STATE OF CALIFORNIA ARNOLD SCHWARZENEGGER, *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

**F I L E D**
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November 15, 2007

Agenda ID #7136
Ratesetting

TO PARTIES OF RECORD IN APPLICATION 07-01-024 et al.

This is the proposed decision of Administrative Law Judge (ALJ) Weissman. It will not appear on the Commission's agenda for at least 30 days after the date it is mailed. The Commission may act then, or it may postpone action until later.

When the Commission acts on the proposed decision, it may adopt all or part of it as written, amend or modify it, or set it aside and prepare its own decision. Only when the Commission acts does the decision become binding on the parties.

Parties to the proceeding may file comments on the proposed decision as provided in Article 14 of the Commission's Rules of Practice and Procedure (Rules), accessible on the Commission's website at www.cpuc.ca.gov.

Comments must be filed either electronically pursuant to Resolution ALJ-188 or with the Commission's Docket Office. Comments should be served on parties to this proceeding in accordance with Rules 1.9 and 1.10. Electronic and hard copies of comments should be sent to ALJ Weissman at saw@cpuc.ca.gov and the assigned Commissioner. The current service list for this proceeding is available on the Commission's website at www.cpuc.ca.gov.

/s/ ANGELA K. MINKIN
Angela K. Minkin, Chief
Administrative Law Judge

ANG:jt2

Attachment

Decision **PROPOSED DECISION OF ALJ WEISSMAN (Mailed 11/15/2007)**

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

| | |
|---|---|
| Southern California Edison Company's Application For Approval of Embedded Energy Efficiency Pilot Programs for 2007-2008. | Application 07-01-024 (Filed January 16, 2007) |
| And Related Matters. | Application 07-01-026<br>Application 07-01-029<br>Application 07-01-030<br>(Filed January 16, 2007) |

# ORDER APPROVING PILOT WATER CONSERVATION PROGRAMS WITHIN THE ENERGY UTILITIES' ENERGY EFFICIENCY PROGRAMS

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## ORDER APPROVING PILOT WATER CONSERVATION PROGRAMS WITHIN THE ENERGY UTILITIES' ENERGY EFFICIENCY PROGRAMS

### 1. Summary

California must both conserve water and reduce the amount of energy needed to meet water customer demand. The California Department of Water Resource's (DWR's) California Water Plan[1] concludes that the largest single new supply available for meeting the state's growing demand for water over the next 25 years is water use efficiency. In addition, as part of its 2005 Integrated Energy Policy Report Proceeding, the California Energy Commission (CEC) produced a report entitled "California's Water-Energy Relationship,"[2] finding that water-related energy use consumes 19% of the state's electricity, 30% of its natural gas, and 88 billion gallons of diesel fuel, per year.

Our Water Action Plan[3] commits this agency to strengthen water conservation programs to a level comparable to the energy efficiency achieved by the energy utilities we regulate. The Water Action Plan also emphasizes the importance of reducing the amount of energy needed by water utilities for water pumping, purification systems, and other water processes such as desalination. In addition, the plan supports programs to reduce energy waste by water utilities from causes such as system leaks, poorly maintained equipment, defective meters, unused machines left idling, and improperly operated systems.

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[1] http://www.waterplan.water.ca.gov/

[2] http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF

[3] ftp://ftp.cpuc.ca.gov/PUC/hottopics/3water/water_action_plan_final_12_27_05.pdf

The Energy Commission's report underscores the importance of determining whether the regulated energy utilities can and should do more to promote water conservation. If the energy utilities can create cost-effective energy savings by encouraging water conservation, then they should add water conservation programs to other more direct energy-saving programs as part of the utilities' energy efficiency portfolio. However, as a threshold matter, we must address several key questions about the actual energy savings related to reduced water consumption, and the appropriate way to allocate such savings among energy utilities that may or may not be funding a water conservation effort.

In this decision, we approve one-year pilot programs for the largest regulated energy utilities through which they will develop partnerships with water agencies, undertake specific water conservation programs, and measure the results. Concurrently, the energy utilities will fund studies necessary to understand more accurately the relationship between water savings and the reduction of energy use, and the extent to which those reductions would vary for different water agencies.

The period for the pilot programs and studies will begin January 1, 2008, will run for 18 months, and will consist of three phases. First, the utilities will design their programs while the utilities and Energy Division retain consultants to undertake evaluations and studies. Second, the consultants will begin baseline studies, and work with the utilities to ensure that the pilot programs are likely to produce useful information. Third, the utilities will implement the approved pilot programs for one year, beginning July 1, 2008.

Cumulatively, the utilities will spend approximately $6 million on this effort. We anticipate that the results of this pilot process will inform later

decisions about the incorporation of water conservation efforts in the energy efficiency programs for 2009-2011 and beyond.

Although we approve most elements of the utilities' proposed pilot programs, we reject some and modify others. In addition, we have expanded upon the studies jointly proposed by the utilities to ensure that the pilot results in the accumulation of the comprehensive, practical information to determine the ongoing role of water conservation efforts in the utilities' energy efficiency programs. Because this decision modifies the programs proposed to date and expands upon the study strategy, the assigned administrative law judge expanded the opportunity for comment on the proposed decision.

The following table sets forth the programs, evaluations, and studies we approve in this decision:

Table 1

| Adopted Programs, Evaluations and Studies | | |
|---|---|---|
| **Programs** | | **Adopted $** |
| SCE | Low Income Direct Install Toilet (multifamily) | $200,000 |
| | Express Water Efficiency | $133,000 |
| | Lake Arrowhead Water Conservation | $176,500 |
| | Water Leakage | $300,000 |
| PG&E | Large Commercial Customer | $700,000 |
| | Low Income Single Family Toilet Replacement | $200,000 |
| | Emerging Technologies in Water Utility Efficiency | $341,000 |
| SDG&E | Managed Landscape | $250,000 |
| | Large Industrial Customer Audits | $496,000 |
| | Recycled Water | $250,000 |
| SCG | CLAWA/EMWD Gas Pump Testing | $436,407 |
| total | | **$3,482,907** |
| **Evaluations*** | Commercial and Industrial Pilot Programs | |
| | i. 'Commercial programs (PG&E) | $123,000 |
| | ii. Industrial Audits/Express Efficiency (SCE) | $50,000 |
| | iii. Industrial Water Audits (SDG&E) | $75,000 |
| | HET Replacement Programs (Single and multifamily) (PG&E and SCE) | $250,000 |
| | Weather-Based Irrigation Controller Programs (SDG&E and SCE) | $50,000 |
| | Emerging Technologies (PG&E) | $100,000 |
| | Residential Indoor/Outdoor for Lake Arrowhead (SCE) | $64,000 |
| | Leak Detection (SCE) | $50,000 |
| | Recycled Water (SDG&E) | $50,000 |
| total | | **$812,000** |
| **Studies** | **Studies** | |
| | Load Profile (all energy utilities) | $475,300 |
| | Toilet Flapper (all energy utilities) | $20,000 |
| | Statewide/Regional Water-Energy Relationship | $425,000 |
| | Water Agency /Function Component | $850,000 |
| total | | **$1,770,300** |
| **Total** | total evaluation and studies (EM&V) | $2,582,300 |
| | **Total Pilot (Pilots + Evals + Studies)** | **$6,065,207** |

* *Evaluations* refers to impact evaluations to be overseen by Energy Division. Process evaluations will be conducted by the utilities and will consist of 2% of the approved individual program budgets.

## 2. Background

Pacific Gas & Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), Southern California Gas Company (SoCalGas), and Southern California Edison Company (SCE) filed the subject applications in

compliance with a ruling issued by assigned Commissioner Dian M. Grueneich on October 16, 2006, in Rulemaking (R.) 06-04-010, the Commission's energy efficiency rulemaking docket.

In Decision (D.) 05-09-043, which preceded the issuance of R.06-04-010, the Commission directed the assigned Commissioner to:

> … explore the issue of counting embedded energy savings[4] associated with water efficiency by informal or formal procedural vehicles in our rulemaking proceeding ….We recognize that there are many tasks and priorities for the coming weeks and months set forth in today's decision, and therefore leave to the Assigned Commissioner to determine the appropriate schedule for considering this issue further. (*mimeo.*, pp.168-169)

The Commission cited this language in R.06-04-010. In the subsequent scoping ruling for that proceeding, dated May 24, 2006, the assigned Commissioner determined that it would be appropriate to convene workshops and receive subsequent written comments addressing the following issues:

(1) Should the Commission's Energy Efficiency Policy Rules be modified to include as measure/program benefits the embedded (upstream) energy savings associated with energy efficiency measures that also reduce water usage (*e.g.*, clothes washers that save both energy and water)? Why or why not?

(2) If so, what approach (methodology and rigor) should be taken for counting those savings on an *ex ante* (forecasted) basis and for verifying and truing up those savings *ex post* (after measure installation)? Should this counting be undertaken for the 2006-2008 program cycle, or on a prospective basis when embedded savings are incorporated into the potentials studies and the

[4] By "embedded energy", we mean the amount of energy needed to produce, convey, and treat a given quantity of water.

> updated savings goals for 2009-2011? Are there other key implementation issues that need to be addressed?

These two general areas of inquiry allowed parties to focus initially on the measures and programs that the energy utilities are administering currently. The assigned Commissioner also included, as Attachment 1 to the scoping memo, a list of more specific issues related to these general questions to be considered at the informal workshops and in written comments.

Assigned Commissioner Grueneich further stated that at some point in the rulemaking or another forum, as appropriate, the Commission should begin looking at the broader context for water-related savings, including the implementation of new water conservation measures not currently undertaken by either energy or water utilities, as well as related issues such as program co-funding by water agencies and energy utilities. Therefore, she asked the utilities and interested participants to spend some time during the workshops addressing the process for embarking on a Commission inquiry into these matters.

Interested parties participated in a workshop held in Downey, California on July 17, 2006. The participants discussed the policy questions set forth in the R.06-04-010 scoping ruling. With the benefit of the results of the workshop, parties filed opening comments by July 31, 2006, and reply comments by August 18, 2006.

Commenting parties agreed that (1) by saving water or developing and treating it more efficiently, it is possible to produce significant energy savings, (2) energy efficiency programs could be more effective if the electric and gas utilities were to promote water efficiency improvements that would provide cost-effective energy savings, and (3) there is a shared sense of urgency to begin

accounting for this energy savings potential and incorporating it into the design of the energy efficiency programs.

In their filed comments, parties described two types of energy savings: cold water savings (related to the production, transportation and treatment of water), and hot water savings (those related to reducing the use of energy to heat water for end-use purposes). It is the former (which includes "upstream" as well as "downstream" savings) that comprises the embedded savings opportunities that are the focus of these applications. The commenting parties identified four ways to reduce net energy consumption related to cold water:

1. Conserve water;
2. Use less energy-intensive water (gravity-fed or recycling versus groundwater, aqueducts or desalination);
3. Make delivery and treatment systems more efficient; and
4. Produce more energy through water delivery and treatment.

In a ruling issued October 16, 2007, assigned Commissioner Grueneich observed that while any of these methods would reduce the net consumption of energy related to water use, the first three appear to be most consistent with an energy efficiency strategy. Those options reduce the amount of energy required to use water. The fourth option reflects an opportunity to take advantage of water delivery and treatment systems to produce more usable energy. This production would likely be in the form of small hydroelectric generating facilities along water delivery paths, or methane gathering at treatment facilities. She suggested that such projects would best be explored in a distributed generation, or renewable energy context.

Most parties asked the Commission to approve some type of pilot program, for implementation during the 2006-2008 energy efficiency program

cycle, to explore the potential for future programs to capture water-related embedded energy savings. In order to improve the likelihood of implementing new programs in the near future, in the October 16, 2006 ruling, the assigned Commissioner directed the utilities to submit applications for the approval of pilot programs consistent with the following criteria:

1. No later than January 15, 2007, PG&E, SDG&E, SoCalGas, and SCE were to file applications seeking approval of one-year pilot programs, as described below.
2. Each utility was to form a partnership with one large water provider to implement a jointly-funded program designed to maximize embedded energy savings per dollar of program cost. The assigned Commissioner encouraged the utilities to work with municipal water utilities to the extent that they appear to be the most promising partners. However, the process was open to all water utilities and agencies in the utility service territories.
3. The assigned Commissioner suggested that funding for these programs would be separate from the funding established for 2006-2008 programs. She encouraged the utilities to work together to develop a common program and funding approach, and suggested that they propose limiting the statewide energy utility cost for these pilot programs to approximately $10 million.
4. While it would be important to count embedded energy savings related to this effort, and to calculate any such savings related to existing programs, the assigned Commissioner directed the utilities not to seek credit for these savings as part of any rewards or penalties related to the 2006-2008 period. She stated that the applications should include proposals for counting the savings for the purpose of understanding program benefits, rather than to affect rewards or penalties.

She further directed the utilities to schedule a planning workshop during the second quarter of 2007 to determine what needed to be done to prepare for

full incorporation of water-related programs during the 2009-2011 planning period. This workshop would address developing a methodology to estimate the magnitude of energy and dollar savings at various localities (and review proxy energy savings developed by the CEC as part of its 2005 Integrated Energy Policy Report); evaluation, measurement and verification protocols; procedural guidelines; marketing, education and outreach; and training.

In addition, in D.06-12-038, which adopted budgets and broadly addressed issues related to low income energy efficiency programs, the Commission directed PG&E, SCE, SDG&E and SoCalGas to file proposals for "energy efficiency water conservation programs for low income customers." (D.06-12-038, *mimeo.*, p. 17). The Commission stated, "[T]he design of the low income programs should incorporate water savings measures that could enhance the overall cost-effectiveness of the energy conservation programs while providing additional benefits to low income customers." (*Id.*, pp. 16-17).

Assigned Commissioner Grueneich and the assigned Administrative Law Judge (ALJ) Steven Weissman held a prehearing conference on January 30, 2007. In a ruling dated February 16, 2007, after considering the comments and concerns offered by various parties at the prehearing conference, the assigned Commissioner and ALJ described a series of objectives for the pilot programs and encouraged the parties to apply them when discussing the pilot proposals, and any potential modifications. We discuss these objectives below.

### 2.1. Workshops

At the prehearing conference, various parties expressed an interest in having the Commission convene additional workshops to further understand and develop the pilot program proposals. The Utility Reform Network (TURN) and the Division of Ratepayer Advocates (DRA) asked that we begin this process

by offering a training session designed to enhance the understanding of energy experts as to the nature of the water utility industry. In the ruling dated February 16, 2007, the assigned Commissioner and ALJ scheduled a training workshop to be held on February 26, 2007, as well as workshops on February 27 and 28. The objectives were as follows:

1. First Day: Provide a common level of industry specific information to facilitate a constructive discussion of the pilot proposals.
2. Second Day: Provide greater clarity about the goals of the program and the standard for reviewing the adequacy of the proposals. In addition, the participants discussed a strategy for the presentation of issues in the workshops to be held on subsequent days.
3. Third Day: Create greater assurance that the pilot programs would be cost-beneficial.

DRA and TURN filed protests on February 20, 2007. In addition, on that day, the Inland Empire filed comments.

The Energy Division staff conducted a fourth workshop on March 16, 2007 to discuss a straw proposal for a program redesign strategy intended to support more accurate testing and measurement.

The workshops led to very constructive discussions about the objectives of the program and the likelihood that the program, as proposed, would produce information that could guide future project development. One result of the workshops is that the utilities pledged to draft a list of questions that they would answer through the pilot programs. PG&E distributed the list of questions to all parties electronically on March 29, 2007.

The assigned Commissioner issued a Scoping Ruling on April 23, 2007, including a schedule for the proceeding, which the ALJ revised in a ruling dated

April 30, 2007. The latter ruling called for an additional workshop, which the staff conducted on May 7, 2007, to discuss a proposed cost-effectiveness "calculator", developed by Energy Division consultants, to assess the potential cost effectiveness of the utilities' proposed programs. In his ruling, the ALJ directed the applicants to serve supplemental testimony on June 14, 2007 proposing revised pilot programs, and for the Energy Division to conduct a workshop on June 20, 2007 to discuss the supplemental testimony. He further set a date of June 26, 2007 for opening comments on the proposed pilot programs, and June 29, 2007 for reply comments.

On June 22, 2007, two days after the workshop, DRA and TURN asked for a short delay to enable interested parties to meet with the applicants on June 27, 2007 to discuss remaining areas of concern. They further asked that the applicants be allowed to serve additional supplemental testimony on July 11, 2007, reflecting changes that parties might agree upon as a result of the June 27, 2007 meeting. Finally, they asked that parties be allowed to file comments concerning the proposed pilot programs on July 18, 2007, with reply comments on July 25, 2007.

The ALJ granted the requested time extension. The meeting between the applicants and other interested parties was productive, and the applicants served additional testimony on July 11, 2007. Having received comments and reply comments as scheduled, the ALJ conducted a second prehearing conference on August 1, 2007. At that time, all of the parties stipulated to the receipt of the applicants' proposals and prepared testimony into evidence without cross-examination and without responsive testimony.

## 3. The Proposed Pilot Programs

### 3.1. PG&E - $2,083,853

PG&E has proposed a pilot program with a total budget of $2,083,853 including Evaluation, Measurement, and Verification (EM&V). As proposed, the program would have the following components:

#### 3.1.1. Industrial Process Improvement in the Food Processing Sector- $285,980[5]

PG&E developed several program components in collaboration with the East Bay Municipal Utility District (EBMUD) and the Sonoma County Water Agency (Sonoma). The first would provide process surveys, audits, and recommendations to create water savings for food processing customers served both by PG&E and one of the two water agencies. PG&E's account services representatives dedicated to the food processing sector have worked with the water conservation staff of both water agencies to identify promising customers for participation in the pilot. Once a customer has followed the recommendations of the survey and installed the water-saving measures, and the water savings have been verified, PG&E and the appropriate water agency would each provide a calculated rebate to offset the cost of the water efficiency improvements. PG&E estimates that the rebates would be $0.75 per water unit (ccf) for EBMUD and Sonoma and $0.08 per kilowatt-hour (kWh) for PG&E. Account representatives and water conservation staff determined a reasonable number of projects that could be completed during the course of a one-year pilot,

[5] PG&E program budget numbers are for PG&E's portion of the partnership only, do not include EM&V, and can be found on page 5 of the July 11, 2007 PG&E supplemental testimony.

based on experience with similar programs and on the number and quality of potential participants. In establishing its budget and cost-effectiveness analysis, PG&E assumed it would complete four projects in EBMUD's service territory and two in Sonoma's territory. Anticipated changes for participating customers include cleaning and sanitation measures (such as using air for washing instead of water), cooling tower improvements, and water recycling and re-use.[6]

#### 3.1.2. Industrial Process Improvement in the Winery Sector - $158,698

PG&E developed a similar program with EBMUD and Sonoma to administer process surveys and audits, and make recommendations for water saving process and/or technology changes that save water in the winery sector. In all other respects (participant selection, number of projects per water agency, and calculation of rebates), the program mirrors the food processing program described above.

#### 3.1.3. Ozone Laundry Treatment in the Hospitality Sector - $216,575

PG&E would also work with the same two water agencies to save water and energy by encouraging replacement of traditional laundry treatment with ozone technology in large hotels and/or commercial laundries. PG&E would attempt to reach 25 customers and to provide rebates on the same basis discussed above.

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[6] June 14, 2007, PG&E Supplemental Testimony, pp. 2-1 to 2-2.

#### 3.1.4. Low-Income Direct Install High Efficiency Toilet Replacement (in Santa Clara) - $505,600

Working through its existing Low-Income Energy Efficiency program, PG&E would collaborate with the Santa Clara Valley Water District (Santa Clara) to install 3,000 high-efficiency toilets in the homes of low income customers. PG&E would identify eligible customers, and manage the work of an installation contractor. Toilet replacement would be available to residents who meet PG&E's current Low-Income Energy Efficiency program participation criteria, are customers of both Santa Clara and PG&E, and qualify for a water agency rebate (the existing toilet must be an older and higher flow model). PG&E would invoice the water agencies for their share of the program. PG&E estimates the cost to be $280 per toilet. Santa Clara would pay $150 per toilet, and PG&E would cover the remaining cost.

#### 3.1.5. Emerging Technologies to Improve Water System Efficiency - $341,000

PG&E proposes to offer incentives to EBMUD, Sonoma, and Santa Clara to test promising new water system operating efficiency technologies. These would include integration of water flow and energy monitoring in Supervisory Control and Data Acquisition (SCADA) systems to detect water losses, integration of customer metering and SCADA to improve water distribution and energy efficiency, and pairing SCADA with modeling to optimize pumping efficiency.[7]

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[7] June 14, 2007 PG&E Supplemental Testimony, pp. 2-5.

### 3.2. SCE - $2,665,488

#### 3.2.1. High-Efficiency Toilets – Direct Replacment of Less-Efficient Toilets in Low Income Homes - $728,700

SCE would collaborate with the Metropolitan Water District of Southern California (MWD) and one or more of its member agencies to directly install high-efficiency toilets for multi-family households in low income areas jointly served by MWD and SCE. SCE would rely on existing Low-Income Energy Efficiency program contractors as well as existing local government partners, such as the South Bay and Ventura, to identify potential low-income customers and other multi-family opportunities. SCE would also work closely with MWD member water agencies with large low income and multi-family customer bases, such as the Central Basin Municipal Water District (Central Basin), to identify and reach target customers. Central Basin serves 24 cities in southeast Los Angeles County. SCE would rely on a network of contractors to install the toilets. MWD would provide an incentive of $165 per toilet and each of its member agencies choosing to participate would contribute $50 per toilet to offset the cost of the direct install while SCE proposes to fund the remaining installation cost, currently estimated at $70-115 per toilet, as well as the incremental cost associated with assessing homes for participation.

As an outcome of the June 27, 2007 meeting and agreement with TURN and DRA, SCE reduced the proposed budget for this program from an initial level of $1,693,000 to a maximum of $728,700. At this funding level, this program component represents about 21% of the total pilot budget, which (SCE argues) much more closely matches the ratio of the budgets for SCE's Low-Income Energy Efficiency programs and SCE's overall energy efficiency portfolio. This significant budget reduction is partially offset by the added

contribution from member agencies, and would allow this program potentially to deliver up to 4,000 toilets instead of the 7,500 originally forecast in SCE's January 2007 filing. Additionally, SCE's toilet program would focus exclusively on multi-family residences. This approach is intended to augment and complement PG&E's similar proposed program, which would exclusively serve single-family residences.[8]

#### 3.2.2. Industrial Water Efficiency Audits - $308,000

SCE would collaborate with the Municipal Water District of Orange County (Orange County) to provide technical audits and recommendations for reducing water consumption for industrial processes. Orange County's existing Industrial Process Water Use Reduction Program focuses on four categories of industrial customers: textiles, food processing, metal plating, and electronics. The program provides technical audits and recommendations to customers to improve the water efficiency of their industrial processes. If the customer follows the recommendations, upon verification of water savings, Orange County, in partnership with the MWD, provides rebates to offset the cost of implementing the audit recommendations. These rebates are $3.00 per 1,000 gallons saved from MWD, and $1.37 per 1,000 gallons saved from Orange County. This pilot program would allow for an expansion of Orange County's Industrial Process Water Use Reduction Program. SCE would provide funding to allow Orange County to provide audits and recommendations to yet-to-be-determined additional industrial customer segments. SCE would enlist SCE

[8] July 11, 2007 SCE Additional Supplemental Testimony, p. 13.

customer account representatives to identify additional interested customers. This would also provide an opportunity to coordinate program delivery with SCE's Industrial Energy Efficiency Program which follows a similar program model.

#### 3.2.3. Express Water Efficiency (pH[9] controllers and ET[10] controllers) - $133,000

SCE would collaborate with MWD to provide rebates for the deployment of advanced pH controllers for cooling towers and Weather Based Irrigation Controllers for commercial customers with chilled water heating, ventilation and air conditioning systems, and/or large landscape irrigation systems. SCE would incorporate these measures into the existing Express Efficiency nonresidential retrofit rebate program, which is a component of the Business Incentives and Services package of energy efficiency programs. MWD is able to provide rebates for specific water conservation measures, but does not have funding approval to provide technical assistance or design recommendations to customers. MWD would provide rebates to offset the cost of the pH controllers and the irrigation controllers in the amounts of $1,900 per cooling tower controller and $630 per irrigated acre controlled by the irrigation equipment. SCE, through its customer account representatives, as well as through other delivery channels available to

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[9] pH is a measurement of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity. The pH scale commonly in use ranges from 0 to 14.

[10] "ET" stands for "evapotranspiration". According to the Lawrence Berkeley National Laboratory, "Evapotranspiration occurs when plants secrete or 'transpire' water through pores in their leaves – in a way, plants sweat like people do. The water draws heat as it evaporates, cooling the air in the process." http://eetd.lbl.gov/HeatIsland/LEARN/Evapo

the Express Efficiency program, would educate customers in an effort to persuade them to install these water conservation measures. SCE would not provide any additional customer economic incentives.

#### 3.2.4. Lake Arrowhead Water Conservation (Residential Indoor/Outdoor) - $176,500

SCE would collaborate with SoCalGas and the Lake Arrowhead Community Services District (Lake Arrowhead) to provide indoor water-conserving devices for year-round residents and outdoor landscaping retrofits to the 1,000 largest residential water consumers, as identified by Lake Arrowhead. Indoor measures would include high-efficiency toilets, low-flow shower heads, and sink aerators, while outdoor measures would include ET/Smart controllers and sprinkler head retrofits. SCE and SoCalGas would provide funds to expand the number of homes that can be served by Lake Arrowhead's program. Lake Arrowhead would identify candidate homes and contribute funds to purchase the water conserving devices. The customer would be responsible for installation and Lake Arrowhead would verify that the customers installed the equipment.

#### 3.2.5. Green Schools Water Efficiency - $282,000

SCE would collaborate with MWD to educate K-12 and college students about the importance of water conservation and install high efficiency toilets in the school. They would focus specifically on overlapping portions of the SCE and MWD service territories. SCE's existing Integrated School-Based Program utilizes the Alliance to Save Energy to deliver the Green Schools and Green Campus energy efficiency programs, which would be expanded through this pilot program to incorporate a water conservation message into their student

education and school toilet retrofit efforts. MWD would provide an incentive of $165 per toilet.

### 3.3. SDG&E - $1,307,627

#### 3.3.1. Managed Landscape - $250,000

SDG&E would request proposals from water management service companies for a Managed Landscape Pilot Project, conducted in the San Diego region at approved property sites owned by third party participants. Potential direct beneficiaries would include multifamily apartment complexes, condominiums, office parks, commercial properties, homeowner associations, and potentially estate properties. SDG&E believes that the ideal location would be a property site with a minimum of four irrigated acres and five or less existing irrigation timers. It is estimated that the pilot would involve up to approximately 20 sites of four acres each.

The objective would be to document and verify achieved water savings and related energy savings obtained through a guaranteed performance contract with the participants, based on a pre-implementation audit and work plan. The pilot project would focus on efficient use of outdoor potable water used for aesthetic landscapes. Given that, in an average year, about 60% of all municipal and industrial water is used on landscape, efficient management of this use of water is critical to achieving water and energy savings. About 45% of all landscape water use takes place in May, June, July, and August when treatment and delivery systems are strained to meet demands. This same time frame coincides with the peak electricity demand period.

SDG&E would issue a competitive bid solicitation to implement this landscape pilot, and provide further program details to the Commission once the company has selected the contractor and finalized the scope of work.

#### 3.3.2. Large Customer Audits - $496,000

The San Diego County Water Authority (County Water Authority) and SDG&E each audit the facilities of large customers, but normally focus only on water or energy, respectively. For the pilot program, the County Water Authority and SDG&E propose integrating audits in a two-part program strategy.

The first part of this audit strategy is to pursue improvements already recommended by the County Water Authority as a result of prior audits. In partnership with one of its member agencies, Otay Water District (Otay), the County Water Authority entered into a contract with Water Management Inc. to examine water savings at three sites. They have spent a total of $40,000 to complete these audits. However, for various reasons, there has been little or no progress in implementing the recommendations. The pilot sponsors would look at these audits to determine if there are energy savings opportunities in addition to those energy and water savings already previously identified.

SDG&E and the County Water Authority would then work together to identify the appropriate, cost effective incentives to implement the recommendations in the audits and create approaches to overcome barriers to customer participation. SDG&E would provide funding to encourage high-priority improvements, *i.e.*, cost effective energy efficient and water efficient measures, which cannot be funded through other water agency incentive programs. The County Water Authority would also contribute funds, and take steps to help the customer receive the financial incentives.

If all recommended water conservation measures from these audits were to be implemented, the County Water Authority expects the potential water savings to be in excess of 120 million gallons/year (or 447 acre feet per year

(AFY)). Assuming an average 10-year life for these measures, this effort could result in 1,200 million gallons/year saved.

The second part of the audit strategy would be to develop and implement an integrated water-energy audit for large customers (where water savings, as well as energy efficiency, can be significant). The County Water Authority and SDG&E would collaborate in the development of a comprehensive water/energy audit tool/instrument to incorporate the lessons learned from the first part of the audit strategy discussed above. A Request for Proposal not to exceed $50,000 (County Water Authority funding) would be issued to conduct an additional seven to ten in-depth water/energy audits of commercial, industrial or institutional high water users in the County Water Authority service area. SDG&E expects that this portion of the pilot program would achieve savings comparable to those resulting from the first part of the program.

#### 3.3.3. Recycled Water Retrofit - $250,000

SDG&E would seek to increase the use of recycled water program by modifying certain facilities. The County Water Authority and its member agencies would identify sites with completed retrofit plans that would allow the customer immediately to switch from potable water usage to recycled water. SDG&E and the County Water Authority would both provide funding for eligible projects. They estimate this strategy would save 2,100 million gallons of water.

#### 3.3.4. Joint Marketing and Outreach - $50,000

SDG&E and MWD would prepare with a plan for coordinating their marketing efforts. They would develop marketing materials and conduct training sessions in conjunction with SDG&E's existing account executive organization for commercial/industrial customers. The County Water Authority

staff would participate in up to four training sessions. SDG&E and the County Water Authority would conduct joint workshops to educate facility managers about water/energy savings opportunities (such as cooling towers). Additionally, they would conduct workshops for dealers selling equipment that facilitates energy savings through water conservation.

The MWD and SDG&E also plan to expand upon existing effort to coordinate their "mass market" programs. Finally, MWD would conduct sessions with member agencies to train and educate them on existing energy efficiency programs that can be used to improve the efficiency of the water delivery system (*e.g.*, high efficiency pumps).

### 3.4. SoCalGas programs - $858,009

#### 3.4.1. Lake Arrowhead/SCE/SoCalGas Water Conservation Partnership - $150,000

SoCalGas would collaborate with Lake Arrowhead and SCE on an Indoor/Outdoor Retrofit Program for residential homes in Lake Arrowhead, California. The indoor portion of the program would apply to Lake Arrowhead homes built prior to 1992, which is estimated at approximately 6,500. These homes are most likely to have older fixtures that are predominantly inefficient in both water use and energy use. The outdoor portion of the program would apply to approximately 1,000 homes which use approximately 1/3 of Lake Arrowhead's annual water supply. Retrofitting those homes is expected to result in substantial water and energy savings.

The following retrofits would be included in the program:

<u>Indoor</u>

1. Replace 5 gallons per flush toilets with efficient 1.3 gallons per flush toilets with a lifetime savings of 0.76 acre feet per toilet (22.5-year lifetime).

2. Replace older shower heads with more efficient fixtures, reducing flow from 4.5 gallons per minute to 2.0 gallons per minute, leading to a lifetime savings of 0.24 acre feet per showerhead (5-year lifetime).
3. Replace older clothes washers with higher efficiency machines, resulting in a lifetime savings of 0.314 acre feet per machine (14-year lifetime).
4. Install new water saving aerators.

Outdoor

1. Install ET/Smart Controllers offering approximately 28% water savings (10-year lifetime).
2. Install more efficient sprinkler hardware with estimated water savings of 5% to 10% (5-year lifetime).

For the indoor portion of the program, the Lake Arrowhead would focus on full-time residents of homes built prior to 1992. For the Outdoor portion of the program, Lake Arrowhead would pursue retrofits for all homes with outdoor irrigation systems. The dual public outreach campaign would include, but not be limited to, direct mail, advertisements, newsletter articles, billing inserts and website information.

Lake Arrowhead would enter into a contract with a qualified vendor to oversee program coordination, quality control checking, and post-installation inspections. Participating residents would receive complete reimbursement for all of the retrofit equipment offered (except the high efficiency clothes washer; the rebate is limited to $200 for this appliance) upon verification by the program contractor that the equipment has been installed. Participating residents could either pay for installation of the equipment or install the equipment themselves. This option would allow the homeowners to choose to have Lake Arrowhead install the equipment at a cost to the resident of up to $700 per house or to

complete the installation of the indoor retrofit components themselves, provided they agree to an inspection. Lake Arrowhead's vendor would install all outdoor retrofit measures.

Lake Arrowhead, SCE and SoCalGas would designate any home that is completely retrofitted as a "Lake Arrowhead Water Star," which might increase the home's market value. Lake Arrowhead is also investigating the possibility of offering preferential water rates to homes that are designated as a "Lake Arrowhead Water Star."

The typical cost for indoor retrofit equipment would be $508.70 per household, based on two toilets ($150 per toilet), two showers ($2.85 each), three sink aerators ($1.00 each), and one clothes washing machine ($200).

The typical cost for outdoor equipment would be $520 per household, based on one ET controller ($400), one shutoff hose nozzle ($8.00), and eight high efficiency sprinkler head replacements ($14.00 each).

In 2003, Lake Arrowhead conducted an ET Controller Pilot Program. The purpose of the program was to test, under local conditions, the effectiveness, reliability and potential irrigation water savings that could result from the District-wide implementation of ET Controller technology. It installed sixty ET controllers (43 residential and 17 commercial) and achieved an average of 28% water savings.

Based on that study, Lake Arrowhead estimates that 280 AFY would be saved if 1,000 homes with irrigation systems were retrofitted with ET controllers. Given the lifetime of ET controllers, that equates to a lifetime savings of more than 2,000 acre feet.

The savings from retrofitting sprinkler hardware is not well established, but estimated in the 5%-10% of outdoor water usage (Vickers, Handbook of

Water Use and Conservation). That represents approximately 50 acre feet of water saved each year by retrofitting 1,000 homes with irrigation systems, which is another 250 acre feet over the lifetime of the sprinkler hardware.[11]

#### 3.4.2. Pump/Engine Testing/Evaluation Program for Crestline-Lake Arrowhead Water Agency and Eastern Municipal Water District - $436,407

This would be a two-phased pilot program. The first phase would be a natural gas pump/engine testing/evaluation program. The results from the pilot program would be used to develop the second phase: a natural gas pump/engine efficiency improvement program.

The historic costs to conduct natural gas pump/engine efficiency tests (labor, services, instrumentation) is about $2,500 per engine/pump (exclusive of water utility time and personnel costs). This is considerably higher than testing for electric pumps. While electric pumps are single integrated units, testing for natural gas driven pumps requires two entirely different evaluations: an evaluation of the natural gas engine that is providing the power to drive the pump, and an evaluation of the efficiency of the pump itself.

Water utilities in the state operate approximately 600 natural gas pump/engines. This pilot would cover approximately 150 gas engines in the SoCalGas service territory. The estimated cost to test these pump/engines is $325,000, plus administration and overhead costs.

The pilot testing/evaluation phase would lead to an evaluation of each water utility natural gas engine/pump, with efficiency rankings and

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[11] July 11, 2007 SCG Additional Supplemental Testimony of Mark Gaines, pp. 4-7.

recommendations for improving the efficiency of both the pump and engine. The maintenance/improvement based upon the test results of the pump/engines might include: 1) improvements based on aging/worn equipment (*e.g.* impellor replacements); 2) changes in hydraulic conditions within the well itself and pumping apparatus; and 3) opportunities to maximize efficiency through technology/improvements in both the engines and the pumps.

SoCalGas argues that this pilot would help establish new working relationships between them and the water agency, and provide critically needed information (an inventory of existing natural gas engine/pump infrastructure efficiencies and recommended improvements) that can be used to build a water natural gas pump/engine energy conservation program for future energy savings in this area.

SoCalGas would use the results of its tests to develop a second phase for inclusion in an upcoming round of funding.

#### 3.4.3. Joint Marketing and Outreach With MWD - $100,000

SoCalGas would participate in the same joint marketing program with MWD proposed by SDG&E and discussed in Section 3.3.4., above.

## 4. Protests

In response to the pilot program applications, the Inland Empire Utilities Agency (Inland Empire) filed comments, while the DRA and TURN filed protests. DRA and TURN offered detailed objections to aspects of each of the proposed pilot offerings.

Inland Empire argued that the goal of the pilot program is not to ensure energy savings, but to determine if energy savings can be realized through

future investments. For this reason, Inland Empire pleaded for a broad perspective on the pilot programs.

DRA agreed that water conservation is an important concern for California and supports the goal of developing and expanding best practices and existing programs to realize the substantial incremental benefits of joint water and energy resources and infrastructure management. However, DRA pointed out that the purpose of the energy efficiency program is to conserve energy, not water. DRA discussed that the utilities' primary obligation in overseeing energy efficiency programs is to fund programs that will directly benefit their ratepayers, as well as to displace the procurement of more costly and emission-intensive fossil fuels. For this reason, the Commission has prioritized energy efficiency first in the loading order.

DRA asserted that for the purpose of this pilot exercise, the energy efficiency program can only be responsible for conserving water that saves energy within respective energy utility territories to benefit ratepayers who support the energy efficiency programs, and that the energy utilities should not use the outcome of this pilot to favor non-utility programs over those that directly benefit their own ratepayers. DRA argued that a useful and appropriate pilot program should produce data that provides for a meaningful comparison of energy-embedded water conservation programs to traditional energy efficiency programs to determine if there is a place for water conservation in the overall energy efficiency strategy.

TURN protested the applications, offering the following three arguments. First, TURN argued that each application lacks essential information, without which the Commission can neither assess potential ratepayer benefits from the pilots nor evaluate whether the pilots will help answer fundamental questions

about water-embedded energy as a demand side resource for energy utilities. Second, TURN claimed that the applications do not appear to satisfy the Commission's directive regarding low income customers. Finally, TURN states that the applications conflict with existing Commission energy efficiency policies. TURN additionally objected to PG&E's proposed funding mechanism.

## 5. Comments on the Revised Proposed Pilot Programs

The ALJ provided the parties with an opportunity to offer comments and reply comments on the revised proposed programs. DRA and TURN filed joint comments, and both the San Diego County Water Authority and the Natural Resources Defense Council (NRDC) also filed comments. Each of the applicant utilities and NRDC filed reply comments. We will discuss those comments, as applicable, below.

## 6. Discussion

### 6.1. Introduction

All at once, the concept of conserving water to save energy is obvious, exciting, and worthy of caution.

It is obvious that it takes energy to produce, deliver, and dispose of potable water. It can take energy to push or pull the water from the place where nature produces it to the place where it is needed. It takes energy to make the chemicals that are often needed to treat water to make it drinkable, and more energy to run the treatment plant. It often takes energy to move the water to storage or to deliver it to a customer. It takes energy to clean the water again after it becomes waste and before it can be released to the greater environment. And if it takes energy to use water, then it must save energy if one can avoid using it.

It is exciting to think of the two concepts together – saving water and saving energy – because the two delivery systems are so clearly interdependent. Not only does it take a great deal of energy to use water, it takes a tremendous amount of water to produce and deliver energy services. It is like a mirror within a mirror: to use less water means using less energy, which in turn further reduces the demand for water. In addition, water and energy customers have much in common: each relies on a limited resource, and each group should be willing to spend some amount of money today to reduce overall demand tomorrow.

The reason for caution is that relying only on that simple calculus – the observation that reducing water use must reduce energy consumption – to support a marriage of conservation and efficiency efforts may not be consistent with the interests of either, absent a transparent, technically supported methodology that appropriately values costs and benefits. Our commitment – and legal requirement – are to pursue all cost-effective energy efficiency savings. We must, therefore, have a methodology that tells us the cost and benefits of cold water savings so that we and the utilities can determine the role of such savings in the overall energy efficiency portfolio.

As of yet, we do not know enough about the energy-saving potential of conserving water to allow for a meaningful comparison of such programs to the more conventional direct energy efficiency strategies. The CEC report relies on some extremely broad observations:

(1) Most of the fresh water is in the northern and central portions of the state, while more people are in southern California.

(2) About half of the water used in the south comes by pipeline from the Colorado River to the west, or by State Water

Project aqueduct from the north. A great deal of energy is needed to pump that water.

(3) By contrast, 40% of the water used in northern California moves with the assistance of gravity, requiring little or no pumping.

(4) On average, it takes much less energy to use water in the north than it does in the south.

(5) A typical northern California urban water system uses 4,000 kWh per million gallons of water, while a typical urban system in the south uses 12,700 kWh per million gallons of water.

This information must be considered with caution. Strategies for producing, delivering, and disposing of water vary significantly from place to place, as do the related energy impacts. For example, the San Francisco waterworks are often considered to be net energy producers because the water is largely conveyed by gravity and the main dam system (Hetch Hetchy) includes hydroelectric generators. By contrast, many communities along the California aqueduct are dependent on pumps to deliver water. Groundwater pumping consumes a lot of energy, while water recycling consumes less. Desalination plants are highly energy-intensive because of the need to force water through a series of filters. While the figures in the CEC report may be typical, they may not accurately reflect the energy related to water use in any particular place.

It is not apparent that the amount of energy needed to use water is the same as the amount of energy saved by not using some amount of it. If we somehow stopped using water entirely, then we could avoid expending any energy at all related to water use. But what happens when we just reduce water use? The CEC report points out that the energy intensity of water varies significantly depending on its source. What is the source of the water that is not

being used? If saved water would have come from the State Water Project, what happens to that water? Does someone else use it? Is it conveyed in the usual way but then stored for future use? Can the system operators turn down the pumps? The same kinds of questions apply if the saved water would have come from a well. Does it matter whether the pump in question operates at a fixed or variable speed? To what extent does the water provider where the savings occur depend on a gravity-fed system? While direct energy efficiency savings can be easily generalized (a certain more efficient light bulb would save the same amount of energy in Arcata as it would in Del Mar), the indirect savings from conserving water cannot.

Another critical question: Even if a measurable amount of energy is saved, do the benefits of the reduced energy consumption flow to the utility customers that are paying for the water conservation program? Many parties point to the numbers in the CEC report that suggest that there is much more energy consumed in conveying water to southern California than there is in distributing it to customers, and thus argue that the cost of a water conservation program must be compared to any resulting conveyance-related energy savings. While it is important to understand all of the savings resulting from a given initiative, those savings may provide little comfort to utility customers who are paying for a water conservation effort, but not seeing a direct benefit in the form of reduced energy use in their own service territory. For instance, pumps that propel water the full length of the State Water project may receive power from one of several regulated or municipal utilities along the way. It would be unfair to ask SDG&E customers to pay for a program that largely benefits customers in PG&E, SCE's, or some other utility's territory.

We are dedicated to incorporating water conservation strategies in the utilities' energy efficiency programs to the extent that such strategies benefit the utilities' customers and are consistent with the overall cost-effectiveness of the energy efficiency programs. Today we authorize the energy utilities to pursue pilot water conservation programs to stimulate innovative partnerships with water agencies and to develop a means for determining the energy savings related to saving water. When the pilots are completed, we want to be in a position to determine whether water conservation and less energy intensive water measures should be funded with utility energy efficiency dollars.[12] In order to do this, the pilot program results must demonstrate that saving and using less energy intensive water, in fact, saves energy – not in the abstract, but in application.

Water measures will need to be cost-effective mechanisms for achieving energy efficiency savings if they are to be part of the overall utility energy efficiency portfolio. A critical element is the development of a cost-effectiveness methodology for water measures comparable to that employed for the consideration of other energy efficiency measures. The embedded energy in water methodology should be the product of a coordinated effort among stakeholders in conjunction with the pilot programs. The utilities should use the pilots to test and refine the methodology.

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[12] We note, with some disappointment, that none of the energy utilities proposed programs involving the third strategic category: improving the efficiency of water delivery and treatment systems. While activities in this category do not rely on anembedded energy rationale, they are an important factor in determining the amount of energy related to water use. We expect the utilities to design programs to address this issue as part of their planning for 2009-1011.

In order to approve the utilities' pilot proposals, we must determine whether the proposals are consistent with the nine program objectives set forth by the assigned Commissioner in her ruling dated February 16, 2007.

After reviewing the initial applications, and considering comments offered at the prehearing conference, in protests, and throughout the workshops, the assigned Commissioner concluded that the proposals seemed unlikely to meet the stated goals and directed the utilities to provide supplemental testimony proposing program revisions. We have reviewed the revised proposals and find that they still fail to ensure that the pilot process will lead to the results we need to fund future energy utility water conservation programs. However, we are committed to proceeding with this effort, and, in this decision, we approve revised programs designed to increase the likelihood that the energy utilities will be able to introduce water conservation measures during the course of the 2009-2011 program period.

### 6.2. Criteria for Approving the Pilot Projects

As discussed above in the Background section, in a ruling dated February 16, 2007, after considering the comments and concerns offered by various parties at the prehearing conference, the assigned Commissioner and ALJ described a series of objectives for the pilot programs and encouraged the parties to apply them when discussing the pilot proposals, and any potential modifications. The objectives are as follows:

1. Reduce energy consumption related to water use in a manner that should prove to be cost-effective for all of the customers of the sponsoring energy utilities;
2. Create a methodology for calculating cost-effectiveness and evaluating water-derived energy efficiency programs;

3. Determine if, in fact, it is cost-effective to save energy through programs that focus on cold water;
4. Better understand how energy is used in the California water system;
5. Test a diverse set of water energy programs and measures, with particular emphasis on new technologies and low-income customers;
6. Better understand what programs and measures are likely to save water and energy;
7. Provide the basis for meaningful ex-post project assessment;
8. Stimulate new partnerships; and
9. Better understand the potential benefits of pursuing each of the strategies identified in the October 16, 2006 ruling:
    a. Conserving water;
    b. Switching to less energy-intensive water sources; and
    c. Increasing the energy efficiency of current water delivery.

These suggested objectives accurately describe our interests as we consider the merits of approving the pilot programs, and are the criteria we will apply in making that assessment.

### 6.3. Questions the Utilities Intended for the Pilot to Answer

In response to initial concerns that the pilot programs were insufficiently detailed to ensure that they would meet the stated goals, the utilities offered to develop a series of questions that they would strive to answer through the pilots. The questions that the utilities submitted are included as Appendix A to this decision.

The utilities have set forth many questions that are important to answer before moving beyond a pilot program to implement ongoing water

conservation programs. However, there are several factors that give pause. First, the utilities have not promised that their pilots would answer these questions. Offering a series of questions that the utilities might or might not be able to address through their pilot programs does not substitute for developing programs that will answer the questions. Second, we note that the utilities' suggested approach to answer most of the questions does not depend on actual programs. Instead, the utilities would rely on studies. While this is not necessarily a flaw, it does suggest that the programs themselves, as proposed, may not be critical to determining the future for energy utility water conservation efforts.

Third, the question related to cost-effectiveness (Are the measures cost-effective?) raises special concern. This is by far the most important question to answer before embarking on more ambitious statewide programs. Yet, in its entirety, the utilities' strategy for developing the answer is as follows: "The [study] would calculate and analyze the cost-effectiveness." We have already discussed, at length, the complex interactions that affect the cost-effectiveness determination in this area. A statement that the utilities would undertake a study that produces this result does not provide sufficient assurance that the pilot process will get us where we need to go.

We have reviewed the utilities' proposals for, but have not found, a logical nexus between the various proposed programs and studies that appears likely to produce sufficiently comprehensive results. Because it remains so important to pursue appropriate energy utility water conservation programs, we set forth, in this decision, a more comprehensive study strategy to be funded by ratepayers and overseen by the Commission's Energy Division. In addition, we will permit the utilities to proceed with a limited number of pilot program offerings to

explore the possibilities for meaningful, innovative partnerships between energy utilities and water agencies. The studies and programs are set forth below.

### 6.4. The Size of the Pilot Program Budgets

In directing the utilities to file proposals for pilot programs, the Assigned Commissioner suggested that they aim for developing a statewide budget of approximately $10 million. Rather than dictating a specific budget, this number is intended to convey a sense of both the importance of the pilot process and the need to impose discipline on program expenditures. Initially, the utility proposals closely approached the $10 million figure. The utilities later trimmed their proposed programs a bit, and reduced the budgets to slightly less than $7 million.

TURN and DRA recommend that the Commission approve the full $10 million in funding allocated among the utilities. They recommend that the Commission designate the uncommitted funds for at least two activities: (1) additional EM&V activities and studies as deemed reasonable and appropriate by the Energy Division, and (2) a statewide third-party solicitation for innovative embedded energy – water conservation project(s), managed by the Energy Division or its consultant(s).

PG&E responded by asserting that the Commission should not dedicate additional ratepayer dollars to the pilot in the absence of a clear plan for such expenditures, which TURN and DRA do not provide.

SCE acknowledges that its total proposed pilot budget of $2.665 million represents a reduction of $.762 million from the $3.427 million budget proposed in the supplemental testimony filed June 14, 2007. The total reduction is partly offset by an increase of $.334 million in SCE's EM&V budget to fund the additional studies.

SCE proposes to set aside the remaining funding within the pilot in order to meet any potential customer demand for the pilot in excess of the initial $2.665 million budget. This would allow SCE the flexibility to meet potential customer demand quickly during the pilot period.

SoCalGas and SDG&E did not comment on this point.

We appreciate TURN and DRA's support for increasing program expenditures, but have identified pilot activities for approval based not on the target budget, but on the merits of the activities themselves. The resulting budget is less than the original $10 million target yet sufficient, in our opinion, to develop the information needed for planning purposes.

### 6.5. Issues Related to Pilot Project Cost-Effectiveness and the Water-Energy Calculator

#### 6.5.1. Introduction

In the October 6, 2006 ruling the assigned Commissioner directed the utilities to ensure that the pilot proposals were designed to maximize energy savings per dollar of program cost. In their January 16, 2007 filings, the utilities all used proxy embedded energy values from the December 2006 California Energy Commission Report "Refining Estimates of Water-Related Energy Use in California." In order to develop more accurate estimates of cost-effectiveness the Energy Division developed a calculator patterned after the E3 calculator used to determine cost-effectiveness of commission-funded energy efficiency measures.

#### 6.5.2. Suitability of the Water Energy Calculator

The Energy Division conducted a workshop on May 7, 2007 in Los Angeles, California, to address the embedded energy in water calculator shortly after it was unveiled at the end of April. At this workshop, the staff

introduced methodologies for measuring *ex ante* savings and provided an opportunity for interested parties to give preliminary feedback on the calculator.

Workshop participants identified two major aspects of the calculator that required modification. The first involved the calculation of participant cost (the cost born by the customer receiving direct program benefits). Prior to the modification, the full cost to the participant was considered to be part of the energy utility program cost while only a portion of the benefits enjoyed by the customer were counted as energy benefits (the rest were assumed to be water conservation benefits that would be part of the water utility's own cost-effectiveness calculation). Subsequently, the staff modified the formula to include a percentage of the costs and benefits equal to the percentage of total program funds contributed by the energy utility (*e.g.*, if the energy utility contributed $75,000 and the water utility contributed $25,000, 75% of the participant cost and benefits would be included in the calculation).

The second aspect of the calculator requiring modification involved the embedded energy of water used indoors. The energy implications of indoor and outdoors water use are different, because much of the water used for landscaping or irrigation will not find its way into the wastewater system. On the other hand, most water used for cooking, bathing, toilets, cleaning, and drinking will eventually find its way into a sewage system and wastewater treatment facility. Before it was changed, the calculator only credited indoor water savings with embedded energy associated with upstream or "fresh" water, and not energy use associated with wastewater.

These two errors caused the measure savings and Total Resource Cost benefits to appear lower than they should have been.

In addition to these two adjustments, the staff added fields to the calculator for gas savings (therms), and for utilities to design programs and add their own measures. Between the May 7, 2007 workshop and the June 14, 2007, the staff revised the calculator several times.

The assigned Commissioner asked the utilities to address the suitability of the calculator in their June 14, 2007 supplemental testimony. Therein, SCE notes that the calculator contains numerous default assumptions upon which the parties had not formed consensus. PG&E argues that some assumptions were not well-defined, and gives examples of issues such as water utility load shape, net-to-gross calculations, and factors for converting water volume to kWh.

The calculation of avoided cost for embedded energy in water measures uses an average energy intensity of water within an energy utility's service territory. Both SCE and PG&E argue that using such an average undervalues the benefits of saving water since water from some sources is more costly to procure than water from other source. SCE believes the calculator should use the intra-marginal energy intensity of the water since this is the last increment of water used to meet demand and would therefore be the first reduced. PG&E, however, advocates using the energy intensity of the extra-marginal source of water under the assumption that water demand is growing, and energy savings will come from not needing to procure water from additional sources. The extra-marginal energy intensity is the energy that would be embedded in the next unit of water that the water agency would have to secure in order to meet rising demand. Many water agencies have not secured an extra-marginal source, so estimates would be based on the energy intensity of expected (rather than contracted) additional water sources.

PG&E and SCE also commented on the fact that the calculator does not include any information on energy saved outside of the funding utility's service territory. SCE argues that this undervalues benefits and results in artificially low cost-effectiveness numbers.

In comments filed after the additional supplemental testimony, interested parties responded to the utility remarks regarding the calculator. NRDC suggests the calculator should account for all energy savings regardless of where they occur, and that the current calculator is not a suitable means of evaluating the programs, since it believes that key issues regarding the costs and benefits have not yet been resolved. TURN and DRA disagree, and advocate keeping the calculator as it is. In response, SCE states that it is content to look at embedded energy outside of its service territory through the proposed studies, with the option of revisiting the calculator in the ex-post analysis. NRDC and SCE also recommend that the study include an assessment of greenhouse gas emission reduction potential from water management options.

The intra-marginal/extra-marginal debate reflects one of the more significant uncertainties related to programs in this subject area. The critical question is, what energy use is avoided when a given amount of water is conserved? If water use could never be higher than it was prior to implementing a water conservation program, then the savings stemming from the program are intra-marginal. If water use is continuing to grow, then it is more likely that the saved water is extra-marginal. In many instances, the two sources should be one and the same. However, we are not at a point where we can say, with confidence, what the avoided water source is for a given water agency. For now, the Energy Division and the energy utilities should use a given water agency's average energy intensity for the purposes of *ex ante* evaluation.

Up to this point, the utilities have identified their intra marginal source as their highest cost water, arguing that the water agencies are rationale, cost-reducing entities that will reduce first where it will financially benefit them the most. The problem is that one source they have identified as an intra marginal source is the State Water Project water which although expensive, offers supplies that often can be put in storage. Additionally, if a water agency reduces its take from the State Water Project one year it may effect its ability to access more water the next. Clearly more than one factor goes into determining an intra marginal source.

Extra marginal analysis has the same identification issue, as well as creating a need to demonstrate that the demand curve is rising and that the water agency will continue to increase its customer base, regardless of whether additional water supplies are available. This may not always be the case.

In theory, either approach would produce better numbers than a utility's average energy intensity for water, but we cannot determine what either source is with any certainty at this time. Our hope is that the load shape and energy water relationship studies we approve in this decision will produce the information we need for this purpose. Ultimately, it would be logical to rely on extra-marginal supply assumptions for long term planning (more than one to two years in the future) and intra-marginal assumptions for the short term (one to two years ahead).

#### 6.5.3. Cost-Effectiveness of the Pilot

Like the E3 energy efficiency calculator, which is used to review most proposed energy efficiency programs, the water energy calculator produces a total resource cost number to determine cost-effectiveness. This number is created by comparing costs and benefits, with benefits represented by avoided

costs. The number is a ratio where a value of one (1), or above, indicates the item has more benefits than it costs, and a value below one (1) means the item costs more than it produces in benefits.

Below is a table showing the energy utilities' proposed programs and their respective Total Resource Cost values.

Table 2

| Utility | Program | TRC |
|---|---|---|
| PGE | **Total Program (budget including EM&V)** | **.28**[13] |
| | Industrial Process Improvement in the Food Processing Sector | .31& .52 |
| | Industrial Process Improvement in the Winery Sector | .41 |
| | Ozone Laundry Treatment in the Hospitality Sector | .33 |
| | Low-Income Direct Install High Efficiency Toilet Replacement | .20 |
| | Emerging technologies to Improve Water System Efficiency | -- |
| SCE | **Total Program** | **.10**[14] |
| | Low-income direct install high efficiency toilet replacement | .07 |
| | Express water efficiency (PH controllers and ET controllers) | .06 |
| | Industrial Water Efficiency (audits) | .10 |
| | Lake Arrowhead Water Conservation | .19 |
| | Green Schools Water Efficiency | .07 |
| SDG&E | **Total Program (budget including EM&V)** | **.31**[15] |
| | Managed landscape | .20 |
| | Large customer audits | .50 |
| | Recycled water retrofit | .28 |
| | Join marketing and outreach | n/a |
| SCG | **Total Program (budget including EM&V)** | **.36**[16] |
| | Los Angeles County Sanitation District/SCE/SoCalGas Water Conservation Partnership | 1.33 |
| | Pump/engine testing/evaluation program for Crestline-Lake Arrowhead Water Agency and Eastern Municipal Water District | --- |
| | Joint Marketing and Outreach | --- |

While these proposed pilot programs are not cost-effective, SCE suggests that since the goal of the pilot is to produce information, the cost-effectiveness of

[13] PG&E's July 11, 2007 Additional Supplemental Testimony, p. 4.

[14] SCE's July 11, 2007 Additional Supplemental Testimony, Attachment E.

[15] SDG&E's July 11, 2007 Additional Supplemental Testimony, p. 3.

[16] SoCalGas' July 11, 2007 Additional Supplemental Testimony, p. 3.

the pilot should be determined by whether the pilot cost-effectively informs decision makers about the merits of implementing given strategies on a broader basis. Similarly, TURN and DRA recommend approving PG&E's programs despite negative total resource cost numbers because they expect the proposed studies to develop the information necessary to inform future water energy activities, and agree with SCE that the pilots themselves do not have to be cost-effective. NRDC believes the Commission should not require a formal cost-effectiveness evaluation since the tool for doing such testing is not yet fully developed, and might compromise early exploration and learning.

Based on the cost-effectiveness calculations submitted by all four utilities in their July 11, 2007 Additional Supplemental Testimony, all utility pilot portfolios have ex-ante cost-effectiveness ratios of less than one. SCE's cost-effectiveness ratio though, is the lowest at .10. This means that for every $100 spent on the program by all parties, $10 in benefits will be received by all parties.

The relative lack of cost-effectiveness provides at least two questions for us to resolve: Should we approve the programs anyway? How do we know that the utilities have chosen the most promising programs?

### 6.6. Evaluation, Measurement and Verification (EM&V)

In the July 11, 2007 additional supplemental testimony, SCE submitted an EM&V plan on behalf of all four energy utilities. In the plan, the utilities propose to conduct water studies (designed to determine how much water is saved through the implementation of a particular program), embedded energy in water studies (to determine how much energy is saved when a given amount of water use is avoided) and process evaluations (to improve the design and efficacy of a particular program or set of programs while the programs are operating). They characterize the water savings and embedded energy studies as impact

evaluations (attempting to measure programs accomplishments). These would therefore fall under the jurisdiction of the Energy Division pursuant to D.05-01-055 and the August 2007 Assigned Commissioner's Ruling (ACR) in this proceeding.

#### 6.6.1. Advisory Committee

As part of their original EM&V plan, the utilities proposed setting up an advisory committee or research working group "to provide substantial input on overall research design, specific issues to be addressed, and research methods."[17] Since most of the EM&V planning has already taken place, the utilities consider that the original functions of the advisory committee have been superseded and now recommend that the current EM&V plans "include one or more Project Advisory Committees to provide input and support during the course of the studies."

All proposed studies would include a Project Advisory Committee that has the following functions:

1. Reviewing and refining the research plan.
2. Holding periodic conference calls and meetings in which participants report on any significant issues encountered in the course of the research, and offer their perspectives on how to resolve issues. Examples include changes to the EM&V plan because of: new methods or new data sources; changes in pilot programs due to findings as the programs get under way; and data collection difficulties that force a different approach.

[17] SCE January 16, 2007 Testimony, p. 16.

3. Reviewing draft results and reports to provide feedback on interpretation and presentation of the data and analysis, as well as the completeness and clarity of reporting.

### 6.6.2. Water Studies

#### 6.6.2.1. Commercial and Industrial Programs Direct In-line Metering End-Use Studies - $338,000 (PG&E - $123,000, SCE - $140,000, SDG&E - $75,000)

This impact evaluation would focus on commercial, industrial, and institutional customers and related applications with the greatest potential for savings or uncertainty. The primary goal of the study is to provide data on the amount, timing, and variability of the water savings derived from the water surveys and associated conservation measures. This study would examine measurements taken both before and after installation of the measure, to create a verified, daily savings profile, and would use a "strategic sampling" plan to minimize response bias.

The study would look at the following programs:

1. PG&E's Commercial Food Service, Food Processing, Hospitality Sector Laundries, and Winery processes.
2. SCE's Industrial Process Water Use Reduction (Audits) and Express Water Efficiency (PH Controllers and Commercial ET Controllers) Programs.
3. SDG&E's Large Customer Water Audits.

#### 6.6.2.2. High Efficiency Toilets Customer Bill Statistical Evaluation - $190,000

This would involve statistical impact evaluations of the low-income high Efficiency Toilet pilot programs, as well as measurement of customer satisfaction. The primary goal of the study would be to answer questions about the amount, timing, and variability of water savings that result from the

installation of high efficiency toilets. Those performing the study would collect a sample of meter readings for participating residential customers over a period of three years. Additionally, they would estimate market savings potential based on the results of this study and a definition of the target market provided by the partner water agency. They would undertake a statistical impact evaluation to determine savings, using pair-matched control and treatment groups to determine the sample.

This evaluation would look at the following programs:

1. SCE's Low Income Direct Install High Efficiency Toilet Replacement Program, and Green Schools/Campuses Program with High Efficiency Toilets.
2. PG&E's Low Income Direct Install High Efficiency Toilet Replacement Program.
3. SoCalGas Low Income Multifamily High Efficiency Toilet Replacement Program.

#### 6.6.2.3. Weather-Based Irrigation Controllers and Landscape Efficiency Customer Bill Statistical Evaluation - $70,000

This impact evaluation would assess the newer irrigation controllers in SDG&E's Landscape Management Efficiency Improvements Program and SCE's Express Water Efficiency Program (ET Controllers) for amount, timing, and variability of water savings. The evaluators would perform statistical impact analysis to determine savings, and employ pair-matched control and treatment groups with stratification to determine the sample.

### 6.6.3. Energy-Water Studies

As proposed, the embedded energy in water studies are designed to look at the embedded energy from a societal perspective, to determine the allocation of avoided costs, and to gather information needed for decision making.

#### 6.6.3.1. Load Profile Study - $475,300

As mentioned elsewhere, the Energy Division and its consultants developed an embedded energy calculator to help energy utilities determine the benefits of particular efforts to conserve water. This evaluation would be designed to update the calculator to reflect the results of secondary research. Specifically, it would create a societal definition of cost-effectiveness that would include benefits for utilities other than the one sponsoring the program. The load profile study also would refine the water demand load shape and determine related changes to the energy load requirement. If feasible, this work would be coordinated with the state-wide Proposition 50[18] study to be conducted by the Lawrence Berkeley National Laboratories. All of the utilities with pilot programs would sponsor this effort.

#### 6.6.3.2. Emerging Technologies to Improve Water System Efficiency - $100,000

This study would investigate emerging technologies in water system operating efficiencies – specifically in monitoring and water systems telecommunications. PG&E would offer incentives to water agencies to test a promising technology or technologies. Specific technologies would include integration of water flow and energy monitoring in the SCADA[19] systems to

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[18] Proposition 50 refers to the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, passed by California voters in November 2002.

[19] "SCADA is an acronym for Supervisory Control and Data Acquisition. SCADA systems are used to monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation. These systems encompass the transfer of data between a SCADA central host computer and a number of Remote Terminal Units (RTUs) and/or Programmable Logic Controllers (PLCs), and the central host and the operator terminals. A SCADA system gathers information (such as where a leak on a pipeline

*Footnote continued on next page*

detect water losses; integration of customer metering and SCADA to improve water distribution and energy efficiency; and a coupling of SCADA with modeling to optimize pumping efficiency. This evaluation would focus on PG&E's Emerging Technologies to Improve Water System Efficiency Program.

#### 6.6.3.3. Analysis of Water-Energy Efficiency Measures in an Isolated Service Area (System-wide Intervention Analysis) (SCE - $64,000)

This study would collect customer-level and system-wide water use data during and following a period of intensive water-use-efficiency retrofits in Lake Arrowhead. Evaluators would compare system-wide changes in water use to system-wide changes in utility energy use to determine treatment effects. This study would evaluate SCE and SoCalGas' Lake Arrowhead Residential Indoor Outdoor Water Conservation program. The SCE portion of the study would consist of a system-wide intervention analysis. Intervention analysis contrasts what would have happened in the absence of the program with what happened with the program.

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has occurred), transfers the information back to a central site, then alerts the home station that a leak has occurred, carrying out necessary analysis and control, such as determining if the leak is critical, and displaying the information in a logical and organized fashion. These systems can be relatively simple, such as one that monitors environmental conditions of a small office building, or very complex, such as a system that monitors all the activity in a nuclear power plant or the activity of a municipal water system." (National Communications System Technical Information Bulletin 04-1, p. 4.)

#### 6.6.3.4. Lost Opportunities and Energy Efficiency Potential in Water/Wastewater Facilities- $200,000

This study would identify specific opportunities for direct water energy efficiency savings and conduct a benchmarking analysis of best practice standards in water distribution, treatment and waste treatment facilities (both retrofit and new construction scenarios). Evaluators would collect and analyze data on 2004 through mid-2007 utility program participation by water and wastewater facilities.

Although the study would be funded through the pilot, resulting efficiency improvements would be funded through the utilities' regular energy efficiency portfolio. The utilities would make reasonable efforts to pursue promising activities during the 2006-2008 energy efficiency program cycle, and would include them in their 2009-2011 energy efficiency program planning. At least 50% of the sites participating in the program would be in SCE's service territory.

#### 6.6.3.5. Toilet Flapper Cost-Effectiveness Studies - $20,000

This study would assess the opportunities and cost effectiveness of promoting toilet flapper replacements as an alternative to toilet replacement. The primary goal of this study is to determine if and how the utilities could offer toilet flapper replacement as a cost-effective addition to ongoing residential and low-income programs. Cost-effectiveness would be determined through a literature review, and if existing literature is found to be inadequate, high-efficiency direct-install toilet contractors would measure leakage rates on the toilets they remove.

#### 6.6.3.6. Water Leak/Leak Detection and Water System Loss Control Study - $200,000

This study would analyze water leakage and water system loss control programs through secondary and primary research[20] to determine the magnitude of the problem, the potential for cost-effective measures to reduce losses, and the merits of entering into collaborative efforts with water agencies to address this problem. The evaluators collect primary data from up to three retail water agencies through rigorous water audits that would contain analyses of retail system loss control alternatives at each site. The water audits would adhere to International Water Association and American Water Works Association audit protocol. Secondary research would draw on a collection of existing water leakage and system loss control studies as well as energy data developed in the load profile research. This secondary research would provide the basis for defining the range of possible water system loss control alternatives, as well as informing other aspects of the study.

The study would distinguish between "real" losses (e.g., physical leaks) and "apparent" losses (due to meter under-registry and system paper accounting issues).

#### 6.6.3.7. Water Energy Savings Alternatives For Low-Income Customers Study - $50,000

This study would compare water/energy savings for toilets with other water uses in low-income homes. The goals of this study would be to 1) include

[20] Secondary research involves a summary or aggregation of existing data. By contrast, primary research involves collecting new data directly from respondents or research subjects for the purpose of performing additional analysis.

low-income customers in efficiency programs and 2) provide greater direct benefits to low income customers. This study would examine the differences between the multi-family and single-family segments, and would develop separate alternatives for these segments as well as for utility bill paying customers and non utility bill paying customers (such as apartment tenants in centrally-metered buildings). The utilities did not propose a specific service area and programs to be included in this study.

#### 6.6.3.8. (Next Generation) Embedded Energy Calculator - $139,800

As discussed above, during the review of these applications, the Energy Division and its consultants developed a "calculator" to assist the utilities in determining the cost-effectiveness of their pilot proposals. This new study would update the current version of the calculator to contain the results of secondary research with the aim of informing alternative policy choices. The focus of the study would be on the determination of cost-effectiveness.

This new generation calculator would define cost effectiveness from the following perspectives: a customer perspective, a narrow single energy utility perspective, multiple energy perspectives, multiple water and energy utility perspectives, a statewide economic perspective, and an inclusive societal perspective. Separate benefits would be associated with each perspective and would be included in the cost-effectiveness calculation to create multiple cost-effectiveness numbers for each measure.

Additionally, this study would summarize existing embedded energy calculators and evaluate their ability to produce information needed for policy decisions, specifically the objectives set forth in the February 16, 2007 ACR in this proceeding.

#### 6.6.4. Process Studies

The utilities intend to perform process evaluations during the implementation of the following programs:

1. Commercial and Industrial Pilot Programs (PG&E, SDG&E, and SCE),
2. High Efficiency Toilet Replacement Programs (PG&E, SoCalGas, and SCE),
3. Weather-Based Irrigation Controller Programs (SDG&E and SCE),
4. Residential Indoor/Outdoor for Lake Arrowhead (SCE), and
5. General Marketing and Joint Marketing and Outreach Programs (SDG&E, SoCalGas).

### 6.7. Measuring and Providing Credit for Energy Savings

While it is clear to all participants that the Commission should encourage strategic integration of water and energy efficiency efforts, there is less certainty as to what changes the utilities can or should incorporate in the current program cycle. The parties disagree as to whether embedded energy savings created through the pilot programs should count towards meeting the adopted energy savings goals and the extent to which the October 6, 2006 ACR has already addressed this topic.

In that ruling, the assigned Commissioner expressed the preference that the utilities not count embedded energy in water savings as part of the overall savings resulting from the 2006-2008 energy efficiency programs. TURN argues that counting the savings toward the goals could unfairly affect the utilities' rewards or penalties since the preliminary shareholder incentive mechanism adopted in D.05-04-051 contains two elements: 1) a minimum performance threshold tied to the utilities' energy efficiency goals (established by D.04-09-

060), and 2) the calculation of performance basis, currently derived from pilot portfolio net benefits (gross savings less free-riders). In D-04-09-060, the Commission stated that the savings goals were derived from studies which presented estimates of "the potential to increase the number of energy efficiency investments made by customers and businesses in specific segments over the next decade," by examining market saturation for a list of over 200 energy efficiency measures for the residential, commercial and industrial sectors.[21]

The water conservation measures SCE, SDG&E and SoCalGas propose to install in their pilot programs were not among the measures considered in theses studies. Thus, when it adopted the energy efficiency goals in D.04-09-060, the Commission did not consider the potential for embedded energy savings from customers who might install cold water conservation measures. In fact, in D.04-09-060 the Commission instructed the utilities to exclude "savings by customers not included in the calculation of savings potential" when "documenting program accomplishments … in order to ensure consistency between the basis for establishing the goals and the assessment of whether those goals have been met."[22]

Nonetheless, the utilities have all argued that (or requested clarification as to whether) embedded energy savings should count towards meeting the goals. For example, PG&E is seeking to count embedded energy savings towards goals. In its July 25, 2007 reply comments PG&E defends its position that the pilot savings should count towards the 2006-2008 program goals stating that "the

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[21] D.04-09-060, *mimeo.*, p. 8.

[22] D.04-09-060, *mimeo.*, p. 32. *See also* Finding of Fact 9.

funds for the pilot would otherwise support activities that would secure savings that would count toward the utilities' energy efficiency goals." Furthermore, PG&E notes that a rigorous EM&V plan has been proposed and believes that the pilot will help reduce greenhouse gas emissions.

Similarly, SCE requests clarification on the topic in their amended supplemental testimony. SCE notes that the October, 2006 ACR directed the utilities not to seek credit for the pilot's embedded energy savings as part of the rewards or penalties relating to the 2006-2008 cycle. However, SCE posits that the ruling focused on rewards/penalties and not credit towards adopted goals. Like PG&E, SCE remarks that it will be directing valuable resources to pilot planning that could otherwise be working on energy efficiency programs that would count towards the goals.

SDG&E/SCG originally asked for clarification on this point, but dropped that request in its amended testimony.

In her October 6, 2006 ruling, the assigned Commissioner states that, "while it would be important to count embedded energy savings related to this effort, and to calculate any such savings related to existing programs, the utilities should not seek credit for these savings as part of any rewards or penalties related to the 2006-2008 period. The applications should include proposals for counting the savings for the purpose of understanding program benefits, rather than to affect rewards or penalties."

As TURN points out, counting embedded energy savings towards the goals could also affect rewards and penalties under the recently adopted incentive mechanism. (D.07-09-043.) The ACR was only intended to provide guidance for the utilities in preparing their applications, not to preclude the Commission from determining the appropriate treatment of savings resulting

from the pilot. Thus, it is important we state here that the utilities shall not count embedded energy savings created during the pilot programs towards their goals. We will not count savings because there is no verified method for measuring them, and because we anticipate the savings resulting from the pilots to be insignificant.

We do not intend, however, to preclude the utilities from counting savings that result water distribution, treatment, waste water treatment systems improvements, funded through 2006-2008 portfolio. Finally, we take note of our recent decision (D.07-10-032), which allows for a consideration of whether to count embedded energy savings in the 2009-2011 cycle once results are available from the pilot programs we approve today.

### 6.8. Assessing the Proposed Programs and Studies Compared to the Applicable Criteria

The utilities submitted the pilot programs and studies together to address the assigned Commissioner's February, 2007 ruling. Here we consider the extent to which the proposed programs meet those needs.

*1. Reduce energy consumption related to water use in a manner that should prove to be cost-effective for all of the customers of the sponsoring energy utilities*

Relying on the Energy Division's embedded energy and water calculator, only one program has a preliminary Total Resource Cost of 1 or above (the standard minimum threshold for finding that a proposed energy efficiency measure is cost beneficial). This is the SoCalGas portion of the Lake Arrowhead/SCE water conservation partnership. The SCE-funded electric aspect of this program has a cost-effectiveness value of 0.19, and it is unclear whether the apparent benefits of the SoCalGas gas portion are actually a byproduct of SCE's participation. In other words, it is unclear whether SoCalGas

is taking credit for savings that come as a result of SCE's contribution to the program.

All other programs have cost-effectiveness values of less than one, and all utility pilot portfolios have Total Resource Costs below 0.40. These calculations are only estimates, and pilot programs often lack the efficiencies inherent in larger programs. Relying solely on potential cost-effectiveness, there can be an argument for adopting a measure with a preliminary value of less than 1.0 if it appeared to be close to cost-effective. However, because of the low preliminary values in this case, it is less likely that the proposed programs would be cost-effective in terms of local energy utility savings. SCE's pilot portfolio Total Resource Cost is 0.10, indicating that either costs would have to decrease ten fold or benefits would have to increase by the same amount. As this is unlikely to occur, it is reasonable to conclude that SCE's pilot portfolio and those of the other utilities would not produce cost-effective savings.

*2. Create a methodology for calculating cost-effectiveness and evaluating water-derived energy efficiency programs*

The Energy Division developed an embedded energy in water calculator that created a methodology for calculating savings.

*3. Determine if, in fact, it is cost-effective to save energy through programs that focus on cold water*

In order to meet this criterion, it is not necessary to rely solely on the pilot programs. Undertaking concurrent studies may be a way to answer this question. But, as we will discuss below, the studies proposed by the utilities alone are not likely to get us all the way there. We will describe a more comprehensive study approach in a section that follows.

*4. Better understand how energy is used in the California water system;*

We address this goal more fully below, when we describe the studies that we approve today. The CEC has begun to look at the issue of energy usage for water treatment and delivery on a broad, general level. In order to pursue long-term programs, we need much greater specificity. Some of the proposed studies would address this in part. The Load Profile study may provide useful information on the energy use of water agencies, but the proposal does not give enough detail about what would be performed. The Lake Arrowhead Partnership could show the effect a number of water conservation measures could have together in an isolated water system with high embedded energy (because the need to pump water to serve customers at higher elevations), but would not be representative of energy intensity elsewhere. It could, however, provide information on extremes and could illustrate one part of California's water system. The proposed update to the embedded energy calculator seeks to do secondary research to quantify benefits associated with perspectives not included in the calculator. These would include statewide economic and societal perspectives. As part of the statewide and societal perspectives, some idea of how water is used in the California system may be examined, but as submitted, the study proposal does not provide any detail on what this might be.

Although several studies may address this objective in part, taken together the proposals do not provide a clear plan for understanding how energy is used in the California water system.

*5. Test a diverse set of water energy programs and measures, with particular emphasis on new technologies and low-income customers*

In their initial applications, the utilities proposed a pilot consisting mainly of toilet installations that the utilities would provide to homes in low income communities. Since that time, the number of toilets proposed by the utilities has

dropped dramatically, yet funding for toilets still makes up 21% of the proposed statewide program budget excluding the EM&V set aside of 20%.

The proposed new technologies are for the most part existing technologies used in new ways. PG&E's Emerging Technologies program focuses on using existing SCADA technology to detect water losses and improve water system efficiency. Likewise, the industrial technical audit programs proposed by SCE and PG&E would provide systems efficiency recommendations for a variety of niche customers such as wineries and food sector, metal plating and electronics.

One more unusual measure proposed is PG&E's Ozone Laundry Treatment program that would encourage customers in the hospitality sector to replace traditional laundry equipment with less water intensive ozone technology. Also of interest is SCE's Express Efficiency component that would provide rebates for pH controllers and irrigation controllers for large commercial and irrigation customers.

Although the proposed measures are more diverse in the latest July 11, 2007 filing than they were in the initial January 15, 2007 applications, it remains unclear how representative these are of all possible measures. The utilities have presented little information on how they selected the measures, or the nature of measures which were considered and not included.

*6. Better understand what programs and measures are likely to save water and energy*

The relative lack of diversity in the proposed programs, both in terms of measures offered and customer classes to be served, reduces the likelihood that the utilities will emerge from the pilots with a comprehensive understanding of which strategies will work. For this reason, in discussion below, we set forth a broader approach for the pilot programs and studies.

*7. Provide the basis for meaningful ex-post project assessment*

One of the desired outcomes of this pilot is better information about the water energy nexus in California. This information would help decision makers determine whether or not cost-effective energy savings could result from water conservation measures. As proposed, the pilots would not provide the certainty needed to determine this. One of the main reasons is that the programs, in and of themselves, do not provide the necessary information about the relationship between conserving water and saving energy. As such, a study or other evaluation is needed to determine this. Unfortunately the proposed program evaluations would almost all involve statistical bill analyses at the customer level. Particularly in the case of the toilets, the effect of a low-flow toilet could arguably be smaller than the effect of extraneous background activity in a statistical analysis. This would not provide a meaningful basis for decision making.

The only other proposal that would address the embedded energy in water directly would be the Load Profile Study. This study, if designed correctly, could yield meaningful information, but instead it proposes to develop water and energy load shapes by feeding the in-line metering results of the California End-Use Study for a small number of agencies into the embedded energy in water calculator to. This is problematic because the California End-Use Study has not yet started and will run for longer than one year making it impossible for this pilot to use the results of the study in the current timeframe. Additionally, water and energy use is completely agency-specific, so the results of this study would not be applicable statewide. Since we do not yet have typologies for water agency energy use in relation to water demand, this study

would need to analyze specific water agency energy and water delivery load shapes before generalizations could be made.

*8. Stimulate new partnerships*

This process has provided the basis for water and energy utilities to work together and recognize ways in which partnerships could benefit the customers of both agencies. In this regard, we applaud the work of both the energy utilities and numerous water agencies. The concerted effort to cultivate new and expanded working relationships has been evident through the various workshops, in comments of the parties, and in the energy utilities' program proposals. In approving the pilot programs and related studies, we seek to honor these efforts and stimulate more progress going forward.

*9. Better understand the potential benefits of pursuing each of the strategies identified in the October 16, 2006 ruling*

*a) Conserving water*

The energy utility pilot proposals seek to utilize water conservation to save energy, but it is unclear whether the full range of water conservation measures (and therefore potential) was considered.

*b) Switching to less energy-intensive water sources*

The SDG&E Recycled Water Retrofit program is the only proposal that includes less energy intensive water. This program would provide funding for customers with completed retrofit plans, and would seek to encourage participation in an existing program.

*c) Increasing the energy efficiency of current water delivery*

This has only been addressed through the SoCalGas Pump Engine Testing evaluation partnership with Crestline Lake Arrowhead Water Agency and the Eastern Municipal Water District. Although this study is an important and unique one, the utility did not provide enough information in the program

description (and no EM&V study was proposed) to enable us to know if this would produce widely applicable results.

**Suitability of the Proposed Studies**

The utilities have proposed a number of studies to provide information that could not be found in their proposed programs alone. These include a toilet flapper cost-effectiveness study to determine if it could be cost-effective to retrofit existing toilets by replacing the flapper rather than the entire toilet, and a study for Lost Opportunities in Water and Wastewater facilities. These studies, however, would be literature reviews and would not result in new research. In the case of the toilet flapper replacement study, the utility proposal indicated that a literature review would be prepared first, and only if that were found to be inadequate, would contractors already replacing existing toilets gather leak rates on the toilets they remove. This second option has considerable potential to produce new and useful data so it is disappointing that a literature review would be the preferred approach. Similarly, in the lost opportunities study in water and wastewater facilities, information about best practices would be gathered and suggestions would be made. However, these suggestions would be made to the water and waste water facilities after the program and so the results of these programs can be neither included in savings nor measured in the pilot. It is disappointing that energy embedded in wastewater has not been a major part of the discussion in this pilot. However commendable this wastewater embedded energy study is, it is not and should not be viewed as a substitute for this commission's goals of pursuing and quantifying embedded energy in wastewater.

In laying out these objectives, the assigned Commissioner hoped that the utilities would propose programs that would provide the information to the

specific nine areas mentioned above. We endorse the objectives. Since the proposals fail to meet some of these objectives, we must insist on some modification prior to approving the pilot proposals.

### 6.9. Discussion of the Utility Proposed Programs and Studies

In this decision, we approve pilot water-energy activities that involve the following water and energy end use sectors:

- Residential
- Residential Low Income – single family and multifamily
- Public Buildings
- Commercial
- Industrial
- Water Supply

We intend for these activities to address a wide range of measures including:

- Indoor water use - plumbing fixtures, appliances and leakage
- Outdoor water use - landscaping and agricultural irrigation and leakage
- Industrial water use
- Special high energy situations with integral high water use, distribution or treatment
- New water conserving technologies

We also intend to ensure that these activities are tested through a range of implementation strategies and implementers including:

- Programs that the energy utilities would manage and deliver through upstream, midstream and downstream segments utilizing both direct installation and rebate strategies

- Partnerships between water agency programs and energy utilities

We expect these activities to focus on:

- Measurement, via direct (in-line metering at the point of consumption of energy or water) monitoring of the annual/daily use amount and use profiles for both water and energy
- Measurement, via direct (customer self-reported information e.g. surveys) or indirect (secondary research like analysis of sales data) means, of program participation potential including market size, saturation and likely free rider estimates
- Cataloging of measure parameters including costs, median lifetimes, remaining life of existing equipment

We authorize several programs that we acknowledge are problematic from a cost effective perspective (such as low income high efficiency toilets). Our logic is that the pilot is intended not only to determine which types of programs are likely to be cost effective, but also which programs are not likely to be cost effective. We want the utilities and Energy Division to develop data to demonstrate accurately the benefits and problems with these programs and measures. If we do not broadly study proposed measures now, we will have to address them at a later date when they re-appear in later applications or programs. We would prefer to address proposed measures under this pilot, and find out now whether or not it makes sense to consider deploying them in the future on a larger scale.

#### 6.9.1. Proposed Programs

The following Table 3 provides a summary of the utility proposals and their proposed funding levels.

| Proposed Programs, Evaluations and Studies | | |
|---|---|---|
| **Programs** | **Proposed** | **Budget** |
| SCE | Low Income Direct Install Toilet (multifamily) | $728,700 |
| | Industrial Water Efficiency Program | $308,000 |
| | Express Water Efficiency | $133,000 |
| | Lake Arrowhead Water Conservation | $176,500 |
| | Green Schools/Green Campus w/Water | $282,000 |
| PG&E | Custom Food Processing Measures | $285,980 |
| | Laundry Ozone Treatment | $216,575 |
| | Custom Winery Measures | $158,698 |
| | Low Income Single Family Toilet Replacement | $505,600 |
| | Emerging Technologies in Water Utility Efficiency | $341,000 |
| SDG&E | Managed Landscape | $250,000 |
| | Large Industrial Customer Audits | $496,000 |
| | Recycled Water | $250,000 |
| | General Marketing | $50,000 |
| SoCalGas | LACSD/SCE/SoCal Gas Water Conservation | $150,000 |
| | MWD/SoCalGas Joint Marketing & Outreach | $100,000 |
| | CLAWA/EMWD Gas Pump Testing | $436,407 |
| | **Total** | **$4,868,460** |
| **Evaluations** | | |
| | Commercial and Industrial Pilot Programs | |
| | i. 'Commercial programs (PG&E) | $123,000 |
| | ii. Industrial Audits/Express Efficiency (SCE) | $140,000 |
| | iii. Industrial Water Audits (SDG&E) | $75,000 |
| | Toilet Replacement Programs -SF&MF (PG&E and SCE) | $190,000 |
| | Weather-Based Irrigation Controller Programs (SDG&E and SCE) | $70,000 |
| | Emerging Technologies (PG&E) | $100,000 |
| | Residential Indoor/Outdoor for Lake Arrowhead (SCE) | $64,000 |
| | Process Evaluations | $153,100 |
| | **Total** | **$915,100** |
| **Studies** | | |
| | Load Profile (all energy utilities) | $475,300 |
| | Lost Opportunities/Direct EE potential (all energy utilities) | $200,000 |
| | Toilet Flapper (all energy utilities) | $20,000 |
| | Water Leak Detection (SCE) | $200,000 |
| | Alternatives for Low-Income (all energy utilities) | $50,000 |
| | Embedded Energy Calculator (all energy utilities) | $139,800 |
| | **Total** | **$1,085,100** |
| | | |
| **Total** | Programs | $4,868,460 |
| | Evaluations | $915,100 |
| | Studies | $1,085,100 |
| | **Total Proposed** | **$6,868,660** |

#### 6.9.1.1. SCE Programs

*Low Income High Efficiency Toilets Direct Installations* – SCE has proposed working with MWD to install high efficiency toilets in single and multifamily low income homes. This program is the major program for SCE, composing 45% of total program budget. However, it is not highly likely to be cost effective based upon the information filed in this proceeding, and we are reluctant to spend such a large amount of money on it. Additionally, PG&E is proposing a similar direct installation program for more efficient toilets in its area.

However, it appears useful to pursue a modified version of this program. We want to know whether it makes sense to use standard water savings assumptions for high efficiency toilets in the low income sector, as some low income families may be larger and have fewer toilets available to the family than higher income families might. If true, both of these factors might result in greater water savings from a more water efficient toilet. Another reason to approve a toilet program is that there is not much performance data currently available related to high efficiency toilets.

Accordingly, we are reducing the size of SCE's toilet program, from $728,700 to $200,000 dollars (which allows for approximately 550 direct toilet installs), and limiting it to multifamily low income installations to compliment changes we are making in the PG&E toilet program (limiting PG&E to single family installations). We are also changing the EM&V study associated with this program to more accurately develop the data we need in order to determine if such a program is likely to be cost effective.

*Green/Schools/Green Campus* – SCE proposes to work with MWD to deliver water conservation education for K-12 and college students and also install high efficiency toilets in schools located in mutual SCE and MWD service territories.

Schools are part of the public sector, which is a sector slow to embrace energy efficiency. This is not a pilot program to test the effectiveness of educational programs. Since there is likely to be a lag between the educational effort and a consumer response, it is not likely to produce meaningful results within the timeframe of a pilot program and we, therefore, do not approve it.

*Industrial Water Efficiency* – SCE proposes working with MWD of Orange County to deliver industrial audits and recommended savings actions. While this is a laudable goal, the program is duplicative of a program offered by SDG&E. For this reason, we do not approve SCE's proposal.

*Express Water Efficiency* – SCE proposes to collaborate with MWD to deliver advanced pH controllers to commercial customers with cooling towers to reduce blowdown requirements, and also to provide weather based irrigation controllers to commercial customers. While the weather based irrigation controls are duplicative of the SDG&E managed landscape program, there is considerable logic behind the efficiency of offering both of these to the customer simultaneously. For this reason, we approve the program.

*Lake Arrowhead Water Conservation* – SCE proposes working with Lake Arrowhead to deliver indoor water-conserving devices to year-round residents and outdoor retrofits to the largest residential water consumers. SCE considers Lake Arrowhead to be one of the highest water embedded energy districts in its service area, so this program has the highest likelihood of being cost-effective. This program has the added advantage of having the utility collaborate directly with a retail water provider in a physically constrained area. We approve this program along with a rigorous impact analysis of its effects.

#### 6.9.1.2. PG&E Programs

*Custom Food Processing* – PG&E proposes to work with EBMUD and Santa Clara to deliver surveys/audits and recommendations for water saving process and/or technology changes that save water in the food processing industry.

*Laundry Ozone Treatment* – PG&E would work with Santa Clara to encourage replacement of traditional laundry treatment with ozone technology in large hotels and/or commercial laundries.

*Custom Winery Measures* – PG&E and Santa Clara would undertake process surveys/audits and make recommendations for water saving process and/or technology changes that save water in wineries

These three programs all address segments of the commercial sector. Although we approve PG&E's proposal to offer these measures, we direct the utility to shift the funding of these programs to a more general large commercial customer program which would allow PG&E to focus on combined commercial and water audits and retrofits. PG&E can pursue the specifically-proposed measures in the context of that broader commercial sector effort.

*Low Income Single Family High Efficiency Toilet Replacement* – PG&E proposes to collaborate with water agencies and install high efficiency toilets in the homes of low income customers. The cost effectiveness of this program is questionable but there is the potential to gather some valuable information on market penetration of these toilets in the low income sector and low income use of toilets (as discussed earlier in relationship to SCE's program). Therefore, we reduce the funding of this program commensurate with the multi-family high efficiency toilet program of SCE and limit it to single family installations. Granting funding for these programs to the two utilities should allow us to

compare these two approaches (single family and multifamily) for water and energy savings.

*Emerging Technologies in Water Utility Efficiency* – PG&E proposes to work with the water agencies to investigate and demonstrate new technologies for saving water. We approve this program, but direct PG&E to include pump efficiency improvements and water and wastewater treatment options in the evaluation of emerging technologies.

#### 6.9.1.3. SDG&E Programs

*Managed Landscape* – This pilot project would focus on efficient use of outdoor water – potable water used for aesthetic landscapes. This program addresses the landscape sector, which is an extremely important sector for water use, and we approve it.

*Large Industrial Customer Audits* – SDG&E and San Diego County would provide both energy and water audits to large industrial customers. This program addresses the industrial water users – another sector that it is important to address, and approve it.

*Recycled Water* – This program would emphasize recycled water retrofits by converting users from a potable water source to a lower energy source using recycled water. This program looks at one option for switching to less energy intensive water, and we approve it.

*General Marketing* – SDG&E and San Diego County would jointly develop marketing materials and communicate water and energy opportunities through the existing SDG&E account executives for commercial/industrial customers. They would also conduct training sessions and develop additional materials. As discussed below, SoCalGas would participate, as well. TURN and DRA oppose the approval of this program, as unlikely to produce measurable results within

the limited timeframe of a pilot program. SDG&E and SoCalGas argue that turning down this program would negate months of cooperative effort between SDG&E and San Diego County. Although we applaud the partnership, it would not be prudent to approve a marketing-only program as part of a short-term pilot program. While marketing is an important part of any program, it is doubtful that this action would lead to energy savings in the time frame of the pilot. Should the Commission later conclude that the utilities make undertake water conservation programs as part of the energy efficiency portfolio, we will reconsider these types of joint training sessions and materials.

While we will not authorize a separate marketing program, we understand that marketing is an important part of any successful program. Therefore, we assume that the energy utilities will spend a modest amount from the individual program budgets on appropriate marketing.

#### 6.9.1.4. SoCalGas Programs

*Lake Arrowhead/SCE/SoCal Gas Water Conservation* – SoCalGas proposes an Indoor/Outdoor Retrofit Program for residential homes in Lake Arrowhead, California with SCE and Lake Arrowhead. Since this is duplicating the SCE Lake Arrowhead water conservation program, it is unlikely to provide us with further useful information and thus we will not approve it.

*MWD/SoCalGas Joint Marketing &Outreach* – SoCal Gas proposes a joint marketing effort with MWD. We reject this proposal for the same reasons we rejected SDG&E's request for involvement in the same activity.

*Crestline Lake Arrowhead/Eastern MWD Gas Pump Testing* – SoCalGas proposes a program with Crestline Lake Arrowhead Water Agency and Eastern MWD to test the efficiency of their natural gas pumps/engines. The electric utilities in the state currently provide a very valuable electric pump testing

program. There is no comparable testing program for natural gas-driven pumps. This is a very useful program in a neglected sector of the water community – natural gas pump/engine efficiency. We approve this program, as it is likely to show us how efficient existing pumps are, how much it would cost to improve their efficiency, and how much energy would be saved from such a program.

### 6.9.2. Discussion of Proposed Evaluations and Studies

In determining what a cost-effective evaluation proposal would look like, we take into account three goals included in the February, 2007 ACR. One was to better understand how energy is used in the California water system. A second was to provide the basis for a meaningful ex-post assessment. A third was to better understand the benefits of pursuing the strategies identified in the October 16, 2006 ruling: conserving water, switching to less energy intensive water sources, and increasing the energy efficiency of the current water delivery system.

With this is mind we apply the following specific criteria to determine whether the utilities' proposed EM&V activities should be approved:

1) Does the proposed study further our understanding of how energy is used in the California water system?
2) Does the proposed study enhance the cost effectiveness methodology for evaluated water derived energy savings?
3) Does the proposed study provide meaningful ex-post project assessment?

#### 6.9.2.1. Evaluations

*Commercial and Industrial Pilot Program*

*(*PG&E*)* – This study would develop data by metering commercial and industrial processes and measuring their water consumption before and after the

conservation intervention. Metering would include water and might include wastewater flow. We approve this study but remind PG&E that the focus of the pilot study has shifted from the specific programs (food processing, laundries, and wineries) to a more general category of commercial customers and that the in-line metering and analysis should be done for any customer that participates in this program.

(SCE) – *Industrial Audits/Express Efficiency (pH controllers and ET)* – This study would look at the variability of water savings derived from the water audits and the Express Water Efficiency (pH Controllers and ET Controllers) program. Since we have not approved the underlying program, we will not approve this study. The Express Water Efficiency program will have its own evaluation study.

(SDG&E) – *Industrial Water Audits* – This study would develop data by metering industrial processes and measuring their water consumption before and after the conservation intervention. Metering would include water and might include wastewater flow. We approve this study.

(PG&E and SCE) – *High Efficiency Toilet Replacement Programs (Single and multifamily)* – The utilities propose using a billing analysis to determine the impact of High Efficiency installations on water savings. We agree that this program should be evaluated, but remain unconvinced that billing analysis and weather data would provide meaningful results. Accordingly, we approve this evaluation study, but modify the budget and emphasis. Our primary concern is the need to determine if toilet replacements in low income homes are used more frequently and save more water (and thus more energy) than toilets in the average residential home. The study in this area needs to determine: 1) the vintage (efficiency) of toilets in low income (single and multifamily) as compared

with average income families in California, 2) the number of toilets in low income houses in contrast with the number in average California residence, 3) number of occupants in low income homes as compared to average income homes, and 4) the frequency of use of low income toilets as compared with average residential installations.

We have augmented the proposed budget to allow for one-half of the installed toilets to be evaluated based upon the utility proposed billing analysis. The other half of the toilets in each service will be evaluated through the use of in-line metering so that we can also have a direct comparison of the comparability and consistency of these two evaluation techniques.

*Weather-Based Irrigation Controller Programs* (SDG&E/SCE) – The utilities propose using a billing analysis to determine the impact of landscaping management improvements and ET controllers as part of SCE's Express Efficiency pilot program. For accounting clarity, we have reduced the budget and limited this program to the SDG&E landscaping pilot (the SCE Express Efficiency pilot would have a separate study and budget). We remain skeptical that billing analysis and weather data will provide meaningful results and would prefer one test case in which landscaping water use is directly measured in an area without the landscape efficiency program, and another with the landscape efficiency program to allow for a comparison of the water savings. On this basis, we approve the proposal.

*Emerging Technologies* (PG&E) – In conjunction with its partner water agencies, PG&E proposes to investigate emerging technologies in water system operating efficiency (specifically in monitoring and telecommunications) as a means to improve water efficiency and reduce water use. We approve this program, but direct that pump efficiency improvements and water and

wastewater treatment options be included in the evaluation of the emerging technologies program.

*Residential Indoor/Outdoor for Lake Arrowhead (*SCE) – This evaluation study would use billing data to determine if the residential retrofits in this area do result in water savings. For reasons stated earlier, we approve this study.

*Water Leak Detection* – The utilities propose a study and literature review on water leakage and water leakage detection in their EM&V budget. The proposed study is expected to assemble the best estimates of water lost in all parts of the water distribution system (pre- and post-use treatment, and end-use stages). The finding and fixing of leaks has the potential to improve the efficiency of the water delivery system. Accordingly, we direct SCE to expand this proposal from a paper EM&V study to include a pilot program in its service area, and have increased the proposed budget by 50% (to $300,000) to fund these added activities. In addition to the paper study, the Commission expects that the program portion will include real applications of leak detection such as detecting and fixing leaks within a water system where costs and water and energy savings are quantified.

*Process Studies* (PG&E, SDG&E, SoCal Gas, and SCE) – These "studies" are utility evaluations of the manner in which the pilot programs are implemented, specifically through interviews with participants and unspecified evaluation of the materials developed for the pilot studies. Since it is the utility's responsibility to conduct program process evaluations of the programs they oversee, the commission will neither approve nor disapprove the methods of these evaluations. We will, however, permit the energy utilities to spend up to 2% of the program budget (excluding the impact evaluation funds) on these activities consistent with the August, 2006 ACR.

#### 6.9.2.2. Studies

*Load Profile* (PG&E, SDG&E, SoCal Gas, and SCE) – The utilities propose a large portion of the budget to review other ongoing studies and measure data from in-line metering done for this pilot. The purpose of the metering would be to translate a measure installation into a change in the water demand profile that can then be compared with the water demand profile at the water agency to derive the effect a measure would have on the agency's energy load.

We approve this study as a means to provide all participants with end-user water use profiles. This study is to conduct in-line metering on selected customer samples and determine the water use shapes for these uses:

- Residential
  - bathing and showers
  - toilets
  - clothes washing
  - dishwasher
  - landscaping
  - other outdoor (pools/spas, etc.)
- Residential Low Income – single family
  - bathing and showers
  - toilets
  - clothes washing
  - dishwasher
  - landscaping
  - other outdoor (pools/spas, etc.)
- Residential Low Income – multifamily
  - bathing and showers
  - toilets
  - clothes washing
  - dishwasher
  - landscaping
  - other outdoor (pools/spas, etc.)
- Public Buildings
  - hot water

  - bathroom uses
  - process uses
  - cooling and heating uses
  - Landscaping (outdoor use)
- Small Commercial
  - hot water
  - bathroom uses
  - process uses
  - cooling and heating uses
- Commercial
  - hot water
  - bathroom uses
  - process uses
  - cooling and heating uses
- Industrial
  - hot water
  - bathroom uses
  - process uses
  - cooling and heating uses
- Agriculture
  - crop irrigation
  - process uses

*Lost Opportunities/Direct Energy Efficiency Potential* (PG&E, SDG&E, SoCalGas, and SCE) – Through this $200,000 study, the utilities propose to identify opportunities for direct water energy efficiency savings and best practice standards in the water distribution, treatment and waste treatment facilities (both retrofit and new construction scenarios). It is not self-evident that the water industry lacks adequate best management practices. For this reason, we do not approve the study.

*Toilet Flapper* (PG&E, SDG&E, SoCal Gas, and SCE) – This study addresses whether toilet flapper replacement could be a cost-effective substitute for whole toilet replacement. Since there is not much research on the subject and few water

utilities are offering such a program, this study would determine whether there is a large potential for cost-effective flapper replacement. We approve this study since it will help determine which programs could be cost-effective to implement.

*Leak Detection* (SCE) – As discussed earlier, the Commission supports a leak detection study that is combined with actual implementation of leak detection measures and corrections. We approve $50,000 to fund an assessment of the leak detection program (SCE) study to evaluate leak detection corrections for their cost and amount of water saved.

*Low Income Alternatives* (PG&E, SDG&E, SoCal Gas, and SCE) – This $50,000 study would investigate water/energy saving alternatives (toilets vs. other water uses) for low income customers. It is unclear why water/energy savings alternatives for low income customers would be any different from any other water/energy customer. Since this information will be determined through other studies it would be duplicative to fund this one as well. Therefore, we do not approve this study.

*Embedded Energy Calculator* (PG&E, SDG&E, SoCal Gas, and SCE) – This study would develop a next generation embedded energy calculator. The utilities request an expansion of the embedded energy calculator for the purpose of determining cost-effectiveness (and benefits) from the multiple perspectives of a customer, a single energy utility, multiple energy utilities, multiple water and energy utilities, statewide economic potential, and overall society. The utilities' expanded calculator would also summarize other embedded energy in water calculators and evaluate their ability to produce the information needed to meet the nine criteria laid in the Feb 2007 ACR and repeated above.

Since the existing calculator can be modified to create multiple cost-effectiveness values, the commission sees no reason why an additional study is needed. The commission believes in the importance of knowing the statewide benefits and costs of embedded energy in water programs, and will explore adding these calculations to the current calculator in the near future. Additionally, while other embedded energy in water calculators would provide an interesting comparison to the calculator developed by Energy Division, the current calculator is modeled on the energy efficiency E3 calculator and was designed to produce results to meet the nine criteria laid out in the February ACR. The Commission finds it highly unlikely that a calculator developed for a different purpose by another organization would better suite its needs.

The CPUC, therefore, declines to fund this study.

### 6.10. Additional Adopted Evaluations and Studies

The tables below show the changes and additions adopted by the Commission in this section.

Table 4

| Adopted Changes to Proposed Evaluations and Studies | | | | |
|---|---|---|---|---|
| **Change** | **Type** | **From** | **To** | **Difference** |
| Large Commercial Customer (PG&E)* | Program | $661,253 | $700,000 | |
| Leak Detection (SCE) | Evaluation | $200,000 | $50,000 | |
| Total | | **$861,253** | **$750,000** | **-$111,253** |

Custom Food, Ozone Laundry, and Custom Winery

Table 5

| Adopted Additional Evaluations and Studies | | |
|---|---|---|
| **Additions** | **Type** | **Budget** |
| Water Leakage | Program | $300,000 |
| Recycled Water (SDG&E) | Evaluation | $50,000 |
| Statewide/Regional Water-Energy Relationship | Study | $425,000 |
| Water Agency /Function Component | Study | $850,000 |
| **Total Additions** | | **$1,625,000** |

### 6.10.1. Additional Evaluation

*Recycled Water* (SDG&E) – SDG&E has proposed to convert users from a potable water source to a lower energy source using recycled water but has not proposed an evaluation program. We will approve a modest ($50,000) study of the recycled water pilot program with the intent on finding out 1) how successful the program was in convincing customers to shift water supplies, 2) how much water was shifted from fresh to recycled water, and 3) how much energy was saved by shifting from fresh to recycled water.

### 6.10.2. Expanded and Additional Studies

There is considerable question about whether investments in water savings are cost effective solely from an energy perspective. The current available information concerning embedded energy in water is intriguing, but is inadequate to develop mature energy efficiency programs. The Energy Commission's broad estimate of imbedded energy savings in northern and southern California serves an important purpose by prompting a closer look, but we cannot rely on these generalized numbers, alone, to conclude that water conservation efforts in specific locations serve the interest of energy ratepayers.

Because this is a new area of investigation, we do not have the benefit of an established body of knowledge on the issue of energy embedded in water to

use as a foundation. Through the questions they pose for consideration during the pilot process, the utilities reflect the need to significantly improve the information base. DRA and TURN spoke eloquently about this challenge in their protests, and encouraged the utilities to spend additional funds on studies needed to answer these questions. TURN for instance, asks whether most of the energy needed to deliver water to southern California may be provided by entities other than the regulated energy utilities.

Many of the EM&V studies proposed by the utilities have, as their goal, filling in some of the missing pieces. However, in order to speed the day when the utilities can implement longer-term water conservation programs, we need to ensure that the pilot studies are comprehensive. Accordingly, we are approving two embedded energy foundational studies to address the added information required to perform the cost-effectiveness calculations:

1) A Statewide/Regional Water-Energy Relationship Study designed to establish the relationship between annual climate and hydrology variation, regional and statewide water demand variations and statewide energy use by the water system; and

2) A Water Agency/Function Component Study which includes a redefined Load Profile Study designed to establish detailed annual and daily profiles for energy use as a function of water delivery requirements for a full range of local, regional, state and federal water agencies within the California water system.

We intend these studies to provide the information basis for a meaningful ex-post assessment following the completing on the pilots to inform the Commission in determining whether future embedded energy in water programs should be added to the energy efficiency portfolio. Since they are part of the overall evaluation work and will provide a significant fraction of the basis for energy savings estimates, the Energy Division will manage these studies.

The utilities and the Commission can use such a foundation to determine cost effective measures for inclusion in future utility energy efficiency programs as well as provide the *ex ante* values that everyone can use to count the energy savings for such measures towards the utility energy efficiency goals as well as the energy efficiency risk/reward mechanism.

The two studies will:

1. Undertake research to quantify the relationship between water use in the state, and the energy used to supply that water. Use the results of this research to develop a model to predict energy use, at the state level, given a specific water delivery amount and distribution across the state.
2. Undertake research to quantify the energy used by the range of Federal, State and Local water agencies within California. Use the results of this research to:
    a. Develop a representative range of water energy intensities (embedded energy) for various types of water agencies, and for the functional components of each of those water systems; and
    b. Develop water energy load profiles for various types of water agencies and for the functional components of each of those water systems.

The results of this study should enable people to predict energy use for specific water agencies with varying amounts of water delivered by those agencies.

The information developed in these studies should provide a much needed understanding of how energy is used in the California water industry. These studies should provide the missing link between water use changes and energy use changes that is required to evaluate utility water savings proposals. Combining the results of these studies with the information on measure water use reductions will allow the Commission to use the results of the water-energy

pilot activity to redirect future water-energy energy efficiency portfolio additions towards water agencies or components of the water system that are likely to have the largest energy savings, and measures that provide cost effective energy savings. The two study areas are described in Appendix B.

The table below, which also appears as Table 1 in the Summary above, provides a summary of the programs, evaluations and studies adopted in this decision.

Table 6

| Adopted Programs, Evaluations and Studies | | |
|---|---|---|
| **Programs** | | **Adopted $** |
| SCE | Low Income Direct Install HET (multifamily) | $200,000 |
| | Express Water Efficiency | $133,000 |
| | Lake Arrowhead Water Conservation | $176,500 |
| | Water Leakage | $300,000 |
| PG&E | Large Commercial Customer | $700,000 |
| | Low Income Single Family HET Replacement | $200,000 |
| | Emerging Technologies in Water Utility Efficiency | $341,000 |
| SDG&E | Managed Landscape | $250,000 |
| | Large Industrial Customer Audits | $496,000 |
| | Recycled Water | $250,000 |
| SCG | CLAWA/EMWD Gas Pump Testing | $436,407 |
| total | | **$3,482,907** |
| **Evaluations*** | | |
| | Commercial and Industrial Pilot Programs | |
| | i. 'Commercial programs (PG&E) | $123,000 |
| | ii. Industrial Audits/Express Efficiency (SCE) | $50,000 |
| | iii. Industrial Water Audits (SDG&E) | $75,000 |
| | HET Replacement Programs (Single and multifamily) (PG&E and SCE) | $250,000 |
| | Weather-Based Irrigation Controller Programs (SDG&E and SCE) | $50,000 |
| | Emerging Technologies (PG&E) | $100,000 |
| | Residential Indoor/Outdoor for Lake Arrowhead (SCE) | $64,000 |
| | Leak Detection (SCE) | $50,000 |
| | Recycled Water (SDG&E) | $50,000 |
| total | | **$812,000** |
| **Studies** | **Studies** | |
| | Load Profile (all energy utilities) | $475,300 |
| | Toilet Flapper (all energy utilities) | $20,000 |
| | Statewide/Regional Water-Energy Relationship | $425,000 |
| | Water Agency /Function Component | $850,000 |
| total | | **$1,770,300** |
| **Total** | total evaluation and studies (EM&V) | $2,582,300 |
| | **Total Pilot (Pilots + Evals + Studies)** | **$6,065,207** |

* *Evaluations* refers to impact evaluations to be overseen by Energy Division. Process evaluations will be conducted by the utilities and will consist of 2% of the approved individual program budgets.

## 7. Conclusion

The goal of the process that triggered the consolidated applications that we address in this decision is to put the utilities and the Commission in the best

position to incorporate appropriate water conservation measures in energy efficiency programs after the completion of the pilot process. As we see it, the ingredients for producing this result include the development of constructive working relationships between energy utilities and water agencies, the identification of innovative, creative, and cost-effective means to promote water conservation, and the development of information needed to understand and quantify the energy savings resulting from reduction in water demand.

We want to ensure that this pilot process produces useful information for future use. Toward that end, we direct the energy utilities and the Energy Division to undertake an 18-month process. The pilot programs shall be offered for one year beginning July 1, 2008. During the six months preceding that date, the utilities and Energy Division shall retain necessary consultants, work together to refine programs, and begin collecting baseline data to allow for accurate "before and after" measurements.

In this decision, we approve utility-proposed pilot programs and studies that appear likely to contribute to the ends discussed above, reject those that do not, and add others that appear necessary to produce useful results. We invite parties to use the process of commenting on the proposed decision to offer substantive comments on the merits of the modified programs and study elements approved in this decision.

## 8. Comments on Proposed Decision

Pursuant to Rule 14.3, parties have an opportunity to file comments and reply comments limited to the discussion of legal, factual, or technical errors in a proposed decision. There are also strict page limitations that usually apply. Because this proposed decision envisions program and study modifications that parties have not had an opportunity to address, we will allow for comments that

go more broadly to the merits of the proposed decision. For the same reason, we waive the page limits.

## 9. Assignment of Proceeding

Dian Grueneich is the assigned Commissioner and Steven Weissman is the assigned ALJ in this proceeding.

## Findings of Fact

1. While direct energy efficiency savings can be easily generalized (a certain more efficient light bulb would save the same amount of energy in Arcata as it would in Del Mar), the indirect savings from conserving water cannot.

2. There is considerable question about whether investments in water savings are cost effective solely from an energy perspective.

3. The current available information concerning embedded energy in water is inadequate to develop mature energy efficiency programs.

4. Because this is a new area of investigation, we do not have the benefit of an established body of knowledge on the issue of energy embedded in water to use as a foundation

5. While it is important to understand all of the savings resulting from a given initiative, those savings may provide little comfort to utility customers who are paying for a water conservation effort, but not seeing a direct benefit in the form of reduced energy use in their own service territory.

6. When the pilots are completed, we want to be in a position to determine whether water conservation and less energy intensive water measures should be allowed to compete for utility energy efficiency dollars. In order to do this, the pilot program results must demonstrate that saving and using less energy intensive water, in fact, saves energy – not in the abstract, but in application.

7. The objectives suggested in the February 16, 2007 assigned Commissioner's ruling accurately describe our interests as we consider the merits of approving the pilot programs, and are the criteria we will apply in making that assessment.

8. A simple statement that the utilities would undertake a study that calculates and analyzes cost-effectiveness does not provide sufficient assurance that the pilot process will get us where we need to go.

9. We are not at a point where we can say, with confidence, what the avoided water source is for a given water agency.

10. Ultimately, it would be logical to rely on extra-marginal supply assumptions for long term planning (more than one to two years in the future) and intra-marginal assumptions for the short term (one to two years ahead).

11. Based on the cost-effectiveness calculations submitted by all four utilities in their July 11, 2007 Additional Supplemental Testimony, all utility portfolios have *ex-ante* cost-effectiveness ratios of less than one.

12. In D.04-09-060 the Commission instructed the utilities to exclude "savings by customers not included in the calculation of savings potential" when "documenting program accomplishments … in order to ensure consistency between the basis for establishing the goals and the assessment of whether those goals have been met." (D.04-09-060, *mimeo*. at p. 32, *see also* Finding of Fact 9.)

13. Since one of the purposes of the pilots is to enhance our methods of accounting for and tracking embedded energy savings and to clarify many of the disagreements over what the appropriate avoided energy metric should be with regard to embedded energy savings, it would be inappropriate to count embedded energy savings from the pilot programs towards our 2006-2008 energy efficiency goals.

14. Taken together, the utilities' study proposals do not provide a clear plan for understanding how energy is used in the California water system.

15. The relative lack of diversity in the proposed programs, both in terms of measures offered and customer classes to be served, reduces the likelihood that the utilities will emerge from the pilots with a comprehensive understanding of which strategies will work.

16. We want to know whether it makes sense to use standard water savings assumptions for high efficiency toilets in low-income sectors, as some low-income families may be larger and have fewer toilets available to the family than higher income families might. If true, both of these factors might result in greater water savings from a more water-efficient toilet.

17. We are not persuaded that an educational program such as SCE's proposed Green Schools program will produce meaningful results within the constraints of a pilot program and, therefore, do not approve it.

18. SCE's proposed industrial water efficiency program is duplicative of a program offered by SDG&E.

19. While the weather based irrigation controls offered by SCE are duplicative of the SDG&E managed landscape program, there is considerable logic supporting the efficiency of offering both advanced pH controllers and irrigation controllers to the customer simultaneously.

20. SCE considers Lake Arrowhead to be one of the highest water embedded energy districts in its service area, so its program has the highest likelihood of being cost-effective.

21. A more general large commercial customer program than that proposed by PG&E would allow it to focus on combined commercial and water audits and retrofits.

22. The landscape and industrial sectors are extremely important sectors for water use.

23. Recycled water is one important option for switching to less energy intensive water.

24. It would not be prudent to approve a marketing-only program as part of a short-term pilot program.

25. Since SoCalGas' Lake Arrowhead water conservation proposal is duplicating the SCE Lake Arrowhead water conservation program, it is unlikely to produce further useful information.

26. The electric utilities in the state currently provide a very valuable electric pump testing program. There is no comparable testing program for natural gas-driven pumps. By proposing to test the efficiency of natural gas pumps and engines, SoCalGas offers a very useful program in a neglected sector of the water community.

27. PG&E's Commercial and Industrial Pilot Program study would develop data by metering commercial and industrial processes and measuring their water consumption before and after the conservation intervention.

28. SDG&E's Industrial Water Audits study would develop data by metering industrial processes and measuring their water consumption before and after the conservation intervention.

29. There is a need to determine if toilet replacements in low-income homes are used more frequently and save more water (and thus more energy) than toilets in the average residential home. The study in this area needs to determine: 1) the vintage (efficiency) of toilets in low-income (single- and multi-family) as compared with average income families in California, 2) the number of toilets in low-income houses in contrast with the number in average California

residence, 3) number of occupants in low-income homes as compared to average income homes, and 4) the frequency of use of low-income toilets as compared with average residential installations.

30. We are skeptical that billing analysis and weather data will provide meaningful assessment of SDG&E's landscaping pilot program and would prefer one test case in which landscaping water use is directly measured in an area without the landscape efficiency program, and another with the landscape efficiency program to allow for a comparison of the water savings.

31. PG&E proposes to investigate emerging technologies in water system operating efficiency (specifically in monitoring and telecommunications) as a means to improve water efficiency and reduce water use.

32. Since it is the utility's responsibility to conduct program process evaluations of the programs it oversees, the Commission will neither approve nor disapprove the methods of these evaluations. We will, however, permit the energy utilities to spend up to 2% of the program budget (excluding the impact evaluation funds) on these activities consistent with the August, 2006 assigned commissioners ruling.

33. The proposed land profile study is a means to provide all participants with end-user water use profiles.

34. Since there is not much research on the subject of toilet flappers and few water utilities are offering such a program, a study in this area would help determine whether there is a large potential for cost-effective flapper replacement.

35. It is unclear why water/energy savings alternatives for low-income customers would be any different from those for any other water/energy customer.

36. We see no reason that the existing water embedded energy calculator cannot be modified to incorporate issues that are of concern. There is no apparent need for the utilities to undertake a parallel effort.

37. In order to speed the day when the utilities can implement longer-term water conservation programs, we need to ensure that the pilot studies are comprehensive.

## Conclusions of Law

1. It would be unfair to ask customers in one energy service territory to pay for a program that largely benefits customers elsewhere.

2. For now, the Energy Division and the energy utilities should use a given water agency's average energy intensity for the purposes of *ex ante* evaluation.

3. The utilities shall not count embedded energy savings created during the pilot programs towards their goals.

4. We should reduce the size of SCE's toilet program, from $728,700 to $200,000 (which allows for approximately 550 direct toilet installs), and limit it to multi-family low-income installations to complement changes we are making in the PG&E toilet program (limiting PG&E to single-family installations). We should also change the EM&V study associated with this program to more accurately develop the data we need in order to determine if such a program is likely to be cost effective.

5. The funding of PG&E's toilet program should be commensurate with the multi-family high-efficiency toilet program of SCE and limited to single-family installations.

6. The Commission should direct PG&E to include pump efficiency improvements and water and wastewater treatment options in the evaluation of emerging technologies

7. We should direct SCE to expand its leak detection proposal from a paper EM&V study to include a pilot program in its service area, and increase the proposed budget by 50% (to $300,000) to fund these added activities. In addition to the paper study, the commission expects that the program portion will include real applications of leak detection such as detecting and fixing leaks within a water system where costs and water and energy savings are quantified.

8. We should approve two embedded energy foundational studies to address the added information required to perform cost-effectiveness calculations:

1) A Statewide/Regional Water-Energy Relationship Study designed to establish the relationship between annual climate and hydrology variation, regional and statewide water demand variations and statewide energy use by the water system; and

2) A Water Agency/Function Component Study which includes a redefined Load Profile Study designed to establish detailed annual and daily profiles for energy use as a function of water delivery requirements for a full range of local, regional, state and federal water agencies within the California water system.

9. Since the studies approved herein are part of the overall evaluation work and will provide a significant fraction of the basis for energy savings estimates, the Energy Division should manage them.

10. We should approve a modest ($50,000) study of the recycled water pilot program with the intent of finding out 1) how successful the program was in convincing customers to shift water supplies, 2) how much water was shifted from fresh to recycled water, and 3) how much energy was saved by shifting from fresh to recycled water.

11. We should direct the utilities to fund and the Energy Division to manage a statewide and regional water-energy use relationship study, described in this

decision, in order to obtain necessary information in this area from an unbiased, independent source.

12. We should direct the utilities to fund and Energy Division to manage the water agency functional component study described in this decision.

13. The Commission should modify the utilities' program offerings to ensure greater diversity in terms of customer classes involved, and programs tested.

14. The Commission should approve the modified programs.

## O R D E R

**IT IS ORDERED** that:

1. The Commission is dedicated to incorporating water conservation strategies in the utilities' energy efficiency programs to the extent that such strategies improve the overall cost-effectiveness of the energy efficiency programs.

2. The Pacific Gas and Electric Company (PG&E), the San Diego Gas & Electric Company (SDG&E), the Southern California Edison Company (SCE), and the Southern California Gas Company (SoCalGas) (collectively, "the energy utilities") shall implement one-year pilot programs commencing July 1, 2008, to conserve water and improve the efficiency of water use, and provide funds for evaluations and studies as approved in this order and set forth in the following table:

Table 7

| **Adopted Programs, Evaluations and Studies** | | |
|---|---|---|
| **Programs** | | **Adopted $** |
| SCE | Low Income Direct Install HET (multifamily) | $200,000 |
| | Express Water Efficiency | $133,000 |
| | Lake Arrowhead Water Conservation | $176,500 |
| | Water Leakage | $300,000 |
| PG&E | Large Commercial Customer | $700,000 |
| | Low Income Single Family HET Replacement | $200,000 |
| | Emerging Technologies in Water Utility Efficiency | $341,000 |
| SDG&E | Managed Landscape | $250,000 |
| | Large Industrial Customer Audits | $496,000 |
| | Recycled Water | $250,000 |
| SCG | CLAWA/EMWD Gas Pump Testing | $436,407 |
| total | | **$3,482,907** |
| **Evaluations*** | | |
| | Commercial and Industrial Pilot Programs | |
| | i. 'Commercial programs (PG&E) | $123,000 |
| | ii. Industrial Audits/Express Efficiency (SCE) | $50,000 |
| | iii. Industrial Water Audits (SDG&E) | $75,000 |
| | HET Replacement Programs (Single and multifamily) (PG&E and SCE) | $250,000 |
| | Weather-Based Irrigation Controller Programs (SDG&E and SCE) | $50,000 |
| | Emerging Technologies (PG&E) | $100,000 |
| | Residential Indoor/Outdoor for Lake Arrowhead (SCE) | $64,000 |
| | Leak Detection (SCE) | $50,000 |
| | Recycled Water (SDG&E) | $50,000 |
| total | | **$812,000** |
| **Studies** | **Studies** | |
| | Load Profile (all energy utilities) | $475,300 |
| | Toilet Flapper (all energy utilities) | $20,000 |
| | Statewide/Regional Water-Energy Relationship | $425,000 |
| | Water Agency /Function Component | $850,000 |
| total | | **$1,770,300** |
| **Total** | total evaluation and studies (EM&V) | $2,582,300 |
| | **Total Pilot (Pilots + Evals + Studies)** | **$6,065,207** |

**Evaluations* refers to impact evaluations to be overseen by Energy Division. Process evaluations will be conducted by the utilities and will consist of 2% of the approved individual program budgets.

3. In the period running from January 1, 2008 to July 1, 2008, the energy utilities and Energy Division shall retain consultants and work together to refine pilot program details. In addition, during this period, the Energy Division and its consultants shall begin collecting baseline data needed for a meaningful "before and after" assessment of the pilot programs.

4. The Executive Director may hire and manage one or more contractors to assist the Energy Division staff in conducting the evaluations of the pilot programs and the studies described in this decision. Such costs shall be paid from funds authorized in this decision as shown in Table 8 (Ordering Paragraph 5) below. The Executive Director, with the approval of the Commission's General Counsel, 1) may contract directly with outside consultants for these services, or 2) may arrange for one or more of the utilities to contract with outside consultants for the provision of the required services to the Energy Division. Contracting through the utilities for services for Energy Division shall be subject to the agreement on terms, conditions and documentation for the contract arrangement that are acceptable to the utility and the Executive Director. However, the Energy Division will be Contract Manager and will retain all contract management responsibilities for these contracts, with the utilities funding the contract utilizing their authorized energy efficiency program funds as described above.

5. The energy utilities shall contribute the following amounts to support the pilot programs, evaluations and studies, from the utilities' unspent energy efficiency funds from prior years:

Table 8

| **Energy Utility Contributions** | | | |
|---|---|---|---|
| **Utility** | **Program funding** | **%* of Evaluations and Studies**** | **Total $** |
| SCE | $809,500 | $852,159 | **$1,661,659** |
| PG&E | $1,241,000 | $1,187,858 | **$2,428,858** |
| SDG&E | $996,000 | $335,699 | **$1,331,699** |
| SoCalGas | $436,407 | $206,584 | **$642,991** |
| All Energy Utilities | $3,482,907 | $2,582,300 | **$6,065,207** |

* Using current 2006-2008 EM&V funding percentages of: PG&E=.46; SCE=.33; SDG&E=.13; SoCalGas=.08
**Evaluations and studies equal $2,582,300

6. In order to ensure that the Commission, the energy utilities, and participating water agencies develop the information necessary to judge the cost-effectiveness of water conservation programs that might later be included in energy utility energy efficiency portfolios, the Energy Division shall administer the approved evaluations and studies.

7. The energy utilities shall perform any necessary process evaluations (assessments of the effectiveness of program design and implementation), and utilize a portion of approved program funding for this purpose.

8. Proposed pilot programs, evaluations and studies not expressly approved in this order are denied.

9. The consolidated proceedings are closed.

This order is effective today.

Dated _____, at San Francisco, California.

# Appendix A

## QUESTIONS THE WATER-ENERGY PILOT PROPOSES TO ANSWER

### Overview

The pilots proposed by the utilities would be designed to explore the potential for a water embedded energy savings program by examining, in sequence, the: 1) technical potential; 2) economic potential; and 3) programmatic potential for carrying out an effective water embedded energy savings strategy.

- **Technical potential** refers to the expected ability of various measures to achieve water-embedded energy savings *and* to the ability to evaluate and attribute the energy and cost savings from measures. In other words, technical potential involves what measures work, to what extent, and if and how they can be measured.

- **Economic potential** refers to the expected ability of various measures to achieve cost-effective savings as defined by various cost tests (to determine which measures are cost-effective).
- **Programmatic potential** refers to the expected ability of measures to be effectively delivered as a utility program. In other words, can the cost-effective measures be successfully implemented in the given time frame?

The pilots would provide resources to support both on-the-ground implementation of water conservation measures and a Water-Energy Study (study) that will be overseen by a Blue Ribbon Panel (composition to be determined). For the study, the study design would ultimately be approved by the Blue Ribbon Panel, but the study is expected to run concurrently with the on-the-ground implementation to examine multiple issues using multiple inputs, including data available from natural fluctuations in water use and data from the pilot implementation. Issues included in the study would include evaluating the on-the-ground implementation programs implemented as part of the pilot, analyzing existing data, examine methods for quantifying energy and water relationships, survey the existing body of research on the topic, etc. The study would develop information and methodologies to be used in broad rollout statewide of a program to deliver energy savings.

Together, these two elements of the pilots (on-the-ground implementation and the study) would provide answers to a set of questions listed below. The utilities

noted that because this is a pilot exploring new ground, they do not know what information they would encounter and cannot guarantee that they would answer the questions, even though both the study and the on-the-ground implementation would be designed to obtain the data needed to do so.

**Technical potential**

*Measures*

1) Which measures or bundle of measures have the technical ability to be deployed effectively at a programmatic level (e.g. which measures are commercially available and viable)?

   How pilot would answer: Screening of available measures by third party contractor for technical feasibility, as part of the study. All measures deployed in pilot would be evaluated for effectiveness (or a subset of the measures, if it is determined that it is not cost-effective to evaluate all measures independently and the evaluations of some measures could be generalized to others).

2) How can the additional water-embedded energy savings be calculated for existing energy programs that already save on-site water?

   How pilot would answer: The study would develop a methodology for calculating energy savings for representative sample of existing programs. The methodology would be applied to the on-the-ground measures and developed with the intent for use in a statewide program rollout of water-embedded energy.

3) What emerging (water-saving) technologies (including existing technologies used in different ways and truly new technologies) might be effective in the near term and in which sectors could they be deployed?

   How pilot would answer: Screening of available technology as part of the WES.

*Verification and Attribution*

4) What methods are available for quantifying the amount and the value of water-embedded savings? What are the costs and validity (level of accuracy) of these methods? Are the methods at the project, program, or water utility

subarea level? How can such methods be developed, improved or refined to provide greater resolution?

How pilot would answer: As part of the study, existing methods would be identified, or new methods developed, based on available information regarding energy costs related to pumping, transporting, storing and treating water and wastewater. The new methods would be applied to the on-the-ground implementation of measures.

5) What is required to create "DEER-equivalent" data for measures designed to save water-embedded energy (e.g. the water and/or energy data about the incremental savings, incremental costs, measure life, etc.) be developed? What is required to create guidance, rules, and or protocols on determining the embedded energy?

   How pilot would answer: Analyzed in the study. If there were sufficient resources and time, the study would develop the data and guidance.

6) What is the average energy intensity for participating customers that incorporates both the upstream and downstream water-embedded energy at the most specific level of measurement available (e.g., pressure zone upstream and wastewater treatment facility downstream)?

   How pilot would answer: The study would analyze historical energy data from water utilities (SCADA or other source) to develop the average energy embedded in water. A pressure zone can be large or small depending on geography (e.g. several customers if the terrain is hilly or an entire city if the terrain is flat). If an area does not have such data, the study could develop baseline energy intensity.

7) What is the marginal energy associated with water use fluctuations related to customer's participation in on-the-ground implementation of water measures (e.g. changes in water volume (water savings) in their pressure zone and wastewater treatment facility)?

   How pilot would answer: The study would analyze historical data from water utilities (SCADA or other source) on the marginal energy associated with participation in on-the-ground measures.

8) What are the time-dependent water savings impacts (load shapes)? What are the time-dependent energy impacts (load shapes)? What are the major characteristics of the operations of water agencies that affect the latter?

   How the pilot would answer: Data provided by water utilities and analyzed in the study.

9) Are there natural gas embedded energy savings impacts? Can they be measured?

   How the pilot would answer: The study would analyze data provided by water and gas utilities, and will look at impacts both in and out of the gas utilities service territory to determine if there is savings potential, especially given that the CEC report did not examine gas impacts.

10) What is the total water-embedded energy saved by measures? What is the impact at the local level and statewide? What methodologies can be developed to calculate and/or attribute those energy savings to utilities and other energy providers?

    How the pilot would answer: Included in the study.

**Economic Potential**

2) What is the cost-effectiveness of counting the embedded energy: 1) in the utility service territory; 2) saved across all utility territories, and 3) of the entire statewide water cycle?

   How the pilot would answer: The study would explore how the cost-effectiveness changes under different scenarios, as well as various policy options for attributing costs and savings (e.g. can policies be developed to allow non-utility energy providers to pay for their portion of the energy saved by a program implemented by a utility-water agency partnership?).

3) What are the water load and energy use profiles for the pressure zone and wastewater treatment facility or facilities associated with expected pilot program customers or groups of customers?

   How pilot would answer: The study would develop with data to be provided by water utilities.

4) What is the average utility energy embedded in average water used by specific customers who might be likely to participate in a statewide program?

   How pilot would answer: The study would analyze historical data from water utilities (SCADA or other source) to determine the average embedded energy for customers (this creates a baseline to which the data from question 4 can be compared). The average would be determined by developing estimates for the water-embedded energy for each stage in the water life-cycle, multiplying those estimates by the average amount of that energy provided by the utility (vs. other energy provider), and then adding the utility energy for each stage of the life-cycle.

5) What is the variability of utility energy embedded in water (as compared to average utility embedded energy) used by specific customers?

   How pilot would answer: The study would analyze data from water utilities (SCADA and other) to determine what fluctuations exist, if any, such as seasonal variability, or differences due to pressure zone, time of day, or water-year type (e.g. dry versus wet). If the variability is small, it is likely that average utility embedded energy figures could be used to calculate accurate energy savings from water conservation measures. If the variability is large, such calculations may need factors that account for the variability.

6) What is the estimated market potential, by customer type, sub-sector and end use, for a statewide program designed to capture water embedded energy? With what precision can this potential be determined? What additional information, if any, is needed to improve the precision of the potential estimate?

   How pilot would answer: Economic assessment developed as part of the study will identify which customer types have the highest embedded energy and segment them by geographic information.

7) Based on analysis of the technical and economic potential, which measures or bundles of measures, by technology and end use, should be considered for development into large-scale utility programs? Which should no longer be considered?

   How pilot would answer: The utilities would conduct preliminary assessments to determine the customers and measures to include in the on-the-ground implementation portion of the pilot. The study would

incorporate the results of the on-the-ground programs but will evaluate a wide variety of measures beyond just those implemented during the pilot phase.

8) Are the measures cost-effective? How do they compare to traditional energy efficiency measures? Do the measures produce additional benefits not captured by traditional energy efficiency measures and cost-effectiveness calculations?

   How pilot would answer: The study would calculate and analyze the cost-effectiveness.

**Programmatic Potential**

1) Which measures or bundles of measures can be delivered by a utility program? Which of these are cost effective?

   How pilot would answer: The study would evaluate the potential to actually deliver measures found to have economic potential (e.g. programmatic potential entails whether sufficient numbers of customers are interested in the measures, whether they are available, whether utilities can deliver them, etc.). The WES will evaluate both on-the-ground implementation outcomes as well as measures not implemented during the pilot phase.

2) What is the estimated programmatic potential for the program, by end use and by market subsector? How much savings can be expected over time, and at what cost?

   How pilot would answer: The study would use the information from the above question to determine whether there are sufficient cost-effective measures with technical, economic, and programmatic potential to put together a successful large-scale program. The study would identify both the energy and water savings that could be expected over time from such a program.

3) What are the pros and cons of various delivery channels (e.g. rebates vs. direct install)? What are potential "lessons learned"? Are there situations in which one delivery channel is preferable? Why? Should staffing (number of staff, capabilities) be included in the assessment?

How the pilot would answer: The study would evaluate the effectiveness of the on-the-ground implementation programs in the service areas of the water partners in addition to other studies that have been done. The evaluation would be both quantitative (examining results of different channels) and qualitative (interpreting results to lessons learned).

4) What program elements should be "statewide" vs. "local"? How will successful marketing approaches differ? What generalizations can be made on the trade-offs between local variation and state-wide consistency? How the pilot would answer: Through observations of the effectiveness of the pilots in the service areas of the water partners. Assessments included in the study.

**(END OF APPENDIX A)**

## Appendix B

## Additional Studies Approved in This Decision

**First Study: Statewide and Regional Water-Energy Relationship**

**Purpose –** Provide a better understanding of how energy is used in the California water industry.

**Problem Statement –** While researchers have documented the on-peak energy demand attributable to the water industry in California[23], no comparable documentation exists for the annual energy use by the water sector. Precipitation in California over the last several decades has ranged from drought to floods. The precipitation experienced at geographical locations across the state also varies widely during a single year. In response to these varying year-to-year and location-to-location demand profiles, the water delivery and energy use patterns of water agencies has also varied. However, the relationship between water deliveries and energy use as influenced by changing precipitation patterns is not well understood. Field measurements of water deliveries and water delivery related energy demand and consumption can provide detailed information for specific local conditions across the state. To understand how those specific local observations will vary based upon statewide conditions requires the development of a statewide water-energy model which examines how interagency water deliveries will vary based upon statewide conditions.

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[23] *"Water Supply Related Electricity Demand in California"*, Demand Response Research Center/California Energy Commission, Lawrence Berkeley National Laboratory, LBNL-62041, December 2006.

The parties have actively debated whether conveyance energy (e.g., Colorado River or State Water Project) should be included in the embedded water energy in Southern California. Through this study, we intend to address that issue.

**Goal of the Study –** Develop a model of the functional relationship between water use in California and energy used in the water sector that can be used in a predictive mode: given a specific water delivery requirements developed from precipitation pattern information, what is the expected energy use.

**Data Requirements** - Historic water availability, water deliveries and use, historic energy use in the water sector, other relevant variables (climate, population, energy costs).

**TASKS:**

**I. Data Development**

**California Water Use and Deliveries**

Statewide: Determine agricultural and urban sectors water deliveries annually from 1980-2005.

By utility service area: Determine agricultural and urban sectors water deliveries annually from 1980-2005.

For the State Water project: Determine water deliveries annually from 1980-2005.

For the Federal Water project: Determine water deliveries annually from 1980-2005.

For the Colorado River Project: Determine water deliveries annually from 1980-2005.

**California Water Related Energy Use (kWh and MMBTU)**

Statewide: For the agricultural and urban sectors annually from 1980-2005

By utility service area: Determine the agricultural and urban sectors energy use annually from 1980-2005.

For the State Water Project: Determine annual energy use from 1980-2005. Note – net energy use (consumption minus generation) is the relevant indicator here.

For the Federal Water project: Determine annual energy use from 1980-2005.

For the Colorado River Project: Determine annual energy use from 1980-2005.

Independent Variables Data: Compile information on variables that are relevant to water use and energy consumption in the water area. These will include weather (evapotranspiration and heating and cooling degree days, precipitation, etc.), population, energy costs, and others. Develop this information statewide, by utility service area, and for the state, federal, and Colorado River projects.

For the State, Federal, and Colorado River projects, also include water available, entitlements, requests for water, and actually delivered water. For the State project include all Table A, Article 21, and Article 55 water requests and deliveries.

**II. Model Development**

Use collected data to develop a model(s) of the functional relationship between water use in California and energy used in the water sector. The analysis should provide model characterizations by indicative sector: statewide, utility service area, the State Water Project, and the Federal Water Project. Embedded energy (kWh/acre-ft, MMBTU/acre-ft) is the model expected output.

**III. Report**

Complete a technical report that summarizes the results of the research and technical finding during this project. The report should include historic relationships between water deliveries and energy use, and times series embedded energy values (kWh/acre foot or MMBTU/acre foot) for a range of scenarios of future conditions. The details of the model development, the methods used by the model for analysis and predictions as well as the model itself in electronic form shall be provided as part of the report.

For the State and Federal project, also assess the impact of United States. District Judge Wagner's[24] current injunction against reduced pumping or increased water releases from late December through June.

For the State, Federal, and Colorado River projects, provide a response to the question: If water conservation results in reduced demand for water in the service area, will that be reflected in reduced water deliveries by the project, and reduced conveyance energy consumption?

Data Sources:

Water – Department of Water Resources - DWR maintains a data base on irrigated acreage and urban water use by data type, water year, and study area, for all of California. Urban water use is by customer class, source of supply, indoor/outdoor split, and population. All this water use data is available

[24] 2007 *NRDC v. Kempthorne*, U.S. District Court for the Eastern District of California, Case Number 1:05-cv-1207 OWW

statewide, by hydrologic region, by planning area, by detailed analysis unit, or by county.

Energy – California Energy Commission (CEC) Demand Forecast and Utility Industrial Reporting. Energy consumption is available by industrial code (SIC 4941 – water supply, 4971 irrigation, 4952 Sewerage or NAICS 221310 – water supply, irrigation 221320 – sewerage).

Estimated Budget: $325,000

Estimated Time of Completion: One year from start of project.

**Second Study: Individual Water Agency and Functional Component Embedded Energy/Water Energy Load Profiles**

Overview – This study is composed of two components: 1) a determination of individual water agency embedded energy determination by functional components and 2) a determination of water energy load profiles. The reason these two are combined in one study is that both utilize the same basic water and energy data, and combining them in one study will eliminate a duplication of effort in data gathering.

**I. Embedded Energy Determination**

Purpose – Develop representative range of energy intensities for water agencies in California, and representative ranges of energy intensities for the various functional components of the water system in California.

Problem Statement – Anecdotal evidence suggests that there is a huge range of energy in water deliveries in California -- from an irrigation district that supplies agricultural water with very low embedded energy to an urban water agency with significant topography relying primarily upon groundwater high water treatment costs for both fresh water and wastewater. While there have

been recent limited attempts to determine the energy intensity of water agencies in California[25], there has been no systematic evaluation in this area. This information is critical for determining the cost effectiveness of utility water savings programs. The cost effectiveness calculations can be used to focus utility water-energy programs into areas that will have the highest energy savings.

Goal of the Proposal – Determine the range of energy intensities in water sector in California.

Data Used - Individual water agency historic water deliveries and use, individual water agency historic energy use.

Tasks:

I. Data Development

1. Selection - Representative water agencies will be selected for analysis after consultation with water trade groups in California. High, average, and low energy intensity water agencies from the four major types of water agencies in California: wholesalers, retailers, wastewater, and irrigation districts, will be selected. Sufficient water agencies in each category should be analyzed in order to be statically representative of the class.

2.Water Agency Historic Water Supplied - For each water agency selected, water deliveries for an appropriate number of representative days per year will be obtained from the representative water agencies. Typically seven days is the minimal requirement: winter high water demand, winter average water demand,

[25] " Supply and Demand Side Water-Energy Efficiency Opportunities." Final Report. Prepared for PG&E by Green Buildings Studio, February 2007.

winter low water demand, summer high water demand, summer average water demand, summer low water demand, and summer demand during utility peak energy demand day.

3. Energy Use (kWh and MMBTU) - For the representative water days per year, energy consumption (both kWh and MMBTU) for every account for the selected water agencies will be collected from the utilities supplying the energy, or water agency energy billing records. Each water agency utility account should be assigned to a functional component of the water system (water supply, freshwater treatment, distribution system, administration, and wastewater treatment).

II. Embedded Energy Determination

I. Water Agency and Functional Component Embedded Energy Determination - The collected data should be used to develop the embedded energy in water (kWh/af or MMBTU/af) for both the system and functional components for the seven water type days: water supply, freshwater treatment, distribution, administration, wastewater treatment, integrated system.

In addition, for each water type day, the marginal water source should be determined after consultation with the water agency, and the embedded energy of that water source provided. A sample summary table is shown below.

| **Name of Water Agency** | | | | | Electric utility: | | Gas Utility: | |
|---|---|---|---|---|---|---|---|---|
| | | **Marginal Water Source** | **Water Supply** | **Fresh Water Treatment** | **Distribution System** | **Waste Water Treatment** | **Administration** | **System (sum of components)** |
| **Winter** | | | | | | | | |
| **Max Water Delivery Day** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |
| **Average** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |
| **Min** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |
| **Summer** | | | | | | | | |
| **Max Water Delivery Day** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |
| **Average** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |
| **Min** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |
| **Utility Peak Day** | kWh/af | | | | | | | |
| *(Mgal or AF)* | MMBtu/af | | | | | | | |

2. Utility range of Embedded Energy - The data from the individual water agencies will aggregated by utility service area to develop expected range of embedded energy by utility. Sample table shown below.

**Utility name:**

| | | **Marginal Water Source** | **Water Supply** | **Fresh Water Treatment** | **Distribution System** | **Waste Water Treatment** | **Administration** | **System (sum of components)** |
|---|---|---|---|---|---|---|---|---|
| **Range** | kWh/af | | | | | | | |
| | MMBtu/af | | | | | | | |
| **High** | kWh/af | | | | | | | |
| | MMBtu/af | | | | | | | |
| **Medium** | kWh/af | | | | | | | |
| | MMBtu/af | | | | | | | |
| **Low** | kWh/af | | | | | | | |
| | MMBtu/af | | | | | | | |

III. Report

Complete a technical report that summarizes the results of the research and technical findings during this project.

Data Sources:

Water – Individual water agencies

Energy – Utility consumption data, individual water agencies

At a minimum, the three major water agency trade groups in California will be consulted.

ACWA Association of California Water Agencies – represents public water agencies in California

CASA California Association of Sanitation Districts – represents wastewater agencies in California

CWA California Water Association- represents private water suppliers in California

Each group should be asked to categorize their members as likely to be high, average, or low energy users. Representatives from each category and the four major types of water agencies (wholesale, retail, wastewater, and irrigation districts) should be selected.

Estimated Budget: $500,000

Estimated Time of Completion: Eighteen months from start of project to final report.

**II. Water Energy Load Profile Determination**

Purpose – Develop representative range of water energy load profiles for water agencies in California, and representative ranges of energy load profiles for the various functional components of the water system in California.

Problem Statement – Water agency energy usage varies significantly throughout the day, and by season. Energy costs also vary significantly throughout the day and by season. The development of water energy load

profiles is necessary to determine when energy associated with water is likely to be saved, and the resultant time-of-day of energy savings. The water-energy load profile can be used to determine the timing of water related energy savings, and to determine the peak demand impact of water savings programs. This type of information is critical for determining the cost effectiveness of utility water savings programs.

Goal of the Proposal – Determine shape of energy load profiles in water sector in California.

Data Used - Individual water agency historic water deliveries and use, individual water agency historic energy use, historic profile of water agency energy use.

Tasks:

I. Energy Load Profile Development

1. Energy Use Profile (kWh and MMBTU by hour) – Using the representative water agencies and their data developed in the embedded energy analysis, load profiles (kW/hr and MMBTU/hr for a 24 hour period) will be developed for the water functional components: water supply, freshwater treatment, distribution, administration, wastewater treatment, integrated system. These profiles will be developed for an appropriate number of representative days per year. Typically seven days is the minimal requirement: winter high water demand, winter average water demand, winter low water demand, summer high water demand, summer average water demand, summer low water demand, and summer demand during utility peak energy demand day. A sample data table follows.

| Name of Water Agency | | | | | Electric utility: | | Gas Utility: | |
|---|---|---|---|---|---|---|---|---|
| | | Marginal Water Source | Water Supply | Fresh Water Treatment | Distribution System | Waste Water Treatment | Administration | System (sum of components) |
| **Winter** | | | | | | | | |
| **Max Water Delivery Day** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| **Average** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| **Min** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| **Summer** | | | | | | | | |
| **Max Water Delivery Day** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| **Average** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| **Min** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| **Utility Peak Day** | kW/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |
| *(Mgal or AF)* | MMBTU/hr | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 | Hours 1-24 |

II. Complete a technical report that summarizes the results of the research and technical finding during this project.

**Data Sources:**

Water – Individual water agencies

Energy – utility consumption data, individual water agencies

Energy Load Profile Shapes – utility data (may need to use representative tariff group shapes for non time-of-use energy data), CEC demand forecast.

**Estimated Budget**: $300,000

**Estimated Time of Completion:** One year from start of the project to final report.

**Additional Studies Summary and Adoption**

*Statewide/Regional Water-Energy Relationship* – Despite extensive discussion at workshops and in the proposals, there were no parties that proposed a study to evaluate energy use in the California water system. Since this is a vitally

important area, and one which will have a direct impact on whether embedded energy in water programs should be included in the overall energy efficiency portfolio, we direct the utilities to fund and the Energy Division to manage a statewide and regional water-energy use relationship study in order to obtain necessary information in this area from an unbiased, independent source.

*Water Agency /Function Component* – There was extensive discussion at the workshops on the need for reliable water and energy load shapes. Therefore, the Commission adopts an additional study to address this issue. Information on the range of embedded energy in water throughout the state (and identification of areas where programs are likely to have the highest impact) is needed to determine if, and under what circumstances future embedded energy programs are likely to be cost-effective.

The water agency/function component study should determine the likely range of embedded energy in water throughout the state and should provide water energy load profile shapes that would be used in the geographic specific cost-effectiveness determinations. We, therefore, direct the utilities to fund and Energy Division to manage the water agency functional component study described in the section above.

**(END OF APPENDIX B)**