



INFORMATION REPORT

TO: DESALINATION TASK FORCE
FROM: PROGRAM MANAGERS
SUBJECT: ENERGY MINIMIZATION AND GREENHOUSE GAS REDUCTION STUDY STATUS REPORT
DATE: APRIL 20, 2011

At the March 16, 2011 **scwd**² Task Force meeting, staff and consultants from Kennedy/Jenks Consultants (K/J) reviewed the draft Energy White Paper and outlined the general approach to the development of the **scwd**² Regional Seawater Desalination Project (Project) Energy Minimization and Greenhouse Gas Reduction Study (Energy Study). Staff plans to provide monthly progress reports to the Task Force with regards to the development of the Energy Study. This Information Report serves as the first monthly progress report.

Energy White Paper

Following input from the **scwd**² Task Force, staff revised the Energy White Paper. Under its new title, *Perspectives on Water Supply Energy Use*, the final version can be found on the program's website: www.scwd2desal.org.

Project Objective: The intended purpose of the Energy White Paper is to serve as a preface to the **scwd**² Energy Minimization and Greenhouse Gas Reduction Study. This paper defines relevant terms, describes the energy requirements of traditional water supplies with those of the Project (which includes the water treatment facility as well as the related intake, pump stations, etc.), and compares the respective energy uses to typical energy requirements for a household. This comparison will put the energy requirements for desalination into broader perspective.

Project Update: Staff and K/J have completed the Energy White Paper. The Paper was made available publically the week of April 11, 2011. Staff incorporated Task Force comments received at the March 16, 2011 Task Force meeting. With the incorporation of Task Force comments and other refinements, the Paper describes the framework for the Energy Minimization and Greenhouse Gas Reduction Study and summarizes the current regulatory guidelines associated with energy use and greenhouse gas emissions of the Project.

Energy Minimization and Greenhouse Gas Reduction Study

A multi-phased approach to the Energy Study was discussed and is generally described below.

1. Calculation of the energy (and corresponding GHG emissions) to be used by each agency with desalination as a supplemental water supply source.

2. Compilation of the regulatory framework and requirements related to energy and greenhouse gas emissions for desalination projects in California. A noteworthy challenge of this task is the fact that much of the regulations and goals are established for emitters of GHGs and the Project, while a consumer of energy, will not in large part directly emit GHGs but rather cause emissions elsewhere – at the power production plant.
3. A description of the different goals that could be set for the reduction of GHG's for the Project that include, but aren't limited to the following.
 - California Environmental Quality Act (CEQA) Threshold. The recently revised CEQA Guidelines did not include a threshold of significance for evaluating whether GHG emissions could be significant. Rather it says that the lead agency (LA) should consider "whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project." Therefore, it leaves the responsibility up to the lead agency to develop their own thresholds or rely on other agencies or experts, but requires substantial evidence that the selected thresholds apply to the particular project and/or region.
 - Net Carbon Neutral. Balance the amount of Project GHG's with credit for the decrease in water production from traditional sources.
 - California Global Warming Solutions Act (AB32). Sets reduction goals for emitters of GHGs. The goal is to reduce statewide emissions to 1990 levels by 2020.
 - City's Climate Action Plan. Reduce community-wide greenhouse gas emissions to 30% below 1990 levels by 2020 and 80% below 1990 levels by 2050.
 - Carbon-free. Offset all energy use by the SWRO facility and related appurtenances.
4. Brainstorm potential GHG mitigation options and conduct an initial screening to develop a list of viable projects and/or programs. Assess these GHG mitigation options based on a common evaluation template. The assessment will be sufficiently detailed to allow the application of evaluation criteria and scoring in the next step.
5. Score and rank the ten potential mitigation options according to evaluation criteria and weighting developed by **scwd**² team.
6. Create short list of preferred mitigation projects, determine appropriate goals for each agency, and draft **scwd**² Energy Minimization and Greenhouse Gas Reduction Study.

Project Objective: As mentioned above, development of the Energy Study is multi-phased. The methodology and approach of each phase as well as data collected to support recommendations will be outlined in the Energy Study, typically in corresponding chapters. The mitigation goals and projects selected by each agency will be informed by each phase of development and will ultimately be the critical components of the Energy Study to support the Project's Environmental Impact Report and regulatory permitting process.

Project Update:

Work Completed: Staff and K/J have completed Phase 1: Energy Projections and Potential Greenhouse Gas Reduction Goals. Methodology and data from this phase of development was presented to the Task Force at the March 16, 2011 meeting. The following tables summarize the data collected in Phase 1.

Table 1: Projected Annual Water Supply Energy Use, City of Santa Cruz

| | Pre-IWP | Conceptual Annual Energy Demand (MWh/year) ¹ | | | | | | |
|-------------------------|--------------|---|--------------|--------------|--------------|--------------|----------------|----------------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
| Water Source | | | | | | | <i>Drought</i> | <i>Drought</i> |
| Surface Water | 4,917 | 4,550 | 4,564 | 4,579 | 4,594 | 4,608 | 3,290 | 3,303 |
| Groundwater | 588 | 588 | 588 | 588 | 588 | 588 | 588 | 588 |
| Desalination | 0 | 0 | 0 | 0 | 0 | 0 | 6,670 | 6,670 |
| Total Energy Use | 5,505 | 5,138 | 5,152 | 5,167 | 5,182 | 5,196 | 10,548 | 10,561 |

¹Based on energy requirements of 1.3 kWh/kgal for surface water, 2.8 for groundwater, and 14.5 kWh/kgal for desalination.

Table 2: Projected Annual Water Supply CO₂e Emissions, City of Santa Cruz

| | Pre-IWP | Conceptual Annual Emissions Produced (MT CO ₂ e/yr) ¹ | | | | | | |
|------------------------|--------------|---|--------------|--------------|--------------|--------------|----------------|----------------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2020 |
| Water Source | | | | | | | <i>Drought</i> | <i>Drought</i> |
| Surface Water | 1,430 | 1,324 | 1,328 | 1,332 | 1,336 | 1,341 | 957 | 961 |
| Groundwater | 171 | 171 | 171 | 171 | 171 | 171 | 171 | 171 |
| Desalination | 0 | 0 | 0 | 0 | 0 | 0 | 1,940 | 1,940 |
| Total Emissions | 1,601 | 1,495 | 1,499 | 1,503 | 1,507 | 1,512 | 3,069 | 3,072 |

¹Based on 2008 PG&E emission factor of 641.35 lbs CO₂e/ MWh. This factor should decrease over time as PG&E continues to diversify and include more green energy into their energy portfolio.

Table 3: Projected Annual Water Supply Energy Use, Soquel Creek Water District

| | Pre-IRP | Conceptual Annual Energy Demand (MWh/year) ¹ | | | | | | |
|-------------------------|--------------|---|---------------|--------------|--------------|--------------|----------------|----------------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
| Water Source | | | | | | | <i>Drought</i> | <i>Drought</i> |
| Groundwater | 3,767 | 2,058 | 2,161 | 2,269 | 2,382 | 2,502 | 2,128 | 2,143 |
| Desalination | 0 | 8,887 | 8,304 | 7,686 | 7,033 | 6,342 | 5,479 | 5,479 |
| Total Energy Use | 3,767 | 10,945 | 10,465 | 9,955 | 9,415 | 8,843 | 7,607 | 7,621 |

¹Based on energy requirements of 2.14 kWh/kgal for groundwater and 14.5 kWh/kgal for desalination.

Table 4: Projected Annual Water Supply CO₂e Emissions, Soquel Creek Water District

| | Pre-IRP | Conceptual Annual Emissions Produced (MT CO ₂ e/yr) ¹ | | | | | | |
|------------------------|--------------|---|--------------|--------------|--------------|--------------|----------------|----------------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
| Water Source | | | | | | | <i>Drought</i> | <i>Drought</i> |
| Groundwater | 1,098 | 600 | 630 | 661 | 695 | 729 | 620 | 625 |
| Desalination | 0 | 2,591 | 2,421 | 2,241 | 2,050 | 1,849 | 1,597 | 1,597 |
| Total Emissions | 1,098 | 3,191 | 3,051 | 2,902 | 2,745 | 2,578 | 2,217 | 2,222 |

¹Based on 2008 PG&E emission factor of 641.35 lbs CO₂e/ MWh. This factor should decrease over time as PG&E continues to diversify and include more green energy into their energy portfolio.

Table 5: Summary of Potential Annual GHG Mitigation

| Potential GHG Mitigation Goal | Annual GHG Emissions to Mitigate (MT/yr CO ₂ e) | |
|-------------------------------|--|---------------------------------|
| | SCWD, Drought ¹ | SqCWD, Non-Drought ² |
| CEQA / CARB | 0 | 0 |
| AB 32 | 1,590 | 1,820 |
| CAP | 2,050 | -- |
| Net Carbon Neutral | 1,510 | 1,600 |
| Carbon Free Desalination | 1,940 | 1,920 |

¹Average of all drought years in 30-year projection period.

²Average of all non-drought years in 30-year projection period.

Current Work:

Energy Study Phase 2: Staff and K/J are currently compiling potential mitigation options for the Project. Staff and K/J will conduct an initial screening to develop a list of no more than ten.

Technical Working Group (TWG): Staff has completed the scope of work for the TWG and is currently selecting participants. The TWG is expected to convene by the end of April and will engage in the development of the Energy Study at each phase of the process.

Future Work and Schedule:

Staff and K/J will continue to develop the Energy Study according to the phases described above. The TWG will review and comment on methodology behind, and data collected to support recommendations during, each phase. Each phase of the Energy Study is expected to be completed according to the following schedule.

| Task | | Approximate Date |
|---|---|-------------------------|
| Complete Phase 1: Energy Projections and Potential Greenhouse Gas Reduction Goals | | ~4/8/11 |
| Post Energy White Paper to scwd2desal.org | | ~4/15/11 |
| Draft Scope of Work for TWG and Select Participants | | ~4/15/11 |
| Convene TWG | Approximately 2 weeks after participant selection | ~4/29/11 |
| Staff and K/J Complete Phase 2: Mitigation Projects Brainstorming and Initial Screening. TWG Review. | Approx. 4 weeks after completion of Phase 1 | ~5/6/11 |
| Staff and K/J Complete Phase 3: Score and Rank Mitigation Options. TWG Review. | Approx. 4 weeks after completion of Phase 2 | ~6/3/11 |
| Staff and K/J Complete Phase 4: Develop Short List of Mitigation Options and Select Goal for Each Agency. TWG Review. | Approx. 4 weeks after completion of Phase 3 | ~7/5/11 |
| Submit Draft Energy Study for Staff and TWG review | Approx. 4 weeks after completion of Phase 4 | ~7/29/11 |
| Present the Draft Energy Study to the scwd ² Task Force | Approx. 4 weeks after receiving comments from staff on Energy Study | ~9/2/11 |