

## Exhibit A SCOPE OF WORK

### TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2	X	SYSTEM DESIGN, MODELING, AND SIMULATION
3	X	SYSTEM HARDWARE DESIGN
4		SYSTEM HARDWARE FABRICATION, INTEGRATION AND TEST
5		SYSTEM DEMONSTRATION AND TESTING
6		PERFORMANCE, MARKET, AND TECHNOLOGY TRANSFER ASSESSMENT

### KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	None		
2	Milan Ilic	Renewable Energy Services - DVBE	
3	None		
4	Leo Casey		
5	None	Renewable Energy Services - DVBE	
6	Leo Casey		

### GLOSSARY

Acronym	Definition
ANSI	American National Standards Institute
AVC	Automatic Voltage Control
CPR	Critical Project Review
DC	Direct Current
DG	Distributed Generator
Energy Commission	California Energy Commission
LCOE	Levelized Cost of Energy
MW	Megawatt
MWe	Megawatts Electric
NREL	National Renewable Energy Laboratory
PAC	Project Advisory Committee
PIER	Public Interest Energy Research
PV	Photovoltaic
ROI	Return on Investment

<b>Acronym</b>	<b>Definition</b>
SEGIS	Solar Energy Grid Integration System
SMUD	Sacramento Municipal Utility District
SOC	State-Of-Charge
UCC.1	Uniform Commercial Code (Financing Statement)
VAR	Volt-Ampere Reactive

### **Problem Statement**

The real power available from renewable power sources varies with wind speed and sun irradiation. This intermittency and load change can cause utility feeder voltage variations outside American National Standards Institute (ANSI) voltage standards or discernible flicker in illuminating devices at customer sites. This voltage variation problem can be addressed with two distinct approaches: through fast reactive power generated by the inverter or through fast real power drawn from an energy storage device. For large voltage variations, a combination of reactive power generation and a storage device may be required.

First, precise reactive power control helps to stabilize the voltage in the power grid. At the transmission level, operation of large electronic volt-ampere reactive (VAR) generators and switched capacitor banks allows existing transmission lines to be operated closer to their thermal limits without risking instability or voltage collapse. In distribution systems, switched capacitors have been deployed to correct power factor and boost voltage, but there has been very little use of electronically generated reactive power.

The second approach to intermittency buffers real power changes with an energy storage device. Energy storage, when paired with renewable energy sources, can stabilize and sustain loads during prolonged (minutes-hours) renewable or utility energy shortages. Faster dynamic distribution system stability enhancements are demonstrated for constant power loads, augmented with energy storage elements (power buffers) and load interface controllers. The power buffer action demonstrates how to transform load-side dynamics, to decouple constant-power loads from the source network.

Today, inverters are typically required by utilities to produce a constant power (with power factor of one), and usually no or little operator intervention is allowed. Utilization of the reactive power available from Photovoltaic (PV) inverters could increase grid reliability and reduce cost of required VAR generators. Also, due to high cost of storage, very few renewable installations have been integrated with storage system. As result there is no targeted research and development on the applications most likely to benefit from a PV-Storage system (such as; peak shaving, load shifting, demand response, and outage protection) and developing PV-Storage system specifically designed to meet those needs.

## **Goals of the Agreement**

The goals of this Agreement are to:

- Demonstrate how high bandwidth automatic voltage control can be applied to the real (Watt) and reactive (VAR) power output from Grid-connected Power Electronics to mitigate intermittency in PV power plant output and load induced voltage variations on the utility feeder.
- Develop electric energy storage components and system specifically designed and optimized for grid-tied PV applications, including conducting targeted research and development on the applications most likely to benefit from a PV-Storage system (i.e., peak shaving, load shifting, demand response, and outage protection) and developing PV-Storage system specifically designed to meet those needs.
- System integration of commercially available Solstice system and large storage with low technical risk.

## **Objectives of the Agreement**

The objectives of this Agreement are to:

- Demonstrate operational voltage control coordinated with high renewable penetration at the distribution level to provide efficiency and cost benefits over present practices by reducing peak power production and transmission from conventional generating stations.
- Demonstrate real power storage buffering of the PV transient intermittency caused by clouds and similar effects.
- Increase ability to serve critical loads at all times by incorporation of energy storage and automatic voltage control.
- Reduce cost of storage power electronics by 50% by use of a regulated Direct Current (DC) bus architecture.
- Improve system efficiency and asset utilization to achieve a high load factor, by increasing the utilization of existing inverters and enabling them to generate useful controlled reactive power without reducing real power output.
- Demonstrate that the PV plant inverters can rapidly inject capacitive or inductive reactive power at key points during a grid disturbance event, and compensate for these disturbances to prevent the cascading collapse, or to assist in quickly restoring the grid.
- Increase 5-12% energy harvested from any PV array by segmenting the array and operating each string or rack and combining the power at the central inverter and overcoming negative effects of soiling, shading and mismatch due to production or aging.
- Increase round-trip efficiency of the battery system to 92%.
- Limit output power ramp rate to 10% per minute to be comparable with conventional power generation assets, so that the utility has enough time to dispatch conventional generator if PV plant cannot satisfy load requirements.

## **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 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 any additional costs will be borne by the Contractor.

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 satisfactory progress is not being made, this conclusion will be referred to the Energy 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**

**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 not reimbursable under this Agreement. While the PIER budget for this task will be zero dollars, the Contractor shall show match funds for this task. Permits must be identified in writing and obtained before the Contractor can incur any costs related to the use of the permits 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.

**2-Phased Project and California Environmental Quality Act (CEQA)**

This project is being conducted in two phases. The first phase involves tasks 2 and 3, and the administrative tasks occurring within the time frame of these technical tasks (hereinafter “Phase I”). In general, these are the system engineering, modeling, and simulation, and the system hardware design. Phase II refers to the remaining work in Agreement (hereinafter “Phase II”). In general, Phase II involves the system hardware fabrication, integration and test, and the system demonstration and testing.

Neither the Contractor nor any of its subcontractors are authorized to expend funds or perform any work on any Phase II activities until further approval by the Energy Commission that the Contractor has completed its CEQA obligations. The Energy Commission has only approved Phase I activities.

During Phase I, the Contractor shall act as lead agency and prepare all documents necessary to comply with CEQA for Phase II, including but not limited to, preparation of an appropriate environmental document. The Energy Commission will consider approval of Phase II funding at an Energy Commission Business Meeting. Only if the Energy Commission so authorizes after verification of completion of CEQA requirements can the Contractor perform Phase II; neither party is bound under this Agreement regarding Phase II work until the Contractor has completed its CEQA process and the Energy Commission has authorized the Contractor to perform the work. The cost of all CEQA compliance will be at the sole expense of the Contractor and not reimbursable under this Agreement. However, the Contractor may consider its cost as match under this Agreement.

**Task 2 SYSTEM ENGINEERING, MODELING, AND SIMULATION**

The goal of this task is to develop a system design for the hybrid PV/energy storage system. The system design will provide the framework for Phase 2 development testing and demonstration of the installation. This task will be broken down into the following subtasks:

### **Task 2.1: Identify Requirements**

The goal of this subtask is to identify detailed requirements for the hybrid system design, balancing the capabilities of the test site PV array and storage, and to develop a validation test plan for the Phase I effort.

#### **The Contractor shall:**

- Perform system engineering for host site to provide a system design for the renewable project that integrates the PV array, and has the ability to integrate with battery energy storage, and will be used for preliminary performance analysis and validation.
- Perform studies to determine the most appropriate storage medium and ratings for the integrated storage
- Develop a preliminary design for the automatic voltage control (AVC) system and write a requirement specification for upgrading existing equipment to meet the new requirements
- Determine the requirements for a computer model of the PV inverter system with added AVC controller and energy storage.
- Summarize the results as listed above in a System Design Report

### **Task 2.2: System Model Development**

The goal of this subtask is to develop a computer model of the system design that will be used to predict system behavior in advance of testing with actual hardware.

#### **The Contractor shall:**

- Construct a transient-type computer model of the system components, using Matlab/Simulink programs.
- Update the model as the project progresses to accurately represent the new controls and the interaction of the system with a simulated grid.
- Build and test the inverter components computer model
- Build and test the storage components computer model
- Build and test a grid connected system model
- Verify the simulation results for each model.
- Prepare a Model Verification Results Report to include the results from model activities listed above

### **Task 2.3: System Simulation**

The goal of this subtask is to perform computer simulation with the system model and confirm expected improvements, such as reduced power intermittency and eliminated voltage flicker at the grid connection.

**The Contractor shall:**

- Develop a model to perform simulation and analysis on project critical functions, using Matlab/Simulink programs.
- Analyze PV firming, using irradiation data from actual site simulate state-of-charge (SOC) for the battery storage as a function of irradiation change
- Analyze PV ramp management
- Analyze Voltage regulation and voltage sag mitigation

**Task 2.4: Preliminary System Performance Assessment and Validation**

The goal of this subtask is to evaluate results of the computer simulations, assess the value of achieved benefits, and verify that the objectives of the validation test plan have been met.

**The Contractor shall:**

- Provide a preliminary system performance assessment, including capital and operating costs, cost/benefit analysis, payback period, installed cost per MWe, Levelized Cost of Energy (LCOE), Return on Investment (ROI), avoided cost of electricity, and quantification of overall climate change benefits of the project.
- Analyze simulation results, confirming that full scale system operating characteristics conform to the verification test plan and summarize the results in the Critical Function Simulation Report.
- Participate in CPR as per Task 1.2

**Deliverables:**

- System Design Report
- Model Verification Results Report
- Critical Function Simulation Report
- CPR Report

**Task 3 SYSTEM HARDWARE DESIGN**

The goal of this task is to develop hardware required to perform the required functions in the field demonstration. A new controller board will be developed that will provide AVC and storage integration.

**The Contractor shall:**

- Design AVC controller
- Design energy storage system

- Define required updates of existing hardware and develop a new controller for system integration (inverter, bidirectional DC-DC converter, AVC and energy storage device)
- Develop a plan for testing the integrated system
- Conduct a team design review on all subsystems and the test plan
- Prepare system hardware design report to include a System Test Plan including related activities listed in this task.
- Participate in CPR as per Task 1.2

**Deliverables:**

- Hardware Design and System Test Plan Report (no draft)
- CPR Report

**Task 4 SYSTEM HARDWARE FABRICATION, INTEGRATION AND TEST**

The goal of this task is to fabricate required hardware for the system that has been designed in Task 2 and perform system integration.

**The Contractor shall:**

- Develop subsystem blocks
- Build and test the AVC controller according to the requirements developed in the system test plan
- Develop site controller to implement voltage control algorithm
- Develop communications network/mechanism to provide feedback from various network nodes
- Modify inverter hardware as required
- Build energy storage system
- Integrate AVC controller with inverter system prior to energy storage integration and subsequent connection to and testing
- Integrate energy storage system with inverter system
- Prepare the System Integration Test Report covering activities listed above

**Deliverables:**

- System Integration Test Report

**Task 5 SYSTEM DEMONSTRATION AND TESTING**

The goal of this task is to perform a field demonstration of the system and conduct testing to assess the system performance. This task will consist of two subtasks:

**Task 5.1 System Demonstration**

The demonstration will occur at a suitable host site available to the partner utility Sacramento Municipal Utility District (SMUD) which could include the Solar Highways

demonstration, feed-in tariff project sites, or other SMUD-approved locations. The sites could be either utility or third-party owned and operated.

**The Contractor shall:**

- Submit reasons for selection of the demonstration site, which must be approved by the Energy Commission Contract Manager.
- Install the full-scale demonstration system with transient AVC and integrated storage capabilities, at the selected host site.
- Install PV panels
- Install storage system
- Connect integrated system to grid in accordance with approved host site plans

**Task 5.2 System Testing**

System testing will include evaluating multiple control strategies to reduce fluctuations in voltage and power on the feeder, and will follow the system test plan developed in Task 3.

**The Contractor shall:**

- Execute System Test Plan
- Collect data on firming grid with battery storage
- Collect data on grid voltage with storage and reduced ramp rates
- Collect data on grid voltage with AVC controller
- Analyze and compare test data with computer model predictions and predict behavior in a large scale scenario
- Supervise SMUD and National Renewables Energy Laboratory (NREL) in performing independent analysis of collected data
- Analyze scale up to utility scale installation(>10 megawatt (MW))
- Prepare field test report to include the analysis of scale up of system to 10 MW

**Deliverables:**

- Demonstration Site Selection (no draft)
- Field Test Report

**Task 6 PERFORMANCE, MARKETING, AND TECHNOLOGY TRANSFER**

The goal of this task is to assess system performance and costs, develop a commercialization plan for the demonstrated system, and develop a technology transfer plan for disseminating the results of the system demonstration to key stakeholders.

**The Contractor shall:**

- Perform an analysis of the market for the proposed technology using results from the updated performance assessment
- Prepare a market summary report that describes the results of the performance assessment and market analysis.

- Prepare a Technology Transfer Plan. The plan shall explain how the knowledge gained in this project 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.
- Indicate the intended use and users of the project results.
  
- **Deliverables:**
- Market Summary Report (no draft)
- Technology Transfer Plan