



## DESALINATION TASK FORCE MEMORANDUM

**TO:** DESALINATION TASK FORCE  
**FROM:** PROGRAM MANAGERS  
**SUBJECT:** ENERGY STUDY STATUS REPORT, PROJECT SHORTLIST AND SENSITIVITY ANALYSIS PROCESS  
**DATE:** JULY 20, 2011

**RECOMMENDATION:** That the scwd<sup>2</sup> Desalination Task Force receive the fourth Energy Study status report, approve a list of projects to evaluate further, and approve the proposed evaluation criteria and weighting sensitivity analysis.

**BACKGROUND:** This memorandum serves as the fourth status report and will update the Task Force on work progress with regard to the Energy Minimization and Greenhouse Gas Reduction Study (Energy Study). To date the Task Force has received the following information.

- March 2011 Task Force Meeting: Received draft Energy White Paper and presentation outlining the approach to the Energy Study.
- April 2011 Task Force Meeting: Received first status report on regulatory framework, energy projections for each agency, and potential goals.
- May 2011 Task Force Meeting: Received second status report on evaluation criteria, the concepts of criteria weighting and goal selection, and the introduction of the Energy Technical Working Group (ETWG) and other professional participants.
- June 2011 Task Force Meeting: Received third status report focusing on the upcoming Project Workshop, criteria, weighting, and initial list of offset/reduction projects and programs.

**DISCUSSION:** Energy Study work was focused on planning and implementing the Workshop, an integral part of the Energy Study's development. The objective of the Workshop was to evaluate a comprehensive list of projects and programs that could be used to reduce energy and/or greenhouse gas impacts, and recommend with consensus approximately fifteen to the Task Force for approval. These fifteen projects would then be further evaluated in greater detail.

Ultimately, the Energy Study will define agency-specific GHG reduction goals, the portfolio of projects recommended to achieve those goals, and the implementation plan(s) to develop the selected projects. Because of changing technology and regulatory requirements, coupled with the tenuous political atmosphere associated with desalination energy use, staff assembled a group of twenty-four Workshop participants to vet an array of potential projects. The participants included ETWG members, other local and regional energy policy experts, technical consultants from Kennedy/Jenks, and City and District engineering, operations and conservation staff. Guidance from this group of technical, operational and policy experts provided a strong, well-

rounded and integrated approach to mitigation project selection while being reflective of the values of this community.

Through six hours of rigorous discussion, the twenty-four participants identified the favorable and unfavorable attributes of each project alternative. Participants then used the recommended evaluation criteria and weighting-range to rank and group the projects into three categories as shown below.

- **Retain** – Approximately 15 projects recommended for Task Force approval to be evaluated in greater detail
- **Consider** – Projects that did not make the top 15 but could provide benefits and potentially be considered by the Task Force to be elevated to the “Retain” category for further evaluation
- **Set aside** – Projects that currently seem less favorable or feasible and are not recommended for further evaluation at this time.

### Projects to Retain

Project Title	Project Description
<b>Energy Efficiency</b>	
Additional Water Conservation Activities	Implement expanded and accelerated programs to increase water conservation and thereby decreasing overall energy associated with water supply.
Recycled Water Projects	Develop recycled water projects where appropriate, such as for the Pasatiempo or Seascape golf courses.
Residential/Commercial Energy Efficiency and Renewables Rebates	Provide rebates for homeowners in their service area to replace appliances or install solar PV, solar water heater, or other renewables. Since PG&E already offers rebates, this project must be additional and accelerated.
Grey Water Program and RainstoreWater	Promote accelerated and additional greywater use and rain storage for irrigation use. This project must be additional and accelerated. Could include residential, commercial, and UCSC.
Santa Cruz WWTP Energy Audit Results (Improved Mixing System)	Install an improved or different mixing system, which was one of the recommendations from the USDOE Energy Audit for the Santa Cruz WWTP.
Santa Cruz WWTP Energy Audit Results (Other Recommendations)	Implement the recommendations from the USDOE Energy Audit for the Santa Cruz WWTP, including installation or replacement of VFD, screwpress, lighting, and Turblex blower. (Installation of an improved mixing system was listed as a separate project due to its higher expected cost.)
Pump & Motor Efficiency Improvement Program	Replace all inefficient pumps and motors in the SqCWD system. Since PG&E already offers efficiency incentives, this would be an accelerated (2-3 year) program. The SCWD indicates they are implementing this program, so the next step would be to look into installing variable speed drives on pumps at the appropriate locations.
<b>Renewables</b>	

Food Waste to Energy	Use food waste and food processing facility waste to co-digest with biosolids to increase digester gas production at the City WWTP. This additional gas could be used to provide fuel for their existing and possible additional internal combustion engines (ICE) to generate additional electricity.
Renewables Purchase	Buy into a larger renewable energy project (solar PV or wind) that is developed by a third-party which can provide economy-of-scale. Various options would be investigated including: equity ownership, power purchase agreement, and Renewable Energy Certificates. Could include Northern California Power Agency or Marin Community Choice Aggregation.
Local Solar PV Projects	Install solar PV projects on building rooftops, parking lot shade structures, open space, or Bay Street Reservoir. The assessment would look at various ownership models including: City/District ownership, purchase power agreements (PPA), and land leases to a third-party owner. Also could include floating solar PV projects on ponds/reservoir such as Loch Lomond.
Solid Oxide Fuel Cells	Install solid oxide fuel cells (such as Bloom Energy) that use natural gas.
Microhydro at Graham Hill WTP	Graham Hill WTP has an existing microhydro turbine that has not been used in several decades. This project would revitalize the old turbine, or investigate a replacement turbine.
Hydro Project at Lake Nacimiento	Investigate the cost and additionality of a Purchase Power Agreement (PPA) with Monterey County Water Resources Agency for existing 4 MW hydropower project on Lake Nacimiento in San Luis Obispo County, CA.
<b>GHG Offset</b>	
GHG Offset Purchases	Describe the potential and cost of carbon offset market purchases. Cost-effective, operationally simple, and effective during annual GHG mitigation plan “true-up” process.
Fleet Fuel Consumption/GHG Policy	Reduce fuel consumption in fleet vehicles. This includes driver behavioral changes, maintenance activities, and alternative fuel opportunities that reduce fuel consumption and GHG emissions. Would address adoption of vehicle policies such as no idle policy, alt fuel vehicles (CNG, hybrids, EVs), minimum MPG standard for new purchases, biodiesel use (B-20), low emissions vehicle purchasing standard, replacement schedule. Would include evaluation of fleet management programs like what RMJ offers.

### Projects to Consider

Project Title	Discussion
<b>Renewables</b>	
Invest in Local Renewable Research	Provide a small annual grant to UC Santa Cruz (or other entities) to fund research in local renewables projects. Not a direct GHG mitigation project but could provide long-term local benefit.
<b>GHG Offset</b>	
Landfill Methane Capture	The City and County landfills already have methane capture facilities that are under existing contracts. Potential for additional opportunities.
Use Recovered CO <sub>2</sub> for RO Permeate Post-Treatment	Inject gaseous CO <sub>2</sub> into desalinated RO permeate during post-treatment to stabilize water. Would need to confirm if recovered CO <sub>2</sub> is NSF approved.

### Projects to Set Aside

Project Title	Discussion
<b>Energy Efficiency</b>	
Investigate the implementation of an energy management system software at GHWTP	Project was successful at City WWTP, but drinking water treatment is less energy intensive than wastewater treatment.
GHWTP Process Audit	Already undergoing a water quality improvement project.
Street Light Replacement	The City already has an aggressive street light replacement program, and there is relatively limited opportunity for additional GHG reduction.
Water Distribution System Leak Detection System and Pressure Management	These systems already exist. This project could enhance system but may only have a marginal energy/GHG return.
Well Efficiency Testing & Rehabilitation	Results can be less effective than predicted or temporary. The existing SqCWD program has been only moderately successful. There is a limited opportunity for the SCWD since groundwater only accounts for small percentage of water supply.
Demand Response	This is more of a cost saving operational strategy and may have little impact on GHG mitigation. SqCWD and SCWD already participate in this program.
Water Supply Pump Optimization	This is more of a cost saving operational strategy and may have little impact on GHG mitigation.
Building Energy Efficiency Measures	Part of City CAP. May be limited opportunity for additional measures since already implemented on some buildings. Not enough resources for recommissioning studies.
Commercial Light Replacement	Offshoot of street light replacement project. May be limited opportunity for GHG mitigation, and participation is not guaranteed.

<b>Renewables</b>	
Local Small Wind Projects	Potential visual and avian impacts or inadequate wind resource. Permitting project is difficult. Space constrained.
Wave/Tidal Energy Generation	Still a maturing technology. Potential for real or perceived environmental impacts.
Microhydro	Changes in flow can change the expected payback. Meters and transmission system would have to be installed throughout system.
Reservoir Pumped Storage	This is more of a cost saving operational strategy and may have little impact on GHG mitigation.
Waste Heat Use	Space constraints of WWTP would make this project difficult.
Forward Osmosis	Still a maturing technology. Potential for fouling in this application
<b>GHG Offset</b>	
Optimize Street Tree Species & Planting	This program may be hard to quantify, and there is relatively limited opportunity for additional GHG reduction. Successful in Sacramento.
Wetlands Carbon Sequestration Project	Inexpensive and good benefit per unit cost, but lack of wetlands protocol and unclear ecological impacts would make project benefits challenging to quantify.
Forestry Offset Program	Can be perceived by the public as “not real”. Needs to be monitored over long period of time.
Alternative Vehicle Rebates for Citizens	This project may be unreliable, since it relies on public participation. Would have less impact than fleet policy since can’t force individuals to change driving patterns.
Video Conferencing	The system could be expensive and may not be used enough to be cost effective.
Refrigerant Leak Detection System	Already exists in some systems. Potential for additional projects may be limited.
Improve Tillage Practices	Science can be hard to quantify, may not meet offset project standards, and relatively small GHG reduction.
Commercial GHG Reduction Incentives	This project may be unreliable, since it relies on public participation. Since incentives already exist, there may be limited and short-lived opportunities for additional GHG reduction.
<b>Miscellaneous</b>	
Increase Public Awareness and Outreach	Not a GHG mitigation project but could be considered as an overall scwd <sup>2</sup> Desalination Program goal or as a general City/District goal.

One project, Use Recovered CO<sub>2</sub> for RO Permeate Post-Treatment, ranked high in the “consider” group. This project has been identified by both the Carlsbad and Huntington Beach Desalination Programs to be an effective GHG mitigation project. Although Workshop participants did not come to a consensus to move it up to the “retain group”, they voted 12-10 in favor of moving it up.

Projects will be evaluated and ranked based on weighted criteria. At its June meeting, the Task Force provided preliminary approval of the evaluation criteria and weightings as follows, cognizant that additional feedback will be received during the development of the Energy Study that may modify the preliminary composition.

### Proposed Weighting Range for Evaluation Criteria

Evaluation Criteria	Proposed Weighting Range
Local Benefit	15 to 20%
Amount Produced or Mitigated	10 to 15%
Technical Maturity and Reliability	15 to 25%
Environmental and Community Impacts	10 to 15%
Operational Complexity	5 to 10%
Cost/Cost Effectiveness	15 to 25%
<b>Total</b>	<b>100%</b>

With feedback from the ETWG and the Task Force, a sensitivity analysis is being proposed as shown in the following table. The analysis will demonstrate the effect of shifting the weighting for each criterion. It will also give valuable perspective on how decisions, such as heavily weighting local benefit or cost effectiveness, may affect project selection, ranking, and implementation costs.

### Recommended Weighting and Proposed Sensitivity Analysis Weightings for Evaluation Criteria

Evaluation Criteria	Recommended Weighting	Sensitivity Analysis #1	Sensitivity Analysis #2	Sensitivity Analysis #3
Local Benefit	20%	10%	75%	20%
Amount Produced or Mitigated	10%	5%	5%	15%
Technical Maturity and Reliability	10%	5%	5%	15%
Environmental and	5%	2.5%	2.5%	10%

Community Impacts				
Operational Complexity	5%	2.5%	2.5%	5%
Cost/Cost Effectiveness	50%	75%	10%	35%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Future Work and Tentative Schedule:** The Energy Study remains on schedule. Following Task Force approval, the retained projects will be evaluated in depth to provide tangible qualitative and quantitative values for each evaluation criterion in order to further rank the projects based on the recommended and sensitivity analysis weighting. The results of the research and sensitivity analysis will then be brought back to the Task Force for consideration and feedback. In addition, staff will develop a recommendation for each agency’s GHG mitigation goal (carbon free, no net increase, City CAP, etc.) based on current regulatory requirements and individual consultation with regulators and CEQA experts.

**FISCAL IMPACT:** There is no fiscal impact associated with this item.