

CONTRACT REQUESTS FORM (CRF)

CEC-94 (Revised 5/11)

CALIFORNIA ENERGY COMMISSION


 New Contract _____ Amendment to Existing Contract: 500-10-043 Amendment Number: 1

Division	Contract Manager:	MS-	Phone	CM Training Date
ERDD - Energy Technology Systems Integration	Consuelo Sichon	43	916-327-2222	9/29/2009

Contractor's Legal Name	Federal ID Number
The Regents of the University of California, San Diego	95-2872494

Title of Project
Renewable Resource Management at UCSD

Term	Start Date	End Date	Amount
New/Original Contract	6/20/2011	12/30/2013	\$ 1,394,298

Line up the Amendment information as best as possible within the following table.

Amendment #	End Date (mm/dd/yy)	Amount
Amendment 1	3/31/2015	\$1,600,000

Business Meeting Information

Proposed Business Meeting Date	1/9/2013	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Consuelo Sichon	Time Needed:	5 minutes

Agenda Item Subject and Description

UNIVERSITY OF CALIFORNIA, SAN DIEGO: Possible approval of Amendment 1 to Agreement 500-10-043 with The Regents of the University of California, San Diego (UCSD) to add \$1,600,000.00 to the existing agreement amount, extend the agreement by 15 months, add a stand-alone distributed energy storage system using different, competitively-procured storage technologies, and add items to the scope of the project. This amendment also includes an additional \$1,525,000 in match funding. The new PIER total funding amount for this agreement is \$2,994,298. The Terms and Conditions are being modified. (PIER electricity funding) Contact: Consuelo Sichon (5 minutes)

Business Meeting approval is not required for the following types of contracts: *Executive Director's signature is required in all cases.*

- Contracts less than \$10k (*Policy Committee's signature is also required*)
- Amendment for a no-cost time extension. Must be first extension, less than one year and original contract less than \$100k.
- Contracts less than \$25k for Expert Witness in Energy Facility licensing cases and amendments.

Purpose of Contract or Purpose of Amendment, if applicable

This amendment will add a second Distributed Energy Storage Systems (DESS) using different storage technology to the project that would be charged/discharged daily for "load shifting". This project will then document and optimize the performance of multiple systems on the UCSD microgrid. This additional battery would be the largest electricity energy storage device located on any university campus in the world; thus it has an extremely high operational and engineering interest. It will represent one of the premier distributed energy storage systems in California. The lessons learned will be shared with the industry and the public. As directed by the Department of General Services, Office of Legal Services, the Exhibit D, Special Terms and Conditions, Disputes Provision is being amended to remove the Binding Arbitration language. In addition, other edits are being made to the remaining language.

CONTRACT REQUESTS FORM (CRF)



California Environmental Quality Act (CEQA) Compliance

1. Is Contract considered a "Project" under CEQA?
 Yes: skip to question 2 No: complete the following (PRC 21065 and 14 CCR 15378):
 Explain why contract is not considered a "Project":

2. If contract is considered a "Project" under CEQA:
 a) Contract **IS** exempt. (Draft NOE required)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: 14 CCR section 15301
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why contract is exempt under the above section:
 The project involves development of solar forecasting tools, installation of energy storage systems on a microgrid, installation and operation of a data communication system used by the California Independent System Operator, and demonstration of a direct current-linked charge port at an existing electric vehicle parking garage.
 b) Contract **IS NOT** exempt. The Contract Manager needs to consult with the Energy Commission attorney assigned to their division and the Siting Office regarding a possible Initial Study.

Budgets Information								
Contract Amount Funded		Breakdown by FY			Funding Sources			
Funding Source	Amount	FY	Amount	Approved?	Funding Source	FY	Budget List No.	Amount
ARFVTF	\$	12-13	\$1,600,000	Yes	PIER-E	11-12	501.027J	\$1,600,000
ECAA	\$		\$					\$
State- ERPA	\$		\$					\$
Federal	\$		\$					\$
PIER - E	\$1,600,000		\$					\$
PIER - NG	\$		\$					\$
Reimbursement	\$		\$					\$
Other	\$		\$					\$
TOTAL:	\$1,600,000	TOTAL:	\$1,600,000				TOTAL:	\$1,600,000
Reimbursement Contract #:					Federal Agreement			

Contractor's Administrator/ Officer		Contractor's Project Manager	
Name:	Byron Washom	Name:	Byron Washom
Address:	9500 Gilman Dr	Address:	9500 Gilman Dr
City, State, Zip:	La Jolla, CA 92093-0224	City, State, Zip:	La Jolla, CA 92093-0224
Phone/ Fax:	(858) 869-5805 / (858) 534-5203	Phone/ Fax:	(858) 869-5805 / (858) 534-5203
E-Mail:	bwashom@ucsd.edu	E-Mail:	bwashom@ucsd.edu

Contractor Is

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)

Selection Process Used

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



Civil Service Considerations	
<input checked="" type="checkbox"/> Not Applicable (Contract is with a CA State Entity or a membership/co-sponsorship)	
<input type="checkbox"/> Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)	
<input type="checkbox"/> The Services Contracted: <ul style="list-style-type: none"> <input type="checkbox"/> are not available within civil service <input type="checkbox"/> cannot be performed satisfactorily by civil service employees <input type="checkbox"/> are of such a highly specialized or technical nature that the expert knowledge, expertise, and ability are not available through the civil service system. 	
<input type="checkbox"/> The Services are of such an: <ul style="list-style-type: none"> <input type="checkbox"/> urgent <input type="checkbox"/> temporary, or <input type="checkbox"/> occasional nature that the delay to implement under civil service would frustrate their very purpose.	
Justification:	

Payment Method	
<input checked="" type="checkbox"/> A. Reimbursement in arrears based on: <ul style="list-style-type: none"> <input type="checkbox"/> Itemized Monthly <input checked="" type="checkbox"/> Itemized Quarterly <input type="checkbox"/> Flat Rate <input type="checkbox"/> One-time 	
<input type="checkbox"/> B. Advanced Payment	
<input type="checkbox"/> C. Other, explain:	

Retention	
1. Is contract subject to retention?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
If Yes, Do you plan to release retention prior to contract termination?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes

Justification of Rates	
The rates charged in this contract by the University of California are UC published rates and the overhead rates are the negotiated rates with the Energy Commission.	

Disabled Veteran Business Enterprise Program (DVBE)	
1. <input checked="" type="checkbox"/> Not Applicable	
2. <input type="checkbox"/> Meets DVBE Requirements DVBE Amount:\$ _____ DVBE %: _____	
<input type="checkbox"/> Contractor is Certified DVBE	
<input type="checkbox"/> Contractor is Subcontracting with a DVBE: _____	
3. <input type="checkbox"/> Requesting DVBE Exemption (attach CEC 95)	

Is Contractor a certified Small Business (SB), Micro Business (MB) or DVBE?		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
If yes, check appropriate box:		<input type="checkbox"/> SB <input type="checkbox"/> MB <input type="checkbox"/> DVBE

Is Contractor subcontracting any services?		<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
If yes, give company name and identify if they are a Small Business (SB), Micro Business (MB) and/or DVBE:		
Power Analytics	<input checked="" type="checkbox"/> No	<input type="checkbox"/> SB <input type="checkbox"/> MB <input type="checkbox"/> DVBE
Smart Grid & Energy IT Consulting	<input checked="" type="checkbox"/> No	<input type="checkbox"/> SB <input type="checkbox"/> MB <input type="checkbox"/> DVBE

CONTRACT REQUESTS FORM (CRF)



Miscellaneous Contract Information

- 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 _____
- 5. Will a final report be required? No Yes
- 6. Is the contract, with amendments, longer than a year? If yes, why? No Yes

The Department of General Services has agreed to give the Commission blanket authority to execute multi-year contracts to support the Commission's RD&D Programs.

The following items should be attached to this CRF

- 1. Scope of Work, Attach as Exhibit A. N/A Attached
- 2. Budget Detail, Attach as Exhibit B. N/A Attached
- 3. CEC 96, NCB Request N/A Attached
- 4. CEC 30, Survey of Prior Work N/A Attached
- 5. CEC 95, DVBE Exemption Request N/A Attached
- 6. Draft CEQA Notice of Exemption (NOE) N/A Attached
- 7. Resumes N/A Attached
- 8. CEC 105, Questionnaire for Identifying Conflicts Attached

 Contract Manager Date Office Manager Date Deputy Director Date

The following signatures are only required when contract approval is delegated to the Executive Office and not approved at a Business Meeting.
 See Business Meeting Information Section.

 Presiding Policy Committee Date Associate Policy Committee Date Executive Director Date

Exhibit A SCOPE OF WORK

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2		Solar Forecasting
3		Distributed Energy Storage Systems (DESSess)
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
<u>gCO₂e/mi</u>	<u>Grams of Carbon Dioxide-equivalent Per Mile</u>
Hr	Hour
kVAR	Kilovolt-Ampere Reactive
NWP	Nation Weather Prediction

Exhibit A

SCOPE OF WORK

Acronym	Definition
<u>MGW</u>	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 <u>Company</u>
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 CAISO spent a

Exhibit A

SCOPE OF WORK

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 CAISO 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 power factor 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.

Exhibit A

SCOPE OF WORK

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)

Exhibit A

SCOPE OF WORK

- 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.

Exhibit A

SCOPE OF WORK

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.

Exhibit A

SCOPE OF WORK

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.

Exhibit A

SCOPE OF WORK

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.

Exhibit A

SCOPE OF WORK

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

Exhibit A

SCOPE OF WORK

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.

Exhibit A

SCOPE OF WORK

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.

Exhibit A

SCOPE OF WORK

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 Generation’s 48 MW PV facility.
- Conduct forecasting of PV plant power output for 6 months.

Exhibit A

SCOPE OF WORK

- 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~~twelve months of operations.)

Deliverables:

- Operations Report (no draft)

Exhibit A

SCOPE OF WORK

Task 3.2 Deploy and Long Term Test of Standalone DESSs

The Contractor shall:

- Identify a variety of existing DESSs on and off campus in a residential, commercial, military, data center, and industrial application for endurance testing.
- Operate the leased, donated, or purchased DESS systems on the customer side of the meter in ~~an on and off~~ standalone 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 and SDG&E with the ability to monitor a microgrid and its resources by ~~integrating the resource elements of CAISO Direct Dispatch~~ including, but not limited to, 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~~ observe UCSD microgrid assets including Plug-in Electric Vehicles (PEV) and DC Fast Chargers. 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 AND GRID ASSISTED ENERGY CHARGING OF ELECTRIC VEHICLES

The goal ~~ins~~ this task is to demonstrate in collaboration with SDG&E an ~~direct current~~ AC grid assisted and DC to DC linked chargeport to maximize the use of renewable energy resources and defer capital utility upgrades.

Exhibit A

SCOPE OF WORK

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) in Collaboration with SDG&E Through the Sustainable Communities Program.

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 **in collaboration with SDG&E** at least one initial prototype utilizing an existing **or new** 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 5.2 Deploy and Demonstrate High Penetrations of Level 2 and Fast DC EV Chargers on Distribution Circuits with Energy Storage and High Penetration of PV

Exhibit A

SCOPE OF WORK

The Contractor shall:

- Install on High PV penetration distribution circuits within the microgrid, and preferably ones with energy storage, approximately thirty Level 2 and three Fast DC EV chargers for workplace, fleet and public access applications.
- Facilitate the utilization of available EV charging stations through EV car sharing programs; ownership/leasing/pilots by faculty, staff, and students; fleet lease/ownership; and visitors to campus.
- Develop a test plan and data acquisition plan for determining the individual and cumulative impacts of intermittent PV supply with random permutations and combinations of EV charging loads.
- Collect data while operating high penetrations of EVs and PVs on selected distribution circuits for a minimum of 6 months. Prepare a report on the cumulative impacts of high penetrations of EVs and PVs on distribution circuits with and without energy storage.
- Participate in a CPR as per Task 1.2.

Deliverables:

- Report on Cumulative Impacts of High Penetrations of EVs and PVs on Distribution Circuits With and Without Energy Storage (no draft)

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 CHP, utility, regulator, military, and microgrid candidate 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.
- Record a video on the military applications of microgrids.

Deliverables:

- Technology Transfer Plan
- Video on military applications of microgrids.

**Exhibit A
Attachment A-1
Schedule of Deliverables and Due Dates**

University of California, San Diego								
Task Number	Task Name	Deliverable(s)	Planned Start Date	Revised Planned Start Date Amd. #1	Planned Completion Date	Revised Planned Completion Date Amd. #1	PIER Funds	Match Funds
1.0	Administration		6/20/2011		8/30/2013	3/31/2015		
1.1	Attend Kick-off Meeting	An Updated Schedule of Deliverables	7/6/2011		7/6/2011		4,987	0
		An Updated List of Match Funds	7/6/2011		7/6/2011			
		An Updated List of Permits	7/6/2011		7/6/2011			
	Commission Contract Manager Deliverables	Final report Instructions	6/19/2012		6/19/2012			
1.2	CPR Meetings	CPR Report(s)	7/5/2012		7/5/2012	1/6/2014	5,577	0
		CPR deliverables identified in this Scope of Work	3/20/2012		5/22/2012	1/31/2014		
	Commission Contract Manager Deliverables	Agenda and a List of Expected Participants	6/29/2012		6/29/2012			
		Schedule for Written Determination	6/29/2012		8/1/2012			
		Written Determination	8/1/2012		8/30/2012			
1.3	Final Meeting	Written documentation of meeting agreements and all pertinent information	5/20/2013	12/31/2014	8/30/2013	3/31/2015	5,282	0
		Schedule for completing closeout activities	3/20/2013	12/31/2014	8/21/2013	3/31/2015		
1.4	Quarterly Progress Reports	Quarterly Progress Reports	6/20/2011		5/21/2013	3/16/2015	6,219	0
1.5	Test Plans, Technical Reports and Interim Deliverables		N/A		N/A		0	0
1.6	Final Report		6/20/2011	5/30/2014	8/21/2013	12/1/2014	12,438	0
1.6.1	Final Report Outline	Draft Outline of the Final Report	1/2/2013	5/30/2014	2/18/2013	6/30/2014	6,219	0
		Final Outline of the Final Report	2/18/2013	6/30/2014	4/18/2013	9/1/2014		
1.6.2	Final Report	Draft Final Report	4/18/2013	9/2/2014	5/21/2013	10/1/2014	6,219	0
		Final Report	5/21/2013	10/15/2014	6/18/2013	12/1/2014		
1.7	Identify and Obtain Matching Funds	A letter regarding Match Funds or stating that no Match Funds are provided	6/20/2011		7/6/2011		0	0
		Letter(s) for New Match Funds	6/20/2011		7/6/2011			
		A copy of each Match Fund commitment letter	6/20/2011		7/6/2011	12/30/2013		
		Letter that Match Funds were Reduced (if applicable)	6/20/2011		7/6/2011			
1.8	Identify and Obtain Required Permits	A letter documenting the Permits or stating that no Permits are required	6/20/2011		7/6/2011	12/30/2013	0	0
		Updated list of Permits as they change during the Term of the Agreement	N/A		N/A			
		Updated schedule for acquiring Permits as it changes during the Term of the Agreement	N/A		N/A			
		A copy of each approved Permit	N/A		N/A			
1.9	Electronic File Format	A Letter requesting exemption from the Electronic File Format (if applicable)	N/A		N/A		0	0
Administrative Tasks Sub-Total							\$ 34,503	\$ -
Technical Tasks			6/20/2011		4/18/2013	12/31/2014		
2.0	SOLAR FORECASTING					1/21/2013	504,251	212,172
2.1	Solar Forecasting through ground data	Accuracy Report (no draft)	6/20/2011		6/19/2012	9/19/2012		
2.2	Solar Forecasting demonstration of tools developed at Semptra Generation's 48 MW PV Plant	Forecasting Tool Performance Report (no draft)	6/20/2011		6/19/2012	9/19/2012		
2.3	Optimize tools into a solar forecasting model	Optimal Forecasting Model Integration Report (no draft)	6/19/2012		10/19/2012	1/21/2013		
3.0	DISTRIBUTED ENERGY STORAGE SYSTEMS (DESS)					3/18/2014	732,415	1,714,672
3.1	Deploy and Demonstrate 33 kW/33 kWh PV Integrated Energy Storage System	Operations Report (no draft)	5/18/2012		6/18/2012	4/1/2013		
3.2	Deploy and Long Term Test DESS's	Test Report (no draft)				3/18/2014		1,525,000
4.0	OBSERVABILITY OF MICROGRID OPERATION BY THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR		5/18/2012		6/18/2012	12/31/2013	848,339	0

Exhibit A
Attachment A-1
Schedule of Deliverables and Due Dates

Task Number	Task Name	Deliverable(s)	Planned Start Date	Revised Planned Start Date Amd. #1	Planned Completion Date	Revised Planned Completion Date Amd. #1	PIER Funds	Match Funds
4.1	Installation and Operation of Data Management for monitoring the microgrid	Observability Report Draft Observability Report Final	5/18/2012		6/18/2012	<u>12/31/2013</u>		
5.0	RENEWABLE ENERGY CHARGING OF ELECTRIC VEHICLES		6/20/2011		6/18/2012	<u>12/31/2014</u>	<u>653,845</u>	37,800
5.1	Demonstrate Renewable Energy for the EV Charging Infrastructures at UCSD	Renewable Energy Charging of Electric Vehicles Report (no draft) CPR Report	5/18/2012		7/30/2012	<u>12/31/2013</u>		
5.2	<u>Deploy and Demonstrate High Penetrations of Level 2 and Fast DC EV Chargers on Distribution Circuits with Energy Storage and High Penetration of PV</u>	<u>Report on Cumulative Impacts of High Penetration of EVs and PVs on Distribution Circuits With and Without Energy Storage (no draft)</u>		<u>3/1/2013</u>		<u>9/30/2014</u>		
6.0	TECHNOLOGY TRANSFER ACTIVITIES	Draft Technology Transfer Plan Final Technology Transfer Plan <u>Video on military applications of microgrids</u>	6/20/2011		4/18/2013	<u>12/31/2014</u> <u>9/30/2013</u>	<u>220,945</u>	0
Technical Tasks Sub-Total							<u>\$ 2,959,795</u>	<u>\$ 1,964,644</u>
Total							<u>\$ 2,994,298</u>	<u>\$ 1,964,644</u>

**Exhibit B
Attachment B-1
Budget Summary**

Summary Project Budget		<u>Amd. #1 PIER Reimbursable Task Costs</u>	<u>Change in Amd. #1 PIER Reimbursable Task Costs</u>	Original PIER Reimbursable Task Costs	<u>Amd. #1 Task Match Funds</u>	Original Task Match Funds	Total Task Costs
University of California, San Diego							
1.0	Administration	<u>34,503</u>	<u>1,773</u>	32,729	0	0	<u>34,503</u>
Project Technical Activities							
2.0	SOLAR FORECASTING	<u>504,251</u>	<u>34,804</u>	469,447	0	212,172	<u>716,423</u>
3.0	DISTRIBUTED ENERGY STORAGE SYSTEMS (DESS)	<u>732,415</u>	<u>385,097</u>	347,318	<u>1,714,672</u>	189,672	<u>2,447,087</u>
4.0	OBSERVABILITY OF MICROGRID OPERATION BY THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR	<u>848,339</u>	<u>627,313</u>	221,026	0	0	<u>848,339</u>
5.0	RENEWABLE ENERGY CHARGING OF ELECTRIC VEHICLES	<u>653,845</u>	<u>453,843</u>	200,002	0	37,800	<u>691,645</u>
6.0	TECHNOLOGY TRANSFER ACTIVITIES	<u>220,945</u>	<u>97,170</u>	123,775	0	0	<u>220,945</u>
Technical Activities Subtotals		<u>2,959,795</u>	<u>1,598,227</u>	1,361,568	<u>1,714,672</u>	439,644	<u>3,399,439</u>
		<u>Amd. #1 Total PIER Cost</u>	<u>Change in Amd. #1 Total PIER Cost</u>	Original Total PIER Cost	Total Match Funds	Total Match Funds	Total Project Cost
Project Totals		<u>2,994,298</u>	<u>1,600,000</u>	1,394,298	<u>1,714,672</u>	<u>439,644</u>	<u>3,433,942</u>

Exhibit B, Attachment B-2 PIER Budget

Budget for PIER Reimbursement to Prime Contractor		Personal Services		Project Operating Expenses						Fees			Amd. #1 PIER Reimburs-able Task Costs	Change In Amd. #1	Original PIER Reimburs-able Task Costs	
University of California, San Diego		Direct Labor	Fringe Benefits	Materials	Equipment	Travel	Misc./Lease	Minor Subcon-tractors	Major Subcon-tractors ¹	Indirect Overhead	G&A	Profit ²				
1.0 Project Administration Activities																
1.1	Attend Kick-off Meeting	2,835	1,491						0	661			4,987	0	4,987	
1.2	CPR Meetings	2,835	1,491				153		0	1,099			5,577	591	4,987	
1.3	Final Meeting	2,835	1,491				77		0	890			5,282	296	4,987	
1.4	Quarterly Progress Reports	2,835	1,491	731			126		0	1,036			6,219	296	5,923	
1.5	Test Plans, Technical Reports and Interim Deliverables															
1.6	Final Report	5,670	2,981	1,461	0	0	252	0	0	2,073	0	0	12,438	591	11,846	
1.6.1	Final Report Outline	2,835	1,491	731			126		0	1,036			6,219	296	5,923	
1.6.2	Final Report	2,835	1,491	731			126		0	1,036			6,219	296	5,923	
1.7	Identify and Obtain Matching Funds															
1.8	Identify and Obtain Required Permits															
1.9	Electronic File Format															
	Administration Activities Subtotals	17,009	8,944	2,192	0	0	608	0	0	5,750	0	0	34,503	1,773	32,729	
Project Technical Activities (Delete rows as necessary)																
2.0	SOLAR FORECASTING	245,092	162,360	11,617	0	0	15,011	5,000	0	65,171	0	0	504,251	34,804	469,447	
2.1	Solar Forecasting through ground data														0	
2.2	Solar Forecasting demonstration of tools developed at Sempra Generation's 48 MW														0	
2.3	Optimize tools into a solar forecasting model														0	
3.0	DISTRIBUTED ENERGY STORAGE SYSTEMS (DESS)	321,344	164,622	499	0	0	83,271	44,000	0	118,679	0	0	732,415	385,097	347,318	
3.1	Deploy and Demonstrate 33 kW/33 kWh PV Integrated Energy Storage System															
3.2	Deploy and Long Term Test DESS's															
4.0	OBSERVABILITY OF MICROGRID OPERATION BY THE CALIFORNIA	413,381	155,566	12,500			125,502		0	141,390			848,339	627,313	221,026	
4.1	Installation and Operation of Data Management for monitoring the microgrid															
5.0	RENEWABLE ENERGY CHARGING OF ELECTRIC VEHICLES	319,401	142,711	0			82,759		0	108,974	0	0	653,845	453,843	200,002	
5.1	Demonstrate Renewable Energy for the EV Charging Infrastructures at UCSD															
5.2	<u>Deploy and Demonstrate High Penetrations of Level 2 and Fast DC EV Chargers on Distribution Circuits with Energy Storage and High Penetration of PV</u>															
6.0	TECHNOLOGY TRANSFER ACTIVITIES	106,994	45,790	14,692	0	0	16,645	0	0	36,824	0	0	220,945	97,170	123,775	
	Technical Activities Subtotals	1,406,212	671,049	39,308	0	0	323,188	49,000	0	471,038	0	0	2,959,795	1,598,227	1,361,568	
Summary																
Prime Contractor		Direct Labor	Fringe Benefits	Materials	Equipment	Travel	Misc.	Minor Subcon-tractors	Major Subcon-tractors	Indirect Overhead	G&A	Profit	Total Amd. #1 PIER Reimburs-able Cost	Change In Amd. #1	Original Total PIER Reimburs-able Cost	
PIER Reimbursable Totals		1,423,221	679,993	41,500	0	0	323,796	49,000	0	476,788	0	0	2,994,298	1,600,000	1,394,298	
Percent of the Total		48%	23%	1%	0%	0%	11%	2%	0%	16%	0%	0%	100%	53%	100%	
Total project expenses =										414,295	Total overhead & profit =		476,788			

(1) Subcontracts worth \$100,000 or 25% of the total award, whichever is less.

(2) Prime Contractor profit not allowed on Subcontractor invoices and profit cannot exceed 10% of the PIER funds allocated to the Task.

Exhibit B, Attachment B-3 Unloaded Personnel Monthly Rates

University of California, San Diego

Name		Job Classification/Title		Projected Monthly Rates (\$)								Projected Total work hourly Effort
				Dates:		From: 6/20/11	From: 7/1/11	From: 7/1/12	From: 3/1/13	From: 7/1/13	From: 7/1/14	
				To: 6/30/11	To: 6/30/12	To: 2/28/13	To: 6/30/13	To: 6/30/14	To: 3/31/15			
		(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)			
Jan Kleissl	Assistant Professor	9,613.00	9,613.00	10,285.91	10,286	10,801	11,341	440				
Byron Washom	Director, Strategic Energy Initiatives	13,281.00	13,281.00	14,210.67	14,211	14,922	15,668	3009.6				
Dave Weil	Mgr, Sustainability	9,785.00	9,785.00	10,274.25	10,275	10,789	11,328	1284.8				
John Dilliot	Mgr, Energy Services	8,800.00	8,800.00	9,240.00	9,240	9,702	10,187	985.6				
Subhash Nangia	Sr. Project Engineer	8,950.00	8,950.00	9,397.50	9,398	9,868	10,361	404.8				
Margarita Ochoa	Administrative Specialist	4,526.00	4,526.00	4,752.30	4,753	4,991	5,241	2640				
JR Romero	Sr. Inspector	6,574.00	6,574.00	6,902.70	6,903	7,249	7,611	1918.4				
Jo Frabetti	Program Analyst III	5,917.00	5,917.00	6,212.85	6,213	6,524	6,850	387.2				
Robert Austin	Energy Mgmt Systems Administrator	5,980.00	5,980.00	6,279.00	6,279	6,593	6,923	1460.8				
Michelle Perez	Admin Analyst	4,250.00	4,250.00	4,462.50	4,463	4,687	4,921	721.6				
Emerson Bartolome	Program Analyst	6,417.00	6,417.00	6,737.85	6,738	7,075	7,429	404.8				
Theodore Chiou	System Support Analyst	4,400.00	4,400.00	4,620.00	4,620	4,851	5,094	404.8				
Jim Ruby	Fleet Manager	6,963.00	6,963.00	7,311.15	7,312	7,678	8,062	440				
Kevin Norris	Sr. Inspector	6,197.00	6,197.00	6,506.85	6,507	6,833	7,175	1672				
TBN	Intern #1	2,598.00	2,598.00	2,727.90	2,728	2,865	3,008	932.8				
TBN	Intern #2	2,598.00	2,598.00	2,727.90	2,728	2,865	3,008	932.8				
TBN	Intern #3	2,598.00	2,598.00	2,727.90	2,728	2,865	3,008	1355.2				
TBN-William Torre	Director, Energy Storage Program	12,500.00	12,500.00	13,125.00	13,125	13,782	14,471	2534.4				
TBN	Energy Data Program Director				10,938	11,485	12,059	2710.4				
TBN	EV Program Director				12,600	13,230	13,892	1038.4				
TBN	Procurement Mgr				9,508	9,984	10,483	633.6				
TBN	Graduate Student Researcher	3,720.00	3,720.00	671,832.00	3,906	4,102	4,307	4176				
TBN	Graduate Student Researcher	3,720.00	3,720.00	671,832.00	3,906	4,102	4,307	4176				
TBN	Undergraduate Lab Assistant	1,760.00	1,760.00	317,856.00	1,848	1,941	2,038	4176				
TBN	Undergraduate Lab Assistant	1,760.00	1,760.00	317,856.00	1,848	1,941	2,038	4176				
TBN	Post Doc	4,500.00	4,500.00	4,725.00	4,725	4,962	5,210	4176				

* Your actual billable rates cannot exceed the ceiling rates specified in this exhibit.

Exhibit B, Attachment B-4 Calculation of Fringe Benefits, Indirect Overhead, General Administrative Expenses, and Profit Rates

University of California, San Diego

Time intervals from the start of the project through the Contract Term End Date. (Use your organization's Fiscal Year start / end dates.)				Percentage Rate			
				Fringe Benefits (FB)	Indirect Overhead (OH)	General & Administrative (GA)	Profit (P) (10% Max)
From:	6/20/11	To:	6/30/11	65%	20%	10%	0%
From:	7/1/11	To:	6/30/12	65%	20%	10%	0%
From:	7/1/12	To:	6/30/13	65%	20%	10%	0%
From:	7/1/13	To:	6/30/14	65%	20%	10%	0%
From:	7/1/14	To:	3/31/15	65%	20%	10%	0%

Note: Use the categories that you typically use in your standard business practice.

Expense Items in the Budget Spreadsheets	List the budget expense items to which the indirect costs or fees are applied. Use the following abbreviations: DL = Direct Labor, FB = Fringe Benefits, M = Materials, EQ = Equipment, T = Travel, MS = Miscellaneous, S = Subcontracts, OH = Indirect Overhead, G&A = General & Administrative (For example, if the Fringe Benefits percentage is applied to Direct Labor expense, you would list DL in the Fringe Benefits line.)
Fringe Benefits	DL
Indirect Overhead	DL, FB, M, T, MS, S (first \$25,000)
General & Administrative	DL, FB, M, T, MS, S
Profit*	NONE

List items you include in each category (e.g., vacation, retirement plan, telephone, secretarial, rent/lease, insurance, etc.). If vacation, holidays, or sick leave are included, do not double count in your hourly rate calculations.

Fringe Benefits	Indirect Overhead	General & Administrative
OASDI	Indirect Salaries / Wages	Charges as allowed by OMB circular A-21
Worker's Compensation	Fringe Benefits on indirect wages	
Health / Dental / Vision	Materials/Supplies	
Life Insurance	Occupancy Costs	
Medicare	Charges as allowed by OMB circular A-21	
Disability		
Unemployment Insurance		
Incentive Award Program		
Retirement System Contribution		
Charges as allowed by OMB circular A-21		

* Prime Contractor profit not allowed on Subcontractor invoices.

**Exhibit B, Attachment B-5
Project Operating Expense Detail**

Pre-approved Travel List *						
Task No.	Trip Number	Trip Purpose	Destination	Who	Amount	
					PIER Funds	Match Funds
Total:					\$0	\$0

* Travel is reimbursed at state rates.

Equipment						
Task No.	Contractor / Sub Name	Name of Equip.	Description	Purpose	Amount	
					PIER Funds	Match Funds
3.2	UCSD	Advanced Energy Storage	2500 kW, via Self-Generation Incentive Program			\$1,525,000
Total:					\$0	\$1,525,000

Material(s)						
Task No.	Contractor / Sub Name	Description of Material(s)	Amount			
			PIER Funds	Match Funds		
1,2	UCSD	Materials for Solar Forecasting: attached memory storage to store the large amounts of data accumulating for solar forecasting. This covers pyranometers and dataloggers in the solar measurement system array- No item will cost more than \$4999 each	\$13,809			
3	UCSD	San Diego Supercomputing Center Materials Associated with SDSC recharge	\$499			
4	UCSD	<u>Wireless & Ethernet Communication Devices for Data Acquisition Infrastructure: no item exceeding \$5,000</u>	\$12,500			
6	UCSD	<u>Technology Transfer materials</u>	\$14,692			
Total:			\$41,500	\$0		

Miscellaneous Expenditures						
Task No.	Contractor / Sub Name	Description of Expenditures	Amount			
			PIER Funds	Match Funds		
All	UCSD	Communication Costs: telephone and associated voice and data communications charges which are directly related to the effort of the individuals working on the project	\$23,855			
2.2	UCSD	Data contract for CAISO connection	\$3,500			
2.3	UCSD	Workshop: room rental, presentation preparation, materials	\$2,958			
3	UCSD	San Diego Supercomputer Center (SDSC) Software Licensing and Hosting for OSISoft PI Server	\$12,945			
5	UCSD	San Diego Supercomputer Center (SDSC) Software Licensing and Hosting for Power Analytics Paladin Live Server	\$12,925			
4	UCSD	4-yr-OSISoft-PI-Software Agreement: Upgrades, Support, etc.	\$0			
3,4,5	UCSD	Communication Costs: telephone and associated voice and data communications charges which are directly related to the effort of the individuals working on the project	\$0			
3.5	UCSD	San Diego Supercomputer Center (SDSC) Computer Services	\$1,650			
3.5	UCSD	SDSC Recharge	\$8,628			
3.5	UCSD	SDSC Application Admin to service OSISoft and Power Analytics Software	\$19,546			
4	UCSD	<u>Metering and Computing Supplies: no item exceeding \$5,000</u>	\$28,000			
4.1	UCSD	SDSC Recharge	\$17,783			
6	UCSD	<u>Recharge for Campus Shuttle Transportation on Microgrid tours</u>	\$12,000			
3.5	UCSD	<u>California & University Conference site hosting expenses</u>	\$18,006			
4	UCSD	<u>Power Analytics Microgrid Controller Annual Maintenance Agreement</u>	\$0			
4	UCSD	<u>OSISoft Data Management Annual Maintenance Agreement</u>	\$86,000			
4	UCSD	<u>SDSC Microgrid Server Charges</u>	\$76,000			
Total:			\$323,796	\$0		

Minor Subcontractors						
Task No.	DVBE Sub.	Key Sub.	Minor Subcontractor Name <i>(or Description of Subcontracted Work if Subcontractor has yet to be determined)</i>	Amount		
				PIER Funds	Match Funds	
2.4	<input type="checkbox"/>	<input type="checkbox"/>	Smart Grid and Energy IT Consulting	\$5,000		
3	<input type="checkbox"/>	<input type="checkbox"/>	EDSA Micro Corporation <u>Power Analytics</u>	\$44,000		
Total:				\$49,000	\$0	

**Exhibit B Attachment B-6
Match Budget**

Contractor / Subcontractor Name:		Amd. #1 University of California, San Diego	Amd.#1 Revised Total Task Match Funds	Change in Amendment #1	Original Total Task Match Funds
1.0 Project Administration Activities					
1.1	Attend Kick-off Meeting		0	0	0
1.2	CPR Meetings		0	0	0
1.3	Final Meeting		0	0	0
1.4	Quarterly Progress Reports		0	0	0
1.5	Test Plans, Technical Reports and Interim Deliverables				
1.6	Final Report	0	0	0	0
1.6.1	Final Report Outline		0	0	0
1.6.2	Final Report		0	0	0
1.7	Identify and Obtain Matching Funds		0	0	0
1.8	Identify and Obtain Required Permits		0	0	0
1.9	Electronic File Format				
	Administration Activities Subtotals	0	0	0	0
Project Technical Activities (Delete rows as necessary)					
2.0	SOLAR FORECASTING	212,172	212,172	0	212,172
2.1	Solar Forecasting through ground data				0
2.2	Solar Forecasting demonstration of tools developed at Sempra Generation's 48 MW				0
2.3	Optimize tools into a solar forecasting model				0
3.0	DISTRIBUTED ENERGY STORAGE SYSTEMS (DESS)	1,714,672	1,714,672	1,525,000	189,672
3.1	Deploy and Demonstrate 33 kW/33 kWh PV Integrated Energy Storage System				0
3.2	Deploy and Long Term Test DESS's				0
4.0	OBSERVABILITY OF MICROGRID OPERATION BY THE CALIFORNIA		0	0	0
4.1	Installation and Operation of Data Management for monitoring the microgrid				0
5.0	RENEWABLE ENERGY CHARGING OF ELECTRIC VEHICLES	37,800	37,800	0	37,800
5.1	Demonstrate Renewable Energy for the EV Charging Infrastructures at UCSD		0		0
5.2	<u>Deploy and Demonstrate High Penetrations of Level 2 and Fast DC EV Chargers on Distribution Circuits with Energy Storage and High Penetration of PV</u>				
6.0	TECHNOLOGY TRANSFER ACTIVITIES	0	0	0	0
	Technical Activities Subtotals	1,964,644	1,964,644	1,525,000	439,644
	Match Funds Totals	1,964,644	1,964,644	1,525,000	439,644
	Percent of the Total	100%	100%		100%

Exhibit F List of Contacts

Commission Contract Manager:

~~Jamie Patterson~~ **Consuelo Sichon**
California Energy Commission
1516 Ninth Street, MS - 43
Sacramento, CA 95814
Phone: (916) 327-~~2342~~ **2222**
Fax: (916) 327-1717
e-mail: ~~jpatters@energy.state.ca.us~~
consuelo.sichon@energy.ca.gov

Commission Contracts Officer:

~~Rachel Grant~~ **Coco Worthy**
California Energy Commission
1516 Ninth Street, MS - 18
Sacramento, CA 95814
Phone: **(916) 654-5833**
Fax: (916) 654-4423
e-mail: **coco.worthy@energy.ca.gov**
*Deliver confidential deliverables
to this location only.*

Invoices, Progress Reports and Non-Confidential Deliverables to:

Accounting Office
California Energy Commission
1516 Ninth Street, MS - 2
Sacramento, CA 95814
Phone: ~~(916) 654-3906~~
Fax: (916) 653-1435
e-mail:

Commission Legal Notices:

~~John P. Butler II~~ **Rachel Grant-Kiley**
Manager, Contracts Office
California Energy Commission
1516 Ninth Street, MS - 18
Sacramento, CA 95814
Phone: (916) 654-4424 **4379**
Fax: (916) 654-4423
e-mail: **rachel.grant-kiley@energy.ca.gov**

Contractor Contract Manager:

Clarice Park
9500 Gilman Drive
MC 0934
La Jolla, CA 92093
Phone: 858-822-5180
Fax: 858-534-0280
e-mail: clpark@ucsd.edu

Contractor Contract Administrator:

Clarice Park
9500 Gilman Drive
MC 0934
La Jolla, CA 92093
Phone: 858-822-5180
Fax: 858-534-0280
e-mail: clpark@ucsd.edu

Contractor Accounting Invoicing Contact:

Meg Felando
9500 Gilman Drive
MC 0954
La Jolla, CA 92093
Phone: 858-534-0838
Fax: 858-534-6867
e-mail: mfelando@ucsd.edu

Contractor Legal Notices:

Clarice Park
9500 Gilman Drive
MC 0934
La Jolla, CA 92093
Phone: 858-822-5180
Fax: 858-534-0280
e-mail: clpark@ucsd.edu

To: Office of Planning and Research
PO Box 3044, 1400 Tenth Street, Room 222
Sacramento, CA 95812-3044

From: California Energy Commission
1516 Ninth Street, MS-48
Sacramento, CA 95814

Project Title: Renewable Resource Management at UCSD

Project Location - Specific: 9500 Gilman Drive

Project Location - City: La Jolla Project Location - County: San Diego, California

Description of Project:

This amendment will add a standalone distributed energy storage system using different, competitively-procured storage technologies and also optimize its performance compared to the initial photovoltaic-integrated storage systems on the campus microgrid.

Name of Public Agency Approving Project: California Energy Commission

Name of Person or Agency Carrying Out Project: The Regents of the University of California, San Diego

Exempt Status: (check one)

- Ministerial (Sec. 21080(b)(1); 15268);
Declared Emergency (Sec. 21080(b)(3); 15269(a));
Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
Categorical Exemption. State type and section number
Statutory Exemptions. State code number.
Common Sense Exemption. 15061(b)(3)

Reasons why project is exempt:

The activity is covered by the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA.

Lead Agency

Contact Person: Consuelo Sichon Area code/Telephone/Ext: 916-327-2222

If filed by applicant:

- 1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project? Yes No

Signature: Date: Title:

Signed by Lead Agency

Signed by Applicant

Date received for filing at OPR: