California Department of Water Resources

Recycled Water Task Force

Water Recycling 2030:

Recommendations of California's Recycled Water Task Force

June 2003

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CHAPTER 4

Issue Areas & Key Recommendations

The issues, potential constraints, and impediments regarding water recycling were grouped by the Task Force into six issue areas. The six workgroups investigating the issues within each area brought recommendations to the Task Force for further deliberation and revision. Within the issue areas, 26 separate issues were identified, 13 of which were deemed to be of highest priority. The Task Force adopted recommendations for all 26 issues, in some cases adopting more than one recommendation for an issue. The six issue areas and the scope of problems included within them are described in this chapter. Also, the highest priority issues and their key recommendations are presented here. In the following chapter the remaining issues and associated recommendations are presented. The six issue areas are as follows:

1. Funding for water recycling,
2. Public dialogue / Public outreach,
3. Plumbing code / Cross-connection control,
4. Regulations and permitting,
5. Economics of water recycling,
6. Science and health / Indirect potable reuse.

At the outset the Task Force emphasizes that while it has investigated ways to promote and increase the use of recycled water, the recommendations presented in this report are not intended to compromise in any way the health and safety of the public. California has a strong record of safe use of recycled water. It is only by continuing this foundation can we maintain public confidence and support and move forward.

The recommendations are given unique numbers for reference, for example, 2.1.3. The first number relates to the issue area, the second to the issue, and the third to the recommendation itself.

the Health and Safety Code Sections 116775 through 116795 to reduce the restrictions on the local ability to impose bans on or more stringent standards for residential water softeners.

Approach and Implementation:

Existing law establishes efficiency standards for self-regenerative water softeners in terms of the amount of water hardness reduction per pound of salt addition. Local agencies are allowed to regulate water softeners but only under conditions wherein the local agency is out of compliance with its discharge permits. The most significant contributions of other pollutants to sewer systems are more easily regulated. It is recommended that the Legislature should pass more flexible regulatory provisions for water softeners. Time frame: July-December 2003.

Recommendation 4.4.2.

On-going or proposed studies on water softeners should continue to be pursued to develop alternatives for salt reduction in recycled water. Funding should be sought for such studies.

Approach and Implementation:

There are two on-going studies related to salinity in wastewater, salinity management practices, and water softeners. They are being conducted by the American Water Works Association Research Foundation and the Municipal Water District of Orange County and will be completed in 2003A committee should be established to review the literature and on-going and proposed studies on water softeners and their contribution to salinity problems with the purpose of identifying additional study needs. It is suggested that a research-related institution, such as the WateReuse Foundation initiate this committee. Time frame: July-September 2003.

Recommendation 4.4.3.

Within the current legal restrictions, local agencies should consider publicity campaigns to educate consumers regarding the impacts of self-regenerative water softeners and promote the use of off-site regeneration by service companies. They should also consider financial incentives to upgrade older inefficient appliances to the current standards.

Approach and Implementation:

Local agencies can influence consumer use of self-regenerative water softeners through education and financial incentives to replace older water softeners with more efficient ones that would reduce the salinity problem. Time frame: July 2003-on-going.

5. Economics of Water Recycling

Economic analysis of water recycling projects takes into account the true benefits and costs incurred to society. This entails the examination of the benefits and costs one would expect to be associated with a recycled water project. Financial analyses, in contrast to economic analyses, are intended to determine cash flow for a project and the feasibility to secure sources of funds to pay for project capital and operating costs. Financial analyses are commonly performed by agencies, but economic analyses typically are not unless they

Currently, El Dorado Irrigation District supplies about 1,000 homes in the El Dorado Hills Serrano residential development with recycled water for front and backyard irrigation.

are required by funding agencies as a funding criterion. Economic analyses, similar to environmental impact studies, allow a full and transparent accounting of costs and benefits to readily identify impacts not apparent in single viewpoint of most financial analyses. In addition, by analyzing all alternatives to water recycling to achieve project objectives, such as water supply, all alternatives can be compared on an equivalent basis to identify alternatives that have the least net cost to society.

Examples on the benefits side of a recycled water project are savings in the form of avoided costs of developing new fresh water sources and lower fertilizer costs because of nutrients present in recycled water; and on the costs side, capital costs and operations and maintenance (O&M). These are known as market benefits and costs since there is an observable market price to quantify the costs and savings. Though more difficult to quantify, one must also consider in an economic analysis the non-market benefits and costs, like environmental impacts. Non-market benefits and costs are named such because markets do not exist where one can buy and sell them for a price. However, these impacts often represent key local, regional, or societal benefits and costs that if ignored would omit a major portion of any systems-based economic feasibility analysis. To that end, analyzing non-market benefits and costs help cast a wider net in identifying stakeholders and developing collaborative partnerships early in the project planning process.

During the 1970s the concept of cost-effectiveness was introduced to incorporate a more rational basis of comparing alternatives based on true costs while still recognizing nonmonetary factors. Adapted to water recycling, the application of cost-effectiveness can be stated as:

> A water recycling project is considered cost-effective when, compared with the development of other alternatives to achieve the project objective, the proposed project will result in the minimum total resources costs over time to meet project objectives. Resource costs to be evaluated include monetary costs as well as nonmonetary factors, including social and environmental effects. An economic analysis, which monetizes costs and benefits associated with each alternative, including costs or benefits that are not just direct project costs and benefits, is given primary consideration unless other factors are overriding. Other important factors include an assessment of the recycled water market, availability of recycled water, financial feasibility, energy consumption, engineering, and environmental impacts.

Federal and California State funding programs adopted cost-effectiveness as a funding criterion and used the economic analysis as the basis for measuring total resources costs.

Another application of economic analyses is the allocation of costs on an equitable basis. Identifying the true benefits and costs of projects to a practical level of detail can help identify the proportion of the total benefits a project beneficiary is expected to enjoy and is a starting point to identifying an equitable share of funding responsibility.

Funding agencies for recycled water projects in California such as the SWRCB, DWR and USBR, each has its own economic analysis process and criteria for project funding. While

there might be overlap in the basic economic analysis, specific requirements may cause the analysis to be incompatible across agencies, so that "apples are being compared to oranges." Similarly, many funding agencies require some economic analysis or data reporting in their applications, but these requirements are sometimes not consistent, causing the applicant to do additional work to tailor each application. A consistent economic feasibility framework across funding agencies would greatly decrease duplicative work, allow projects to be compared by the same criteria and increase the opportunity for communication and collaboration for planning and identifying equitable funding partnerships.

5.1. UNIFORM ANALYTICAL METHOD FOR ECONOMIC ANALYSES

Issue

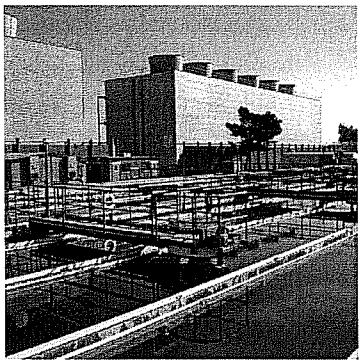
Each funding agency has its own economic analysis procedure and criteria for project funding. This lack of consistency complicates the task of project proponents intending to apply for State or federal financial assistance. Conducting an economic feasibility analysis often requires a broader investigation so as to include cost or benefit factors beyond the local project area and the non-market benefits and costs. Most local agencies consider only the cash flow factors that the agencies will experience. They are not accustomed to the concept and procedures of economic analyses. In addition, they often do not have the resources to determine some of the factors that should be included in economic analyses, such as impacts beyond their boundaries. To assist local agencies, a methodology to carry out economic analysis is needed.

Defining all potential benefits of a project will also help in distributing the funding burden of projects between beneficiaries. Without an equitable distribution of the funding burden, opportunities may be lost to develop recycled water projects, which is a clear impediment to increasing the use of recycled water.

Recommendation 5.1.1.

The State should lead in developing a uniform method for analyzing projects using economic analysis procedures and a consistent economic feasibility framework across funding agencies. This could be accomplished by an advisory team of economists, recycled water experts, and stakeholders.

a. Identify a set of desirable characteristics for an economic feasibility analysis framework based on true benefits and costs for recycled water projects in California.
b. Review existing frameworks to find the commonalities and gaps based on the characteristics from the above recommendation; add components to the framework that fill in the gaps.
c. Develop a practical and implementable process to identify and include non-market benefits and costs into the framework. Development of non-market benefits and costs that are associated with regions or types of recycled water use would provide results that could be applied to many projects. This is a large task and could be undertaken by both an advisory team and special studies.
d. Develop a mechanism to increase the opportunity for identifying equitable capital and operational funding schemes according to the beneficiaries based on allocation



Water Factory 21, operated by Orange County Water District, provides up to 15 mgd of tertiary and advanced treatment of recycled water injected into an aquifer for groundwater recharge and a seawater intrusion barrier. This has operated since 1975.

of the benefits and costs in the economic analysis. This could include beneficiaries on both the local, regional, and statewide level.

e. Develop guidance to conduct an economic feasibility analysis.

f. Develop a mechanism for information from the economic feasibility analysis to feed into the financial feasibility analysis and funding decision-making.

g. Develop appropriate benchmarks for comparing the incremental costs of developing recycled water with the cost of developing an equivalent amount through other measures such as additional water or demand reduction.

Approach and Implementation:

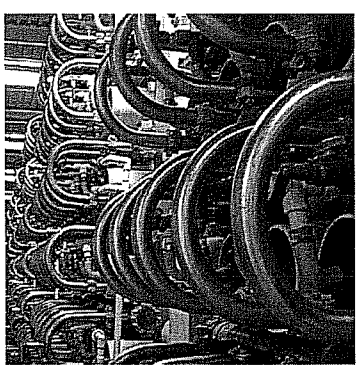
An expert panel of economists and water recycling specialists should be formed by DWR/ SWRCB/DHS to carry out this recommendation. The panel should be formed by September 2003 and submit its findings to DWR by August 2004.

6. Science and Health/Indirect Potable Reuse

Public acceptance of recycled water use is dependent on confidence that its use is safe. The public entrusts regulatory agencies, especially the DHS, to establish sound criteria that will protect public health. To establish such criteria, it is necessary to identify the constituents of health concern that might be present in recycled water, to determine the pathways of human contact, to determine the mechanisms for reducing harmful constituents through treatment, and to calculate the relative health risk.

Four water quality factors are of particular concern: (1) microbiological quality, (2) total mineral content (e.g., total dissolved solids), (3) presence of toxicants of the heavy metal type, and (4) the concentration of stable organic substances. Particularly for the last two categories, recent studies in environmental toxicology and pharmacology have revealed potential long-term health risks associated with chemical compounds such as disinfection byproducts (DBPs) such as N-nitrosodimethyl amine (NDMA), pharmaceutically active compounds (PhACs), pesticides, and personal care products (PCPs) at low concentrations (orders of ppb and ppt). Those trace organic compounds along with some inorganic compounds such as arsenic and hexavalent chromium found in recycled water are of special concern for human and ecological health risk. In addition, there are growing concerns with those trace contaminants in recycled water, which were coincided with increasingly sensitive detection techniques that enabled detection of extremely low contaminant concentrations.

Reverse osmosis is one of the advanced technologies that is used at Water Factory 21 to treat recycled water before direct injection into a groundwater aquifer to replenish the aquifer.



As we expand indirect potable reuse, public concerns increase as well as the uncertainties in our ability to quantify all of the factors. Even with nonpotable uses, some pathogens have become of increasing concern. It is necessary to keep abreast of new chemicals and pathogens of emerging concern to ensure that existing water recycling practices and regulations are continuing to adequately protect public health. In addition, any efforts to introduce new uses of recycled water or changed practices should be based on sound scientific evidence.

CHAPTER 5

Additional Important Recommendations

In addition to the key recommendations set forth in Chapter 4, the Task Force has adopted additional recommendations that will also enhance our ability to implement water recycling projects. These additional recommendations are presented in this chapter organized under the same six issue areas described in Chapter 4. While considered less important than the previous set of recommendations, they nevertheless are feasible to implement and in some cases are essential to address specific types of projects. The numbering of issues continues from the previous chapter.

1. Funding for Water Recycling

1.2. FUNDING COORDINATION

Issue

Different funding agencies often lack coordination of their efforts so as to maximize benefits and prioritize funding.

Recommendation 1.2.1.

A revised funding procedure should be developed to provide local agencies with assistance in potential State and federal funding opportunities. Assistance and guidance would be provided to such agencies as follows:

a. The SWRCB would facilitate a newly established Water Recycling Funding Coordination Committee (Committee) to coordinate applicant's funding needs with the appropriate funding agencies. The Committee would guide the local agency through the identification of (1) Correct funding source(s), (2) Accountability measures and (3) Monitoring and assessment reporting requirements.

b. The Committee would establish quantifiable objectives to be used in the review of a proposed project. Objectives should include 1) the local, regional, and State benefits, and; 2) non-water supply benefits, resulting from the project. When reviewing proposed projects, the Committee would recommend modifications to maximize the benefit to the State's water supply.

c. The Committee would work cooperatively with funding agencies, streamlining project selection while ensuring an open process for setting selection criteria. Peer review

nance activities on the recycled water piping systems to verify that cross-connections have not occurred. Many agencies provide a financial incentive to use recycled water by selling the recycled water at a lower price than potable water, sometimes using potable water revenue to subsidize the recycled water system costs. Another mechanism could be providing tax incentives to users. The Legislature should consider tax incentives to offset costs incurred by users of recycled water. Local agencies should consider tax or other financial incentives to offset costs incurred by users of recycled water. Time frame: July 2003 and on-going thereafter.

4.6. SOURCE CONTROL

Issue

Source water/wastewater quality is a significant potential impediment to the expansion of recycled water usage in California. While it can be resolved through technology and management, the costs both monetarily and to public perception of recycled water can be expensive. Local agencies promoting water recycling must be aware of the potential presence of chemicals in recycled water and the potential public perception of what might be in the water. Thus, they must ensure that there is a strong source control program in place to maintain public confidence in the safety of water recycling projects.

Recommendation 4.6.1.

Local agencies should maintain strong source control programs to protect the quality of recycled water for potential uses and protect public health.

Approach and Implementation:

Local agencies maintain source control programs that include identification of all dischargers into sewer systems, analyses of discharge contributions, establishment of discharge limits on chemicals of concern, strong enforcement of limits, and public education programs regarding household chemicals that are unregulated. Time frame: July 2003 and on-going thereafter.

5. Economics of Water Recycling

5.2. ECONOMIC ANALYSIS

Issue

A project may be economically feasible, but not financially feasible and vice versa. Economic analyses provide more transparency on true benefits and costs and increase the probability of identifying project beneficiaries that can make the project more financially feasible and economically justified. Often project feasibility studies overlook economic analyses and focus on financial analyses.

Recommendation 5.2.1.

Local agencies are encouraged to perform economic analyses (quantifying total benefits and costs) of water recycling projects in addition to financial analyses (to determine cash flow) even if they are not seeking State or federal funding.

Approach and Implementation:

Agencies need to include such analysis in their feasibility studies once a guidebook on conducting economic feasibility analysis is developed pursuant to Recommendation 5.1.1 (e) Time frame: January 2004 - ongoing.

Recommendation 5.2.2.

A financial and an economic analysis should be included as two of the funding criteria in State and federal funding programs. Projects proposed for funding should be financially feasible (sufficient cash flow to pay for and maintain the project) and economically feasible (total statewide project benefits exceed total statewide project costs). The funding agencies should provide guidance and assistance for all funding applicants to conduct the analyses; and review the analyses in applications to ensure they are done appropriately and consistently. These analyses need not duplicate appropriate analyses already performed by local agencies.

Approach and Implementation:

A revised funding procedure as required by Recommendation 1.2.1 needs to include a requirement that agencies applying for public funds submit a financial and an economic analysis to be eligible to receive funding. Time frame: January 2004 - ongoing.

6. Science and Health/Indirect Potable Reuse

6.3. STATEWIDE SCIENCE-BASED PANEL ON INDIRECT POTABLE REUSE

Issue

After extensive discussions and deliberation on this issue, recommendation was made not to reconvene the California Indirect Potable Reuse Committee. The State of California Department of Health Services should be able to make informed and scientific determinations on issues related to indirect potable reuse based on the following publications.

- "Report of the Scientific Advisory Panel on Groundwater Recharge with Reclaimed Wastewater", Prepared for State of California, State Water Resources control Board, Department of Water Resources, and Department of Health Services, November 1987.
- "Issues in Potable Reuse - The viability of augmenting drinking water supplies with reclaimed water", National Research Council, 1998.
- " A Proposed Framework for Regulating the Indirect Potable Reuse", Prepared by The California Potable Reuse Committee, January 1996.
- DHS Draft Groundwater Recharge Regulations (August 2002)