

GRANTS/CONTINGENT AWARD REQUEST



To: Grants and Loans Office Date: 3/14/2012
Project Manager: Paul Roggensack Phone Number: 916-327-2224
Office: Energy Efficiency Research Office Division: Energy Research and Development MS- 51
Project Title: Data Center Demonstration with Combined Heat and Power Technology

Type of Request: (check one)

[X] New Agreement: (include items A-F from below) Agreement Number: PIR-11-014
Program: PIER NG / Industrial/ Ag/ Water
Solicitation Name and/or Number: PON-11-501-70 (2011 Emerging Technology Demonstration Grant)
Legal Name of Recipient: ICF International
Recipient's Full Mailing Address: 12011 NE 1ST ST STE 210 BELLEVUE, WA 98005-3182
Recipient's Project Officer: Rick Tidball Phone Number: (425) 688-0141 x26
Agreement Start Date: 6/29/2012 Agreement End Date: 3/29/2015

[ ] Amendment: (Check all that apply) Agreement Number:
[ ] Term Extension - New End Date:
[ ] 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:
[X] CEC has made CEQA finding described in CEC-280, attached

Funding Information:

\*Source #1: NG Amount: \$ 974,179.00 Statute: 10- FY: 11-12 Budget List #: 501.001E
\*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: 5/9/2012 [ ] Consent [X] Discussion
Business Meeting Participant: Paul Roggensack Time Needed: 5 minutes

Agenda Notice Statement: (state purpose in layperson terms)

Possible approval of a [X] Grant / [ ] Contingent Award to...
Possible approval of Agreement PIR-11-014 for \$974,179.00 with ICF International to demonstrate the use of a hybrid uninterruptable power supply (UPS) microturbine at a California datacenter. The modified Capstone microturbine will provide power quality during energy fluctuations and a power source in case of grid failure while taking the UPS off the grid. This UPS can be run on natural gas or renewable energy resources. The length of this agreement is 33 months. (PIER natural gas funding.) Contact: Paul Roggensack. 5 minutes.

Project Manager Date Office Manager Date Deputy Director Date

# Exhibit A WORK STATEMENT

1 **TASK LIST**

Task #	CPR	Task Name
1	N/A	Administration
2		Project Initiation
3		Site Evaluation and CCHP Requirements
4		Preliminary Design
5		Performance Modeling
6	X	Final Design
7		Hardware Procurement
8		Installation and Start-up
9		Test Plan and Monitoring
10		Measurement and Verification
11		Technology Transfer Activities
12		Production Readiness Plan

2  
3 **KEY NAME LIST**

4  
5 **GLOSSARY**

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

Term/Acronym	Definition
CCHP	Combined Cooling, Heating, and Power System
COP	Coefficient of Performance
CPR	Critical Project Review
Energy Commission	California Energy Commission
Genset	Electrical Power Generation Set
GHG	Greenhouse Gas
HHV	Higher Heating Value
kW	Kilowatt
LHV	Lower Heating Value
M&V	Measurement & Verification
MBtu	1,000 British Thermal Units
O&M	Operation and Maintenance
PIER	Public Interest Energy Research
RD&D	Research, Development, and Demonstration
RT	Refrigeration Ton
SCE	Southern California Edison
SCGC	Southern California Gas Company
TOU	Time of Use
UPS	Uninterruptible Power Supply

8

# Exhibit A

## WORK STATEMENT

### 1 **Problem Statement:**

2 Data centers require an extremely reliable supply of high quality electric power, and to  
3 meet this requirement data centers typically install on-site equipment to supply power to  
4 critical loads in the event that grid power is lost. A traditional uninterruptible power  
5 supply (UPS) solution for data centers consists of power electronics to condition the  
6 utility power, batteries to provide energy to ride through short utility disturbances, and  
7 one or more fossil-fuel fired generators for extended outages. While this technology  
8 can provide continuous high quality power to critical loads, it does so with decreased  
9 efficiency compared to the use of grid power. Therefore, traditional solutions increase  
10 ongoing utility and maintenance costs, and never payback initial capital costs.

### 11 12 **Goals of the Agreement:**

13 The goal of this agreement is to integrate three Capstone Hybrid UPS microturbine units  
14 with an advanced double-effect Thermax exhaust-fired absorption chiller and  
15 demonstrate the resulting Hybrid UPS and Combined Cooling, Heating, and Power  
16 System (CCHP) system at a data center operated by Southern California Gas Company  
17 (SCGC). The resulting Hybrid UPS CCHP system provides the following benefits  
18 relative to traditional UPS and electrical power generation set (genset) solutions:

- 19 • Higher energy efficiency
- 20 • Reduced demand for grid electricity
- 21 • Fewer criteria pollutants
- 22 • Lower utility bills
- 23 • Reduced carbon footprint

24  
25 Quantitative and measurable goals include:

- 26 • 66% CHP system efficiency lower heating value (LHV) basis
- 27 • 247 kilowatt (kW) reduction in electricity demand at data center
- 28 • 80% NOx emissions reduction compared to using utility power
- 29 • 18% to 41% reduction in energy costs (depending on operating scenario)

### 30 31 **Objectives of the Agreement:**

32 The objectives of demonstrating this innovative CCHP system are to:

- 33 • Document that system reliability, availability, and power quality meet data center  
34 expectations
- 35 • Match thermal and electric outputs to an operating data center's load profile
- 36 • Quantify savings compared with traditional UPS and backup generator solutions  
37 in a commercial California installation
- 38 • Confirm that this system will meet strict California emissions requirements
- 39 • Verify efficiency and greenhouse gas reduction levels sufficient to make the  
40 technology eligible for utility energy efficiency rebate programs in California
- 41 • Develop alternative energy sources for data centers
- 42 • Act as a real-world operating system to demonstrate all the above capabilities to  
43 prospective data center customers

# Exhibit A

## WORK STATEMENT

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### **Product Guidelines:**

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

### **TASK 1 ADMINISTRATION**

#### **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 Recipient shall:**

- Attend a “Kick-Off” meeting with the Commission Project Manager, the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the Commission Project 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 Project 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:

- Discussion of the terms and conditions of the Agreement
- Discussion of Critical Project Review (Task 1.2)
- Match fund documentation (Task 1.6)
- Permit documentation (Task 1.7)

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

- The Commission Project Manager’s expectations for accomplishing tasks described in the Scope of Work
- An updated Schedule of Products
- Discussion of Progress Reports (Task 1.4)
- Discussion of Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
- Discussion of the Final Report (Task 1.5)

#### **The Commission Project Manager shall:**

- Designate the date and location of this meeting.

#### **Recipient Products:**

- Updated Schedule of Products (no draft)
- Updated List of Match Funds (no draft)

## Exhibit A WORK STATEMENT

- 1           • Updated List of Permits (no draft)

2  
3 **Commission Project Manager Product:**

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

5  
6 **Task 1.2 Critical Project Review (CPR) Meetings**

7  
8 The goal of this task is to determine if the project should continue to receive Energy  
9 Commission funding to complete this Agreement and to identify any needed  
10 modifications to the tasks, products, schedule or budget.

11  
12 CPRs provide the opportunity for frank discussions between the Energy Commission  
13 and the Recipient. CPRs generally take place at key, predetermined points in the  
14 Agreement, as determined by the Commission Project Manager and as shown in the  
15 Technical Task List above. However, the Commission Project Manager may schedule  
16 additional CPRs as necessary, and any additional costs will be borne by the Recipient.

17  
18 Participants include the Commission Project Manager and the Recipient and may  
19 include the Commission Grants Officer, the Public Interest Energy Research (PIER)  
20 Program Team Lead, other Energy Commission staff and Management as well as other  
21 individuals selected by the Commission Project Manager to provide support to the  
22 Energy Commission.

23  
24 **The Commission Project Manager shall:**

- 25           • Determine the location, date, and time of each CPR meeting with the  
26 Recipient. These meetings generally take place at the Energy  
27 Commission, but they may take place at another location.
- 28           • Send the Recipient the agenda and a list of expected participants in  
29 advance of each CPR. If applicable, the agenda shall include a  
30 discussion on both match funding and permits.
- 31           • Conduct and make a record of each CPR meeting. One of the outcomes  
32 of this meeting will be a schedule for providing the written determination  
33 described below.
- 34           • Determine whether to continue the project, and if continuing, whether or  
35 not modifications are needed to the tasks, schedule, products, and/or  
36 budget for the remainder of the Agreement. Modifications to the  
37 Agreement may require a formal amendment (please see the Terms and  
38 Conditions).
- 39           • Provide the Recipient with a written determination in accordance with the  
40 schedule. The written response may include a requirement for the  
41 Recipient to revise one or more product(s) that were included in the CPR.

42  
43 **The Recipient shall:**

- 44           • Prepare a CPR Report for each CPR that discusses the progress of the

## Exhibit A WORK STATEMENT

1 Agreement toward achieving its goals and objectives. This report shall  
2 include recommendations and conclusions regarding continued work of  
3 the projects. This report shall be submitted along with any other products  
4 identified in this scope of work. The Recipient shall submit these  
5 documents to the Commission Project Manager and any other designated  
6 reviewers at least 15 working days in advance of each CPR meeting.

- 7 • Present the required information at each CPR meeting and participate in a  
8 discussion about the Agreement.

### 9 **Commission Project Manager Products:**

- 10 • Agenda and a list of expected participants (no draft)
- 11 • Schedule for written determination (no draft)
- 12 • Written determination (no draft)

### 13 **Recipient Product:**

- 14 • CPR Report(s) (no draft)

### 15 **Task 1.3 Final Meeting**

16 The goal of this task is to closeout this Agreement.

### 17 **The Recipient shall:**

- 18 • Meet with Energy Commission staff to present the findings, conclusions,  
19 and recommendations. The final meeting must be completed during the  
20 closeout of this Agreement.

21 This meeting will be attended by, at a minimum, the Recipient, the  
22 Commission Grants Office Officer, and the Commission Project Manager.  
23 The technical and administrative aspects of Agreement closeout will be  
24 discussed at the meeting, which may be two separate meetings at the  
25 discretion of the Commission Project Manager.

26 The technical portion of the meeting shall present an assessment of the  
27 degree to which project and task goals and objectives were achieved,  
28 findings, conclusions, recommended next steps (if any) for the Agreement,  
29 and recommendations for improvements. The Commission Project  
30 Manager will determine the appropriate meeting participants.

31 The administrative portion of the meeting shall be a discussion with the  
32 Commission Project Manager and the Grants Officer about the following  
33 Agreement closeout items:

- 34 ○ What to do with any equipment purchased with Energy Commission  
35 funds (Options)

## Exhibit A WORK STATEMENT

- 1           ○     Energy Commission's request for specific "generated" data (not
- 2                     already provided in Agreement products)
- 3           ○     Need to document Recipient's disclosure of "subject inventions"
- 4                     developed under the Agreement
- 5           ○     "Surviving" Agreement provisions, such as repayment provisions
- 6                     and confidential Products
- 7           ○     Final invoicing and release of retention
- 8           ○     Prepare a schedule for completing the closeout activities for this
- 9                     Agreement

### 10 11 **Products:**

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

### 14 15 **Task 1.4 Monthly Progress Reports**

16  
17 The goal of this task is to periodically verify that satisfactory and continued progress is  
18 made towards achieving the research objectives of this Agreement on time and within  
19 budget.

20  
21 The objectives of this task are to summarize activities performed during the reporting  
22 period, to identify activities planned for the next reporting period, to identify issues that  
23 may affect performance and expenditures, and to form the basis for determining  
24 whether invoices are consistent with work performed.

### 25 26 **The Recipient shall:**

- 27           •     Prepare a Monthly Progress Report which summarizes all Agreement
- 28                     activities conducted by the Recipient for the reporting period, including an
- 29                     assessment of the ability to complete the Agreement within the current
- 30                     budget and any anticipated cost overruns. Each progress report is due to
- 31                     the Commission Project Manager within 10 days of the end of the
- 32                     reporting period. The recommended specifications for each progress
- 33                     report are contained in Exhibit A, Attachment A-2.

### 34 35 **Product:**

- 36           •     Monthly Progress Reports (no draft)

### 37 38 **Task 1.5 Final Report**

39  
40 The goal of the Final Report is to assess the project's success in achieving its goals and  
41 objectives, advancing science and technology, and providing energy-related and other  
42 benefits to California.

43  
44 The objectives of the Final Report are to clearly and completely describe the project's  
45 purpose, approach, activities performed, results, and advancements in science and

## Exhibit A WORK STATEMENT

1 technology; to present a public assessment of the success of the project as measured  
2 by the degree to which goals and objectives were achieved; to make insightful  
3 observations based on results obtained; to draw conclusions; and to make  
4 recommendations for further RD&D projects and improvements to the PIER project  
5 management processes.  
6

7 The Final Report shall be a public document. If the Recipient has obtained confidential  
8 status from the Energy Commission and will be preparing a confidential version of the  
9 Final Report as well, the Recipient shall perform the following activities for both the  
10 public and confidential versions of the Final Report.  
11

### 12 **The Recipient shall:**

- 13 • Prepare an Outline of the Final Report.
- 14 • Prepare a Final Report following the approved outline and the latest  
15 version of the PIER Final Report guidelines published on the Energy  
16 Commission's website at  
17 <http://www.energy.ca.gov/contracts/pier/contractors/index.html> at the  
18 time the Recipient begins performing this task, unless otherwise instructed  
19 in writing by the Commission Project Manager. Instead of the timeframe  
20 listed in the Product Guidelines located in Section 5 of the Terms and  
21 Conditions, the Commission Project Manager shall provide written  
22 comments on the Draft Final Report within fifteen (15) working days of  
23 receipt. The Final Report must be completed on or before the end of the  
24 Agreement Term.
- 25 • Submit one bound copy of the Final Report with the final invoice.  
26

### 27 **Products:**

- 28 • Draft Outline of the Final Report
- 29 • Final Outline of the Final Report
- 30 • Draft Final Report
- 31 • Final Report  
32

### 33 **Task 1.6 Identify and Obtain Matching Funds**

34  
35 The goal of this task is to ensure that the match funds planned for this Agreement are  
36 obtained for and applied to this Agreement during the term of this Agreement.  
37

38 The costs to obtain and document match fund commitments are not reimbursable  
39 through this Agreement. Although the PIER budget for this task will be zero dollars, the  
40 Recipient may utilize match funds for this task. Match funds shall be spent concurrently  
41 or in advance of PIER funds for each task during the term of this Agreement. Match  
42 funds must be identified in writing and the associated commitments obtained before the  
43 Recipient can incur any costs for which the Recipient will request reimbursement.  
44

## Exhibit A WORK STATEMENT

### 1   **The Recipient shall:**

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

### 34   **Products:**

- 35       •     A letter regarding match funds or stating that no match funds are provided  
36       (no draft)
- 37       •     Copy(ies) of each match fund commitment letter(s) (if applicable)  
38       (no draft)
- 39       •     Letter(s) for new match funds (if applicable) (no draft)
- 40       •     Letter that match funds were reduced (if applicable) (no draft)

### 41   **Task 1.7 Identify and Obtain Required Permits**

## Exhibit A WORK STATEMENT

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

4  
5 Permit costs and the expenses associated with obtaining permits are not reimbursable  
6 under this Agreement. Although the PIER budget for this task will be zero dollars, the  
7 Recipient shall budget match funds for any expected expenditures associated with  
8 obtaining permits. Permits must be identified in writing and obtained before the  
9 Recipient can make any expenditures for which a permit is required.

### 10 11 **The Recipient shall:**

- 12 • Prepare a letter documenting the permits required to conduct this  
13 Agreement and submit it to the Commission Project Manager at least 2  
14 working days prior to the kick-off meeting. If there are no permits required  
15 at the start of this Agreement, then state such in the letter. If it is known at  
16 the beginning of the Agreement that permits will be required during the  
17 course of the Agreement, provide in the letter:
  - 18 ○ A list of the permits that identifies the:
    - 19 ▪ Type of permit
    - 20 ▪ Name, address and telephone number of the permitting  
21 jurisdictions or lead agencies
- 22 • The schedule the Recipient will follow in applying for and obtaining these  
23 permits.
- 24 • Discuss the list of permits and the schedule for obtaining them at the kick-  
25 off meeting and develop a timetable for submitting the updated list,  
26 schedule and the copies of the permits. The implications to the  
27 Agreement if the permits are not obtained in a timely fashion or are denied  
28 will also be discussed. If applicable, permits will be included as a line item  
29 in the Progress Reports and will be a topic at CPR meetings.
- 30 • If during the course of the Agreement additional permits become  
31 necessary, provide the appropriate information on each permit and an  
32 updated schedule to the Commission Project Manager.
- 33 • As permits are obtained, send a copy of each approved permit to the  
34 Commission Project Manager.
- 35 • If during the course of the Agreement permits are not obtained on time or  
36 are denied, notify the Commission Project Manager within 10 days. Either  
37 of these events may trigger an additional CPR.

### 38 39 **Products:**

- 40 • Letter documenting the permits or stating that no permits are required (no  
41 draft)
- 42 • A copy of each approved permit (if applicable) (no draft)
- 43  
44 • Updated list of permits as they change during the term of the Agreement

# Exhibit A WORK STATEMENT

1 (if applicable) (no draft)

- 2 • Updated schedule for acquiring permits as changes occur during the term  
3 of the Agreement (if applicable) (no draft)

## 4 5 **TECHNICAL TASKS**

### 6 7 **TASK 2. PROJECT INITIATION**

#### 8 **Task 2.1 Confirm Project Demonstration Site**

9 The goal of this task is to ensure the pilot demonstration site remains committed prior  
10 and during the period of demonstration.

#### 11 12 **The Recipient Shall:**

- 13 • Verify the SCGC will host the project by providing their datacenter as the project  
14 demonstration site; otherwise obtain a new suitable demonstration site for this  
15 project.  
16 • Provide a letter to the Commission Project Manager from SCGC or other  
17 demonstration site committing to host the project.

#### 18 19 **Products**

- 20 • Letter from SCGC or other demonstration site committing to host the project  
21

#### 22 **Task 2.2. Confirm third-party Measurement and Verification (M&V) Vendor**

23 The goal of this task is to ensure a subcontractor is available and can perform the M&V  
24 required for this project.

#### 25 26 **The Recipient shall:**

- 27 • Confirm that DE Solutions will be the M&V vendor for the project, or obtain  
28 another suitable M&V vendor for this project.  
29 • Provide a letter to the Commission Project Manager from DE Solutions or other  
30 third party confirming M&V performance for the project.

#### 31 32 **Products:**

- 33 • Letter from DE Solutions or other subcontractor confirming M&V performance  
34

### 35 **TASK 3 SITE EVALUATION AND CCHP REQUIREMENTS**

36 The goal of this task is to assess site power and chilled water requirements. In addition,  
37 the site's physical layout will be assessed for installation suitability. Electrical  
38 interconnection with facility electrical distribution system and existing UPS, chilled water  
39 interconnection, cooling tower water source, and natural gas interconnection will be  
40 evaluated.

#### 41 42 **The Recipient shall:**

43 Prepare a Site Evaluation and CHP Requirements Report including:

## Exhibit A WORK STATEMENT

- 1 • Dimensioned site plan showing existing layout, location of proposed CHP
- 2 system, and the access to facility's electrical distribution system, existing UPS,
- 3 chilled water interconnection, cooling tower water source, and natural gas supply.
- 4 • An annual hourly profile of site electrical power requirements.
- 5 • An annual hourly profile of site chilled water requirements.
- 6 • An assessment of current cooling tower water supply.

### 7 8 **Product:**

- 9 • Site Evaluation and CCHP Requirements Report (no draft)

### 10 11 **TASK 4 PRELIMINARY DESIGN**

12 The goal of this task is to prepare a preliminary design for the CCHP system.

### 13 14 **The Recipient shall:**

15 Prepare a Preliminary Design Report that includes:

- 16 • Analysis of the optimized system configuration.
- 17 • Site plan showing placement of the proposed Hybrid UPS CCHP system and all
- 18 interconnections.
- 19 • Estimate of installation costs.

### 20 21 **Product:**

- 22 • Preliminary Design Report (no draft)

### 23 24 **TASK 5 PERFORMANCE MODELING**

25 The goal of this task is to model system performance based on the preliminary design

26 findings in Task 4. Design alternatives will be modeled to optimize performance.

### 27 28 **The Recipient shall:**

- 29 • Conduct CCHP system modeling.
- 30 • Prepare an Economic Modeling Report with modeling results showing the
- 31 system's efficiency, emissions, and anticipated economic performance.

### 32 33 **Product:**

- 34 • Economic Modeling Report (no draft)

### 35 36 **TASK 6 FINAL DESIGN**

37 The goal of this task is to prepare complete plans and specifications for the optimized

38 system.

## Exhibit A WORK STATEMENT

1 **The Recipient shall:**

- 2     • Finalize all required permits and approvals to proceed with installation, including,  
3     but not limited to:
- 4         ○ Local air quality district pollution permit
  - 5         ○ Utility interconnection agreement
- 6     • Prepare a Final Design Report that will include:
- 7         ○ Mechanical piping and layout
  - 8         ○ Structural drawings
  - 9         ○ Electrical drawings
  - 10         ○ Installation guidelines/specifications
  - 11         ○ All permits and approvals
- 12     • Use final design report to solicit bids from general contractors, evaluate bids, and  
13     select general contractor.
- 14     • Submit CPR Report and present information at the CPR Meeting in  
15     accordance with Subtask 1.2.

16  
17 **Product:**

- 18     • Final Design Report (no draft)
  - 19     • CPR Report (no draft)
- 20

21 **TASK 7     HARDWARE PROCUREMENT**

22 The goal of this task is to procure all major pieces of equipment, including the  
23 microturbines, absorption chiller, and the battery bank required for the demonstration.  
24

25 **The Recipient shall:**

26 Coordinate with general contractor, Capstone, Regatta, and Thermax to place orders for  
27 major hardware items and have this equipment delivered to the demonstration site. The  
28 integrated system is expected to consist of the following core technologies:

- 29     • Three natural gas-fired C65 Hybrid UPS microturbines
- 30     • One double effect absorption chiller
- 31     • Three individual battery banks, one for each microturbine
- 32     • An optional exhaust duct burner (if modeling indicates there is an economic  
33     advantage for including a duct burner)

34 **Product:**

- 35     • Status of hardware procurement incorporated into monthly reports (no draft)
- 36

37 **TASK 8     INSTALLATION AND START-UP**

38 The goal of this task is to install and commission the Hybrid UPS CCHP system at  
39 SCGC's data center in Monterey Park, California.  
40

41 **The Recipient shall:**

42 Coordinate with general contractor as needed. The general contractor will be  
43 responsible for installing the Hybrid UPS CCHP system and associated instrumentation  
44 and monitoring equipment needed for M&V testing.

## Exhibit A WORK STATEMENT

- 1       • Prepare Installation Report, including photographs of the installed Hybrid UPS  
2       CCHP system.  
3

4       **Product:**

- 5       • Installation Report (no draft)  
6

7       **TASK 9       TEST PLAN AND MONITORING**

8       The goals of this task are to develop a test plan and monitor system operation. This  
9       task will include periodic site visits to inspect the equipment and ensure that the  
10      equipment is operating correctly.  
11

12      **The Recipient shall:**

13      Work with DE Solutions (M&V partner) to prepare a Test Plan that will capture sufficient  
14      data to determine the following:

- 15      • Overall CHP efficiency  
16      • Microturbine electric efficiency  
17      • Absorption chiller coefficient of performance (COP)  
18      • System operating time and availability  
19      • NOx emissions  
20      • Electrical production and parasitic power consumption  
21      • Chilled water production  
22      • Fuel usage  
23      • Power quality  
24

25      **Product:**

- 26      • Test plan (no draft)  
27

28      **TASK 10      MEASUREMENT AND VERIFICATION**

29      The goal of this task is to complete an M&V evaluation.  
30

31      **The Recipient shall:**

32      DE Solutions will work independently to complete this task, which will include:

- 33      • Ensure that all necessary sensors, meters, data loggers, and any other  
34      equipment needed for M&V are installed correctly and operating properly.  
35      • Collect and analyze data.  
36      • Prepare M&V report that addresses all the items listed in the Goals and  
37      Objectives of the Agreement on page 2.  
38

39      **Product:**

- 40      • M&V Report (no draft)  
41

42      **TASK 11      TECHNOLOGY TRANSFER ACTIVITIES**

## Exhibit A WORK STATEMENT

1 The goal of this task is to disseminate project results to help accelerate  
2 commercialization.

3

4 **The Recipient shall:**

5 Capstone will be the lead team member, and will:

6 • Prepare a Technology Transfer Plan which explains how the knowledge gained  
7 in this project will be made available to the public. Include key elements in Final  
8 Report.

9 • Conduct technology transfer activities in accordance with the Technology  
10 Transfer Plan and report these activities in Monthly Progress Reports.

11

12 **Products:**

13 • Technology Transfer Plan

14

15 **TASK 12 PRODUCTION READINESS PLAN**

16 The goal of the plan is to determine the steps necessary to fully commercialize the  
17 CCHP technology.

18

19 **The Recipient shall:**

20 Capstone will be the lead team member and will prepare a Production Readiness Plan  
21 with a high degree of detail which will include:

22 • Identification of critical production processes, equipment, facilities, personnel  
23 resources, and support systems that will be needed to produce a commercially  
24 viable product.

25 • Description of internal manufacturing facilities, as well as supplier technologies,  
26 capacity constraints imposed by the design under consideration, identification of  
27 design critical elements and the use of hazardous or non-recyclable materials.  
28 The product manufacturing effort will include “proof of production processes”.

29 • A projected “should cost” for the product when in production.

30 • The expected investment threshold to launch the commercial product.

31 • An implementation plan to ramp up to full production.

32

33 **Products:**

34 • Production Readiness Plan

35