Original Agreement # EPC-16-059 Amendment # 04

Division	Agreement Manager:	MS-	Phone
ERDD	Mike Gravely	51	916-704-4339

Recipient's Legal NameFederal ID #DOE- Lawrence Berkeley National Laboratory94-2951741

Revisions: (check all that apply)	Additional Requirements
Term Extension New End Date: 12/31/2025	Include revised schedule and complete items A, B, C, & F below.
Budget Augmentation Amendment Amount: \$ 1,000,000	Include revised budget and complete items A, B, C, D, & F below.
Budget Reallocation	Include revised budget and complete items A, B, C, & F below.
Scope of Work Revision	Include revised scope of work and complete items A, B, C, E, & F below.
Change in Project Location or Demonstration Site	Include revised scope of work and complete items A, B, C, E, & F below.
Novation/Name Change of Prime Recipient	Include novation documentation and complete items A, B, C, & F below.
Terms and Conditions Modification	Include applicable exhibits with bold/underline/ strikeout and complete items A, B, C, & F below.

A) Business Meeting Information Business Meeting approval is not required for the following types of Agreements:

Minor amendments delegated to Executive Director per December 2013 Resolution

Proposed Business Meeting Date 12/14/2022 Consent Discussion

Business Meeting Presenter Mike Gravely Time Needed: 5 minutes

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

Agenda Item Subject and Description:

Lawrence Berkeley National Laboratory

Proposed resolution approving Amendment 4 to Agreement EPC-16-059 for a \$1,000,000 budget augmentation with follow-on funding, a scope of work update, and a three-year term extension, and adopting staff's determination that this action is exempt from CEQA. This amendment will support the research and development of a software solution to address cost recovery, participation in demand response, and security challenges faced by military bases and other government workplaces when deploying chargers that will be shared by fleet and personally-owned electric vehicles (EV). (EPIC funding) Contact: Mike Gravely

TOTAL: \$ 1,000,000

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

Legal Company Name:	Budget
Kisensum, Inc.	\$ 142,300
TechFlow, Inc.	\$ 605,585
	\$

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

Legal Company Name:

D) Budget Information (only include amendment amount information)

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	21-22	301.0011	\$1,000,000
			\$

R&D Program Area: ESRB: ETSI

Explanation for "Other" selection

Federal Agreement #:

E) California Environmental Quality Act (CEQA) Compliance

- 1. Is Agreement considered a "Project" under CEQA?
 - \boxtimes 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 ; Cal. Code Regs., tit. 14, § 15306

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

Explain reason why Agreement is exempt under the above section: The Energy Commission made CEQA findings pertaining to this project, including finding that it was categorically exempt under 14 CCR sections 15301, 15303, and 15306, when the project was originally approved by the Commission on May 10, 2017. The currently-proposed changes are to augment the budget with follow-on funding, update the Scope of Work, and extend the agreement term. These changes will support additional work to research and develop a software solution to address cost recovery, participation in demand response, and security challenges faced by military bases and other government workplaces when deploying chargers that will be shared by fleet and personally-owned electric vehicles.



CALIFORNIA ENERGY COMMISSION

The project as now proposed, like as previously proposed, will use existing nontactical electric vehicles and operations at Los Angeles Air Force Base, involve installation of small new equipment including electric vehicle chargers, and consist of software development and data collection activities. For these reasons, the same categorical exemptions as originally determined to be applicable remain applicable. The project as amended will have no significant impact on the environment.

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
	Mitigated	Mitigated Negative

- Environmental Impact Report
- Statement of Overriding Considerations

F) The following items should be attached to this GARF (as applicable)

1. Exhibit A, Scope of Work/Schedule

2.	Exhibit B, Budget Detail	□ N/A

3.	CEQA Documentation
4	Novation Documentation

	-
\square	N/A

Attached

Attached

X Attached

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Attached

5. CEC 105, Questionnaire for Identifying Conflicts

Agreement Manager

Date

N/A

N/A

Office Manager

Date

Deputy Director

Date

1 I. TASK ACRONYM/TERM LISTS

A. Task List

2 3

CPR¹ Task # Task Name 1 **General Project Tasks** Optimization and Control Algorithm Development 2 3 Х Implement and Integrate Second-Life Battery System and Control Algorithms Design, Plan, and Execute Vehicle-to-Grid and Vehicle-to-Building 4 Demonstration and Testing Identify and Quantify Business Cases for Plug-in Electric Vehicles and 5 Second-Life Batteries for Load Shifting and Photovoltaic Support Develop Software Solution to Enable Cost Recovery for Shared <u>X</u> <u>6</u> Chargers Design Charge Management Program to Optimize Station Usage <u>7</u> **Evaluation of Project Benefits** 8 Technology/Knowledge Transfer Activities 9

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B. Acronym/Term List

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Acronym/Term	Meaning
CAM	Commission Agreement Manager
	Commission Agreement Officer
COTS	Commercial off-the-shelf
CPR	Critical Project Review
DER-CAM	Distributed Energy Resources Customer Adoption Model
DoD	United States Department of Defense
DOE	United States Department of Energy
IOU	Investor Owned Utility
LAAFB	Los Angeles Air Force Base
PEV	Plug-in Electric Vehicle
POEV	Personally owned electric vehicle
PV	Photovoltaic
Recipient	DOE - Lawrence Berkeley National Laboratory
SBS	Second-life Battery System
SCE	Southern California Edison
TAC	Technical Advisory Committee
V2B	Vehicle-to-Building
V2G	Vehicle-to-Grid
ZEV	Zero-Emission Vehicle

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

A. Purpose of Agreement

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.

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The purpose of this Agreement is to fund the demonstration of an automated control system for fleet plug-in-electric vehicles (PEVs) and repurposed second-life PEV batteries that reduces the overall cost of PEV ownership by maximizing PEV battery lifetime, shifting load to reduce electricity bill demand charges, and providing vehicle-to-grid (V2G) and vehicle-to-building (V2B) services, including these that support the utilization of an aits photoveltein (DV) generation

6 including those that support the utilization of on-site photovoltaic (PV) generation.
 7

8 The Agreement will also fund the research and development of software solutions to address cost 9 recover, charge management, and security challenges faced by military bases and other 10 government workplaces when deploying chargers that will be shared by fleet and personally-11 owned electric vehicles (POEV).

12

13 Problem/ Solution Statement14

15 Problem

Meeting California's statutory energy goals requires significant increases in the number of PEVs operating on California roads and the amount of renewable power generation in California. PEVs can provide energy storage needed to support renewable power generation through V2G and V2B services. However, the risk of accelerated electric vehicle battery degradation is commonly

20 cited as a concern inhibiting the implementation of V2G and V2B technology.

- 21
- 22 California needs to shift PEV charging from overnight home charging to daytime
- 23 workplace charging so that charging load better coincides with the profile of PV power
- 24 generation. A major challenge that military bases and other federal, state, and municipal
- 25 government workplaces face in promoting employee PEV adoption through workplace
- 26 charging is a requirement that the cost of the electricity delivered to POEVs be exactly
- 27 paid for by the POEV owners. There can be no net gain or loss for the cost of the
- 28 <u>electricity delivered to POEVs. Charging activity data is also needed to inform design of a</u>
- 29 charging station sharing program that can be replicated at other government workplaces
- 30 <u>facing similar requirements. The United States Department of Defense (DoD) has</u>
- 31 attempted to deploy commercial off-the-shelf (COTS) products (hardware and software)
- 32 to address POEV charging at federal facilities, but demand is often not sufficient to
- 33 support the ongoing cost of software, operations & maintenance. Further, COTS
- 34 products lack capabilities to locally curtail charging in response to demand and meet
- 35 current security requirements of the DoD.

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37 Solution

- 38 This project will address this concern by:
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- 42 2) Advancing scientific knowledge of the impacts on the lifetime of PEV and repurposed
 43 batteries when providing V2B and V2G services while implementing optimization and
 44 control strategies to provide adequate PEV charge to meet mobility needs.
- 45 <u>3) Monitoring fleet PEV and POEV charging activity and costs to inform design of a</u> 46 <u>charging station sharing program that can be replicated at other government</u>
- 47 workplaces facing similar cost recovery and security requirements.
- 48

1 The project team will build upon existing work, such as Agreement 500-11-025 "Los Angeles Air 2 Force Base Vehicle-to-Grid Demonstration," Agreement 500-13-009 "Optimized Electric Vehicle 3 Fleet Management and Grid Transaction," and Agreement EPC-14-057 "Smart Charging of Plug-4 in Vehicles with Driver Engagement for Demand Management and Participation in Electricity 5 Markets," to create new optimization and control algorithms that maximize lithium-ion battery life 6 for PEVs and that are used to generate revenue or reduce costs by providing V2B and V2G 7 services. This project will advance the scientific knowledge of lithium-ion battery degradation that 8 may result from providing V2B and V2G services by measuring battery performance and 9 comparing that to performance of control batteries that are only used to provide transportation. 10 This project will also advance current technology by demonstrating a cost-effective, scalable approach to configuring and controlling second-life PEV batteries for providing V2B and V2G 11 12 services.

13

14 Los Angeles Air Force Base (LAAFB) will install ~17 Level 2 charging stations and ~5 DC 15 Fast Chargers to support the acquisition of ~15 fleet BEVs and at least 20 POEVs at the

16 site during the work day. The project will leverage these resources at LAAFB and

17 develop a software solution to monitor and calculate costs of POEV charging, meet DoD

18 cost recovery and security requirements, and support demand response program

19 participation. The project will also collect charging activity data to inform design of a

20 replicable charging station sharing program that can be implemented at other bases and

- 21 government workplaces with similar requirements.
- 22 23

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B. Goals and Objectives of the Agreement

25 Agreement Goals

26 The goals of this Agreement are to:

- Decrease the overall lifecycle cost of PEV ownership for fleet operators by increasing the overall useful service capacity and lifetime of PEV batteries (including accounting for recycling and waste generation from manufacturing new batteries); and
- Advance scientific knowledge of the impacts on the lifetime of PEV and repurposed batteries when providing V2G and V2B services while implementing optimization and control strategies to provide adequate PEV charge to meet mobility needs.
 Increase the availability of POEV charging at military and other government
 - Increase the availability of POEV charging at military and other government workplaces and in turn increase the uptake of POEV ownership at these locations.
 - <u>Shift night time home charging of POEVs to daytime workplace charging at</u> military and other government workplaces.
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Ratepayer Benefits:² The technologies developed and demonstrated in this project could lead to

41 significant benefits to California investor owned utility (IOU) electricity ratepayers, particularly in

42 the form of peak load shifting and energy cost reductions, to help deliver electricity reliability and

43 at a lower cost than current commercially-available stationary energy storage. Bi-directional PEV

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).

- charging technology in conjunction with second-life battery storage creates a flexible energy
 resource with high capacity and availability.
- 3

4 With uni-directional smart charging only, PEV batteries can provide load shifting similarly to 5 energy storage but are limited in capacity and availability. With uni-directionality, only PEV battery 6 capacity equal to that consumed during travel is available. Capacity and availability greatly 7 improve when the PEVs and charging stations are bi-directional. With bi-directionality, the full 8 range of the PEV batteries' capacity is available whenever the PEV is connected to the host 9 charging station. Finally, while PEV charging as an energy resource is available only when PEVs 10 are connected to their charging stations, a key feature of second-life battery storage is that it can 11 be used to shift load at any time.

12

13 This project will demonstrate a managed charging system for fleet and POEV

- 14 applications. The managed charging system can control charging of PEVs to ensure
- 15 distribution system health is not compromised. For example, if vehicles are connected to
- 16 chargers that are served by a transformer that is overloaded, locationally-resolved
- 17 <u>automated demand response signals from a utility can be used to temporarily reduce the</u>
- 18 load on transformers to avoid failures. Further, PEV charging can be managed to
- 19 respond to phase imbalances and/or voltage sag that is detected by utilities.
- 20
- 21 Technological Advancement and Breakthroughs:³ California's statutory energy goals, particularly 22 the Governor's zero emission vehicle (ZEV) mandate, SB 32, and SB 350, will require significant 23 increases in PEVs and renewable power generation. The impact of renewable power generation 24 intermittency on the grid can be significantly reduced by using energy storage. A cost-effective 25 and synergistic way to provide this storage is to use PEV batteries as storage resources during 26 the significant time that the PEVs are parked and not being used to provide mobility. 27 Manufacturing and recycling of batteries is highly energy intensive. If the useful lifetime of PEV 28 batteries can be extended, this will reduce their life-cycle carbon footprint. Repurposing PEV 29 batteries with energy capacities that are no longer optimal for transportation to provide stationary 30 energy storage applications greatly increases their useful lifetime and decreases the overall life-31 cycle carbon footprint, when compared to using new stationary storage batteries. This project will 32 address technical challenges of minimizing battery degradation of fleet PEV batteries used to 33 provide transportation and V2G and V2B services as well as the challenge of cost-effectively 34 configuring and controlling repurposed PEV battery packs to serve as fixed energy storage 35 resources.
- 36

This project will develop a software solution to monitor the cost of electricity delivered to
 POEVs and fleet vehicles using shared chargers, ensure cost recovery required for military
 bases and other government workplaces, and meet DoD security requirements. Charging
 data will be collected to inform advancement of similar solutions for other military bases
 and government workplaces across California.

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44 Agreement Objectives

45 The objectives of this Agreement are to:

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.

1	•	Develop V2G and V2B control methods for maximizing PEV and second-life
2		battery lifetimes that are based on customer needs and grid conditions; and
3	•	Conduct a controlled study of the impact of providing V2G and V2B services
4		on PEV batteries by using new batteries and dedicating a number of them as
5		control batteries that provide mobility only; and
6	•	Develop a scalable second-life battery energy storage solution for fleet
7		applications and demonstrate the integration and application of second-life
8		battery storage into V2G and V2B service applications; and
9	•	Develop and demonstrate the use of PEV and second-life battery storage for
10		load shifting, demand management, and improving power quality and reliability
11		for customers with PV generation.
12	•	Develop and evaluate accounting and settlement methods to recover
13		POEV workplace charging costs at military bases and other government
14		workplaces.
15	•	Manage charging for PEV chargers behind the same meter as buildings
16		to maximize service to PEV drivers and minimize additions to monthly
17		peak demand charges.
18	•	Determine costs and benefits for combining PEV charging stations with
19		PV generation and/or battery energy storage. Analyze and simulate these
20		costs and benefits for sites and conditions other than LAAFB.
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III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

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Subtask 1.1 Products

6 The goal of this subtask is to establish the requirements for submitting project products (e.g., 7 reports, summaries, plans, and presentation materials). Unless otherwise specified by the 8 Commission Agreement Manager (CAM), the Recipient must deliver products as required below 9 by the dates listed in the Project Schedule (Part V). Products that require a draft version are 10 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 11 12 the product is required. With respect to due dates within this Scope of Work, "days" means working days. 13 14

15 **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

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• 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.

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1		The following describes the accepted formats for electronic data and desuments provided to the Energy Commission as products under this
23		Agreement and establishes the software versions that will be required to
5 1		review and approve all software products:
т 5		Data sets will be in MS Access or MS Excel file format (version 2007)
6		or later), or any other format approved by the CAM
7		Text documents will be in MS Word file format version 2007 or
8		- Text documents will be in WS word me format, version 2007 of
0		Documents intended for public distribution will be in PDE file format.
10		 Documents intended for public distribution will be infinite infinite. The Recipient must also provide the native Microsoft file format.
11		 Project management documents will be in Microsoft Project file.
12		format version 2007 or later
12		
14	0	Software Application Development
15	0	Use the following standard Application Architecture components in
16		compatible versions for any software application development required by
17		this Agreement (e.g., databases models modeling tools) unless the CAM
18		approves other software applications such as open source programs:
10		Microsoft ASP NET framework (version 3.5 and un) Recommend
$\frac{1}{20}$		
20		 Microsoft Internet Information Services (IIS) (version 6 and up)
22		 Recommend 7.5
23		 Visual Studio NET (version 2008 and up) Recommend 2010
24		 C# Programming Language with Presentation (UI) Business
25		Object and Data Lavers.
26		 SQL (Structured Query Language)
27		 Microsoft SQL Server 2008, Stored Procedures, Recommend 2008
28		 R2.
29		 Microsoft SQL Reporting Services, Recommend 2008 R2.
30		 XML (external interfaces).
31		
32	Any excep	tions to the Electronic File Format requirements above must be approved
33	in writing b	y the CAM. The CAM will consult with the Energy Commission's Information
34	Technolog	y Services Branch to determine whether the exceptions are allowable.
35	0.	
36	MEETINGS	
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38	Subtask 1.2 Kick-off	Meeting
39	The goal of this sul	btask is to establish the lines of communication and procedures for
40	implementing this Agr	eement.
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42	The Recipient shall:	
43	Attend	a "Kick-off" meeting with the CAM, the Commission Agreement Officer
44	(CAO),	and any other Energy Commission staff relevant to the Agreement. The
45	Recipie	ent will bring its Project Manager and any other individuals designated by
46	the CA	AM to this meeting. The administrative and technical aspects of the
47	Agreen	nent will be discussed at the meeting. Prior to the meeting, the CAM will
48	provide	e an agenda to all potential meeting participants. The meeting may take
49	place in	n person or by electronic conferencing (e.g., WebEx), with approval of the
50	CAM.	

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1		The <u>administrative portion</u> of the meeting will include discussion of the following:
2		• I erms and conditions of the Agreement;
3		• Administrative products (subtask 1.1);
4		• CPR meetings (subtask 1.3);
2		• Match fund documentation (subtask 1.7);
6		• Permit documentation (subtask 1.8);
7		• Subcontracts (subtask 1.9); and
8		• Any other relevant topics.
9 10		The technical newtice of the manufine will include discussion of the followine.
10		The <u>connical portion</u> of the meeting will include discussion of the following:
11		 I he CAM s expectations for accomplishing tasks described in the Scope of Mostly
12		WOFK; An undeted Draiget Schedule:
13		• An updated Project Schedule;
14		 Technical products (subtask 1.1); Dragmaga reports and investors (subtask 4.5);
15		 Progress reports and invoices (subtask 1.5); Final Danatt (subtask 1.6);
10		• Final Report (Sublask 1.0); Technical Advicent Committee meetings (subtacks 1.10 and 1.11); and
10		• Technical Advisory Committee meetings (sublasks 1.10 and 1.11); and
18		• Any other relevant topics.
19	_	Dravide on Undeted Preject Schedule List of Match Funds, and List of Permits as
20	•	Provide an Opdated Project Schedule, List of Match Funds, and List of Permits, as
21		needed to reliect any changes in the documents.
22	The CAM aba	п.
23	The CAW Sha	II. Designate the data and location of the meating
24	•	Designate the date and location of the meeting.
25	•	Send the Recipient a Rick-off Meeting Agenda.
20 27	Paginiant Bra	aduata.
21	Recipient Pro	Judis.
28	•	Updated Project Schedule (<i>Ir applicable</i>)
29	•	Updated List of Match Funds (<i>it applicable</i>)
30	•	Updated List of Permits (if applicable)
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32	CAM Product	
33	•	Kick-off Meeting Agenda
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35	Subtask 1.3 C	critical Project Review (CPR) Meetings
36	The goal of t	his subtask is to determine if the project should continue to receive Energy
37	Commission fu	unding, and it so whether any modifications must be made to the tasks, products,
38	schedule, or b	budget. CPR meetings provide the opportunity for frank discussions between the
39	Energy Comm	hission and the Recipient. As determined by the CAM, discussions may include
40	project status,	challenges, successes, advisory group findings and recommendations, final report
41	preparation, ar	nd progress on technical transfer and production readiness activities (if applicable).
42	Participants w	ill include the CAM and the Recipient and may include the CAO and any other
43	individuals sel	ected by the CAM to provide support to the Energy Commission.
44		
43 46		generally take place at key, predetermined points in the Agreement, as determined
40	by the CAM a	nd as snown in the Lask List on page 1 of this Exhibit. However, the CAM may
47	schedule addi	tional CPR meetings as necessary. The budget will be reallocated to cover the
48	additional cost	s porne by the Recipient, but the overall Agreement amount will not increase. CPR

49 meetings generally take place at the Energy Commission, but they may take place at another

		-
1 2 2	location, or n CAM.	nay be conducted via electronic conferencing (e.g., WebEx) as determined by the
3 4	The Recipie	nt shall:
5 6	•	Prepare a <i>CPR Report</i> for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes
/ 8 9	•	Submit the CPR Report along with any other <i>Task Products</i> that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is
10		required for Task 2, submit the Task 2 products along with the CPR Report).
11	•	Attend the CPR meeting.
12 13	•	Present the CPR Report and any other required information at each CPR meeting.
14	The CAM sh	all:
15 16	•	Determine the location, date, and time of each CPR meeting with the Recipient's input.
17 18	•	Send the Recipient a <i>CPR Agenda</i> and a <i>List of Expected CPR Participants</i> in advance of the CPR meeting. If applicable, the agenda will include a discussion of
19		match funding and permits.
20	•	Conduct and make a record of each CPR meeting. Provide the Recipient with a
21		Determine whether to continue the project, and if as whether modifications are
22	•	peeded to the tasks, schedule, products, or budget for the remainder of the
$\frac{23}{24}$		Agreement If the CAM concludes that satisfactory progress is not being made
2 1 25		this conclusion will be referred to the Deputy Director of the Energy Research and
26		Development Division
20	•	Provide the Recipient with a Progress Determination on continuation of the project
28	·	in accordance with the schedule. The Progress Determination may include a
29		requirement that the Recipient revise one or more products.
30		
31	Recipient Pr	oducts:
32	•	CPR Report(s)
33	•	Task Products (draft and/or final as specified in the task)
34		
35	CAM Produc	cts:
36	•	CPR Agenda
37	•	List of Expected CPR Participants
38	•	Schedule for Providing a Progress Determination
39 40	•	Progress Determination
41	Subtask 1.4	Final Meeting
42	The goal of the	his subtask is to complete the closeout of this Agreement
43		
44	The Recipier	nt shall:
45	•	Meet with Energy Commission staff to present project findings, conclusions, and
46		recommendations. The final meeting must be completed during the closeout of this
47		Agreement. This meeting will be attended by the Recipient and CAM, at a
48		minimum. The meeting may occur in person or by electronic conferencing (e.g.,
49		WebEx), with approval of the CAM.

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2		The technical and administrative aspects of Agreement closeout will be discussed
3		at the meeting, which may be divided into two separate meetings at the CAM's
4		discretion.
5		• The technical portion of the meeting will involve the presentation of
6		findings, conclusions, and recommended next steps (if any) for the
7		Agreement. The CAM will determine the appropriate meeting participants.
8		• The administrative portion of the meeting will involve a discussion with the
9		CAM and the CAO of the following Agreement closeout items:
10		Disposition of any state-owned equipment.
11		 Need to file a Uniform Commercial Code Financing Statement
12		(Form UCC-1) regarding the Energy Commission's interest in
13		patented technology.
14		 The Energy Commission's request for specific "generated" data
15		(not already provided in Agreement products).
16		 Need to document the Recipient's disclosure of "subject inventions"
17		developed under the Agreement.
18		 "Surviving" Agreement provisions such as repayment provisions
19		and confidential products.
20		 Final invoicing and release of retention.
21		
22	•	Prepare a Final Meeting Agreement Summary that documents any agreement
23		made between the Recipient and Commission staff during the meeting.
24	•	Prepare a Schedule for Completing Agreement Closeout Activities.
25	•	Provide All Draft and Final Written Products on a CD-ROM or USB memory stick,
26		organized by the tasks in the Agreement.
27		
28	Products:	
29	•	Final Meeting Agreement Summary <i>(if applicable)</i>
30	•	Schedule for Completing Agreement Closeout Activities
31	•	All Draft and Final Written Products
32		
33	REPORTS A	ND INVOICES
34		
35	Subtask 1.5	Progress Reports and Invoices
36	The goals of	this subtask are to: (1) periodically verify that satisfactory and continued progress is
37	made toward	Is achieving the project objectives of this Agreement; and (2) ensure that invoices
38	contain all re	quired information and are submitted in the appropriate format.
39		
40	The Recipie	nt shall:
41	•	Submit a monthly <i>Progress Report</i> to the CAM. Each progress report must:
42		• Summarize progress made on all Agreement activities as specified in the
43		scope of work for the preceding month, including accomplishments,
44		problems, milestones, products, schedule, fiscal status, and an assessment
45		of the ability to complete the Agreement within the current budget and any
46		anticipated cost overruns. See the Progress Report Format Attachment for
4'/		the recommended specifications.
48	•	Submit a monthly or quarterly <i>Invoice</i> that follows the instructions in the "Payment
49		ot Funds" section of the terms and conditions, including a financial report on Match
50		Fund and in-state expenditures.

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Products:

2	•	Progress Reports
3	•	Invoices
4		
5	Subtask 1.6	Final Report
6	The goal of the	nis subtask is to prepare a comprehensive Final Report that describes the original
7	purpose, app	roach, results, and conclusions of the work performed under this Agreement. The
8	CAM will revi	ew the Final Report, which will be due at least two months before the Agreement
9	end date. Wh	nen creating the Final Report Outline and the Final Report, the Recipient must use
10	the Style Man	ual provided by the CAM.
11		
12	Subtask 1.6.	1 Final Report Outline
13	T I D · ·	
14	The Recipier	
15	•	Prepare a Final Report Outline in accordance with the Style Manual provided by
10		the CAM. (See Task 1.1 for requirements for draft and final products.)
1/ 10	Posiniant Dr	aducte
10	Recipient Ph	Final Papart Outline (draft and final)
20	•	
20	CAM Produc	. t ·
22	•	Style Manual
${23}$	•	Comments on Draft Final Report Outline
24	•	Acceptance of Final Report Outline
25		
26	Subtask 1.6.	2 Final Report
27		
28	The Recipier	nt shall:
29	•	Prepare a Final Report for this Agreement in accordance with the approved Final
30		Report Outline, Style Manual, and Final Report Template provided by the CAM
31		with the following considerations:
32		• Ensure that the report includes the following items, in the following
33		order:
34 25		 Cover page (required) Credite page on the reverse side of sever with legal disclaimer
33 36		 Credits page on the reverse side of cover with legal disclation (required)
30		(required) ■ Acknowledgements nage (ontional)
38		 Acknowledgements page (optional) Preface (required)
39		 Abstract keywords and citation page (required)
40		 Table of Contents (required, followed by List of Figures and List
41		of Tables, if needed)
42		Executive summary (required)
43		 Body of the report (required)
44		 References (if applicable)
45		 Glossary/Acronyms (If more than 10 acronyms or abbreviations
46		are used, it is required.)
47		 Bibliography (if applicable)
48		 Appendices (if applicable) (Create a separate volume if very
49 50		large.)
30		 Attachments (il applicable)

Scope of Work 1 Ensure that the document is written in the third person. 0 2 Ensure that the Executive Summary is understandable to the lay public. 0 3 Briefly summarize the completed work. Succinctly describe . 4 the project results and whether or not the project goals were 5 accomplished. 6 Identify which specific ratepayers can benefit from the 7 project results and how they can achieve the benefits. 8 If it's necessary to use a technical term in the Executive 9 Summary, provide a brief definition or explanation when the 10 technical term is first used. Follow the Style Guide format requirements for headings, figures/tables, 11 0 12 citations, and acronyms/abbreviations. 13 Ensure that the document omits subjective comments and opinions. 0 However, recommendations in the conclusion of the report are allowed. 14 15 Include a brief description of the project results in the Abstract. 0 16 17 Submit a draft of the report to the CAM for review and comment. The CAM will • 18 provide written comments to the Recipient on the draft product within 15 days of 19 receipt 20 Consider incorporating all CAM comments into the Final Report. If the Recipient • 21 disagrees with any comment, provide a written response explaining why the 22 comment was not incorporated into the final product 23 Submit the revised Final Report and responses to comments within 10 days of • 24 notice by the CAM, unless the CAM specifies a longer time period or approves a 25 request for additional time. 26 Submit one bound copy of the Final Report to the CAM along with Written • 27 Responses to Comments on the Draft Final Report. 28 29 Products: 30 Final Report (draft and final) 31 Written Responses to Comments on the Draft Final Report 32 33 **CAM Product:** 34 Written Comments on the Draft Final Report 35 36 MATCH FUNDS, PERMITS, AND SUBCONTRACTS 37 38 Subtask 1.7 Match Funds 39 The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this 40 Agreement and applies them to the Agreement during the Agreement term. 41 42 While the costs to obtain and document match funds are not reimbursable under this Agreement, 43 the Recipient may spend match funds for this task. The Recipient may only spend match funds 44 during the Agreement term, either concurrently or prior to the use of Energy Commission funds. 45 Match funds must be identified in writing, and the Recipient must obtain any associated

EXHIBIT A

46 commitments before incurring any costs for which the Recipient will request reimbursement.

48 **The Recipient shall:**

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Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If <u>no match funds</u> 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 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.
 - A copy of 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.

32 **Products**:

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

37 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.

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- The Recipient shall:
- Prepare a *Permit Status Letter* that documents the permits required to conduct this
 Agreement. If <u>no permits</u> 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.

22 **Products**:

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

28 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.

33 The Recipient shall:34 • Manage

- 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
 - If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
 - Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

46 **Products**:

- 47 48
- Subcontracts (*draft if required by the CAM*)

49 **TECHNICAL ADVISORY COMMITTEE**

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1 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:

6 Provide guidance in project direction. The guidance may include scope and 7 methodologies, timing, and coordination with other projects. The guidance may be 8 based on: 9 Technical area expertise; 0 10 Knowledge of market applications; or 0 Linkages between the agreement work and other past, present, or future 11 0 12 projects (both public and private sectors) that TAC members are aware of 13 in a particular area. 14 15 Review products and provide recommendations for needed product adjustments, • 16 refinements, or enhancements. 17 Evaluate the tangible benefits of the project to the state of California, and provide • 18 recommendations as needed to enhance the benefits. 19 Provide recommendations regarding information dissemination, market pathways, 20 or commercialization strategies relevant to the project products. 21 22 The TAC may be composed of qualified professionals spanning the following types of disciplines: 23 Researchers knowledgeable about the project subject matter; • 24 Members of trades that will apply the results of the project (e.g., designers, • 25 engineers, architects, contractors, and trade representatives); 26 Public interest market transformation implementers; • 27 Product developers relevant to the project; • 28 U.S. Department of Energy research managers, or experts from other federal or • 29 state agencies relevant to the project; 30 Public interest environmental groups; • 31 Utility representatives; • 32 Air district staff; and • 33 Members of relevant technical society committees. • 34 35 The Recipient shall: 36 Prepare a List of Potential TAC Members that includes the names, companies, 37 physical and electronic addresses, and phone numbers of potential members. The 38 list will be discussed at the Kick-off meeting, and a schedule for recruiting members 39 and holding the first TAC meeting will be developed. 40 Recruit TAC members. Ensure that each individual understands member 41 obligations and the TAC meeting schedule developed in subtask 1.11. 42 Prepare a List of TAC Members once all TAC members have committed to serving 43 on the TAC. 44 Submit Documentation of TAC Member Commitment (such as Letters of . 45 Acceptance) from each TAC member. 46 47 Products: 48 List of Potential TAC Members 49 List of TAC Members • 50 **Documentation of TAC Member Commitment**

1 Subtask 1.11 TAC Meetings

2 The goal of this subtask is for the TAC to provide strategic guidance for the project by participating 3 in regular meetings, which may be held via teleconference. 4

The Recipient shall:

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- 6 Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. • 7 Determine the number and location of meetings (in-person and via teleconference) 8 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 • meetina.
 - 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.

Products:

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

26 **IV. TECHNICAL TASKS**

28 **TASK 2: OPTIMIZATION AND CONTROL ALGORITHM DEVELOPMENT**

29 The goal of this task is to create new optimization and control algorithms in the Distributed Energy 30 Resources Customer Adoption Model (DER-CAM) framework with impacts on battery health 31 expressed as an economic cost using models and model parameters derived from actual battery 32 measurements (e.g., charging and temperature) made during driving, charging, and V2B and V2G 33 service. 34

35 The Recipient shall:

- Analyze battery charging and discharging data to develop a battery degradation • model.
- 38 Calibrate battery degradation model using charging, discharging, and • 39 environmental condition data. 40
 - Exercise model to develop degradation cost functions.
 - Integrate cost functions in DER-CAM optimization and control algorithms. •
- 42 Write a *Battery Degradation Model Report* that includes but is not limited to the 43 following:
 - A description of data used to develop model; and •
 - Calibration methods and results; and •
 - Generation of battery degradation cost functions; and •
- 47 Description of upgrades to DER-CAM to integrate battery degradation cost 48 functions.

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1 **Products:**

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- Battery Degradation Model Report
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 5 TASK 3: IMPLEMENT AND INTEGRATE SECOND-LIFE BATTERY SYSTEM AND CONTROL
 6 ALGORITHMS

7 The goals of this task are to; 1) design and assemble second-life battery system (SBS) using 8 batteries from existing vehicles at Los Angeles Air Force Base (LAAFB); and 2) develop and 9 integrate battery-life maximizing algorithms into the existing PEV and second-life battery control 10 system. The existing vehicles were purchased under Energy Commission Agreement 500-11-11 025. Under the terms of that agreement, title to the vehicles went to the Energy Commission, and 12 that is unchanged by this current Agreement EPC-16-059.

14 **The Recipient shall:**

- 15 Design the SBS, which will be an aggregated energy storage system with an • 16 inverter. 17 Develop battery-life maximizing algorithms for the battery control software. • 18 Prepare a CPR Report in accordance with subtask 1.3 (CPR Meetings). • 19 Participate in a CPR meeting. • 20 Write Second-life Battery Hardware and Control System Report that includes but 21 is not limited to the following: 22 Summary of analysis and grading of second-life batteries; and 0 23 Description of specifications and design of SBS; and 0 24 25 Products: 26 Second-life Battery Hardware and Control System Report 27 **CPR** Report • 28 29 30 TASK 4: DESIGN, PLAN, AND EXECUTE VEHICLE-TO-GRID AND VEHICLE-TO-BUILDING 31 DEMONSTRATION AND TESTING 32 The goals of this task are to: 33 (1) Demonstrate various V2G and V2B use cases, particularly those that support LAAFB's PV 34 generation (e.g., PV following, reactive power control, demand cost management, demand 35 response, and ancillary services); and 36 (2) Analyze data, quantify performance and report results. 37 38 The Recipient shall: 39 Specify V2B and V2G use cases. • 40 Create test plan detailing methods and schedule. • 41 Execute **simulated** demonstration test plan. • 42 Collect and analyze data. • 43 Quantify system performance with technical and economic metrics. • 44 Write a System Testing and Performance Report that includes but is not limited to 45 the following:
 - Description of V2B and V2G use cases; and
 - Test plan with methods and schedule; and
 - Description of test plan execution; and
 - Description of data collection and analysis; and
 - V2B and V2B and SBS performance results; and

1		 Description of methods to predict charging behavior; and
2	• Se	cond-life Battery Technical Potential Study
3 4		• Generalize key parameters such as fleet size and demand, PV size, building load etc.
5		 Conduct parametric simulations to evaluate the cost benefits across.
6 7		different usage patterns and climate zones in California.
0	Draduata	
0	Flouucis.	Simulated System Testing and Performance Section included in Final Penort
9 10	•	Simulated System resting and renormance Section included in rinal Report
10		
12	TASK 5' IDEN	NTIEY AND QUANTIEY BUSINESS CASES FOR PLUG-IN FLECTRIC VEHICLES
13	AND SECON	D-I IFE BATTERIES FOR LOAD SHIFTING AND PHOTOVOL TAIC SUPPORT
14	The goal of th	is task is to quantify benefits of second-life battery storage (e.g. additional PV that
15	could be insta	led increased V2B and V2G service capability and reliability)
16		
17	The Recipien	nt shall:
18	•	Specify SBS use cases.
19	•	Calculate costs and economic benefits of SBS for various use cases.
20	•	Specify business models for various SBS scenarios, vendors, and end-use
21		customers.
22	•	Include in Final Report discussion that includes but is not limited to:
23		• Description of SBS use cases and potential vendors and customers: and
24		Business models for SBS: and
25		 Proposed adoption specifications for IOUs and PEV manufacturers.
26	•	Design and implement a project solution which replaces thirteen (13) Princeton
27		Power chargers with nine (9) level II chargers for Government vehicle use and four
28		(4) level II Point of Sale (POS) capable chargers for Personally Owned Vehicle
29		(POV) use.
30	•	Collect Data and evaluate third-party charging billing methods
31		Collect and analyze time-resolved charging power data.
32		Collect battery charge data to determine impact on battery second life
33		value and end of life expectations.
34		• Assess average battery use for systems using charging system so market
35		projections estimated based on the battery systems being charged.
36		Check cost calculations using base tariff.
37		• Determine if EV charging contributes to base's monthly peak demand,
38		and if so devise and implement smart charging to minimize peak demand
39		charge.
40	•	Develop, test, and evaluate innovative charging management method that
41		achieves net-zero electricity cost for employee EV charging with respect to the
42		base.
43	•	Transport of bi-directional Nissan LEAFs from LAAFB.
44		
45	Products:	
46	•	Performance of Third-Party Brokered Private Vehicle Charging in Final Report.
47	•	Open-source software tool for Co-op Self-Operated Private Vehicle Charging.
48		

1	TASK 6: DEVELOP SOFTWARE SOLUTION TO ENABLE COST RECOVERY FOR SHARED
2	Develop test and evaluate software solution for accurately monitoring and calculating
5 Д	electricity costs for each POEV charging session at LAAFB. Develop and implement
5	methods for payment by POEV owners to LAAFB and quantify cost recovery. Develop
6	test, and evaluate software solution for participation of POEVs in day-ahead demand
7	response program participation.
8	
9	The Recipient shall:
10	 Install ~17 Level 2 chargers and ~5 DC fast chargers at LAAFB to support
11	both fleet vehicles and POEVs.
12	• Develop open-source software to monitor and calculate electricity costs for
13	POEV charging sessions while meeting DoD security requirements.
14	• Prepare and submit POEV Cost Recovery Software Functionality Report
15	that describes software functionality and capability.
16	Develop open-source software to manage charging station sharing
17	between POEV owners and LAAFB fleet PEV managers.
18	 Prepare and submit Charging Management Software Functionality Report
19	that describes software functionality and capability.
20	 Test and evaluate POEV cost recovery software to demonstrate net-zero
21	electricity costs for POEV charging with respect to the base.
22	 Test and evaluate charging management software to enable participation of
23	POEVs in day-ahead demand response programs.
24	• <u>Develop and submit a POEV Cost Recovery and Charge Management</u>
25	Software Test Report that describes software test results.
26	• <u>Prepare a CPR Report #2 in accordance with Subtask 1.3 (CPR Meetings).</u>
2/	• Participate in a CPR meeting.
28	Draduata
29 20	FIGUUCIS. DOEV Cost Pacovery Software Eurotionality Penert (draft and final)
30 21	Charge Management Software Functionality Report (draft and final)
27	 <u>Charge Management Software Functionality Report (draft and final)</u> <u>POEV Cost Recovery and Charge Management Software Test Report (draft</u>
32	and final)
34	• CPR Report #2
35	
36	
37	TASK 7: DETERMINE CHARGING PATTERNS TO INFORM CHARGE MANAGEMENT
38	PROGRAM DESIGN
39	Determine charging patterns of fleet PEVs and POEVs. Design charging management
40	programs to optimize charging station usage (i.e., maximize the number of EVs that can
41	be served by each charging station). Determine staff price sensitivity through surveys and
42	direct variation of charging cost structures. Explore incentives for staff participation in
43	smart charging for demand response and site solar power generation.
44 15	The Decisiont challs
43 16	Interrecipient Sildii.
40 17	 Survey base start to determine now their charging behavior would change depending on the cost of REV charging. Survey will collect date including
-+/ 48	but not limited to: vehicle make and model to determine battery size
49	commute distance, and other charging locations
• -	volumete alexanee, and enter charging recordenie

1 2 3 4 5 6 7 8 9	• •	Design and implement tests to measure price sensitivity of staff using base charging stations that would include periods of different pricing structures. Design, implement, and evaluate smart charging methods, building on LBNL's previous work in EPC-14-057, to decrease peak demand, participate in demand response programs, and maximize charging during peak solar generation periods. Develop and submit a POEV Charging Behavior and Price Sensitivity Report that describes survey results and participation in smart charging with guidance for other military bases and government workplaces.
10		
11	Products:	
12	•	POEV Charging Behavior and Price Sensitivity Report (draft and final)
13		
14		
15	TASK 8: EVA	LUATION OF PROJECT BENEFITS
10	The goal of th	is task is to report the benefits resulting from this project.
l / 10	The Desinior	t aballi
18	The Recipier	It shall: Complete three Dreiget Depetite Questionneires that correspond to three main
19	•	complete three Project Benefits Questionnaires that correspond to three main
20		term Benefite Questionneire: and (2) Finel Meeting Benefite Questionnaire, (2) Mid-
21	_	Drevide all leve accumptions used to actimate prejected benefits, including terrated
22	•	Provide all key assumptions used to estimate projected benefits, including targeted
23		narket sector (e.g., population and geographic location), projected market
24		penetration, baseline and projected energy use and cost, operating conditions, and
25		in the question paires include:
20		
27		- For Product Development Projects and Project Demonstrations:
20		Published documents, including date, title, and periodical name
30		 Fublished documents, including date, title, and periodical name. Estimated or actual energy and cost savings and estimated
31		statewide energy savings once market potential has been realized
32		Identify all assumptions used in the estimates
33		 Greenhouse gas and criteria emissions reductions
34		 Other non-energy benefits such as reliability, public safety, lower
35		operational cost. environmental improvement. indoor
36		environmental quality, and societal benefits.
37		Data on potential job creation, market potential, economic
38		development, and increased state revenue as a result of the project.
39		 A discussion of project product downloads from websites, and
40		publications in technical journals.
41		 A comparison of project expectations and performance. Discuss
42		whether the goals and objectives of the Agreement have been met
43		and what improvements are needed, if any.
44		
45		Additional Information for Product Development Projects:
46		Outcome of product development efforts, such copyrights
47		and license agreements.
48		Units sold or projected to be sold in California and outside
49		ot California.

	EXHIBIT A Scope of Work
1 2 3 4 5 6 7	 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.
8 9 10 11 12	 <u>Additional Information for Product Demonstrations</u>: Outcome of demonstrations and status of technology. Number of similar installations. Jobs created/retained as a result of the Agreement.
13 14	 For Information/Tools and Other Research Studies: Outcome of project
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	 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.
31 32	 Respond to CAM questions regarding responses to the questionnaires. Within the first 3 months of the project, create a project survey entry responding to
33 34 35 36 37	 the California Public Utilities Commission's "Electric Vehicle Pilot Survey" related to Proceeding R.13-11-007, "Alternative Fueled Vehicles Rulemaking" (2013). The survey entry should contain the most complete project information available. Resources for completing the Electric Vehicle Pilot Survey can be found at the following links:
38 39 40	 <u>http://www.energy.ca.gov/research/notices/2015-12-</u> <u>14 workshop/presentations/05a CPUC Electric Vehicle Pilot</u>
41 42	 <u>http://www.energy.ca.gov/research/notices/2015-12-</u> <u>14</u> workshop/presentations/
43 44 45	The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.
46 47 F	Products:

- 1 Electric Vehicle Pilot Survey response ٠ 2 **Kick-off Meeting Benefits Questionnaire** • 3 Mid-term Benefits Questionnaire 4 **Final Meeting Benefits Questionnaire** 5 6 7 **TASK 9: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES** 8 The goal of this task is to develop a plan to make the knowledge gained, experimental results, 9 and lessons learned available to the public and key decision makers. 10 11 The Recipient shall: 12 Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use • 13 the format provided by the CAM. 14 Prepare a Final Project Fact Sheet at the project's conclusion that discusses 15 results. Use the format provided by the CAM. Prepare a Technology/Knowledge Transfer Plan that includes: 16 • 17 An explanation of how the knowledge gained from the project will be made 0 18 available to the public, including the targeted market sector and potential 19 outreach to end users, utilities, regulatory agencies, and others. 20 A description of the intended use(s) for and users of the project results. 0 21 Published documents, including date, title, and periodical name. 0 22 Copies of documents, fact sheets, journal articles, press releases, and 0 23 other documents prepared for public dissemination. These documents 24 must include the Legal Notice required in the terms and conditions. Indicate 25 where and when the documents were disseminated. 26 A discussion of policy development. State if project has been or will be cited 0 27 in government policy publications, or used to inform regulatory bodies. 28 The number of website downloads or public requests for project results. 0 29 0 Additional areas as determined by the CAM. 30 31 activities with • Conduct technology transfer in accordance the 32 Technology/Knowledge Transfer Plan. These activities will be reported in the 33 Progress Reports. 34 When directed by the CAM, develop *Presentation Materials* for an Energy • 35 Commission- sponsored conference/workshop(s) on the project. 36 When directed by the CAM, participate in annual EPIC symposium(s) sponsored 37 by the California Energy Commission. Provide at least (6) six High Quality Digital Photographs (minimum resolution of 38 39 1300x500 pixels in landscape ratio) of pre and post technology installation at the 40 project sites or related project photographs. 41 Prepare a Technology/Knowledge Transfer Report on technology transfer . 42 activities conducted during the project. 43 44 Products: 45 Initial Fact Sheet (draft and final) • 46 Final Project Fact Sheet (draft and final) • 47 Presentation Materials (draft and final) • 48 **High Quality Digital Photographs** • 49 Technology/Knowledge Transfer Plan (draft and final) • 50
 - Technology/Knowledge Transfer Report (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: Lawrence Berkeley National Laboratory

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 Amendment 4 to Agreement EPC-16-059 with Lawrence Berkeley National Laboratory for a \$1,000,000 budget augmentation with follow-on funding, a scope of work update, and a three-year term extension. This amendment will support the research and development of a software solution to address cost recovery, participation in demand response, and security challenges faced by military bases and other government workplaces when deploying chargers that will be shared by fleet and personally owned electric vehicles (EV); 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 14, 2022.

AYE: NAY: ABSENT: ABSTAIN:

Dated:

Liza Lopez Secretariat