



GRANT REQUEST FORM (GRF)

A) New Agreement # EPC-19-031

B) Division	Agreement Manager:	MS-	Phone
ERDD	Robin Goodhand	51	916-327-1536

C) Recipient's Legal Name	Federal ID Number
Antora Energy, Inc.	82-4788390

D) Title of Project
Solid-state Long Duration Energy Storage for Industrial Applications

E) Term and Amount

Start Date	End Date	Amount
6/30/2020	3/31/2024	\$ 1,999,787

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:

ANTORA ENERGY, INC. Proposed resolution approving agreement EPC-19-031 with Antora Energy, Inc. for a \$1,999,787 grant to develop and field-test a breakthrough, long-duration, energy storage system based on thermophotovoltaic technology, and adopting staff's determination that this action is exempt from CEQA. The pilot test site will be located at an existing cogeneration power plant in Fresno County. (EPIC funding) Contact: Robin Goodhand.

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, § 15303

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

Explain reason why Agreement is exempt under the above section: The project involves development, testing, and pilot-scale demonstration of an energy storage system based on thermophotovoltaic (TPV) technology. The technology includes using electricity to heat graphite blocks, and then reconverting the heat to electricity at a later time. Testing, fabricating TPV material, and producing TPV



GRANT REQUEST FORM (GRF)

devices will take place at an existing laboratory in Berkeley, California. The pilot-scale TPV facility will be built at an existing cogeneration power plant site east of the City of San Joaquin in Fresno County. The project includes a 200 sq. ft. foundation, the TPV equipment, and associated electrical connections, within the over 49-acre complex containing cogeneration, solar power, and agricultural by-products processing.

Fresno County has jurisdiction over the cogeneration complex, and its latest approval for the cogeneration plant was Conditional Use Permit No. 3158 in 2006, including environmental analysis. Based on initial review, Fresno County Planning Staff has determined the proposed TPV system is incidental to the existing authorized use, with no effect on the previously analyzed environmental impacts at the cogeneration power plant site. Fresno County Planning Staff indicated (May 14, 2020) that the County’s review of Antora’s TPV project would be ministerial, with no additional CEQA action on its part.

The Antora TPV project consists of the operation, maintenance, permitting, and/or minor alteration of 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 includes new, small facilities and/or installation of small, new equipment in small structures. Therefore, this project is exempt under California Code of Regulations, title 14, section 15303, New Construction or Conversion of Small Structures.

- 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
U.S. Department of Energy (National Renewable Energy Laboratory)	\$ 199,870
D2Solar LLC	\$ 95,000
Wellhead Electric Company, Inc.	\$ 90,000
DAPR Engineering, LLC	\$ match only \$800,000

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

Legal Company Name:
Fresno Cogeneration Partners, L.P.



GRANT REQUEST FORM (GRF)

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	\$1,999,787
			\$
			\$

R&D Program Area: ESRO: ETSI

TOTAL: \$ 1,999,787

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: David Bierman
Address: 4385 Sedge St

City, State, Zip: Fremont, CA
94555-1159

Phone: 720-937 -631 0

E-Mail: David@Antora.Energy

2. Recipient's Project Manager

Name: David Bierman
Address: 4385 Sedge St

City, State, Zip: Fremont, CA
94555-1159

Phone: 720-937 -631 0

E-Mail: David@Antora.Energy



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

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
Antora Energy, Inc.

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Analysis of Emerging Storage Markets and Cost Modeling
3	X	Development and Testing of Large-Area TPV Modules
4	X	Development of Pilot-Scale System
5		Field Testing of Pilot-scale System at Customer Site
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities
8		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
TAC	Technical Advisory Committee
TPV	Thermophotovoltaic

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 field-testing of a breakthrough energy storage technology at a customer site.

B. Problem/ Solution Statement

Problem

The electricity generation sector accounts for over 25 percent of all greenhouse gas emissions in the United States, making it a key culprit in global climate change. In California, the impacts of a warming climate are already being acutely experienced in the form of increased wildfire risk. The 2018 wildfire season inflicted over 100 fatalities and \$10 billion in economic damage, while a single Public Safety Power Shutoff can cost residents and businesses over \$1 billion and critically endanger elderly and vulnerable populations.² Ultra-low-cost electricity storage systems capable of storing enough energy to continuously discharge for days or weeks can provide the critical multi-day resiliency California businesses and communities require, while also supporting a zero-carbon grid, based on variable renewables. However, existing storage technologies such as lithium-ion batteries are an order of magnitude too expensive for multi-day storage applications

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
Antora Energy, Inc.

1 and are plagued by considerable safety and lifetime concerns, creating the critical need for a new,
2 low-cost energy storage technology.

3
4 **Solution**

5 Antora has developed a breakthrough energy storage technology that combines an inexpensive
6 solid thermal storage medium with a world-record-breaking thermophotovoltaic (TPV) heat
7 engine. Antora’s “thermal battery” is charged by using electricity to resistively heat inexpensive
8 carbon blocks, which are held in a well-insulated container to minimize heat leakage. It is
9 discharged by using specialized photovoltaic panels to convert the heat radiated from the
10 carbon blocks back to electricity. The solid graphite storage material is not flammable, is one of
11 the most thermally and mechanically robust materials used in industry today, and has a well-
12 established and conflict-free supply chain, thus eliminating the fire safety, lifecycle, and
13 environmental justice challenges that burden lithium-ion batteries. This combination of a safe,
14 long-lasting, and ultra-low-cost electrical energy storage system enables the multi-day
15 discharge durations required to provide true resiliency in California while supporting the
16 widespread deployment of variable renewable resources required for a zero-carbon grid. Under
17 the proposed project, Antora will build and test a first pilot-scale storage system at a customer
18 site.

19
20 **C. Goals and Objectives of the Agreement**

21
22 **Agreement Goals**

23 The goals of this Agreement are to:

- 24 • Advance Antora’s solid-state thermal storage system to TRL6, by demonstrating
25 engineering-scale system performance in a relevant field environment
- 26 • Collect operational data on the pilot system to validate performance and demonstrate a
27 high level of reliability.
- 28 • Demonstrate resiliency, emissions reduction, and cost savings of TPV energy storage to
29 co-generation and industrial customers.

30
31 **Ratepayer Benefits:**² This Agreement will result in the ratepayer benefits of:

- 32 • **Lower costs:** The installed capital costs of Antora’s thermal battery are expected to be
33 20x lower than lithium-ion batteries, which would result in the ability to supply multi-day
34 storage services for <\$0.05/kWh.
- 35 • **Resiliency:** Antora’s low-cost thermal battery could provide the multi-day resiliency that
36 traditional energy storage technologies cannot.
- 37 • **Increased safety:** Antora’s energy storage medium is solid graphite, which is not
38 flammable. The system does not contain toxic or reactive materials, improving system
39 safety relative to currently fielded technologies.
- 40 • **Economic development:** The objective of the proposed project is to build Antora’s first
41 pilot-scale system at a customer site to test system operation in an agricultural combined
42 heat and power application. This will result in immediate job creation, while supporting the

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

EXHIBIT A Scope of Work Antora Energy, Inc.

1 local agricultural economy by stimulating the agricultural cooking and processing industry
2 with inexpensive and emission-free heat.

- 3 • **Environmental benefits:** Antora’s thermal battery consists primarily of graphite blocks,
4 thermal insulation, and photovoltaic modules, all of which are expected to have working
5 lifetimes of decades and minimal decommissioning issues. Antora’s system does not
6 contain toxic materials or rely on supply chains with inherent environmental justice issues.
- 7 • **Public health:** Antora’s technology will be a cornerstone of the transition to a fossil-fuel-
8 free electricity system, thus substantially improving air quality by eliminating >50 kT of
9 NO_x emissions that disproportionately impact low-income and disadvantaged
10 communities.
- 11 • **Energy security:** By supporting the transition to a 100% renewable electricity future,
12 Antora’s thermal battery will help eliminate dependence on fossil-fueled resources. This
13 benefit will be magnified as electric vehicles further penetrate the market and are
14 increasingly charged with clean and renewable energy.

15 Technological Advancement and Breakthroughs:³ The Antora team is developing an innovative
16 thermal storage system that solves the two critical challenges that have traditionally hampered
17 this class of technologies by combining a safe, chemically inert, all-solid storage medium with a
18 thermophotovoltaic (TPV) heat engine. Moving to an all-solid carbon storage medium avoids the
19 cost and complexity associated with managing a molten storage medium, and the cost of our
20 carbon storage media is expected to be more than 10x lower than conventional molten salts.
21 Further, over the past year, the Antora team has developed the world’s most efficient solid-state
22 heat engine. By combining standard photovoltaics manufacturing with our novel device design,
23 our TPV heat engine unlocks lower costs and higher efficiencies than conventional heat engines.
24 This innovation is the key enabling technology for our energy storage system.

25 26 Agreement Objectives

27 The overall objective for this project is to demonstrate a revolutionary energy storage device
28 at a pilot-scale on a customer site. In order for the project to be a success, all sub-components
29 need to be integrated together, and the pilot-scale system must demonstrate all functionality
30 of the eventual commercial system.

31
32 The specific goals of this project are:

- 33 • Optimize the system design in order to maximize value, through market analysis and
34 value-stacking available for this technology, to the customer for behind-the-meter
35 applications
 - 36 • Scale fabrication from the current cell level to the large-area modules necessary for a
37 pilot demonstration
 - 38 • Establish a supply chain for the construction of a full system
 - 39 • Demonstrate reliable operation at an industrial customer site
- 40

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

EXHIBIT A
Scope of Work
Antora Energy, Inc.

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.

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.

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- 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;
- 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.

EXHIBIT A
Scope of Work
Antora Energy, Inc.

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

- 2 ○ The CAM's expectations for accomplishing tasks described in the Scope of Work;
- 3 ○ An updated Project Schedule;
- 4 ○ Technical products (subtask 1.1);
- 5 ○ Progress reports and invoices (subtask 1.5);
- 6 ○ Final Report (subtask 1.6);
- 7 ○ Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- 8 ○ Any other relevant topics.

- 9
- 10 ● Provide an *Updated Project Schedule, List of Match Funds, and List of Permits*, as needed
- 11 to reflect any changes in the documents.
- 12

13 **The CAM shall:**

- 14 ● Designate the date and location of the meeting.
- 15 ● Send the Recipient a *Kick-off Meeting Agenda*.
- 16

17 **Recipient Products:**

- 18 ● Updated Project Schedule (*if applicable*)
- 19 ● Updated List of Match Funds (*if applicable*)
- 20 ● Updated List of Permits (*if applicable*)
- 21

22 **CAM Product:**

- 23 ● Kick-off Meeting Agenda
- 24

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

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

34
35 CPR meetings generally take place at key, predetermined points in the Agreement, as determined
36 by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may
37 schedule additional CPR meetings as necessary. The budget will be reallocated to cover the
38 additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR
39 meetings generally take place at the Energy Commission, but they may take place at another
40 location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the
41 CAM.

42
43 **The Recipient shall:**

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

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- 1 • Attend the CPR meeting.
- 2 • Present the CPR Report and any other required information at each CPR meeting.
- 3

4 **The CAM shall:**

- 5 • Determine the location, date, and time of each CPR meeting with the Recipient's input.
- 6 • Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance
- 7 of the CPR meeting. If applicable, the agenda will include a discussion of match funding
- 8 and permits.
- 9 • Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule*
- 10 *for Providing a Progress Determination* on continuation of the project.
- 11 • Determine whether to continue the project, and if so whether modifications are needed to
- 12 the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM
- 13 concludes that satisfactory progress is not being made, this conclusion will be referred to
- 14 the Deputy Director of the Energy Research and Development Division.
- 15 • Provide the Recipient with a *Progress Determination* on continuation of the project, in
- 16 accordance with the schedule. The Progress Determination may include a requirement
- 17 that the Recipient revise one or more products.
- 18

19 **Recipient Products:**

- 20 • CPR Report(s)
- 21 • Task Products (draft and/or final as specified in the task)
- 22

23 **CAM Products:**

- 24 • CPR Agenda
- 25 • List of Expected CPR Participants
- 26 • Schedule for Providing a Progress Determination
- 27 • Progress Determination
- 28

29 **Subtask 1.4 Final Meeting**

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

31

32 **The Recipient shall:**

- 33 • Meet with Energy Commission staff to present project findings, conclusions, and
- 34 recommendations. The final meeting must be completed during the closeout of this
- 35 Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The
- 36 meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval
- 37 of the CAM.
- 38

39 The technical and administrative aspects of Agreement closeout will be discussed at the

40 meeting, which may be divided into two separate meetings at the CAM's discretion.

- 41 ○ The technical portion of the meeting will involve the presentation of findings,
- 42 conclusions, and recommended next steps (if any) for the Agreement. The CAM will
- 43 determine the appropriate meeting participants.
- 44 ○ The administrative portion of the meeting will involve a discussion with the CAM and
- 45 the CAO of the following Agreement closeout items:
 - 46 ▪ Disposition of any state-owned equipment.
 - 47 ▪ Need to file a Uniform Commercial Code Financing Statement (Form UCC-1)
 - 48 regarding the Energy Commission's interest in patented technology.

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- 1 ▪ The Energy Commission’s request for specific “generated” data (not already
- 2 provided in Agreement products).
- 3 ▪ Need to document the Recipient’s disclosure of “subject inventions” developed
- 4 under the Agreement.
- 5 ▪ “Surviving” Agreement provisions such as repayment provisions and
- 6 confidential products.
- 7 ▪ Final invoicing and release of retention.
- 8 • Prepare a *Final Meeting Agreement Summary* that documents any agreement made
- 9 between the Recipient and Commission staff during the meeting.
- 10 • Prepare a *Schedule for Completing Agreement Closeout Activities*.
- 11 • Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick,
- 12 organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

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

Products:

- 37 • Progress Reports
- 38 • Invoices

Subtask 1.6 Final Report

41 The goal of this subtask is to prepare a comprehensive Final Report that describes the original
42 purpose, approach, results, and conclusions of the work performed under this Agreement. The
43 CAM will review the Final Report, which will be due at least **two months** before the Agreement

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 end date. When creating the Final Report Outline and the Final Report, the Recipient must use
2 the Style Manual provided by the CAM.

3
4 **Subtask 1.6.1 Final Report Outline**

5
6 **The Recipient shall:**

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

9
10 **Recipient Products:**

- 11 • Final Report Outline (draft and final)

12
13 **CAM Product:**

- 14 • Style Manual
- 15 • Comments on Draft Final Report Outline
- 16 • Acceptance of Final Report Outline

17
18 **Subtask 1.6.2 Final Report**

19
20 **The Recipient shall:**

- 21 • Prepare a *Final Report* for this Agreement in accordance with the approved Final Report
22 Outline, Style Manual, and Final Report Template provided by the CAM with the following
23 considerations:
 - 24 ○ Ensure that the report includes the following items, in the following order:
 - 25 ▪ Cover page (**required**)
 - 26 ▪ Credits page on the reverse side of cover with legal disclaimer (**required**)
 - 27 ▪ Acknowledgements page (optional)
 - 28 ▪ Preface (**required**)
 - 29 ▪ Abstract, keywords, and citation page (**required**)
 - 30 ▪ Table of Contents (**required**, followed by List of Figures and List of Tables,
31 if needed)
 - 32 ▪ Executive summary (**required**)
 - 33 ▪ Body of the report (**required**)
 - 34 ▪ References (if applicable)
 - 35 ▪ Glossary/Acronyms (If more than 10 acronyms or abbreviations are used,
36 it is required.)
 - 37 ▪ Bibliography (if applicable)
 - 38 ▪ Appendices (if applicable) (Create a separate volume if very large.)
 - 39 ▪ Attachments (if applicable)
 - 40 ○ Ensure that the document is written in the third person.
 - 41 ○ Ensure that the Executive Summary is understandable to the lay public.
 - 42 ▪ Briefly summarize the completed work. Succinctly describe the project
43 results and whether or not the project goals were accomplished.
 - 44 ▪ Identify which specific ratepayers can benefit from the project results
45 and how they can achieve the benefits.
 - 46 ▪ If it's necessary to use a technical term in the Executive Summary,
47 provide a brief definition or explanation when the technical term is first
48 used.

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- 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.

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

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 which the match funds will be applied. If the in-kind contribution is equipment
2 or other tangible or real property, the Recipient must identify its owner and
3 provide a contact name, address, telephone number, and the address where
4 the property is located.

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

16
17 **Products:**

- 18 • Match Funds Status Letter
- 19 • Supplemental Match Funds Notification Letter (*if applicable*)
- 20 • Match Funds Reduction Notification Letter (*if applicable*)

21
22 **Subtask 1.8 Permits**

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

29
30 **The Recipient shall:**

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

37
38 The list of permits and the schedule for obtaining them will be discussed at the Kick-off
39 meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and
40 copies of the permits will be developed. The impact on the project if the permits are not
41 obtained in a timely fashion or are denied will also be discussed. If applicable, permits will
42 be included as a line item in progress reports and will be a topic at CPR meetings.

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

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 **Products:**

- 2 • Permit Status Letter
- 3 • Updated List of Permits (*if applicable*)
- 4 • Updated Schedule for Acquiring Permits (*if applicable*)
- 5 • Copy of Each Approved Permit (*if applicable*)

6
7 **Subtask 1.9 Subcontracts**

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

11
12 **The Recipient shall:**

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

24
25 **Products:**

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

27
28 **TECHNICAL ADVISORY COMMITTEE**

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

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

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

47
48 The TAC may be composed of qualified professionals spanning the following types of disciplines:

EXHIBIT A Scope of Work Antora Energy, Inc.

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

12 **The Recipient shall:**

- 13 • Prepare a *List of Potential TAC Members* that includes the names, companies, physical
- 14 and electronic addresses, and phone numbers of potential members. The list shall include
- 15 the expertise of each proposed TAC member and the value to the project. The list will be
- 16 discussed at the Kick-off meeting, and a schedule for recruiting members and holding the
- 17 first TAC meeting will be developed.
- 18 • Recruit TAC members. Ensure that each individual understands member obligations and
- 19 the TAC meeting schedule developed in subtask 1.11.
- 20 • Prepare a *List of TAC Members* once all TAC members have committed to serving on the
- 21 TAC.
- 22 • Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from
- 23 each TAC member.
- 24
- 25

26 **Products:**

- 27 • List of Potential TAC Members
- 28 • List of TAC Members
- 29 • Documentation of TAC Member Commitment

30 **Subtask 1.11 TAC Meetings**

31 The goal of this subtask is for the TAC to provide strategic guidance for the project by participating
32 in regular meetings, which may be held via teleconference.
33

34 **The Recipient shall:**

- 35 • Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the
- 36 number and location of meetings (in-person and via teleconference) in consultation with
- 37 the CAM.
- 38 • Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during
- 39 recruiting. Revise the schedule after the first TAC meeting to incorporate meeting
- 40 comments.
- 41 • Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC
- 42 meeting.
- 43 • Organize and lead TAC meetings in accordance with the TAC Meeting Schedule.
- 44 Changes to the schedule must be pre-approved in writing by the CAM.
- 45

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- 1 • Prepare *TAC Meeting Summaries* that include any recommended resolutions of major
2 TAC issues.
3

4 **The TAC shall:**

- 5 • Help set the project team's goals and contribute to the development and evaluation of its
6 statement of proposed objectives as the project evolves.
7 • Provide a credible and objective sounding board on the wide range of technical and
8 financial barriers and opportunities.
9 • Help identify key areas where the project has a competitive advantage, value proposition,
10 or strength upon which to build.
11 • Advocate on behalf of the project in its effort to build partnerships, governmental support
12 and relationships with a national spectrum of influential leaders.
13 • Ask probing questions that insure a long-term perspective on decision-making and
14 progress toward the project's strategic goals.
15

16 **Products:**

- 17 • TAC Meeting Schedule (draft and final)
18 • TAC Meeting Agendas (draft and final)
19 • TAC Meeting Back-up Materials
20 • TAC Meeting Summaries
21

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 **III. TECHNICAL TASKS**

2
3 NOTE: Products to be provided to the Energy Commission should not include a level of technical
4 detail that would inadvertently disclose Intellectual Property prematurely to the public (e.g., prior
5 to the preparation and filing of patent applications). See Tasks 3, 4.1, 4.2, 5.1, and 5.2, in
6 particular.
7

8 **TASK 2: ANALYSIS OF EMERGING STORAGE MARKETS AND COST MODELING**

9 The goal of this task is to guide the direction of the technical development by determining desired
10 product specifications for various behind-the-meter long-duration storage markets.
11

12 **SUBTASK 2.1: PERFORM OPTIMIZATION ANALYSIS**

13 The goal of this sub-task is to gather necessary data for performing technology assessments for
14 the pilot-site use, other markets, and long-term markets to optimize the system's economic value.
15

16 **The Recipient shall:**

- 17
- 18 • Use operational and economic data relevant to the storage technology for optimization
and market analysis
 - 19 • Organize data in order to more easily obtain and analyze in the following tasks
 - 20 • Set up optimization model
 - 21 • Clearly document and justify modeling assumptions
 - 22 • Assess current technology status and perform sensitivity analysis
 - 23 • Recommend ideal markets and estimate price-points (near-term and long-term)
 - 24 • Identify complete set of product specifications and system performance targets
 - 25 • Prepare a *Presentation Summary of Early Findings*
 - 26 • Prepare a *Market Analysis and Cost Modeling Report*, which includes but is not limited to:
 - 27 ○ Summary of the data collected
 - 28 ○ Results from optimization and sensitivity analysis
 - 29 ○ Description of target near-term and long-term markets
- 30

31 **Products:**

- 32
- 33 • Presentation Summary of Early Findings
 - 34 • Market Analysis and Cost Modeling Report (draft and final)
- 35

36 **SUBTASK 2.2: ENGAGEMENT WITH SITE HOST & ANTORA ADVISORY BOARD**

37 The goal of this sub-task is to solicit feedback directly from the customer, other key stakeholders,
38 and company advisors to help incorporate all findings from the market analysis into the pilot
39 design. Engagement and feedback will be used to revisit product specifications, cost metrics, and
40 overall development plan to ensure that the goals are aligned with findings in subtask 2.1.

41 **The Recipient shall:**

- 42
- 43 • Host meeting(s) with demonstration site owner and Antora advisory board to review
findings from aforementioned study
 - 44 • Prepare *Presentation Materials* for site host presentation
 - 45 • Prepare *Meeting Notes* from meeting with site host and advisory board
- 46

47 **Products:**

- 48
- Presentation Materials

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- Meeting Notes

TASK 3: TESTING OF ALPHA PROTOTYPE SYSTEM

The goal of this sub-task is to rigorously test the existing alpha prototype (developed outside of this agreement) in order to inform the development of the pilot system.

The Recipient shall:

- Collect operational data on alpha system
- Analyze the purge gas in the system to determine any contaminants
- Test different graphite specimens and summarize key differences.
- Experiment with charge and discharge rates to determine proper operation
- Characterize heat leakage and compare with modeling
- Prepare *Alpha Testing Report* which includes but is not limited to:
 - Description of the system
 - Discussion of the data collected
 - Discussion of the key findings to be used in pilot system development

Products:

- Alpha Testing Report (draft and final)

TASK 4: DEVELOPMENT AND TESTING OF LARGE-AREA TPV MODULES

The goal of this task is to use single TPV cells to develop and test full TPV modules, which are to be used in the pilot-scale system.

SUBTASK 4.1: TPV CELL FABRICATION AND MODULARIZATION

The goal of this sub-task is to fabricate TPV material and to integrate individual TPV devices into a water-cooled module for the pilot-scale system.

The Recipient shall:

- Fabricate large areas of high-efficiency TPV devices
- Characterize uniformity across large areas of cells
- Interconnect cells to form large area cell array
- Characterize the series resistance of the modules
- Test the thermal interface material and characterize the thermal resistance between the cells and the cooling water
- Perform thermal modeling to estimate the temperature of the TPV cells in operation
- Model the expected efficiency of the module.
- Prepare *TPV Cell Fabrication and TPV Module Development Report* which includes but is not limited to:
 - Description of the cell structure
 - Summary of uniformity findings
 - Summary of the performance of the modules
 - Discussion of the module fabrication and any challenges encountered

Products:

- TPV Cell Fabrication and TPV Module Development Report (draft and final)

TASK 4.2: RELIABILITY TESTING

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 The goal of this sub-task is to characterize the performance of the TPV module after thermal
2 cycling and exposure to high-temperature graphite.
3

4 **The Recipient shall:**

- 5 • Develop a *Reliability Test Plan* to understand the effects of thermal testing
- 6 • Characterize the series resistance of the modules after cycling
- 7 • Perform thermal shocking and ultraviolet exposure testing
- 8 • Model the expected efficiency of the module over time
- 9 • Participate in CPR meeting per subtask 1.3
- 10 • Prepare *CPR Report #1* per subtask 1.3
- 11 • Prepare *Module Reliability Report* which includes but is not limited to:
 - 12 ○ Summary of the performance of the modules after thermal testing

13
14 **Products:**

- 15 • Reliability Test Plan
- 16 • Module Reliability Report (draft and final)
- 17 • CPR Report #1

18
19
20 **TASK 5: DEVELOPMENT OF PILOT-SCALE SYSTEM**

21 The goal of this task is to develop a pilot-scale system on a customer site. This pilot will
22 demonstrate key functionalities of the technology and will help inform the development of Antora's
23 first product for our agriculture co-generation customer.
24

25
26 **SUBTASK 5.1: DESIGN OF PILOT-SCALE SYSTEM**

27 The goal of this sub-task is to develop the conceptual design and detailed engineering of the pilot-
28 scale system.
29

30 **The Recipient shall:**

- 31 • Develop a *Detailed Engineering Design* of the pilot system (exclusive of proprietary
32 information):
 - 33 ○ Bill of materials
 - 34 ○ Engineering Drawings
 - 35 ○ Assembly Drawings
 - 36 ○ Wiring and plumbing diagrams
- 37 • Create instrumentation plan to measure system performance, to be revisited in Task 5.3
- 38 • Develop safety Failure Mode and Effects Analysis (FMEA) with mitigation strategies
- 39 • Source all components (electrodes, insulation, graphite blocks, motion elements, etc.)
- 40 • Prepare *Pilot-scale System Development Report* which includes but is not limited to:
 - 41 ○ Description of the system with measurement instrumentation
 - 42 ○ Discussion of the key findings and insights

43
44 **Products:**

- 45 • Pilot-scale System Development Report (draft and final)

46
47 **SUBTASK 5.2: BUILD PILOT-SCALE SYSTEM**

48 The goal of this sub-task is to build the pilot-scale system at the customer facility.

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1
2 **The Recipient shall:**

- 3 • Prepare the site for construction
4 • Build pilot-scale system
5 • Participate in CPR meeting #2 per subtask 1.3
6 • Prepare *CPR Report #2*
7 • Prepare *Pilot-Scale System Assembly Report* which includes but is not limited to:
8 ○ Review of the assembly process
9 ○ Prepare final bill of materials for the system
10 ○ Provide list of improvements that can be applied to future construction of similar
11 systems

12
13 **Products:**

- 14 • Pilot-Scale System Assembly Report (draft and final)
15 • CPR Report #2
16
17

18 **TASK 6: FIELD TESTING OF PILOT-SCALE SYSTEM AT CUSTOMER SITE**

19 The goal of this task is to operate the pilot-scale system on a customer site and collect necessary
20 data to understand the system's performance.
21

22 **SUBTASK 6.1: COMMISSIONING OF PILOT-SCALE SYSTEM**

23 The goal of this sub-task is to bring the fully constructed system to safe operation by running a
24 series of pre-defined tests.
25

26 **The Recipient shall:**

- 27 • Develop *Commissioning Test Plan* which includes but is not limited to:
28 ○ Rigorous safety checks
29 ○ Basic performance checks including rapid charging and discharging
30 ○ Analysis of any argon gas contaminants
31 • Execute commissioning test plan
32 • Operate the system according to a pre-determined electrical input and electrical and
33 thermal output schedule.
34 • Conduct routine maintenance checks to quantify any component degradation during
35 normal operation.
36 • Collect data on various key components including but not limited to:
37 ○ Storage block temperature
38 ○ External shell temperature
39 ○ Water flow rates and temperatures
40 ○ TPV temperature and performance
41 • Prepare *Commissioning Procedure and Operation Report* which includes but is not limited
42 to:
43 ○ Description of the commissioning test plan
44 ○ Description of commissioning test plan execution
45 ○ Description of notes and high-level observations on operation of the system
46

47 **Products:**

- 48 • *Commissioning Test Plan*

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- Commissioning Procedure and Operation Report (draft and final)

SUBTASK 6.2: MEASUREMENT AND VERIFICATION OF SYSTEM PERFORMANCE

The goal of this sub-task is to develop a measurement and verification plan and to analyze the data that is collected from the system to understand its performance overall and for the specific site user application(s).

The Recipient shall:

- Develop a *Measurement and Verification Plan* which includes but is not limited to:
 - Proposed metrics for measurement
 - Location of measurement devices along the system
 - Baseline assumptions and performance targets
 - Reporting intervals
- Organize all data collected from system operation and performance into a database.
- Analyze key metrics including but not limited to:
 - Volumetric energy density and therefore marginal storage cost
 - Dispatchability of electrical power
 - Useful heat extracted from system
 - Heat leakage through insulation
 - Charging rates
 - Total number of operational hours
- Compare the observed behavior to the estimated system behavior and discuss any key differences or unexpected results.
- Prepare *Measurement and Verification of Pilot-scale System Performance Report* which includes but is not limited to:
 - Results from the pilot-scale system operation and testing
 - Summary of the analysis of the operational data collected
 - Discussion of improvements to be made on future system
- Participate in the final TAC meeting to present on final results per subtask 1.10

Products:

- *Measurement and Verification Plan*
- Measurement and Verification of Pilot-scale System Performance Report (draft and final)

TASK 7: 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:

EXHIBIT A
Scope of Work
Antora Energy, Inc.

- For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
- Respond to CAM questions regarding responses to the questionnaires.

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

Products:

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

TASK 8: 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. Antora has identified three key audiences to engage via technology transfer activities to advance commercialization of the technology—policy makers, public, and potential customers and funders.

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 format provided by the CAM.

- 2 • Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use
- 3 the format provided by the CAM.
- 4 • Prepare a *Technology/Knowledge Transfer Plan* that includes:
 - 5 ○ An explanation of how the knowledge gained from the project will be made available
 - 6 to the public, including the targeted market sector and potential outreach to end users,
 - 7 utilities, regulatory agencies, and others.
 - 8 ○ A description of the intended use(s) for and users of the project results.
 - 9 ○ Published documents, including date, title, and periodical name.
 - 10 ○ Copies of documents, fact sheets, journal articles, press releases, and other
 - 11 documents prepared for public dissemination. These documents must include the
 - 12 Legal Notice required in the terms and conditions. Indicate where and when the
 - 13 documents were disseminated.
 - 14 ○ A discussion of policy development. State if project has been or will be cited in
 - 15 government policy publications, or used to inform regulatory bodies.
 - 16 ○ The number of website downloads or public requests for project results.
 - 17 ○ Additional areas as determined by the CAM.
- 18 • Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer
- 19 Plan. These activities will be reported in the Progress Reports. Activities might include
 - 20 ○ Extensive engagement with potential customers to share project findings and to
 - 21 ensure product development aligns with their needs
 - 22 ○ Development of a website to host project information to make it easily accessible
- 23 • When directed by the CAM, develop *Presentation Materials* for an Energy Commission-
- 24 sponsored conference/workshop(s) on the project.
- 25 • When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the
- 26 California Energy Commission.
- 27 • Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500
- 28 pixels in landscape ratio) of pre and post technology installation at the project sites or
- 29 related project photographs.
- 30 • Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities
- 31 conducted during the project.

32
33 **Products:**

- 34 • Initial Fact Sheet (draft and final)
- 35 • Final Project Fact Sheet (draft and final)
- 36 • Presentation Materials (draft and final)
- 37 • High Quality Digital Photographs
- 38 • Technology/Knowledge Transfer Plan (draft and final)
- 39 • Technology/Knowledge Transfer Report (draft and final)

40
41
42 **TASK 9: Production Readiness Plan**

43 The goal of this task is to determine the steps that will lead to the manufacturing of technologies
44 developed in this project or to the commercialization of the project's results. This task will be
45 informed by activities and data collected in all previous tasks.

46
47 **The Recipient shall:**

- 48 • Prepare a *Production Readiness Plan*. The degree of detail in the plan should be

EXHIBIT A
Scope of Work
Antora Energy, Inc.

1 proportional to the complexity of producing or commercializing the proposed product, and
2 to its state of development. As appropriate, the plan will discuss the following:

- 3 ○ Critical production processes, equipment, facilities, personnel resources, and support
4 systems needed to produce a commercially viable product.
- 5 ○ Internal manufacturing facilities, supplier technologies, capacity constraints imposed
6 by the design under consideration, design-critical elements, and the use of hazardous
7 or non-recyclable materials. The product manufacturing effort may include “proof of
8 production processes.”
- 9 ○ The estimated cost of production.
- 10 ○ The expected investment threshold needed to launch the commercial product.
- 11 ○ An implementation plan to ramp up to full production.
- 12 ○ The outcome of product development efforts, such as copyrights and license
13 agreements.
- 14 ○ Patent numbers and applications, along with dates and brief descriptions.
- 15 ○ Other areas as determined by the CAM.

16
17 **Products:**

- 18 • Production Readiness Plan (draft and final)

19
20
21 **IV. PROJECT SCHEDULE**

22
23 Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ANTORA 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-19-031 with Antora Energy, Inc. for a \$1,999,787 grant to develop and field-test a breakthrough long-duration energy storage system based on thermophotovoltaic technology. The system will be pilot tested at an existing cogeneration power plant in Fresno County; 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:

Cody Goldthrite
Secretariat