

STATEMENT OF WORK AND PROJECT TASK DESCRIPTIONS

This project shall be conducted in accordance with the Recipient's State Energy Program (SEP) Special Project grant application as submitted to and approved by the United States Department of Energy (DOE). In the event of a conflict between the terms of this grant agreement (including the incorporated documents) and the Recipient's grant application, this grant agreement shall be considered controlling.

Problem Statement:

Combined heat and power (CHP) is an important concept for improving energy efficiency by allowing for waste heat capture for productive purposes from electricity production. Based on distributed generation (DG) technologies including engines, turbines, microturbines, and fuel cells, CHP can provide energy services with overall efficiencies in the 60-80% range, and without the significant transmission and distribution losses that are inevitable with central station generation.

California has a strong recent interest in CHP in regard to meeting the goals of Assembly Bill 32 - the Global Warming Solutions Act (AB 32). Based on the levels of greenhouse gas emission reductions needed to meet the goals of AB 32, needs for an additional 4 GW of CHP in California by 2020 have been identified. This compares with approximately 9 GW of CHP at present, but with much of this at large industrial settings included for enhanced oil recovery in the California central valley. The tasks proposed here are intended to help to achieve the AB 32 scoping plan goals, but much additional efforts will be required as the current CHP market is developing slowly due to regulatory uncertainty about incentives and "feed in tariffs" among other factors.

Key planned PCEAC activities include an extensive website with information on CHP/district energy and links to other sites, organizing and hosting workshops and conferences targeted to CHP "end user" groups, conduct of facility energy audits and "level 2" CHP screenings, preparation of state assessment and policy reports, preparation of project profile case studies, responses to inquiries for information from potential end users and other parties, project management, and other miscellaneous activities.

The PRAC network will achieve this objective by targeted education and outreach as well as project assistance using the following strategies:

- Continue to extend PRAC network activities throughout CA, NV, and HI and work closely with existing organizations and companies in the region in order to facilitate the deployment of CHP;
- Provide outreach and education to potential CHP users;
- Identify regulatory and policy barriers and opportunities, and work with stakeholders to address obstacles to CHP deployment; and
- Identify and facilitate high impact CHP projects -- projects that have the potential to be replicated, open up new markets, and have the potential for large market impact.

The specific tasks that the PRAC would undertake through this Agreement are outlined in the work scope below.

Goals of the Agreement:

The goal of this Agreement is to advance the state of knowledge and conduct directed outreach and CHP field performance and implementation status assessment activities related to further deployment of CHP in California.

Objectives of the Agreement:

The objectives of this Agreement are to carry forward the activities of the PRAC network for an additional period in Nevada and Hawaii as well as within California. The PRAC network proposes several new and continued tasks to help the Pacific Region adopt and realize further deployment of CHP systems. It will provide essential outreach and research support to enhance technology transfer and deployment of advanced CHP technologies.

Product Guidelines:

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

TASK 1 TARGETED MARKET WORKSHOP

The goal of this task is to The PRAC shall conduct an additional targeted CHP market workshop in 2011, beyond those already planned with other (U.S. DOE) funding. The topic will be determined from an updated CHP Roadmap for the Pacific Region. The funds will be used to support the meeting logistics and to also offset registration fees for end users to maximize the turnout of end users in the sector and to help produce action oriented material summarizing the workshop findings and promote follow up for site assessments. This effort will be led by UCI with support from UCB and SDSU.

The Recipient shall:

- Plan a target market CHP workshop in the Pacific region
- Advertise and promote the CHP workshop
- Execute the CHP workshop
- Develop summary target market workshop report

Products and Due Dates:

- Targeted workshop summary report
Product due date: July 31, 2011

TASK 2 TARGETED MARKET PARTICIPATION

This task would support a presence of PRAC at key CHP oriented conferences (e.g., PowerGen 2011 and CADER). The field of renewable energy and fuels are strongly intertwined with power generation and CHP, especially in the biomass arena. The Power-Gen conference is the premier event in the renewables sector and the draw of Las Vegas provides for large attendance expectations. An introduction to the renewables community from around the world would have benefit not only for the PRAC but for all RACs owing to the wide geographic draw. While the

renewables aspect suggests primarily solar, wind, and hydro, nearly 50% of the attendees at PowerGen are typically associated with other forms of renewables and of those nearly all were associated with power generation, heat, or both. This show would seem to be a good fit for PRAC with close proximity to the California centers.

The Recipient shall:

- Develop education and outreach materials in advance of conference(s)
- Participate in conferences with posters, booth space, and podium presentations (to the extent possible)
- Follow-up based on contacts made at the workshop and subsequent enquiries

Products and Due Dates:

- Conference materials (no draft)
Product due date: August 31, 2011

TASK 3 CHP SYSTEM FIELD OPERATIONAL PERFORMANCE ASSESSMENT

The goal of the task is to gain a better understanding of the actual "real world" performance of CHP systems in the Pacific Region and reliability of existing systems, and to compare actual performance to projected performance. Performance metrics would be gathered with regard to electrical and overall thermal operating efficiency, operating "duty cycle" patterns, maintenance needs and downtime/availability, and other relevant performance related issues impacting implementation of CHP systems. The task would also examine the current status and short term potentials of the CHP market in the Pacific region and define a set of recommendations that may better target financial incentives as well as improve performance and implementation of CHP systems.

To the extent possible, the assessments shall be conducted according to the ASERTTI Case Study Protocol. The protocol is intended to provide data on electrical, thermal, emissions, and operational performance of CHP systems based on data collected using the Long Term Monitoring Protocol as well as additional financial and qualitative information from the plant. If the site resources and project funding are not adequate to allow for use of the ASERTTI protocol, the incremental costs of doing so will be estimated (for potential future use) and efforts will be made instead to collect performance data based on long-term utility bills and interviews with plant personnel. SDSU will lead and UCI and UCB will assist in recruiting potential CHP sites willing to have this service.

The Recipient shall:

- Perform field assessments of current CHP system performance
- Identify the potential and cost to equip sites with monitoring equipment that would allow assessment with the ASERTTI case study protocols
- Report on task findings

Products and Due Dates:

- Field Assessment Report (no draft)
Product due date: August 31, 2011

TASK 4 PROJECT SCREENING UPDATE IN TARGET MARKETS

Under this task SDSU will revisit the CHP sites that have been screened for CHP installation in previous phases of the PRAC project, and generate an update report that explores and reports the current project status for each site. If any projects have moved forward, progress will be documented and if they have not, the reasons for this will be explored (e.g., expiration of most SGIP incentives, volatility in natural gas prices, etc.). The locations include those in all three of the PRAC states: California, Hawaii, and Nevada.

The Recipient shall:

- Revisit previously screened sites and determine if CHP is still being considered (possibly delayed due to recent policy uncertainties) and if so what could be done or is needed to move projects forward
- Document findings in a brief report

Products and Due Dates:

- Project screening update report (no draft)
Product due date: August 31, 2011

TASK 5 PROJECT PROFILES FOR CHP TARGET MARKETS

Under this task the PRAC will produce 4-5 additional project profile studies targeted at attractive applications and niches for CHP in the Pacific Region. These target markets include food processing facilities, hotels/casinos, wineries and breweries, swimming pool heating applications, and high-tech industry. This task would bring the total to project profiles conducted by the PRAC to about 25, with 10 now completed and 8-10 additional ones being prepared under existing funding. These various studies throughout California, Nevada, and Hawaii would be available individually on the PRAC (and MAC) website and also would be bound together in a revised "Pacific Region CHP Applications Handbook" that covers a wide range of applications and settings.

The Recipient shall:

- Conduct site visits and other data gathering activities on 4-5 additional CHP sites
- Prepare project profiles (two-page) for the 4-5 sites, including key information, site pictures, etc.
- Upload the profiles to the project website and provide to the U.S. DOE central site

Products and Due Dates:

- 4-5 completed CHP project profiles
Product due date: August 31, 2011

TASK 6 REVISED STATE BASELINE AND ACTION PLAN REPORTS

Under this task, the PRAC will perform revisions and additions to the individual state baseline assessment/action plan reports for California, Hawaii, and Nevada. The revisions would include:

- updating the reports with the latest developments on interconnection, utility rate, and incentive policies;
- updating the “CHP landscape” sections including installed systems base, general conditions for CHP in each state, etc.;
- adding additional report sections to briefly summarize the operating principles and commercial availability of key CHP system technologies;
- expanding and revising the appendices of CHP industry contacts for the Pacific region; and
- soliciting additional comments on the reports from CHP stakeholders in the Pacific region.

The revised reports will be made available through the PRAC website and also through the state energy offices. An additional component of this task is to make the state baseline assessments responsive to requests from project sponsors for key performance metrics, such as recently installed CHP projects, estimates of energy and greenhouse gas emissions reductions from CHP system operations, etc.

The Recipient shall:

- Gather data and information needed to update the three state reports
- Perform updates to the reports
- Release draft reports for review by stakeholders and the PRAC advisory board
- Release the revised reports through the PRAC website

Products and Due Dates:

- State Baseline Assessment/Action Plan Reports (no draft report) (three)
Product due date: August 31, 2011