

A large, dynamic splash of water is the central focus of the page, set against a light blue background. The water is captured in mid-air, creating a sense of movement and freshness. The splash is composed of many small droplets and larger bubbles, with a bright white highlight at the top where the water is most concentrated. The overall color palette is a range of blues, from light sky blue to a deeper, muted blue.

# Volume 2

Chapter 16 Recycled Municipal Water



Recommendations from a 40-member Recycled Water Task Force would improve the way projects are planned, increase State and federal financial support for research and project construction, improve the regulatory framework, and advance the use of recycled water.

# Chapter 16 *Recycled Municipal Water*

Water recycling, also known as reclamation or reuse, is an umbrella term encompassing the process of treating wastewater, storing, distributing, and using the recycled water. Recycled water is defined in the California Water Code to mean “water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur.”

The treatment and use of municipal wastewater for golf course irrigation is an example of water recycling. Higher levels of treatment can make municipal wastewater reusable for school yards, residential landscape and park irrigation, industrial uses or even uses within office and institutional buildings for toilet flushing.

The following discussion of recycled water focuses on treated municipal wastewater. This is wastewater of domestic origin, but includes wastewater of commercial, industrial and institutional origins if such wastewater is mixed with domestic wastewater before treatment. Many industries recycle and reuse their own wastewater. However, because of a lack of data, recycling of non-domestic wastewater is not included in the recycling-quantity estimates below.

## Recycled Water Use in California

Californians have used recycled water since the late 1800s and public health protections have been in effect since the early part of the 1900s. Recycled water use has dramatically increased in the past several decades as water agencies needed to supplement their water supplies. Today, California’s water agencies recycle about 500,000 acre-feet of wastewater annually, almost three times more than in 1970.

Noting the importance of water recycling to our state, a 40-member Recycled Water Task Force was established pursuant to Assembly Bill No. 331 (Goldberg, Chapter 590, Statutes of 2001). The Task Force identified opportunities for, and constraints and impediments to, increasing the use of recycled water in California. Over the course of nearly 14 months, the Task Force conducted intensive study in collaboration with

many other experts, the public, and State staff to develop recommendations (see Box 16-1 on following pages) for actions at many levels. The recommendations are not restricted to legislative actions or statutory changes. Many can be implemented by State or local agencies without further legislative authorization or mandate.

The Task Force recommendations, if implemented, would significantly:

- Improve the way projects are planned
- Increase State and federal financial support for research and project construction
- Improve the regulatory framework
- Advance the use of recycled water as a valuable resource that would significantly mitigate growing water demands as called for by the California Water Code, Sections 13500 et seq.

Progress has begun on several of the Task Force recommendations. For example, the SWRCB issued an Executive Memorandum to Regional Board Executive Officers on February 24, 2004, setting a new framework for regulating of incidental runoff associated with recycled water use. AB 334 (Goldberg, Chapter 172, Statutes of 2003) gives communities additional flexibility to regulate water softeners as a source-control measure.

## Potential Benefits from Water Recycling

The primary benefit of water recycling is augmenting water supply. Rather than discharging and losing the water, recycled water can be reused as a new water supply. Using recycled water for irrigation can spare high quality potable water used

for irrigation, making more potable water supply available. There is a potential of about 0.9 million to 1.4 million acre-feet annually of additional water supply from recycled water by the year 2030.

When looking at California's overall water supply, recycling provides new water for the state only in areas where wastewater is discharged to the ocean or to salt sink. Recycling in other areas may provide new water for the water agency, but does not necessarily add to the state's water supplies. In these locations, discharged wastewater in interior California mixes with other water and becomes source water for downstream water users.

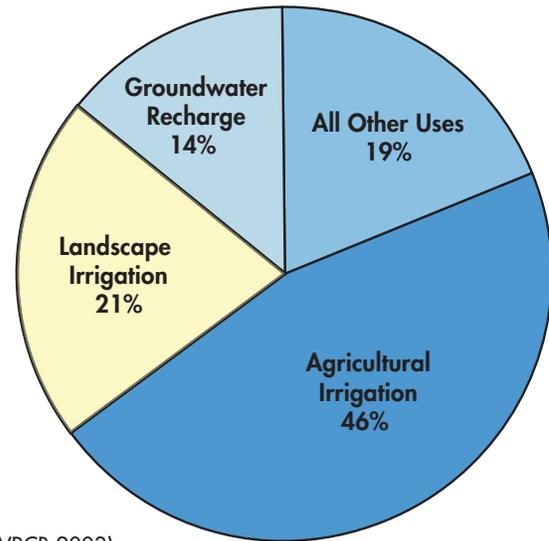
For many communities, an investment in recycled water could also provide other benefits:

1. Provide more reliable local sources of water, nutrients, and organic matter for agricultural soil conditioning and reduction in fertilizer use
2. Reduce the discharge of pollutants to water bodies, beyond levels prescribed by regulations, and allow more natural treatment by land application
3. Provide a more secure water supply during drought periods
4. Provide economic benefits resulting from a more reliable water supply
5. Improve groundwater and surface water quality and contribute to wetland and marsh enhancement
6. Provide energy savings; the use of recycled water as a local source offsets the need for energy-intensive imported water

## Potential Costs of Recycled Water

The estimated capital cost for the range of potential recycling (from previous section) by 2030 is about \$6 billion to \$9 billion.<sup>1</sup> The actual cost will depend on the quality of the wastewater, the treatment level to meet recycled water intended use, and the availability of a distribution network. Uses, such as irrigation near the treatment plant, will benefit from lower treatment and distribution costs. Irrigation of a wide array of agriculture and landscape crops can even benefit from the nutrients present in the recycled water by lowering the need for applied fertilizer. However, the use of recycled water for irrigation without adequate soil and water management may cause accumulation of salts or specific ions in soil and groundwater. Some uses, such as an industrial process farther away from the

Figure 6-1 Where recycled water is used in California



(SWRCB, 2003)

Recycled water use has dramatically increased in the past several decades for irrigated agriculture and landscapes, groundwater recharge and other uses. Today, California's water agencies recycle about 500,000 acre-feet of wastewater annually, almost three times more than in 1970.

treatment plant, may need to pay higher costs for treatment and distribution. Given the wide range of local conditions that can affect costs, the majority of applications would cost between \$300 and \$1,300 per acre-foot of recycled water. Costs outside this range are plausible depending on local conditions. Uses that require higher water quality and have higher public health concerns will have higher costs.

## Major Issues Facing More Recycled Water Use Affordability

The cost of recycled water, relative to other water sources, will influence how much recycled water is produced for each region. The costs are dependent on the availability of treatable water, demand for treated water, the quality of the source as well as the product water, the type of the intended beneficial use, and the proximity of recycled water facilities to the end users. In addition, the need for disposal brine lines is considered a major issue for some inland agencies. The lack of adequate local funding to plan feasible recycled water projects can slow the construction of new projects. Public funding as well as incentive measures can help advance water recycling

<sup>1</sup> Water Recycling 2030; Recycled Water Task Force (2003).

## Box 16-1 California Recycled Water Task Force Recommendations Summary (2003)

**Funding for Water Recycling Projects.** State funding for water reuse/recycling facilities and infrastructure should be increased beyond Proposition 50 and other current sources. The California Water Commission in collaboration with DWR and SWRCB should seek federal cost sharing legislation for water recycling.

**Funding Coordination.** A revised funding procedure should be developed to provide local agencies with assistance in potential State and federal funding opportunities and a Water Recycling Coordination Committee should be established to work with funding agencies.

**Department of Water Resources Technical Assistance.** Funding sources should be expanded to include sustainable State funding for DWR's technical assistance and research, including flexibility to work on local and regional planning, emerging issues, and new technology.

**Research Funding.** The State should expand funding sources to include sustainable State funding for research on recycled water issues.

**Regional Planning Criterion.** State funding agencies should make better use of existing regional planning studies to determine the funding priority of projects. This process would not exclude projects from funding where regional plans do not exist.

**Funding Information Outreach.** Funding agencies should publicize funding availability through workshops, conferences, and the Internet.

**Community Value-Based Decision-Making Model for Project Planning.** Local agencies should engage the public in an active dialogue and participation using a community value-based decision-making model in planning water recycling projects.

**State-Sponsored Media Campaign.** The State should develop a water issues information program, including water recycling, for radio, television, print, and other media.

**Educational Curriculum.** The State should develop comprehensive education curricula for public schools; and institutions of higher education should incorporate recycled water education into their curricula.

**University Academic Program for Water Recycling.** The State should encourage an integrated academic program on one or more campuses for water reuse research and education, such as through State research funding.

**Statewide Science-Based Panel on Indirect Potable Reuse.** As required by AB 331, the Task Force reviewed the 1996 report of the California Indirect Potable Reuse Committee and other related advisory panel reports and concluded that reconvening this committee would not be worthwhile at this time. However, it is recommended to convene a new statewide independent review panel on indirect potable reuse to summarize existing and on-going scientific research and address public health and safety as well as other concerns such as environmental justice, economic issues and public awareness.

**Leadership Support for Water Recycling.** State government should take a leadership role in encouraging recycled water use and improve consistency of policy within branches of State government and local agencies should create well-defined recycled water ordinances and enforce them.

**DHS Guidance on Cross-connection Control.** DHS should prepare guidance that would clarify the intent and applicability of Title 22, Article 5 of the California Code of Regulations pertaining to dual plumbed systems and amend this article to be consistent with requirements included in a California version of Appendix J that the Task Force is recommending to be adopted.

**Health and Safety Regulation.** DHS should involve stakeholders in a review of various factors to identify any needs for enhancing existing local and State health regulation associated with the use of recycled water.

**Stakeholder Review of Proposed Cross-Connection Control Regulations.** Stakeholders are encouraged to review Department of Health Services draft changes to Title 17 of the Code of Regulations pertaining to cross-connections between potable and nonpotable water systems.

*continued*

projects that provide local, regional and statewide benefits. The cost of recycled water can influence water markets, especially if recycled water is available for transfer.

## Water Quality

The quality of the recycled water will affect its usage. Public acceptance of recycled water use depends on confidence in the safety of its use. Four water quality factors are of particular concern: (1) microbiological quality, (2) salinity, (3) presence of heavy metals, and (4) the concentration of stable organic and inorganic substances or emerging contaminants originating from various pharmaceuticals and personal care products, household chemicals and detergents, agricultural

fertilizers, pesticides, fungicides, animal growth hormones, and many other sources. The salinity of recycled water can limit its usefulness for some applications such as salt sensitive landscaping, golf courses, and agriculture. Each use of water generally adds salt to the water. In particular, the use of water softeners adds salt to the water. Also, water conservation can further concentrate salts. Hence, the resulting wastewater, that is high in salts, would be more difficult and expensive to recycle. There is generally a limit to how many times water can be recycled unless a more expensive treatment technology, such as reverse osmosis, is used to remove the salts (see the Desalination strategy).

### *Box 16-1 continued from previous page*

**Cross-Connection Risk Assessment.** DHS should support a thorough assessment of the risk associated with cross-connections between disinfected tertiary recycled water and potable water.

**Uniform Plumbing Code Appendix J.** The State should revise Appendix J of the Uniform Plumbing Code, which addresses plumbing within buildings with both potable and recycled water systems, and adopt a California version that will be enforceable in the state.

**Recycled Water Symbol Code Change.** The Department of Housing and Community Development should submit a code change to remove the requirement for the skull and crossbones symbol in Sections 601.2.2 and 601.2.3 of the California Plumbing Code.

**Incidental Runoff.** The State should investigate, within the current legal framework, alternative approaches to achieve more consistent and less burdensome regulatory mechanisms affecting incidental runoff of recycled water from use sites.

**Source Control.** Local agencies should maintain strong source control programs and increase public awareness of their importance in reducing pollution and ensuring a safe recycled water supply.

**Water Softeners.** The Legislature should amend the Health and Safety Code Sections 116775 through 116795 to reduce the restrictions on local ability to impose bans on or more stringent standards for residential water softeners. Within the current legal provisions on water softeners, local agencies should consider publicity campaigns to educate consumers regarding the impact of self-regenerative water softeners.

**Uniform Interpretation of State Standards.** The State should create uniform interpretation of State standards in State and local regulatory programs by taking specific steps recommended by the Task Force.

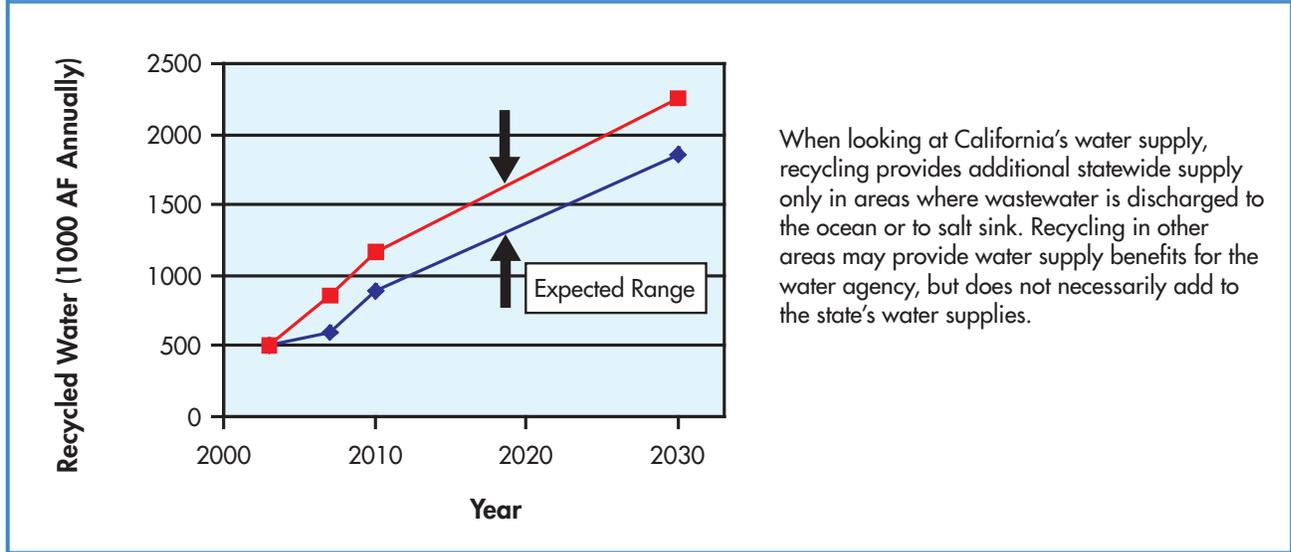
**Permitting Procedures.** Various measures should be conducted to improve the administration and compliance with local and State permits. State and local tax incentives should be provided to recycled water users to help offset the permitting and reporting costs associated with the use of recycled water.

**Uniform Analytical Method for Economic Analyses.** A uniform and economically valid procedural framework should be developed to determine the economic benefits and costs of water recycling projects for use by local, State, and federal agencies.

**Project Performance Analysis.** Resources should be provided to funding agencies to perform comprehensive analysis of the performance of existing recycled water projects in terms of costs and benefits and recycled water deliveries.

**Economic Analyses.** Local agencies are encouraged to perform economic analyses in addition to financial analyses for water recycling projects and State and federal agencies should require economic and financial feasibility as two criteria in their funding programs.

Figure 16-2 Range of potential water recycling (Water Recycling 2030 Report)



When looking at California's water supply, recycling provides additional statewide supply only in areas where wastewater is discharged to the ocean or to salt sink. Recycling in other areas may provide water supply benefits for the water agency, but does not necessarily add to the state's water supplies.

## Public Acceptance

Public perception and acceptance of some recycled water uses currently limits its application. In some areas, public concerns about potential health issues have limited the use of recycled water for indirect potable purposes such as groundwater recharge and replenishment of surface storage, and even for irrigation of parks and school yards.

## Potential Impacts

Areas in interior California that discharge their wastewater to streams, rivers, or the groundwater contribute to downstream flows. Recycling water would remove this source of water and potentially affect downstream water users including the environment. In some instances, recycling is discouraged when dischargers are required to maintain a certain flow in the stream for downstream users.

## Recommendations to Increase Recycled Water Usage

1. State and local agencies and various stakeholders should actively follow up with the implementation of the Recycled Water Task Force recommendations (see Box 16-1) as they constitute a culmination of intensive study and consultation by a statewide panel of experts drawing upon the experience of many agencies. Such recommendations provide advice that can be used as a toolbox for communities to improve their planning of recycled water projects. (Implementing parties: State and local agencies and various stakeholders)

2. Funding should be increased beyond Proposition 50 and other sources toward sustainable technical assistance and outreach, advanced research on recycled water issues, and adequate water reuse/recycling infrastructure and facilities. (Implementing parties: federal, State, and local agencies)
3. The State should encourage an academic program on one or more campuses for water reuse research and education; develop education curricula for public schools; and encourage institutions of higher education to incorporate recycled water education into their curricula. (Implementing parties: State and academic institutions)
4. Agencies should engage the public in an active dialogue and participation using a community value-based decision-making model (determining what a community values, then making decisions based on that information) in planning water recycling projects. (Implementing parties: State and local agencies)
5. State should create uniform interpretation of State standards in State and local regulatory programs and clarify regulations pertaining to water recycling including: health regulations, permitting procedures, cross-connection control and dual plumbed systems. (Implementing parties: State agencies)

## Selected References

- Water Recycling 2030, California Recycled Water Task Force Report, 2003.
- SWRCB, California Municipal Wastewater Reclamation Survey, 2003.

Water Recycling 2000, California's Plan for the Future.

State Water Conservation Coalition, Reclamation/Reuse Task Force and the Bay Delta Reclamation Sub-Work Group, 1991.

Southern California Comprehensive Water Reclamation and Reuse Study, Phase II. Final Report (Draft), 2000.

Other reports such as DWR Water Recycling Survey, 1993; California Water Plan Update 1998.