Application No.: Application 07-01
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Date: January 16, 2007
Witness: Mark F. Gaines

PREPARED DIRECT TESTIMONY

OF

MARK F. GAINES

BEFORE THE PUBLIC UTILITES COMMISION OF THE STATE OF CALIFORNIA

JANUARY 16, 2007

PREPARED DIRECT TESTIMONY OF

MARK F. GAINES

San Diego Gas & Electric Company

I.
PURPOSE

The purpose of my testimony is to present San Diego Gas & Electric Company's ("SDG&E") proposed energy efficiency/water pilot partnership established with the San Diego County Water Authority ("Water Authority" or "SDCWA"), demonstrate the potential savings associated with the pilot, and support the funding and cost recovery mechanism associated with the pilot.

II.
BACKGROUND

On October 16, 2006 the California Public Utilities Commission ("Commission") issued Assigned Commissioner's Ruling on Process Related to the Consideration of Embedded Energy Savings Related to Water Efficiency ("ACR"). The ACR among other things directed each of the utilities to file applications for one-year jointly-funded pilot partnership programs with one large water provider. The ACR also directed the utilities to work together to develop a common program and funding approach.

Furthermore, the Commission in Decision ("D.") 06-12-038 at page 17 directed the utilities to propose programs that offer benefits to low income customers,

> "This order directs all four applicant utilities each to file a specific program proposal for water conservation efforts. Each proposal shall identify specific ways to implement such energy efficiency water conservation programs for low income customers, whether and how they might dovetail with other non-LIEE programs, which agencies they will work with, and a budget."

SDG&E's proposed pilot program is a result of its coordination with Pacific Gas & Electric Company ("PG&E"), Southern California Edison ("SCE") and Southern California Gas Company ("SoCalGas") in designing this pilot. SDG&E has also been

participating in an informal group called "Water Energy Partners" the membership of which includes representatives from the utilities, Toward Utility Rate Normalization, Division of Ratepayer Advocates, Natural Resources Defense Council California Energy Commission ("CEC"), several water agencies including the San Diego County Water Authority ("Water Authority" or "SDCWA") and Commission staff. This group provided a forum to discuss the design of the utilities water pilot partnerships. SDG&E's proposal also includes a low income customer component.

The Water Authority was formed in 1944. As a water wholesaler, the SDCWA's mission is to provide a safe and reliable supply of water to its 23 member agencies in the San Diego region, which in turn deliver the water to individual homes and businesses throughout the county. The agencies are represented through a board of directors. A member of the San Diego County Board of Supervisors also serves as a representative to the Water Authority board of directors. The county's 2.7 million residents rely on imported water for 90 percent of their total supply in a typical year.

III.
PROPOSED PILOT PROGRAM

SDG&E and SDCWA propose a pilot program consisting of five components to be implemented in 2007. The program is designed to complete all project installations within the given year consistent with the Commission's direction for a one-year pilot. This pilot also includes a Low Income Energy Efficiency ("LIEE") component that will be implemented together with SDG&E's 2007 LIEE program. The implementation component of this pilot include the following:

Low Income Multifamily High Efficiency Toilet Replacement Pilot Program Component

For more than 15 years, SDG&E has administered and implemented a low income direct install program for energy-related measures (weatherization, appliances, etc.). This program has never included plumbing activities for cold-water items. The Water Authority has offered incentives since May 1991 for various water saving toilets. While there has been good overall single-family participation in these toilet replacement

programs over the years by various SDCWA member agencies, the Water Authority has not specifically targeted the multi-family market, particularly for low income. Therefore targeting the multi-family sector presents a good opportunity to reach new market segments for potential significant water savings.

This pilot program would utilize the existing SDG&E LIEE Program infrastructure, and contractor management expertise, by offering a direct install toilet replacement program for qualifying low income multi-family customers/owners. The direct install approach is designed to encourage property managers/owners to agree to participate in this program and to optimize the benefits of the toilet replacements. Similar to the LIEE direct install approach, offering turn key services to multi-family property managers/owners increases the probability that existing water inefficient toilets will be replaced. SDG&E will contract with qualified plumbing contractor(s) with expertise in water measures, specifically in high efficiency toilet replacement.

To optimize the benefits of toilet replacement, a toilet assessment will be completed at the same time as the weatherization measure assessment completed as part of the qualification visit performed by the LIEE program's outreach contractor. If replacement is feasible and can be performed within the scope and cost of the program (exceptions could include damaged flooring at toilet location, non-repairable (high cost) water connections, damaged sewer lines at toilet, etc), a high-efficiency toilet will be installed by the plumbing contractor. Only existing toilets of 3.5 gal/flush or more will qualify for replacement. SDG&E will manage this component of the pilot. SDCWA, working in conjunction with the Metropolitan Water District's[1] programs/funding, will purchase and store the toilets.

Lastly, the installation contractor will be required to recycle each toilet, including the fixture, to ensure they are not put back on the market. The partnership projects replacements of up to 2500 high efficiency toilets.

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[1] The Metropolitan Water District of Southern California ("MWD" is a consortium of 26 cities and water districts that include parts of San Diego Los Angeles, Orange, Riverside, San Bernardino and Ventura Counties.

Managed Landscape Pilot Program Component

This component of the pilot program will request proposals from water management service companies for an embedded water-energy savings Managed Landscape Pilot Project (Project). The Project will be conducted in the San Diego region at approved property sites owned by third party participants. Participants will include multifamily apartment complexes, condominiums, office parks, commercial properties, homeowner associations, and potentially estate properties. The ideal participant will be a property site with a minimum of four irrigated acres and five or less existing irrigation timers. It is estimated that the Pilot will involve up to approximately 20 sites of four acres each.

The objective of the project is to fully 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 will focus on efficient use of outdoor potable water used for aesthetic landscapes. Given that about 60% of all municipal and industrial water is used on landscape in an average year, efficient management of this use of water is critical to achieve water and energy savings. This is especially important when one considers that 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 will issue a competitive bid solicitation to implement this landscape pilot. SDG&E will provide further program details once the contractor has been selected and the scope of work finalized. The updates, as with the implementation updates for all program strategies outlined here, will be provided in the appropriate venue as directed by the Commission.

Large Customer Audits Pilot Program Component

SDCWA and SDG&E both conduct audits on large customers in the past but only focused on water and energy, respectively. Both organizations support the concept of integrating water and energy in the audit process to reduce auditing costs and supply the

customer with more comprehensive recommendations for both water and energy usage. To achieve these goals, the Water Authority and SDG&E are proposing to integrate audits in a two-part program strategy.

The first part of this audit strategy is to follow-up on recommendations provided as part of large customer audits already completed by SDCWA upon which the customers have not acted. The Water Authority, in partnership with Otay Water District ("OWD"), one of its member agencies, contracted with Water Management Inc. to examine water savings on three sites. Both the Water Authority and OWD have spent a total of $40,000 to complete these audits. While these existing, completed water audits have identified numerous water savings opportunities, there has been little or no movement to implement the recommendations identified due to a variety of customer-specific reasons such as: lack of funding, competition with other customer priorities, pay back, etc.. This audit strategy will 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 Water Authority will 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 will provide funding to incent priority improvements, i.e., cost effective[2] energy efficient and water efficient measures, which cannot be funded through other water agency incentive programs. The Water Authority will identify funding from existing water incentive programs and take steps to help the customer access this funding.

If all recommended water conservation measures from these audits were to be implemented, the Water Authority projects the potential water savings to be in excess of 120 million gallons/year (or 447 acre foot 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 will 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 Water Authority and SDG&E will coordinate 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 (RFP) not to exceed $50,000 (Water Authority funding) will be issued to conduct an additional 7-10 in-depth water/energy audits of commercial, industrial or institutional high water users in the San Diego County. SDG&E and the Water Authority expect that comparable savings from these additional audits can be achieved similar to the first component of this strategy.

Recycled Water Pilot Component

The recycled water program component will increase the use of recycled water by implementing retrofits in order to convert users who can switch from a potable water source to a lower energy using recycled water source. Direct savings will be documented through water meter readings. The Water Authority and its member agencies will identify sites with completed retrofit plans that will allow the customer to switch from potable water usage to recycled water usage that can be implemented immediately; assist in coordinating plan review and approval with regulatory agencies. SDG&E and SDCWA will provide co-funding for eligible projects. This strategy is estimated to achieve 2100 million gallons of water saved.

Joint Marketing and Outreach Pilot Program Component

There are numerous other opportunities to leverage existing Water Authority programs and efforts with SDG&E programs that can also be done during the Pilot. SDG&E and the Water Authority will work collaboratively to evaluate and determine how best to utilize each others' organizations to create a more effective and efficient marketing effort. Marketing materials will be developed to leverage and communicate these opportunities through the existing SDG&E account executive organization for commercial/industrial customers. Training sessions and additional materials will be developed accordingly. Water Authority staff will participate in up to four training sessions. Joint workshops will also be conducted to educate facility managers about

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[2] Customer cost effectiveness may be determined based on pay back period calculations.

water/energy savings opportunities (e.g., cooling towers). Additionally, workshops for equipment dealers that promote water/energy products will be conducted.

In addition to jointly marketing commercial/industrial water and energy rebates, the Water Authority and SDG&E plan to coordinate their "mass market" programs. Each entity has existing programs that are already being coordinated. This component of the pilot program would add additional emphasis to this effort.

Finally, the Water Authority will help coordinate and 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).

More details on the program strategies are described in the Attachment to this testimony.

IV.
FUNDING FLEXIBILITY WITHIN PROGRAM PILOT AND BEYOND THE FUNDING PERIOD

SDG&E and SDCWA proposed pilot components include individual budgets. However, funds may need to be shifted among these components within the pilot to address programmatic issues (e.g., limited customer interest, increased number of program contractors to meet greater demand, etc.) that may arise during implementation. Therefore, SDG&E proposes to have full funding flexibility within the pilot program in order to meet unexpected program implementation challenges that arise from such pilot efforts.

The pilot is designed to complete installations within the given year, and the partnership intends to aggressively implement the proposed pilot immediately following Commission approval and to complete all implementation activities within the 12-month period[3] as envisioned by the ACR. There may, however, be circumstances where there

[3] ACR, Ordering Paragraph No. 1, p. 3.

are post-installation activities that must be completed, such as inspections, project verification, contractor payments and reporting, beyond the one-year target. There may also be instances where the customer has signed a contractual agreement with the program partner during the one-year pilot period but does not complete installation until after the program end date. Therefore, SDG&E seeks clarification that it can utilize pilot funds for these post-implementation activities to satisfy obligations which were incurred prior to the termination of the pilot including completion of committed customer projects yet to be installed.

V.
REQUEST FOR AUTHORIZATION TO ENCUMBER FUNDS FOR START-UP ACTIVITIES PRIOR TO COMMISSION APPROVAL OF PILOT WATER PARTNERSHIP

The ACR intends for these pilot programs to be implemented by July 1, 2007 for a one-year implementation cycle.[4] In order for some of the components of this proposal to be implemented in a timely manner and meet the Commission's objectives for this pilot, SDG&E is requesting that the Commission authorize SDG&E to spend a portion of the requested budget to be used for start-up activities. Both the Large Customer Audit and Recycled Water strategies require the issuance of RFPs to ensure that appropriate program contractors are on board to implement these strategies expeditiously after the proposal is approved. The final approval of contracts from the RFP process will be contingent on the Commission approving SDG&E and SDCWA's proposal. Additional administrative activities may have to be undertaken to ensure effective and efficient partnering between SDG&E and SDCWA as administrative responsibilities will be shared between them such as develop program processes to pay incentives to pay program participants.

Historically, the Commission has approved funding for administrative activities needed to prepare for full program implementation. In D.05-09-043, the Commission

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[4] *Ibid.*

recognized that start-up activities would be required to implement on-bill financing in 2006 and therefore allowed carryforwards of 2006 funds into 2005.[5]

Therefore, SDG&E requests that the Commission approve up to $25,000 to be spent on start-up activities for this pilot.

VI.
DEMONSTRATION OF PILOT SAVINGS POTENTIAL AND EXPECTED COSTS

The ACR directed that the pilot proposal be designed to maximize embedded energy savings per dollar of program cost (Ordering Paragraph 2). SDG&E proposes to use the information from the CEC's recent study conducted by Navigant, "Refining Estimates of Water-Related Energy Use in California" (December 2006) to present savings estimates for this pilot. SDG&E presents the embedded energy savings assumptions for each proposed strategy in the Attachment. Specifically, SDG&E will utilize the "millions of gallons per kWh" ("mg/kWh") conversion factor identified for the Southern California region shown in the study to estimate the energy savings benefits of the pilot. Based on the information available, SDG&E believes this conversion factor is reasonable and adequately demonstrates an expected level of embedded energy savings from the proposed pilot. SDG&E does not believe that the current platform for demonstrating the standard program cost effectiveness, the E3 calculator, will adequately represent the costs and benefits expected from this pilot.

The purpose of this pilot is to collect the necessary data to be able to fully demonstrate the cost effectiveness of a future water/energy efficiency program. As directed by the ACR, SDG&E will, provide to the Commission, an embedded energy savings per dollar of program cost (as summarized below) in lieu of the traditional Total Resource Cost and Program Administrator Cost test results.

The following table shows that this proposed pilot has a dollar per energy savings per ratio of $0.08/kWh. The total budget used in the calculation is the full cost of the program which includes SDG&E's budget (both program and EM&V) and the Water

[5] D.05-09-043 at pages 153-154.

Authority's contribution. The Water Authority provided the lifecycle millions of gallons ("MG") savings for the different components presented in this application. SDG&E then multiplied the water savings estimates by the conversion factors in the CEC's study to obtain the gross lifecycle energy savings from the component. A net-to-gross ratio ("NTG") of 0.80 was then applied to the converted energy savings as directed by D.06-12-013.[6]

[6] D.06-012-013 at page 15, "Under the Database for Energy Efficient Resources (DEER): 'All existing programs not listed below shall use a default value of 0.8.'"

Projected Budgets by Component	SDG&E	SDCWA	Total	Estimated Savings (MG)	Estimated Net KWH Savings*	Estimated kWh/$
Low Income Multifamily High Efficiency Toilet Replacement	$375,000	$412,500	$787,500	700	7,292,320	0.11
Managed Landscape	$200,000	$15,000	$215,000	600	5,333,280	0.04
Large Customer Audits	$121,000	$77,000	$198,000	0	0	0
Recycled Water	$300,000	$550,000	$850,000	2,100	18,666,480	0.05
General Marketing	$50,000	$50,000	$100,000	0	0	0
EM&V	$261,627	0	$261,627	0	0	0
Total	**$1,307,627**	**$1,104,500**	**$2,412,127**	**2,700**	**31,292,080**	**0.08**

Notes:

Source of Savings Conversion: Refining Estimates of Water-Related Energy Usage In California, CEC, 2006, Appendix C, page 14.

Toilet Replacement Component utilizes the Indoor Rate: 13,022 kWh/MG
Managed Landscape and Recycled Water Components utilize the Outdoor Rate: 11,111 kWh/MG

NTG ratio applied is 0.80.

VII.
PROPOSED PILOT PROGRAM COSTS AND RATE RECOVERY PROPOSAL

The ACR determined that the total cost for these pilot programs would be limited to $10 million statewide (Ordering Paragraph 3). It was also determined that the funding would be separate and apart from the funding established for the 2006-2008 energy efficiency programs. The ACR also directs the utilities to work together to develop a common funding approach. SDG&E, together with SoCalGas, PG&E and SCE, discussed and agreed to a methodology to allocate the $10 million. The utilities agreed to allocate the budget based on the weighted funding of the current 2006-2008 energy efficiency program portfolio budgets approved in D. 05-09-043. Therefore, SDG&E's proposed allocation for its share of the water energy efficiency pilot program is $1.3 million. The table below shows the statewide funding allocation.

Authorized 2006-2008 Energy Efficiency Budgets & Proposed Water Efficiency Budget			
IOU	**2006-2008 Program Budgets**	**Proposed**	
		Allocation	**Budget**
PG&E	$867,468,243	44%	$ 4,406,160
SCE	$674,831,998	34%	$ 3,427,696
SDG&E	$257,540,565	13%	$ 1,308,134
SoCalGas	$168,921,633	9%	$ 858,009
Total	$1,968,762,439	100%	$10,000,000

The proposed funding requirement for SDG&E's energy efficiency/water pilot partnership is $1.3 million. SDG&E proposes to utilize unspent Pre-1998 Electric Demand-Side Management ("DSM") program funds from uncommitted funds for the pilot partnership. Upon Commission approval of the funding requests, SDG&E proposes to transfer the balancing account funds from prior program cycles to the current electric energy efficiency and low income energy efficiency program cycles. The energy efficiency transfer will record an adjustment of $933,134 from the Pre-1998 Electric DSM balancing account to the current (Post 1997) Electric Energy Efficiency Balancing

Account. The low income energy efficiency transfer will record an adjustment of $375,000 from the Pre-1998 Electric DSM balancing account to the electric Low Income Energy Efficiency Balancing Account. Therefore, there are no rate or revenue impacts associated with SDG&E's proposal.

The Water Authority will be contribute $1,104,500 from its own funding sources to pay for administrative and incentive costs for the program as part of their contribution to this pilot.

VIII.
ENERGY EFFICIENCY SAVINGS ACHIEVEMENT

The Ruling's Ordering Paragraph 4 states:

> "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 a 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."

SDG&E appreciates the Commission's direction to not count any savings achievement for the purpose of determining rewards or penalties for this program cycle, given the uncertainties related to determining actual energy savings achieved. However, SDG&E seeks clarification on whether the energy savings achieved by the pilot can be counted towards the Commission's current energy efficiency goals since the directive could be interpreted to not disallow the utilities from counting such energy savings towards the achievement of the current energy efficiency goals adopted in D.04-09-060. SDG&E believes that the embedded energy savings from this pilot program are real and therefore should be reflected as part of SDG&E's achievement towards meeting the Commission's cumulative energy savings goals and accounted for in the Commission's next energy savings goal update. SDG&E proposes that the savings reported from this pilot be based on the measurement activities proposed in Section IX below. This

acknowledgement would be consistent with the Commission's desire to provide the state with valuable energy resources towards meeting the stat's Energy Action Plan energy policies.

IX.
PROPOSED EVALUATION, MEASUREMENT AND VERIFICATION ACTIVITIES

SDG&E recognizes that, although this partnership is at a local level, the implications for embedded energy savings are statewide and therefore the majority of the work must be conducted at a statewide level, either managed by the Commission's Energy Division staff or by the utilities as designated by the Commission. The CEC's study is a reasonable source for preliminary savings estimates. Additional work, however, must be completed to verify the estimates presented in the study that were gathered through review of various work papers and interviews with stakeholders.

The ACR directs the utilities to conduct a planning workshop during the second quarter of 2007 to address, together with 2009-2001 planning issues, a methodology to estimate the magnitude of savings along various localities and review the CEC's study.[7] SDG&E recommends that from this forum a working group of interested parties (i.e., Commission staff, CEC, energy utilities, water utilities and other intervenors) be created that will be tasked with addressing evaluation, measurement & verification ("EM&V") issues, identifying and prioritizing work, developing study plans, and advising the entity (ies) assigned to conduct the evaluation work.

The primary objective of the EM&V activities should be the development of methodologies to measure and attribute correctly embedded energy savings from water conservation activities that correspond to the load impact parameters required for energy efficiency programs (i.e., energy savings—kWh and therms, demand reductions, load shapes, net-to-gross ratios). EM&V Protocols can then be developed to apply to these types of programs thus offering the opportunity for the energy utilities to include these

[7] ACR Ordering Paragraph 5.

embedded energy savings towards their energy efficiency goals, and seek credit for these efforts as part of any rewards or penalties in future program years.

In addition to these EM&V activities, SDG&E proposes to conduct process evaluations to determine effectiveness of the program design, customer response and satisfaction with the program.

SDG&E is requesting a total of $261,627 for the EM&V activities that will be undertaken to evaluate this pilot. This represents the equivalent of 20 percent of SDG&E's portion of the proposed program budget.

This concludes my testimony.

QUALIFICATIONS

My name is Mark F. Gaines. My business address is 555 West Fifth Street, Los Angeles, CA 90013. I am employed by Southern California Gas Company as Director Customer Programs. My responsibilities include Energy Efficiency and Demand Response program development and implementation for SDG&E and SoCalGas. I have been employed by the SoCalGas since 1983.

I have a Bachelor of Science in Civil and Environmental Engineering from the University of California, Irvine, a Masters in Business Administration from the University of California, Los Angeles and am a registered professional engineer in Mechanical Engineering in California. I have previously testified before this Commission.

ATTACHMENT

San Diego Gas & Electric Company and San Diego County Water Authority Partnership

Energy Efficiency/Water Pilot Program Concept Paper

San Diego Gas & Electric and San Diego County Water Authority
Energy/Water Savings Pilot Program
Program Implementation Plan

1. Projected Program Budget

Projected Budgets by Component	SDG&E	SDCWA	Total
Low Income Multifamily High Efficiency Toilet Replacement	$375,000	$412,500	$787,500
Managed Landscape	$200,000	$15,000	$215,000
Large Customer Audits	$121,000	$77,000	$198,000
Recycled Water	$300,000	$550,000	$850,000
Joint Marketing	$50,000	$50,000	$100,000
EM&V	$261,627	0	$261,627
Total	**$1,307,627**	**$1,104,500**	**$2,412,127**

*Water Authority may provide additional funding for incentives as necessary (amount has not been quantified) .

2. Projected Program Impacts

SDG&E provides its lifecycle estimate of energy savings (KWH) in the following section, Program Cost Effectiveness.

3. Program Cost Effectiveness

Projected Budgets by Component	SDG&E	SDCWA	Total	Estimated Savings (MG)	Estimated Net KWH Savings*	Estimated kWh/$
Low Income Multifamily High Efficiency Toilet Replacement	$375,000	$412,500	$787,500	700	7,292,320	0.11
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Recycled Water	$300,000	$550,000	$850,000	2,100	18,666,480	0.05
Joint Marketing	$50,000	$50,000	$100,000	0	0	0
EM&V	$261,627	0	$261,627	0	0	0
Total	**$1,307,627**	**$1,104,500**	**$2,412,127**	**2,700**	**31,292,080**	**0.08**

Notes:

1) Source of Savings Conversion: Refining Estimates of Water-Related Energy Usage In California, CEC, 2006, Appendix C, page 14.

- Toilet Replacement Component utilizes the Indoor Rate: 13,022 kWh/MG
- Managed Landscape and Recycled Water Components utilize the Outdoor Rate: 11,111 kWh/MG

2) NTG ratio applied is 0.80.

4. Program Descriptors

San Diego Gas & Electric in Partnership with the San Diego County Water Authority (Water Authority) propose the Energy/Water Savings pilot in an effort to promote the following objectives: 1) the reduction of net energy consumption related to water use by capturing embedded, or "upstream savings." 2) Conservation of water 3) the use of less energy-intensive water (gravity-fed or recycling versus groundwater, aqueducts or desalination). The following five components will be piloted in an effort to meet these objectives:

1. Low Income Multifamily High Efficiency Toilet Replacement Pilot Program Component

   Installation of high efficiency toilets for qualifying low-income multi-family customers/owners

2. Managed Landscape Pilot Program Component

   Includes an RFP process whereby proposals will be accepted from water management service companies for an embedded water-energy savings Managed Landscape Pilot Project (Project). The project will be conducted in the San Diego region at approved property sites owned by third party participants

3. Large Customer Audits Pilot Program Component:

   Involves two components: I. Follow-up on several large customer audits where the customer has not taken any action and, II. The development and implementation of an integrated water-energy audit for large customers where water savings and energy savings may be significant.

4. Recycled Water Pilot Program Component:

   The recycled water component will pilot recycled water retrofits by converting users from a potable water source to a lower energy source using recycled water. Direct savings will be documented through water meter readings.

5. Joint Marketing and Outreach Pilot Program Component

   This effort is intended to leverage existing opportunities within each organization and to develop new marketing efforts to promote the Energy/Water pilot program. SDG&E and the Water Authority will jointly develop marketing materials to help leverage and communicate these opportunities through the existing SDG&E account executive (AE) organization for commercial/industrial customers. Training sessions and additional materials will also be developed accordingly.

San Diego Gas & Electric and San Diego County Water Authority
Energy/Water Savings Pilot Program
Program Implementation Plan

5. Program Statement

The San Diego Gas & Electric and San Diego County Water Authority Partnership was originally developed as a means to capitalize on water-related embedded energy savings. The partnership between SDG&E and the Water Authority leverages a long-standing relationship between the two organizations, which embodies the preservation of two vital resources, water, and energy. In response to the ACR in R.06-04-010 directing IOU's to create a partnership with a water provider to implement a jointly funded pilot program, SDG&E and the Water Authority have moved forward to pursue a pilot program, which maximizes opportunities to capture water-related embedded energy savings well into the planning process for the IOUs' 2009-2011 energy efficiency program cycle.

6. Program Rationale

San Diego County Water Authority ("Water Authority") was formed in 1944. As a water wholesaler, the San Diego County Water Authority's mission is to provide a safe and reliable supply of water to its 23 member agencies in the San Diego region, who in turn deliver the water to individual homes and businesses throughout the county. The agencies are represented through a board of directors. A member of the San Diego County Board of Supervisors also serves as a representative to the Water Authority board of directors. The county's 2.7 million residents typically rely on imported water for 90 percent of their total supply in a typical year. The Water Authority's vast experience makes it an ideal partner for San Diego Gas & Electric. Together the two agencies will endeavor to achieve the Commissions ultimate goals of maximizing opportunities to capture water-related embedded energy savings.

The San Diego region currently uses an average of 650,000 acre-feet per year (AF/yr) in a normal rainfall year. Approximately 10% of the water is produced locally, with the remaining 90% coming from the Colorado River Aqueduct (CRA) and the State Water Project (SWP). The marginal cost of energy may be calculated from the marginal source of water – ocean water desalination. Marginal water is the increment of water used when all lowest-cost water is exhausted. The Water Authority's approved Urban Water Management Plan relies on the development of 56,000 acre-feet of desalinated ocean water by 2015. Ocean water desalination is the only local source of water beyond local rainfall and groundwater and is critical to the region's water supply reliability in the event of a natural disaster or catastrophic failure of the CRA, SWP, or Metropolitan Water District's (Metropolitan) system. The conservation efforts proposed herein will defer the construction of an ocean water desalination plant and further aid in conserving water and energy.

The Water Authority and San Diego Gas & Electric Company (SDG&E) began a reciprocal resource conservation partnership going back almost a decade. Early programs included brochure distribution, water/energy audits, and residential showerhead/light bulb distribution. In 1992, the Water Authority created a

Commercial Industrial, and Institutional (CII) Voucher Incentive Program (VIP). This program provides incentives to businesses in the commercial, industrial, and institutional setting for the installation of ultra-low flush toilets and (ULFT) urinals, commercial high-efficiency clothes washers (HEW), and cooling tower conductivity controllers. In the early 90's, at the height of a drought in the San Diego region, businesses and institutions quickly installed ULFT's and urinals.

As the 90's drew to a close, business owners changed their focus to reducing their energy costs. Incentives for HEW's became very popular. In an attempt to build and sustain target market awareness and accelerate market penetration, Water Authority staff sought additional funding sources for the expensive HEW's. Currently, HEW vouchers are supported by Metropolitan Water District of Southern California (MWD), the Water Authority, its' twenty-three member agencies, as well as SDG&E. The combining of funding sources resulted in a $ 280 [$150 from the water voucher program; $130 rebate from energy] voucher to the customer. As a consequence of this combining of resources, the market share for commercial HEW's has grown rapidly since the initiation of the partnering program and substantially exceeded projections. Market penetration of HEW's has exceeded 20% of the coin-operated market segment in the San Diego region in a record time frame.

Historically, the peak months of water consumption are May, June, July, and August, which represents 45% of the annual water use in the region. This water peak coincides with SDG&E's electric peak. Also, water supply and distribution varies greatly among the 23 local water agencies. Most local water (rainfall) flows by gravity to local reservoirs. It is then pumped to existing treatment facilities and further pumped up to elevation to the end use customer. Run-off water from irrigation is disposed via the storm water system and does not undergo wastewater treatment.

7. Program Outcomes

The SDG&E/Water Authority partnership will work toward the following outcomes:

- Implementation of a pilot program designed to maximize embedded energy savings per dollar of program cost.
- Maximize awareness of SDG&E/Water Authority energy efficiency and water conservation programs, in all market segments.

8. Program Component Descriptions

8.1. Low Income Multifamily High Efficiency Toilet Replacement Pilot Program Component

The Low Income pilot program would utilize the existing SDG&E Low Income Energy Efficiency (LIEE) Program infrastructure, and SDG&E's experience with managing contractors, by offering a direct install program for qualifying low-

income multi-family customers/owners. The direct install / no-cost approach should optimize participation for multi-family owners with limited upfront capital. For more than 15 years, SDG&E has administered and implemented a low-income direct install program for energy-related measures (weatherization, appliances, etc.). This program has never included plumbing activities for cold-water items. The Water Authority has offered incentives since May 1991 for various water saving toilets. While there has been good overall single-family participation in these toilet replacement programs, the Water Authority has not specifically targeted the multi-family market, particularly for low income, which is seen to be a source of significant water savings. Although the pilot will initially target primarily multi-family units to maximize the results of the pilot program, single- family installations may be considered in instances where the cost structure is similar to multi-family installations.

Program Indicators

The programs primary Success Indicator will be the number of toilets installed.

8.2. Managed Landscape Pilot Program Component

The Managed Landscape component will fully 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 one-year pilot project will focus on efficient use of outdoor water - potable water used for aesthetic landscapes. Given that about 60% of all municipal and industrial water is used on landscape in an average year, efficient management of this increment is critical to achieve water and energy savings. This is especially important when one considers that 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 energy peak demand period. Implementation of this component will be further detailed following the responses to the RFP, as day to day implementation will be managed by the contractor.

Program Indicators

The programs primary Success Indictors will be: the number of sites installed and gallons saved under contract and the number of sites continuing with the program after completion of the pilot study.

8.3. Large Customer Audits Pilot Program Component

The Audit component will integrate water and energy audit services into one comprehensive audit. The comprehensive approach includes two parts: I. Follow-up on several large customer audits that the customers have not acted upon, and II. development and implementation of an integrated water-energy audit for large customers (where water savings, as well as energy, can be significant).

Program Indicators

Primary Success Indicators will be as follows:

Part 1: Gallons saved

Part 2: number of audits conducted and number of audits resulting in improvements

8.4. Recycled Water Pilot Program Component

The recycled water program will pilot recycled water retrofits by converting users from a potable water source to a lower energy using recycled water source. Direct savings will be documented through water meter readings.

Program Indicators

The primary Success Indicator will be number of sites connected to Recycled Water system

8.5. Joint Marketing and Outreach Pilot Program Component

There are numerous other opportunities to leverage existing Water Authority programs and efforts with SDG&E programs that can also be done during the Pilot. Neither party wishes to miss out on these as they surface. This effort is intended to evaluate and determine how best to utilize each other's organizations to create an overall more effective and efficient marketing effort. The Partners plan to develop marketing materials to help leverage and communicate these opportunities through the existing SDG&E account executive (AE) organization for commercial/industrial customers. Training sessions and additional materials will be developed accordingly.

Program Indicators

Maximize awareness of SDG&E's and Water Authority's energy efficiency and water conservation programs through cross marketing to customers Success will be measured by accelerated participation in programs and customer survey of knowledge of programs.

9. Program Implementation

9.1. Low Income Multifamily High Efficiency Toilet Replacement Pilot Program Component

SDG&E will contract with qualified plumbing contractor(s) with expertise in high efficiency toilet replacement to perform direct install applications. Toilet assessment will be completed at the same time as the weatherization measure assessment during the qualification visit performed by the LIEE program's existing outreach contractor. If replacement is feasible and can be performed within the scope and cost of the program (exceptions could include damaged flooring at toilet location, non-repairable (high cost) water connections, damaged sewer lines at toilet, etc), a high-efficiency toilet will be installed by the plumbing contractor. Only existing toilets of 3.5 gal/flush or more will

qualify for replacement. The Water Authority (working in conjunction with the Metropolitan's programs/funding) will purchase and store the toilets. Lastly, the installation contractor will be required to recycle each toilet, including the fixture, to ensure they are not put back on the market.

SDG&E expects to install up to 2,500 high efficiency toilets in low-income multi-family units. The total cost to purchase and install the high-efficiency toilets will be between $265 and $375 per toilet. The Water Authority share will be $165 a toilet (using incentives from Metropolitan, so SDG&E's costs will range between $100 and $210 for each toilet.) The Water Authority will additionally fund approximately $11,000 in overhead. Assuming that 2,500 toilets are installed, the Water Authority's share will be $412,500 and SDG&E's share will be $375,000 (labor overhead included). Water savings for each high-efficiency toilet is 0.28 million gallons of water over the 20-year life of the toilet.[1] The total estimated water savings is 700 million gallons.

9.2. Managed Landscape Pilot Program Component

This pilot program will request proposals from water management service companies for an embedded water-energy savings Managed Landscape Pilot Project (Project). The Project will be conducted in the San Diego region at approved property sites owned by third party participants. Participants will include multifamily apartment complexes, condominiums, office parks, commercial properties, homeowner associations, and potentially estate properties. The ideal participant 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 can handle around 20 sites at four acres each (with five monitoring units installed per site for a total of 100 units). The monitoring units will be attached to irrigation controllers to monitor water use and transmit the data to the contractor. All water use will be metered.

- *Project Operations:*

A water management service company (Contractor) shall provide participants a guaranteed savings program for reducing outdoor water using a remote service. The remote service provides weather-based adjustments; monitors irrigation watering times, tracks metered usage, and compiles savings reports. Remote water management shall be done daily using three different types of meteorological data: (1) forecasts made available by the National Weather Service (NWS), (2) evapotranspiration ("Eto")[2] measurements from the California Irrigation Management Information System (CIMIS) weather stations, and (3) measured precipitation (rainfall) from NWS stations. In

[1] Reference: CUWCC BMP #14.

[2] *Eto is reference evapotranspiration, which is a standard unit of measure representing the amount of water lost by cool season grass via leaves and the surrounding soil. It is the amount of water that must be replenished to maintain proper health of the plant. Eto data is derives from five CIMIS stations in urban San Diego county.*

addition, the Contractor shall record and store all irrigation activations each day as well as store one or more years of retrieved data for each participant site.

- *Verification of Savings:*
The Contractor shall use metered data from dedicated landscape meters to build the baseline consumption history, to compare usage after installation, and to track savings performance over a period of one-year. If customers wish, they may extend the service after the Project via a shared-savings program with the Contractor. Based on prior experience, it is estimated that there will be a 98% retention rate for a minimum of six (6) years. Mixed-use meters shall not be used unless sub-meters can be installed.

- *Estimated Costs:*
The Water Authority shall bear the administrative costs of the program, estimated at $15,000 (labor plus overhead). All programmatic costs will be covered by SDG&E. SDCWA will manage the contract with the contractor, regularly invoicing SDG&E. As a "direct install" program, program participants shall bear no costs (other than routine maintenance and irrigation system improvements, if needed, to improve irrigation system efficiency). Participants shall be encouraged to take advantage of Water Authority landscape conservation incentive programs and to sign up for Metropolitan Water District's measured landscape savings program. The 20 sites would cost an estimated $200,000 (covering site selection, analysis, installation, equipment and metering).

- *Water Savings Estimates:*
With the requirement that all project sites with dedicated meters enroll in a water budget program, it is likely that a high level of potential savings will be achieved and retained long-term. Water savings for 20 average sites is estimated at over 100 million gallons per year, or 600 MG total for the program. See Appendix for details.

9.3. Large Customer Audits Pilot Program Component

Part I:
The Water Authority, in partnership with Otay Water District (OWD), contracted with Water Management Inc. to examine water and energy savings on three sites. Both the Water Authority and OWD spent a total of $40,000 to complete these audits. While these existing, completed water audits have identified numerous water savings opportunities, there has been little or no movement to implement the recommendations identified due to a variety of customer-specific reasons. This program would look at those audits and see what additional energy savings opportunities exist. SDG&E and ;///the Water Authority will then work together to identify the necessary incentives to implement the recommendations in the audits and create approaches to

overcome customer impediments to participation. SDG&E will provide funding to make high priority improvements, which cannot be funded through other water agency incentive programs. High Priority Improvements will be determined based on best potential for implementation, and or best savings potential. The Water Authority will identify funding from their (and Metropolitan Water District's) existing incentive programs and take steps to help the customer access this funding. If all the water measures from these audits were implemented, the potential water savings is estimated at over 120 million gallons/year (or 447 AFY). Assuming an average 10-year life for these measures, this effort could result in 1,200 million gallons/year saved.

Measures:

- I-CON Electronic Bathroom, Shower & Faucet Controls
- Replace commercial toilets, urinals, & flush valves
- Ozone Laundry System
- Kitchen Pre-Rinse Spray Valves
- Water Softener Line Fix
- Freezer defrosting & belt washing water recycling system
- Upgrade washdown system
- Low-flow high-pressure nozzles
- Rack Washer system adjustments & parts upgrades

Part II:

The Water Authority/SDG&E will coordinate development of a comprehensive water/energy audit to incorporate the results and knowledge gained from Part 1 of this part of the Pilot. We will issue a Request for Proposal (RFP) not to exceed $50,000 (Water Authority funding) to conduct 7-10 in-depth additional audits of commercial, industrial or institutional high water users in the San Diego County. Both water and energy savings opportunities will be included in these audits.

These audits and a final report will be completed by June 2007. SDG&E staff will participate in the selection of the audit consultant. SDG&E will also help identify high potential users of water/energy/sewer for resource savings. Customers will also be selected to ensure equitable distribution among the Water Authority's member agencies (23 agencies) and their willingness to implement recommendations.

SDG&E and the Water Authority will work together to identify incentive programs and opportunities for the customer to implement recommendations identified in the audits. The Water Authority and its retail agencies will contribute funding for specific device installations, as shown in Appendix.

SDG&E has an existing energy audit program that will be utilized. All water savings processes that are identified in the 7-10 audits will be forwarded to Metropolitan's Industrial Process Improvement (IPI) Program for implementation. Water Authority staff will work with both customer and Metropolitan staff for implementation. Financial incentives are subject to availability of Program funds as authorized by Metropolitan's Board of Directors. Process improvements include water-saving improvements such as: installing equipment that will capture, treat and reuse water that would otherwise be discharged to the sewer, and replacing existing process equipment with more efficient equipment resulting in reduced water demand. Documented water savings derived from implemented projects must meet minimum qualifying criteria.

All processes that are identified in the audit must meet the following guidelines. Proposed improvements must be new. Projects that have commenced construction or that have installed equipment prior to agreement execution are excluded from participation in the program. The proposed process improvements must be functional for at least five years. Project costs to achieve water savings must have a minimum two-year simple pay back to qualify.

Estimated Costs:
In addition to the funding the Water Authority has already made to audits under Part 1, the Water Authority will contribute an additional $50,000 for the Part 2 RFP and $27,000 for administration costs (labor plus overhead). SDG&E will contribute funds to augment water incentives under Part 1 to "move" the audits; estimated funding is $100,000 plus $21,000 for administration. Water Authority contribution to the incentives for specific devices that could be installed are shown in Appendix. Costs of improvements will be specific to each individual audit. Cost effectiveness of non-device based improvements will be made after evaluation of each audit and prior to completing an agreement with the customer to make improvements.

9.4. Recycled Water Pilot Program Component

The Water Authority and its member agencies will:

- Identify sites with completed retrofit plans ready for submittal to regulatory agencies for approval that can be implemented immediately.
- Assist in coordinating plan review with regulatory agencies.
- Assist in coordinating regulatory plan review and approval.

Total estimated Water Authority and member agency staff time spent on the recycled water projects is estimated at 10% of total project cost, or $85,000 for a total project cost of $850,000.

The Water Authority or member agency will:

- Provide in matching funds all costs for plan preparation and project oversight.
- Provide at least 25% in matching funds for retrofit (construction) per project.
- Conduct inspections of final installation to ensure it was installed in accordance with plans and specifications.

SDG&E will:

- Provide up to 75% of funding for retrofit (construction) per project, not to exceed $50,000 per project.
- Reimburse customer 50% of SDG&E contribution upon retrofit plan approval by regulatory agencies, and remaining 50% upon project completion.

Criteria for each site will include:

- Customer type
- Readiness to proceed
- Projected savings per site
- Comprehensive cost estimates

Funding/Savings:
SDG&E costs for this part of the pilot will not exceed $300,000 total (covering up to six sites). Total estimated costs for the Water Authority and its' member agencies are estimated to be $550,000. Each recycled water site improvement is estimated to have a life of 30 years. Cost and savings estimates for four "typical" retrofit projects are $850,000 for a water savings of approximately 2,100 MG over the life of the project.

9.5. Joint Marketing and Outreach Pilot Program Component

Water Authority staff will participate in up to four training sessions. We will also hold joint workshops to educate facility managers about water/energy savings opportunities (e.g., cooling towers). Additionally, we will conduct workshops for equipment dealers that promote water/energy products. Examples of areas where we would hope to encourage additional involvement from customers in water projects are shown in Appendix.

In addition to jointly marketing commercial/industrial water and energy rebates, the Water Authority and SDG&E plan to coordinate "mass market" programs. Each entity has existing programs that are already being coordinated. The Pilot program would add additional emphasis to this effort.

Lastly, the Water Authority will help coordinate and 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).

Funding/Savings:
SDG&E is estimating $50,000 to cover its share of these activities. The Water Authority is allocating labor and materials form its existing budget to cover these activities, estimated at $50,000 total.

10. Customer Description

- Low income multi-family customers in SDG&E service territory for high efficiency toilets
- Commercial/Industrial customers in SDG&E's service territory for Managed Landscape, Large Customer Audit, Recycled Water and General Marketing components.

11. Customer Interface

- The installation of high efficiency toilets for low-income multi family customers will provide direct face-to-face interaction with this customer segment.
- SDG&E and SDCWA plan to leverage and enhance current contacts (including those with A/E's) to promote and market all program strategies jointly.

12. Subcontractor Activities

SDG&E will contract with qualified plumbing contractors with expertise in high efficiency toilet replacement. Water Authority will contract with landscape management company for managed landscape program implementation. Water Authority will contract with consultant to complete commercial, industrial and institutional audits.

13. Quality Assurance and Evaluation Activities

SDG&E and SDCWA will establish and oversee quality assurance measures for the pilot program, including oversight and verification of subcontractor activities. These procedures and the associated reporting will be developed in more detail as a part of program implementation. In general however, SDG&E and SDCWA will continue the level of due diligence and quality assurance of its present energy efficiency offerings, including a representative percentage of pre/post installation confirmation inspections for toilet installations

In addition, the primary objective of the EM&V activities should be the development of methodologies to measure and attribute correctly embedded energy savings from water conservation activities that correspond to the load impact parameters required for energy efficiency programs (i.e., energy savings—kWh and therms, demand reductions, load shapes, net-to-gross ratios). EM&V Protocols can then be developed to apply to these types of programs thus offering the opportunity for the energy utilities to include these embedded energy savings towards their

energy efficiency goals, and seek credit for these efforts as part of any rewards or penalties in future program years.
In addition to these EM&V activities, SDG&E proposes to conduct process evaluations to determine effectiveness of the program design, customer response and satisfaction with the program.

SDG&E is requesting a total of $261,627 for the EM&V activities that will be undertaken to evaluate this pilot. This represents the equivalent of 20 percent of SDG&E's portion of the proposed program budget

14. Marketing Activities

See 8.5 above.

15. CPUC Objective

The SDG&E, SDCWA Partnership was created in response to the ACR in R.06-04-010, which directed the IOU's to create a partnership with a water provider to implement a jointly funded pilot program. The purpose of the pilot is to maximize opportunities to capture water-related embedded energy savings to inform the planning process for the IOUs' 2009-2011 energy efficiency programs.

San Diego Gas & Electric and San Diego County Water Authority
Energy/Water Savings Pilot Program
Program Implementation Plan

Appendix

Managed Landscape Program

Water Savings Estimates

Water savings estimates are calculated using data from detailed, large landscape audits performed by the City of San Diego over the last five years.

Per Site:

Pre-implementation water use:
4 acres * 43,560 sq.ft. per acre x 120% Eto x 48" annual Eto x .623 conversion factor from inches to gallons / 50% observed distribution uniformity / 325,851 gallons/acre-foot (AF) = 38.4 AF or 12,505,135.1 gallons or 12.5 MG

Post-implementation water use:
4 acres x 43,560 sq.ft. per acre x 80% Eto x 48" annual Eto x .623 conversion factor from inches to gallons / 62.5% distribution uniformity / 325,851 gallons/AF =
20.5 AF or 6,669,405.4 gallons or 6.7 MG

Note: 80% Eto and 62.5% DU are set by AB 325, the Model Water Efficient Landscape Ordinance. Many sites are designed to use even less water. An Eto of 48" is the mean Eto for the region.

Overall Estimated Potential Savings:

12,505,135.1 – 6,669,405.4 = 5,835,729.7 gallons, 5.8 MG, 17.9 AF
5,835,729.7 gallons/site x 20 sites = 116,714,594 gallons, 116.7 MG or 358.2 AF/year

San Diego Gas & Electric and San Diego County Water Authority
Energy/Water Savings Pilot Program
Program Implementation Plan

Commercial, Industrial & Institutional Voucher Program

Co-funding for each device

Device	Metropolitan	Authority	Member Agency
Connectionless Food Steamer	$ 485.00	$ 27.50	$ 27.50
CTCC	$ 625	$ 21.50	$ 21.50
CTCC - PH	$ 1,900	$ 21.50	$ 21.50
Ultra-Low-Flush Toilet 1.6gpf	$ 135	$ 19.50	$ 19.50
High-Efficiency Toilet 1.28gpf	$ 165	$ 19.50	$ 19.50
High-Efficiency Washer - Single	$ 130	$ 29.00	$ 29.00
High-Efficiency Washer - Multi	$ 130	$ 150.00	$ 50.00
Pre-Rinse Spray Valve	$ 60	$ 16.50	$ 16.50
High-Efficiency Urinals 0.5gpf	$ 200	$ 19.50	$ 19.50
Zero Water Urinals	$ 400	$ 19.50	$ 19.50
Waterbrooms	$ 150	$ 19.00	$ 19.00
X-R Processing Unit - Hospital	$ 3,120	$ 27.00	$ 27.00
X-R Processing Unit - Imaging	$ 3,120	$ 27.00	$ 27.00
Industrial Process Improvement Program	$ 195.00		

Commercial/Industrial Markets

LAUNDRY OPERATIONS:

- Water recovery or ozone systems in large commercial operations to minimize use.
- Large commercial operations should consider installing high recovery water recycle equipment.
- *Water recycling equipment can reduce water use by as much as eighty percent.*

FOOD SERVICE

Equipment Selection

- Eliminate all water-cooled equipment using once-through cooling.
- Eliminate all water-cooled equipment unless it uses a chilled water or cooling tower loop. This includes icemakers, refrigeration equipment, and ice cream machines.
- Install 1.0 gpm hand-washing faucets.

Food Disposal

- Eliminate garbage disposals and sluice trough systems in favor of garbage cans and strainer baskets that eliminate the need for a pulper system, thus eliminating both water and energy use for disposal.

Dishwashing Equipment

- Ware washers (dishwashers) should use less than 1.2 gallons per rack for fill-and-dump machines and less than 0.9 gallons per rack for all other types of machines. For under-the-counter machines, water use should not exceed 1.0 gallon per rack for high-temperature machines and 1.7 gallons per rack for low temperature machines.
- Install pre-rinse spray valves that use 1.6 gallons per minute or less.
- Ensure that ice cream scoop faucets use no more than 0.5 gallons per minute.
- Power soakers for pots and pans can help reduce cleaning effort, but they consume 80 to 85 gallons per fill and 30kWh per day.

Food Preparation

- Install connectionless steamers that don't need either a water supply or a wastewater drain. Most boilerless steamers are also efficient, but those that have water connection and a drain are not.
- Install ice machines that use no more than 20 gallons per hundred pounds of ice made. Flake ice machines are more water-efficient (12 gal/100 lbs) and should be used where possible. {15%-50% if replacing an air-cooled unit and 85%-95% if water-cooled}
- Provide sufficient refrigerator capacity to minimize thawing of food under running water.

Floor Washing

- Use pressure washing equipment, or self contained spray and vacuum systems similar to carpet cleaners but designed for food service use.

MEDICAL FACILITIES AND LABORATORIES

Large hospitals operate facilities that in large part are similar to hotels with food service. All of the above items applicable to these types of operations should be considered. Medical facilities

also have many unique types of equipment that use water. The following is a list of some of the more water-intensive operations and equipment found in these facilities.

Vacuum Pumps

- For medical and dental vacuum pump systems, choose dry vacuum systems to eliminate water use and save energy. This also eliminates the need for the installation and annual inspection of reduced pressure zone backflow preventers.
- Eliminate venturi aspirator vacuum systems by using mechanical dry vacuum equipment.

Sterilizers

- Steam sterilizers are commonly used in hospitals and research laboratories to clean and disinfect surgical equipment, tools and supplies.
- Most sterilizers are used only intermittently; however, potable water is used continuously to flush sterilizer equipment whether or not the unit is in use.
- New retrofit devices are capable of mixing potable water with heated condensate discharge only when the sterilizer is in use, thereby saving significant amounts of water.
- Based on data obtained from several medical facility installations, water savings for a steam sterilizer retrofit are about 1.3 acre-feet per year per unit.
- The retrofit devices have a life expectancy of 15 years and cost $1,900.

Hood Systems

- For laboratory exhaust hoods, use dry systems wherever possible.
- Where exhaust hood scrubber systems are used, adjust flow rates to minimize water use. Incorporate recirculating systems and use alternate sources of water wherever possible.
- Include self-closing valves on fume hood wash down systems
- For special applications such as perchloric acid hoods to limit water use.

Water Filtration Equipment

- The water used in kidney dialysis equipment can be produced by using deionization resins or by a combination of reverse osmosis and deionization.
- Deionization resins are often regenerated off-site by resin supplier/contractors thus eliminating water use at the clinic or hospital.
- These off-site regeneration operations are often more water efficient.
- When reverse osmosis (RO) is used at the medical facility, a reject stream equal to 25% to 60% of the incoming water volume is produced.
- RO equipment that minimizes water rejection is ideal.
- The product water from the RO unit should be able to be stored and used on demand as opposed to some older systems that produce RO water and continually dump the portion that is not used.
- Follow similar considerations for intravenous fluids and other medical fluids that require pharmaceutical grade water.

Equipment Selection

- Use air-cooled medical and laboratory equipment where possible.
- If a cooling water system must be used, use a chiller or a closed loop system such as chilled water or cooling tower water loop instead of a single pass water-cooling system.
- See examples of equipment that might use single pass (once-through) cooling water below.

Examples of Water Cooled Medical and Laboratory Equipment:

- Air Compressors
- Centrifuges
- Diffusion pumps
- Electron Microscopes
- Extractors
- Gas Chromatography/Mass Spec.
- Ion implantation equipment
- Rotary Evaporators/Concentrators
- Spectrometers of all types (FTIR, ICP, etc.)
- Stills
- Turbo Molecular Pumps
- Vacuum Systems
- Water Cooled Optics & Lasers

Film Processing

The use of commercial roll film processing equipment is decreasing, as digital cameras become the standard home and commercial media. In the past, film processing mini labs found in drug, grocery, and department stores used significant volumes of water. Some older equipment is reported to have used as much as 20 gallons of potable water per roll of film developed.

- Almost all-new roll film development equipment being installed today uses plumbing-less technology. This new technology reduces chemical use and silver pollution, while reducing the amount of water needed to only a few gallons a day which is added by hand by the attendant.
- Choose "plumbing-less" mini laboratory equipment that does not require a fill line with a reduced pressure zone (RPZ) backflow preventer and drain line.
- Strongly encourage digital technologies that eliminate water use and the discharge of pollutants. However, it should be pointed out that even if the picture is digital, some water will be used if conventional prints of the pictures are produced.

1. Adjust equipment
2. Modify equipment or install water-saving devices
3. Replace with more efficient equipment
4. Reuse or recycle water or use an alternate water source
5. Change to waterless process