

Draft scwd² GHG Reduction Project Assessments

Introduction

Sixteen greenhouse gas (GHG) reduction projects are currently being evaluated as part of the **scwd²** Energy Minimization and GHG Reduction Study (Energy Study). The 16 projects were selected collaboratively with input from Task Force members, Energy Study Technical Working Group (ETWG) members, City and District staff, Energy Study Technical Advisors Kennedy/Jenks, and additional community members. The attached 16 Draft Project Assessments (DPA) provide information and preliminary analysis of the GHG reduction project evaluations.

Project and Energy Study Background

The energy requirement of seawater desalination as a supplemental supply is among the key issues in the evaluation of the proposed project. **scwd²** is conducting an Energy Study to ensure that the most advanced and energy efficient technologies and approaches are identified and incorporated into the proposed desalination project. Indirect GHG emissions are attributed to the proposed project from the purchased power to treat and distribute desalinated water. The Energy Plan will also explore ways the agencies can offset all or a portion of the GHGs that are indirectly associated with the desalination project.

As part of the Energy Study, **scwd²** convened an Energy Technical Working Group (ETWG) to provide independent scientific review and guidance on the planning, execution, and reporting of the energy aspects of the Desalination Program. During the Energy Study Project Workshop in June 2011, the ETWG and other workshop participants reviewed over 45 projects and identified fifteen to evaluate further. Another project was later added by the **scwd²** Task Force. The potential GHG reduction projects are broadly categorized as:

- Water and energy efficiency projects
- Renewable energy projects
- GHG Offset projects (match table below and PPT)

Table 1 lists the sixteen projects that were evaluated in more detail:

Table 1: GHG Reduction Project Assessments

PA #	Project Title
Water and Energy Efficiency Projects	
1	Additional Water Conservation Activities
2	Recycled Water Projects
3	Residential/Commercial Energy Efficiency and Renewables Rebates/Incentives
4	Graywater and Rainwater Programs
5	Improved Digester Mixing System at Santa Cruz WWTP
6	Energy Audit Recommended Improvements at Santa Cruz WWTP
7	Pump and Motor Efficiency Improvement Program
Renewable Energy Projects	
8	Food Waste to Energy Project
9	Renewable Energy Purchase Programs
10	Local Solar Projects
11	Fuel Cells
12	Microhydro at Graham Hill WTP
13	Hydropower Project at Lake Nacimiento
GHG Offset Projects	
14	GHG Offset Purchases
15	Fleet Fuel Reduction Program
16	Carbon Dioxide Addition for Post-Treatment

Project Assessment Components

The scwd² GHG reduction Draft PAs have been developed using a common format to facilitate comparing and contrasting the various efficiency, renewable energy and GHG offset project options. The DPAs include the following nine sections which are based on the project evaluation criteria.

1. **Executive Summary** – The first page of each DPA presents an executive summary that describes the project, the potential expected amount of GHG reduction, the project lifetime and sustainability of the GHG reduction, and the conceptual cost of the project.
2. **Project Description** – This section provides a description of the project, background information on the program or technology, and vendors that could provide equipment or services related to the project.
3. **History and Technical Maturity** – This section provides a discussion of the history of the technology or program, the stage of research and/or development of the technology, and existing systems or programs that SCWD or SqCWD have experience with.
4. **Reliability and Operational Complexity** – This section discusses the proven performance, stage of research and/or development, and reliability of the proposed project. Reliability of the project is the ability of the project to produce the expected GHG reductions. This section also discusses the operational complexity of the project.
5. **Sustainability** – This section describes the project life and the sustainability of the project to provide GHG reductions (and/or water and energy savings) over a long period

of time, assuming proper maintenance to the system. For example, a solar project will provide GHG reductions for the 20 to 30 year life of the solar equipment. The solar equipment can be replaced and the renewable energy and GHG reductions can be sustained into the future. An efficiency project only provides a GHG reduction for the accelerated period of the equipment replacement. Efficiency projects do not provide sustained GHG reductions into the future due to the requirement for GHG reductions to be “additional” to what would happen in the absence of proposed project.

6. **Local Considerations** – This section describes the local economic and social benefits of the proposed project to the community and considers the environmental and community factors related to the proposed projects. Local considerations include:
 - a. Helping to improve the local economy through local construction, job creation, and training
 - b. Helping to educate and inform the community on water, energy and sustainability issues
 - c. Reduction of local energy consumption and/or reduction of local GHG emissions
 - d. Reduction/reuse of local waste generation
 - e. Impacts on the air, land, water, noise, aesthetic/visual, and if it creates waste by-products
7. **Energy Production, Energy Savings, and GHG Reduction** – This section describes the expected amount of energy saved, renewable energy produced, or GHG mitigated by a proposed project. In many of the Draft PAs, the GHG reductions are calculated separately for SCWD and for SqCWD to account for different proposed operating scenarios for the desalination facility and different project specific factors for each agency. Eligibility criteria for renewable energy projects have been developed by the US Department of Energy and state agencies such as the California Energy Commission (CEC) Emerging Renewables Program. GHG reduction projects pursued by **scwd**² should meet these eligibility criteria in order to be recognized by regulatory agencies.
8. **Cost / Cost Effectiveness** – This section provides a summary of the conceptual level costs for the project, and develops a GHG reduction cost effectiveness factor in dollars per metric ton of equivalent carbon dioxide reduced (\$/MT CO₂e). A cost summary table is provided for each project that summarizes the cost categories described below:
 - a. Conceptual Capital Costs: The conceptual level capital costs generally include equipment, engineering and construction or installation. For efficiency rebate programs, the money for the rebates was assumed to be set aside as a capital cost reduction. For some projects, applicable PG&E rebates or incentives that could reduce the project capital costs are included.
 - b. Conceptual O&M Costs: The conceptual level operations and maintenance (O&M) costs include labor, materials, and applicable fuel, chemical, or other operating costs. For efficiency rebate programs, the money for marketing was assumed to be an operating cost. For efficiency and renewable energy projects that reduce the cost of energy purchased from the grid, the savings are included to reduce O&M costs.

- c. Average Annual Net Costs: This represents the average of the calculated annual net costs for a project, and is intended to show the magnitude of the annual cost of implementing the project. The net cost is calculated by subtracting the project costs from the project benefits for each year of operation. Project costs include debt service on the capital cost of the project (if any), O&M costs, and any fuel costs. Benefits include any cash payments paid by PG&E as an incentive and the avoided cost of electricity that results from saving or generating electricity.
 - d. Lifecycle Energy Cost (\$/KWh): Lifecycle cost is a tool to gauge the cost effectiveness of the project. The net present value (NPV) of the Annual Net Cost is used for this calculation. This eliminates the effects of inflation, the different cost characteristics of projects, and the different lives of projects. A NPV calculation converts the Annual Net Costs to present day dollars, and creates a levelized cost in \$/KWh.
 - e. Lifecycle CO₂ Reduction Cost (\$/MT): This metric is similar to the Lifecycle Energy Cost but reflects the cost of the reduced metric tons of GHG rather than the energy saved or generated. The calculation is the same except for the denominator changes from energy (KWh) to metric tons reduced (MT). This metric is expressed in \$/MT.
9. **Summary of Advantages and Disadvantages** – This section provides an overview of general advantages and disadvantages of the project.

Next Steps - Project Assessment Scoring and Ranking

The proposed project evaluation criteria are as follows:

1. Local Benefit and Considerations
2. Energy Production or GHG Reduction
3. Technical Maturity
4. Sustainability
5. Reliability and Operational Complexity
6. Cost / Cost Effectiveness

The recommended project evaluation criteria would be applied to evaluate, score, and rank the proposed GHG reduction projects. The project evaluation criteria could have different weightings based on the relative importance of the criteria for the overall Program objectives. With six evaluation criteria, the average weighting, based on 100-percent total weight, is approximately 15-percent. Therefore, the weighting of criteria could be categorized, for example, with those criteria of higher relative importance having a higher than average weighting.

SCWD and SqCWD staff has worked with Energy Study Technical Advisor, Kennedy/Jenks to identify a proposed weighting range for each evaluation criterion. Based on feedback from the Task Force and the ETWG, the range for each criterion was refined to a recommended weighting. In addition, several proposed sensitivity analyses were developed to vary the weight of some of the factors. The recommended weightings of the evaluation criteria and example potential sensitivity analysis weightings are shown in Table 2.

Table 2: Recommended Weighting and Example Sensitivity Analysis Weightings for Evaluation Criteria

Evaluation Criteria	Proposed Weighting Range	Recommended Weighting	Sensitivity Analyses		
			Cost-Focused	Local-Focused	Other
Local Benefit	15 to 20%	20%	10%	50%	20%
Energy Produced or GHG Reduced	10 to 15%	10%	5%	10%	15%
Technical Maturity	15 to 25%	10%	5%	10%	15%
Sustainability	10 to 15%	5%	2.5%	2.5%	10%
Reliability and Operational Complexity	5 to 10%	5%	2.5%	2.5%	5%
Cost/Cost Effectiveness	15 to 25%	50%	75%	25%	35%
Total		100%	100%	100%	100%

This report, including the sixteen PAs, will be distributed to the ETWG members for their review and comment. **scwd**² staff will hold a second Energy Study Project Workshop in October 2011 during which time the ETWG will use the above criteria to evaluate, score, and rank the proposed 16 GHG reduction projects. The results of this ranking will be presented to the **scwd**² Task Force for review and comment.

Next Steps – Portfolio of GHG Reduction Projects

Based on the project rankings, a recommended portfolio of projects will be developed for SCWD and for SqCWD to meet the range of potential GHG reduction goals for the **scwd**² Desalination Program. The recommended portfolio of projects for each agency will be presented to the ETWG and the **scwd**² Task Force for review and comment.

Project Assessment Attachments

- 1 Additional Water Conservation Activities
- 2 Recycled Water Projects
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