



GRANT REQUEST FORM (GRF)

A) New Agreement # EPC-21-011 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Hatice Gecol	43	916-776-0688

C) Recipient's Legal Name	Federal ID Number
Center for Transportation and the Environment, Inc.	58-2052891

D) Title of Project
Hydrogen Back-Up Generation Vehicle (H2BUG)

E) Term and Amount

Start Date	End Date	Amount
12/15/2021	3/31/2026	\$ 3,000,000

F) Business Meeting Information

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

Proposed Business Meeting Date 12/8/2021 Consent Discussion

Business Meeting Presenter Quenby Lum Time Needed: 5 minutes

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

Agenda Item Subject and Description:

Center for Transportation and the Environment

CENTER FOR TRANSPORTATION AND THE ENVIRONMENT, INC. Proposed resolution approving agreement EPC-21-011 with Center for Transportation and the Environment, Inc. for a \$3,000,000 grant to design, build, test, and demonstrate two mobile, zero-emission, hydrogen fuel cell backup generation vehicles (H2BUG), and adopting staff's determination that this action is exempt from CEQA. The goal of the H2BUG project is to be able to drive 90 miles each way to emergency and disaster relief locations and provide at least 35 kW of continuous power for a minimum of 48 hours. The H2BUG vehicles will be designed based on an emergency disaster relief vehicle that will be developed under the U.S. Department of Energy and U.S. Department of Defense's H2Rescue program. (EPIC funding) Contact: Quenby Lum.

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)



Explain reason why Agreement is exempt under the above section: This project involves the demonstration and testing of two mobile energy storage systems (H2BUGs). Each H2BUG will have a hydrogen fuel cell that powers the truck and also exports power to facilities or buildings. During system testing, the H2BUGs will drive to the project sites, park on existing ground, and connect to the site's electrical services downstream of the meter. The H2BUG system is for temporary use at a site, such as emergencies, and will not be permanent. Safety precautions related to high-pressure hydrogen storage and high-voltage vehicle systems will be used in design and operation.

Design, assembly, and initial testing of the H2BUG prototype will occur at existing laboratory and manufacturing facilities of Cummins, Inc. in Milpitas, California. The H2BUG prototype will also be tested at an existing facility of Federal Emergency Management Agency in Tracy, California. Assembly, initial testing, and demonstration of the H2BUGs will occur at existing laboratory and manufacturing facilities of Cummins, Inc. in West Sacramento, California. Electrical testing of the H2BUGs will be conducted at an existing facility of San Diego Gas & Electric Company in Escondido, California. Demonstration test sites will be at existing facilities of Southern California Gas Company and additional sites to be identified by CEC. Minor electrical connection upgrades may be needed at the test sites. Vehicle trips will be minimal. This project is therefore categorically exempt from environmental review under section 15301 of the CEQA Guidelines, because it consists of operation, maintenance, or minor alteration of existing public and private structures, facilities, mechanical equipment, or topographical features, and because it involves negligible or no expansion of use beyond that existing at the time of the lead agency's determination.

The project is also categorically exempt under section 15306 of the CEQA Guidelines, because it consists of basic data collection, research, experimental management, and resource evaluation activities which will not result in a serious or major disturbance to an environmental resource.

- 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



GRANT REQUEST FORM (GRF)

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

Legal Company Name:	Budget
BREATHE SOUTHERN CALIFORNIA	\$ 75,000
Cummins Inc.	\$ 2,383,754
Southern California Gas Company	\$ 0 (match only)
	\$
	\$

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

Legal Company Name:
San Diego Gas & Electric Company
Federal Emergency Management Agency

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	20-21	301.001H	\$3,000,000
			\$
			\$
			\$

R&D Program Area: ESRO: ETSI

TOTAL: \$ 3,000,000

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Jason Hanlin

Address: 730 Peachtree St NE Ste 450

City, State, Zip: Atlanta, GA 30308-1244

Phone: 404-808-6489

E-Mail: jason@cte.tv

2. Recipient's Project Manager

Name: Erik Brewer

Address: 730 Peachtree St NE Ste 450

City, State, Zip: Atlanta, GA 30308-1244

Phone: 678-296-4763

E-Mail: brewer@cte.tv

L) Selection Process Used

- Competitive Solicitation Solicitation #: GFO-20-310
- First Come First Served Solicitation Solicitation #:
- Non-Competitive Bid Follow-on Funding (SB 115)



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

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 checked="" type="checkbox"/> N/A | <input type="checkbox"/> Attached |

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

Exhibit A Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Vehicle Design
3	X	Vehicle Build, Test, and Commissioning
4		Demonstration, Data Collection, and Analysis
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CDOT	California Department of Transportation
CEC	California Energy Commission
CPR	Critical Project Review
CTE	Center for Transportation and the Environment, Inc.
DOE	U.S. Department of Energy
DOD	U.S. Department of Defense
FEMA	Federal Emergency Management Agency
H2BUGs	Mobile zero-emission hydrogen fuel cell backup generation vehicles
MORBUGs	Mobile Renewable Backup Generation Systems
PEM	Proton Exchange Membrane
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to design, build, test, and demonstrate two mobile zero-emission hydrogen fuel cell backup generation vehicles (H2BUGs), which is to be able to drive 90 miles each way to emergency and disaster relief locations, and provide at least 35 kW of continuous power for a minimum of 48 hours. The H2BUGs will be designed based on an emergency disaster relief vehicle that will be developed under the U.S. Department of Energy (DOE) and U.S. Department of Defense (DOD) H2Rescue program.

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

B. Problem/ Solution Statement

Problem

As a result of increased wildfire intensity and frequency, the State of California, and California Energy Commission (CEC) have identified the need to broaden and improve emergency response to support the safety and health of affected communities. Critically, this includes electrical utility outages caused by either wildfire damage or preemptive de-energization by electrical utilities. Mobile Renewable Backup Generation Systems (MORBUGs) are an innovative technical solution to support electrical outages, provide emission reduction benefits during emergency and non-emergency events, and increase the resilience of California's electrical generation and distribution grid to the harmful effects of climate change and extreme weather events.

Solution

The project team will develop a MORBUG capable of exporting a minimum of 35 kW of continuous load for a minimum of 48 hours. The hydrogen fuel-cell powered back up generation (H2BUG) system is expected to meet size and weight regulation thresholds for mobile assets including those of California Department of Transportation (CDOT), without a waiver. The developed solution will demonstrate a simple, transportable system that can be easily set up and removed. Additionally, the system will be self-contained and able to operate over the 48-hour load utilization without needing additional equipment or replacements from the demonstration site. This approach seeks to address the goals of GFO-20-310, while balancing the resources, capabilities, and requirements of all project stakeholders, including the CEC.

In order to achieve the intended goals outlined by the Applied Research and Development grant funding opportunity GFO-20-310, Center for Transportation and the Environment, Inc. (CTE) ("Recipient") will develop a self-contained vehicle MORBUGs solution utilizing a Kenworth class 7 truck chassis. Onboard power will be generated by a proton exchange membrane (PEM) fuel cell, for the purpose of locomotion and emergency power export. Hydrogen fuel will be stored at an advanced pressure (and volume efficiency) of 700 bar, with an on-board capacity of 175 kg without the use of an auxiliary tender vehicle. Even with notably high on-board fuel storage capacity, the chassis will possess sufficient room to operate an emergency relief cabin similar to what may be found on Federal Emergency Management Agency (FEMA) emergency command vehicles.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Deliver two (2) Class 7 disaster relief vehicles, meeting all applicable Federal Motor Vehicle Safety Standards and CDOT weight limits without a waiver.
- Demonstrate zero-emission propulsion and stationary export power from an on-board PEM fuel cell electric power system.
- Measure and verify the system performance at four different testing locations covering all four seasons, different climate zones and operating conditions representing typical emergency or disaster relief conditions.

Exhibit A Scope of Work

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability and increased safety by developing and demonstrating a zero-emission emergency response vehicle that is capable of power export like that of a diesel generator. The vehicle also includes an emergency response cabin that will have similar features as an incident command vehicle typically used by federal, state, and local agencies.

Compared to conventional technology, H2BUG has several competitive advantages:

- Zero-emissions: emergency and disaster relief typically rely on diesel generators that are noisy, disruptive, have unpleasant fumes and whose emissions contribute to poor air quality and health problems. H2BUG produces no tailpipe emissions and doesn't need to be towed by a diesel-powered truck to an emergency and disaster relief site.
- Increased utility and self-sufficiency: mobile diesel generators are only used to provide power. They need to be towed to an emergency or disaster relief site and need frequent refueling. H2BUG is a fully self-contained system that can drive to/from an emergency or disaster relief site, provide exportable power, supply up to 10 gallons of water and serve as an incident command vehicle. It is also fully self-sufficient as it brings its own fuel on-board.
- Reduced reliance on petroleum fuels: H2BUG uses hydrogen to drive and generate export power reducing the consumption of diesel fuel to transport and operate a diesel generator. It also eliminates the risk of diesel fuel spills when refueling a diesel generator. If fueled with green electrolytic hydrogen, H2BUG can be powered by 100 percent renewable sources of energy like solar and wind power.
- Quiet operation: fuel cells are quiet during operation as they have fewer moving parts. In addition, the PEM fuel cell on H2BUG turns off rather than idles like a diesel generator and the system can still provide full power from the high voltage batteries when the PEM fuel cell is off, leading to quieter operation.
- Faster load response: because exportable power is directly provided by the high voltage system, H2BUG can support rapidly changing loads without degradation to power quality, i.e., transient response is much better than with a rotating machine.
- More efficient partial load operation: when the PEM fuel cell is turned on, it operates at steady state and at its optimal operating condition to recharge the high voltage battery while the high voltage junction box and export power inverter modulate the power output as needed.

Technological Advancement and Breakthroughs³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by creating a clean energy mobile backup system. The project will design, build, test, and demonstrate a zero-emission H2BUG capable of driving over 90 miles each way to emergency and disaster relief locations and provide at least 35 kW of continuous power for a minimum of 48 hours. H2BUG leverages the PEM fuel cell used in a heavy-duty fuel cell truck powertrain to generate exportable electricity through a large on-board DC to AC inverter

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

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

Exhibit A Scope of Work

making it a truly mobile system. In addition, it uses a high-capacity 700 bar hydrogen tank system allowing H2BUG to be self-sufficient, meeting the energy level and duration without needing additional hydrogen tanks. The hydrogen-based system will also be capable of incorporating green electrolytic hydrogen as a fuel which would make H2BUG zero-emission.

Agreement Objectives

The objective of this Agreement is to demonstrate that the following technical targets can be achieved:

- System design integrated into a base truck platform and emergency relief body suited to this specific vocation.
- Locally self-sufficient to be able to drive to an emergency or disaster relief site, provide reliable mobile renewable backup generation and drive back (180-mile round trip).
- Support a minimum of 35 kW of continuous load for a minimum of 48 hours during four separates seasons and in three different climate zones in California.
- Demonstrate at least 1,000 hours system durability with less than five percent system performance degradation.
- Hydrogen refueling compliant with SAE J2600⁴ and SAE J2601⁵.

TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

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

The Recipient shall:

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

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.

⁴ Compressed Hydrogen Surface Vehicle Fueling Connection Devices J2600_201510, https://www.sae.org/standards/content/j2600_201510/

⁵ Fueling Protocol for Gaseous Hydrogen Powered Industrial Trucks J2601/3_201306, https://www.sae.org/standards/content/j2601/3_201306/

Exhibit A Scope of Work

- 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 California Energy Commission's (CEC) software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick.

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

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

○ **Software Application Development**

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

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

Exhibit A Scope of Work

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

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

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

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

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

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

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

The CAM shall:

- Designate the date and location of the meeting.

Exhibit A Scope of Work

- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

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

The Recipient shall:

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

The CAM shall:

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

Exhibit A Scope of Work

- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda
- Progress Determination

Subtask 1.4 Final Meeting

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

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
 - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
 - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any procured equipment.
 - The CEC's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

Exhibit A Scope of Work

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

The Recipient shall:

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

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

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

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)

Exhibit A Scope of Work

- Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)
 - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
 - Executive summary (**required**)
 - Body of the report (**required**)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)
 - Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
- Submit a draft of the Executive Summary to the TAC for review and comment.
 - Develop and submit a *Summary of TAC Comments* received on the Executive Summary. For each comment received, the recipient will identify in the summary the following:
 - Comments the recipient proposes to incorporate.
 - Comments the recipient does propose to incorporate and an explanation for why.
 - Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt.
 - Incorporate all CAM comments into the *Final Report*. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
 - Submit the revised *Final Report* electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:

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

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

Exhibit A Scope of Work

The Recipient shall:

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

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

- 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.

Exhibit A Scope of Work

The Recipient shall:

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

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

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

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

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

Products:

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

Exhibit A Scope of Work

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

Exhibit A Scope of Work

The Recipient shall:

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

Products:

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

Subtask 1.11 TAC Meetings

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

The Recipient shall:

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

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- 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.

Exhibit A Scope of Work

- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

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

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to identify key performance targets for the project. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the draft *Project Performance Metrics Questionnaire* to the CAM prior to the Kick-off Meeting.
- Present the draft *Project Performance Metrics Questionnaire* at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC Performance Metrics Summary* will identify:
 - TAC comments the recipient proposes to incorporate into the final *Project Performance Metrics Questionnaire*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit a final *Project Performance Metrics Questionnaire* with incorporated TAC feedback.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the recipient met each of the performance metrics in the final *Project Performance Metrics Questionnaire*.
- Discuss the final *Project Performance Metrics Questionnaire* and *Project Performance Metrics Results* at the Final Meeting.

Products:

- Project Performance Metrics Questionnaire (draft and final)
- TAC Performance Metrics Summary
- Project Performance Metrics Results

III. TECHNICAL TASKS

TASK 2 VEHICLE DESIGN

The goals of this task are to define the vehicle system and subsystem requirements to ensure compliance with the goals and objectives of the Agreement. The Project Team will build and demonstrate the DOE/DOD H2Rescue vehicle as the predecessor to H2BUG. The Project Team

Exhibit A Scope of Work

will also complete final vehicle design for H2BUG as well as perform a technical feasibility assessment of how the system can be transitioned to all green electrolytic hydrogen.

Subtask 2.1 Build and Demonstrate H2BUG Prototype Vehicle⁶

The goals of this subtask are to complete the build of the DOE/DOD H2Rescue vehicle which will serve as the prototype for H2BUG, as well as validate the H2Rescue vehicle in emergency response service.

The Recipient shall:

- Complete all procurement activity including Hydrogenic Power Module, battery system, hydrogen storage system, traction motor and inverter, and power export system.
- Build and assemble the subsystems for the H2Rescue vehicle including vehicle chassis, fuel cell electric powertrain, and export power system.
- Test and validate the H2Rescue vehicle at the Cummins facility in Milpitas, California and at the FEMA's Distribution Center in Tracy, California.
- Integrate all subsystems into the vehicle chassis.
- Validate and commission the system-level H2Rescue vehicle, including approximately 500 miles of on-road testing.
- Conduct operational testing per the DOE/DOD validation scenarios.
- Prepare a *Prototype Build and Validation Report* that will serve as the lessons learned to be incorporated into the H2BUG final design.

Products:

- Prototype Build and Validation Report

Subtask 2.2 Final Vehicle Design

The goal of this task is to finalize the vehicle design based on feedback from the H2BUG Prototype Vehicle demonstration and Prototype Build and Validation Report.

The Recipient shall:

- Optimize the individual major subsystems relative to prioritized criteria identified in the H2BUG Prototype Build and Validation Report.
- Finalize the detailed designs and specification for each component, subsystem, and the overall vehicle.
- Prepare the *Final Vehicle Design Report* that will include, but is not limited to:
 - Overall requirements;
 - Overall vehicle, system and subsystem specifications and performance characteristics;
 - Vehicle packaging;
 - Power and energy profile description and supporting data;
 - Fuel demand description and supporting data;
 - Criteria pollutant and GHG emissions reductions;
 - Electric traction drive system specifications; and
 - Auxiliary systems.

⁶ Work to finish building the prototype vehicle under the subtask 2.1, Build and Demonstrate H2BUG Prototype Vehicle, will only be funded by match funds. (Match funds are discussed in subtask 1.7.)

Exhibit A Scope of Work

Products:

- Final Vehicle Design Report

Subtask 2.3 Green Electrolytic Hydrogen Technical Feasibility Assessment

The goal of this task is to perform a technical and commercial feasibility assessment of how the system can be transitioned to all green electrolytic hydrogen.

The Recipient shall:

- Conduct a technical and commercial feasibility assessment of how the system can use all green electrolytic hydrogen as defined in Public Utilities Code section 400.2 (SB1369, 2018)⁷. The feasibility assessment will include, but is not limited to:
 - Assessment of technical performance of current self-contained and transportable electrolyzers that can be connected to renewable energy source (solar photovoltaic or wind) to generate green electrolytic hydrogen and coupled to a compressor, tanks, booster, chiller and dispenser system for vehicle refueling;
 - Overall system requirements;
 - Power and hydrogen requirements;
 - Operational requirements;
 - Space requirements;
 - Overall system costs.
- Prepare a *Green Electrolytic Hydrogen Feasibility Report* that summarizes the outcomes of the technical feasibility assessment.
- Provide a *CPR Report #1* for subtasks 2.1, 2.3. and 2.3 and participate in a CPR Meeting per subtask 1.3.

Products:

- Green Electrolytic Hydrogen Feasibility Report
- CPR Report #1

TASK 3 VEHICLE BUILD, TEST, AND COMMISSIONING

The goals of this task are to build, test, and commission two (2) zero-emission H2BUG capable of driving over 90 miles each way to emergency and disaster relief locations and provide at least 35 kW of continuous power for a minimum of 48 hours.

Subtask 3.1 Vehicle Build

The goals of this task are to build the two zero-emission H2BUG.

The Recipient shall:

- Receive approval from the CAM and place orders for long lead items and equipment.
- Prepare base vehicle chassis for system upfit.

⁷ “green electrolytic hydrogen” means hydrogen gas produced through electrolysis and does not include hydrogen gas manufactured using steam reforming or any other conversion technology that produces hydrogen from a fossil fuel feedstock,
https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=PUC&division=1.&title=&part=1.&chapter=2.3.&article=17.

Exhibit A Scope of Work

- Build and assemble the powertrain subsystems (such as fuel cell, fuel storage and delivery, accessory, traction, high voltage battery, cooling, export power).
- Integrate all subsystems into the truck chassis and finalize the truck build.
- Submit *High quality digital photographs of the two completed vehicles*.
- Prepare the *Vehicle Build Report* that details lessons learned and best practices from the equipment procurement and vehicle build.

Products:

- High quality digital photographs of the two completed vehicles.
- Vehicle Build Report

Subtask 3.2 Vehicle Testing and Commissioning

The goals of this task are to test and commission the two zero-emission H2BUG.

The Recipient shall:

- Perform commissioning and shake-down testing to verify that all systems operate as expected and meet performance requirements.
- Conduct electrical and structural tests, to ensure the system is robust and durable.
- Prepare and submit the *H2BUG Commissioning Report* that describes lessons learned and best practices from testing and commissioning.
- Provide a *CPR Report #2* for subtasks 3.1 and 3.2 and participate in a CPR Meeting per subtask 1.3.

Products:

- H2BUG Commissioning Report
- CPR #2 Report

TASK 4 DEMONSTRATION, DATA COLLECTION, AND ANALYSIS

The goals of this task are to complete planning activities that are critical to demonstration success, conduct vehicle testing in accordance with the goals and objectives of the Agreement, and perform data analysis to be defined in the measurement and verification (M&V) Plan.

Subtask 4.1 Demonstration Plan

The goal of this task is to develop a Demonstration Plan that encompasses fueling, operations, and maintenance to ensure success of vehicle testing.

The Recipient shall:

- Ensure hydrogen fuel is available for operational testing at each demonstration site.
- Fuel H2BUGs with green electrolytic hydrogen if it is available at refueling locations.
- Prepare and submit the *Demonstration Plan* that will include, but is not limited to:
 - The Fueling Plan defining the hydrogen requirements, schedule, and other details specific to the hydrogen storage design.
 - The Operations Plan documenting all testing procedures for the demonstration of both project vehicles, including, but is not limited to:
 - Test sites and schedule;
 - Vehicle transportation between test sites;

Exhibit A Scope of Work

- Vehicle and test site set up procedures;
- Relevant safety considerations; and
- Vehicle removal and test site tear down procedures.
- Prepare the *Maintenance Plan* documenting the preventative maintenance schedule and process flow for responding to issues encountered during the demonstration.

Products:

- Demonstration Plan
- Maintenance Plan

Subtask 4.2 Measurement and Verification (M&V) Plan

The goal of this task is to develop the M&V Plan that will capture the key operating data required to describe vehicle performance in all of the test conditions. The time period the demonstration testing will occur is expected to last at least two years so there is time to learn from the research.

The Recipient shall:

- Develop the *M&V Plan* which will include:
 - Definition of performance parameters to be collected
 - Identification of the method of collection for each performance parameter
 - Definition of the frequency of collection

Products:

- M&V Plan (draft and final)

Subtask 4.3 Vehicle #1 Operations and Support

The goal of this task is to test Vehicle 1 at the Cummins facility in West Sacramento during four separate seasons.

The Recipient shall:

- Conduct electrical and structural tests.
- Conduct the necessary field work to make connections between the vehicle's power export system and the load that will be powered.
- Test Vehicle #1 to verify the capability of providing minimum 35 kW power for at least 48 hours continuously.
- Test Vehicle #1 in a minimum of eight two-day tests for four separate seasons (a minimum of two (2) times providing minimum 35 kW power for at least 48 hours continuously per season).
- Deliver Vehicle #1 to SDG&E's Integrated Test Facility in Escondido, California and conduct electrical tests.
- Provide maintenance and service to Vehicle #1, as required.
- Prepare the *Vehicle #1 Operations Results Report* that will include, but is not limited to:
 - Overview of the Vehicle #1 operational testing;
 - Description of any challenges or issues encountered during testing;
 - Lessons learned and best practices; and
 - Assessment of any system degradation between tests across all four seasons.

Products:

Exhibit A Scope of Work

- Vehicle #1 Operations Results Report

Subtask 4.4 Vehicle #2 Operations and Support

The goal of this task is to test Vehicle #2 in three different climate zones in California.

The Recipient shall:

- Deliver Vehicle #2 to the first climate zone in San Bernardino, California.
- Conduct the necessary field work to make connections between the vehicle's power export system and the load that will be powered.
- Test Vehicle #2 a minimum of two (2) times to verify the capability of providing minimum 35 kW power for at least 48 hours continuously.
- Transport Vehicle #2 to the second climate zone in Rimforest, California, conduct the necessary field work to prepare for testing, and repeat testing (a minimum of two (2) times providing minimum 35 kW power for at least 48 hours continuously).
- Transport Vehicle #2 to the third climate zone in Santa Clarita, California, conduct the necessary field work to prepare for testing, and repeat testing (a minimum of two (2) times providing minimum 35 kW power for at least 48 hours continuously).
- Provide maintenance and service to Vehicle #2, as required.
- Prepare the *Vehicle #2 Operations Results Report* that will include, but is not limited to:
 - Overview of the Vehicle #2 operational testing;
 - Description of any challenges or issues encountered during testing;
 - Lessons learned and best practices; and
 - Assessment of any system degradation from transport between test sites.

Products:

- Vehicle #2 Operations Results Report

Subtask 4.5 Data Collection and Analysis

The goal of this task is to collect and analyze performance data from both vehicles in accordance with the M&V plan.

The Recipient shall:

- Collect and analyze the performance data from both vehicles as defined in the M&V Plan.
- Perform baseline vehicle comparison analysis as defined in the M&V Plan.
- Document downtime, issues, and failures during the demonstration period and include appropriate root cause analysis.
- Prepare and submit *Quarterly Data Analysis Reports*.
- Prepare and submit an *M&V Report* that will characterize vehicle performance under all operating conditions of vehicle testing and will include, but is not limited to:
 - An analysis of optimal operating conditions to maximize vehicle performance;
 - Hydrogen fuel consumption at different loads with quantified maximum export power duration of the H2BUG system;
 - Reductions in fuel use, emissions, and maintenance costs as comparable with a fossil-fueled equivalent vehicle;
 - A summary of maintenance and service activities conducted during vehicle testing; and
 - Data analysis results, lessons learned, and recommendations for improvements

Exhibit A Scope of Work

Products:

- Quarterly Data Analysis Reports
- M&V Report

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.
 - 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.

Exhibit A Scope of Work

- 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 CEC may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

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

TASK 6 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement. Eligible activities include, but are not limited to, the following:

- Scale-up analysis including manufacturing analysis, independent design verification, and process improvement efforts.
- Technology verification testing, or application to a test bed program located in California.
- Legal services or licensing to secure necessary intellectual property to further develop the technology
- Market research, business plan development, and cost-performance modeling.
- Entry into an incubator or accelerator program located in California.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan (Draft/Final)* that identifies the proposed activities the recipient will conduct to accelerate the successful commercial adoption of the technology.
- Present the *Draft Technology Transfer Plan* to the TAC for feedback and comments.

Exhibit A Scope of Work

- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Technology Transfer Plan*. This document will identify:
 - TAC comments the recipient proposes to incorporate into the *Final Technology Transfer Plan*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in *Final Technology Transfer Plan*.
- Develop and submit a *Technology Transfer Summary Report (Draft/Final)* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the CEC.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

- Technology Transfer Plan (Draft/Final)
- Summary of TAC Comments
- Technology Transfer Summary Report (Draft/Final)
- High Quality Digital Photographs

IV. PROJECT SCHEDULE

- Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: CENTER FOR TRANSPORTATION AND THE ENVIRONMENT

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-21-011 with Center for Transportation and the Environment, Inc. for a \$3,000,000 grant to design, build, test, and demonstrate two mobile, zero-emission, hydrogen fuel cell backup generation vehicles (H2BUG). The goal of the H2BUG project is to be able to drive 90 miles each way to emergency and disaster relief locations and provide at least 35 kW of continuous power for a minimum of 48 hours. The H2BUG vehicles will be designed based on an emergency disaster relief vehicle that will be developed under the U.S. Department of Energy and U.S. Department of Defense H2Rescue program.; and

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

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on December 8, 2021

AYE:

NAY:

ABSENT:

ABSTAIN:

Liza Lopez
Secretariat