STATE OF CALIFORNIA

CONTRACT REQUEST FORM (CRF)

CEC-94 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

A) New Agreement 600-17-008 (To be completed by CGL Office)

600 Fuels and Transportation Division	Matthew Ong	27	916-653-5285

The Regents of the University of California, Irvine	95-2226406

Roadmap for the Deployment and Buildout of Renewable Hydrogen Generation Plants

	5 / 9 / 2018	6 / 30 / 2019	$ 350,000

☐ Operational agreement (see CAM Manual for list) to be approved by Executive Director

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

Proposed Business Meeting Date	5 / 9 / 2018	☐ Consent	☒ Discussion
Business Meeting Presenter		Time Needed:	5 minutes

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

Agenda Item Subject and Description

UNIVERSITY OF CALIFORNIA, IRVINE. Proposed resolution approving Agreement 600-17-008 with The Regents of the University of California, on behalf of the Irvine campus for a $350,000 contract to conduct a one-year research study to establish a roadmap for the development of renewable hydrogen generation facilities in California. The results will provide immediate insight into the size, location, technology, costs, and input and distribution resources required for the early fuel cell electric vehicle (FCEV) market. The study will recommend a plan for the roll-out of facilities to support the mature FCEV market and meet state goals. (ARFVTP funding)

Contact: Matthew Ong

(Staff Presentation: 5 minutes)

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":
   Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because it is for a paper study and computational analyses, encompassing basic data collection, research, experimental management, and resource evaluation activities that do not result in major disturbances to an environmental resource (Categorical Exemption under CEQA Guidelines §15306. Information Collection).

2. If Agreement is considered a "Project" under CEQA:
   ☐ a) Agreement **IS** exempt. (Attach draft NOE)
   ☐ Statutory Exemption. List PRC and/or CCR section number: _____
   ☐ Categorical Exemption. List CCR section number: _____
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)
   Explain reason why Agreement is exempt under the above section:
   _____

   ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study ☐ Environmental Impact Report
   ☐ Negative Declaration ☐ Statement of Overriding Considerations
   ☐ Mitigated Negative Declaration

Legal Company Name:	Budget	SB	MB	DVBE
	$ 0	☐	☐	☐
	$ 0	☐	☐	☐
	$ 0	☐	☐	☐

Legal Company Name:

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J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
ARFVTP			$350,000
Funding Source			$
Funding Source			$
Funding Source			$
Funding Source			$
R&D Program Area: Select Program Area			$350,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Name:	Paul Lekutai		Name:	Scott Samuelsen	
Address:	UCI Office of Research 141 Innovation Drive, Suite 250		Address:	Advanced Power & Energy Program University of California, Irvine	
City, State, Zip:	Irvine, CA 92697		City, State, Zip:	Irvine, CA 92697-3550	
Phone:	949-824-4781	Fax: - -	Phone:	949-824-5468	Fax: 949-824-7423
E-Mail:	plekutai@uci.edu		E-Mail:	gss@apep.uci.edu	

☐ Solicitation Select Type Solicitation #: - - # of Bids: _____ Low Bid? ☐ No ☐ Yes
☐ Non Competitive Bid *(Attach CEC 96)*
☒ Exempt Interagency

☐ Private Company *(including non-profits)*
☒ CA State Agency *(including UC and CSU)*
☐ Government Entity *(i.e. city, county, federal government, air/water/school district, joint power authorities, university from another state)*

☒ No ☐ Yes
If yes, check appropriate box: ☐ SB ☐ MB ☐ DVBE

☒ Not Applicable (Agreement is with a CA State Entity or a membership/co-sponsorship)
☐ Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)
☐ The Services Contracted:
- ☐ are not available within civil service
- ☐ cannot be performed satisfactorily by civil service employees
- ☐ are of such a highly specialized or technical nature that the expert knowledge, expertise, and ability are not available through the civil service system.

☐ The Services are of such an:
- ☐ urgent
- ☐ temporary, or
- ☐ occasional nature

that the delay to implement under civil service would frustrate their very purpose.

Justification:

☒ A. Reimbursement in arrears based on:
☒ Itemized Monthly ☐ Itemized Quarterly ☐ Flat Rate ☐ One-time
☐ B. Advanced Payment
☐ C. Other, explain:

1. Is Agreement subject to retention? ☒ No ☐ Yes
   If Yes, Will retention be released prior to Agreement termination? ☐ No ☐ Yes

R) Justification of Rates

Standard Energy Commission-University of California negotiated personnel and overhead rates for projects were applied.

1. ☒ Exempt (Interagency/Other Government Entity)
2. ☐ Meets DVBE Requirements DVBE Amount:$ 0 DVBE %:
   - ☐ Contractor is Certified DVBE
   - ☐ Contractor is Subcontracting with a DVBE: Name of DVBE Company
3. ☐ Contractor selected through CMAS or MSA with no DVBE participation.
4. ☐ Requesting DVBE Exemption (attach CEC 95)

1. Will there be Work Authorizations?	☒ No	☐ Yes
2. Is the Contractor providing confidential information?	☒ No	☐ Yes
3. Is the contractor going to purchase equipment?	☒ No	☐ Yes
4. Check frequency of progress reports		
☒ Monthly ☐ Quarterly ☐ Other...		
5. Will a final report be required?	☐ No	☒ Yes
6. Is the Agreement, with amendments, longer than a year? If yes, why?	☐ No	☒ Yes
Project will be for 1 year of study and analyses. An extra 1-2 months is given for agreement closeout.		

1. Exhibit A, Scope of Work	☐ N/A	☒ Attached
2. Exhibit B, Budget Detail	☐ N/A	☒ Attached
3. CEC 96, NCB Request	☒ N/A	☐ Attached
4. CEC 95, DVBE Exemption Request	☒ N/A	☐ Attached
5. CEQA Documentation	☒ N/A	☐ Attached
6. Resumes	☒ N/A	☐ Attached
7. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
SCOPE OF WORK

TASK LIST

Task #	Task Name
1	Agreement Management
2	Research Design and Data Collection
3	Renewable Hydrogen Production Facility Siting Analysis
4	Renewable Hydrogen Roadmap Development

ACRONYMS/GLOSSARY

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

Acronym	Definition
APEP	Advanced Power and Energy Program
CCM	Commission Contract Manager
FCEV	Fuel Cell Electric Vehicle
GFO	Grant Funding Opportunity
STREET	Spatially and Temporally Resolved Energy and Environmental Tool
UCI / UC Irvine	University of California, Irvine

BACKGROUND/PROBLEM STATEMENT

Hydrogen fuel cell electric vehicles (FCEVs) are expected to play an integral role in: (1) achieving the governor's target of 5 million zero-emission vehicles on the road in California by 2030, and (2) meeting the state's environmental goals of reducing greenhouse gas and criteria pollutant emissions from the transportation sector. While hydrogen refueling stations, largely co-funded by the Energy Commission, are being deployed to support the emerging retail market for light-duty FCEVs, the sources of hydrogen are immediately stressed due to existing demands from the industry in general, and petroleum refining in particular. Senate Bill 1505 (Lowenthal, Chapter 877, Statutes of 2006) requires that 33.3% of the hydrogen fuel dispensed today by publicly funded hydrogen refueling stations be derived from renewable sources, providing an additional challenge to the FCEV refueling industry. Given these State goals and requirements, a roadmap for the development of resources to generate renewable hydrogen from today to full build-out is both prudent and timely to develop. This roadmap will serve as a tool to guide future State policy and funding decisions.

GOALS AND OBJECTIVES OF THE AGREEMENT

The goal of this agreement is to perform a one-year research effort to establish an initial roadmap for the optimal deployment of renewable hydrogen generation facilities in California. The objectives to meet this goal are to:

- Collect relevant information and data on developed and proposed renewable hydrogen production projects.
- Characterize the current and projected state of relevant renewable hydrogen production technologies and systems, including both central and distributed generation.

- Use the spatial and temporal analyses capability embodied within the University of California, Irvine (UCI) Advanced Power and Energy Program (APEP) Spatially and Temporally Resolved Energy and Environmental Tool (STREET) tool to provide immediate insight into the size, location, technology, costs, feedstock supply and hydrogen distribution resources required to supply renewable hydrogen to the network of fueling stations planned serving the early FCEV market through 2025.
- Develop a high-level roadmap consisting of a time-phased plan for the roll-out of facilities required to serve the evolving renewable hydrogen market including light-duty vehicles and other transportation sector uses (e.g., freight, ports, rail), considering the impacts from other potential future markets for renewable hydrogen such as petroleum refining.
- Create a plan for further research and development to support the build-out described in the roadmap and identify steps required to further refine the roadmap.

FORMAT/REPORTING REQUIREMENTS

Deliverables/Reports

When creating reports, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager (CCM), the latest version of the Consultant Reports Style Manual published on the Energy Commission's web site:

http://www.energy.ca.gov/contracts/consultant_reports/index.html

Each final deliverable shall be delivered as one original, reproducible, 8 ½" by 11", camera-ready master in black ink. Illustrations and graphs shall be sized to fit an 8 ½" by 11" page and readable if printed in black and white.

Electronic File Format

The Contractor shall deliver an electronic copy (CD ROM or memory stick or as otherwise specified by the CCM) of the full text in a compatible version of Microsoft Word (.doc).

The following describes the accepted formats of electronic data and documents provided to the Energy Commission as contract deliverables and establishes the computer platforms, operating systems and software versions that will be required to review and approve all software deliverables.

- Data sets shall be in Microsoft (MS) Access or MS Excel file format.
- PC-based text documents shall be in MS Word file format.
- Documents intended for public distribution shall be in PDF file format, with the native file format provided as well.
- Project management documents shall be in MS Project file format.

Software Application Development

If this scope of work includes any software application development, including but not limited to databases, websites, models, or modeling tools, contractor shall utilize the following standard Application Architecture components in compatible versions:

- Microsoft ASP.NET framework (version 3.5 and up) Recommend 4.0
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5
- Visual Studio.NET (version 2008 and up) Recommend 2010

- C# Programming Language with Presentation (UI), Business Object and Data Layers
- SQL (Structured Query Language)
- Microsoft SQL Server 2008, Stored Procedures Recommend 2008 R2
- Microsoft SQL Reporting Services Recommend 2008 R2
- XML (external interfaces)

Any exceptions to the Software Application Development requirements above must be approved in writing by the Energy Commission Information Technology Services Branch.

TASK 1- AGREEMENT MANAGEMENT

Task 1.1 Kick-off Meeting

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

The Contractor shall:

- Attend a "kick-off" meeting with the CCM, the Contracts Officer, and a representative of the Accounting Office. The meeting will be held via Web-Ex or teleconference. The Contractor shall include their Project Manager, Contracts Administrator, Accounting Officer, and others designated by the CCM in this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting.

- If necessary, prepare an updated Schedule of Deliverables based on the decisions made in the kick-off meeting.

The CCM shall:

- Arrange the meeting including scheduling the date and time.

- Provide an agenda to all potential meeting participants prior to the kick-off meeting.

Deliverables:

- Updated Schedule of Deliverables
- Kick-Off Meeting Agenda (CEC)

Task 1.2 Invoices

The Contractor shall:

- Prepare invoices for all reimbursable expenses incurred performing work under this Agreement in compliance with the Exhibit B of the Terms and Conditions of the Agreement. Invoices shall be submitted with the same frequency as progress reports (task 1.4). Invoices must be submitted to the Energy Commission's Accounting Office.

Deliverables:

- Invoices

Task 1.3 Manage Subcontractors

The goal of this task is to ensure quality products, to enforce subcontractor Agreement provisions, and in the event of failure of the subcontractor to satisfactorily perform services, recommend solution to resolve the problem.

The Contractor shall:

- Manage and coordinate subcontractor activities. The Contractor is responsible for the quality of all subcontractor work and the Energy Commission will assign all work to the Contractor. If the Contractor decides to add new subcontractors, they shall 1) comply with the Terms and Conditions of the Agreement, and 2) notify the CCM who will follow the Energy Commission's process for adding or replacing subcontractors.

Deliverables:

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

Task 1.4 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.

The Contractor shall:

- Prepare progress reports which 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. Each progress report is due within 15 calendar days after the end of the reporting period. The CCM will provide the format for the progress reports.

Deliverables:

- Quarterly Progress Reports

Task 1.5 Final Report

The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work completed under this Agreement. The Final Report shall be prepared in language easily understood by the public or layperson with a limited technical background.

The Final Report must be completed before the termination date of the Agreement in accordance with the Schedule of Deliverables.

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

Task 1.5.1 Final Report Outline

The Contractor shall:

- Prepare and submit a draft outline of the Final Report for review and approval. The CCM will provide written comments to the Contractor on the draft outline. The Contractor shall review the comments and discuss any issues with the recommended changes with the CCM.

- Prepare and submit the final outline of the Final Report, incorporating CCM comments.

Deliverables:
- Draft Outline of the Final Report
- Final Outline of the Final Report

Task 1.5.2 Final Report

The Contractor shall:
- Prepare the draft Final Report for this Agreement in accordance with the approved outline.

- Submit the draft Final Report for review and comment. The CCM will provide written comments to the Contractor. The Contractor shall review the comments and discuss any issues with the recommended changes with the CCM.

- Prepare and submit the Final Report, incorporating CCM comments.

Deliverables:
- Draft Final Report
- Final Report

Task 1.6 Final Meeting
The goal of this task is to discuss closeout of this Agreement and review the project.

The Contractor shall:
- Meet with Energy Commission staff prior to the term end date of this Agreement. The meeting will be held via Web-Ex or teleconference. This meeting will be attended by the Contractor Project Manager and the CCM. The CCM will determine any additional appropriate meeting participants. The administrative and technical aspects of Agreement closeout will be discussed at the meeting.

- Present findings, conclusions, and recommended next steps (if any) for the Agreement, based on the information included in the Final Report.

- Prepare a written document of meeting agreements and unresolved activities.

- Prepare a schedule for completing the closeout activities for this Agreement, based on determinations made within the meeting.

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

<u>TECHNICAL TASKS</u>

Task 2 Research Design and Data Collection

The goal of this task is to acquire the data and information needed to perform the siting, modeling, and analysis work under Tasks 3 and 4. The data shall include information on renewable hydrogen production technologies and feedstock sources available in California.

The Contractor shall:

- Work with the CCM to designate target areas, data resources, and optimization parameters for the analysis of hydrogen production facilities.

- Identify existing and prospective facilities and systems for producing hydrogen in California. These may include projects proposed and awarded under Grant Funding Opportunity (GFO)-17-602, Renewable Hydrogen Transportation Fuel Production Facilities and Systems.

- Track, analyze, and extract insights and real-world data from the designated set of existing and prospective renewable hydrogen projects.

- Identify appropriate data resources for determining the quantities and spatial distribution of potential feedstock for renewable hydrogen production, including renewable electricity and biomass and biogas resources.

- Characterize the cost and performance of relevant renewable hydrogen production technologies, including but not limited to electrolysis, anaerobic digestion, and gasification. The evaluation shall take into account scale dependence, siting requirements, and regulations and policies that could impact technology adoption.

Deliverables:

- List of Data Sources
- Renewable Hydrogen Production Projects and Feedstocks Data (Non-Confidential)
- Interim Report on Renewable Hydrogen Production Technology Cost and Performance

Task 3 Renewable Hydrogen Production Facility Siting Analysis

The goal of this task is to use and enhance the necessary modeling tools in conjunction with the information collected in Task 2 to conduct siting analyses for renewable hydrogen production facilities and systems in California.

The Contractor shall:

- Develop the methodology, employing the STREET analysis platform, for candidate site identification and ranking (e.g., by land area, zoning, permitting, and in and out-bound logistics requirements for the defined set of potential production technologies)

- Develop and/or enhance modeling capabilities to map the quantities and spatial distribution of potential feedstocks for renewable hydrogen production.

- Establish scenarios for optimal spatial deployment and technology of renewable hydrogen production facilities considering feedstock and product logistics, environmental impacts, and delivered cost of hydrogen.

- Perform parametric variations to analyze the relative benefits of different methods for hydrogen production, including but not limited to central and distributed hydrogen production systems and combinations thereof.

Deliverables:

- Summary and List of Proposed Siting Methodologies and Modeling Methods
- Interim Report on Results of Renewable Hydrogen Production Siting Analysis

Task 4 Renewable Hydrogen Roadmap Development

The goal of this task is to develop a roadmap for the deployment of renewable hydrogen production for use in FCEVs and the broader transportation sector, and provide suggestions for future work. The roadmap will provide specific detail on serving the planned network of 200 hydrogen refueling stations and several thousand FCEVs in the 2020 to 2025 time frame and will provide higher-level scenarios through 2050.

The Contractor shall:

- Perform siting and economic analyses on the potential deployment of renewable hydrogen production facilities using five-year intervals beginning in 2020 and extending through 2050, and incorporate siting analyses from Task 3.

- Model and analyze an early deployment phase (2020 to 2025), featuring technologies that are currently in commercial deployment, and assess project cost and performance improvements based on current trends.

- Model and analyze a mid/long-term phase (2025 to 2050), including a range of technology scenarios, technology forecasting, and scenarios for growth in renewable hydrogen demand to serve an expanded array of transportation and non-transportation demand for renewable hydrogen.

- Quantify the estimated amount of subsidies required over time to meet target price points for delivered and dispensed hydrogen based on the expected evolution of feedstock and conversion costs.

- Perform a high-level research and development needs assessment.

- Create a research and development plan to support the build-out described in the roadmap.

- Identify future potential steps for further refining the roadmap.

Deliverables:

- Renewable Hydrogen Production Roadmap Outline
- Renewable Hydrogen Production Roadmap Draft Report
- Renewable Hydrogen Production Roadmap Final Report
- Assessment of R&D Needs and Future Work

RESOLUTION NO: 18-0509-10

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: UNIVERSITY OF CALIFORNIA, IRVINE

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 Agreement 600-17-008 with The Regents of the University of California, on behalf of the Irvine campus for a $350,000 contract to conduct a one-year research study to establish a roadmap for the development of renewable hydrogen generation facilities in California. The results will provide immediate insight into the size, location, technology, costs, and input and distribution resources required for the early fuel cell electric vehicle (FCEV) market. The study will recommend a plan for the roll-out of facilities to support the mature FCEV market and meet state goals; 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 May 9, 2018.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat