Full-Scale Cell
KW	Kilowatt
kWh	Kilowatt-hour
LCOE	Levelized Cost of Energy
RTE	Round Trip Efficiency
SSC	Sub-Scale Cell
TAC	Technical Advisory Committee
TCO	Total Cost of Ownership

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

### A. Purpose of Agreement

The purpose of this Agreement is to fund the advanced development of an aqueous, air-breathing energy storage system, resulting in the Recipient's first fielded demonstration and independent measurement and verification of a kilowatt-scale, 100-hour prototype energy storage system operating under relevant customer use conditions.

The recipient's weatherized kW-scale Module will demonstrate a significant improvement in energy storage duration and safety relative to current and projected lithium-ion energy storage systems under a range of use cases that include integrating high-levels of renewable energy

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

# **Exhibit A Scope of Work Form Energy, Inc.**

generation in customer and microgrid configurations while also providing multiple days of backup power.

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

### **Problem**

No commercially available energy storage technologies can cost-effectively provide multiple days of energy storage duration needed to achieve reliable 100% renewable energy over a year or to maintain energy service in the event of multi-day grid outages caused by wildfire public safety power shutoffs or other grid outages. Existing technologies are either too expensive or geographically inflexible. Commercial and industrial customers that need highly-reliable energy often resort to backup diesel generators, which does not align with California's goals to reduce greenhouse gas emissions and air pollutants, or they pursue short-duration lithium-ion storage, which can only cost-effectively provide short durations of storage for critical loads, leaving communities and commercial and industrial customers vulnerable to the economic and safety threats of extended grid outages.

### **Solution**

This project will be the first fielded and independently verified prototype-scale demonstration of a new form of low-cost, long-duration energy storage that has the potential to be over 100-times cheaper per kWh than lithium-ion energy storage and provide multiple days-to-weeks of continuous zero-carbon backup power in customer and grid applications. The prototype will use breakthrough battery materials sourced from super-abundant, ultra-low-cost, globally scalable materials from existing supply chains. This demonstration is intended to help accelerate the commercial entry of the recipient's storage technology. It should also provide performance information that will help utilities, regulators and grid operators identify cost-effective solutions to help customers maintain reliability during grid failures, while also helping California meet its renewable energy and zero-carbon goals.

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

### **Agreement Goals**

The goals of this agreement are to:

- Demonstrate the performance of Form Energy's multi-day aqueous air-breathing energy storage system under a range of simulated customer use cases;
- Determine the most valuable use cases for Form Energy's energy storage system;
- Design and build Form Energy's first weatherized 10 kW/1000 kWh (100 hour duration) Module, which will accelerate the commercialization of Form Energy's energy storage system
- Demonstrate a pilot-scale system at an end use customer test site to characterize performance to customer needs.
- Increase industry knowledge about how Form Energy's energy storage system can provide a cost-effective zero-carbon energy storage solution to the challenges of:
  - maintaining customer electric reliability during multi-day grid outages caused by wildfire public safety power shutoffs or other grid failures
  - enabling reliable 100% renewable energy microgrids and electric systems.

# Exhibit A Scope of Work Form Energy, Inc.

## Ratepayer Benefits:<sup>2</sup>

This project is intended to result in ratepayer benefits of lower cost, increased safety, increased reliability and resiliency, and lower greenhouse gas emissions and air pollutants, primarily by furthering the development and accelerating the commercialization of Form Energy's technology. According to Form Energy, this technology is an ultra-low-cost, long-duration aqueous air-breathing energy storage technology. The laboratory evaluation will also provide data about the optimal use of multi-day battery energy storage under a range of simulated use cases. This information should help utilities, regulators and system operators identify least-cost energy resource solutions to address two of California's most pressing electric grid needs: zero-carbon energy resources that can cost-effectively manage the intermittency of renewable resources; and zero-carbon solutions to maintain reliable electricity service in the event of widespread power outages caused by grid outages.

## Technological Advancement and Breakthroughs:<sup>3</sup>

This Agreement is intended to lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by advancing the development of Form Energy's ultra-low-cost, long-duration energy storage technology made from safe, globally abundant materials. If successful, this new class of energy storage would help achieve California's goals to cost-effectively and reliably integrate a 100% renewable and zero-carbon grid by 2045, and to support zero-carbon microgrid configurations and customer energy resiliency in the event of grid outages. This funding will allow Form Energy to design another iteration of its storage energy system and to test it in a first-of-a-kind field deployment, generating knowledge that can be applied to larger prototypes. According to the Recipient, compared to previous prototypes, this Module will have an improved energy footprint by 30 times, duration improved by a factor of 4 and round-trip efficiency (RTE) increased by 10%, each of which would lead to reduced total cost of ownership (TCO) and levelized cost of energy (LCOE). In turn, lower TCO and LCOE of storage could translate to lower overall ratepayer costs, reduced environmental impacts of new infrastructure, and benefits to disadvantaged communities by enabling natural gas plants to retire.

## Agreement Objectives

The objectives of this project are to:

- Review and provide a gap analysis of codes and standards to inform product and prototype building, electrical design, performance testing, transport and safety testing of a kW-scale, 100-hour weatherized energy storage system (Module).
- Conduct safety testing of sub-scale and full-scale energy storage cells
- Design a weatherized kW-scale, 100-hour prototype energy storage system (Module)
- Assemble and install a weatherized kW-scale, 100-hour DC-output prototype aqueous air-breathing energy storage system at a test facility

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

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

## Exhibit A Scope of Work Form Energy, Inc.

- Develop test duty cycles, customer load, and renewable energy generation profiles to use in demonstrating energy storage system performance
- Independent measurement and verification of system performance, including an evaluation of its benefits for host customers and California load serving entities and ratepayers.

### 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)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

##### The Recipient shall:

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

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

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

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

###### For all products

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

## **Exhibit A Scope of Work Form Energy, Inc.**

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

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
  - Text documents will be in MS Word file format, version 2007 or later.
  - Documents intended for public distribution will be in PDF file format.
  - The Recipient must also provide the native Microsoft file format.
  - Project management documents will be in Microsoft Project file format, version 2007 or later.
- **Software Application Development**  
Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - Visual Studio.NET (version 2008 and up). Recommend 2010.
  - C# Programming Language with Presentation (UI), Business Object and Data Layers.
  - SQL (Structured Query Language).
  - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
  - Microsoft SQL Reporting Services. Recommend 2008 R2.
  - XML (external interfaces).

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

### **MEETINGS**

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

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

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

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

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

- Terms and conditions of the Agreement;



## **Exhibit A Scope of Work Form Energy, Inc.**

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

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

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

### **The CAM shall:**

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

### **Recipient Products:**

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

### **CAM Product:**

- Kick-off Meeting Agenda

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

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient.

As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

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

## **Exhibit A Scope of Work Form Energy, Inc.**

place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

### **The Recipient shall:**

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

### **The CAM shall:**

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

### **Recipient Products:**

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

### **CAM Products:**

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

### **Subtask 1.4 Final Meeting**

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

### **The Recipient shall:**

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

## **Exhibit A Scope of Work Form Energy, Inc.**

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

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
  - Disposition of any state-owned equipment.
  - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
  - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
  - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

### **Products:**

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

## **REPORTS AND INVOICES**

### **Subtask 1.5 Progress Reports and Invoices**

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

### **The Recipient shall:**

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

# Exhibit A Scope of Work Form Energy, Inc.

## Products:

- Progress Reports
- Invoices

## Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

### Subtask 1.6.1 Final Report Outline

#### The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)

#### Recipient Products:

- Final Report Outline (draft and final)

#### CAM Product:

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

### Subtask 1.6.2 Final Report

#### The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
  - Ensure that the document is written in the third person.
  - Ensure that the Executive Summary is understandable to the lay public.

## **Exhibit A Scope of Work Form Energy, Inc.**

- Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
- Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
- If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

### **Products:**

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

### **CAM Product:**

- Written Comments on the Draft Final Report

## ***MATCH FUNDS, PERMITS, AND SUBCONTRACTS***

### **Subtask 1.7 Match Funds**

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

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

### **The Recipient shall:**

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

## Exhibit A Scope of Work Form Energy, Inc.

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

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

### Products:

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

### Subtask 1.8 Permits

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

### The Recipient shall:

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

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not

## **Exhibit A Scope of Work Form Energy, Inc.**

obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

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

### **Products:**

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

### **Subtask 1.9 Subcontracts**

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

### **The Recipient shall:**

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

### **Products:**

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

## Exhibit A Scope of Work Form Energy, Inc.

### **TECHNICAL ADVISORY COMMITTEE**

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

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

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

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

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

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

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



## **Exhibit A Scope of Work Form Energy, Inc.**

### **Products:**

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

### **Subtask 1.11 TAC Meetings**

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

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

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

#### **The TAC shall:**

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

### **Products:**

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

# Exhibit A

## Scope of Work

### Form Energy, Inc.

#### 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: SAFETY CODES AND STANDARDS EVALUATION AND TESTING

The goal of this task is to perform a comprehensive review of relevant safety codes for similar battery technologies, cross-referenced with an internal Failure Mode and Effects Analysis (FMEA) which ranks expected failure modes by priority. Appropriate safety testing procedures will be both written and executed for Sub-Scale Cells (SSCs) and Full-Scale Cells (FSCs). The results will be evaluated to improve safe design of FSCs.

##### Subtask 2.1: Codes and Standards Evaluation

The goal of this subtask is to determine applicable and relevant codes and standards for product testing, electrical design, performance testing, transport and safety testing of a weatherized kW-scale energy storage system (Module).

##### The Recipient shall:

- Perform a literature review of the codes and standards landscape for battery-related product testing, electrical design, performance, transport, and safety.
- Examples of relevant standards that may be reviewed include (but are not limited to):
  - NFPA 855 (Standard for the Installation of Stationary Energy Storage Systems)
  - IEC 61427 (Secondary cells and batteries for renewable energy storage)
  - UL 9540A (Standard for Energy Storage Systems and Equipment)
  - UN 38.3 (Transportation Testing for Lithium Batteries)
  - UL 1741 (Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources)
  - Ingress Protection for dust and water to level IP55 or as required
- Battery systems that will be used as example cases include: Li-ion, Pb-acid and/or Zn-air chemistries.
- Perform a FMEA on the existing SSC and FSC designs to find and rank possible failure modes.
- Prepare a *Codes and Standards Report* which includes:
  - A description of relevant product, building, electrical, performance, transport and safety test standards
  - An analysis of test intent from applicable Li-ion, Pb-acid, and/or Zn-air battery safety tests and how they can be adapted to test aqueous air-breathing technology
  - A description of areas where as-written test standards are missing, yet testing on the topic is necessary or helpful for customer confidence in the final product
  - A list of potential safety hazards that are not addressed in existing safety standards, informed by the results of the FMEA

##### Products:

- Codes and Standards Report (Draft and Final)

## **Exhibit A Scope of Work Form Energy, Inc.**

### **Subtask 2.2: Develop and Execute Sub-Scale Cell and Full-Scale Cell Safety Testing**

The goal of this subtask is to develop and execute SSC and FSC safety test plans that draw from the Codes and Standards Report to design tests in the same spirit as Li-ion, Pb-acid, and/or Zn-air battery safety testing.

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

- Prepare an *SSC Safety Test Plan* applicable to Form Energy technology. It will include:
  - Description of test plan intent and which safety risks are being evaluated
  - Description of test fixtures to create suspected unsafe failure modes in a lab setting for sub-scale cells
  - Description of test procedures to observe battery behavior during test conditions for sub-scale cells
- Execute the SSC Safety Test Plan by building the test fixtures and sub-scale cells and sending them to the test site, which will perform the described tests.
- Prepare an *FSC Safety Test Plan*, which will outline a similar plan of test as the SSC Safety Test Plan, but for the updated Full-Scale Cell design
- Execute the FSC Safety Test Plan by building the test fixtures and Full-Scale Cells, then shipping them to the test site, which will perform the described tests.
- Perform a second FMEA based on the results of Sub-Scale and Full-Scale Cell Safety testing
- Participate in a CPR meeting # 1 per subtask 1.3
- Prepare *CPR Report # 1* per subtask 1.3
- Prepare a *Safety Test Report* that includes:
  - A summary of results from SSC and FSC Safety Testing
  -

#### **Products:**

- Safety Test Report (Draft and Final)
- CPR Report # 1

### **TASK 3: DESIGN AND BUILD A WEATHERIZED kW-SCALE MODULE FOR FIELD DEPLOYMENT**

The goal of this task is to design and build a Weatherized kW-Scale Module based on the recommendations for safer design from Subtask 2.2 and the learnings of Form Energy's internal existing kW-scale laboratory system, which is a system assembly of multiple FSCs and ancillary support systems (these systems support the operation of FSCs).

#### **Subtask 3.1: Generate Design of Weatherized kW-Scale Module**

The goal of this subtask is to explicitly design how the Recipient's internal existing kW-scale laboratory system will be re-designed to fit inside a limited space and then weatherized to prevent damage from environmental dust and water.

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

- Generate design for incorporation of FSCs and ancillary systems into a limited footprint Module.
  - Hold Preliminary Design Planning Meeting
  - Hold Intermediate Design Review and Safety Review Meeting
  - Incorporate necessary changes into design
  - Hold Final Design Review Meeting

## **Exhibit A Scope of Work Form Energy, Inc.**

- Participate in a CPR meeting # 2 per subtask 1.3
- Prepare *CPR Report #2* per subtask 1.3
- Prepare a *Weatherized kW-Scale Module Design Report* which will review high-level non-confidential design and design decisions.
  - This report should not disclose any confidential information.

### **Products:**

- Weatherized kW-Scale Module Design Report (Draft and Final)
- CPR Report #2

### **Subtask 3.2: Site Preparation, Equipment Procurement, and Assembly**

The goal of this subtask is to ensure the timely arrival of all necessary materials, parts and hardware listed in the bill of materials for the assembly of the Module.

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

- Order materials, machined parts, and other hardware used for assembly, with special attention to long lead time items and possible supply chain interruptions.
- Ensure timely arrival of parts needed to begin assembly of the Module
- Collaborate with test site to ensure the conditions of the site are appropriate for Module assembly and operation.
- Consider the following during site preparation:
  - Ground preparation: a concrete pad exists at the designated site and is expected to be sufficient
  - Water delivery
  - Electrical power supply
  - Existing battery cycling and monitoring equipment
- Manufacture the necessary number of FSCs according to the design created in Subtask 3.1.
- Coordinate delivery of FSCs to the deployment site in preparation for final system assembly
- Assemble the Module according to the design created in Subtask 3.1 and will coordinate installation with deployment site.
- Prepare *Assembly Documentation Report* including:
  - Before and after documentation of assembly progress
  - Documentation on installation of system
  - Lessons learned from 1st assembly of a Weatherized kW-Scale Module
  - This report should not disclose any confidential information

### **Products:**

- Assembly Documentation Report (Draft and Final)

### **Subtask 3.3: Commissioning Module for Testing at Deployment Site**

The goal of this subtask is to design and install electrical battery test equipment, for the kW-Scale Module, then run initial performance cycles testing after assembly at deployment site is complete. This will complete commissioning of the energy storage system.

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

- Consult with project partners and subcontractors to select the appropriate battery performance test equipment based on previous testing at Form Energy on its internal kW-scale laboratory system.

## **Exhibit A Scope of Work Form Energy, Inc.**

- Prepare *Initial Test Plan* that will include:
  - Test configuration diagram
  - List of appropriate test equipment identified by project partners and subcontractors
  - Expected metrics of performance
- Request recommendations from project partners and subcontractors for independent measurement and verification processes. Appropriate metering points and a data collection frequency will be defined to ensure an appropriate resolution of data will be obtained during operation.
- Purchase and install necessary electrical battery test equipment, sensors and alarms on site.
- Troubleshoot to resolve possible issues with initial functioning of the system, monitoring, sensors or alarms.
- Run initial operation procedures according to the Initial test Plan for the kW-Scale Module and record data.
- Participate in CPR Meeting # 2
- Prepare *CPR Report # 2* per subtask 1.3
- Participate in TAC Meeting to discuss findings of this task
- Prepare *Commissioning Report*, which will include:
  - Documentation of system operation
  - Lessons learned and best practices

### **Products:**

- Initial Test Plan
- Commissioning Report (Draft and Final)
- CPR Report # 2

### **TASK 4: DC BATTERY PERFORMANCE AND TESTING, AC INTERFACE MODELING, AND VERIFICATION**

The goal of this task is to monitor DC power battery performance of the kW-Scale Module when operating according to use case scenarios and to develop a model for components between the DC battery power input/output and a theoretical AC interconnection.

#### **Subtask 4.1: Develop AC Interface Model for Duty Cycle Generation and DC Output Modeling**

The goal of this subtask is to create an AC Interface Model to bridge FormWare output of predicted customer AC load profiles and derive the equivalent DC battery duty cycles for the kW-Scale Module.

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

- Develop a framework for modeling small-scale prototype battery system performance as if it were a larger-scale battery system connected to the grid through a series of inverters and transformers. Electric utility will provide technical advice.
- Produce a model that can generate a DC duty cycle appropriate for the kW-Scale Module from AC load profiles generated by FormWare using customer data.
- Add a DC power output modeling feature to generate an expected AC output to the grid from the kW-Scale Module DC power output/input data after a specific duty cycle is run.

## **Exhibit A Scope of Work Form Energy, Inc.**

The model will enable Form Energy to predict Module performance at larger system scales.

- Prepare *Modeling Summary Report* that includes but not limited to:
  - A summary of the results and lessons learned
  - A summary of utility feedback

### **Product:**

- Modeling Summary Report (draft and final)

### **Subtask 4.2: Create Relevant Customer Load Profiles and Use Case Scenarios**

The goal of this subtask is to determine relevant use cases to test on the kW-Scale Module.

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

- Work with load serving entities (e.g. Southern California Edison and Peninsula Clean Energy) to understand how a kW-scale and larger system can be useful (profitable) in customer and grid applications.
- Request project partners' and subcontractors' input based on their own experience and data. The most relevant use cases will be decided based on techno-economic modeling and input from load serving entities.
- Produce customer load and distributed generation profiles and convert them into testable DC duty cycle profiles to run on the kW-Scale Module, using the AC Interface Model produced in Subtask 4.1.
- Produce an *Expected Use Case Scenario Report*, including load patterns and resulting waveforms this Module can expect to experience.

### **Product:**

- Expected Use Case Scenario Report (Draft and Final)

### **Subtask 4.3: Produce and Verify DC Use Case Battery Performance Data**

The goal of this subtask is to produce DC Battery Performance data from the kW-Scale Module when operated under realistic use case scenarios and DC load profiles as calculated in Subtask 4.2.

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

- Operate the kW-Scale Module with deployment site, according to designated DC duty cycling profiles developed in Subtask 4.2
  - Deployment site will assist in recording and verifying battery system performance data, such as DC power output/input, voltages, interior temperature, and auxiliary systems power consumption.
  - Subcontractor will consult on approaches to proper verification of collected data
- Produce *Performance Verification Summary*, which will include:
  - A summary of how the kW-Scale Module performed with respect to DC performance metrics when operated under specific use case scenarios

### **Products:**

- Performance Verification Summary (Draft and Final)

## **Exhibit A Scope of Work Form Energy, Inc.**

### **Subtask 4.4: Model Weatherized kW-Scale Module Grid-Level Performance Using AC Interface**

The goal of this subtask is to model the expected performance of the Weatherized kW-Scale Module when operated under a realistic use case scenario as if it existed at larger scale on the AC power grid.

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

- Use the operational DC power output/input data from Subtask 4.3 in the AC Interface Model developed in Subtask 4.1, in collaboration with deployment site
- Evaluate modeled AC grid performance against expected targets for this size system
- Evaluate impacts of outdoor weather variations on expected system performance and if possible, compare to internal kW-scale laboratory system running a comparable or identical duty cycle
- Produce *Grid-Level Performance Model Summary*, which will include:
  - Expected performance for a 1 MW AC-connected pilot system
  - A high-level description of how the expected performance was calculated from DC performance data and AC Interface Modeling
  - High-level takeaways for future integration with electric grid
- Participate in TAC Meeting per subtask 1.10

#### **Products:**

- Grid-Level Performance Model Summary (Draft and Final)

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

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

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

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

## **Exhibit A Scope of Work Form Energy, Inc.**

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

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

### **Products:**

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



## **Exhibit A Scope of Work Form Energy, Inc.**

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

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

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

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
  - A description of the intended use(s) for and users of the project results.
  - Published documents, including date, title, and periodical name.
  - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
  - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
  - The number of website downloads or public requests for project results.
  - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

#### **Products:**

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

### **TASK 7: PRODUCTION READINESS PLAN**

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

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

**Exhibit A**  
**Scope of Work**  
**Form Energy, Inc.**

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

**Products:**

- Production Readiness Plan (draft and final)

**PROJECT SCHEDULE**

Please see the attached Excel spreadsheet.

**To:** Office of Planning and Research  
 PO Box 3044  
 1400 Tenth Street, Room 113  
 Sacramento, CA 95812-3044

**From:** California Energy Commission  
 1516 Ninth Street, MS-48  
 Sacramento, CA 95814

**Project Applicant:** Form Energy, Inc.

**Project Title:** Demonstrating an Aqueous Air-Breathing Energy Storage System for Multi-Day Resiliency

**Project Location – Specific:**

Lab work: Form Energy HQ located in San Francisco  
 Pilot-test site: UCI Engineering Laboratory Facility located northwest of the Engineering Service Road/East Peltason Drive intersection

**Project Location – City:** Lab: San Francisco. Pilot: Irvine 92697 **Project Location – County:** Lab: San Francisco Pilot: Orange

**Description of Nature, Purpose and Beneficiaries of Project:**

Under grant Agreement EPC-19-041, the California Energy Commission will provide a grant of \$1,998,215 to Form Energy, Inc. for the advanced development of an aqueous, air-breathing, battery energy storage system. The project will result in the grant recipient’s first fielded demonstration and independent measurement and verification of a 10 kW / 1,000 kWh (100-hour) prototype energy storage system operating under relevant customer use conditions.

The project consists of design, manufacturing, installation, and data collection. Activities will include laboratory evaluation to provide data about the optimal use of multi-day battery energy storage; manufacturing at Form Energy’s existing laboratory; and a pilot-test at the University of California, Irvine Campus, Grid Evolution Laboratory.

Beneficiaries will include customers who eventually may buy electricity storage devices using this technology; California’s electric utilities and their customers (i.e., ratepayers); along with the public at large and the environment. This project should result in ratepayer benefits of lower cost, increased safety, increased reliability and resiliency, and lower greenhouse gas emissions and air pollutants.

**Name of Public Agency Approving Project:** California Energy Commission

**Name of Person or Agency Carrying Out Project:** Form Energy, Inc.

**Exempt Status:** *(check one)*

- Ministerial Exemption (Pub. Resources Code § 21080(b)(1); Cal. Code Regs., tit 14, § 15268);
- Declared Emergency (Pub. Resources Code § 21080(b)(3); Cal. Code Regs., tit 14, § 15269(a));
- Emergency Project (Pub. Resources Code § 21080(b)(4); Cal. Code Regs., tit 14, § 15269(b)(c));
- Categorical Exemption. State type and section number  
Cal. Code Regs., titl. 14, § 15301; Cal. Code Regs., titl. 14, § 15306
- Statutory Exemptions. State code number.
- Common Sense Exemption. (Cal. Code Regs., tit 14, §15061(b)(3))

**Reasons why project is exempt:**

The project involves design, further development, manufacturing, and testing of an aqueous, air-breathing, battery energy storage system. The development and manufacturing will take place at an existing laboratory operated by Form Energy. The pilot-testing will be performed at existing laboratories at the University of California, Irvine Campus. (Testing will also take place in New York.) The project consists of the operation of these existing public or private facilities, involving negligible or no expansion of existing or former use. Therefore, this project is exempt under California Code of Regulations, title 14, section 15301, Existing Facilities. In addition, the project involves data collection and research, which would not result in a serious or major disturbance to an environmental resource. Therefore, this project is exempt under California Code of Regulations, title 14, section 15306, Information Collection. The Regents of the University of California on behalf of the Irvine Campus (UC Irvine) is the Lead Agency under CEQA for the pilot test site. UC Irvine prepared a Notice of Exemption for its portion of the project on May 19, 2020, on the basis of the same two CEQA exemptions cited above.

**Lead Agency**

**Contact Person:** Chie Yee Yang **Area code/Telephone/Ext:** 916-327-1536

**If filed by applicant:**

1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project?  Yes  No

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Title:** \_\_\_\_\_

**Signed by Responsible Agency**

**Signed by Lead Agency**

**Signed by Applicant**

**Date received for filing at OPR:** \_\_\_\_\_

STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: FORM ENERGY, 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-19-041 with Form Energy, Inc. for a \$1,998,215 grant for the advanced development of an aqueous, air-breathing battery energy storage system. The project will result in the recipient's first fielded demonstration and independent measurement and verification of a 10 kW / 1,000 kWh (100-hour) prototype energy storage system operating under relevant customer use conditions; 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 Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on June 10, 2020.

AYE:

NAY:

ABSENT:

ABSTAIN:

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Cody Goldthrite  
Secretariat