THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Office of the General Counsel

VIA E-MAIL

December 12, 2016

Director Michael T. Hogan
Director Keith Lewinger
Director Elsa Saxod
Director Fern Steiner
San Diego County Water Authority
4677 Overland Avenue
San Diego, CA 92123

Re: Your letter dated November 5, 2016 regarding Board Agenda Item 7-4 (Local Resources Program Agreement with Eastern Municipal Water District)

Dear Directors Hogan, Lewinger, Saxod, and Steiner:

This letter responds to your November 5, 2016 letter opposing November Board Item 7-4, styled as a "**Notice of Non-Liability and Disclaimer of Financial or Contract Responsibility.**" (Attachment 1) In that letter, SDCWA's representatives on Metropolitan's Board state their opposition to Board Letter 7-4 and its proposed action item, purport to disclaim financial or contract responsibility, and provide notice of an intent to seek recovery of self-described illegal rates and other amounts. SDCWA's letter is ineffective to relieve SDCWA, as a member agency of Metropolitan, from financial or contractual responsibility for any action properly taken as a result of a more than 50 percent affirmative vote by Metropolitan's Board regarding Item 7-4. The approval of Item 7-4 is binding on SDCWA.

Under Section 50 of the Metropolitan Water District Act, the powers of Metropolitan are exercised by and through its Board of Directors. The affirmative vote of members representing more than 50 percent of the total number of votes is sufficient to approve an item and to bind the District. The agreement that was the subject of Item 7-4 was approved by a majority of Metropolitan's Board at the November 2016 meeting. SDCWA as an individual member agency has no legal authority to either disavow responsibility for actions taken by the Board or to shield itself from the obligations of the District that are authorized by a majority of its Board.

Below, Metropolitan further responds to SDCWA's blanket and erroneous assertions that Metropolitan's rates and programs are illegal and its other arguments:

1. Metropolitan has complied with all applicable laws in connection with setting rates. The rates reflect reasonable and fair allocations of the costs of supplying service. Metropolitan, unlike SDCWA, supports its rates and charges with a cost of service analysis in every rate-setting cycle. We acknowledge the decision of the trial court in the 2010 and 2012 rate litigation. However, as you know, we disagree with and have filed an appeal challenging the determination of that court. Moreover, as we have pointed out in the pending appeal, Proposition 26 is inapplicable to wholesale water agencies like Metropolitan and exempts reasonable rates for services. While the appeal is pending, the trial court decision has no legal effect.

The ultimate determination of the legality of Metropolitan's rates in general or any particular rate component will not impact the Local Resources Program ("LRP") agreement. The agreement approved by Metropolitan's Board requires Metropolitan to pay an incentive of up to $305 per acre-foot for recovered groundwater delivered by the proposed project. The source of the funds to make the required payments will be determined by Metropolitan as part of its regular and ongoing review of revenue requirements.

SDCWA has recognized this fact. In November 2009, when SDCWA was seeking approval from the Metropolitan Board for funding the Carlsbad Seawater Desalination Plant and concerns were expressed by some member agencies that SDCWA may challenge the legality of the Water Stewardship Rate ("WSR"), Director Lewinger, speaking in support of Metropolitan's funding and in opposition to the inclusion of proposed restrictive language in the contract, stated:

> "The argument that the General Managers [of certain member agencies] make, that we're gonna do away with the Stewardship Fee and that somehow jeopardizes the ability to pay for the local resource projects is a fallacy. The Board of Directors in its fiduciary responsibility must evaluate the commitments we've made, and how we are going to fund those commitments. We may do it differently in the future than we've done it in the past, but we're going to have to raise enough money to fund those commitments."

(Attachment 2, Transcript of November 9, 2009 Water Planning and Stewardship Committee meeting, pgs. 21-22)

2. Your assertion that the sole beneficiary of Item 7-4 is the Eastern Municipal Water District because it receives the local supply is incorrect and ignores the regional benefits from this and other LRPs. Metropolitan has shown that LRPs benefit all member agencies regardless of project location. LRPs provide benefits to all member agencies because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on the District's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all system users. This information is detailed in the materials that have been

provided to the Board over several years. The attached portions of Metropolitan's budget and cost of service report for fiscal years 2016/17 and 2017/18 provide examples. (Attachment 3)

SDCWA's assertions of lack of regional benefit and legality are another change in position by SDCWA. When Metropolitan was considering the proposed agreement to provide funding to SDCWA for the Carlsbad Seawater Desalination Plant, SDCWA Board Chairman Claude "Bud" Lewis argued for the regional benefit of the project in an October 13, 2009 letter to Metropolitan's Board Chairman (cc'g both Boards, the California Governor, and certain Legislators) (Attachment 4) as follows:

- "final action [is] needed to deliver this highly reliable water supply project to Southern California";
- "this project helps implement MWD's 2004 Integrated Resources Plan";
- the project "will provide 56,000 acre-feet of reliable water annually within the MWD service territory at a time when we most need it";
- the project will reduce SDCWA's water supply allocation and so "means more water for all of MWD's other member agencies";
- "The Water Authority urges the MWD board to approve the SDP agreement in November so that this important regional water supply project can proceed."

Significantly, SDCWA funds local resource development within its service area based on the regional benefit of such projects. SDCWA's 2015 cost of service study for 2016 rates and charges states:

> "**Local Water Supply Development**: This is the cost to implement local water supply projects within the Water Authority's service area in order to provide a long-term reliable and sustainable supply. The cost is recovered through the Customer Service charge to recognize the general regional benefit."

(Attachment 5, pg. 15) Carollo Engineers, which performed the study, stated SDCWA's rates and charges are reasonable, consistent with industry best practices, and "adhere to legal requirements." (Attachment 5, pg. 37)

3. SDCWA's argument that Metropolitan has judicially admitted that there are no regional water supply benefits is, as SDCWA knows, untrue. Like SDCWA's own cost of service study (above), Metropolitan has shown that the development of local supplies by Metropolitan member agencies provides benefits to the region. Metropolitan's judicial filings in the SDCWA litigations are entirely consistent with Board Letter 7-4 and other material provided to the Metropolitan Board addressing such benefits. SDCWA's reliance on Appellants' Opening Brief

at pages 80-81 (in footnote 1) is misplaced. The language quoted by SDCWA simply addresses the trial court's error in concluding that the WSR does not recover a transportation-related cost.

In its brief, Metropolitan explained that conservation and local water development projects create a local supply, not a Metropolitan supply. The increase in supply at the local level reduces the demand for imported water supplies and decreases the burden on Metropolitan's infrastructure, thus reducing system costs and freeing up conveyance capacity to the benefit of all system users. Metropolitan's argument in the brief that you cite is that such costs are properly allocated to Metropolitan's *transportation* costs, as they provide system-wide transportation benefits. The financial impact on Metropolitan is avoided transportation costs that would otherwise be collected through transportation rates paid by all users of the system. This is a validated concept embraced by the U.S. Environmental Protection Agency and others. (Attachment 6)[1] Overall, the decrease in demand resulting from Metropolitan's demand management programs is estimated to have resulted in transportation cost savings of approximately $2.7 billion in 2015 dollars. (Attachment 7) Metropolitan's position is far from an admission that LRPs create benefits only to the project participant; it is the opposite. We have attached a more complete excerpt of the brief you cite for your review and to avoid any misunderstanding. (Attachment 8)

Contrary to the argument in your letter, it is SDCWA that has changed its position related to demand management programs. As noted in our prior correspondence, SDCWA and participants in its service area have requested and have been the recipient of millions of dollars of demand management benefits; for example:

- From July 2011 through February 2016, $68,022,345 in conservation benefits was paid to participants in the SDCWA service area, including turf removal rebates. (Attachment 9 and its Attachment 3) This included 23 percent of the turf removal rebates funded by Metropolitan between July 2014 and February 2016. SDCWA did not object to these payments and did not ask Metropolitan to not provide such benefits to consumers in its service area.

- From inception of Metropolitan's conservation program through February 2016, the SDCWA service area received $128,086,053 in conservation payments, second only

[1] The EPA's 2002 report titled "Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs," for example, states: "Water utilities across the United States and elsewhere in North America are saving substantial amounts of water through strategic water-efficiency programs. These savings often translate into capital and operating savings, which allow systems to defer or avoid significant expenditures for water supply facilities and wastewater facilities." The EPA offers Metropolitan as a case study, concluding: "Conservation efforts have considerably reduced the cost estimate of Metropolitan's capital-improvement." (Attachment 6, EPA report's pgs. 2 and 4)

to Los Angeles. (Attachment 9 and its Attachment 3) These benefits were funded through Metropolitan's rates by all of Metropolitan's member agencies.

With two exceptions, the SDCWA delegation on the Metropolitan Board voted in favor of all of Metropolitan's demand management programs and contracts from 1991 until May 2010, immediately prior to filing the 2010 rate litigation. (Attachment 9 and its Attachment 1)

4 and 5. SDCWA states (based upon its own projections) that the project approved in Item 7-4 is not needed and that there is no need to "free up capacity" in Metropolitan's transportation system because Metropolitan's transportation system has and will have excess capacity in the future. Metropolitan's goal-setting forecasts and projections are based on thorough study, such as contained in its Integrated Resources Plan Update and Urban Water Management Plan. SDCWA is, of course, entitled to its own views of the adequacy of water supplies in the Metropolitan service area. But SDCWA's disagreement with Metropolitan's projections provides no basis for disclaiming financial and contractual responsibility for Board actions.

6. SDCWA asserts that there is no "legislative mandate" for Metropolitan to engage in demand management efforts such as the LRP challenged here. SDCWA is wrong. The Metropolitan Water District Act, a state statute, expressly directs Metropolitan to "expand water conservation, water recycling and groundwater recovery efforts" and "place increased emphasis on sustainable, environmentally sound, and cost-effective water conservation, recycling, and groundwater storage and replenishment measures." Metropolitan's conservation and local resource programs, including adopting and approving actions such as described in Board Letter 7-4, comply with this legislative mandate.

7. In your November 5 Letter re Item 7-4 and in other recent communications to Metropolitan, and statements in Committee and Board meetings, SDCWA representatives have stated that the WSR "has already been determined by the Superior Court to be an illegal tax." You further state that SDCWA "will seek recovery of *all* Water Stewardship Rates paid if the trial court's judgment is upheld." (Italics added.) These statements do not accurately reflect what was litigated.

In its Petitions/Complaints in the 2010 and 2012 cases, SDCWA sought invalidation of the WSR only on the basis that it should be a supply rate rather than a transportation rate. The trial court decision was that there was not sufficient evidence in the applicable administrative record to support allocating 100 percent of the WSR to transportation rates. The court's rationale was that the allocation was unfair to wheelers.

The trial court invalidated the WSR only as adopted in 2010 and 2012, and only on this basis. This ruling is on appeal. The trial court did not find that the WSR was invalid when paid as part of the full service rate, nor that it was invalid in any other year, nor that it would be invalid under a different administrative record. SDCWA did not contend, and the trial court did not rule, that

the WSR is an illegal tax per se. These points are clear from the attached portions of the trial court's decision. (Attachment 10)

In addition, as noted and as SDCWA is well aware, because the trial court's decision is on appeal (by both parties), it is not final and has no legal effect. For this further reason, Metropolitan is not "knowingly funding" the proposed project with illegal rates.

8. SDCWA's attempts to excuse itself from its responsibilities as a member agency by providing a "Notice of Non-Liability and Disclaimer of Financial or Contract Responsibility" is without a legal basis and is ineffective. Metropolitan operates as required under the Metropolitan Water District Act by a majority vote of its Board; SDCWA is not excused from the consequences of Board actions simply because it disagrees. The approval of the project was based upon valid Board action and is fully binding upon SDCWA.

Sincerely,

Gary Breaux
Assistant General Manager/
Chief Financial Officer

Marcia Scully
General Counsel

cc: Metropolitan Board of Directors and Member Agencies
Metropolitan General Manager Jeff Kightlinger
SDCWA Board of Directors
SDCWA Board Secretary Melinda Cogle

Attachments

Attachment 1

San Diego County Water Authority
4677 Overland Avenue • San Diego, California 92123-1233
(858) 522-6600 FAX (858) 522-6568 www.sdcwa.org

November 5, 2016

Randy Record and
Members of the Board
Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153

RE: Board Memo 7-4 - Adopt CEQA determination and authorize entering into a Local Resources Program agreement with Eastern Municipal Water District for Perris II Brackish Groundwater Desalter - **OPPOSE;**

NOTICE OF NON-LIABILITY AND DISCLAIMER OF FINANCIAL OR CONTRACT RESPONSIBILITY ASSOCIATED WITH BOARD MEMO 7-4; RESERVATION OF RIGHTS; AND NOTICE OF INTENT TO SEEK RECOVERY OF ILLEGAL RATES, FURTHER AWARD OF PREJUDGMENT INTEREST AND OTHER RELIEF

Dear Chairman Record and MWD Board Members,

We have reviewed Board Memo 7-4 and OPPOSE the board action for the reasons stated in this and many prior letters on the subject of MWD's illegal rates and subsidy programs (and other subjects such as the IRP), all of which are incorporated herein by reference, including but not limited to the following:

- Under California law, including Proposition 26, MWD is required to set rates that do not exceed the reasonable costs of providing the service for which the particular rate is being charged. MWD must also show that the manner in which its costs are allocated and rates charged among member agencies bears a reasonable relationship to the respective burdens on and benefits those customers receive from MWD. MWD is required to make these determinations on a factual record. However, MWD has failed to do so by any cost of service analysis, in Board Memo 7-4, or otherwise.

- While Board Memo 7-4 includes a declaration that the Local Resources Program (LRP) "benefit[s] all member agencies regardless of project location," MWD offers no <u>evidence</u> of such a regional benefit. To the contrary, the Board memo identifies the specific member agency that will benefit from these payments, namely, the Eastern Municipal Water District, which will own, operate and receive the water supply benefits of the project.

- MWD has judicially admitted that its LRP benefits only the local, individual member agencies receiving subsidy payments, and has expressly denied that there are any regional water supply benefits.[i] Statements in Board Memo 7-4 purporting to justify payment of these subsidies on the basis of a self-declared regional water supply benefit are directly contrary to representations MWD has made to the trial court and court of appeal in the Water Authority rate litigation.

- There is no demonstration that this project is needed in order to reduce demand for MWD imported water supplies.[ii] In arbitrarily relying on the 174,000 AFY LRP goal set nearly 10 years ago, in 2007, upon which the October 2014 board authorization is purportedly based, MWD is intentionally choosing to ignore changed circumstances and rely on outdated data. In its own planning projections, MWD reduced the 2035 demand for MWD water from 1,931,000 AF in its 2010 Regional Urban Water Management Plan (RUWMP) to 1,726,000 AF in its 2015 RUWMP; this reduction alone would completely eliminate any need for this project by MWD, even if the payment source were not illegal, which it is.

- MWD has not demonstrated any need to "free up conveyance capacity to the benefit of all system users," and none can be demonstrated as a matter of fact. Due to the reduced demand for MWD water, now and in the future, MWD has excess capacity and no constraints that this project will "free up" to the benefit of any, let alone all, users of MWD transportation facilities.

- MWD does not have any "legislative mandates"[iii] that require it to subsidize local water supply development for the customers of the Eastern Municipal Water District; on the other hand, MWD does have a common law, statutory and Constitutional mandate to assign the costs it incurs proportionally according to benefits received by its customers. The costs of this water supply must be assigned to the project beneficiary, Eastern Municipal Water District.

- The Water Stewardship Rate has already been determined by the Superior Court to be an illegal tax and MWD is on notice that the Water Authority will seek recovery of all Water Stewardship Rates paid if the trial court's judgment is upheld on appeal. The Water Authority also puts MWD and Eastern Municipal Water District on notice that it objects to being charged the WSR or having any financial responsibility now or in the future for any costs of LRP contracts entered into by MWD. In addition to the reasons stated above, Water Authority ratepayers have been barred by the MWD board's June 2011 action from receiving any WSR benefits.

While we strongly support the kind of local water supply development represented by this project, MWD is knowingly funding this project with illegal rates, with the knowledge that these water supplies are not needed by and will not benefit MWD's regional customers as MWD now

claims. As a result, this contract is void or voidable. The Water Authority expressly disclaims any direct or indirect financial or contractual responsibility for this project or future subsidies to be paid by MWD. The Water Authority hereby gives MWD, its member agencies, rating agencies and all interested persons NOTICE OF ITS INTENT TO SEEK RECOVERY OF ILLEGAL RATES, FURTHER AWARD OF PREJUDGMENT INTEREST AND OTHER RELIEF.

Sincerely,

Michael T. Hogan	Keith Lewinger	Elsa Saxod	Fern Steiner
Director	Director	Director	Director

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[i] For example, MWD has stated that, "'supplies'...refers to the local member agencies' water supplies, not a supply related cost or benefit for Metropolitan. Conserving and developing the local member agencies' water supplies has nothing to do with Metropolitan's water supplies, which are imported from outside its service area. The superior court erred in confusing the two." Appellants' Opening Brief at pages 80-81.

[ii] See January 10, 2016 letter RE Board Memo 8-3: Adopt the 2015 Integrated Water Resources Plan Update - REQUEST TO DEFER BOARD ACTION ADOPTING 2015 IRP UPDATE, OR IN THE ALTERNATIVE, OPPOSE

[iii] SB 60 (Hayden) was signed into law in 1999, to prohibit MWD from engaging in certain deceptive and political practices and requiring it to establish an Office of Ethics. SB 60 requires MWD to place increased emphasis on planning for more sustainable, environmentally sound, and cost-effective water supply including conservation, recycling, and groundwater storage and replenishment measures. Contrary to MWD's arguments on appeal and at trial, SB 60 does not address, let alone require, MWD to pay for some of its member agencies' local projects.

Attachment 2

AUDIO TRANSCRIPTION OF

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

WATER PLANNING AND STEWARDSHIP COMMITTEE MEETING

November 9, 2009

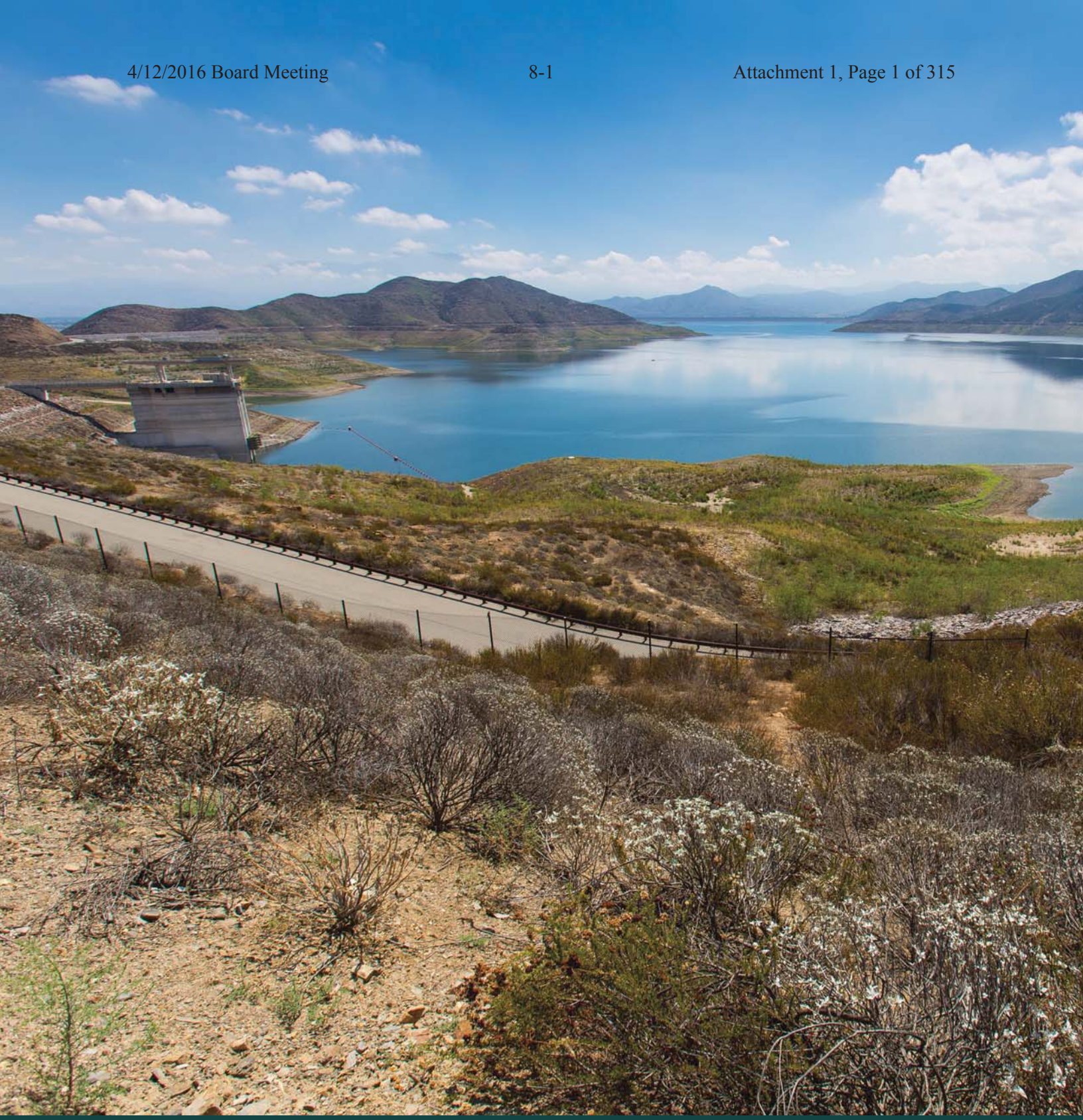
ATKINSON-BAKER, INC.
COURT REPORTERS
(800) 288-3376
www.depo.com

TRANSCRIBED BY: MARY HARLOW
FILE NO. A707397

1 signed the letter, 'Well, we've entered in - if we
2 enter into this agreement, what's the guarantee that
3 we're going to have the funding supply in the future
4 to cover this ex-- added expense?' Well, the same
5 question could be asked of the 91 agreements that have
6 been previously entered into, and the 1.2 billion
7 dollars that Metropolitan has a commitment to.
8 When the Board of Directors looks at changing
9 its rate structure, it has to take all of these
10 factors into consideration. We have to look at all of
11 the commitments we've made to pay bills. We're going
12 to have to pay our State Water Project costs. We
13 don't have an option to opt out of that. We're going
14 to have to pay our bonds. We don't have an option to
15 opt out of that. We have to pay our employees. We
16 don't have an option to just get rid of all of 'em.
17 And we're gonna have to pay for the contractual
18 commitments that we've entered into.
19 So when the Board of Directors in the future
20 discusses changes in the rate structure, part of that
21 discussion must be, how are we going to fund the
22 commitments that we have entered into. The argument
23 that the General Managers make, that we're gonna do
24 away with the Stewardship Fee and that somehow
25 jeopardizes the ability to pay for the local resource

1 projects is fallacy. The Board of Directors in its
2 fiduciary responsibility must evaluate the commitments
3 we've made, and how we are going to fund those
4 commitments. We may do it differently in the future
5 than we've done it in the past, but we're going to
6 have to raise enough money to fund those commitments.
7 Thank you.
8 VICE CHAIRMAN PETERSON: Thank you. Director
9 Edwards?
10 DIRECTOR EDWARDS: Well, I'd like to second
11 John Morris's motion.
12 VICE CHAIRMAN PETERSON: Okay. That's it?
13 DIRECTOR EDWARDS: That's it.
14 VICE CHAIRMAN PETERSON: Okay. Director
15 Lowenthal?
16 DIRECTOR LOWENTHAL: Anything else?
17 MALE DIRECTOR: Well, (indiscernible).
18 DIRECTOR LOWENTHAL: You sure?
19 MALE DIRECTOR: (indiscernible)
20 MALE DIRECTOR: Why?
21 DIRECTOR LOWENTHAL: Thank you, Mr. Chairman,
22 and I appreciate the motion that's been made. I
23 think, in listening to the speakers and also what our
24 own Board grapples with when it comes to business
25 practices and commitments, you know, while we are in

Attachment 3, Part 1



PROPOSED BIENNIAL BUDGET

Fiscal Years 2016/17 and 2017/18

Realizing the Benefit of Sound Investments

DEMAND MANAGEMENT

OVERVIEW

Demand Management costs are Metropolitan's expenditures for funding local water resource development programs and water conservation programs. These demand management programs incentivize the development of local water supplies and the conservation of water to reduce the reliance on imported water. These programs are implemented after the service connection between Metropolitan and its member agencies and, as such, do not add any water to the quantity Metropolitan obtains from other sources or to Metropolitan's own supply. Rather, the effect of these downstream programs is to produce a local supply of water for the local agencies.

Demand Management programs reduce the use of and burden on Metropolitan's distribution and conveyance system, which, in turn, helps reduce the capital, operating, maintenance and capital improvement costs associated with these facilities. For example, local water resource development and conservation has deferred the need to build additional infrastructure such as the Central Pool Augmentation Project and the San Diego Pipeline No. 6. Overall, the decrease in demand resulting from these projects is estimated to defer the need for projects between four and twenty-five years at a savings of between $324 and $910 million. The programs also free up capacity in Metropolitan's system to convey both Metropolitan water and water from other non-Metropolitan sources.

The budgeted costs for Demand Management are as follows:

Demand Management Cost Summary[1], $ millions

	2014/15 Actual	2015/16 Budget	2016/17 Proposed	Change from 2015/16	2017/18 Proposed	Change from 2016/17
Conservation Credits Program	$134.4	$20.0	$27.0	$7.0	$32.0	$5.0
Local Resources Program	$35.8	$41.7	$43.7	$2.0	$41.9	$(1.8)
Future Supply Actions		0	$4.4	$4.4	$2.0	$(2.4)

[1] Does not include Departmental costs reflected elsewhere in this Budget.

Budgeted Demand Management costs reflect increasing the financial commitment for the Conservation Credits Program and maintaining the financial incentives for existing contracts under the Local Resources Program.

In addition to Metropolitan's own objectives, Metropolitan also pursues local water resource development because it has uniquely been directed to do so by the state Legislature. In 1999, then Governor Davis signed Senate Bill (SB) 60 (Hayden) into law. SB 60 amended the Metropolitan Water District Act to direct Metropolitan to increase conservation and local resource development. No other water utility in California, public or private, has been specifically identified by the state Legislature and directed to pursue water conservation and local water resource development.

Metropolitan's Demand Management programs also support the region's compliance with the requirements of SB X7-7. In 2009, the state Legislature passed SB X7-7, which was enacted to reduce urban per capita water use by 20 percent by December 31, 2020. Urban retail water suppliers are not eligible for state water grants or loans unless they comply with the water conservation requirements of the legislation. Demand Management programs help the region achieve urban per capita water use reductions.

Demand Management costs also support the Strategic Plan Policy Principles approved by Metropolitan's Board on December 14, 1999. These principles embody the Board's vision that Metropolitan is a regional provider of wholesale water services. In this capacity, Metropolitan is the steward of regional infrastructure and the regional planner responsible for coordinated drought management and the collaborative development of additional supply reliability and necessary capacity expansion. Through these regional services, Metropolitan ensures a baseline level of reliability and quality for service in its service area.

DEMAND MANAGEMENT PROGRAMS REDUCE RELIANCE ON IMPORTED WATER

Metropolitan increased the emphasis on Demand Management programs after the devastating drought of the early 1990's. Metropolitan's 1996 Integrated Resources Plan identified the Preferred Resource Mix as the resource plan that achieved the region's reliability goal of providing the full capability to meet all retail-level demands during all foreseeable hydrologic events, represented the least-cost sustainable resources plan, met the region's water quality objectives, was balanced and diversified and minimized risks, and was flexible, allowing for adjustments should future conditions change.

The Preferred Resource Mix included locally developed water supplies and conservation, and recognized that regional participation was important to achieve their development. Additional imported supplies frequently have relatively lower development costs, but can create a large cost commitment for regional infrastructure to transport and store those imported supplies. On the other hand, local projects, like those designed to recycle water or increase groundwater production, may have higher development costs but require little or no additional infrastructure to distribute water supplies to customers. This trade-off between relatively lower-cost imported supplies requiring large regional infrastructure investments and relatively higher-cost local supply development requiring less additional local infrastructure was an important consideration in the development of the Preferred Resource Mix. A strategy of aggressively investing in imported water supply would lead to higher costs for the region because of the larger investments required in infrastructure. Since 1996, the Integrated Resources Plan has been updated twice, in 2004 and 2010, reaffirming long-term sustainability of the region's water supply through implementation of conservation and local resource development.

DEMAND MANAGEMENT PROGRAMS REDUCE DEMANDS AND BURDENS ON METROPOLITAN'S SYSTEM

Demand Management programs decrease and avoid operating and maintenance and capital improvement costs, such as costs for repair of and construction of additional or expanded water conveyance, distribution, and storage facilities. The programs also free up capacity in Metropolitan's system to convey both Metropolitan water and water from other non-Metropolitan sources.

The purpose of Demand Management is to generate additional local resources or reduce consumption through conservation, which reduces the amount of water that must otherwise be transported through Metropolitan's system. Investments in Demand Management programs like conservation, water recycling and groundwater recovery help defer the need for additional conveyance, distribution, and storage facilities. Demand Management is an important part of Metropolitan's resource management efforts. Metropolitan's

incentives in these areas contribute to savings for all users of the system in terms of lower capital costs that would otherwise have been required to expand and maintain the system.

SB 60 DIRECTED METROPOLITAN TO EXPAND DEMAND MANAGEMENT PROGRAMS

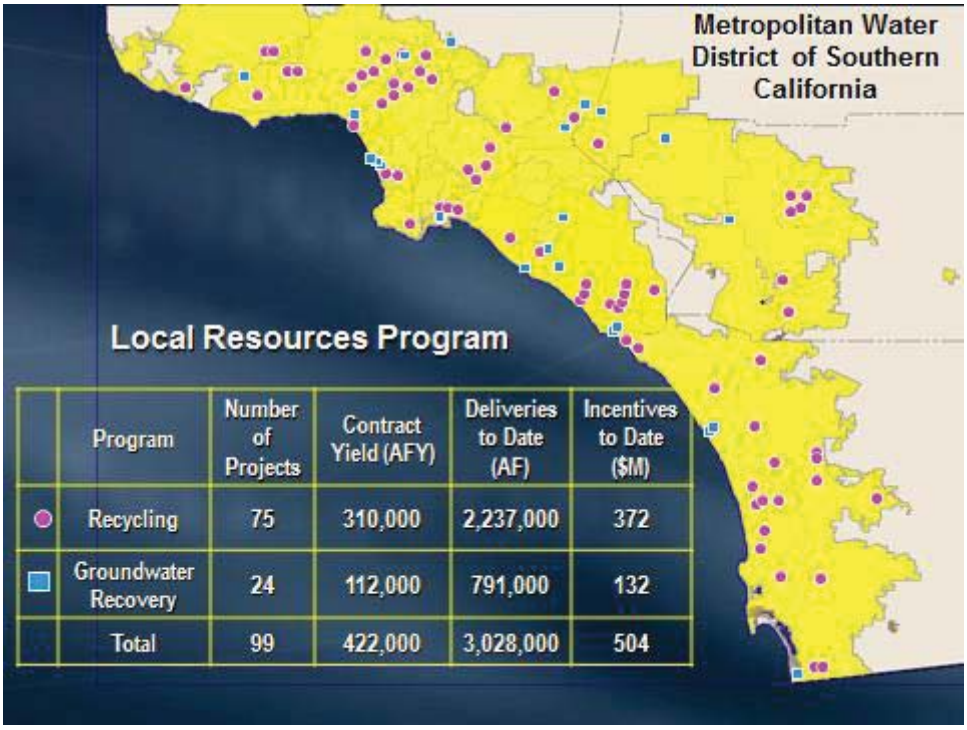
In September 1999, Governor Gray Davis signed SB 60 (Hayden) into law. SB 60 amended the Metropolitan Water District Act to direct Metropolitan to increase "sustainable, environmentally sound, and cost-effective water conservation, recycling, and groundwater storage and replenishment measures." SB 60 also requires Metropolitan to hold an annual public hearing to review its urban water management plan for adequacy in achieving an increased emphasis on cost-effective conservation and local water resource development, and to invite knowledgeable persons from the water conservation and sustainability fields to these hearings. Finally, Metropolitan is required to annually prepare and submit to the Legislature a report on it progress in achieving the goals of SB 60. SB 60 specifically indicated that no reimbursement was required by legislation because Metropolitan, as a local agency, has the authority to levy service charges, fees or assessments sufficient to pay for the program or level of service mandated by SB 60. No other water utility in California, public or private, has been specifically identified by the state Legislature and directed to pursue water conservation and local water resource development.

In FY 2014/15 alone, Metropolitan's service area achieved 1.5 million acre-feet of water savings from conservation, recycled water and groundwater recovery programs. The 1.5 million acre-feet of water savings from water management activities in fiscal year 2014/15 nearly equaled actual water sold in the same period of 1.91 million acre-feet. These savings derived from programs for which Metropolitan paid incentives, as well as code-based conservation achieved through legislation, building and plumbing codes and ordinances, and reduced consumption resulting from changes in water pricing. Cumulatively, since 1990 Metropolitan has invested almost $1 Billion to achieve water savings.

Metropolitan's Conservation Credits Program provides incentives to residents and businesses for use of water-efficient products and qualified water-saving activities. Rebates have been provided to residential customers for turf removal and purchasing of high-efficiency clothes washers and toilets. Rebates are also provided to businesses and institutions for water-saving devices. In fiscal year 2014/15, the Conservation Credits Program achieved 944,000 acre-feet of saved water through new and existing conservation initiatives funded with incentives and maintained through plumbing codes. Cumulatively, through fiscal year 2014/15 the Conservation Credits Program has achieved over 2.2 million acre-feet of water savings.

Metropolitan provides financial incentives through its Local Resources Program for the development and use of recycled water and recovered groundwater. The Local Resources Program consists of 75 recycling projects and 24 groundwater recovery projects located throughout Metropolitan's service area, of which 85 projects are in operation. From the Local Resources Program's inception in 1982 through FY 2014/15, Metropolitan has paid out about $372 million in incentives to produce about 2.2 million acre-feet of recycled water. Metropolitan also provided approximately $132 million to produce 791,000 acre-feet of recovered degraded groundwater for municipal use.

Local Resources Program Projects



	Program	Number of Projects	Contract Yield (AFY)	Deliveries to Date (AF)	Incentives to Date ($M)
●	Recycling	75	310,000	2,237,000	372
■	Groundwater Recovery	24	112,000	791,000	132
	Total	99	422,000	3,028,000	504

SB X7-7 REQUIRES INCREASED CONSERVATION

SBX7-7 mandated a new requirement to lower urban per capita water use 20 percent by December 31, 2020. Enacted by the state Legislature and signed into law by Governor Schwarzenegger as part of a historic package of water reforms in November 2009, the "20x2020" plan gave local communities flexibility in meeting this target while accounting for previous efforts in conservation and recycling. The Legislature found that reducing water use through conservation and regional water resources management would result in protecting and restoring fish and wildlife habitats, reducing dependence on water through the Delta, and providing significant energy and environmental benefits. Metropolitan coordinates closely with its member agencies to achieve these targets both at a retail agency level in compliance with legislative requirements, and as a region in achieving a true 20 percent reduction in per-capita water use.

BUDGET HIGHLIGHTS

The budget for the Demand Management costs is increasing slightly when comparing the biennial budget to FY 2015/16, due primarily to increased expenditures for the Conservation Credits Program.

Attachment 3, Part 2

Metropolitan Water District of Southern California

FISCAL YEARS 2016/17 and 2017/18 COST OF SERVICE FOR PROPOSED WATER RATES AND CHARGES

Table 17: Functional Allocation of Metropolitan Storage Facilities

	Functional Allocations		
Storage Facilities	Emergency	Drought	Regulatory
Diamond Valley Lake	50%	45%	5%
Other Regulatory			100%
Lake Skinner	77%		23%
Lake Mathews	44%		56%
Semi-Tropic		100%	
Arvin-Edison		100%	
CRA Off-Stream		100%	
Groundwater Conjunctive Use		100%	

(a) DVL allocations are based on modeled changes in year-end reservoir levels (2004-2009) as relative to capacity and emergency storage criteria

(b) Lake Skinner and Lake Matthews allocation percentages are derived from Southern California's Integrated Water Resources Plan, March 1996, Volume 2 "Metropolitan's System Overview", Section 4, p. 10, Table 4-3.

Treatment

This function includes capital financing, operating, maintenance, and overhead costs for Metropolitan's five treatment plants and is considered separately from other costs so that the treatment function may be priced separately.

Distribution

This function includes capital financing, operating, maintenance, and overhead costs for the Distribution System of feeders, canals, pipelines, laterals, and other appurtenant works. The Distribution System facilities are distinguished from Conveyance and Aqueduct facilities at the point of connection to the SWP, Lake Mathews (CRA), and other major turnouts along the CRA facilities. Examples include the Rialto Pipeline; the Etiwanda Pipeline; the Foothill Feeder; the Sepulveda Feeder; the Santa Monica Feeder; the Upper, Middle, and Lower Feeders; and the San Diego Pipelines No.1, No. 2, No. 3, No. 4, and No. 5.

Demand Management

A separate demand management service function has been used to clearly identify the cost of Metropolitan's incentives in local resources like conservation, recycling, and desalination.

Metropolitan increased the emphasis on Demand Management programs after the devastating drought of the early 1990's. Metropolitan's 1996 Integrated Resources Plan identified the Preferred Resource Mix as the resource plan that achieved the region's reliability goal of providing the full capability to meet all retail-level demands during foreseeable hydrologic events, represented the least-cost sustainable resources plan, met the region's water quality objectives, was balanced and diversified and minimized risks, and was flexible, allowing for adjustments should future conditions change.

The Preferred Resource Mix included locally developed water supplies and conservation, and recognized that regional participation was important to achieve their development. Additional imported supplies frequently have relatively lower development costs, but can create a large cost commitment for regional infrastructure to transport and store those imported supplies. On the other hand, local projects, like those designed to recycle water or increase groundwater production, may have higher development costs but require little or no additional infrastructure to distribute water supplies to customers. This trade-off between relatively lower-cost imported supplies requiring large regional infrastructure investments and relatively higher-cost local supply development requiring less additional local infrastructure was an important consideration in the development of the Preferred Resource Mix. A strategy of aggressively investing in imported water supply would lead to higher costs for the region because of the larger investments required in infrastructure.

Demand Management Programs decrease and avoid operating and capital maintenance and improvement costs, such as costs for repair of and construction of additional or expanded water conveyance, distribution, and storage facilities. Investments in demand side management programs like conservation, water recycling, and groundwater recovery help defer the need for additional conveyance, distribution, and storage facilities. The programs also free up capacity in Metropolitan's system to convey both Metropolitan water, and water from other non-Metropolitan sources.

Metropolitan's 1996 Integrated Resource Plan included an analysis of future demand scenarios and their effect on infrastructure requirements. A comparison of capital infrastructure costs with and without Demand Management Programs showed a difference of around $2 billion. In other words, the ability to meet demand through local Demand Management Programs resulted in an anticipated $2 billion in capital cost savings. A sensitivity analysis further showed that a 5% increase or decrease in demand had a correlative effect on when Metropolitan would need to incur capital infrastructure costs. Since then, Metropolitan has seen the benefits materialize. Metropolitan has been able to defer the need to build additional infrastructure such as the Central Pool Augmentation Project tunnel and pipeline, completion of San Diego Pipeline No. 6, the West Valley Interconnection, and the completion of the SWP East Branch expansion. Overall, the decrease in demand resulting from these projects is estimated to defer the need for projects between four and twenty-five years at a savings of approximately $2.7 billion in 2015 dollars.

Since 1996, the Integrated Resources Plan has been updated three times, in 2004, 2010, and 2015, reaffirming long-term sustainability of the region's water supply through implementation of conservation and local resource development.

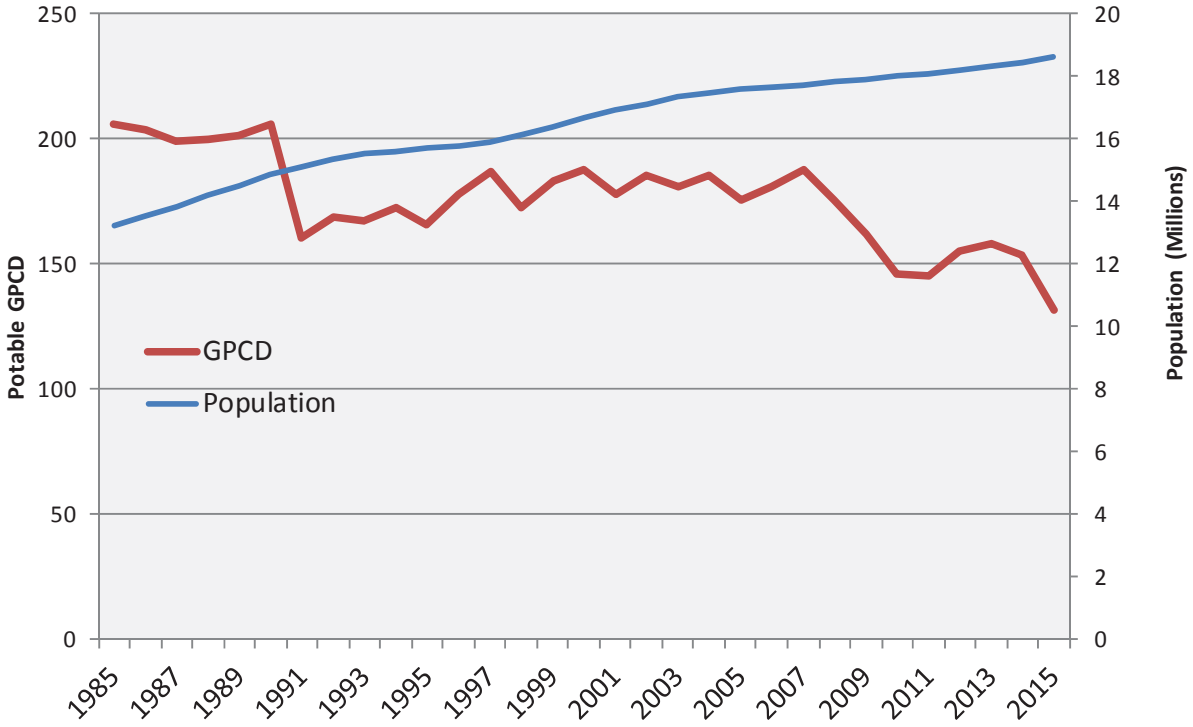
Demand management is an important part of Metropolitan's resource management efforts. Metropolitan's incentives in these areas contribute to savings for all users of the system in terms of lower capital costs that would otherwise have been required to expand and maintain the system.

Demand Management: SB-60

In September 1999, Governor Gray Davis signed SB 60 (Hayden) into law. SB 60 amended the Metropolitan Water District Act to direct Metropolitan to increase "sustainable, environmentally sound, and cost-effective water conservation, recycling, and groundwater storage and replenishment measures." SB 60 also requires Metropolitan to hold an annual public hearing to review its urban water management plan for adequacy in achieving an increased emphasis on cost-effective conservation and local water resource development, and to invite knowledgeable persons from the water conservation and sustainability fields to these hearings. Finally, Metropolitan is required to annually prepare and submit to the Legislature a report on it progress in achieving the goals of SB 60. SB 60 specifically indicated that no reimbursement was required by legislation because Metropolitan, as a local agency, has the authority to levy service charges, fees or assessments sufficient to pay for the program or level of service mandated by SB 60. No other water utility in California, public or private, has been specifically identified by the state Legislature and directed to pursue water conservation and local water resource development.

In fiscal year 2014/15 alone, Metropolitan's service area achieved 1.5 million acre-feet of water savings from conservation, recycled water and groundwater recovery programs. Figure 16 below compares population in millions on the right axis and gallons per capita daily (GPCD) water is on the left axis. While the population has increased to approximately 18.5 million, GPCD water use has decreased to approximately 125 GPCD. These reductions derived from programs for which Metropolitan paid incentives, as well as code-based conservation achieved through legislation, building and plumbing codes and ordinances, and reduced consumption resulting from changes in water pricing. Cumulatively, since 1990 Metropolitan has invested almost $1 billion and Metropolitan's service area has achieved 17.9 million acre-feet of water savings. These water savings reduce per capita water demands, allowing Metropolitan to serve a growing population with existing supplies and without constructing additional facilities for imported water.

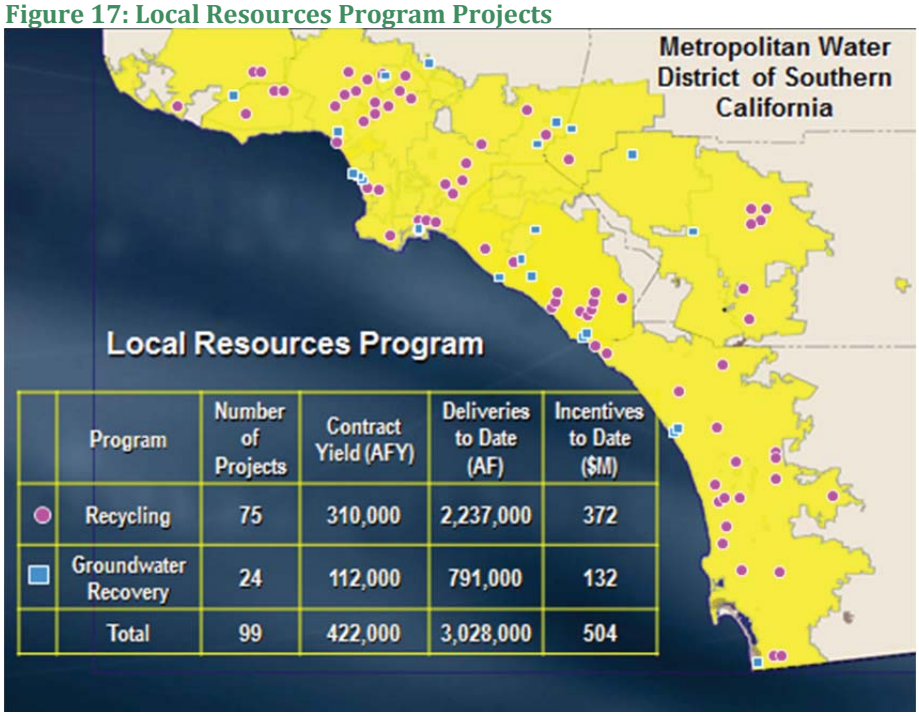
Figure 16: Population and Per Capita Daily Water Use



Metropolitan's Conservation Credits Program provides incentives to residents and businesses for use of water-efficient products and qualified water-saving activities. Rebates have been provided to residential customers for turf removal and purchasing of high-efficiency clothes washers and toilets. Rebates are also provided to businesses and institutions for water-saving devices. In fiscal year 2014/15, the Conservation Credits Program achieved 944,000 acre-feet of saved water through new and existing conservation initiatives funded with incentives and maintained through plumbing codes. Cumulatively, through fiscal year 2014/15 the Conservation Credits Program has achieved over 2.2 million acre-feet of water savings.

Metropolitan provides financial incentives through its Local Resources Program for the development and use of recycled water and recovered groundwater for the participants. The Local Resources Program consists of 75 recycling projects and 24 groundwater recovery projects located throughout Metropolitan's service area, of which 85 projects are in operation, as shown in Figure 17. From the Local Resources Program's inception in 1982 through FY 2014/15, Metropolitan has paid out about $372 million in incentives to produce about 2.2 million acre-feet of recycled water. Metropolitan also provided approximately $132 million to produce 791,000 acre-feet of recovered degraded groundwater for municipal use.

Figure 17: Local Resources Program Projects



	Program	Number of Projects	Contract Yield (AFY)	Deliveries to Date (AF)	Incentives to Date ($M)
●	Recycling	75	310,000	2,237,000	372
■	Groundwater Recovery	24	112,000	791,000	132
	Total	99	422,000	3,028,000	504

Demand Management: SB X7-7

SB X7-7 mandated a new requirement to lower urban per capita water use 20 percent by December 31, 2020. Enacted by the state Legislature and signed into law by Governor Schwarzenegger as part of a historic package of water reforms in November 2009, the "20x2020" plan gave local communities flexibility in meeting this target while accounting for previous efforts in conservation and recycling. The Legislature found that reducing water use through conservation and regional water resources management would result in protecting and restoring fish and wildlife habitats, reducing dependence on water through the Delta, and providing significant energy and environmental benefits. Metropolitan coordinates closely with its member agencies to achieve these targets both at a retail agency level in compliance with legislative requirements, and as a region in achieving a true 20 percent reduction in per-capita water use.

Metropolitan provides incentives under both the Conservation Credits Program and the Local Resources Program. The incentives developed were based on the benefits of the programs. The financial benefits of these programs to Metropolitan continue to be the reduction in capital investments due to a deferral and/or downsizing of *regional* infrastructure to import water, and the reduction in Operations and Maintenance expenditures needed to distribute, store and treat imported water. These benefits occur year-round regardless of hydrologic conditions because once a large capital project is deferred, the savings are permanent. Additional benefits of local water management programs are realized during droughts or emergencies when imported supplies are scarcer. The greatest economic benefit associated with developing local resources is the downsizing of Metropolitan's regional capital investment plan needed to deliver additional imported water to member agencies.

Projects that have been deferred or downsized due to the conservation and local resource development include the Central Pool Augmentation Project tunnel and pipeline, completion of San Diego Pipeline No. 6, the West Valley Interconnection, and the completion of the SWP East Branch expansion.

The incentives must be adequate to cause member agencies to construct local resource development. The Local Resources Program was conceived in 1982. The easiest, most cost-effective projects have already been

implemented. Future projects are more difficult to site and are more costly to develop. Member agencies have indicated that cost is the predominant constraint and that financial assistance is needed, especially in early years. In 2014, the Metropolitan Board increased the Local Resources Program incentives to account for the impact of inflation and the increase in the average unit cost of projects since the Local Resources Program was approved.

Administrative and General (A&G)

These costs occur in each of the Groups' departmental budgets and reflect overhead costs that cannot be directly functionalized. The COS process allocates A&G costs to the service functions based on the labor costs of non-A&G dollars allocated to each function.

Hydroelectric

Hydroelectric costs include the capital financing, operating, maintenance, and overhead costs incurred to operate the 16 small hydroelectric plants located throughout the water distribution system.

Functional Assignment Bases

The functional assignment bases are used to assign costs that make up the Revenue Requirement into the various service functions. The primary functional assignment bases used in the cost-of-service process are listed below.

- Direct assignment
- Net Book Value plus Work-In-Progress
- Prorating in proportion to other allocations
- Manager analysis
- Prior year results

Schedule 3 summarizes the total dollar amounts assigned, including the absolute value of Revenue Offsets (rather than showing Revenue Offsets as a reduction to costs), using each of the above types of assignment bases, for FY 2016/17 and FY 2017/18. It assigns both total Revenue Requirements before Revenue Offsets and Revenue Offsets by summing the items before assigning dollars to the primary functional assignment bases.

To ensure the correct amount has been assigned, the Revenue Requirement is restated at the bottom portion of each fiscal year chart.

Attachment 4

San Diego County Water Authority
4677 Overland Avenue • San Diego, California 92123-1233
(858) 522-6600 FAX (858) 522-6568 www.sdcwa.org

October 13, 2009

Tim Brick, Chairman
Metropolitan Water District
of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153

Re: Carlsbad Desalination Project
Item 9-2, October 13, 2009 MWD Board Meeting

Dear Chairman Brick,

After years of planning and an unprecedented level of environmental and public review by numerous public agencies and regulators, including the California Coastal Commission, the State Lands Commission and Regional Water Quality Control Board, the Carlsbad Desalination Project is fully permitted and ready to start construction within a matter of weeks. Approval by Metropolitan Water District of the Seawater Desalination Program (SDP) agreement among MWD, the San Diego County Water Authority, and nine of the Water Authority's member public agencies is the final action needed to deliver this highly reliable water supply project to Southern California. Unfortunately, based on comments and actions taken at your board's Water Planning and Stewardship Committee on Monday, it appears that the MWD Board may end up frustrating project implementation by delaying approval of the SDP agreement. MWD's failure to timely approve the SDP agreement – at the same time it is experiencing a water supply shortage allocation and statewide water crisis – would seriously undermine MWD's reputation and credibility in Sacramento and Washington at a time when it is most needed in Bay-Delta negotiations.

As part of its August 20, 2001 action approving the seawater desalination program, MWD adopted administrative guidelines including provisions for, "Agreements coordinated through sponsoring member agencies for terms up to 25 years." (Emphasis added.) The Water Authority is the member agency coordinating the Carlsbad project in direct conformance with MWD's administrative guidelines. Three months later, in November 2001, MWD issued a request for proposals for seawater desalination projects within MWD's service area; the Carlsbad project was one of five approved projects. This project helps implement MWD's 2004 Integrated Resources Plan, which included a target of developing 150,000 acre-feet of seawater desalination; the Carlsbad project alone will satisfy more than one-third of that goal.

The Carlsbad project has strong support across a broad spectrum of stakeholders, including business and civic organizations, and state and local elected officials. In fact, MWD supported the project throughout its development and permitting, providing supportive testimony before key permitting agencies, including the California State Lands Commission and the California Coastal Commission. The project will provide 56,000 acre-feet of reliable water annually within the MWD service territory at a time when we most need it. The project completion date is scheduled for 2012, long before MWD can reasonably expect to find or implement any alternative that could provide such a large and reliable water supply. Moreover, under MWD's Supply Allocation Plan, the Water Authority's water supply allocation from MWD would be reduced as a result of the implementation of this project. This means more water for all of MWD's other member agencies. Progress on the project was recently reported to MWD's newly created Special Committee on Desalination and Recycling; there was no suggestion at that time that MWD needed more time to study the project. Indeed, the premise of that meeting was an expressed concern that MWD's current program supporting seawater desalination projects might have to be changed because member agency projects were not being implemented in a timely fashion.

The SDP agreement has been extensively and successfully negotiated among the parties. Under the agreement, the Water Authority has agreed to perform all obligations MWD has required, including commitments to ensure that the public interest is protected under the public/private partnership with Poseidon. Drafted by MWD's own legal counsel, the SDP agreement ensures that the public interest is protected through provisions that ensure public funds are properly expended and accounted for, that payments are made only for water that is actually delivered, and that project costs are minimized. These are the exact concerns the Water Authority and its member agencies have and which have been addressed in the SDP agreement. As MWD's largest member agency, the Water Authority has a strong and vested interest in assuring that MWD dollars are wisely spent.

During yesterday's Water Planning and Stewardship Committee, several board members questioned the SDP agreement, as though this agreement presented novel terms. But, the agreement is no different than many other agreements MWD has approved for local projects of other member agencies, including three of the other four seawater desalination projects approved as part of MWD's RFP process. MWD's up to $250/af contribution is paid only if water is actually produced, and is used solely to offset legitimate project costs as specified and verified by MWD. With the structure of this agreement, MWD bears no risks associated with project permitting and development.

MWD has reviewed this project numerous times during its development over the past several years and the project proponents, including the Water Authority and its

member agencies, have relied upon MWD's past review, comments, encouragement and strong support before regulatory and permitting agencies. The SDP agreement for MWD funding has been a specified project element that MWD has also known about and encouraged for many years. The Water Authority and its member agencies pursued the project in the good faith expectation that MWD would evaluate the project on an equal basis with other LRP projects under existing programs, consistent with SDP agreements signed with other agencies, and within the timeframe identified for successful project implementation. The last minute questions now being raised by MWD board members and the proposed referral to a new committee for yet another round of review cannot be justified based on the merits of this project, will likely jeopardize favorable financing for the project and could place the project itself at risk. There is no legitimate reason for MWD to erect a new roadblock to water supply reliability for its own customers.

The MWD board authorized entering into the SDP agreement in 2005 with all five member agencies, including the Water Authority, responding to the RFP. Since that time, MWD has executed three other SDP agreements. In the case of this agreement, each and every concern raised by MWD staff and legal counsel has been addressed by the Water Authority, its participating member public agencies, and Poseidon. The Water Authority urges the MWD board to approve the SDP agreement in November so that this important regional water supply project can proceed.

Sincerely,

Claude A. Lewis

Claude A. "Bud" Lewis
Chair
Board of Directors

CC: San Diego County Water Authority Board of Directors
Poseidon Resources, LLC
San Diego County Legislative Delegation
Governor Arnold Schwarzenegger
Senate Natural Resources and Water Committee Chair Fran Pavley
Assembly Water, Parks and Wildlife Committee Chair Jared Huffman

Attachment 5

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carollo.com

COST OF SERVICE STUDY

MAY 2015

San Diego County Water Authority

Calendar Year 2016 Rates and Charges

cost has been allocated to the storage rate component and will be recovered through the CY 2016 rates. The CY 2016 cost represents an increase from CY 2015 due to greater expected storage and evaporation levels.

Local Water Supply Development: This is the cost to implement local water supply projects within the Water Authority's service area in order to provide a long-term reliable and sustainable supply. The cost is recovered through the Customer Service charge to recognize the general region benefit. A total of $4.03 million will be recovered through the CY 2016 rates.

Twin Oaks Reimbursement: This reimbursement reflects a 25-year payback to customer service for the upfront investment in the implementation of the Twin Oaks Valley Water Treatment Plant. This original investment was funded through use of Pay-as-you-Go (PAYGO) funds, which had been historically collected from the non-treatment functional rate categories. The cost is recovered through the treatment charge. A total of $0.77 million will be recovered through the CY 2016 rates.

3.3 CAPITAL COSTS

The Water Authority's existing CIP is based on the results of planning studies, including the 2010 Urban Water Management Plan (UWMP) and the 2002 Regional Water Facilities Master Plan and extends through 2030. These CIP projects include a mix of new facilities that will add capacity to existing conveyance, storage, and treatment facilities, as well as repair and replace aging infrastructure. The Water Authority utilizes both PAYGO and debt financing to fund capital improvements.

3.3.1 Annual Debt Service

The Water Authority finances major capital improvements, in part, by issuing debt for two primary reasons. First, given the size of recent capital projects, the Water Authority does not have the financial reserves available that would otherwise be required to fund the CIP nor would it be reasonable to increase the water rates and charges in order to cash fund these improvements. Secondly, spreading the debt service costs for the project over the repayment period provides intergenerational equity by effectively spreading the financial burden between both existing and future users of the system. This approach allows the Water Authority to better match the cost of improvements with those benefitting from the improvements. This methodology is internally consistent with the development of the Water Authority's System and Treatment Capacity Charges.

Finally, as an auxiliary benefit to the use of debt, the cash generated from meeting the Water Authority's coverage requirements provides additional cash that can be used to fund PAYGO projects.

6 FINDINGS

Based on the independent review performed for this rate study, Carollo confirms the Water Authority's existing methodology, cost allocations, rate-setting principles, and proposed CY 2016 rates are reasonable and consistent with AWWA cost-of-service principles, Board policies, and California legal requirements. Carollo's finding for this study are as follows:

- The Water Authority has significant detail and a sound basis for existing and proposed water rates and charges.
- The resulting cost of service allocations and existing methodology provide a clear, reasonable, and provide a defensible nexus between the cost of service provided and rates charged.
- Board policies and cost-of-service guidelines are applied consistently with industry best practices and AWWA M1 standards.
- The Water Authority's rates and charges adhere to the legal requirements as described within this report.
- The IAC was calculated in compliance with Board policies and adheres to the legal requirements as described within this report.
- The existing methodology yields an appropriate and reasonable method for allocating costs, which could be sustained absent substantial changes in cost drivers or customer discharge patterns occur.
- Revenue adjustments are necessary to cover the Water Authority's budget requirements. The revenue requirements for CY 2016 are coverage driven, as existing revenues fall below the desired DSCR target of 1.50x and necessary deposits into the RSF.
- The proposed CY 2016 water rates and charges necessitate roughly an $8 million utilization of the RSF and continue to meet the Board's DSCR target of 1.50x.

Attachment 6, Part 1

United States Environmental Protection Agency

Cases in Water Conservation:

How Efficiency Programs Help Water Utilities Save Water and Avoid Costs

New York City Department of Environmental Protection

www.nyc.gov/dep

City of Ashland

Tampa Water Department

Water Resources Authority Massachusetts

Irvine Ranch Water District

Reduce Your Use

Town of Gilbert water conservation

City of Santa Monica

What Will You Save Today?

Water Conservation Program City of Houston

A Message from the Administrator

Christine Todd Whitman

I believe water is the biggest environmental issue we face in the 21st Century in terms of both quality and quantity. In the 30 years since its passage, the Clean Water Act has dramatically increased the number of waterways that are once again safe for fishing and swimming. Despite this great progress in reducing water pollution, many of the nation's waters still do not meet water quality goals. I challenge you to join with me to finish the business of restoring and protecting our nation's waters for present and future generations.

Table of Contents

Introduction

Water utilities across the United States and elsewhere in North America are saving substantial amounts of water through strategic water-efficiency programs. These savings often translate into capital and operating savings, which allow systems to defer or avoid significant expenditures for water supply facilities and wastewater facilities.

These case studies feature the efforts and achievements of 17 water systems. These systems range in size from small to very large, and their efficiency programs incorporate a wide range of techniques for achieving various water management goals. In every case, the results are impressive. The following summary table provides an overview of the case studies, highlighting problems addressed, approaches taken, and results achieved. In general, water conservation programs also produce many environmental benefits, including reduced energy use, reduced wastewater discharges, and protection of aquatic habitats.

The incidence of water conservation and water reuse programs has increased dramatically in the last 10 years. Once associated only with the arid West, these programs have spread geographically to almost all parts of the United States. In many cities, the scope of water conservation programs has expanded to include not only residential customers, but commercial, institutional, and industrial customers, as well. These case studies illustrate some of the tangible results achieved by water conservation programs implemented at the local level. Many of these accomplishments have broader relevance to other communities facing similar water resource management and infrastructure investment issues.

EPA used secondary data sources to compile these case studies. These sources are cited in the "Resources" section at the end of each piece. In addition, contacts for each water system have reviewed and approved their case study. Because the case studies come from secondary sources, the type of information provided is not necessarily uniform or comparable, and is not intended to provide generalized results. The terms water conservation and water efficiency are used here in their broadest context, which includes water loss management, wastewater reclamation and reuse for non-potable purposes, adoption of conservation water rates, changes to more efficient water-using equipment, and behavioral changes that reduce water use.

Summary of Conservation Case Studies

City	Problem	Approach	Results
Albuquerque, New Mexico	A dry climate and increased population growth put a strain on Albuquerque's water supply.	Albuquerque's Long-Range Water Conservation Strategy Resolution consisted of new conservation-based water rates, a public education program, a high-efficiency plumbing program, landscaping programs, and large-use programs.	Albuquerque's conservation program has successfully slowed the groundwater drawdown so that the level of water demand should stay constant until 2005. Peak demand is down 14% from 1990.
Ashland, Oregon	Accelerated population growth in the 1980s and the expiration of a critical water right created a water supply problem.	Ashland's 1991 water efficiency program consisted of four major components: system leak detection and repair, conservation-based water rates, a showerhead replacement program, and toilet retrofits and replacement.	Ashland's conservation efforts have resulted in water savings of approximately 395,000 gallons per day (16% of winter usage) as well as a reduction in wastewater volume.
Cary, North Carolina	With the population more than doubling during the past 10 years and high water demand during dry, hot summers, the city's water resources were seriously strained.	Cary's water conservation program consists of eight elements: public education, landscape and irrigation codes, toilet flapper rebates, residential audits, conservation rate structure, new homes points program, landscape water budget, and a water reclamation facility.	Cary's water conservation program will reduce retail water production by an estimated 4.6 mgd by the end of 2028, a savings of approximately 16% in retail water production. These savings reduced operating costs and have already allowed Cary to delay two water plant expansions.
Gallitzin, Pennsylvania	By the mid-1990s, the town of Gallitzin was experiencing high water loss, recurring leaks, low pressure, high operational costs, and unstable water entering the system.	Gallitzin developed an accurate meter reading and system map, and a leak detection and repair program.	The results of the program were dramatic. Gallitzin realized an 87% drop in unaccounted-for water, a 59% drop in production, and considerable financial savings.
Gilbert, Arizona	Rapid population growth during the 1980s put a strain on the water supply of this Arizona town located in an arid climate.	Gilbert instituted a multi-faceted water conservation program that included building code requirements, an increasing-block water rate structure, a metering program, public education, and a low water-use landscaping program.	Gilbert has been particularly successful reusing reclaimed water. A new wastewater reclamation plant was built, as well as several recharge ponds that serve as a riparian habitat for a diverse number of species.

Summary of Conservation Case Studies

City	Problem	Approach	Results
Goleta, California	A growing California town, Goleta was facing the possibility of future water shortages. Its primary water source, Lake Cachuma, was not sufficient to meet its needs.	Goleta established a water efficiency program that emphasized plumbing retrofits, including high-efficiency toilets, high-efficiency showerheads, and increased rates.	The program was highly successful, resulting in a 30% drop in district water use. Goleta was able to delay a wastewater treatment plant expansion.
Houston, Texas	Houston's groundwater sources have experienced increasing problems with land subsidence, saltwater intrusion, and flooding. These problems, along with a state regulation to reduce groundwater use, led Houston to explore methods for managing groundwater supplies.	Houston implemented a comprehensive conservation program that included an education program, plumbing retrofits, audits, leak detection and repair, an increasing-block rate structure, and conservation planning.	The dramatic success of pilot programs has led Houston to predict a 7.3% reduction in water demand by 2006 and savings of more than $260 million.
Irvine Ranch Water District, California	IRWD has experienced dramatic population growth, drought conditions in the late 80s and early 90s, and increasing wholesale water charges.	IRWD's primary conservation strategy was a new rate structure instituted in 1991. The five-tiered rate structure rewards water-efficiency and identifies when water is being wasted. The goal is to create a long-term water efficiency ethic, while maintaining stable utility revenues.	After the first year of the new rate structure, water use declined by 19%. Between 1991 and 1997, the district saved an estimated $33.2 million in avoided water purchases.
Massachusetts Water Resources Authority	MWRA is a wholesale water provider for 2.2 million people. From 1969 to 1988, MWRA withdrawals exceeded the safe level of 300 mgd by more than 10% annually.	MWRA began a water conservation program in 1986 that included leak detection and repair, plumbing retrofits, a water management program, an education program, and meter improvements.	Conservation efforts reduced average daily water demand from 336 mgd (1987) to 256 mgd (1997). This allowed MWRA to defer a water-supply expansion project and reduce the capacity of the treatment plant, resulting in total savings ranging from $1.39 million per mgd to $1.91 million per mgd.
Metropolitan Water District of Southern California	Metropolitan Water District is the largest supplier of water for municipal purposes in the United States. Metropolitan recognized the need for conservation, given increased economic and population growth, drought, government regulations, water quality concerns, and planned improvement programs.	Metropolitan's Conservation Credits Program provides funding for a large percentage of water conservation projects. Projects have included plumbing fixture replacement, water-efficiency surveys, irrigation improvements, training programs, and conservation-related research projects.	Conservation efforts have considerably reduced the cost estimate of Metropolitan's capital-improvement. Water savings have amounted to approximately 66,000 acre-feet per year, a savings of 59 mgd.

Summary of Conservation Case Studies

City	Problem	Approach	Results
New York City, New York	By the early 1990s, increased demand and periods of drought resulted in water-supply facilities repeatedly exceeding safe yields. Water rates more than doubled between 1985 and 1993.	New York's conservation initiatives included education, metering, leak detection, water use regulation, and a comprehensive toilet replacement program.	Leak detection and repair, metering, and toilet replacements were particularly successful programs. New York reduced its per-capita water use from 195 gallons per day in 1991 to 167 gallons per day in 1998, and produced savings of 20 to 40% on water and wastewater bills.
Phoenix, Arizona	Phoenix is one of the fastest growing communities in the United States and suffers from low rainfall amounts. The state legislature has required that, after 2025, Phoenix and suburban communities must not pump groundwater faster than it can be replenished.	Water conservation programs instituted in 1986 and 1998 focused on pricing reform, residential and industrial/ commercial conservation, landscaping, education, technical assistance, regulations, planning and research, and interagency coordination.	Phoenix's conservation program currently saves approximately 40 mgd. Phoenix estimates that the conservation rate structure alone saved 9 mgd.
Santa Monica, California	Santa Monica faced rapid population growth, which put a strain on its water supplies. Also, contamination was found in several wells in 1996, forcing the city to increase water purchases.	Santa Monica instituted a multifaceted water conservation program that includes water-use surveys, education, landscaping measures, toilet retrofits, and a loan program.	Santa Monica was able to reduce its water use by 14% and waste-water flow by 21%. The toilet retrofit program resulted in a reduction of 1.9 mgd and net savings of $9.5 million from 1990 to 1995.
Seattle, Washington	Steady population growth, dry summers, and lack of long-term storage capacity forced Seattle to choose between reducing use and developing new water sources.	Seattle's water conservation program has included a seasonal rate structure, plumbing fixture codes, leak reduction, incentives for water-saving products, and public education. Special emphasis has been placed on commercial water conservation.	Per-capita water consumption dropped by 20% in the 1990s. The seasonal rate structure, plumbing codes, and efficiency improvements are particularly credited with success. It is estimated that the commercial water conservation programs will save approximately 8 mgd.
Tampa, Florida	Rapid economic and residential population growth along with seasonal population growth has put a strain on Tampa's water supply.	Since 1989, Tampa's water conservation program has included high efficiency plumbing retrofits, an increasing-block rate structure, irrigation restrictions, landscaping measures, and public education. Particular emphasis has been put on efficient landscaping and irrigation.	Tampa's landscape evaluation program resulted in a 25% drop in water use. A pilot retrofit program achieved a 15% reduction in water use.

Summary of Conservation Case Studies

City	Problem	Approach	Results
Wichita, Kansas	Ten years ago, analysts determined that the city's available water resources would not meet its needs beyond the first decade of the 21st century. Alternative sources were not available at an affordable price.	Wichita utilized an integrated resource planning approach. This included implementing water conservation, evaluating existing water sources, evaluating nonconventional water resources, optimizing all available water resources, pursuing an application for a conjunctive water resource use permit, evaluating the effects of using different water resources, and communicating with key stakeholders.	Analysis of resource options for Wichita resulted in a matrix of 27 conventional and nonconventional resource options.
Barrie, Ontario	Rapid population growth put a strain on Barrie's water and wastewater infrastructure, forcing the city to consider expensive new supply options and infrastructure development.	Barrie's conservation plan focused on replacing inefficient showerheads and toilets.	Barrie was able to save an average of 55 liters (14.5 gallons) per person per day. The reduction in wastewater flows enabled Barrie to defer an expensive capital expansion project. Water conservation efforts saved an estimated $17.1 million (Canadian dollars) in net deferred capital expenditures.

mgd = million gallons per day

Albuquerque, New Mexico: Long-Range Planning to Address Demand Growth

Background

Albuquerque's water system produces approximately 37 billion gallons per year and serves a population of approximately 483,000. The city receives less than 9 inches of rain per year, and its water supply was strained severely when its population grew by 24 percent between 1980 and 1994.

In 1993, the United States Geological Survey reported that groundwater levels in Albuquerque were dropping significantly. The rate of groundwater withdrawals by the city was more than twice the amount that could be sustained over time. The city planned to use surface water diverted from the Colorado River Basin to the Rio Grande River Basin to recharge its falling groundwater supplies, but studies of the area showed that the plan was not feasible. In 1994, Albuquerque instead adopted a comprehensive Water Resources Management Strategy, which included plans to make more direct use of surface water supplies, reclaim wastewater and shallow groundwater for irrigation and other nonpotable uses, and implement an aggressive water conservation program.

Approach

Albuquerque adopted the Long-Range Water Conservation Strategy Resolution, which states that "conservation can extend the city's supply at a fraction of the cost of other alternatives." The resolution's goal is to reduce total water usage by 30 percent by 2004, a decrease of 75 gallons per capita per day over 9 years. The water conservation program includes five components:

- **Water Rates.** The city applies a summer surcharge of 21 cents per ccf (100 cubic feet) when customers' use exceeds 200 percent of their winter average. In 1995, the city increased the rate by 8.8 cents per ccf of water consumed to fund the water conservation program. More than half of the revenue from the surcharge is allocated to the conservation program, and a large portion is returned to customers through rebates and other incentives. On May 1, 2001, the commodity rate increased to $1.07 per ccf ($1.43 per 1,000 gallons) including an additional state surcharge of 2.44 cents per ccf.
- **Public Education.** Education programs consist of running public relations campaigns, including water usage information in water bills, and organizing cooperative programs

with schools and community organizations. The city works with citizens and affected customers whenever new legislation or measures are developed or proposed.

- **Residential Use.** Albuquerque amended its Uniform Plumbing Code to require high-efficiency toilets (1.6 gallons or less per flush) in all new residential construction. The city also established rebates for high-efficiency toilets (up to $100) and efficient clothes washers ($100). The city offers free water audits and installation of high-efficiency plumbing devices.
- **Landscaping/Outdoor Water Use.** In 1995, the city adopted the Water Conservation Landscaping and Water Waste Ordinance. The ordinance includes strict requirements for landscaping new developments, such as prohibiting the use of high-water-use grasses on more than 20 percent of the landscaped area. It also includes restrictions for landscaping on city properties, along with watering and irrigation regulations. Since 1996, the city has offered tools to assist property owners in converting to Xeriscape™ landscapes. In addition to how-to videos and guides, homeowners can choose from six professionally designed Xeriscape™ plans. The Xeriscape™ Incentive Program provides a rebate of 25 cents per square foot of converted landscape area up to $500 ($700 for commercial landscapes).
- **Institutional, Commercial, and Industrial Water Use.** The city requires all customers using more than 50,000 gallons per day to prepare and implement a water conservation plan. The city plans to adopt an ordinance to prohibit once-through cooling systems. The city currently runs a program to reduce water losses it can't account for and makes free water-use surveys available for non-residential customers.

Results

Albuquerque's water conservation program has successfully slowed the drawdown of the area's groundwater supply. Estimates indicate that the water conservation programs will decrease the level of water demand in Albuquerque until 2005. Water savings from conservation will help mitigate the rate of future demand growth.

Specific conservation programs have met with considerable success. By the end of April 2001, rebates had been provided for more than 39,000 high-efficiency toilets. At the close of the year, per capita water use had dropped to 205 gallons per day—a reduction of 45 gallons per day from 1995 levels. Albuquerque found that, by 2001, its landscaping program and rate structure had helped reduce peak water use by 14 percent from its high point in 1990.

Summary of Results for Albuquerque, NM

Number of high-efficiency toilets installed (by 2001)	39,303
Reduction in per-capita water use (from 1995 to 2001)	45 g/c/d
Reduction in peak demand (1990 – 2001)	14%

g/c/d = gallons per capita per day

Resources

City of Albuquerque, Water Conservation Programs 1998, <www.cabq.gov/waterconservation/index.html>

Edward R. Osann and John E. Young, *Saving Water, Saving Dollars: Efficient Plumbing Products and the Protection of America's Waters* (Potomac Resources, Inc., Washington, DC, April 1998), p. 39.

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Ashland, Oregon: Small Town, Big Savings

Background

Ashland, Oregon, is a small city of approximately 20,000 people. The Water Division treats and transports an average of 6.5 million gallons daily in the summer and 2.5 million gallons daily in the winter. Annual usage is approximately 150 gallons per capita per day. Ashland experienced an accelerated population growth rate in the late 1980s. At the same time, it faced the imminent expiration of a critical water right. Initially, the city had two options available to increase water supplies. The first was to create a reservoir by damming Ashland Creek at a cost of approximately $11 million. The second was to lay 13 miles of pipeline to the Rogue River at a cost of approximately $7.7 million. The city decided, however, that neither option was fiscally or politically feasible. Furthermore, the proposed dam site disturbed habitat for the endangered spotted owl. Ashland therefore decided to implement a four-point water efficiency program to address its water supply problem.

Approach

Ashland's water conservation program became a natural addition to the city's existing resource conservation strategy, which addresses energy efficiency, regional air quality, recycling, composting, and land use. In 1991, the city council adopted a water efficiency program with four major components: system leak detection and repair, conservation-based water rates, a high-efficiency showerhead replacement program, and toilet retrofits and replacement. The city estimated that these programs would save 500,000 gallons of water per day at a cost of $825,875—approximately one-twelfth the cost of the proposed dam—and would delay the need for additional water-supply sources until 2021.

Implementation of the program began with a series of customer water audits, which in turn led to high-efficiency showerhead and toilet replacements and a $75 rebate program (later reduced to $60). Ashland also instituted an inverted block rate structure to encourage water conservation. Recently, Ashland began offering rebates for efficient clothes washers and dishwashers (including an energy rebate for customers with electric water heaters). The town provides a free review of irrigation and landscaping, as well.

Results

Implementation of Ashland's Water Conservation Program began in July 1992. By 2001, almost 1,900 residences had received a water audit. Almost 85 percent of the audited homes

participated in the showerhead and/or toilet replacement programs. Ashland has been able to reduce its water demand by 395,000 gallons per day (16 percent of winter use) and its wastewater flow by 159,000 gallons per day. An additional benefit of the program has been an estimated annual savings of 514,000 kilowatt-hours of electricity, primarily due to the use of efficient showerheads.

Summary of Results for Ashland, OR

Water Savings	
Water Savings per day (by 2001)	395,000 gal.
Reduction in winter usage	16%
Wastewater reduction per year (by 2001)	58 million gal.
Cost Savings	
Estimated cost of proposed reservoir program	$11,000,000
Estimated cost of proposed pipeline program	$7,700,000
Cost of water conservation program	$825,875
Total estimated avoided costs	$6,874,125 – $10,174,125

Resources

"A Negadam Runs Through It," *Rocky Mountain Institute Newsletter.* Vol. XI, No. 1 (Spring 1995), p. 8.

"The City of Ashland Municipal Utility Comprehensive Conservation Programs," The Results Center. Profile #115 <www.crest.org >.

The City of Ashland, Oregon, Conservation Department, <www.ashland.or.us/SectionIndex.asp?SectionID=432>.

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Cary, North Carolina: Cost-Effective Conservation

Background

The population of Cary, North Carolina—an affluent suburb just west of Raleigh—has more than doubled during the past 10 years, putting a strain on the city's water resources. In 1995, Cary officials began planning to expand the city's water plant to meet increased demand. Two additional expansions were scheduled to occur within a 30-year time period. Cary's water supplies are particularly strained during its dry, hot summers, mostly because of irrigation and lawn watering. Most water use in Cary (approximately 75 percent) can be attributed to residential customers, and commercial customers account for almost 21 percent of total usage. Analysts predict that the average daily retail water demand in Cary will grow from 8.6 million gallons per day (mgd) in 1998 to 26.7 mgd in 2028.

Approach

Recognizing the need to incorporate conservation into its integrated resource management, the Cary town council adopted a water conservation program in 1996 with the following goals:

- Reduce the town's average per capita water use by 20 percent by 2014 (later revised to 2020).
- Support the high quality of life in Cary by providing safe, reliable water service, while reducing per capita use of water.
- Conserve a limited natural resource.
- Reduce costs of infrastructure expansion.

In 1999, Cary decided to have its conservation programs place a greater emphasis on measures that could reduce peak-day demand during the high-volume summer months. The resulting 10-year Water Conservation and Peak Demand Management Plan is based on a careful benefit/cost analysis of numerous potential conservation programs. According to the plan, any conservation measures undertaken by the city must meet certain criteria:

- A benefit/cost ratio greater than 1.0
- Reasonable cost
- Significant water savings
- Nonquantifiable but positive effects (community acceptance)

Cary's water conservation program consists of eight elements:

Public Education. Cary runs several public education programs. The "Beat the Peak" campaign is aimed at the high-demand summer months. Through this program, residents are encouraged to gauge their sprinkler use. Another program, called "Block Leader," is a grassroots effort to involve residents in water conservation. Cary also runs an elementary school program to distribute educational materials in schools, offers workshops to teach water-efficient landscaping and gardening, and distributes printed material on water conservation to the general public.

Landscape and Irrigation Codes. The city implements water-use-restriction ordinances limiting outdoor watering during summer peak months. The Controlling Wasteful Uses of Water Ordinance allows the city to regulate and control irrigation and reduce hardscape watering and runoff. Commercial landscaping regulations require drought-tolerant plants and other water-efficient landscaping methods.

Toilet Flapper Rebates. Customers receive rebates to replace existing flappers with early closure flappers that can save up to 1.3 gallons per flush.

Residential Audits. Residential customers are offered a 1-hour audit to assess water use, detect leaks, and provide supplies such as low-flow plumbing devices.

Conservation Rate Structure. Cary has established an increasing-block rate structure to encourage water conservation. The rate structure consists of three tiers—a low-use, average-use, and high-use.

New Homes Points Program. The city approves development projects based on a point scale, giving extra points for subdivisions that use selected water-efficient measures.

Landscape Water Budget. Large public and private irrigation users are provided monthly water budgets that identify the appropriate watering needs for their situation.

Water Reclamation Facility. The city is building a water reclamation facility that will produce up to 1.58 million gallons of reclaimed water per day. The water will be used for irrigation and other nonpotable uses. Reclaimed water will be offered free of charge to bulk-purchase customers.

Results

According to estimates, water conservation in Cary will reduce retail water production by 4.6 mgd (16 percent) by the end of 2028. Water conservation efforts will also help Cary reduce operating costs and defer considerable capital expenditures. The city has delayed the two water plant expansions, projecting that the 10-year savings from water conservation will be 1 mgd and 2 mgd by 2019.

Cary's water reclamation facility is expected to cut peak demand in the city by 8 percent. City ordinances restricting water use considerably decreased usage during peak demand months. In addition, 80 percent of residential customers and 99.9 percent of commercial customers comply with the rain sensor ordinance. City residents have redeemed approximately 500 rebates and have purchased more than 1,000 flappers. The city also distributed 25,000

packets to residents to gauge amounts of irrigation, reached 19 percent of the city's customers through Block Leaders, and mailed water conservation brochures to all customers.

Summary of Results for Cary, NC

Program Element	Water savings projected in 2009 (mgd)	Water savings projected in 2019 (mgd)	Unit cost of water saved ($/mgd)	First 5 years of costs ($)	Benefit/cost ratio
Residential water audits	0.053	0.077	546.85	71,335	1.13
Public education	0.3	0.41	400.59	314,280	1.53
Toilet flapper rebate	0.005	0	828.04	11,762	1.03
Water reclamation facility	0.27	0.3	NA	NA	NA
Landscape water budgets	0.013	0.023	754.33	64,175	0.88
New home points program	0.5	0.77	38.18	100,000	16.20
Landscape/irrigation codes	0.02	0.04	276.07	128,350	2.60
Inverted-block rate structure	0.14	0.42	49.40	54,000	14.26
Combined results	1.17	2.0	137.50	655,552	4.44

Source: Raftelis Environmental Consulting as reported in Jennifer L. Platt and Marie Cefalo Delforge, "The Cost-Effectiveness of Water Conservation," *American Water Works Association Journal.* Vol. 93, No. 3 (March 2001), p. 78.

Note: Water savings estimated for the water conservation plan do not equal the total water savings associated with the sum of each plan element because of the "shared water savings" produced by conservation measures that focus on similar end uses. The decision to construct a water reclamation facility was made independent of this study.

Resources

"Cary's Bulk Reclaimed Water Project," Town of Cary <www.townofcary.org/depts/pio/bwindex.htm>.

Platt, Jennifer L. and Delforge, Marie Cefalo. "The Cost-Effectiveness of Water Conservation," *American Water Works Association Journal*. Vol. 93, No. 3 (March 2001), pp. 73-83.

"Town of Cary Water Conservation," Town of Cary Public Works and Utilities <www.townofcary.org/depts/pwdept/water/waterconservation/overview.htm>.

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Gallitzin, Pennsylvania: Leak Management by a Small System

Background

Gallitzin is a small town in western Pennsylvania with a population of approximately 2,000. The Gallitzin Water Authority services approximately 1,000 connections. In the mid-1990s, the system was experiencing water losses exceeding 70 percent. In November 1994, the system was using an average of 309,929 gallons per day. Gallitzin experienced a peak usage in February 1995 of 500,000 gallons per day. The water authority identified five major problems in the system:

- High water loss
- Recurring leaks
- High overall operational costs
- Low pressure complaints
- Unstable water entering the distribution system

Based on these issues, the authority decided it needed a comprehensive program for water leak detection and corrosion control.

Approach

Gallitzin first developed accurate water production and distribution records using 7-day meter readings at the plant and pump station. It then created a system map to locate leakage. Through the use of a leak detector, the authority found approximately 95 percent of its leaks. Outside contractors identified the remaining 5 percent. The city initiated a leak repair program and a corrosion control program at the Water Treatment Plant. Gallitzin was one of the first systems to receive technical assistance from the Pennsylvania Department of Environmental Protection Small Water Systems Outreach Program. The training helped the authority repair distribution system leaks, replace meters, and improve customer billing. Gallitzin is also working to improve the capacity of surface-water sources and develop a supplemental groundwater source.

Results

By November 1998, 4 years after implementation of the program, the system delivered an average of 127,893 gallons per day to the town—down from 309,929 gallons per day in November 1994. Unaccounted-for water dropped to only 9 percent. The financial savings from the program have been highly beneficial. The city saved $5,000 on total annual chemical costs and $20,000 on total annual power costs from 1994 to 1998. The significant savings help the authority keep water rates down.

Other beneficial impacts reported by the Gallitzin Water Authority include:

- Extended life expectancy of equipment
- Savings in purchased water costs during drought conditions
- Reduction in overtime costs
- Improvement in customer satisfaction
- Enhanced time utilization

Summary of Results for Gallitzin, PA

	Unit	1994	1998	Percentage change
Customers	Connections (approximate)	1,000	1,000	0%
Water	Production gallons per day	309,929	127,893	-59%
	Annual production gallons	113,124,085	46,680,945	-59%
	Water pumped from low to high tank	99,549,195 (88%)	35,010,708 (75%)	-65%
	Total plant production hours	5,387	2,223	-59%
	Filter backwash water (gallons)	1,316,788	543,376	-59%
	Unaccounted-for water	70%	9%	-87%
Power	Kilowatt-hours	142,807	50,221	-65%
	Total power cost @ $.081/kwh	$31,671	12,367	-61%
Chemicals	Cost per million gallons ($) *	$90.98	$116.86	28%
	Total chemical cost ($)	$10,292	$5,455	-47%

Source: John Brutz, "Leak Detection Helps District Cut Losses," A presentation at the Energy Efficiency Forum in San Diego, California (August 1999).

* Added sodium bicarbonate treatment; other unit chemical costs remained constant or declined.

Resources

John Brutz, "Leak Detection Helps District Cut Losses," A presentation at the Energy Efficiency Forum in San Diego, California (August 1999).

"First Small Water System Outreach Effort A Success," July 12, 1996. Pennsylvania Department of Environmental Protection press release, <www.dep.state.pa.us/dep/counties/common/outreach.htm>.

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Gilbert, Arizona: Preserving Riparian Habitat

Background

The town of Gilbert, Arizona, has experienced rapid population growth, increasing from 5,717 residents in 1980 to 29,188 residents in 1990, with an estimated 2001 population of 115,000. This rapid growth has strained water resources, particularly because Gilbert is located in a very arid region, receiving an annual average rainfall of 7.66 inches and losing substantial amounts of water annually to evaporation. Prior to March 1997, Gilbert was entirely dependent upon groundwater. The town now relies on a combination of water supplies, with a capacity of 27 million gallons per day (mgd) from groundwater and 15 mgd from surface water. Surface water capacities will be expanded to 40 mgd by the summer of 2002 following the addition of a new water treatment plant. Gilbert's average water demand is 28.5 mgd, with a peak demand of 41.5 mgd. Gilbert opted to implement a comprehensive water efficiency program to help meet increased water demand, and is recognized as the first community in Arizona to design and implement a 100-year water plan. A key component of the plan is wastewater reclamation and recharge of groundwater. The reuse project has created wildlife habitat and the recharge areas are used for recreation, education, and research.

Approach

Gilbert has implemented a multifaceted approach to water conservation. First, building code requirements exist for all new construction and include requirements for efficient plumbing devices and the use of recycled water. Next, an increasing-block water rate structure was instituted, consisting of the following:

Monthly Consumption (Gallons)	Cost per 1,000 gallons
0 to 20,000	$0.85
20,000 to 30,000	1.10
30,000+	1.25

All water use in Gilbert—residential, commercial, and industrial—is metered, and Gilbert set a goal of 100 percent reuse of reclaimed water. The town also sponsors several public-education programs and requires using pre-approved low water-use plant materials for all landscaping in street right-of-way. Gilbert also is developing additional conservation measures, such as water-use audits, free conservation kits, Xeriscape™ brochures and other outdoor water saving information; a homeowners water conservation education program; and a new school education program.

Results

Gilbert's conservation efforts are considered a success, particularly its efforts to reuse and recharge all its reclaimed water. Gilbert receives credits from the state where the effects of recharge are measurable. Water reclamation has helped the city meet groundwater management goals and has provided an additional resource for meeting water demand. In 1986, Gilbert built a 5.5 mgd wastewater reclamation plant, allowing the city to store recharge water for future use. In 1989, the town developed a 40-acre recharge site with six recharge ponds. In 1993, it expanded the site to 75 acres and 12 recharge ponds.

By 2001, the system served 20 customers via 25 miles of reclaimed water distribution pipeline and recharged more than 5 billion gallons of water. As an incentive, the cost of the reclaimed water is $0.03 per 1,000 gallons. An added benefit of the reuse project has been the development of a shoreline habitat for diverse plant species and a variety of birds, mammals, fish, amphibians, and insects that provides educational and recreational opportunities for local residents. In October 1999, Gilbert completed a 130-acre project with 7 percolation basins averaging 9 acres each that recharge up to 4 mgd of tertiary-treated effluent from the wastewater reclamation plant, as well as surface water from the Colorado River and from Salt River Project's system.

Summary of Results for Gilbert, AZ

Amount of water recharged	5 billion gallons
Number of recharge ponds	12
Number of reclaimed water customers	20

Resources

"Gilbert, Arizona," Center for Renewable Energy and Sustainable Technology, <www.crest.org>.

Gilbert, Arizona, Home Page, <www.ci.gilbert.az.us/water/index.htm>.

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Goleta, California: Avoiding Shortages and Plant Expansion

Background

The Goleta, California, Water District serves approximately 75,000 customers spanning an area of about 29,000 acres. Goleta's water supply comes primarily from Lake Cachuma (9,300 acre-feet per year) and the state Water Project (4,500 acre-feet per year). The district can also produce approximately 2,000 acre-feet per year from groundwater wells. In 1972, analysts predicted future water shortages in Goleta, so the district began seeking additional water sources and established a water efficiency program.

Approach

Goleta's water efficiency program cost approximately $1.5 million and emphasized plumbing retrofits, including the installation of high-efficiency toilets (1.6 gallons per flush) and showerheads. The program also included free onsite water surveys, public education, and changes in metering and rate structure. A mandatory rationing plan was imposed on May 1, 1989 to reduce use by 15 percent.

Results

Between 1987 and 1991, Goleta issued 15,000 rebates for high-efficiency toilets and installed 35,000 low-flow showerheads. Between 1983 and 1991, 2,000 new high-efficiency toilets were installed in new construction and remodels. Onsite surveys and public education efforts helped consumers improve outdoor water efficiency, and increased water rates provided extra incentive for consumers to reduce water use. The conservation and rationing programs, as well as the rate increases, contributed to a 50-percent drop in per capita residential water use in 1 year—between May 1989 and April 1990. Total district water use fell from 125 to 90 gallons per capita per day—twice the original target of 15 percent. The water-efficiency program also reduced sewage flow from 6.7 million gallons per day (mgd) to 4 mgd. As a result, Goleta Sanitary was able to delay a multimillion-dollar treatment plant expansion.

Summary of Results for Goleta, CA

Number of toilet rebates (1987–1991)	15,000
Number of toilets installed in new construction and remodels (1983–1991)	2,000
Number of showerheads installed	35,000
Reduction in per-capita residential water use	50%
Reduction in total district water use	30%
Reduction in wastewater flow	2.7 mgd (40%)

mgd= million gallons day

Resources

Goleta Water District, Home Page, <www.goletawater.com/html/framework/splash.html>.

"Residential Indoor Water Efficiency: Goleta, CA," Center for Renewable Energy and Sustainable Technology, <www.crest.org>.

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Houston, Texas: Reducing Capital Costs and Achieving Benefits

Background

The Houston Department of Public Works and Engineering serves a population of 1.7 million and provides water service to more than 553,000 retail connections. The city also sells wholesale water to 16 other communities. Houston receives an average of 50 inches of rain per year and has sufficient water supplies to meet demand through 2030, but 43 percent of Houston's water comes from groundwater sources that are threatened by increasing instances of land subsidence, saltwater intrusion, and flooding. In some areas, the land has actually subsided, or sunk, 10 feet. Conversion to surface sources or expanded use of surface water will require costly construction of water treatment plants and transmission mains. In addition, Houston is required by state regulations to reduce groundwater use 20 percent by 2030. These factors have led Houston to explore methods for managing its groundwater supplies.

Approach

Houston implemented water conservation programs to help reduce city expenditures and capital investments. In 1993, the Texas Natural Resource Conservation Commission also required Houston to implement a conservation plan to meet state requirements. The conservation program has four elements:

- Education program
- In-house program
- Contract customers program
- Conservation planning program

The education program consists primarily of outreach initiatives, as well as efficiency retrofits for older structures. The in-house program includes city irrigation audits, leak detection and repair for city pools and fountains, and analysis of city departments' water use. The contract customers program eliminated unnecessary requirements, required billing based on actual water use, and added penalties for excessive water usage during peak-demand periods.

The conservation planning program began in 1994 when Houston was awarded a grant from the Texas Water Development Board that financed a conservation planning study. The study examined the costs and benefits of more than 200 con-

servation measures. The conservation plan adopted by the city council in 1998 expanded existing educational and other programs to include residential water audits, appliance labeling, commercial indoor audits, cooling tower audits, public indoor and exterior audits, pool and fountain audits and standards, an unaccounted-for water program, increased public education, and a "water-wise and energy-efficiency program."

Houston also uses an increasing-block rate structure with two tiers for single-family residents. A minimum charge covers a base amount of water. Consumption between 5,000 and 12,000 gallons per month is billed an additional $2.36 per 1,000 gallons and consumption greater than 12,000 gallons per month is billed an additional $4.30 per 1,000 gallons.

Results

Since the program's inception, Houston has distributed 10,000 "WaterWise and Energy Efficient" conservation kits with high-efficiency showerheads and faucet aerators to area fifth-graders as part of a comprehensive education program, the majority of which were installed in homes. In addition, a pilot program at a 60-unit low-income housing development in Houston replaced 5 gallons-per-flush toilets with 1.6 gallons-per-flush toilets, fixed leaks, and installed aerators. At a total cost of $22,000, shared between the utility and the housing authority, the program reduced water consumption by 72 percent, or 1 million gallons per month. Water and wastewater bills dropped from $8,644 to $1,810 per month. These dramatic results have led the Houston Housing Authority to develop plans to retrofit more than 3,000 additional housing units.

The Houston City Council approved a new conservation plan on September 2, 1998 that includes a forecast of the savings from implementing the recommended water conservation measures. The plan predicts that implementation will reduce water demand by 7.3 percent by 2006. Including savings from continued use of efficient plumbing products in new construction and renovation, the overall demand forecast for 2006 will be cut by 17.2 percent.

Summary of Results for Houston, TX

Pilot Retrofit Program at 60-Unit Housing Development	
Fixture costs paid by water utility	$5,000
Fixture costs paid by housing authority	$6,000
Labor costs paid by housing authority	$11,000
Total cost of program	$22,000
Savings in water and wastewater bills from low-income pilot program	$6,834 per month
Activities and Water Savings	
Conservation kits distributed	10,000
Conservation kits installed	8,000
Average water savings from conservation kits	18% per household
Water savings from low-income pilot program (above)	72% (1 million gallons per month)
Predicted cut in water demand from conservation plan	7.3% (year 2006)
Total predicted cut in water demand	17.2% (year 2006)
Cost Savings	
Predicted benefit cost ratio of conservation plan	3.7 to 1
Predicted savings from conservation plan	$262 million

Resources

Daniel B. Bishop and Jack A. Weber, *Impacts of Demand Reduction on Water Utilities* (Denver: American Water Works Association, 1996), pp. 48-49.

City of Houston Water Conservation Branch Web page, <www.ci.houston.tx.us/pwe/utilities/conservation/>.

Edward R. Osann and John E. Young, *Saving Water, Saving Dollars: Efficient Plumbing Products and the Protection of America's Waters* (Potomac Resources, Inc., Washington, DC, April 1998), pp. 31-32.

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Irvine Ranch Water District, California: Reducing Purchased Water Costs Through Rates

Background

Irvine Ranch Water District (IRWD) in California provides water service, sewage collection, and water reclamation for the city of Irvine and portions of surrounding communities. The district serves a population of approximately 150,000 in a 77,950-acre service area containing 59,646 domestic and reclaimed water connections. IRWD delivered a total of 22.8 billion gallons of water between 1996 and 1997. The area has experienced considerable growth and development during recent decades. The district's service population grew by more than 75 percent in the 1980s and is projected to grow by 20 percent every 10 years. Population growth, drought conditions in the late 1980s and early 1990s, and increasing wholesale water charges led IRWD to choose conservation as one approach to meet the growing demand for water. The district is now a recognized leader in water reclamation and conservation programs.

Approach

IRWD adopted a five-tiered rate structure to reward water efficiency and identify areas where water is being wasted. The rate structure aims to create a long-term water efficiency ethic while maintaining stable utility revenues. IRWD individualizes rates for each account based on landscape square footage, number of residents, any additional needs of individual customers (such as for medical uses), and daily evapotranspiration rates (the amount of water lost through evaporation and transpiration of turfgrass).

Based on daily fluctuations in precipitation, each customer's rates are adjusted on each water bill to reflect estimated needs. When customers use more water than needed, they are given progressively expensive penalties. This individualized feedback alerts customers to excess use or leakage. Customers that correct a problem can request the removal of the penalties. Because IRWD does not depend on penalty revenues, such requests can be quickly and readily granted, leading to very high customer satisfaction ratings.

The five-tiered rate structure consists of the following:

Rate Tier	Amount and Basis
Low-volume discount	$0.48 per 100 cubic feet (ccf) for use of 0-40 percent of allocation ($0.64 per 1,000 gallons)
Conservation base rate	$0.64 per ccf for use of 41-100 percent of allocation ($0.85 per 1,000 gallons)
Inefficient	$1.28 per ccf for use of 101-150 percent of allocation ($1.71 per 1,000 gallons)
Excessive	$2.56 per ccf for use of 151-200 percent of allocation ($3.42 per 1,000 gallons)
Wasteful	$5.12 per ccf for use of 201 or greater percent of allocation ($6.85 per 1,000 gallons)

In addition to the consumption charges, all customers are billed a fixed water-service fee based on meter size, which ensures that utility revenues are permanently stable, regardless of the level of water sales. Residential customers with usage levels approximately 10 ccf/month are charged a flat sewer fee of $6.60 per month. Sewer fees are $0.74 per ccf ($0.99 per 1,000 gallons) for non-residential customers using more than 10 ccf per month. IRWD also imposes a pumping surcharge that varies from $0.11 to $0.56 per ccf ($0.15 to $0.75 per 1,000 gallons) for customers residing in high elevations. The average total residential water bill is approximately $20 per month.

Results

IRWD implemented the new rate structure in June 1991 and its impact was immediately evident. Water use in 1991/1992 declined by 19 percent, as compared to 1990/1991. Surveys show that customer satisfaction with the rate structure is highly favorable, reflecting 85 to 95 percent approval.

IRWD believes that the implementation of incentive pricing, especially the individualized customer water budget, made their other conservation programs more effective. Over the 6-year period between 1991 and 1997, IRWD spent approximately $5 million on other conservation programs such as irrigation workshops, water audits, and fixture rebates. During that time period, the estimated savings in avoided water purchases has been $33.2 million. Savings in landscape water totaled 61,419 acre-feet, valued at $26.5 million. Landscape water usage dropped from an average of 4.11 acre-feet to less than 2 acre-feet per year. The residential sector showed a 12 percent reduction in use following a major drought, because awareness of water conservation issues was still high. Since then, usage is, on average, 9 percent lower per household than in 1990. From 1992 to 1998, savings totaled 15,611 acre-feet, valued at $6 million in avoided purchases. IRWD also was able to avoid raising water rates for 5 years.

Summary of Results for Irvine Ranch Water District, CA

Water Savings	
Water savings (1990/91 to 1991/92)	19%
Landscape water impact savings (1991 to 1997)	61,419 acre-feet (20 billion gallons)
Residential water impact savings (1991 to 1997)	12% per year
Residential water impact savings (1991 to 1997)	15,611 acre-feet (5 billion gallons)
Water Cost Savings	
Conservation program (6-year period)	$5 million
Avoided water purchases (6-year period)	$33.2 million
Net savings in avoided water purchases (6-year period)	$28.2 million

Resources

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Irvine Ranch Water District, "Irvine Ranch Water District Rates and Charges: Residential," Irvine Ranch Water District, <www.irwd.com/FinancialInfo/ResRates.html>.

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Massachusetts Water Resources Authority: Deferring Capital Needs Through Conservation

Background

The Massachusetts Water Resource Authority (MWRA) is a wholesale water provider for 2.2 million people in 46 cities, towns, and municipal water districts in Massachusetts. From 1969 to 1988, MWRA withdrawals exceeded the safe yield level of 300 million gallons per day (mgd) by more than 10 percent annually. Consequently, MWRA was under pressure to make plans to increase supply capacity. One plan it developed was to divert the Connecticut River, which would cost $120 million to $240 million (in 1983 dollars) and have an annual operation and maintenance cost of $3 million. MWRA also developed a plan for a new water treatment facility that complied with the Safe Drinking Water Act. The plant was originally designed with a 500 mgd demand maximum. Ultimately, the Commonwealth of Massachusetts determined that a water conservation plan would be the best initial solution for its supply needs, with other plans to follow as needed.

Approach

Although adequate precipitation helped avoid a major water-supply crisis during the 20-year period of exceeding the safe yield, MWRA began a water conservation program in 1986 to help address the supply problem. The conservation program included the following:

- Vigorously detecting and repairing leaks in MWRA pipes (270 miles) and community pipes (6,000 miles).
- Retrofitting 370,000 homes with low-flow plumbing devices.
- Developing a water management program for area businesses, municipal buildings, and nonprofit organizations.
- Conducting extensive public information and school education programs.
- Changing the state plumbing code to require new toilets to use no more than 1.6 gallons of water per flush.
- Improving meters to help track and analyze community water use.
- Using conservation-minded water/sewer rate structures on the community level.

Results

MWRA's conservation efforts reduced average daily demand from 336 mgd in 1987 to 256 mgd in 1997. The decrease in demand allowed for a reduction in the size of MWRA's planned treatment plant, as well as a 20-year deferral of the need for an additional supply source.

The present-value cost savings of deferring the water supply expansion are estimated to be $75 million to $117 million, depending on the initial capital investment. The capacity of the treatment plant has been reduced from 500 mgd to 405 mgd—an estimated $36 million cost reduction. Together, the deferral of the water-supply expansion project and the reduction in the capacity of the treatment plant amount to a total savings of $111 million to $153 million. The estimated cost of the conservation program is $20 million.

Summary of Results for Massachusetts Water Resources Authority

Water Savings	
Total demand reduction (1987-1997)	80 mgd
Capacity reduction of planned treatment facility	95 mgd
Capital Savings	
Present value savings of deferring supply expansion	$75-$117 million
Present value savings of reducing treatment plant capacity	$36 million
Total savings (deferring water supply and reducing treatment plant capacity)	$1.39 mil./mgd to $1.91 mil./mgd

mgd= million gallons per day

Resources

Daniel B. Bishop and Jack A. Weber, *Impacts of Demand Reduction on Water Utilities* (Denver: American Water Works Association, 1996), pp. 44-45, 98-102.

Massachusetts Water Resources Authority, <www.mwra.state.ma.us/water/html/wat.htm>.

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Metropolitan Water District of Southern California: Wholesale Conservation

Background

The Metropolitan Water District ("Metropolitan") is the wholesale supplier of water for Southern California. Metropolitan "imports" water for its 26 member water agencies from the Colorado River and Northern California, providing 60 percent of the water needed by a population of more than 17 million. In recognition of increasing demands and limited supplies, Metropolitan provides significant local assistance to develop more reliable local supplies through conservation, water recycling, and groundwater cleanup. Since its initiation in the late 1980s, Metropolitan has spent $155 million on conservation programs alone.

Approach

Metropolitan provides financial support for conservation programs in one of two ways—it pays local agencies either 50 percent of the cost of the water conservation project or $154 per acre-foot of conserved water, whichever is less. Projects are generally conducted in partnership with Metropolitan's member agencies, which include retailers and other wholesalers. Projects must directly or indirectly reduce the demand for potable water from Metropolitan. Examples include education and training, research, and support for new legislative initiatives or improved fixture efficiency standards.

One of the largest initiatives has been toilet retrofit rebates. More than 2 million pre-1992 toilets have been replaced with new high-efficiency toilets, thanks to local water agencies across the area. Other efforts have included water-efficiency site surveys, irrigation equipment improvements, distributions of new high-efficiency showerheads, rebates for high-efficiency washing machines, and research into toilet performance and leakage rates.

Results

As of 2001, the water savings from Metropolitan's conservation programs were estimated to be 66,000 acre-feet per year, or 59 million gallons daily. These savings are in large part due to the fact that residents in numerous municipalities replaced more than 2 million inefficient toilets with 1.6 gallons-per-flush models. The conservation credits program also resulted in the distribution of 3 million high-efficiency showerheads and 200,000 faucet aerators. Local offi-

cials in different areas surveyed approximately 60,000 households for water use information, and performed 2,000 large landscape irrigation audits. In addition, officials conducted 1,000 commercial water use surveys. Metropolitan's and its member agencies' efforts have made many customers view their water agencies as resources for finding solutions to high water use problems. Metropolitan is counting on conservation efforts to continue reducing demand in the future.

Summary of Results for Metropolitan Water District of Southern California

Conservation Program Activities and Water Savings	
Number of pre-1992 toilets replaced	2 million
Number of high-efficiency showerheads distributed	3 million
Number of faucet aerators distributed	200,000
Number of high-efficiency clothes washer rebates issued	20,000
Number of residential water-use surveys conducted	60,000
Number of large landscape irrigation audits	2,000
Number of commercial water use surveys conducted	1,000
Total water savings from conservation program	66,000 AFY (59.1 mgd)

AFY= acre-feet per year

Resources

Metropolitan Water District, Southern California, <www.mwd.dst.ca.us/mwdh2o/pages/conserv/conserv01.html>.

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New York City, New York: Conservation as a Water Resource

Background

New York City's infrastructure includes more than 6,100 miles of water pipes and more than 6,400 miles of wastewater lines. By the mid-1970s, increased demand resulted in water-supply facilities repeatedly exceeding safe yields. By 1990, three of New York's wastewater treatment plants were exceeding permitted flows. Water and sewer rates more than doubled between 1985 and 1993 due to the cost of meeting federal mandates (including the prohibition of dumping sewage sludge into the ocean), the end of subsidies from the city's general revenue budget to the water and sewer system, and reductions in federal funding for water pollution control projects. The city faced the need for costly water-related infrastructure projects.

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP

www.nyc.gov/dep

In 1992, the city conducted an avoided-cost analysis of the available supply alternatives. It compared current supply costs with the costs of a toilet rebate program. In the end, conservation offered the most economical option.

Approach

Beginning in 1985, New York implemented a series of conservation initiatives, including education, metering (1985 to present), leak detection (1981 to present), and water use regulation. For example, the city initiated computerized sonar leak detection of all city water mains and used an advanced flow-monitoring program to help detect leaks in large sewer mains that lead to wastewater treatment plants operating at high capacity. The city installed magnetic locking hydrant caps between 1992 and 1995 to discourage residents from opening hydrants in the summer, and these are still used when appropriate.

A program to install water meters at unmetered residences began in 1991. The city also began conducting a door-to-door water-efficiency survey with homeowners that included educational information, free showerheads and aerators, and a free leak inspection. New York's program to replace water-guzzling toilets with high-efficiency toilets (1.6 gallons per flush) was a particularly impressive example of modern water-demand management. The program aimed to replace more than 1 million toilets over a 3-year period (1994 to 1997). Homeowners, apartment-building owners, and commercial-property owners received rebates of $150 or $240 per toilet.

Results

The leak-detection program saved 30 to 50 million gallons per day (mgd) in its early years and continued to help reduce losses. In 1996, leak detection and repair efforts saved approximately 11 mgd. Savings from metering total more than 200 mgd at a cost of $150 million. New York City performed more than 200,000 homeowner inspections, resulting in the elimination of more than 4 mgd in leaks. The city also replaced 1.3 million inefficient toilets between March 1994 and April 1997, saving an estimated 70 to 80 mgd. Customers realized 20 to 40 percent savings in total water and wastewater bills. Overall, New York's conservation efforts resulted in a drop in per capita water use from 195 gallons per day in 1991 to 167 gallons per day in 1998.

Summary of Results for New York City

Water savings from leak detection program	30 to 50 mgd
Water savings from meter installation	200 mgd
Homeowner inspections	200,000
Water savings from homeowner inspections	4 mgd
Number of inefficient toilets replaced	1.3 million
Water savings from toilet replacement program	70 to 80 mgd

mgd = million gallons per day

Resources

Edward R. Osann and John E. Young, *Saving Water, Saving Dollars: Efficient Plumbing Products and the Protection of America's Waters* (Potomac Resources, Inc., Washington, DC, April 1998), pp. 37-38.

U.S. Environmental Protection Agency, "Regional Approaches to Efficient Water Uses: Tales from the Trenches," Cleaner Water Through Conservation (1998), <www.epa.gov/OW/you/chap4.html>.

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Phoenix, Arizona: Using Less, Conserving More

Background

The Phoenix Water Services Department provides water for 350,000 retail connections and a population of approximately 1.3 million people in one of the fastest-growing communities in the United States. As the sixth largest city in the United States and the 17th largest metropolitan area, Phoenix also has the second largest land area of all cities in the United States. Average annual rainfall in Phoenix is 7.25 inches. Approximately 98 percent of Phoenix proper relies entirely on surface water, and the surrounding growth areas (consisting of an additional 1.5 million people) use a combination of ground and surface water sources. The major source of water is a very old agricultural reclamation project that has been devoted to urban use. This project has helped keep water prices the lowest in the area and lower than any other comparable city in the country. Unfortunately, the area's inexpensive water sources have been depleted, and new water-supply projects pose environmental and financial problems. The state legislature has required that after 2025, Phoenix and suburban communities must not pump groundwater faster than it can be replenished. Accordingly, the city has been pressed to either look for alternative surface supplies or reduce demand. City facilities—mostly parks—constitute the city's single largest water customer. Because of irrigation and cooling uses, Phoenix summer demand is nearly twice that of winter use. Planners determined that conservation was the best solution to the problem.

Approach

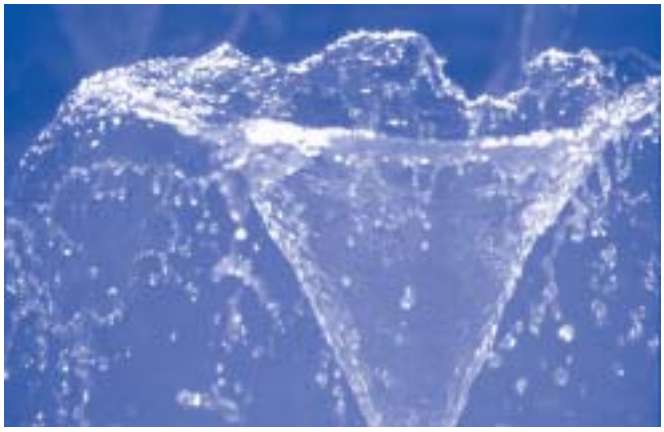
Phoenix has maintained a water conservation program since 1982 and, in 1986, the city approved a comprehensive water conservation program. The plan outlined five water conservation programs:

- Water pricing reform
- Indoor residential water conservation
- Industrial and commercial water conservation
- Plant and turf irrigation efficiency
- Water-efficient landscaping

Residential water use amounts to 70 percent of Phoenix's water deliveries; consequently, residential water conservation is a high priority. Phoenix uses a rate structure that nearly reflects marginal costs, with three seasonal variations reflecting the city's seasonal costs. The rate includes a monthly service charge and a volume charge that varies by season. Under the 1986 plan, Phoenix offered to replace old, high-flow fixtures (showerheads and faucets) in homes built before 1980. The program distributed educational materials, offered installation, and provided materials and support for community organizations to facilitate implementation. In 1990, the city amended its plumbing code to require water-conserving fixtures (including high-efficiency toilets) in new construction and renovation. That code requires the same flow reduction as those required 2 years later by the federal Energy Policy Act, 42 U.S.C., Chapter 77.

Phoenix's water conservation program provides assistance to low-income, elderly, and disabled customers. For more than 10 years, the city offered energy and water audits and plumbing retrofits through senior-citizen organizations. In another program, the city used high-school students to help low-income residents with audits, repairs, and replacements.

In 1998, Phoenix developed a new water conservation plan that focuses on public education and public awareness, technical assistance, regulations, planning and research, and interagency coordination. This plan focuses less on structural fixes, such as plumbing retrofitting, and more on changing behaviors and educating the next generation of water users. Many of the elements in the 1998 plan reflect a continuation or adaptation of elements in the 1986 plan. Other elements reflect new program initiatives in response to citizen interests and preferences. Most notable are mandates for school education programs, public education about conservation techniques, and city/citizen partnerships at the neighborhood level to address conservation needs. Phoenix was a key player in the development of the "Water—Use it Wisely" regional advertising and promotion campaign.



Results

Estimates suggest that by 1987, Phoenix's conservation program was saving approximately 20,000 acre-feet per year (18 million gallons per day (mgd)), which constitutes a 6 percent decrease in per-capita water use since 1980. From 1982 to 1987, Phoenix saved approximately 10,000 acre-feet of water per year (9 mgd) due to its conservation rate structure. A modified conservation rate implemented in 1987 saved an additional 25,000 acre-feet per year (22.5 mgd). Through the voluntary residential conservation program, more than 170,000 homes have been retrofitted with water-saving fixtures. Through programs for low-income, elderly, and disabled residents, the city installed approximately 1,500 high-efficiency toilets annually. Implementation of recent rate changes and water conservation measures has boosted average annual water savings to more than 45,000 acre-feet (40 mgd).

Summary of Results for Phoenix, AZ

Activities and Actual Water Savings	
Water savings from conservation programs (1982–1987)	20,000 acre-feet/year (18 mgd) (6% per capita)
Current savings from conservation program	45,000 acre-feet/year (40 mgd)
Number of homes retrofitted with water saving devices	170,000
Number of high-efficiency toilets distributed through low-income, elderly, and disabled program	1,500 per year

mgd = million gallons per day

Resources

Daniel B. Bishop and Jack A. Weber, *Impacts of Demand Reduction on Water Utilities* (Denver: American Water Works Association, 1996), pp. 48-50.

Edward R. Osann and John E. Young, *Saving Water, Saving Dollars: Efficient Plumbing Products and the Protection of America's Waters* (Potomac Resources, Inc., Washington, DC, April 1998), p. 39.

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Santa Monica, California: Conservation in a Sustainable City

Background

Like many Southern California cities, Santa Monica has faced rapid urban development and increased strain on water supplies. Residential customers consume approximately 68 percent of the water, while commercial and industrial customers consume 32 percent. The city draws water from local groundwater wells and imports water from the Metropolitan Water District of Southern California (MWD). Prior to 1996, the groundwater aquifers provided approximately 65 percent of total supplies. In 1996, the city found methyl tertiary-butyl ether (MTBE) contaminants in several wells, forcing Santa Monica to increase purchases to approximately 78 percent of total supplies. The city has four reservoirs with a total capacity of 40 million gallons for storing imported water. In 2002, 15 percent of supplies came from local groundwater and 85 percent from MWD.

In 1992, Santa Monica's city council initiated a Sustainable City Program. The program provides the city with a coordinated, proactive approach to implementing existing and planned environmental programs. The program consists of five major policy areas: (1) community and economic development, (2) transportation, (3) pollution prevention, (4) public-health protection, and (5) resource conservation. Resource conservation encompasses the city's programs in water, energy, recycling, and waste management.

Approach

Santa Monica has instituted a multifaceted approach to water conservation, including numerous policies and programs. The city's policies include:

- No Water Waste Ordinance
- Plumbing code
- Water-conserving landscape regulations
- Water demand mitigation fee
- Wastewater mitigation for large development projects
- Retrofit-Upon-Sale Ordinance
- Water and wastewater rate structure

Santa Monica's water conservation programs include:

- Residential water-use surveys
- Commercial and industrial water-use surveys
- Demonstration sustainable gardens
- Sustainable landscape workshops and garden tours
- Sustainable landscape guidelines
- California irrigation management information system
- Bay Saver Toilet Retrofit Program
- Water Efficiency Revolving Loan Program

The No Water Waste Ordinance regulates through notification-education—the use of fines for violating water use practices, such as lawn watering hours, hosing down driveways, swimming pool filling, and leakage. The Retrofit-Upon-Sale Ordinance requires the installation of water-saving plumbing devices whenever any residential or commercial property is sold or transferred. In 1996, the city modified the fixed and variable charges in the rate structure to encourage water conservation. Through the water use surveys, residents can receive free showerheads, faucet aerators, and garden-hose nozzles. The city encourages efficient irrigation and landscaping through several programs.

The Bay Saver Toilet Retrofit Program, at a total cost of $5.4 million, offers a $75 rebate for individuals to purchase and install high-efficiency toilets (1.6 gallons per flush). The Water Efficiency Revolving Loan Program provides no-interest loans to institutional, commercial, and residential water customers to pay for plumbing fixture retrofits, irrigation system upgrades, and other cost-effective water efficiency measures.

Results

Based on 1990 usage levels, Santa Monica established a water reduction goal of 20 percent by 2000. In 1990, water usage amounted to 14.3 million gallons per day (mgd). In one year, water use dropped almost 22 percent—to 11.4 mgd. The drop could be explained primarily by emergency measures instituted in response to a drought. When the city dropped the emergency measures in 1992, water use rose gradually to 12.3 mgd in 1995—reflecting a 14 percent savings from the 1990 level.

The city also established a wastewater flow reduction goal of 15 percent—from 10.4 mgd in 1990 to a target of 8.8 mgd in 2000. The city surpassed its goal by reducing flow to 8.2 mgd, a 21 percent reduction from 1990.

Santa Monica replaced more than 1,200 institutional plumbing fixtures in all city-owned or operated facilities. Between 1990 and July 1996, the Bay Saver Toilet Retrofit Program replaced more than 41,000 residential toilets and 1,567 commercial toilets. Estimates indicate that the program was

responsible for the permanent reduction of 1.9 mgd in water use and wastewater generation, as well as $9.5 million in avoided sewage treatment capacity purchases and avoided purchases of imported water.

Summary of Results for Santa Monica, CA

Activities and Water Savings	
Water savings, 1990-1995	2 mgd (14% decrease)
Number of residential toilets replaced	41,000 (53%)
Number of commercial toilets replaced	1,567 (10%)
Number of city-owned plumbing fixtures replaced	1,200
Wastewater flow reduction, 1990-1995	2.2 mgd (21% reduction)
Cost Savings	
Net savings from Bay Saver Toilet Retrofit Program	$9.5 million

mgd = million gallons per day

Resources

City of Santa Monica Environmental Programs Division, <pen.ci.santa-monica.ca.us/environment/policy/water>.

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Seattle, WA: Commercial Water Savings

Background

Seattle Public Utilities provides water to approximately 1.3 million people in Seattle and surrounding areas. The Seattle area has experienced steady population growth. Although the city is known for its rain, Seattle experiences dry summers with water demand at its peak due to increases in watering, irrigation, and recreation use. The Seattle area has very little carryover storage capacity from year to year and usually depends on the slow melting snow; an unusually dry winter can lead to summer water shortages. Adequate river flow is necessary for survival of the area's valued aquatic life, including Puget Sound's threatened Chinook salmon. The natural environment and the growing population compete for water resources, particularly during the dry season. Increasing demand and limits on existing supplies have forced the development of a dual strategy of demand reduction and cooperative supply management.

City of Seattle and 26 wholesale water utility partners

Approach

Seattle uses a multifaceted approach to water conservation. Strategies include an increasing block rate structure during the peak season for residential customers, plumbing fixture codes and regulations, operational improvements to reduce leaks and other water losses, market transformation to encourage and support water-saving products and appliances, customer rebates and financial incentives to encourage customers to use water-saving technology, and public education. Seattle targets several specific programs at residential customers. The Home Water Savers Program distributes water-efficient showerheads and provides free installation for apartments. WashWise promotes the purchase of resource-efficient washing machines through a mail-in cash rebate. Seattle also actively encourages water-wise gardening and landscaping, and the city strongly supports public education.

Seattle places special emphasis on its Water Smart Technology (WST) Program, in particular, understanding the needs and preferences of commercial customers to help them understand the benefits of conservation. The commercial program provides financial incentives, including technical and financial assistance, for the purchase and installation of cost-effective and water-efficient equipment, commercial toilet rebates for replacing older inefficient toilets and urinals, free irrigation-system assessments and audits, financial assistance for upgrading irrigation systems, and promotion of storm water and wastewater reuse.

Results

By all indications, Seattle's water conservation programs are successful. In the 1990s, annual average water consumption dropped 12 percent—from 171 million gallons per day (mgd) to 150 mgd. Per capita water consumption dropped by 20 percent. Estimates indicate that Seattle's water demand is approximately 30 mgd less than it would have been without conservation. Regional water consumption in 1997 was the same as in 1980. The seasonal rate structure is credited with saving close to 5 mgd since 1990. Plumbing codes and regulations have saved more than 4 mgd. Improvements in system efficiency have saved approximately 13 mgd since 1990. The Home Water Savers Program involved 330,000 customers and saved nearly 6 mgd.

Seattle's WST Program has been a remarkable success. Estimated median water savings for a commercial incentive program are approximately 6,000 gallons per day. More than 150 businesses have participated in the incentive program for total savings of approximately 1 mgd. By the end of 1997, 600 businesses participated in the commercial toilet-rebate program, replacing nearly 10,000 fixtures and saving approximately 0.8 mgd. Water efficient irrigation improvements for businesses have saved an additional 3 million gallons each year. Together, the commercial incentive programs could save Seattle approximately 8 mgd—reflecting a 20 percent overall reduction in commercial water use. The average avoided cost associated with new or expanded supply and transmission facilities is $1.89 per one hundred cubic feet ($2.53 per 1,000 gallons). On a per unit basis, commercial conservation programs have proved to be approximately twice as cost-effective as developing new supplies.

Summary of Actual and Projected Results for Seattle, WA

Water Savings 1990–1998	
Water savings from seasonal rates	5 mgd
Water savings from plumbing regulations	4 mgd
Water savings from system efficiency improvements	13 mgd
Home Water Savers Program participants	330,000 residences
Water savings from Home Water Savers Program	6 mgd
Water savings from commercial incentive programs	8 mgd
Commercial Toilet Rebate Program participants	600 businesses
Water savings from Commercial Toilet Rebate Program	0.8 mgd
Water savings from commercial irrigation improvements (1990-1998)	3 mgd

Cost Savings	
Conventional supply cost (avoided supply cost for all customers)	$1.89 per ccf ($2.53 per 1,000 gals)
Cost of commercial conservation	$0.93 per ccf ($1.25 per 1,000 gals)
Cost to participating customers	$0.36 per ccf ($0.48 per 1,000 gals)
Additional benefits to participating customers (water-bill savings)	$0.74 per ccf ($0.99 per 1,000 gals)
Net additional benefits (water savings less program participation costs)	$0.38 per ccf ($0.51 per 1,000 gals)
Total net benefits (avoided supply cost plus net additional benefits)	$1.42 per ccf ($1.90 per 1,000 gals)

ccf = hundreds of cubic feet

mgd = million gallons per day

Resources

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Tampa, Florida: Growth and Water Management

Background

Tampa Water Department

Florida's Tampa Bay region has experienced rapid economic and population growth for many years, and the demand for water has grown even faster. In the 1980s, Tampa's and Hillsborough County's population grew by 8 percent, and water demand grew by more than 25 percent. Florida experiences periodic droughts, with an average of four drought years in every 10-year period. In Florida, Tampa is unique for its heavy dependence on surface water supplies—75 percent of its drinking water comes from the Hillsborough River, which is greatly affected by periods of drought.

Approach

Since 1989, the Tampa Water Department has implemented several measures to reduce water usage, including water-conserving codes, an increasing-block rate structure, public education, in-school education, and other conservation projects. The city promotes water efficiency through water use restrictions, fines for water use violations, and plumbing and landscaping codes. Outdoor irrigation is limited to one day per week and prohibited between 8 a.m. and 6 p.m., and all new irrigation systems must have rain sensors. The city also provides homeowners with free Sensible Sprinkling irrigation evaluations and distributes free rain sensors. The landscape code limits the amount of irrigated turfgrass to 50 percent in new developments and encourages the use of Florida-friendly plants and low-volume irrigation methods.

The city modified the plumbing code to require water-efficient plumbing fixtures in all new construction and renovation. Tampa's Water Department began distributing water conservation kits to homeowners in 1989. The kits include toilet tank dams, efficient showerheads, aerators, leak detection kits, and information. In 1994, the department conducted a pilot toilet rebate program to retrofit toilets in existing buildings with high-efficiency toilets (1.6 gallons per flush). The pilot program was well received, with high rates of participation and product satisfaction. Tampa expanded the rebate program and now offers rebates as high as $100 for replacement toilets in single family and multi-family homes, as well as for commercial customers.

Results

Tampa has experienced much success with its water conservation programs. The Sensible Sprinkling irrigation evaluation program resulted in a 25 percent drop in water use. Estimates indicate that the distribution of more than 100,000 conservation kits resulted in savings of 7 to 10 gallons of water per person per day.

An evaluation of the pilot toilet rebate program revealed that household water use decreased from an average of 258 gallons per day to 220 gallons per day—a 15 percent reduction. The city replaced 27,239 older toilets with high-efficiency toilets, accounting for 245.9 million gallons of water saved each year. Although the city's water service population increased 20 percent from 1989 to 2001, per capita water use decreased 26 percent.

Summary of Results for Tampa, FL

Number of Sensible Sprinkling landscape evaluations performed	915
Water savings from Sensible Sprinkling landscape evaluation program	25%
Number of water-saving kits distributed	100,000
Water savings from distribution of water-saving kits	7 to 10 gallons per day per person
Number of inefficient toilets replaced	27,239
Water savings from toilet rebate program	38 gallons per day per household

Resources

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Wichita, Kansas: Integrated Resource Planning

Background

A decade ago, analysts determined that Wichita's available water resources could not meet the city's needs beyond the first decade of the 21st century. Based on conventional operating practices, the city was fully utilizing existing water supplies and had no new supplies readily available. The city explored the option of drawing water from a water reservoir located 100 miles away. Due to the high cost of transporting water, as well as social, environmental, and political opposition, the city chose to reevaluate its options.

Wichita eventually opted for a more holistic approach to water management, in which water conservation is a significant component. In the early 1990s, the city adopted an integrated resource planning approach. The process of developing a long-term plan encouraged the involvement of various stakeholders, including the community, water users, and regulatory agencies. Ultimately, the group investigated non-conventional water sources that do not typically have firm yields.

Approach

The Wichita case is noteworthy for its very long-term perspective, the number and variety of water resource options considered, and the emphasis on regional coordination issues. The case is especially useful in recognizing how regulatory institutions affect the feasibility of water resource options. Regulatory considerations in Wichita included water rights, source water protection, drinking water standards, environmental impacts, and historic preservation.

Analysts in Wichita summarized the key elements of their "customized" integrated planning approach as follows:

- Implement water conservation to help control customer demand and water use.
- Evaluate existing surface water and groundwater sources to determine their capacity and condition, methods of enhancing their productivity, and ways to protect their quality.
- Evaluate nonconventional water resources for meeting future water needs.
- Optimize all available water resources to enhance water supply.
- Pursue an application for conjunctive water resource use permit from state agencies.
- Evaluate the effects of using different water resources on water supply, delivery, and treatment facilities with consideration of risk and reliability.
- Communicate with key stakeholders including regulatory agencies, other water users, and the public.

Results

The comprehensive analysis of resource options for Wichita resulted in a large matrix with a total of 27 conventional and nonconventional resource options and their key characteristics. For each option, the analysis considered: construction costs, expected available flow (including alternative scenarios when applicable), unit costs, general advantages and disadvantages, and specific implementation issues related to policy or political, legal, environmental, and water quality concerns. Analysts used a screening process to eliminate several options from further consideration, including the "no action" option (because of adverse economic development consequences). Then they ranked the remaining options in terms of overall desirability.

Planners in Wichita recognized that water supply operations are growing in complexity and that operational tradeoffs are necessary when implementing an integrated approach. The key benefit to better planning, however, is the more effective use of the region's water resources.

Summary of Results for Wichita, KS

Resource Alternative	Expected Yield (mgd)	Construction Cost ($mil)	Unit Cost ($/mil. gal.)	Rank*
Low-range water conservation	15	23	77	1
Little Arkansas River supply to water treatment plant	0 to 44	21	23	2
Little Arkansas River: subsurface storage	34	26 to 126	46 to 219	3A
Little Arkansas River: bank storage	7 to 39	6.2 to 175	45 to 221	3B
Little Arkansas River: bank storage	7 to 39	11.5 to 164	41 to 207	3B
Gilbert-Mosley remediated groundwater	3	1.5	25	4
Cheney Reservoir: operations modifications	up to 60	0	0	5
Reserve Wellfield	10.8	1.0	4.7	6
Reserve Wellfield (peak use only)	10.8	1.0	37	6
Cheney overflow pipeline to water treatment plant	28	53	96	7
Cheney overflow pipeline to water treatment plant	35	60	87	7
Equis Beds: purchase water rights	As available	$400/acre-ft	1,227	8
Milford Reservoir (existing)	60	155	141	9
Cheney overflow: subsurface storage	34	65 to 165	94 to 237	10
Treated wastewater reuse: local irrigation	1.1	15	1,336	11
No action	23	0	0	ns

Source: David R. Warren, et al., "IRP: A Case Study From Kansas," *Journal American Water Works Association* 87, no. 6 (June 1995): 57-71.

ns = not selected as a viable alternative based on screening level cost.

* Rankings were based on a variety of criteria, including, but not limited to, the cost criteria provided.

Resources

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Barrie, Ontario: Wastewater Capital Deferral

Background

Barrie, Ontario, is located 80 miles north of Toronto on the shore of Lake Simcoe. Due to rapid population growth, the city's groundwater supplies, managed by the Barrie Public Utilities Commission, suffered serious capacity limitations. In 1994, the city planned a new surface-water supply at a cost of approximately $27 million (Canadian dollars). Wastewater flows began reaching capacity at the Water Pollution Control Center, forcing consideration of a $41 million addition to accommodate future growth and development.

Approach

To help ease the water use burden, Barrie developed a conservation partnership with the Ontario Clean Water Agency (OCWA) and the Ministry of the Environment (MOE). The program focused on replacing inefficient showerheads and toilets and delivering information kits to homeowners and landlords. The city offered homeowners a $145 rebate per toilet and $8 per showerhead; the OCWA and MOE covered materials and program administration costs. The goal was to achieve a 50 liters per person per day (13.2 gallons per person per day) reduction in water use for 15,000 households, which would constitute a 5.5 percent reduction in average daily wastewater flows from the 1994 level.

Results

Between 1995 and 1997, a total of 10,500 households received 15,000 high-efficiency toilets (1.6 gallons per flush), representing 60 percent of the program goal. A pre-and-post analysis of participating households indicated an average reduction of 62 liters per person per day (16.4 gallons per person per day)—24 percent higher than the goal of 50 liters per person per day (13.2 gallons per person per day). Total program savings translated to 55 liters per person per day for the system (14.5 gallons per person per day). Based on the total number of participating households, the conservation program generated water savings totaling 1,628 cubic liters per day. More than 90 percent of the program participants were satisfied with the program and the products installed.

The reduction in wastewater flows in Barrie enabled a 5-year deferral of the capital expansion project at the Water Pollution Control Center. Water conservation efforts also made it possible to scale back the cost of the upgrade to

$19.2 million—for a net saving of $17.1 million after accounting for the cost of the conservation program. The reductions in wastewater flows and the planned upgrades at the facility mean that no new hydraulic capacity will be needed until 2011. Barrie also will delay construction of a lake-based water filtration plant beyond 2020 and defer the associated cost and rate impacts.

The conservation program also results in environmental, economic, and social benefits to the community. The conservation program is credited for creating more jobs than the proposed capital-works program, as well as preserving individual disposable incomes due to lower water and energy bills.

Summary of Results for Barrie, Ontario

Activities and Water Savings	
Participating households	10,500
Installations of high-efficiency toilets	15,000
Water savings in retrofitted homes	62 l/c/d (19 g/c/d)
System water savings from total program	55 l/c/d (14.5 g/c/d)
Wastewater flow reduction	1,335 m^3/day (0.35 mgd)
Capital Savings (millions of Canadian dollars)	
Original cost of upgrade	$41.0
Revised cost of upgrade	$19.2
Savings	$21.8
Cost of program	$4.7
Net capital deferral	$17.1

l/c/d = liters per capita per day; g/c/d/ = gallons per capita per day;

m3 = cubic meters; mgd = million gallons per day

Resources

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Acknowledgments

EPA would like to thank the representatives of the featured municipalities for their cooperation on this project.

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United States Environmental Protection Agency
Office of Water (4204M)
EPA832-B-02-003
July 2002
www.epa.gov/owm/water-efficiency/index.htm

Attachment 6, Part 2

Conservation Limits Rate Increases for a Colorado Utility

Demand Reductions Over 30 Years Have Dramatically Reduced Capital Costs

NOVEMBER, 2013

Alliance *for* Water Efficiency

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Why are my rates going up again?

"Why do you ask me to conserve and then raise my rates?" asked a concerned citizen at a public meeting in Westminster, Colorado in 2011.

"Very good question," pondered Westminster Utilities' staff as they struggled with only limited success for a compelling answer. They knew water conservation has had a profound impact on the city by reducing demand, the amount of additional water needed to purchase and eliminating the need for expansion of facilities, but they didn't have a good way to quantify the impacts and respond to the citizen's question.

Similar tough questions have been posed to water utilities across the country as water and wastewater rates have increased faster than the Consumer Price Index (CPI) over the past 15 years, (Beecher 2013), (Craley and Noyes 2013). Managing the public response to and understanding of rate increases has taken on increasing significance in recent years as utilities grapple with the double edged sword of rising infrastructure costs and decreasing demands (Goetz M. 2013).

Rather than leaving the question of customer conservation and rates hanging without a satisfactory response, the Westminster staff decided to do some research to try and come up with some answers using data from their own system. The timing of the question was significant as the City is working towards completing a series of identified projects designed to meet the City's needs at a projected buildout date of 2050 (using current and projected demands which include conservation).

To examine the impact of conservation on rates, the City looked at marginal costs due to the buildout requirements by removing conservation from the equation. The results of the City's research were startling: Reduced water use in Westminster since 1980 has resulted in significant savings in both water resource and infrastructure costs, saving residents and businesses 80% in tap fees and 91% in rates compared to what they would have been without conservation.

The City's research on water demands and rates since 1980 provided a useful response to the citizen's question and revealed previously unexplored and under-appreciated benefits of long-term water conservation in reducing rate increases. Water rates in Westminster are much lower today than they would have been in the absence of demand reductions from conservation. Here's how the City was able to reach this important conclusion.

Change in Water Use

To explore the impacts of demand management on water rates and tap fees, Westminster staff examined water demand records, water rates, tap fees[1], and capital project costs from 1980 through 2010 with the following question in mind: "What would our water rates and tap fees be today if per customer water demands remained unchanged since 1980?". 1980 was chosen because it predated City related conservation programs and two levels of plumbing code related changes.

The first step was to examine water use patterns. To do this, Westminster staff examined water use patterns from 1980 – 2010 by taking total demand (all customer classes) and dividing by the best estimate of the service area population for each year. Westminster has a reclaimed water system that reuses treated wastewater for irrigation thus lowering the City's impact on water resources. To be conservative, reclaimed water was assumed to be a conservation measure. This consumption was added back into potable water use to reflect the full use of water without conservation. As shown in Figure 1 average gpcd, based on total City water use, was 21% higher 30 years ago, starting at 180 gpcd in 1980 and ending at 149 gpcd in 2010. Westminster attributes these changes in demand to three primary management factors:

1. Utility sponsored water conservation programs
2. The City's inclining block and seasonal rate water billing structure
3. National plumbing codes implemented as part of the Energy Policy Act of 1992 (EP Act)

1 Tap fees, also called connection fees or development fees, are the costs paid by new customers to join the water system.

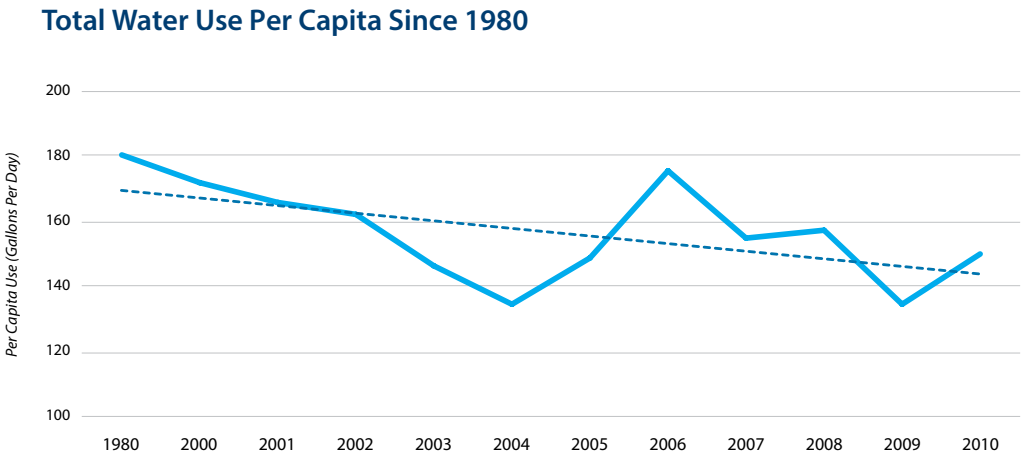


Figure 1: Average gpcd in Westminster, based on total water use 1980 – 2010

New Supply Requirements and Cost

Once the changes in water demand were quantified, the Westminster staff were able to estimate what water use in 2010 would have been without the enactment of water conservation programs and policies. Through this analysis it was concluded that if per capita water use had not decreased by 21%, Westminster would have been required to secure an additional 7,295 acre-feet (AF) of additional water supply order to meet the customer demand while satisfying the City's reliability requirements.

New water supply in Colorado's Front Range does not come cheap. Current market costs for new water supply average $30,000 per acre-foot on Colorado's Front Range. Westminster pays close attention to the cost of new supply as it builds these costs into the tap fees of new customers so that the City can fully recover the expense of serving new customers without burdening existing customers with the cost of growth. The staff also concluded that had conservation from 1980 – 2010 not occurred, the City would have been competing with other water providers in the region to acquire more raw water, further tightening the market and making new water supply even more expensive. At this average price, the estimated cost of obtaining and delivering the required additional 7,295 AF of water would have required a capital investment of $218,850,000. With this simple analysis alone, the cost savings associated with reduced water use became obvious, but staff realized this was only part of the story.

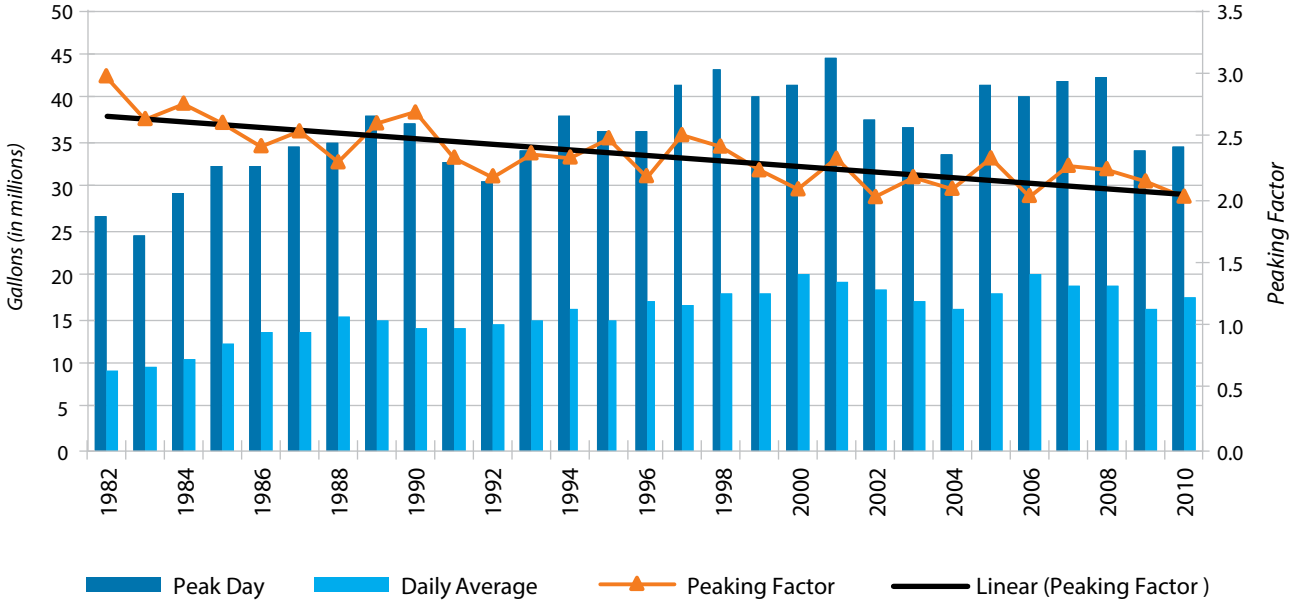
If per capita water use had not decreased by 21%, Westminster would have been required to secure an additional 7,295 acre-feet (AF) of additional water supply order to meet the customer demand.

Additional Peak Demands and Infrastructure Costs

Peak demand in 2010 would also have been considerably higher had conservation not been implemented in Westminster over the past 30 years. The City has found that water conservation programs have altered irrigation patterns thus reducing the system's peak day factor. In 1980 the peak to average day factor in Westminster was 3.0, but by 2010 changes in irrigation practices and reduced water demand cut the peak factor to 2.1 — a 30% reduction.

Potable Water Production

Peak Day, Daily Average, Peaking Factor



If 1980 demand levels had been perpetuated along with the 1980 peaking factor of 3, then the City's peak requirement at buildout was estimated to be 52 MGD *higher* than the current planned maximum capacity. This level of peak demand would require the City to add an additional 52 MGD of treatment capacity at an estimated finished and installed cost of $2,500,000 per MGD[2]. Developing the additional water treatment infrastructure to meet these higher demands would have required a capital investment by the City of approximately $130,000,000.

2 Based on recent projects and engineering estimates

Additional Wastewater Treatment Infrastructure Costs

If conservation were not taken and water demands had stayed at 1980 levels, staff determined that Westminster would have needed to add an additional 4 MGD of wastewater treatment capacity to their system. Adding wastewater treatment capacity costs the City an estimated $5,000,000 per MGD[3]. Thus the additional 4 MGD of wastewater would have required a capital investment by the City of approximately $20,000,000.

Total Estimated Costs of Increased Demand

All estimated costs associated with the hypothetical increased demand were assembled into a single table and then the City added in the costs of debt financing charges which would certainly have been part of these capital construction projects, had they been implemented. As shown in Table 1, had the citizens of Westminster not reduced their water use, the estimated total cost to the City of the increased demand came to $591,850,000 – more than half a billion dollars.

Table 1: Estimated new infrastructure costs of increased demand

Additional water treatment capacity	52 MGD total ($2,500,000/MG)	$130,000,000
Additional wastewater treatment capacity	4 MGD total ($5,000,000/MG)	$20,000,000
Additional water resources	7,295 AF total ($30,000/AF)	$218,850,000
Interest (on debt funding for all projects)*		$223,000,000
Total Costs		**$591,850,000**

** For the purposes of this analysis it is assumed that debt would have been issued, and the resulting debt service would have been paid through rates. Those costs were included in the impacts to rates.*

3 Based on recent projects and engineering estimates

Next the staff examined the increases in operating costs that the City estimates it would have incurred to handle the increased demand and associated additional infrastructure. While no additional staff personnel were assumed to be necessary, it was assumed that operating costs (power, chemicals, and other annual costs related to water and wastewater treatment, distribution and collection) would increase proportionally to the demand increases as shown in Table 2. From this analysis, it was estimated that Westminster would have incurred an additional $1,238,000 per year on average in operating costs associated with the additional demand.

Table 2: Estimated additional operating costs of new demand*

Additional annual operating cost of water treatment facilities	21% increase	$480,400
Additional annual operating cost of wastewater treatment facilities	20% increase	$757,600
Total estimated additional operating costs		**$1,238,000 per year**

**No additional staff personnel were added*

Impact to Water and Wastewater Rates and Tap Fees

Once the cost estimates were completed, the question of how to recover the additional costs through rates and fees was examined. Westminster Utilities has just two sources of revenue that it must use to pay for all costs associated with running the water and wastewater systems: (1) Water and wastewater rates; and (2) Tap fees. In theory, water and wastewater rates are set by the City so that the revenue generated covers operations and maintenance of the system as well as some of the repair and replacement costs, and debt service. Tap fees are set to cover the costs of buying into the existing system based on current value plus any new infrastructure (capital projects), and water resources required by growth.

In practice, existing customers build the City's water and wastewater systems before new customers arrive so that growth can occur. Infrastructure must be planned for future demands and not constructed as needed. When new customers connect and pay their tap fees, current customers are reimbursed for their investment in the City's existing systems. Those funds pay for capital improvement projects including repair and replacement, thus reducing the costs to existing customers. Therefore, both rates and tap fees are impacted by the same projects.

Working from this basic division of costs between rates and tap fees, Westminster developed an estimate of what 2012 water and wastewater rates and tap fees for single-family customers would need to be to cover the additional costs incurred as a result of the hypothetical additional supply requirements. In 2012, the average single-family customer in Westminster paid a total of $410 for water and $245 for wastewater service. To cover the single-family sector's share of the additional annual costs associated with the increased demand considered in this analysis, the average single-family customer would have to pay an additional $553 per year for water service and $43 per year for wastewater service. The weighted average of these additional costs means that the average single-family customer would pay combined water and wastewater rates that are 91% higher than they are today if 1980-level water demands were perpetuated over the past 30 years. These results are shown in Table 3.

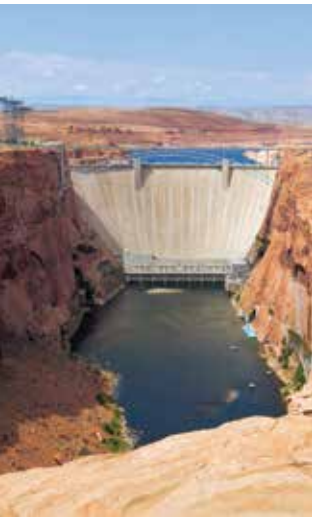
Table 3: New single-family rates and fees required to pay for additional demand

	Total Avg. Per Customer Charges in 2012	Additional Charges Required to Cover New Costs	New 2012 Annual SF Water/Sewer Bill	% Increase in Charges from Additional Demands
Water	$410	$553	$963	135%
Sewer	$245	$43	$288	17%
Total	$655	$596	$1,251	91%

A similar analysis was conducted to examine the impact of increased demands on tap fees for new customers in Westminster. In 2012 the average tap fee for a new customer (residential and non-residential combined) was $21,229, of which 77% was for water and 23% was for wastewater components. The combined cost of new infrastructure, new water resources, and repair and replacement associated with the increased demand modeled in this analysis would require an 80% increase in the average tap fee, up to $38,181 as shown in Table 4.

Table 4: New tap fees required to pay for additional demand

	Avg. Per Customer Tap Fee in 2012	Additional Tap Fee Charges Required to Cover New Costs	New 2012 Avg. Tap Fee	% Increase in Charges from Additional Demands
Water	$16,325	$16,086	$32,411	99%
Sewer	$4,904	$866	$5,770	18%
Total	$21,229	$16,952	$38,181	80%



With Conservation Rates Go Up, But Not Nearly as Much

There is a commonly held belief in the water industry that declining per capita usage due to water conservation has "forced an increase to rates to account for fewer units of volume billed" (Craley and Noyes 2013). But the rate increases necessitated by conservation are actually much smaller than the rate increases that would be necessary to account for population growth in the absence of conservation. The 21% reduction in average per capita water demand that Westminster has experienced over the past 30 years has resulted in significant benefit to its customers and reduced the rate of increase in water and wastewater rates. While water and wastewater rates and tap fees have increased over that 30 year time period, they have increased much less than they would have. Customers in Westminster have avoided increasing their water rates by 99% and their wastewater rates by 18% had this level of water conservation not been achieved. New customers in Westminster have also avoided an 80% increase in water and sewer tap fees. Yes rates have gone up, but because of the costs associated with new water supply and infrastructure, they have gone up much less than they would have.

An answer to the citizen's question about water conservation and rates had been found and the result was far more dramatic than the staff had anticipated. The next time a question was posed about the relationship between conservation and water rates, the Westminster staff was prepared with an answer: Water rates are going to increase with or without water conservation because the costs of operating and maintaining the water system continue to increase. However, water rates increase at a much slower rate if citizens conserve because the city does not need to purchase expensive new water supply and construct expensive new infrastructure. The net results of water conservation is a significant cost savings to the customer in water and wastewater rates and in tap fees.

Each water system is unique, so the results from Westminster may not be applicable to everyone. Utilities could perform a similar analysis to see the real value of conservation. However, the over $590 million dollar cost associated with the additional 7,295 AF of demand reveals the significant hardship associated with expanding water resources supply and wastewater treatment infrastructure in today's environment. The high cost also highlights the tremendous value that is inherent in a utility's water treatment, wastewater treatment and delivery infrastructure. Imagine the cost of obtaining water rights and constructing an entire water supply system today. The cheapest water (by far) is the water we already have and the best way to keep rates and tap fees low is to conserve the water we already have. The cost of water to providers may vary by region but the cost of infrastructure remains more consistent. The least expensive infrastructure to build, operate and maintain is the infrastructure that isn't needed in the first place. Conserve water or don't conserve water – your rates will go up – but if conservation is the lowest cost source of new supply (and it almost always is) then your rates will go up less than they would have without conservation.

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Attachment 10

SUPERIOR COURT OF CALIFORNIA

COUNTY OF SAN FRANCISCO

SAN DIEGO COUNTY WATER AUTHORITY, Plaintiff/Petitioner, vs. METROPOLITAN WATER DIST. OF SOUTHERN CALIFORNIA, et al. Defendants/Respondents.	Case No. CPF-10-510830 Case No. CPF-12-512466 STATEMENT OF DECISION ON RATE SETTING CHALLENGES

San Diego County Water Authority (San Diego) challenges the legality of four rates set by Metropolitan Water District of Southern California (Met).

San Diego alleges three defects. First, San Diego argues that Met improperly allocates the bulk of Met's costs under its contract with the California Department of Water Resources' State Water Project to the System Access Rate and the System Power Rate. Second, San Diego contends that Met illegally treats all of its costs for conservation and local water supply development programs as transportation costs by recovering them through the Water Stewardship Rate, which Met charges as a transportation rate. The asserted result of these

Summary of Arguments

San Diego argues that Met's System Access Rate, System Power Rate, Water Stewardship Rate, and wheeling rate are illegal and should be invalidated. San Diego Post-Trial Brief at 4. San Diego argues that (1) Met recovers the costs Met pays the SWP for transportation through its transportation rates without any basis for treating the SWP as its own conveyance system; and (2) Met charges its full Water Stewardship Rate in its wheeling rate even though the programs that are funded by the rate are primarily *supply* benefits. *Id.* at 3-4.

San Diego also contends that Met incurs dry-year peaking costs which benefit some member agencies (such as Los Angeles) which are recovered disproportionately from other member agencies (such as San Diego) through the transportation rates, among others. *Id.*

Met argues that it is reasonable to allocate SWP transportation costs to its transportation rates for four reasons: (1) SWP transportation costs are Met transportation costs;[67] (2) Met uses SWP facilities as an extension of its own system;[68] (3) Met has an integrated, regional system that delivers a blend of water which includes SWP water; and (4) Met's allocation is consistent with industry guidelines.[69] Met Closing Brief at 45-60. San Diego counters that the SWP costs are supply costs, i.e., costs incurred to obtain a supply of water. San Diego Post-Trial Brief at 20-25. San Diego accuses Met of improperly protecting member agencies that do not wheel water from facing increased rates when wheeling member agencies purchase water from other sources. *Id.* at 7.

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[67] Met relies on the facts that (1) its contract with the Department of Water Resources breaks down its charges to Met to reflect both costs associated with supply water and those associated with water delivery; and (2) it pays a share of the capital costs of expanding the SWP system in the reaches it uses. Met Post-Trial Brief, 45-49.
[68] Met relies on its contractual right to use SWP facilities to transport non-project water and the fact that it has exercised that right. Met Closing Brief, 49-53.
[69] Met points to the 1993 Raftelis textbook, the RMI reports, and the 2010 Raftelis report. Met Closing Brief, 55-59.

"reasonable basis" for the rates. *Inyo*. For reasons summarized just above, the latter, but not the former, rules apply here.

Summary. In sum, I conclude Proposition 26, the Wheeling statute, Govt. Code § 54999.7(a), and the common law (reasonable rates requirement) apply here. In each case the core inquiry is the same, and looks to cost causation, that is, whether the costs of the services (e.g. wheeling) are reasonably related to the costs of providing those services.

2. Analysis On The Merits

Setting aside San Diego's challenge to the dry year peaking (discussed below), I summarize the challenges to Met's rates, phrased as function of the cost causation principle: Is it reasonable for Met to include in its transportation rates (A) via the Systems Access Rate and the System Power Rate, the cost the state charges to Met to transport water to Met? (B) the Water Stewardship Rate?

I summarize here the basic guidance from the central cases. *MWD* tells us that the relevant costs may--or may not--be system-wide costs; but it is clear that I do not simply look to the marginal costs of providing e.g. wheeling services. (Had I done so, and because wheeling occurs solely when there is unused capacity, I might have concluded that aside from power and other costs required to literally move the wheeled water, no other costs could be included in wheeling rates.) *Morro Bay* reminds us that rates may not discourage wheeling, and loss of income attributable to lost water sales is not a permissible justification for [increasing] wheeling rates. *Palmdale* emphasizes cost causation, and bars unjustified price discrimination. *Griffith I* and *Griffith II* emphasize the rule that it is permissible to spread the costs of programs across all

rates. Met Closing Brief at 53. But this is no syllogism. While one can easily conclude from these predicates that all water-purchasing member agencies should pay some share of those SWP's costs—indeed, of all costs billed by the SWP to Met—it does not follow that a given portion of those costs (such as SWP's transportation constituent) ought to be billed to wheelers who happen to be member agencies. This is especially true as it appears that the water moved by the SWP system, even when it is not water purchased from the SWP, is nevertheless generally water which is sold by Met to its member agencies, *not wheeled water*.

The position Met takes here reflects its position on the core legal dispute presented by this case, and I turn to that more specifically now.

The Core Dispute. Met writes that, on the subject of system-wide costs such as (i) those paid for SWP's transportation of water and (ii) for programs funded by the water stewardship rates, "In 1997, MWD recognized that if it did not charge these costs to wheelers as well as its full-service customers, then its full-service customers would end up subsidizing the costs of wheeling transactions." Closing Brief at 6. Compare, e.g., *MWD v. IID*, 80 Cal.App.4th at 1432-33.

The core dispute is whether, under the current rate structure, wheelers are subsidizing water purchasers. San Diego says that wheelers such as itself subsidize the other member agencies. Under the wheeling statute, for example, that is not permitted because it would discourage wheeling, and under the balance of the statutes at play in this case wheelers would be paying more than a reasonable fee for the service.

This core dispute centers on the impact of the so-called San Pedro principles adopted in 1997, which San Diego characterizes as implementing an illegal rate stability plan and Met

capacity in the extant transportation system. Wheeling is "[s]ubject to the General Manager's determination of available system capacity." Admin. Code § 4405(a). And Met notes, "MWD also resolved that it would make the determination of whether there is unused capacity in its conveyance system (as required by the Wheeling Statue) on a 'case-by-case basis in response to particular requests for wheeling [services].' DTX-680 at AR2012-002450; JTX-1 AR2010-002450." Met Closing Brief at 20. While wheelers would benefit as a general matter by reason of increased capacity in that they might be able to wheel more water, those who in fact are permitted to wheel do so in a system built out to move non-wheeled water, that is, water that Met sells to its member agencies. Thus the costs and avoided costs attributable to the demand management programs relate to the transportation needs to provide purchased water. This too suggests that the cost of wheeling, while properly a function of system-wide costs associated with transportation as such, should not be a function of system-wide avoided costs of transporting purchased water.

C. Dry Year Peaking

San Diego alleges that costs attributable to dry year peaking are improperly part of the wheeling rate. Here's how San Diego phrases it:

> The dry-year peaking costs at issue here are those associated with purchasing and storing water and having capacity available in MWD's facilities to deliver water supplies to its member agencies when they "roll on" to MWD's system in dry years. For example, Los Angeles has a long history of rolling on and off the system, depending on the hydrological conditions in the Owens Valley where it obtains much of its water: between 2004 and 2009, Los Angeles's purchases from MWD swung from 367,000 acre-feet in 2004 to 208,000 acre-feet in 2006 and back up to 434,000 acre-feet in 2009
> San Diego's Amended Reply To MWD's First Pretrial Brief at 17.

It remains unclear exactly how these costs are part of the wheeling rate. Presumably some capital storage costs, some transportation costs, and some supply costs are part of what San Diego calls dry year peaking. *Cf.* San Diego's Post-Trial Brief at 30:20-28. Of course dry year

proposition did not seem to be seriously disputed, I have from time to time mentioned that evidence.

As to the standard of review, the higher de novo standard probably applies to Proposition 26, and under the Wheeling statute to the question of whether a rate might properly include a certain component. Under the Wheeling statue, the deferential standard applies to the issue of fair compensation, as it does to Govt. Code § 549997(a) and the common law's 'reasonable basis' standard.

But in this case, regardless of the standard, the result the same. There is no substantial evidence in the record to support Met's inclusion in its transportation rates, and hence in its wheeling rate, of 100% of (1) the sums it pays to the California Department of Water Resources' SWP disaggregated by the SWP as for transportation of that purchased water; and (2) the costs for conservation and local water supply development programs recovered through the Water Stewardship Rate. Indeed, the record confirms that these rates over-collect from wheelers, because at least a significant portion of these costs are attributable to supply, not transportation. These rates – the System Access Rate, System Power Rate, Water Stewardship Rate, and Met's wheeling rate – therefore violate Proposition 26 (2013-14 rates only), the Wheeling statute, Govt. Code § 549997(a), and the common law. The Court invalidates each rate for both the 2011-2012 and 2013-2014 rate cycles.

So too, under either the substantial deference or de novo standard, San Diego has not shown that there is a "dry year peaking" phenomenon for which Met's rates fail to fairly account. No violation of the pertinent law has been shown with respect to 'dry year peaking'.

Further Orders. San Diego has asked me to retain jurisdiction to ensure compliance with this ruling. At least until judgment is entered an appeal is taken, such an order does not appear