STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # ARV-21-001 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
Fuels and Transportation	Matt Alexander		916-805-7481

C) Recipient's Legal Name	Federal ID #
HummingbirdEV	47-4215899

D) Title of Project
The Advanced Vehicle-to-Vehicle Mobile Charging Project

E) Term and Amount

Start Date	End Date	Amount
7 / 15 / 2021	7 / 29 / 2024	$ 998,287

F) Business Meeting Information

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

Proposed Business Meeting Date 7 / 15 / 2021 ☐ Consent ☒ Discussion

Business Meeting Presenter Matt Alexander Time Needed: 10 minutes

Please select one list serve. Select

Agenda Item Subject and Description:
HUMMINGBIRDEV. Proposed resolution approving Agreement ARV-21-001 with HummingbirdEV for a $998,287 agreement to develop and deploy a seamless and streamlined vehicle-to-vehicle mobile charging solution, and adopting staff's determination that this action is exempt from CEQA. (Clean Transportation Program Funding) Contact: Matt Alexander (Staff Presentation: 5 minutes)

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?

   ☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

   Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:

   a) ☒ Agreement **IS** exempt.

   ☐ Statutory Exemption. List PRC and/or CCR section number:

   ☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit. 14, Sections 15301 and 15306

   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3) Explain reason why Agreement is exempt under the above section:

   Cal. Code Regs., tit. 14, Section 15301 provides that the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing structures, facilities, mechanical equipment or topographical features involving negligible or no expansion of use beyond that existing are categorically exempt

from the provisions of CEQA. This project will develop and deploy a seamless and streamlined vehicle-to-vehicle mobile charging solution at an existing facility. Therefore, this project is exempt under California Code of Regulations, title 14, sections 15301.

Cal. Code Regs., tit. 14, sect. 15306 consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. The Project will develop and deploy a seamless and streamlined vehicle-to-vehicle mobile charging solution and will involve on-road and stationary testing validating V2V charging with various light-duty vehicles. This work will not result in a serious or major disturbance to an environmental resource. For these reasons, the proposed project will have no significant effect on the environment and is categorically exempt under section 15306.

b) ☐ Agreement **IS NOT** exempt. (consult with the legal office to determine next steps)

Check all that apply

- ☐ Initial Study
- ☐ Negative Declaration
- ☐ Mitigated Negative Declaration
- ☐ Environmental Impact Report
- ☐ Statement of Overriding Considerations

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

Legal Company Name:	**Budget**
Techtruth Consulting LLC	$ 59,000
TBD (V2V Hardware)	$ 25,000

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

Legal Company Name:
American Automobile Association of Northern California, Nevada & Utah (AAA)

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
ARFVTP	18/19	601.118K	$173,287
ARFVTP	20/21	601.118M	$825,000

R&D Program Area: Select Program Area TOTAL: $

Explanation for “Other” selection

STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Mary Ramirez

Address: 5787 Preston Ave.

City, State, Zip: Livermore, CA 94551

Phone: 925-400-6888

E-Mail: Mary.Ramirez@hummingbirdevusa.com

2. Recipient's Project Manager

Name: Rakesh Koneru

Address: 5787 Preston Ave.

City, State, Zip: Livermore, CA 94551

Phone: 925-548-6875

E-Mail: Rakesh.Koneru@hummingbirdevusa.com

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-20-605

☐ First Come First Served Solicitation Solicitation #: - -

M) The following items should be attached to this GRF

1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		Attached
4. Recipient Resolution	☒ N/A	☐ Attached
5. CEQA Documentation	☐ N/A	☒ Attached

Matt Alexander
Agreement Manager **6/16/2021**
Date

Mark Thurgood
Office Manager 6/18/2021
Date

John Butler II
Deputy Director 6/24/2021
Date

Exhibit A
SCOPE OF WORK

TECHNICAL TASK LIST

<Insert the Task numbers and Task names for your Agreement.

Task #	CPR	Task Name
1		Administration
2		Design and Develop V2V Mobile Charger Components, Interface, and Overall System
3	X	Test and Analyze V2V Mobile Charger Components/Interface
4		Integrate Powertrain Components and Test Complete System
5	X	Deliver and Deploy V2V Mobile Chargers
6		Project Fact Sheet
7		Data Collection, Analysis, and Reporting

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Rakesh Koneru, other HummingbirdEV staff TBD		
2	Rakesh Koneru, other HummingbirdEV staff TBD		
3	Rakesh Koneru, other HummingbirdEV staff TBD		
4	Rakesh Koneru, other HummingbirdEV staff TBD		
5	Rakesh Koneru, other HummingbirdEV staff TBD	American Automobile Association of Northern California, Nevada & Utah (AAA)	
6	Rakesh Koneru, other HummingbirdEV staff TBD	Kevin Nesbitt – TechTruth Consulting LLC	
7	Rakesh Koneru, other HummingbirdEV staff TBD	Kevin Nesbitt – TechTruth Consulting LLC	

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
		American Automobile Association of Northern California, Nevada & Utah (AAA)	

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
AAA	American Automobile Association of Northern California, Nevada & Utah
CAM	Commission Agreement Manager
CPR	Critical Project Review
FTD	Fuels and Transportation Division
Recipient	HummingbirdEV
V2V	Vehicle-to-Vehicle

Background

Assembly Bill (AB) 118 (Núñez, Chapter 750, Statutes of 2007), created the Clean Transportation Program, formerly known as the Alternative and Renewable Fuel and Vehicle Technology Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change, clean air, and alternative energy policies. AB 8 (Perea, Chapter 401, Statutes of 2013) re-authorizes the Clean Transportation Program through January 1, 2024. The Clean Transportation Program has an annual budget of approximately $100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Retrofit medium- and heavy-duty on-road and non-road vehicle fleets to alternative technologies or fuel use.

- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

On August 7, 2020, the CEC released a Grant Solicitation and Application Package entitled "BESTFIT Innovative Charging Solutions" under the Clean Transportation Program. This competitive grant solicitation offered to fund projects that demonstrate transformative technology solutions and work to accelerate the successful commercial deployment of electric vehicle (EV) charging for both light-duty (LD) and medium- and heavy-duty (MD/HD) applications. In response to GFO-20-605, the Recipient submitted application #15 which was proposed for funding in the CEC's Notice of Proposed Awards on April 16, 2021. GFO-20-605 and Recipient's application are hereby incorporated by reference into this Agreement in their entirety.

In the event of any conflict or inconsistency between the terms of the Solicitation and the terms of the Recipient's Application, the Solicitation shall control. In the event of any conflict or inconsistency between the Recipient's Application and the terms of Commission's Award, the Commission's Award shall control. Similarly, in the event of any conflict or inconsistency between the terms of this Agreement and the Recipient's Application, the terms of this Agreement shall control.

Problem Statement:

Range anxiety is one of the most cited reasons for consumers that have avoided purchasing an electric vehicle (EV), with 58% of drivers afraid that they will run out of power before being able to charge their vehicle and another 49% that fear the low availability of charging stations. When EVs run out of power on the road today, the driver has to call a towing service and be towed to the nearest charging station – a time-consuming and expensive process. To help ease consumer concerns and accelerate the deployment of EVs across California and beyond, there is a need to successfully commercialize a mobile, all-electric recharging service that provides immediate, fast charging to the vehicle on the side of the road.

Our team aims to address this need and develop an all-electric vehicle-to-vehicle (V2V) mobile direct current (DC) charging solution. We will partner with American Automobile Association of Northern California, Nevada & Utah (AAA) to deploy 2 V2V mobile chargers for their customers and build consumer awareness and confidence in adopting electric vehicles knowing that there is a solution for emergency situations.

Goals of the Agreement:

The goal of this Agreement is to develop and deploy a seamless and streamlined V2V mobile charging experience.

Objectives of the Agreement:

The objectives of this Agreement are to develop and deploy two all-electric vehicles as mobile V2V fast chargers tailored for AAA to ease range anxiety. In doing so, we will create a robust and secure software platform for information exchange and safe charge sessions. We will also standardize a protocol for V2V DC charging and power transfer.

TASK 1 ADMINISTRATION

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement. The Commission Agreement Manager (CAM) shall designate the date and location of this meeting and provide an agenda to the Recipient prior to the meeting.

The Recipient shall:

- Attend a "Kick-Off" meeting with the CAM, the Commission Agreement Officer (CAO), and a representative of the Energy Commission Accounting Office. The Recipient shall bring their Project Manager, Agreement Administrator, Accounting Officer, and any others determined necessary by the Recipient or specifically requested by the CAM to this meeting.
- Discuss the following administrative and technical aspects of this Agreement:
    - Agreement Terms and Conditions
    - Critical Project Review (Task 1.2)
    - Match fund documentation (Task 1.6) No reimbursable work may be done until this documentation is in place.
    - Permit documentation (Task 1.7)
    - Subcontracts needed to carry out project (Task 1.8)
    - The CAM's expectations for accomplishing tasks described in the Scope of Work
    - An updated Schedule of Products and Due Dates
    - Monthly Progress Reports (Task 1.4)
    - Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
    - Final Report (Task 1.5)

Recipient Products:

- Updated Schedule of Products

- Updated List of Match Funds
- Updated List of Permits

Commission Agreement Manager Product:

- Kick-Off Meeting Agenda

Task 1.2 Critical Project Review (CPR) Meetings

CPRs provide the opportunity for frank discussions between the Energy Commission and the Recipient. The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

The CAM may schedule CPR meetings as necessary, and meeting costs will be borne by the Recipient.

Meeting participants include the CAM and the Recipient and may include the Commission Agreement Officer, the Fuels and Transportation Division (FTD) program lead, other Energy Commission staff and Management as well as other individuals selected by the CAM to provide support to the Energy Commission.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. Prepare a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. Modifications to the Agreement may require a formal amendment (please see section 8 of the Terms and Conditions). If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Lead Commissioner for Transportation for his or her concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the CAM and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

CAM Products:

- Agenda and a list of expected participants
- Schedule for written determination
- Written determination

Recipient Product:

- CPR Report(s)

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

  This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the Commission Agreement Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Agreement Manager.

  The technical portion of the meeting shall present an assessment of the degree to which project and task goals and objectives were achieved, findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The Commission Agreement Manager will determine the appropriate meeting participants.

  The administrative portion of the meeting shall be a discussion with the Commission Agreement Manager and the Grants Officer about the following Agreement closeout items:

  - What to do with any equipment purchased with Energy Commission funds (Options)

- Energy Commission's request for specific "generated" data (not already provided in Agreement products)
- Need to document Recipient's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions
- Final invoicing and release of retention

- Prepare a schedule for completing the closeout activities for this Agreement.

Products:

- Written documentation of meeting agreements
- Schedule for completing closeout activities

Task 1.4 Monthly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the objectives of this Agreement on time and within budget.

The objectives of this task are to summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, and to form the basis for determining whether invoices are consistent with work performed.

The Recipient shall:

- Prepare a Monthly Progress Report which summarizes all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Agreement Manager within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in Section 6 of the Terms and Conditions of this Agreement.
- In the first Monthly Progress Report and first invoice, document and verify match expenditures and provide a synopsis of project progress, if match funds have been expended or if work funded with match share has occurred after the notice of proposed award but before execution of the grant agreement. If no match funds have been expended or if no work funded with match share has occurred before execution, then state this in the report. All pre-execution match expenditures must conform to the requirements in the Terms and Conditions of this Agreement.

Product:

- Monthly Progress Reports

Task 1.5 Final Report

The goal of the Final Report is to assess the project's success in achieving the Agreement's goals and objectives, advancing science and technology, and providing energy-related and other benefits to California.

The objectives of the Final Report are to clearly and completely describe the project's purpose, approach, activities performed, results, and advancements in science and technology; to present a public assessment of the success of the project as measured by the degree to which goals and objectives were achieved; to make insightful observations based on results obtained; to draw conclusions; and to make recommendations for further projects and improvements to the FTD project management processes.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Recipient shall perform the following activities for both the public and confidential versions of the Final Report.

The Recipient shall:

- Prepare an Outline of the Final Report, if requested by the CAM.
- Prepare a Final Report following the latest version of the Final Report guidelines which will be provided by the CAM. The CAM shall provide written comments on the Draft Final Report within fifteen (15) working days of receipt. The Final Report must be completed at least 60 days before the end of the Agreement Term.
- Submit one bound copy of the Final Report with the final invoice.

Products:

- Outline of the Final Report, if requested
- Draft Final Report
- Final Report

Task 1.6 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the Energy Commission budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of Energy Commission funds for each task during the term of this Agreement. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Agreement Manager at least 2 working days prior to the kick-off meeting. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such 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 each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.
    - Amount of each in-kind contribution, a description, documented market or book value, and its 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 shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.
- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured. For match funds provided by a grant a copy of the executed grant shall be submitted in place of a letter of commitment.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the Commission Agreement Manager if during the course of the Agreement additional match funds are received.
- Notify the Commission Agreement Manager within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR meeting.

Products:

- A letter regarding match funds or stating that no match funds are provided
- Copy(ies) of each match fund commitment letter(s) (if applicable)

- Letter(s) for new match funds (if applicable)
- Letter that match funds were reduced (if applicable)

Task 1.7 Identify and Obtain Required Permits

The goal of this task 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. Although the Energy Commission budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

The Recipient shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Agreement Manager at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
  - A list of the permits that identifies the:
    - Type of permit
    - Name, address and telephone number of the permitting jurisdictions or lead agencies
  - The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule and the copies of the permits. The implications to the Agreement 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 the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide the appropriate information on each permit and an updated schedule to the Commission Agreement Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Agreement Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Agreement Manager within 5 working days. Either of these events may trigger an additional CPR.

Products:

- Letter documenting the permits or stating that no permits are required
- A copy of each approved permit (if applicable)
- Updated list of permits as they change during the term of the Agreement (if applicable)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable)
- A copy of each final approved permit (if applicable)

Task 1.8 Obtain and Execute Subcontracts

The goal of this task is to ensure quality products and to procure subcontractors required to carry out the tasks under this Agreement consistent with the Agreement Terms and Conditions and the Recipient's own procurement policies and procedures. It will also provide the Energy Commission an opportunity to review the subcontracts to ensure that the tasks are consistent with this Agreement, and that the budgeted expenditures are reasonable and consistent with applicable cost principles.

The Recipient shall:

- Manage and coordinate subcontractor activities.
- Submit a draft of each subcontract required to conduct the work under this Agreement to the Commission Agreement Manager for review.
- Submit a final copy of the executed subcontract.
- If Recipient decides to add new subcontractors, then the Recipient shall notify the CAM.

Products:

- Letter describing the subcontracts needed, or stating that no subcontracts are required
- Draft subcontracts
- Final subcontracts

TECHNICAL TASKS

TASK 2 DESIGN AND DEVELOP V2V MOBILE CHARGER COMPONENTS, INTERFACE, AND OVERALL SYSTEM

The goal of this task is to identify the operational requirements of the all-electric Class 5 V2V Mobile Charging Unit and fully design the system so that it has the capability to universally charge stranded light-duty EVs.

The Recipient shall:

- Identify operational requirements of the all-electric Class 5 V2V Mobile Charging Unit with AAA, such as:
    - Vehicle speed
    - Charging power
    - Types of vehicles to be served
    - Powertrain specifications
    - Number of charging cycles per day
    - Number of miles driven per day
- Prepare a Summary of Operational Requirements for V2V Mobile Charger and submit to the CAM.
- Complete a non-proprietary Schematic Design of V2V Mobile Charger (e.g., drawings, block diagram, etc.) according to the Summary of Operational Requirements for V2V Mobile Charger that identifies the linkages between vehicle components (e.g., battery pack, battery management system), charging components (e.g., V2V charging interface), and software communications. Submit Schematic Design of V2V Mobile Charger to the CAM.
- Design and develop the required components/systems based on the identified operational requirements and completed schematics, including the following:
    - Mechanical architecture required to facilitate mobile charging units, including but not limited to:
        - Packaging
        - Manufacturing
        - Assembly
        - Bill of materials
    - Electrical and electronic architecture required to facilitate mobile charging units, including but not limited to:
        - Packaging
        - Manufacturing
        - Assembly
        - Bill of materials
    - The software architecture required to facilitate V2V charging, including the following functionalities:
        - Detect valid destination vehicle

        - Encrypt communication channels
        - Regulate DC power to destination vehicle energy storage system
        - Fault Accommodation and User Notification
        - Integrate user's charging requests to Driver Digital Interface (vehicle display)
    - A standardized software protocol for V2V DC Charging/Power Transfer that is capable of:
        - Enforcing exchange power transfer limits
        - Detecting valid energized connections
        - Safe start and end of session
        - Security and diagnostics
- Prepare a Summary Report on the Design and Development of the Components/System and submit to the CAM.

Products:

- Summary of Operational Requirements for V2V Mobile Charger
- Schematic Design of V2V Mobile Charger
- Summary Report on the Design and Development of the Components/System

TASK 3 TEST AND ANALYZE V2V MOBILE CHARGER COMPONENTS/INTERFACE

The goal of this task is to successfully test the Class 5 V2V mobile charger components, systems, and V2V charging in a controlled environment.

The Recipient shall:

- Prepare a Bench Testing Plan, which will include details such as the number of hours of operation, the type of monitoring to be performed, and the manner in which data will be validated, analyzed, and reported. Submit to the CAM.
- Test compatibility, capabilities, and safety of all hardware, software, electrical, and internal components.
- Test all low voltage, high voltage components as per specifications on a bench to understand the full scope of capabilities for each system.
- Conduct Protocol Testing of individual system components.
- Conduct bench testing to validate complete V2V system charging.

- Conduct software testing between system components for safety and standardization.
- Prepare a Bench Test Report and Engineer Analysis, including but not limited to the tests completed, test results, and analysis and takeaways of the results. Submit to the CAM.

Products:

- Bench Testing Plan
- Bench Test Report and Engineer Analysis

[CPR WILL BE HELD IN THIS TASK. See Task 1.2 for details]

TASK 4 INTEGRATE POWERTRAIN COMPONENTS AND TEST COMPLETE SYSTEM

The goal of this task is to integrate the vehicle powertrain components and successfully test the V2V mobile charger on the road in real world conditions.

The Recipient shall:

- Complete integration and assembly of V2V mobile charger, including:
  - Identification of sub and main assemblies of components, parts, and systems.
  - Integration of battery packs, powertrain, embedded hardware, power electronics, charging, and auxiliary systems into the Class 5 V2V mobile chargers.
  - Manufacture, assembly, and integration of wiring into Class 5 V2V mobile chargers including Controller Area Network (CAN) low and high voltage.
- Finish V2V mobile charger vehicle commissioning.
- Prepare a Real-World Testing Plan, which will include details such as the number of hours of operation, the type of monitoring to be performed, and the manner in which data will be validated, analyzed, and reported. Submit to the CAM.
- Conduct on-road testing in accordance with the Real-World Testing Plan.
- Conduct stationary testing validating V2V charging with various light-duty vehicles in accordance with the Real-World Testing Plan.

- Prepare a Real-World Test Report and Engineer Analysis, including but not limited to the tests completed, documentation of the light-duty vehicles tested, test results, analysis and takeaways of the results, and photographs of the final commissioned V2V mobile chargers. Submit to the CAM.

Products:

- Real-World Testing Plan
- Real-World Test Report and Engineer Analysis

TASK 5 DELIVER AND DEPLOY V2V MOBILE CHARGERS

The goal of this task is to complete a final quality review and deliver two class 5 V2V mobile chargers for demonstration to AAA, and complete all field, driver, and safety training required for maintenance and use of the mobile chargers.

The Recipient shall:

- Conduct a final quality review of two V2V mobile chargers and deliver to AAA locations. Submit Photographic Proof of Delivery to AAA to the CAM.
- Prepare a Training and Operation Instruction Manual (written and/or video) for AAA.
- Conduct driver/operator training for day-to-day operation of the truck including regenerative braking, emergency shut-off of batteries, effective range, and V2V charging.
- Conduct technician training, including maintenance needs, how to troubleshoot electrical systems compared to conventional fuel counterparts, and safety requirements.
- Deploy the V2V mobile chargers for operation in AAA's service.
- Provide routine and safety inspections of the V2V mobile chargers for the duration of the agreement every 3,000 miles or 45 calendar days, whichever comes first or sooner if mechanical issues are detected by EV data loggers. If mechanical and/or safety issues are encountered, submit a short Description of Mechanical/Safety Issue that identifies the problem and resolution to the CAM.
- Submit an AB 841 Certification that certifies the project has complied with all AB 841 (Ting, Chapter 372, Statutes of 2020) requirements specified in Exhibit C or describes why the AB 841 requirements do not apply to the project. The certification shall be signed by Recipient's authorized representative. Although AB 841 becomes effective January 1, 2022, as a policy matter the CEC is applying the EVITP certification requirements to

project work funded under this Agreement, regardless of whether it might be performed prior to January 1, 2022, unless an exception applies.

- Submit Electric Vehicle Infrastructure Training Program (EVITP) Certification Numbers of each EVITP-certified electrician that installed electric vehicle charging infrastructure or equipment. EVITP Certification Numbers are not required to be submitted if AB 841 requirements do not apply to the project.

Products:

- Photographic Proof of Delivery to AAA
- Description(s) of Mechanical/Safety Issue as needed
- AB 841 Certification signed by Recipient's authorized representative
- EVITP Certification Numbers of each EVITP certified electrician

[CPR WILL BE HELD IN THIS TASK. See TASK 1.2 for details]

TASK 6 PROJECT FACT SHEET

The goal of this task is to develop an initial and final project fact sheet that describes the CEC-funded project and the benefits resulting from the project for the public and key decision makers.

The Recipient shall:

- Prepare and submit to the CAM an Initial Project Fact Sheet at start of the project that describes the project and the expected benefits. Use the format provided by the CAM.
- Prepare and submit to the CAM a Final Project Fact Sheet at the project's conclusion that describes the project, the actual benefits resulting from the project, and lessons learned from implementing the project. Use the format provided by the CAM.
- Submit to the CAM at least (6) six High Quality Digital Photographs (minimum resolution of 1300x500 pixels in landscape ratio) from the project.

Products:

- Initial Project Fact Sheet
- Final Project Fact Sheet
- High Quality Digital Photographs

Task 7 DATA COLLECTION, ANALYSIS, AND REPORTING

The goal of this task is to collect operational data from the project, to analyze that data for economic and environmental impacts, and to include the data and analysis regular progress reports and the Final Report.

The Recipient shall:

- Develop data collection test plan for deployed charging equipment.
- Troubleshoot any issues identified.
- Collect a minimum of 12 months of data from:
    - Mobile charger activity (energy used for vehicle propulsion) including, but not limited to:
        - Mobile unit charging location
        - Charge session time and duration
        - Idle and in-field service time and duration
        - Travel routes, distances, and average speed
        - Energy taken onboard (kWh)
        - Peak power delivered (kW)
        - Total electricity and charging cost
    - In-field charging events (energy used to charge stranded vehicles) including, but not limited to:
        - V2V charging location
        - Charge session time and duration
        - Idle and in-field service time and duration
        - Energy provided via V2V (kWh)
        - Peak power delivered via V2V (kW)
        - Service cost to rescued driver
        - Types of vehicles rescued
        - Number of unique vehicles rescued
        - Response time
- Submit the data described above electronically in a monthly progress report throughout the duration of the data collection period.
- Develop a plan to provide other relevant data and information throughout the duration of the funding agreement including, but not limited to:
    - Lessons learned
    - Best practices (e.g., permitting and installation processes)
    - Job creation
    - Economic development
    - Increased state revenue

- End user evaluations and user acceptance (through means such as surveys, interviews, and focus groups)
- Degree to which disadvantages communities were served

- Submit the data described above electronically in a quarterly progress report throughout the duration of the agreement.
- Compare any project performance and expectations provided in the proposal to Energy Commission with actual project performance and accomplishments.
- Collect data, information and analysis described above and:
    - Prepare a Summary Report on Data, Analysis, and Results from Mobile Charger Activity and In-Field Charging Events and submit to the CAM.
    - Prepare a Summary Report on Best Practices, Lessons Learned, and Barriers to Implementation and submit to the CAM.
    - Include discussion of the data and results in the Final Report.

Products:

- Monthly progress reports
- Quarterly progress reports
- Summary Report on Data, Analysis, and Results from Mobile Charger Activity and In-Field Charging Events
- Summary Report on Best Practices, Lessons Learned, and Barriers to Implementation

RESOLUTION NO: 21-0715-6a

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: HUMMINGBIRDEV

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

RESOLVED, that the CEC approves Agreement ARV-21-001 with HummingbirdEV for a $998,287 agreement to develop and deploy a seamless and streamlined vehicle-to-vehicle mobile charging solution; and

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

CERTIFICATION

The undersigned Secretariat to the 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 July 15, 2021.

AYE:
NAY:
ABSENT:
ABSTAIN:

_____
Liza Lopez
Secretariat