



To: Grants and Loans Office

Date: 8/28/2012

Project Manager: Anish Gautam

Phone Number: 916-327-2382

Office: Energy Efficiency Research Office

Division: Energy Research and Development

MS- 51

Project Title: Demonstration of Zinc-Flow Energy Storage System

Type of Request: (check one)

New Agreement: (include items A-F from below) Agreement Number: Assigned by G&L Office

Program: PIER E / Industrial/ Ag/ Water

Solicitation Name and/or Number: _____

Legal Name of Recipient: Premium Power Corporation

Recipient's Full Mailing Address: 87 CONCORD ST
NORTH READING, MA 01864-2601

Recipient's Project Officer: Doug Alderton Phone Number: 978-664-5000 Ext. 20

Agreement Start Date: 9/20/2010 Agreement End Date: 9/30/2013

Amendment: (Check all that apply) Agreement Number: PIR-10-001

Term Extension – New End Date: 3/31/2015

Work Statement Revision (include Item A from below)

Budget Revision (include Item B from below)

Change of Scope (include Items A – F as applicable from below)

Other: _____

ITEMS TO ATTACH WITH REQUEST:

- A. Work Statement
- B. Budget
- C. Recipient Resolution, if applicable. (Resolution may be requested in Special Conditions if not currently available.)
- D. Special Conditions, if applicable.
- E. CEQA Compliance Form
- F. Other Documents as applicable
 - Copy of Score Sheets
 - Copy of Pre-Award Correspondence
 - Copy of All Other Relevant Documents

California Environmental Quality Act (CEQA)

CEC finds, based on recipient's documentation in compliance with CEQA:

Project exempt: _____ NOE filed: _____

Environmental Document prepared: _____ NOD filed: _____

Other: _____

CEC has made CEQA finding described in CEC-280, attached

Funding Information:

*Source #1: _____ Amount: \$ _____ Statute: _____ FY: _____ Budget List #: _____

*Source #2: _____ Amount: \$ _____ Statute: _____ FY: _____ Budget List #: _____

*Source #3: _____ Amount: \$ _____ Statute: _____ FY: _____ Budget List #: _____

If federally funded, specify federal agreement number: _____

* Source Examples include ERPA, PIER-E, PIER-NG, FED, GRDA, ARFVT, OTHER.

Business Meeting Approval: (refer to Business Meeting Schedule)

Proposed Business Meeting Date: 11/14/2012 Consent Discussion

Business Meeting Participant: Anish Gautam Time Needed: _____

Agenda Notice Statement: (state purpose in layperson terms)

Possible approval of a Grant / Contingent Award to...

Possible approval of this amendment with Premium Power Corporation to extend the agreement by 18 months for a new end date of March 31, 2015. The amendment will allow for the development, shipment- and installation, and field testing and monitoring of the upgraded version of their Premium Power Corporation's Zinc-Bromide flow battery. This amendment will also allow for selection of a new demonstration site if necessary and remove references to Wal-Mart and PowerBlock 150 in project documents, and revise identified personnel. (PIER natural gas funding.) Contact: Anish Gautam.

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Project Manager	Date	Office Manager	Date	Deputy Director	Date		

**Exhibit A
WORK STATEMENT**

TECHNICAL TASK LIST

Task #	CPR	Task Name
1		Administration
2		Site Plan
3		Manufacture and Factory Test
4	X	Factory Acceptance Test
5		Delivery, Installation and Commissioning
6		Training
7	X	Measurement and Verification (M&V)
8		Quarterly Maintenance
9		Technology Transfer Activities
10		Production Readiness Plan

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Bill O'Donnell		
2			
3	Bill O'Donnell		
4			
5	Bill O'Donnell		
6			
7			
8	Bill O'Donnell		
9			
10	Bill O'Donnell		

GLOSSARY

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

Term/ Acronym	Definition
CESA	California Energy Storage Association
CPR	Critical Project Review
DG	Distributed Generation
DOD	Depth of Discharge
ESS	Energy Storage System
Energy Commission	California Energy Commission
EPRI	Electric Power Research Institute
IOU	Investor Owned Utility
M&V	Measurement and Verification
MSDS	Material Safety Data Sheet

Term/ Acronym	Definition
PAC	Project Advisory Committee
PB150	PowerBlock150
PIER	Public Interest Energy Research
PPC	Premium Power Corporation
RD&D	Research, Development and Demonstration
SDG&E	San Diego Gas and Electric
TOU	Time of Use
UL	Underwriters Laboratories
UPS	Uninterruptable Power Supply
VAC	Voltage Alternating Current
VRLA	Valve Regulated Lead Acid

1
2 **Problem Statement:**

3 The United States electricity industry will face significant challenges over the coming
4 years. There will be a shift from a model in which electricity is generated and controlled
5 centrally, to one in which energy is more dispersed and integrated at a local level, taking
6 advantage of renewable energy sources. Additionally, environmental awareness and
7 rising prices will require the energy industry to become increasingly responsive to the
8 need for more timely energy usage and pricing information, more tailored energy
9 options, and greater individual customer control.

10
11 This project will demonstrate the impact of energy storage on monitoring and control
12 strategies, grid reliability, and load management. The ~~PowerBlock~~ system **to be**
13 **demonstrated** will provide local dispatchable stored energy for peak shaving, demand
14 response and load management. It also lays the foundation for participation in other
15 ancillary services programs and provides the firming and shifting of locally installed
16 intermittent renewable generation. Larger deployment of energy storage will foster
17 increased penetration of renewable generation and defer the need for building new
18 plants for grid balancing requirements.

19
20 **Goals of the Agreement:**

21 The goal of this agreement is to demonstrate one 100kW/150kWh (minimum discharge
22 and storage capacity) **commercial-scale Zinc-Bromide Flow PowerBlock[®] 150 (PB150)**
23 energy storage system (ESS) for customer-side applications (peak load reduction,
24 **demand response** and load management). The project will be located at **a**
25 **commercial/industrial facility in California in one of the investor owned utility**
26 **service territories** ~~Wal-Mart retail store at 4840 Shawline Street, San Diego, CA,~~
27 ~~within San Diego Gas and Electric's (SDG&E) Southern California operating territory.~~
28 Specific goals include: shaving power peaks and load shifting that result in significant
29 reduction of **the demonstration facility's** ~~Wal-Mart's~~ demand and energy charges;
30 participation in one of **the local utility's** ~~SDG&E's~~ demand response programs;
31 successful integration of the system into **host the demonstration** ~~Wal-Mart's~~ facility;
32 successful data measurement and verification of the economic and social benefits and
33 costs of the system; feasibility analysis and recommendations for further advancement
34 of the technology and deployment of the technology **to other industrial and**

1 **commercial end-users** for Wal-Mart.

2
3 **Objectives of the Agreement:**

4 The specific objectives of this project are to demonstrate and evaluate one Premium
5 Power Corporation PB150, fully integrated mobile **Energy Storage System (ESS)** to:

- 6 • Provide peak shaving in order to reduce demand charges and lower Wal-Mart's
7 overall utility bills **for the demonstration facility**;
- 8 • Shift off-peak power to on-peak periods to assist the utility in load leveling
9 generation resources and lower **the demonstration facility's** Wal-Mart's energy
10 bill to take advantage of time of use (TOU) rates;
- 11 • ~~Provide limited backup energy to a specific load circuit in the event of a power~~
12 ~~outage;~~
- 13 • Study the feasibility of using ESS at other California store
14 **commercial/industrial** locations with high demand or TOU rate structures;
- 15 • Demonstrate long term, commercial scale operation of a high-efficiency peak
16 shift energy storage system, with the capability to withstand daily deep
17 discharge cycling and maintain **a long** 30+ year design life as opposed to
18 today's Valve Regulated Lead Acid (VRLA) battery systems that have a limited
19 cycling capability and life span.

20
21 **Product Guidelines:**

22 For complete product guidelines, refer to Section 5 in the Terms and Conditions.

23
24
25 **TASK 1 ADMINISTRATION**

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27 **Task 1.1 Attend Kick-off Meeting**

28
29 The goal of this task is to establish the lines of communication and procedures for
30 implementing this Agreement.

31
32 **The Recipient shall:**

- 33 • Attend a "Kick-Off" meeting with the Commission Project Manager, the
34 Grants Officer, and a representative of the Accounting Office. The
35 Recipient shall bring its Project Manager, Agreement Administrator,
36 Accounting Officer, and others designated by the Commission Project
37 Manager to this meeting. The administrative and technical aspects of this
38 Agreement will be discussed at the meeting. Prior to the kick-off meeting,
39 the Commission Project Manager will provide an agenda to all potential
40 meeting participants.

41
42 The administrative portion of the meeting shall include, but not be limited
43 to, the following:

- 44 ○ Discussion of the terms and conditions of the Agreement
- 45 ○ Discussion of Critical Project Review (Task 1.2)

- 1 ○ Match fund documentation (Task 1.6)
- 2 ○ Permit documentation (Task 1.7)

3

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

5 following:

- 6 ○ The Commission Project Manager's expectations for accomplishing
- 7 tasks described in the Scope of Work
- 8 ○ An updated Schedule of Products
- 9 ○ Discussion of Progress Reports (Task 1.4)
- 10 ○ Discussion of Technical Products (Product Guidelines located in
- 11 Section 5 of the Terms and Conditions)
- 12 ○ Discussion of the Final Report (Task 1.5)

13

14 **The Commission Project Manager shall:**

- 15 • Designate the date and location of this meeting.

16

17 **Recipient Products:**

- 18 • Updated Schedule of Products (no draft)
- 19 • Updated List of Match Funds (no draft)
- 20 • Updated List of Permits (no draft)

21

22 **Commission Project Manager Product:**

- 23 • Kick-Off Meeting Agenda (no draft)

24

25 **Task 1.2 Critical Project Review (CPR) Meetings**

26

27 The goal of this task is to determine if the project should continue to receive Energy

28 Commission funding to complete this Agreement and to identify any needed

29 modifications to the tasks, products, schedule or budget.

30

31 CPRs provide the opportunity for frank discussions between the Energy Commission

32 and the Recipient. CPRs generally take place at key, predetermined points in the

33 Agreement, as determined by the Commission Project Manager and as shown in the

34 Technical Task List above. However, the Commission Project Manager may schedule

35 additional CPRs as necessary, and any additional costs will be borne by the Recipient.

36

37 Participants include the Commission Project Manager and the Recipient and may

38 include the Commission Grants Officer, the Public Interest Energy Research (PIER)

39 Program Team Lead, other Energy Commission staff and Management as well as other

40 individuals selected by the Commission Project Manager to provide support to the

41 Energy Commission.

42

43 **The Commission Project Manager shall:**

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

- 1 • Send the Recipient the agenda and a list of expected participants in
2 advance of each CPR. If applicable, the agenda shall include a
3 discussion on both match funding and permits.
- 4 • Conduct and make a record of each CPR meeting. One of the outcomes
5 of this meeting will be a schedule for providing the written determination
6 described below.
- 7 • Determine whether to continue the project, and if continuing, whether or
8 not modifications are needed to the tasks, schedule, products, and/or
9 budget for the remainder of the Agreement. Modifications to the
10 Agreement may require a formal amendment (please see the Terms and
11 Conditions). If the Commission Project Manager concludes that
12 satisfactory progress is not being made, this conclusion will be referred to
13 the Energy Commission's Research, Development and Demonstration
14 (RD&D) Policy Committee for its concurrence.
- 15 • Provide the Recipient with a written determination in accordance with the
16 schedule. The written response may include a requirement for the
17 Recipient to revise one or more product(s) that were included in the CPR.
18

19 **The Recipient shall:**

- 20 • Prepare a CPR Report for each CPR that discusses the progress of the
21 Agreement toward achieving its goals and objectives. This report shall
22 include recommendations and conclusions regarding continued work of
23 the projects. This report shall be submitted along with any other products
24 identified in this scope of work. The Recipient shall submit these
25 documents to the Commission Project Manager and any other designated
26 reviewers at least 15 working days in advance of each CPR meeting.
- 27 • Present the required information at each CPR meeting and participate in a
28 discussion about the Agreement.
29

30 **Commission Project Manager Products:**

- 31 • Agenda and a list of expected participants (no draft)
- 32 • Schedule for written determination (no draft)
- 33 • Written determination (no draft)
34

35 **Recipient Product:**

- 36 • CPR Report(s) (no draft)
37

38 **Task 1.3 Final Meeting**

39
40 The goal of this task is to closeout this Agreement.
41

42 **The Recipient shall:**

- 43 • Meet with Energy Commission staff to present the findings, conclusions,
44 and recommendations. The final meeting must be completed during the
45 closeout of this Agreement.
46

1 This meeting will be attended by, at a minimum, the Recipient, the
2 Commission Grants Office Officer, and the Commission Project Manager.
3 The technical and administrative aspects of Agreement closeout will be
4 discussed at the meeting, which may be two separate meetings at the
5 discretion of the Commission Project Manager.
6

7 The technical portion of the meeting shall present an assessment of the
8 degree to which project and task goals and objectives were achieved,
9 findings, conclusions, recommended next steps (if any) for the Agreement,
10 and recommendations for improvements. The Commission Project
11 Manager will determine the appropriate meeting participants.
12

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

- 16 ○ What to do with any equipment purchased with Energy Commission
17 funds (Options)
- 18 ○ Energy Commission's request for specific "generated" data (not
19 already provided in Agreement products)
- 20 ○ Need to document Recipient's disclosure of "subject inventions"
21 developed under the Agreement
- 22 ○ "Surviving" Agreement provisions, such as repayment provisions
23 and confidential Products
- 24 ○ Final invoicing and release of retention
- 25 ○ Prepare a schedule for completing the closeout activities for this
26 Agreement
27

28 **Products:**

- 29 • Written documentation of meeting agreements (no draft)
- 30 • Schedule for completing closeout activities (no draft)

31
32 **Task 1.4 Monthly Progress Reports**
33

34 The goal of this task is to periodically verify that satisfactory and continued progress is
35 made towards achieving the research objectives of this Agreement on time and within
36 budget.
37

38 The objectives of this task are to summarize activities performed during the reporting
39 period, to identify activities planned for the next reporting period, to identify issues that
40 may affect performance and expenditures, and to form the basis for determining
41 whether invoices are consistent with work performed.
42

43 **The Recipient shall:**

- 44 • Prepare a Monthly Progress Report which summarizes all Agreement
45 activities conducted by the Recipient for the reporting period, including an
46 assessment of the ability to complete the Agreement within the current

1 budget and any anticipated cost overruns. Each progress report is due to
 2 the Commission Project Manager within 10 days of the end of the
 3 reporting period. The recommended specifications for each progress
 4 report are contained in Exhibit A, Attachment A-2.

5
 6 **Product:**

- 7 • Monthly Progress Reports (no draft)

8
 9 **Task 1.5 Final Report**

10
 11 The goal of the Final Report is to assess the project's success in achieving its goals and
 12 objectives, advancing science and technology, and providing energy-related and other
 13 benefits to California.

14
 15 The objectives of the Final Report are to clearly and completely describe the project's
 16 purpose, approach, activities performed, results, and advancements in science and
 17 technology; to present a public assessment of the success of the project as measured
 18 by the degree to which goals and objectives were achieved; to make insightful
 19 observations based on results obtained; to draw conclusions; and to make
 20 recommendations for further RD&D projects and improvements to the PIER project
 21 management processes.

22
 23 The Final Report shall be a public document. If the Recipient has obtained confidential
 24 status from the Energy Commission and will be preparing a confidential version of the
 25 Final Report as well, the Recipient shall perform the following activities for both the
 26 public and confidential versions of the Final Report.

27
 28 **The Recipient shall:**

- 29 • Prepare an Outline of the Final Report.
- 30 • Prepare a Final Report following the approved outline and the latest
 31 version of the PIER Final Report guidelines published on the Energy
 32 Commission's website at
 33 <http://www.energy.ca.gov/contracts/pier/contractors/index.html> at the
 34 time the Recipient begins performing this task, unless otherwise instructed
 35 in writing by the Commission Project Manager. Instead of the timeframe
 36 listed in the Product Guidelines located in Section 5 of the Terms and
 37 Conditions, the Commission Project Manager shall provide written
 38 comments on the Draft Final Report within fifteen (15) working days of
 39 receipt. The Final Report must be completed on or before the end of the
 40 Agreement Term.
- 41 • Submit one bound copy of the Final Report with the final invoice.

42
 43 **Products:**

- 44 • Draft Outline of the Final Report
- 45 • Final Outline of the Final Report
- 46 • Draft Final Report

- Final Report

Task 1.6 Identify and Obtain Matching Funds

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

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

The Recipient shall:

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

1 Agreement and may trigger an additional CPR.
2

3 **Products:**

- 4 • A letter regarding match funds or stating that no match funds are provided
5 (no draft)
- 6 • Copy(ies) of each match fund commitment letter(s) (if applicable)
7 (no draft)
- 8 • Letter(s) for new match funds (if applicable) (no draft)
- 9 • Letter that match funds were reduced (if applicable) (no draft)

10
11 **Task 1.7 Identify and Obtain Required Permits**

12
13 The goal of this task is to obtain all permits required for work completed under this
14 Agreement in advance of the date they are needed to keep the Agreement schedule on
15 track.

16
17 Permit costs and the expenses associated with obtaining permits are not reimbursable
18 under this Agreement. Although the PIER budget for this task will be zero dollars, the
19 Recipient shall budget match funds for any expected expenditures associated with
20 obtaining permits. Permits must be identified in writing and obtained before the
21 Recipient can make any expenditures for which a permit is required.

22
23 **The Recipient shall:**

- 24 • Prepare a letter documenting the permits required to conduct this
25 Agreement and submit it to the Commission Project Manager at least 2
26 working days prior to the kick-off meeting. If there are no permits required
27 at the start of this Agreement, then state such in the letter. If it is known at
28 the beginning of the Agreement that permits will be required during the
29 course of the Agreement, provide in the letter:
 - 30 ○ A list of the permits that identifies the:
 - 31 ▪ Type of permit
 - 32 ▪ Name, address and telephone number of the permitting
33 jurisdictions or lead agencies
- 34 • The schedule the Recipient will follow in applying for and obtaining these
35 permits.
- 36 • Discuss the list of permits and the schedule for obtaining them at the kick-
37 off meeting and develop a timetable for submitting the updated list,
38 schedule and the copies of the permits. The implications to the
39 Agreement if the permits are not obtained in a timely fashion or are denied
40 will also be discussed. If applicable, permits will be included as a line item
41 in the Progress Reports and will be a topic at CPR meetings.
- 42 • If during the course of the Agreement additional permits become
43 necessary, provide the appropriate information on each permit and an
44 updated schedule to the Commission Project Manager.
- 45 • As permits are obtained, send a copy of each approved permit to the
46 Commission Project Manager.

- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Project Manager within 10 days. Either of these events may trigger an additional CPR.

Products:

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

TECHNICAL TASKS

TASK 2.0 - SITE PLAN

The goal of this task is to provide a coordinated site plan and site preparation plan that identifies specific issues which need to be addressed during project implementation and validation.

The Recipient Shall:

- **Verify that the proposed demonstration site can still host the project and enter into a written agreement to with the demonstration site, or obtain a new suitable demonstration site.**
- A detailed Site Plan Report will be completed at the beginning of the project. This site plan will assess power, physical and environmental conditions, as well as any other site-specific conditions that may drive system and utility infrastructure requirements and project success criteria. Particularly, the site plan will:
 - Provide critical load data, which considers voltage, current grounding and other usage characteristics, that will be used to estimate the **ESS PB150's** impact on the loads and ~~its backup capability, and~~ required switch gear.
 - Evaluate the site's standard generating and existing backup sources, including the grid and any conventional sources such as gas turbines, diesel generators or alternative generating sources such as wind, photovoltaic, and geothermal, which may drive a non-standard **ESS PB150** configuration. This information will be used to help evaluate the physical and logical site configuration, including potential interaction between the **ESS PB150** and the generating source(s).
 - Identify the actual modes of operation, i.e. peak shaving, demand management, ~~uninterruptable power supply (UPS)/backup~~ or custom

1 mode of operation, which will be used to specify system configuration and
 2 determine the performance and benefits (cost analysis methodology and
 3 estimation).

- 4 • Determine the physical location of the unit based on access, grounding
 5 and surface preparation characteristics. This will be used to drive the
 6 material handling requirements and installation sequence. Proper
 7 grounding is a safety and operational requirement. The site's physical
 8 layout determines the location(s) of ground rod(s), as more than one rod
 9 may be required.
- 10 • Evaluate serviceability of the installation location including tractor-trailer
 11 hookup/drop capability, forklift access, crane access and other service
 12 access needs. Positioning of the ESS PB150 is critical to allow proper
 13 interconnection, adequate space for maintenance and repair operations,
 14 as well as removal of the system due to the unit being transportable and
 15 off-loadable.
- 16 • Recommendations for site security will be provided. There will be limited
 17 access to manual controls and the ESS PB150 will be secured against
 18 unrestricted public access.
- 19 • Environmental conditions will be assessed and an action plan generated.
 20 Local weather and geography including temperature, humidity, elevation
 21 and flood plain will be considered. Extreme operating conditions may
 22 require a non-standard ESS PB150 configuration.
- 23 • Other items in site-specific design review will be considered, including:
 24 available short circuit current and distributed generation (DG) contribution,
 25 light load condition and back-feed, inadvertent islanding, equipment
 26 ratings, system protection and integration, existing service
 27 reinforcements/modifications, power quality and utility network
 28 interconnection protection requirements.
- 29 • Use the site plan survey to develop a site preparation guideline for the proper
 30 installation and commissioning of the ESS PB150

31 .
 32 **Products:**

- 33 • Written agreement with demonstration site
- 34 • Completed Site Plan Report (no draft)
- 35 • Site Preparation Guidelines (no draft)

36
 37
 38 **TASK 3.0 - MANUFACTURE AND FACTORY TEST**

39 The goal of this task is to manufacture, assemble and successfully factory test one of
 40 Premium Power Corp's Zinc-Bromide ESS units.

41
 42 **The Recipient Shall:**

- 1 • Manufacture **ESS** ~~one standard PB150~~. The Recipient will create and
2 update (as needed) a build record during manufacture of the **ESS PB150**.
3 Adjustments to the design will be made to remain in compliance with the
4 results of Task 1.7 and Task 2.
- 5 • The completed **ESS PB150** will undergo factory test(s) and the recipient
6 will develop a report on the testing process and results along with any
7 changes that need to be made.
- 8 • The **ESS PB150** system will be packaged onto a 2040 foot **ISO shipping**
9 **container and/or skid mounted enclosure** trailer with **all necessary**
10 **balance of plant equipment including** a chiller, ~~transfer switch~~ and
11 any required transformers so that it can remain capable of being hauled
12 and connected to any applicable site with a 480VAC or ~~240VAC~~
13 service panel.

14 **Products:**

- 15 • Build Records (no draft)
- 16 • Factory Test Report (no draft)

19 **TASK 4.0 - FACTORY ACCEPTANCE TEST**

20 The goal of this task is to simulate in-service operation, verify system functionality, **and**
21 perform customer inspection and acceptance of the **ESS PB150** prior to delivery.

23 **The Recipient Shall:**

- 24 • Upon completion of the **ESS PB150** and factory test, a 7-day simulation of
25 in-service operation will verify the modes of operation are functioning as
26 established by the project site plan. Data collection will occur and be
27 analyzed and the first operational report will be produced.
- 28 • Update the builds records and the factory test report based on the results
29 from the 7-day simulation.
- 30 • At the end of the 7-day factory test a 1-day inspection and acceptance
31 visit will be held at the recipients North Reading and/or Billerica
32 Massachusetts facilities, where inspection and acceptance of the unit will
33 occur resulting in a signed acceptance form from the recipient, the
34 demonstration site and subcontractor(s). During the inspection process
35 the build records, factory test report, and operational test report will be
36 reviewed. A visual and physical inspection of the unit as well as system
37 and subsystem functionally will be reviewed. All Underwriters
38 Laboratories (UL) and other applicable standards will be reviewed.
39 Delivery, installation and commissioning dates and resources will be
40 reconfirmed.
- 41 • Participate in a CPR as per Task 1.2.

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Products:

- Operational Test Report (no draft)
- Updated Build Records (no draft)
- Updated Factory Test Report (no draft)
- Signed Inspection and Acceptance Form (no draft)
- CPR Report (no draft)

TASK 5.0 - DELIVERY, INSTALLATION & COMMISSIONING

The goal of this task is to deliver, install and commission the ESS PB150 at the project demonstration site.

The Recipient Shall:

- Work with the utility partner(s) and site managers to utilize the site plan, and permitting guidelines, and the UL interconnection standards to install and commission the ESS PB150 at the project site.
- Prior to shipment, an installation and commissioning plan will be generated. This plan will utilize the guidelines generated during the site planning, permitting and standards compliance tasks of this project to properly install and commission the ESS PB150. Engineering documentation and materials (to be included in the installation and commissioning plan) for the site will typically include (but not be limited to):
 - Schematic wiring diagrams
 - Control wiring diagrams
 - Physical layout diagrams
 - Ground Rods
 - Safety equipment as deemed necessary
 - Any equipment required by permitting and safety agencies
- Ensure that one of its qualified field engineers will be present for system installation and commissioning. The project utility partner will lead and direct the final interconnection to the grid and provide over-site for the commissioning of the ESS PB150. All installation partners and participants must read and understand all applicable safety and emergency procedures. An operation and maintenance manual will be provided several weeks before the shipment of the ESS PB150. The manual will provide unloading and positioning instructions and required material handling equipment specifications.
- Generate a report on the delivery, installation and commissioning of the

1 ~~ESS PowerBlock150~~ at the demonstration site.

2
3 **Products:**

- 4 • Installation and Commissioning plan (no draft)
- 5 • Operation and Maintenance manual (no draft)
- 6 • Delivery, Installation and Commissioning Report (no draft)

7
8
9 **TASK 6.0 – TRAINING**

10 The goal of this task is to provide operator and safety training to on-site personnel and
11 the project partners.

12
13 **The Recipient Shall:**

- 14 • Develop a product operator manual for use by site personnel.
- 15 • Create a training curriculum for the 2-day session.
- 16 • Hold a two-day training session that will cover operation and safety
17 procedures and basic system maintenance. The site operators and utility
18 partners will learn the following (but not be limited to):
- 19 • What to do in the event of a safety or emergency situation.
- 20 • Trainees will review the Material Safety Data Sheet (MSDS) sheets and
21 safety procedures in the event of an electrolyte containment failure and or
22 other subsystem failure. They will learn the basic systems that comprise
23 the ~~ESSPB150~~, how they function and interact.
- 24 • The trainees will review the modes of operation in both manual and
25 automatic modes and will learn how to perform basic troubleshooting and
26 clear system faults. They will also learn to follow protocols in the event
27 that basic troubleshooting procedures do not result in rectification of the
28 system fault.
- 29 • Trainees will learn how to remotely and locally access the ~~ESSPB150~~
30 monitoring software via the internet and Ethernet connection and review
31 and download real-time and archived data for review and analysis. They
32 will be capable of setting alarms that will send email and/or pager
33 notification 24/7 of any preferred data set including faults, system self-
34 corrections, when the unit enters a particular mode of operation (i.e.
35 demand response UPS or Peak Shave mode), or any other set of
36 predetermined parameters.
- 37 • Develop a list of training session attendees for the Energy Commission.

38 **Products:**

- 39 • Training Session Curriculum and List of Attendees (no draft)
- 40 • Product Operator Manual (no draft)

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Task 7.0 - MEASUREMENT & VERIFICATION (M&V)

The goal of this task is to conduct the measurement and verification (M&V) testing of the energy storage systems technical and economic performance and to provide utilities (e.g., SDG&E, PG&E, SCE, etc) SDG&E the information necessary to consider the technology for participation in their energy efficiency programs.

The Recipient Shall:

- Work with Energy Commission staff and utility partner's M&V team to identify required data to be measured and verified. The recipient will also assist in the performance analysis and feasibility of participation in the utility partner's energy efficiency programs.
- Provide data and analysis consistent with the objectives of this agreement in the Monthly M&V Reports.
- Participate in a CPR as per Task 1.2.

Products:

- Monthly M&V Report (no draft)
- CPR Report (no draft)

TASK 8.0 - QUARTERLY MAINTENANCE

The goal of this task is to provide project maintenance and a warranty to keep the project running smoothly over the demonstration period.

The Recipient Shall:

- Either the recipient or ~~qualified~~ qualified service personnel will visit the project site quarterly to perform basic and preventative maintenance. The recipient will authorize project partners that have been trained as described in Task 6 to perform basic system maintenance.
- Warrant that, with respect to the ~~ESS PowerBlock~~ delivered, for a period of 18 months beginning on the date the ~~ESS PowerBlock~~ is put into service, such ~~ESS PowerBlock~~ (a) has been manufactured in a good workmanlike manner using new parts and components to meet or exceed the applicable Specifications in all material respects, (b) is substantially free from defects in material and workmanship, and (c) shall meet the applicable specifications when it is operated in accordance with guidelines set forth in the User Manual. The ~~ESS PB150~~ will be considered in-service upon the completion of the commissioning of the system as described in Task 5 above. This warranty shall cover both parts and labor.

- Basic and Preventative Maintenance will be performed by trained service and/or the recipient's personnel only. Basic and preventative maintenance procedures and the intervals in which they will be performed will be listed in the applicable sections of the owner's manual. The **ESS PB150** is equipped with extensive data monitoring and telemetry. Inspections may be done online to verify system operation and determine health of the system.
- System alarms will be set up to notify the recipient and the project partners (via email and pager) in the event that UPS mode has initiated, faults and/or service is required.

Products:

- Quarterly Maintenance Reports (no draft)

TASK 9.0 - TECHNOLOGY TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to key decision-makers.

The Recipient shall:

- 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. This report should also include minimum run times with economic benefits in dollars by offloading peak demand.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities shall be reported in the Monthly Progress Reports.

Products:

- Draft Technology Transfer Plan
- Final Technology Transfer Plan

TASK 10.0 - PRODUCTION READINESS PLAN

The goal of the plan is to determine the steps that will lead to the manufacturing of the technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

1 • Prepare a Production Readiness Plan. The degree of detail in the
2 Production Readiness Plan discussion should be proportional to the
3 complexity of producing or commercializing the proposed product and its
4 state of development. The plan shall include, as appropriate, but not be
5 limited to:
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- 7 • Identification of critical production processes, equipment, facilities,
8 personnel resources, and support systems that will be needed to
9 produce a commercially viable product.
- 10 • Internal manufacturing facilities, as well as supplier technologies,
11 capacity constraints imposed by the design under consideration,
12 identification of design critical elements and the use of hazardous or
13 non-recyclable materials. The product manufacturing effort may
14 include “proof of production processes.”
- 15 • A projected “should cost” for the product when in production.
- 16 • The expected investment threshold to launch the commercial product.
- 17 • An implementation plan to ramp up to full production.

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19 **Products:**

- 20 • Draft Production Readiness Plan
- 21 • Final Production Readiness Plan

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

Task Number	Task Name	Product(s)	Planned Start Date	Amd #1 Planned Start Date	Due Date	Amd #1 Due Date
1.1	Attend Kick-off Meeting		9/20/2010	9/5/2012	2/7/2011	2/7/2011
		Updated Schedule of Products (no draft)	9/20/2010	9/5/2012	2/7/2011	2/7/2011
		Updated List of Match Funds (no draft)	9/20/2010	9/5/2012	2/7/2011	2/7/2011
		Updated List of Permits (no draft)	9/20/2010	9/5/2012	2/7/2011	2/7/2011
		Kick-Off Meeting Agenda (no draft)	9/20/2010	9/5/2012	2/7/2011	2/7/2011
1.2	Critical Project Review Meetings		4/4/2011	1/4/2013	7/16/2012	5/30/2014
		CPR Report (no draft)	4/4/2011	1/4/2013	5/3/2011	3/1/2013
	1st CPR Meeting	Agenda and a list of expected participants (no draft)	4/12/2011	1/14/2013	4/20/2011	2/15/2013
		Schedule for written determination (no draft)	4/28/2011	1/28/2013	5/5/2011	3/5/2013
		Written determination (no draft)	5/5/2011	3/5/2013	5/20/2011	3/20/2013
	2nd CPR Meeting	CPR Report (no draft)	6/1/2012	4/1/2014	6/28/2012	4/28/2014
		Agenda and a list of expected participants (no draft)	6/12/2012	4/10/2014	6/20/2012	4/22/2014
		Schedule for written determination (no draft)	6/25/2012	4/25/2014	7/3/2012	5/15/2014
		Written determination (no draft)	7/3/2012	5/15/2014	7/16/2012	5/30/2014
1.3	Final Meeting		5/1/2013	1/19/2015	5/30/2013	2/16/2015
		Written documentation of meeting agreements (no draft)	5/1/2013	1/15/2015	5/10/2013	1/27/2015
		Schedule for completing closeout activities (no draft)	5/10/2013	1/27/2015	5/30/2013	2/16/2015
1.4	Monthly Progress Reports					
		Monthly Progress Reports (no draft)	Upon full execution of agreement	Upon full execution of agreement	The 10th of each month during the approved term of this Agreement	The 10th of each month during the approved term of this Agreement
1.5	Final Report		10/3/2012	8/13/2014	1/28/2013	12/3/2014
		Draft Outline of the Final Report	10/3/2012	8/11/2014	10/30/2012	9/8/2014
		Final Outline of the Final Report	11/1/2012	9/8/2014	11/20/2012	10/6/2014
		Draft Final Report	12/3/2012	10/6/2014	12/26/2012	11/3/2014
		Final Report	1/2/2013	11/3/2014	1/28/2013	12/3/2014

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

1.6 Identify and Obtain Match Funds	A letter regarding match funds or stating that no match funds are provided (no draft)	9/20/2010	12/3/2012	10/20/2010	1/3/2013
	Copy(ies) of each match fund commitment letter(s) (if applicable) (no draft)	9/20/2010	12/3/2012	10/20/2010	1/3/2013
	Letter(s) for new match funds (if applicable) (no draft)	N/A	NA	Within 10 days of identifying new match funds	Within 10 days of identifying new match funds
	Letter that match funds were reduced (if applicable) (no draft)	N/A	N/A	Within 10 days of identifying new match funds	Within 10 days of identifying new match funds
	1.7 Identify and Obtain Required Permits	9/20/2010	9/10/2013	6/30/2011	6/20/2013
Letter documenting the permits or stating that no permits are required (no draft)	9/20/2010	12/19/2012	6/30/2011	5/1/2013	
A copy of each approved permit (if applicable) (no draft)	N/A	N/A	Within 10 days of receiving each permit	Within 10 days of receiving each permit	
Updated list of permits as they change during the term of the Agreement (if applicable) (no draft)	N/A	N/A	Within 10 days of change in list of permits	Within 10 days of receiving each permit	
Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable) (no draft)	N/A	N/A	Within 10 days of change in schedule for obtaining permits	Within 10 days of receiving each permit	
2 Site Plan		9/28/2010	11/27/2012	12/27/2010	5/1/2013
	<u>Written agreement with demonstration site</u>		11/27/2012		4/15/2013
	Completed Site Plan Report (no draft)	9/28/2010	12/17/2012	11/26/2010	2/20/2013
	Site Preparation Guidelines (no draft)	11/22/2010	11/27/2012	12/27/2010	5/1/2013
3 Manufacture and Factory Test		9/28/2010	1/8/2013	3/29/2011	8/1/2013
	Build Records (no draft)	9/28/2010	1/8/2013	2/24/2011	7/1/2013
	Factory Test Report (no draft)	3/1/2011	7/1/2013	3/29/2011	8/1/2013
4 Factory Acceptance Test		4/4/2011	9/6/2013	5/3/2011	10/8/2013

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

	Operational Test Report (no draft)	4/4/2011	9/6/2013	5/3/2011	10/8/2013
	Updated Build Records (no draft)	4/4/2011	9/6/2013	5/3/2011	10/8/2013
	Updated Factory Test Report (no draft)	4/4/2011	9/6/2013	5/3/2011	10/8/2013
	Signed Inspection and Acceptance Form (no draft)	4/4/2011	9/6/2013	5/3/2011	10/8/2013
	CPR Report (no draft)	4/4/2011	9/6/2013	5/3/2011	10/8/2013
5	Delivery, Installation and Commissioning	5/10/2011	11/6/2013	6/30/2011	12/6/2013
	Installation and Commissioning Plan (no draft)	5/10/2011	8/15/2013	5/23/2011	9/17/2013
	Operation and Maintenance Manual (no draft)	5/24/2011	8/15/2013	6/14/2011	10/15/2013
	Delivery, Installation and Commissioning Report (no draft)	6/16/2011	11/20/2013	6/30/2011	12/6/2013
6	Training	7/1/2011	8/15/2013	8/15/2011	11/1/2013
	Training Session Curriculum and List of Attendees (no draft)	7/1/2011	12/9/2013	7/26/2011	12/17/2013
	Product Operator Manual (no draft)	7/27/2011	8/15/2013	8/15/2011	10/15/2013
7	Measurement and Verification (M&V)	8/25/2011	11/15/2013	6/28/2012	12/4/2014
	Monthly M&V Report (no draft)	8/25/2011	1/6/2014	5/30/2012	12/4/2014
	CPR Report (no draft)	6/1/2012	11/3/2014	6/28/2012	12/4/2014
8	Quarterly Maintenance	6/16/2011	12/6/2013	6/28/2012	12/4/2014
	Quarterly Maintenance Reports (no draft)	6/16/2011	12/6/2013	6/28/2012	12/4/2014
9	Technology Transfer Activities	7/3/2012	10/1/2014	9/3/2012	12/1/2014
	Draft Technology Transfer Plan	7/3/2012	10/1/2014	8/1/2012	11/3/2014
	Final Technology Transfer Plan	8/2/2012	11/3/2014	9/3/2012	12/1/2014
10	Production Readiness Plan	7/3/2012	10/1/2014	9/3/2012	12/1/2014
	Draft Production Readiness Plan	7/3/2012	10/1/2014	8/1/2012	11/3/2014
	Final Production Readiness Plan	8/2/2012	11/3/2014	9/3/2012	12/1/2014