

**CONTRACT AMENDMENT REQUEST FORM (CARF)**

CEC-276 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION



Original Agreement #	600-13-009		2
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ERDD	Kiel Pratt	43	916-327-1412
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DOE- Lawrence Berkeley National Laboratory	94-2951741
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<input checked="" type="checkbox"/> Term Extension	New End Date: 6/30/2020	Include revised schedule and complete items A, B, C, D, & H below.
<input checked="" type="checkbox"/> Budget Augmentation	Amendment Amount: \$ 692,472	Include revised budget and complete items A, B, C, D, E, F, & H below.
<input type="checkbox"/> Budget Reallocation		Include revised budget and complete items A, B, C, D, & H below.
<input checked="" type="checkbox"/> Scope of Work Revision		Include revised scope of work and complete items A, B, C, D, & H below.
<input checked="" type="checkbox"/> Change in Project Location or Demonstration Site		Include revised scope of work and complete items A, B, C, D, G, & H below.
<input type="checkbox"/> DVBE Replacement		Include revised scope of work and complete items A, B, C, D, F, & H below.
<input type="checkbox"/> Novation/Name Change of Prime Contractor/Recipient		Include novation documentation and complete items A, C, D, & H below.
<input type="checkbox"/> Terms and Conditions Modification		Include applicable exhibits with bold/underline/strikeout and complete items A, B, C, D, & H below.

**Business Meeting approval is not required for the following types of Agreements:**

<input type="checkbox"/> Operational agreement (see CAM Manual for list) to be approved by Executive Director
<input type="checkbox"/> ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	3/8/2017	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Kiel Pratt	Time Needed: 5 minutes	

Please select one list serve. Altfuels (AB118- ARFVTP)

**Agenda Item Subject and Description**

Possible approval of Amendment 2 with Lawrence Berkeley National Laboratory (LBNL) to change the project site to Marine Corps Air Station Miramar (MCAS Miramar) in San Diego from the current sites of Moffett Federal Airfield and Parks Reserve Forces Training Area, to extend the term by 36 months to provide for a minimum of two full years for data collection and analysis, to augment the budget by \$692,472 for a total project budget of \$2,992,472, and to modify the scope to add activities and deliverables commensurate with the new location, added funding, and increasing the length of the agreement. The amendment would provide the vehicle-grid integration demonstration with sufficient time and resources to complete the installation of equipment, collect multi-year data and complete a full analysis of the project performance.

<input type="checkbox"/> Non Competitive Bid ( <i>Attach CEC 96</i> )
<input checked="" type="checkbox"/> Exempt Other Governmental Entity

Legal Company Name:	Budget	SB	MB	DVBE
Kisensum, Inc.	\$ 375,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Archetype USA, LLC	\$ 305,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	\$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	\$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Legal Company Name:
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Funding Source	Funding Year of Appropriation	Budget List No.	Amount
ARFVTP	16-17	601.1181	\$692,472
			\$
R&D Program Area:	ESRO: ETSI		\$

**CONTRACT AMENDMENT REQUEST FORM (CARF)**



Explanation for "Other" selection	
Reimbursement Contract #:	Federal Agreement #:

1. <input checked="" type="checkbox"/> Exempt (Interagency/Other Government Entity) 2. <input type="checkbox"/> Meets DVBE Requirements DVBE Amount:\$ _____ DVBE %: _____ <input type="checkbox"/> Contractor is Certified DVBE <input type="checkbox"/> Contractor is Subcontracting with a DVBE: _____ 3. <input type="checkbox"/> Contractor selected through CMAS or MSA with no DVBE participation. 4. <input type="checkbox"/> Requesting DVBE Exemption (attach CEC 95)
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1. Is Agreement considered a "Project" under CEQA? <input checked="" type="checkbox"/> Yes (skip to question 2) <input type="checkbox"/> No (complete the following (PRC 21065 and 14 CCR 15378)): Explain why Agreement is not considered a "Project": Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because .						
2. If Agreement is considered a "Project" under CEQA: <input checked="" type="checkbox"/> a) Agreement <b>IS</b> exempt. (Attach draft NOE) <input type="checkbox"/> Statutory Exemption. List PRC and/or CCR section number: _____ <input checked="" type="checkbox"/> Categorical Exemption. List CCR section number: <u>Cal. Code Regs., tit 14, § 15301</u> <input type="checkbox"/> Common Sense Exemption. 14 CCR 15061 (b) (3) Explain reason why Agreement is exempt under the above section: The project has no possibility of significantly affecting the environment because it will take place on an existing military base and involves the procurement of environmentally-friendly electric vehicles and associated equipment, as well as enhancement of existing base energy resource capabilities to demonstrate vehicle-grid integration technologies. <input type="checkbox"/> b) Agreement <b>IS NOT</b> exempt. (Consult with the legal office to determine next steps.) Check all that apply <table style="width:100%;"> <tr> <td><input type="checkbox"/> Initial Study</td> <td><input type="checkbox"/> Environmental Impact Report</td> </tr> <tr> <td><input type="checkbox"/> Negative Declaration</td> <td><input type="checkbox"/> Statement of Overriding Considerations</td> </tr> <tr> <td><input type="checkbox"/> Mitigated Negative Declaration</td> <td></td> </tr> </table>	<input type="checkbox"/> Initial Study	<input type="checkbox"/> Environmental Impact Report	<input type="checkbox"/> Negative Declaration	<input type="checkbox"/> Statement of Overriding Considerations	<input type="checkbox"/> Mitigated Negative Declaration	
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<input type="checkbox"/> Negative Declaration	<input type="checkbox"/> Statement of Overriding Considerations					
<input type="checkbox"/> Mitigated Negative Declaration						

1. Exhibit A, Scope of Work	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
2. Exhibit B, Budget Detail	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
3. CEC 96, NCB Request	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
4. CEC 95, DVBE Exemption Request	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
5. CEQA Documentation	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
6. Novation Documentation	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
7. CEC 105, Questionnaire for Identifying Conflicts		<input checked="" type="checkbox"/> Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date
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## Exhibit A - Statement of Work

### I. Title of project

Optimized V1G and V2G Electric Vehicle Fleet Management and Grid Transaction at ~~Mountain View and Dublin Army Reserve Bases~~ Marine Corps Air Station Miramar in San Diego, CA

### II. Background

The U.S. Department of Energy has directed the Regents of the University of California to perform the work stated in this Exhibit A for the California Energy Commission (Energy Commission). Lawrence Berkeley National Laboratory (LBNL), a laboratory owned by the Department of Energy, is located at 1 Cyclotron Rd., Berkeley, California. The Regents of the University of California, a not-for-profit corporation organized under the laws of the State of California, with its principal place of business at Berkeley, CA, manages and operates Lawrence Berkeley National Laboratory under DOE Contract No. DE-AC02-05CH11231.

The California Energy Resources Conservation and Development Commission (Energy Commission) is an agency organized under the laws of the State of California with a principal place of business at 1516 Ninth Street, Sacramento, California 95814.

### III. Problem Statement

Electrification of non-tactical vehicle fleets represents a key efficiency, environmental, and energy security objective for the Department of Defense (DoD). However, the cost premium for plug-in electric vehicles (PEV) is a barrier to widespread deployment. The DoD has planned demonstrations to evaluate options for reducing that barrier of electric vehicle (EV) ownership.

Currently, a PEV fleet of approximately 40 vehicles is being deployed at the Los Angeles Air Force Base (LA AFB) to test their ability to provide frequency regulation to the California wholesale ancillary services market to test the scalability of one opportunity for additional revenue through providing grid services. In this work, LBNL will serve as overall project lead and work with numerous participating entities (~~local utility~~, CAISO, fleet management platform developer(s), demand response (DR) communication coordinator, LA AFB, Energy Commission, PEV vendors, Electric Vehicle Supply Equipment (EVSE) vendors, and various legal personnel) to coordinate the numerous aspects and challenges in getting this demonstration project to be successfully completed. ~~This project~~ **presented here** will be in ~~Pacific Gas and Electric Company's (PG&E)~~ **the San Diego Gas & Electric (SDG&E)** service territory, specifically, at the ~~Army Reserve 63rd Regional Support Command HQ (RSC-HQ) on the Moffett Federal Air Field in Mountain View and the Parks Reserve Forces Training Area (aka Camp Parks) in Dublin, CA~~ **Marine Corps Air Station (MCAS) Miramar in San Diego, CA.**

## Goals and Objectives

The Army Reserve **MCAS Miramar** project will leverage the **bi-directional, also known as V2G,** technology and capabilities developed for the L.A. AFB project ~~but will~~ **and explore its application in conjunction with optimized control of multiple distributed Energy Resource (DER) components – a fleet of uni-directional, also known as V1G, PEVs and EVSEs, an existing photovoltaic (PV) system, a stationary flow battery, and building HVAC and lighting loads in one site office building (via existing advanced building controls) –** in a different market with a different set of rules and time scale of transactions. In this project, the ability to provide economic energy resources to the wholesale electricity market will be examined using the baseline-based model known as the proxy demand resource (PDR). This is timely, as it gives the DoD an opportunity to take part in PG&E's Supply Side Pilot (SSP) that is scheduled to begin in April 2015 **minimize charging costs and generate revenue through optimized participation in retail and wholesale DR programs and ancillary services markets will be developed, demonstrated, and evaluated.**

A fleet of approximately 8 **6 bi-directional** PEVs will be **procured along with approximately 6 dedicated bi-directional EVSEs and** located **installed** at the RSC-HQ site and approximately 7 PEVs will be located at the Camp Parks site, each with its own dedicated charging stations **MCAS Miramar**. The PEVs will provide Level 2 bi-directional charging. This configuration allows the fleet to be charged and discharged in a controlled manner allowing the vehicle batteries to be used as a component in the base power systems at RSC-HQ and Camp Parks. A fleet management platform enables normal operation and also communicates the charging and discharging commands, while optimization algorithms ensure that the vehicles provide the maximum possible benefit to the base while meeting operational **transport** requirements. Communication between the RSC-HQ, Camp Parks and PG&E will be achieved using a Demand Response Automation Server (DRAS) that sends signals to the fleet management platform using the OpenADR protocol.

Despite the similar technology, the RSC-HQ/Camp Parks **MCAS Miramar** demonstration will differ from the L.A. AFB in several significant ways:

- ~~— The PEVs will not be bid into the CAISO regulation markets but will participate in the CAISO Proxy Demand Resource program and bid into the Day Ahead energy markets with potential to bid into Real-time energy markets in the future.~~
- ~~— The fleet will be integrated with site loads so that it can be bid as an integrated system.~~
- ~~— The fleet charging will be controlled to maximize revenue considering the impacts of the site's baseline load on demand response program settlements.~~
- ~~— The PEVs and the building loads will participate in the market for multiple hours on multiple days in each month to demonstrate and evaluate the capabilities of the PEV fleet to provide a predictable and repeatable grid resource. The control~~

~~system will provide a bid amount and bid price making this demonstration a truly transactive energy demonstration.~~

~~—An examination of the impacts of smart charging on battery cycling and potentially battery life will be included in the analysis of the project.~~

**The project team will demonstrate and evaluate the performance of a mixed fleet of approximately 6 bi-directional PHEVs and approximately 24 uni-directional PEVs. These resources will provide aggregated demand management and simulated participation in current retail and wholesale DR programs.**

**The project will not be enrolled or committed to a particular program, allowing the project team to demonstrate and study the performance of the resource in participating in both current and proposed program configurations (e.g. DR hours changing from 12-6p to 4p-9p, “anytime” DR, flexible ramping, etc). Flexible load applications to be studied include demand management, DR, and frequency regulation for which the team will leverage automatic generation control (AGC) signals collected at Los Angeles Air Force Base.**

This project aims to achieve the functionality described above as follows.

1. Using existing fleet management platform from the LA AFB project will provide the necessary additional front-end PEV fleet management and charging services tools. This platform will reside on on-site servers or a cloud-based server and communicate to the charging stations to control charging and discharging, and schedule PEV itineraries **for both the approximately 24 V1G and approximately 6 V2G PEVs and EVSEs.**
2. Optimization capability based on Berkeley Lab’s Distributed Energy Resources Customer Adoption Model (DER-CAM) will be used to deliver optimal scheduling for the fleet **in conjunction with monitoring of PV generation and control of building loads and the stationary storage battery.** Optimization will seek to balance impacts on utility bills due to demand charges as well as opportunities and obligations ~~in the CA Independent System Operator’s (CAISO) wholesale market~~ **to provide DR and ancillary services.** An optimization algorithm embedded in the fleet management system and the system’s performance will be tested against DER-CAM’s reference optimization cases specifically designed and programmed for ~~the RSC-HQ and Camp Parks~~ **MCAS Miramar.**
- ~~3. OpenADR capable hardware will be installed on-site allowing participation in ancillary services (AS) markets.~~
4. The PEV fleet will be integrated into site building loads so control of loads can contribute to overall base utility cost savings and energy efficiency goals.

This entire system will meet the cyber security requirements of ~~the RSC-HQ and Camp Parks~~ **MCAS Miramar.**

#### IV. Technical and economic/cost performance objectives

- A. The overall technical goal of this project is to demonstrate an all-electric non-tactical fleet at the RSC-HQ on the Moffett Federal Air Field in Mountain View and at Camp Parks in Dublin MCAS Miramar that has the ability to can be integrated and controlled with other DERs (PV, stationary battery, and building loads) to minimize charging costs and provide economic energy resources to the wholesale electricity market.

The specific, technical objectives upon which this project's success will be evaluated are:

- Demonstrate and evaluate V2G for peak shaving demand management and demand cost savings.
- Demonstrate V2G for retail and wholesale DR program participation, including the DR auction mechanism (DRAM) by simulating day ahead bidding based on actual resource capabilities determined by DER-CAM followed by actual resource service delivery meeting program requirements and rules.
- Demonstrate capability to provide resource that could be bid into various ancillary services markets using actual automated generation control (AGC) dispatches collected in the LA AFB V2G project.
- Compare performance metrics of V2G to V1G to provide resources described above and evaluate cost-effectiveness of each.
- Compare PV load following of V2G and V1G in which PEV charging is controlled to follow PV generation levels as they vary diurnally to demonstrate capability to minimize PV curtailment.
- Compare performance metrics of V2G to stationary storage to provide above resources.
- Demonstrate provision of above resources with coordinated control of V1G, V2G, stationary flow battery storage, PV, and building loads.
- ~~Demonstrate and evaluate the use of the baseline-based model known as the proxy demand resource (PDR) to provide economic energy resources to the wholesale electricity market.~~
- ~~Expand upon the LA AFB model by integrating participation in the wholesale electricity market to provide this service integrated with the demand response resources of the buildings at RSC-HQ and Camp Parks.~~
- ~~Participate in the CAISO Proxy Demand Resource program and bid into the Day Ahead energy markets with potential to bid into Real-time energy markets in the future.~~
- ~~Examine the impacts of smart charging on battery cycling and potentially battery life.~~

- ~~Apply and evaluate the technology and capabilities developed for the L.A. AFB in a different market with a different set of rules and time scales of transactions.~~

- B. The overall economic/cost goal of this project is to create a fully functioning all-electric fleet of non-tactical PEVs at the Army Reserve facilities at Moffett Field and Camp Parks that can provide economic energy resources to the wholesale electricity market MCAS Miramar and evaluate the cost-effectiveness of providing various DR and ancillary service resources with V1G alone, V2G alone, and both with other DERs (PV, stationary flow battery storage and building loads).

The specific, economic/cost objectives upon which project's success will be evaluated are:

- Demonstrate the technical viability of integrated PEV charge/discharge, DER, and building load management to participate in and perform in wholesale electricity markets for demand resources DR and ancillary services.
- The ability of the charging/discharging and load control algorithms to optimize across vehicle availability and range, DR and ancillary resource participation and net electricity costs.
- Ease of deployment of a fleet management platform developed for one base to other bases in different markets and different timescales of grid interactions.
- The ability to apply the successes and lessons learned from this project to streamlining the roll out of the fleet management platform and lowering the cost of implementations at other military installations in the U.S.

## V. Preliminary Activities

### 1.1 Attend Kick Off Meeting

The Facility Operator's Project Manager (Principal Investigator) shall attend a "kick off" meeting with the Commission Contract Manager to review the Energy Commission's expectations for: accomplishing tasks described in the work statement; administrative requirements in the terms and conditions of the contract (e.g., invoicing, statements vesting title, prior approvals, data disclosure limitations, monthly progress reporting format and content, etc.); and the Energy Commission's roles and responsibilities. The location of this meeting shall be designated by the Commission Contract Manager.

### 1.2 Describe Synergistic Projects

Documentation of synergistic project value assessments will be received,

reviewed and approved in writing by the Commission Contract Manager before: 1) any Program funds under this contract are disbursed, and 2) Program-funded work on Technical Tasks may begin.

Provide written concurrence from each technical manager of the identified synergistic projects that information and technology derived from the synergistic project is unrestricted and available for exchange and collaboration in conjunction with this project.

There are several synergistic projects. These are:

1. Title: Optimal scheduling of Air Force Demonstration Plug-in Electric Vehicles  
Contact Name: Jim Galvin, ESTCP & ~~Sila Kiliccote~~ **Doug Black**, PI  
This is a DoD ESTCP funded project that funds the development of a fleet management platform which also acts as the platform to provide bids and deliver awards to and from the CAISO to maximize the value of participation in regulation products in the CAISO ancillary services markets. The funds for this project are \$2.5M.
2. Title: Los Angeles Air Force Base Vehicle to Grid Demonstration  
Contact Name: Kiel Pratt, California Energy Commission & ~~Sila Kiliccote~~ **Doug Black**, PI  
This is an Energy Commission funded project that will demonstrate the integration of the building automation system with the fleet management platform to coordinate management of the building and EV fleet. About \$500k of this project (excluding the purchase of the cars) is directly synergistic with this project.
3. Title: DoD PEV Fleet Management Program  
Contact Name: Camron Gorguinpour  
DoD allocated approximately \$15M to select, purchase, construct the infrastructure for and deploy PEV fleets starting with the LA AFB and including deployments at Ft. Hood, JB Andrews and JB McGuire. As a cost share to the Energy Commission project, they purchased and developed 13 EVSEs at \$30k each. This project will greatly benefit from their experience in selecting and procuring EVSEs and PEVs, as well as infrastructure design and development. Approximate synergistic efforts is around \$1.5M.
4. **Title: MCAS Miramar Microgrid System**  
**Contact Name: Mick Wasco**  
**The existing building level microgrid system at MCAS Miramar was a ~\$3M investment from the Office of Secretary of Defense (OSD) through the Environmental Security Technology Certification Program (ESTCP). This funding provided the necessary infrastructure upgrades, development of the microgrid controller, and of course the advanced energy storage system in the form of a ZnBr Flow Battery. With nearly four years of development, design, and construction, MCAS Miramar has successfully implemented a microgrid system for a base building that is capable of running off of**

energy storage and solar power isolated from the grid. MCAS Miramar has requested from and received funds from the Navy to fund the cost of the electrical infrastructure upgrades, including trenching and wiring, to support the approximately 6 bi-directional EVSEs in this study. In addition, the Navy will also support this study by funding the upgrade of the approximately 24 uni-directional EVSEs to include smart charging capabilities. Approximate synergistic effort is around \$300k.

5. ~~Title: Supply Side Pilot~~

~~Contact Name: John Hernandez, PG&E~~

~~This is a pilot project led by PG&E. The objective of the project is to understand the cost and effort needed for customers from various sectors to participate in CAISO's proxy demand response model. Approximate synergistic effort from this project is \$800k.~~

### 1.3 Identify Required Permits

Prepare and submit to the Commission Contract Manager a list of all permits required for construction and/or operation of equipment or the project facility, the name, address and telephone number of the permitting agencies, and the schedule the Facility Operator will follow in applying for and obtaining these permits.

There will be several permits required to complete this project. ~~Here is a list:~~

1. ~~AFCEC **System Security Plan (SSP)** – this is DoD's requirement to provide a list of all the hardware and software to be installed at the site. Each software and hardware should adhere to DoD's cybersecurity requirements.~~
2. ~~**Global Information Grid (GIG) Waiver** – This is a DoD requirement when a new Internet connection is being added to a base. It requires that quotes from vendors are acquired and that one of the quotes was acquired from a Defense Information Systems Agency (DITCO).~~
3. ~~Additional permits for trenching and installation of EVSE's may also be required.~~

### 1.4 Obtain Required Permits

Facility Operator (The University of California) will supply written certification that Facility Operator has received all necessary and required permits to construct, operate, or test the proposed equipment or facility as soon as they are received. During this project, the Facility Operator shall comply with all applicable laws, ordinances, regulations and standards. If the Facility Operator is required to obtain permits specifically for performance of this Agreement, such permit expenses shall be separately identified as a cost and shall be reimbursable by the Energy Commission.

## 1.5 Prepare Production Readiness Plan

A Production Readiness Plan is not applicable to this project.

## VI. Description of tasks to be performed

### TECHNICAL TASKS

### GLOSSARY

*Specific terms and acronyms used throughout this work statement are defined as follows:*

<b><u>AGC</u></b>	<b><u>Automatic Generation Control</u></b>
AFCEC	Air Force Civil Engineer Center
CAISO	California Independent System Operator
CPR	Critical Project Review
DER-CAM	Distributed Energy Resources Customer Adoption Model
DITCO	Defense Information Systems Agency
DOD	Department of Defense
DOE	Department of Energy
DRAS	Demand Response Automation Server
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
GIG	Global Information Grid
<b><u>MCAS</u></b>	<b><u>Marine Corps Air Station</u></b>
LA AFB	Los Angeles Air Force Base
PDR	Proxy Demand Response
PEV	Plug-In Electric Vehicles
PG&E	Pacific Gas and Electric Company
PIER	Public Interest Energy Research
<b><u>PV</u></b>	<b><u>Photovoltaic</u></b>
RSC-HQ	Army Reserve 63rd Regional Support Command Headquarters
SSP	Supply Side Pilot
<b><u>SSP</u></b>	<b><u>System Security Plan</u></b>
<b><u>V1G</u></b>	<b><u>Vehicle-to-grid (uni-directional; charge only)</u></b>

<b>V2G</b>	<b>Vehicle-to-grid (bi-directional; charge and discharge)</b>
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**SCOPE OF WORK**

This agreement includes a set of administrative tasks and a set of Technical Tasks. The remainder of this work statement defines these Technical Tasks. Task descriptions include goals, Contractor activities, and deliverables. The deliverables, such as test plans, technical reports and other interim deliverables, for each task are defined to the extent possible, but are subject to change based on recommendations from the Project Manager and the approval of the Commission Contract Manager. The Contractor shall submit a draft of each deliverable, unless described differently in the Technical Tasks, to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. Deliverables not requiring a draft version are indicated by marking “(no draft)” after the deliverable name.

The Commission Contract Manager will provide written comments back to the Contractor on the draft deliverable within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final deliverable within 5 working days of receipt. Key elements from this deliverable shall be included in the Final Report for this project.

When creating technical deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

**Technical Task List**

Task 2.1	Analyze Building Loads and Integration of Behind-the-meter Systems
Task 2.2	Electric Vehicle and Charging Station Procurement
Task 2.3	Coordination with Local Utility and ISO <b><u>of Integration with Existing DERs and Control Systems</u></b>
Task 2.4	Fleet Management & Control Algorithm Development
Task 2.5	DER-CAM Optimization
Task 2.6	Battery Degradation Study
Task 2.7	Financial Benefits Analysis
Task 2.8	Installation of Wires/Trenching/Box Upgrades
Task 2.9 <b><u>2.8</u></b>	Technology Transfer Activities

**Task 2.1 Analyze Building Loads and Integration of Behind-the-Meter Systems**

The goal of this task is to get a clear understanding of the building loads at the site as well as integration **and capabilities** of the behind-the-meter **DER** systems (**PV and stationary flow battery**) at the site.

**The Contractor shall:**

- Analyze building loads. Specifically consider the weather sensitivity and load variability of the loads as well as analyzing the appropriateness of the baseline by comparing the actual data and the baseline and reporting on the Mean Absolute Percentage Error.
- Lead the integration of the behind-the-meter systems at the site by working with the EV Fleet management developer and the building control vendor.
- Write a *memo* summarizing the **DERs**, building loads and integration issues behind the meter at ~~the Army Reserve sites at Moffett Field and Camp Parks~~ **MCAS Miramar**.

**Deliverables:**

- Building Loads **and DER** Memo

**Task 2.2 Electric Vehicle, and Charging Station, and Stationary Battery Procurement**

The goal of this task is to procure plug-in electric vehicle sedans and/or trucks and dedicated charging stations for use at the Army Reserve sites at Moffett Field and Camp Parks.

**The Contractor shall:**

- Purchase ~~up to 15~~ **approximately 6** EV sedans ~~vans~~ and/or trucks including coordination of paperwork and delivery to ~~Moffett Field and Camp Parks~~ **MCAS Miramar** (with PG&E taking **the Energy Commission maintaining** title).
- Design and size the infrastructure in addition to purchasing and installing of ~~up to 15~~ **approximately 6** dedicated charging stations with delivery to ~~Moffett Field and Camp Parks~~ **MCAS Miramar**.
- **Purchase and install an upgrade to the existing stationary flow battery to enable stand-alone remote operation and no less than 25 kW power and 125 kWh energy capacities.**
- Write a *memo* summarizing the details of the infrastructure, including digital photographs of the charging stations and vehicles, also to include the ~~via~~ **vehicle identification** numbers of vehicles

**Deliverables:**

- Infrastructure Memo

**Task 2.3 Coordination with Local Utility and ISO of Integration with Existing DERs and Control Systems**

The goal of this task is to research optimal operations associated with **demand management, demand response, and ancillary services** opportunities using a Demand Response Automation Server (DRAS) under the OpenADR protocol and working with a scheduling contractor, local utility and the CAISO **of V1G PEVs, V2G PEVs, PVs, stationary flow battery, and building loads.**

**The Contractor shall:**

- Explore optimization of behind-the-meter vehicle-to-building applications and automated demand response **and ancillary services** opportunities using a DRAS under the OpenADR protocol **incorporating existing on-site DERs (PV, stationary flow battery, and building loads)**. This task includes establishing communications with the CAISO and installing a gateway, if necessary, to establish communications for telemetry.
- Work with a scheduling coordinator to assess the economics of implementation and evaluate scaling issues as well as ensuring proper and timely communication between CAISO and the vehicle and building resources. The scheduling coordinator will also be in charge of calculating and communicating settlements.
- Write a *memo* summarizing the integration issues with the CAISO systems and scheduling coordinator systems **of the integration of V1G and V2G resource control systems with existing PV, stationary battery, and building load control systems.**

**Deliverables:**

- Integration Issues Memo

**Task 2.4 Fleet Management and Control Algorithm Development**

The goal of this task is to develop a fleet management operations algorithm that optimizes and controls charging at the Army Reserve **MCAS Miramar** site as well as addresses integration and security issues.

**The Contractor shall:**

- Develop a control algorithm to dispatch EVs and optimize and control the charging for ~~army~~ **MCAS Miramar** base **V1G and V2G** fleet. This development effort will include creation of an optimization framework and implementation as well as comparison of the performance of the optimization capability with DER-CAM.
- Implement cyber security protocol. Develop requirements for and implement EV management, adopt a data collection mechanism and develop an interface of the various system modules (DRAS, DER-CAM, Real-time charging control, EVSE, and vehicle data collection).
- Implement and test integration of the **a simulated** CAISO **AGC** signal to enable market participation.
- Forecast and optimize the control capabilities for this demonstration site.
- Write a *report* on the control algorithm development and performance.

**Deliverables:**

- Control Algorithm Development and Performance Report

**Task 2.5 DER-CAM Optimization**

The goal of this task is to optimize the number of PEVs for charging and discharging and analyze the results.

**The Contractor shall:**

- Forecast and optimize charging and discharging of PEVs as well as building loads for developing and meeting ~~their bids~~ **demand management, demand response, and ancillary services provision**.
- Determine and execute the optimal schedule for all on-site generation
- Collect data and analyze the performance of optimization schedules.
- Write a *report* on the performance analysis.

**Deliverables:**

- Performance Analysis Report

**Task 2.6 Battery Degradation Study**

The goal of this task is to evaluate the degradation of the batteries in the PEVs due to grid transactions at this demonstration site.

**The Contractor shall:**

- Develop requirements to collect data from the PEVs while they are being driven and while they are parked and participating in grid transactions
- Collect the data (the raw data is not a deliverable under this agreement)
- Analyze the data and evaluate battery degradation
- Write a *memo* summarizing the analysis on battery degradation due to drive cycles and grid transactions (this is a to be a public document it shall contain

no raw data or make mention of information deemed sensitive to the manufacturer)

**Deliverables:**

- Battery Degradation of the PEVs Memo

**Task 2.7 Financial Benefits Analysis**

The goal of this task is to evaluate the financial performance of the system in different markets and explore additional scenarios given the demonstrated capabilities of the current system (size of resource, duration, response, frequency, etc.).

**The Contractor shall:**

- Extract the performance data such as speed of response, frequency of response, duration, etc. to evaluate the performance of the system.
- Apply the performance at different markets or market interaction models to locate the most profitable market and/or program for the base to participate.
- Evaluate the financial performance of the system in different markets and explore additional scenarios
- Write a *memo* on the financial benefits of various scenarios as well as costs of the system

**Deliverables:**

- Financial Benefits of Various Scenarios Memo

**Task 2.8 Installation of Wires/Trenching/Box Upgrades**

~~The goal of this task is to install the necessary wires, trenching, box upgrades, etc. to enable the operation of the charging stations.~~

~~**The Contractor shall:**~~

- ~~• LBNL will hire a building contractor and work with them to acquire the necessary permits, develop and build the necessary infrastructure.~~
- ~~• Write a memo describing the functional infrastructure, including any/all necessary installation of wiring, trenching or box upgrades.~~

~~**Deliverables:**~~

- ~~• Functional Infrastructure Memo~~

**Task 2.9 2.8 Technology Transfer Activities**

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

**The Contractor shall:**

- Develop a *Technology Transfer memo* outlining the challenges of scaling this activity to future sites. **To inform vehicle-grid integration standards development and evaluation, the *Technology Transfer memo* will also specify all data streams between PEVs, EVSEs, and control system(s) used for each demonstrated V2G capability and describe role that each data stream serves.**

**Deliverables:**

- Technology Transfer Memo

**Task 3.0 Reporting Tasks**

All reports shall be delivered to:

~~David G. Hungerford, Ph.D.~~ **Kiel Pratt**  
Commission Agreement Manager  
Energy Efficiency **Systems** Research Office  
Energy Research and Development Division  
California Energy MS-54 **43**  
Sacramento, CA 95814

### **Task 3.1 Quarterly Progress Reports**

The Contractor shall prepare *written* Quarterly Progress Reports to the Commission Contract Manager by the 30th of the following month, starting after the Department of General Service's contract approval date and shall continue each quarter until the Final Report has been accepted by the Commission Contract Manager. The progress report should summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Attachment A-2 provides a recommended format and content requirements for the Quarterly Progress Report.

### **Task 3.2 Final Report**

The Final Report shall be a public document. If the Contractor will be preparing a confidential version of the final report as well, the Contractor shall perform the following tasks for both the public and confidential versions of the Final Report. When creating the Final Report, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

#### **Subtask 3.2.1 Final Report Outline**

- Contractor shall prepare and submit to the Commission Contract Manager for review an outline of the Final Report describing the original purpose, approach and results of the project.
- The outline shall be submitted to the Commission Contract Manager for review. The Commission Contract Manager shall determine if the outline is satisfactory. If the Commission Contract Manager determines that the outline is unsatisfactory, he or she will, in a timely manner, provide to the Contractor written comments, which indicate how the outline can be improved. The Contractor shall revise the outline to meet the Commission Contract Manager's requirements. Upon finding the final report outline satisfactory, the Commission Contract Manager shall provide to the Contractor written approval of it.

### **Subtask 3.2.2 Draft Final Report for Comment**

- The Contractor shall prepare and submit to the Commission Contract Manager a draft Final Report on the project. The format of the report shall follow the approved outline.
- The draft final report shall be submitted to the Commission Contract Manager for review and to determine, in a timely manner, if it is satisfactory. If the Commission Contract Manager determines that it is unsatisfactory, he or she will, provide to the Contractor written comments, which indicate how it can be improved. The Contractor shall revise the draft final report incorporating the Commission Contract Manager's corrections and required changes. Upon finding the revised draft to be satisfactory, the Commission Contract Manager shall provide to the Contractor written approval of it.

### **Subtask 3.2.3 Final Report**

- The Contractor shall prepare Final Report and submit it to the Commission Contract Manager after receiving the Commission Contract Manager's written approval of the draft Final Report. This task shall be deemed complete and accepted by the Commission only when the Commission Contract Manager approves the Final Report in writing. Upon approval, the Contractor shall submit two unbound copies of the Final Report to the Commission Contract Manager.

### **Task 3.3 Final Meeting**

Contractor shall meet with the Commission Contract Manager to present findings, conclusions, and recommended next steps (if any) for the project.

Contractor will also discuss with the Commission Contract Manager the following contract close-out items:

- What to do with any state-owned equipment (Options), if applicable
- Commission's request for specific "generated" data (not already provided in contract deliverables)
- Need to document Contractor's disclosure of "subject inventions" developed under the contract
- Need to file UCC-1 form re: Commission's interest in patented technology
- Other "surviving" contracts provisions.

## VIII. Critical Project Reviews

The Energy Commission will conduct critical project reviews at the conclusion of the following tasks:

- Task 2.1- ~~2.2 Analyze Building Loads and Integration of Behind-the-Meter Systems~~ **Electric Vehicle, Charging Station, and Stationary Battery Procurement**

Critical project reviews are meetings between the Contractor, the Energy Commission Contract Manager and other individuals selected by the Commission Contract Manager to provide objective, technical support to the Energy Commission. The purpose of these meetings is to discuss with the Contractor the status of the project and its progress toward achieving its goals and objectives. These meetings may take place at the Energy Commission offices in Sacramento, or at another, reasonable location determined by the Commission Contract Manager.

Prior to the critical project review meeting, the Contractor will provide the task deliverable(s) to the Commission Contract Manager sufficiently in advance to allow the Contract Manager's review of the deliverable document(s) before the review meeting. If not already defined in the Work Statement, the Commission Contract Manager shall specify the contents of the deliverable document(s).

At the critical project review meeting, the Contractor shall present the required technical information and participate in a discussion about the project with the Commission Contract Manager and other meeting attendees, if any.

Following the critical project review meeting, the Energy Commission will determine whether the Contractor is complying satisfactorily with the Work Statement and whether the project is demonstrating sufficient progress toward achieving its goals and objectives to warrant continued financial support for the project.

### **Energy Commission Key Personnel and Agreement Management**

- A. The name and area code/phone number of the California Energy Commission's Contract Manager is listed on Exhibit F and is the official technical contact for the Energy Commission.

The Commission's Contract Manager is responsible for the day to day project status, decisions and communications with the Facility Operator Project Manager (Principal Investigator). The Commission Contract Manager will review and approve all project deliverables, reports, and invoices.

The Energy Commission may change the Contract Manager by notice given to the Facility Operator at any time signed by the Contract Officer of the

Energy Commission.

- B. The name and area code/phone number of the California Energy Commission's Contract Officer is listed on Exhibit F and will be the Contract Officer for the Agreement and is the official administrative contact for the Energy Commission.

### **Facility Operator's Key Personnel and Agreement Administration**

The Facility Operator (The University of California) is obligated to comply with the terms and conditions of its Management and Operating (M&O) Contract with the DOE when performing work under this agreement. The DOE may require substitution of the named "key personnel" under this agreement should the DOE determine that the services of the Project Manager (Principal Investigator) or other named key personnel are necessary to meet the Facility Operator's M&O Contract obligations to the DOE. Should the DOE direct the Facility Operator to substitute the named key personnel under this agreement, the Facility Operator shall inform the Energy Commission of the directed substitution in accordance with paragraphs A and B below. In the event that the Energy Commission does not concur with the substitution of named key personnel as directed by the DOE, this agreement shall be terminated in accordance with the Termination provision of the terms and conditions.

- A. The name and area code/phone number of the National Laboratory's Project Manager (Principal Investigator) is on Exhibit F and will be the Project Manager (Principal Investigator) for this project and is the official technical contact for Lawrence Berkeley National Laboratory.

The Facility Operator's Project Manager (Principal Investigator) is responsible for the day to day project status, decisions, and communications with the Energy Commission Contract Manager. The Facility Operator's Project Manager (Principal Investigator) will review and approve all project deliverables and reports.

The Facility Operator's Project Manager (Principal Investigator) is designated as "key personnel" under the Agreement. The Energy Commission reserves the right to prior written concurrence of any substitution of the Project Manager (Principal Investigator).

- B. The key personnel are listed on Exhibit F in this agreement.

Facility Operator's key personnel may not be substituted without the Commission Contract Manager's prior written concurrence. Such concurrence shall not be unreasonably withheld. All other personnel may be substituted by Facility Operator, with written notification made to the Commission Contract Manager.

- C. The name and area code/phone number of National Laboratory Agreement Administrator is on Exhibit F and will be the Agreement Administrator for this Agreement and is the official administrative contact for Lawrence Berkeley National Laboratory.

**Facility Operator's key subcontractors**

The Facility Operator's key subcontractors are listed on Exhibit F in this agreement.

Facility Operator's key subcontractors may not be substituted without the Commission Contract Manager's prior written concurrence. Such concurrence shall be timely provided and not unreasonably withheld. Delay in written concurrence may result in a work stoppage of subcontract work. All other subcontractors may be substituted by Facility Operator, with written notification made to the Commission Contract Manager.

**STATE OF CALIFORNIA**

**STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION**

**RESOLUTION - RE: LAWRENCE BERKELEY NATIONAL LABORATORY**

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

**RESOLVED**, that the Energy Commission approves Amendment 2 to Contract 600-13-009 with the Department of Energy's Lawrence Berkeley National Laboratory (LBNL) to change the project site to Marine Corps Air Station Miramar in San Diego from the current sites of Moffett Federal Airfield and Parks Reserve Forces Training Area, to extend the term by 36 months to provide for a minimum of two full years for data collection and analysis, to augment the budget by \$692,472 for a total project budget of \$2,992,472, and to modify the scope of work to add activities and deliverables commensurate with the new location, added funding, and increased length of the agreement. The amendment would provide the vehicle-grid integration demonstration with sufficient time and resources to complete the installation of equipment, collect multi-year data and complete a full analysis of the project performance; and

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

## **CERTIFICATION**

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on March 8, 2017.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

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Cody Goldthrite,  
Secretariat