Exhibit A
SCOPE OF WORK

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2		SOLAR FORECASTING
3		DISTRIBUTED ENERGY STORAGE SYSTEMS (DESS)
4		OBSERVABILITY OF MICROGRID OPERATION BY THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR
5	X	RENEWABLE ENERGY CHARGING OF ELECTRIC VEHICLES
6		TECHNOLOGY TRANSFER ACTIVITIES

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Jan Kleissl – UCSD	None	
2	Jan Kleissl – UCSD		CAISO
3	Byron Washom – UCSD		
4	Byron Washom – UCSD		CAISO
5	Byron Washom – UCSD		
6	Byron Washom – UCSD		

GLOSSARY

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

Acronym	Definition
AC	Alternating Current
CAISO	California Independent System Operator
CCM	Energy Commission Contract Manager
CPR	Critical Project Review
CPUC	California Public Utilities Commission
DC	Direct Current
DER	Distributed Energy Resources
DESS	Distributed Energy Storage Systems
EV	Electric Vehicle
Energy Commission	California Energy Commission
Hr	Hour

Acronym	Definition
kVAR	Kilovolt-Ampere Reactive
NWP	Nation Weather Prediction
MG	Megawatt
NERC	North American Electric Reliability Corporation
PAC	Project Advisory Committee
PIER	Public Interest Energy Research
PV	Photovoltaic
RPS	Renewable Portfolio Standard
SDG&E	San Diego Gas & Electric
WECC	Western Electric Coordinating Council
UCC.1	Uniform Commercial Code (Financing Statement)
UCSD	University of California San Diego

Problem Statement

Renewable generation, storage, and the charging of electric vehicles must be integrated to work together in a microgrid so as to be able to provide grid support for the California Independent System Operator (CAISO).

This contract will fund four microgrid projects that involve solar forecasting, demonstration of distributed energy storage systems, demonstration of renewable energy charging of electric vehicles, and improvement of CAISO microgrid operations observability.

Goal of the Agreement

The goal of this Agreement is to show the benefits of coordinated resources in a microgrid system. The individual resources will be operated together in an integrated fashion to maximize their contribution as a resource and the aggregated response will be observed by the CAISO. Each resource has individual objectives for measuring success. The objectives are listed in the following section.

Objectives of the Agreement

The objective of this Agreement is to individually maximize the operation of resources of a microgrid and integrate them into a system that is observable by the CAISO.

University of California, San Diego's (UCSD) industrial 42 Megawatt (MW) customer microgrid is universally recognized by energy authorities as one of the most sophisticated in the country with a diversity of distributed generation, renewable energy, energy storage, energy efficiency and demand response capability.

The objectives of the solar forecasting project are to:

1. Develop solar forecasting products for hour-ahead solar forecasting.
2. Demonstrate the application of this solar forecasting at Sempra Generation's 48 MW Photovoltaic (PV) Plant.
3. Decrease the ancillary services cost per additional MW of solar power on the grid by 50%, if the proposed forecasting model was used operationally. This will reduce the indirect cost of solar power to California ratepayers. During 2008, the CASIO spent a total of $113 million to acquire ancillary services, the "fast-response" products that the system operator uses to respond to sudden changes in the output of variable generation. In a 2007 study CASIO estimated that it would need to acquire significant additional ancillary services to meet the 20% Renewable Portfolio Standard (RPS) goal, largely due to the uncertainty or lack of forecasting for renewable generation. The opportunity to reduce this expanded procurement through the development of more accurate forecasting tools (such as the models proposed in this project) is clearly worth tens of millions of dollars.
4. Integrate output of models into utility forecasting tools and transmission and distribution models based upon the needs of CAISO and the utilities in California. Test compatibility of tools in commercial scheduler/optimizers to enable supply, storage and load adjustments on a microgrid. UCSD's microgrid as a commercialization test bed will provide market linkages to facilitate the demonstration and widespread adoption of the results. To assure maximization of project benefits to utilities and California ratepayers, from the very start we will involve utilities and CAISO in the project planning and execution under the auspices of the California Solar Energy Collaborative. The final release of the models estimated in late 2012 will be advertised through Western Electric Coordinating Council (WECC) and North American Electric Reliability Corporation (NERC) working groups.

The objectives of the Distributed Energy Storage Systems (DESS) project are to:

1. Demonstrate the performance of a fleet of DESSs on daily circuit level, total kilowatt hour (kW-hr)charge/ discharge, charge/discharge durations, fleet round trip efficiency, peak demand with and without fleet, charge cycle demand with and without fleet, kilovolt-ampere reactive (kVAR) hours provided/consumed by fleet, peak kVAR provided/consumed by fleet, circuit pf with/without fleet, average charge/discharge per DESS, kW-hr, kVAR, kW and kVAR, load factor with/without fleet, total charge/discharge exceptions due to power/voltage limits, communications failures (number and duration), islanding customer minutes, customer events (number of customer interruptions avoided), islanding duration, number and duration of DESS unit outages (fully discharged), and minimum and maximum available energy of the fleet.
2. Determine if distribution feeders can be monitored for actual power flows to determine the mitigation effects and cost competitiveness of DESS on different loading patterns of the PV generation and existing customer load on the feeder?
3. Develop control algorithms for both the PV inverters and the DESS inverters in an effort to determine if distribution feeder loading can be optimized and improved by 10%.

4. Demonstrate that advanced control systems with DESS negate the capital cost impact to distribution feeders when their limit of 15% is exceeded.
5. Demonstrate DESS as a mitigating measure comparable in cost to utility based solutions.

The objectives of the Observability of Microgrid operation by the California Independent System Operator project are to:

1. Demonstrate that a highly instrumented microgrid can appreciably raise the distribution and CAISO operators' understanding of microgrids to a level that will permit these resources to become competitive operational assets for power generation, demand response and ancillary services responding to dynamic price signals.
2. Demonstrate that distributed energy resources, including solar PV coupled with advanced energy storage and demand response, have the capability to adjust their internal microgrid operations to stabilize the variable renewable generation which will allow local utilities to better balance their networks and the CAISO to reliably schedule and dispatch the microgrid.

The objectives of the Renewable Energy Charging of Electric Vehicles are to:

1. Document that electric vehicle (EV) emission levels below 130 gCO2e/mi can be achieved with renewable distributed energy resources as the charging source.
2. Demonstrate that a direct current linked chargeport for charging of EVs can mitigate variable renewable generation.
3. Demonstrate that bi-directional, vehicle-to-grid operability provides ancillary grid services, storage, and/or generating assets.
4. Document that renewable resources provide EV charging at a delivered cost comparable to the Experimental Tariff Rates approved by the California Public Utilities Commission (CPUC) for San Diego Gas and Electric company (SDG&E).
5. Demonstrate that a direct current linked chargeport is more efficient than an AC linked chargeport.

TASK 1.0 ADMINISTRATION

MEETINGS

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 Contractor shall:

- Attend a "kick-off" meeting with the Commission Contract Manager, the Contracts Officer, and a representative of the Accounting Office. The Contractor shall bring their Project Manager, Contracts Administrator, Accounting Officer, and others designated by the Commission Contract Manager to this meeting. The

administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Contract Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Terms and conditions of the Agreement
- CPRs (Task 1.2)
- Match fund documentation (Task 1.7)
- Permit documentation (Task 1.8)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Contract Manager's expectations for accomplishing tasks described in the Scope of Work;
- An updated Schedule of Deliverables
- Progress Reports (Task 1.4)
- Technical Deliverables (Task 1.5)
- Final Report (Task 1.6)

The Commission Contract Manager shall designate the date and location of this meeting.

Contractor Deliverables:

- An Updated Schedule of Deliverables
- An Updated Gantt Chart (if included)
- An Updated List of Match Funds
- An Updated List of Permits

Commission Contract Manager Deliverables:

- Final Report Instructions

Task 1.2 CPR Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and if it should, are there any modifications that need to be made to the tasks, deliverables, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Contractor. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Contract Manager and as shown in the Technical Task List above and in the Schedule of Deliverables. However, the Commission Contract Manager may schedule additional CPRs as necessary, and, if necessary, the budget will be reallocated to cover the additional costs borne by the Contractor, but the overall contract amount will not increase.

Participants include the Commission Contract Manager and the Contractor, and may include the Commission Contracts Officer, the PIER Program Team Lead, other Energy

Commission staff and Management as well as other individuals selected by the Commission Contract Manager to provide support to the Energy Commission.

The Commission Contract Manager shall:

- Determine the location, date and time of each CPR meeting with the Contractor. These meetings generally take place at the Energy Commission, but they may take place at another location.

- Send the Contractor 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. One of the outcomes of this meeting will be a schedule for providing the written determination described below.

- Determine whether to continue the project, and if continuing, whether or not to modify the tasks, schedule, deliverables and budget for the remainder of the Agreement, including not proceeding with one or more tasks. If the Commission Contract Manager concludes that the project needs a formal amendment or that satisfactory progress is not being made and the project needs to be ended, these conclusions will be referred to the Commission's Research, Development and Demonstration Policy Committee for its concurrence.

- Provide the Contractor with a written determination in accordance with the schedule. The written response may include a requirement for the Contractor to revise one or more deliverable(s) that were included in the CPR.

The Contractor 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 deliverables identified in this Scope of Work. Submit these documents to the Commission Contract Manager 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.

Contractor Deliverables:
- CPR Report(s)
- CPR deliverables identified in the Scope of Work

Commission Contract Manager Deliverables:
- Agenda and a List of Expected Participants

- Schedule for Written Determination
- Written Determination

Task 1.3 Final Meeting
The goal of this task is to closeout this Agreement.

The Contractor shall:

- Meet with the Energy Commission 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 Contractor, the Commission Contracts Officer, and the Commission Contract 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 Contract Manager.

  The technical portion of the meeting shall present findings, conclusions, and recommended next steps (if any) for the Agreement. The Commission Contract Manager will determine the appropriate meeting participants.

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

  - What to do with any state-owned equipment (Options)
  - Need to file UCC.1 form re: Energy Commission's interest in patented technology
  - Energy Commission's request for specific "generated" data (not already provided in Agreement deliverables)
  - Need to document Contractor's disclosure of "subject inventions" developed under the Agreement
  - "Surviving" Agreement provisions, such as repayment provisions and confidential deliverables
  - Final invoicing and release of retention

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

Deliverables:
- Written documentation of meeting agreements and all pertinent information
- Schedule for completing closeout activities

REPORTING

See Exhibit D, Reports/Deliverables/Records.

Task 1.4 Quarterly Progress Reports
The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research 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 to the Commission Contract Manager within 10 working days after the end of the reporting period. Attachment A-2, Progress Report Format, provides the recommended specifications.

Deliverables:
- Quarterly Progress Reports

Task 1.5 Test Plans, Technical Reports and Interim Deliverables
The goal of this task is to set forth the general requirements for submitting test plans, technical reports and other interim deliverables, unless described differently in the Technical Tasks. When creating these 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

The Contractor shall:

- Unless otherwise directed in this Scope of Work, submit a draft of each deliverable listed in the Technical Tasks to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. 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.

Task 1.6 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 done under this Agreement. The Commission Contract Manager will review and approve the Final Report. The Final Report must be completed on or before the termination date of the Agreement. When creating these 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

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

Task 1.6.1 Final Report Outline

The Contractor shall:

- Prepare a draft outline of the Final Report.

- Submit the draft outline of Final Report to the Commission Contract Manager for review and approval. The Commission Contract Manager will provide written comments back to the Contractor on the draft outline within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final outline to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final outline within 5 working days of receipt.

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

Task 1.6.2 Final Report

The Contractor shall:

- Prepare the draft Final Report for this Agreement in accordance with the approved outline.

- Submit the draft Final Report to the Commission Contract Manager for review and comment. The Commission Contract Manager will provide written comments within 10 working days of receipt.

  Once agreement on the draft Final Report has been reached, the Commission Contract Manager shall forward the electronic version of this report for Energy Commission internal approval. Once the approval is given, the Commission Contract Manager shall provide written approval to the Contractor within 5 working days.

- Submit one bound copy of the Final Report with the final invoice.

Deliverables:
- Draft Final Report
- Final Report

MATCH FUNDS, PERMITS, AND ELECTRONIC FILE FORMAT

Task 1.7 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. While the PIER budget for this task will be zero dollars, the Contractor may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds during the term of this Agreement. Match funds must be identified in writing, and the associated commitments obtained before the Contractor can incur any costs for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:

    1. 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.

    2. 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 Contractor shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.

        - 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.

- Discuss match funds and the implications to the Agreement if they are significantly 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 Contract Manager if during the course of the Agreement additional match funds are received.

- Notify the Commission Contract Manager within 10 working days if during the course of the Agreement existing match funds are reduced. Reduction in match funds may trigger an additional CPR.

Deliverables:
- A letter regarding Match Funds or stating that no Match Funds are provided
- Letter(s) for New Match Funds
- A copy of each Match Fund commitment letter
- Letter that Match Funds were Reduced (if applicable)

Task 1.8 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 reimbursable under this Agreement. Permits must be identified in writing before the Contractor can incur any costs related to the use of the permit(s) for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:

    1. If there are no permits required at the start of this Agreement, then state such in the letter.

    2. 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

    - Schedule the Contractor will follow in applying for and obtaining these permits.

- The list of permits and the schedule for obtaining them will be discussed at the kick-off meeting, and a timetable for submitting the updated list, schedule and the copies of the permits will be developed. 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, then provide the appropriate information on each permit and an updated schedule to the Commission Contract Manager.

- As permits are obtained, send a copy of each approved permit to the Commission Contract Manager.

- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Contract Manager within 5 working days. Either of these events may trigger an additional CPR.

Deliverables:
- A letter documenting the Permits or stating that no Permits are required
- Updated list of Permits as they change during the Term of the Agreement
- Updated schedule for acquiring Permits as it changes during the Term of the Agreement
- A copy of each approved Permit

Task 1.9 Electronic File Format
The goal of this task is to unify the formats of electronic data and documents provided to the Energy Commission as contract deliverables. Another goal is to establish the computer platforms, operating systems and software that will be required to review and approve all software deliverables.

The Contractor shall:

- Deliver documents to the Commission Contract Manager in the following formats:
    - 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.

- Request exemptions to the electronic file format in writing at least 90 days before the deliverable is submitted.

Deliverables:

- A letter requesting exemption from the Electronic File Format (if applicable)

TECHNICAL TASKS

The Contractor shall prepare all deliverables in accordance with the requirements in Task 1.5. Deliverables not requiring a draft version are indicated by marking "(no draft)" after the deliverable name.

Task 2 SOLAR FORECASTING

The goal of this task is to develop solar forecasting tools for utilities, microgrid owner-operators, and CAISO. Intra-Hour to 3 day-ahead solar forecasting tools will be integrated, evaluated, and made publically available by being published online.

Task 2.1 Solar Forecasting through ground data

The Contractor shall:

- Acquire solar power data for California.
- Evaluate cross-correlation algorithms to detect cloud motion and cloud optical depth from ground station data, satellite data, and numerical weather prediction (NWP).
- Evaluate forecast accuracy for single large power plants and dense clusters of distributed urban PV rooftop arrays.
- Prepare a report documenting accuracy (mean absolute percentage error) and applicability of solar forecasting by forecast duration, region, season, and meteorological condition.

Deliverables:

- Accuracy Report (no draft)

Task 2.2 Solar Forecasting demonstration of tools developed at Sempra Generation's 48 MW PV Plant

The Contractor shall:

- Install algorithms developed in Task 2.1 at Sempra generations 48 MW PV facility.
- Conduct forecasting of PV plant power output for 6 months.
- Prepare a Forecasting Tool Performance Report that contains forecasting results including:
    1. Description of experimental data and algorithms used to deliver power output forecasts.
    2. Analysis of the performance of the forecast against actual output data.
    3. Recommendations for future applications of sky imagery for solar forecasting.

Deliverables:

- Forecasting Tool Performance Report (no draft)

Task 2.3 Optimize tools into a solar forecasting model

The Contractor shall:

- Conduct data assimilation to integrate NWP, satellite, and ground data into an optimal forecasting product.
- Evaluate and optimize model performance in different high solar penetration regions of California. This optimal solar forecasting model for California will be updated every hour with 5 minute to 3-day-ahead forecast at 1km resolution using a data assimilation approach for ground, satellite, and NWP data.
- Prepare Report documenting accuracy and applicability of integrated solar forecasting tools by forecast duration, region, season, and meteorological condition.

Deliverables:

- Optimal Forecasting Model Integration Report (no draft)

Task 3 DISTRIBUTED ENERGY STORAGE SYSTEMS (DESS)

The goal of this task is to integrate diverse DESSs on a microgrid to optimize their benefits, which include increased flexibility, functionality, interoperability, cyber security, observability, and operational efficiency of microgrid and distribution systems.

Task 3.1 Deploy and Demonstrate 33 kW/33 kWh PV Integrated Energy Storage System

The Contractor shall:

- Install on campus in a commercial retail application a 33 kW/33 kWh PV integrated storage system.
- Operate the integrated storage system for a minimum of 6 months.
- Develop a test plan and data acquisition for the specifics of a PV-Lithium ion battery system.
- Collaborate on the development of charge/discharge algorithms based upon results in parallel projects in solar forecasting.
- Prepare an operations report on the first six months of operations.)

Deliverables:

- Operations Report (no draft)

Task 3.2 Deploy and Long Term Test DESSs

The Contractor shall:

- Identify a variety of existing DESSs on and off campus in a residential, commercial and industrial application for endurance testing

- Operate the systems in an on and off grid mode for endurance testing.
- Prepare a test report on all endurance testing.

Deliverables:
- Test Report (no draft)

Task 4 OBSERVABILITY OF MICROGRID OPERATION BY THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR

The goal of this task is to utilize advanced data management and visualization software to provide CAISO with the ability to monitor a microgrid and its resources by integrating the resource elements of CAISO Direct Dispatch, UCSD's Microgrid Controller, Solar Forecasting, Building & Critical Infrastructure Energy Efficiency Programs, and other Future Sustainability and Energy Efficiency Programs.

Task 4.1 Installation and Operation of Data Management System for monitoring the microgrid

The Contractor shall:
- Conduct a study in collaboration with CAISO that provides sufficient information to determine the appropriate data management to connect various UCSD microgrid assets. This will include connection to the buildings, interfacing to the building automation system(s), critical campus facilities infrastructure including power/distribution systems, water/distribution systems, HVAC and other related infrastructure.
- Install, debug, integrate, operate and maintain the data communication system used by CAISO.
- Determine if the data communication system and the data in collaboration with CAISO meets CAISO's needs.
- Prepare an Observability Report on observability of microgrid operation by CAISO.

Deliverables:
- Observability Report

Task 5 RENEWABLE ENERGY CHARGING OF ELECTRIC VEHICLES

The goal is this task is to demonstrate a direct current linked chargeport to maximize the use of renewable energy resources and defer capital utility upgrades.

Task 5.1 Demonstrate Renewable Energy for the EV Charging Infrastructures at UC San Diego's 3 PV Garages (735 kW) and Directed Biogas Fuel Cell (2.8 MW)

The Contractor shall:

- Examine the current plans of Japanese, Chinese, and other solar assisted EV charging system developers.
- Demonstrate grid-tied and grid independent renewable energy resources to assist electric vehicle charging.
- Demonstrate dispatchable, grid-tied and grid independent battery storage to assist vehicle charging.
- Demonstrate the use of demand-response-enabled EV loads.
- Assemble a Project Advisory Group composed of original equipment manufacturers utilities, CAISO, and other stakeholders.
- Deploy at least one initial prototype utilizing an existing PV parking canopy model.
- Gather data for 6 months.
- Analyze and visualize data in collaboration with SDG&E and CAISO.
- Demonstrate that a direct current linked chargeport for charging of EVs can mitigate variable renewable generation.
- Demonstrate that bi-directional, vehicle-to-grid operability provides ancillary grid services, storage, and/or generating assets.
- Determine the efficiency and compare the performance of a direct current linked chargeport with the performance characteristics of an AC linked chargeport.
- Document in a report on Renewable Energy Charging of Electric Vehicles that renewable resources provide EV charging at a delivered cost comparable to the Experimental Tariff Rates approved by the CPUC for SDG&E.
- Document in a report on Renewable Energy Charging of Electric Vehicles that EV emission levels are achievable with renewable distributed energy resources as the charging source.
- Participate in a CPR as per Task 1.2.

Deliverables:
- Renewable Energy Charging of Electric Vehicles Report (no draft)
- CPR Report

Task 6 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:
- Working with the Energy Commission Contract Manager, prepare a Technology Transfer Plan. The plan shall explain how the knowledge gained in this contract will be made available to the public. The level of detail expected is least for research-related projects and highest for demonstration projects. Key elements from this report shall be included in the Final Report for this project.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities shall be reported in the Monthly Progress Reports.

Deliverables:

- Technology Transfer Plan