

Addressing Water Scarcity Through Recycling and Reuse: A Menu for Policymakers

Prepared by Baker & McKenzie LLP



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Executive Summary

While governments in water scarce regions are looking for ways to expand water recycling and reuse, they often have difficulty finding information on the policy options from which they might choose. The purpose of this white paper is to provide such a menu of policy options, drawing on examples from around the world. While this is only a representative sample and does not provide an exhaustive list of programs and policies, the major types of policies being used to increase water recycling and reuse include the following:

Education and Outreach

- Recognition awards and certification programs
- Information dissemination and educational outreach efforts
- Reporting of water consumption, discharge, and reuse data

Removing Barriers

- Modifying local regulations that require that all water meet potable standards
- Revising plumbing codes to allow dual piping
- Alleviating stringent permitting and inspection requirements for recycled water

Incentives

- Direct subsidies
- Reductions in payments to the government
- Payments for reintroduction of recovered water
- Pricing mechanisms
- Regulatory relief for recycled water users
- Government procurement of water recycling/reuse equipment
- Structuring of water rights to reduce the use of potable water

Mandates and Regulation

- Requiring utilities to develop plans for recycled water
- Restricting potable water to human or food related uses

- Requiring the use of recycled water for certain large volume activities, e.g., irrigation
- Requiring water recovery systems

This menu provides a valuable starting point for governments to evaluate the appropriate mix of policies that will best fit their needs. For some, tools applied elsewhere to one type of water use may be applied to a different use. For others, information will be enough to spur action; while for still others, financial incentives or regulatory requirements will be more effective.

For further information on how this policy menu might be applied to your needs, please visit www.ge.com/water.

Introduction

Water recycling and reuse is most common in communities that face limited water supplies. Many of their responses combine aggressive water conservation measures with water recycling initiatives to address current as well as future water scarcity.¹

The purpose of this white paper is to help communities and other governmental authorities think through their options for increasing recycling and reuse of water in their area. The paper is built around a menu of policies that are being used in different locations, including efforts to:

- Provide more information on and recognition of water recycling and reuse efforts
- Reduce or remove regulatory or cost barriers that prevent more water reuse or recycling
- Provide financial, regulatory or other incentives for water recycling and reuse
- Require more water recycling and reuse

This menu offers a spectrum of policy tools ranging from less intensive mechanisms, such as making information available, to more proactive, regulatory approaches that require water reuse. Examples of how these policies are being applied in communities around the world are included below, as well as in a more detailed appendix at the end of this paper.

¹The terms water reuse, water recycling, and reclamation are often used for the recapture and treatment of water from wastewater treatment facilities. Generally, and in this paper, recycling, and reuse are used for water that has been discharged by a business or home and treated to remove its contaminants. Reclamation is a broader term that includes recycled water, as well as water from a variety of other sources such as brackish groundwater or the sea. This paper does not discuss water conservation or water efficiency programs that focus on using less water for a particular purpose

Clearly, each community has different water, economic, social, and other needs. As such, this menu is best seen as a tool to help spark discussion of what set of policies might work best in any particular situation or for any particular group of users. Over 2500 GE Water & Process Technologies field based personnel are located in a community near you. Contact your local GE representative through our website at www.ge.com/water.

Education and Outreach

One of the tools commonly used by governments, and especially local governments, in promoting their programs is public education. The area of water recycling and reuse is no exception – local governments with water recycling programs make education a key element of their efforts.

Education and outreach is generally perceived as critical to advancing water recycling, not only to encourage its use, but also to overcome any public concerns about the safety and quality of recycled water. Thus, most communities with a water-recycling program have active public education programs. These programs are often supplemented by state and regional level government campaigns.

Spain's National Autonomous Communities in cooperation with the national government have launched a national public awareness campaign advertising rational water use in newspapers and other media.

Local communities raise awareness through a number of common techniques used by governments worldwide:

Recognition programs support private water reuse efforts by:

- Presenting awards to individuals and entities that have voluntarily made significant contributions to water recycling.

Like many communities with restricted water supplies Singapore has a comprehensive education and outreach campaign for both residents and businesses to promote its recycled water program known as NEWater. The campaign includes media advertising, an audit program for commercial customers, and an education center.

The National Environmental Agency and the Public Utilities Board of **Singapore** have at least three separate awards recognizing individuals and businesses for their commitment to water conservation and environmental sustainability.

- Officially recognizing private water recycling efforts in government publications and websites, in particular those efforts that are innovative or are role models for other water users.
- Developing government certification programs for water recycling technologies.

Information dissemination and educational outreach are probably the most common mechanisms used by local governments and treatment districts in the promotion of their recycling and reuse programs. These education and outreach programs raise awareness by publishing brochures, posting information on government websites, and advertising on TV and in newspapers and other media. The messages conveyed by these outreach programs fall into several broad categories:

- The condition of the community's water supply and the importance of water recycling to the future growth and stability of the community.
- The community's water reuse programs and how residents and businesses may participate.
- The allowable uses of recycled water or the situations when its use is required.
- The treatment processes required for recycled water and the methods for ensuring the safety and quality of the treated water.

For example: The National Water Commission and the various state and municipal water utilities in **Mexico** have numerous education programs regarding recycled water use and technologies including outreach to the general public and training for utility managers and engineers.

Technical assistance is another form of public education for the larger, more sophisticated water users such as industrial or institutional users. Governments and water treatment or wastewater districts offer more specialized information and services for these users, including:

The California Eastern Municipal Water District (U.S.) provides information for landscaping, industrial, and agricultural businesses, on applying to use recycled water. A wide variety of uses are permitted, including crop and landscape, irrigation, construction site management and industrial processes.

- Water use audits intended to identify conservation and water reuse opportunities.

The **New Jersey, U.S.** Wastewater Reuse Program produces recycled water guidelines entitled "Reclaimed Water for Beneficial Reuse Technical Manual."

- Technical manuals that detail the water recycling technologies available to large users and the treatment standards that must be met before effluent may be reused.

- Construction and development guidelines for recycled water systems.
- Recycled water permit application guidelines.

For example: The **EU** has developed industry-specific reference documents on pollution-prevention measures (Best Available Techniques or BAT), which include recommended water recycling and reuse techniques. BAT reference documents are available for over 30 industry types and practices, including iron and steel production, refineries, and intensive livestock farming. The BAT reference documents assist permitting authorities and industry in determining compliance with BAT, which is one of the conditions for obtaining an environmental permit under the EU Integrated Pollution Prevention Control Directive.

Reporting of water consumption, discharge, and reuse by large water users is used primarily by local governments to track their water recycling progress. However, reporting requirements have the additional benefit of educating users about their own efforts and allowing the government to identify entities that could be encouraged (or required) to replace potable water with recycled water.

The **Australian** state of **Victoria's** Environment and Resources Efficiency Plan requires all large users of water and energy, including shopping centers, hospitals, sporting facilities, and universities, as well as commercial and industrial sites, to audit their water and energy use and register with the government if they exceed certain thresholds.

Removing Barriers

Barriers to water recycling and water recycling systems come in many forms: technological, financial, and regulatory. In fact, regulations intended to protect the public or programs providing services to the community may have the unintended effect of discouraging or even preventing voluntary water reuse.

One of the biggest barriers to water recycling is a municipal, state, or regional water code that does not recognize the use of recycled water. Local

Permitting requirements vary depending on the end use of recycled water in **Arizona, U.S.**, as well as the level of potential contaminants and the anticipated exposure to humans. Industrial wastewater with a sewage component or wastewater used for crops or food products requires a permit, while industrial waste water that is recycled or used only in industrial processes typically does not. For individual residents, a general use permit allows the use of 400 gallons per day of grey water for irrigation in single family homes with no notification requirements. Other types of reuse require a notice of intent but may still operate under the general use permit.

regulations requiring that all water used in the community meet potable water standards hinders or prevents water reuse.

As a result, the first steps toward water recycling are to set specific quality standards for recycled water and to provide guidance on the use of the reclaimed water.

The **British Columbia, Canada** plumbing code explicitly permits grey and black water systems

Other local requirements that may present barriers to water

reuse by making it more difficult or expensive include:

- Building and plumbing codes that prohibit the installation of the dual piping necessary for recycled water or grey water use.
- Regulations that impose stringent permitting and inspection requirements for recycled water regardless of the use or risk of human exposure. For example, imposing the same set of standards on a water reuse system in an industrial chemical manufacturing facility as for residential lawn irrigation.
- Actions that encourage (or do not discourage) potable water use, such as subsidizing the construction of potable water systems or not imposing full cost pricing on potable water use.
- Incentives for investments in technologies that consume large amounts of water.

In **Spain** national law provides for regulation of recycled water, including i) permitted and prohibited uses; ii) quality standards; and iii) treatment plant operating conditions.

Depending on their authority and the structure of their state or national legal schemes, not all communities will initiate the regulatory changes necessary to allow the use of recycled water. Many communities are constrained by state or federal requirements that they must follow. However, communities do have control over their local

building and development codes as well as their local funding, all of which can play a significant role in encouraging or discouraging water recycling and reuse.

Incentives

Incentives used by communities to encourage water recycling most commonly take the form of economic incentives that make recycled water cheaper than potable water. Another approach is to tie water usage to conservation programs and exempt recycled water users from many of the community's conservation requirements. Still others involve property rights and payments for the reuse of recycled water, pricing schemes that use higher rates for potable water, subsidies or grants for water recycling and reuse technologies, and programs for government procurement of water recycling infrastructure. Examples of these types of financial and regulatory incentives include the following:

Direct subsidies, generally in the form of grants for the installation of water reuse technologies and other capital expenditures.

For example:

- The **Singapore** Public Utilities Board will fund up to 50% of the cost of recycled water feasibility studies and the capital cost of recycling facilities. It will also pay companies an incentive fee for every cubic meter of water saved up to a cap.
- **New South Wales, Australia** offers rebates for the installation of rainwater tanks at residences and schools.

The Emilia Romagna Region in Italy offers grants for the adoption of water reuse and water reuse technologies in the petrochemical sector.

Two EU sources – LIFE and Eco-Innovation – provide funding for environmental projects including water reuse.

Recent water reuse projects funded under LIFE include: a pilot project for effluent reuse in the textile industry (ENEA, the Italian National Agency for Energy, New Technology and the Environment), a demonstration project on water recycling for photo film and photo paper production (Fuji Photo Film BV), and development of a new wastewater recycling system for the commercial laundry industry (Textil-Service Klingelmeier GmbH & Co. KG).

One of the four areas prioritized by Eco-Innovation in 2008 is the building and construction sector, including new water-saving systems such as grey water use.

- **Tucson, Arizona, U.S.** made loans to two school districts for the capital costs associated with reclaimed water. The City also funded installation of dual piping in a neighborhood that was an early adopter of recycled water technologies.
- **California, U.S.** provides grants for facilities' planning studies to determine the feasibility of using recycled water.

Reductions in payments to governments in the form of tax deductions or reduced lease payments for investments in water recycling technologies.

For example:

- In **Singapore**, the water conservation tax does not apply to recycled water and potable water usage fees are higher than for recycled water.
- In **Spain** environmental investments are entitled to a corporate tax deduction of up to 10%.
- The purchase of effluent treatment or conveyance equipment is exempt from sales and use taxes in **New Jersey, U.S.**, as well as being eligible for a corporate business tax credit.

Mexican income tax regulations provide for accelerated depreciation of assets used for water recycling and reuse.

Payments for the reintroduction of recovered water into the raw water source: programs under which the water supply or wastewater treatment district compensates water users who recover and reinject treated water into its original source.

For example: The Metropolitan Water District of Southern **California (U.S.)** pays local water agencies a fee for every gallon of water that is recycled, recovered, or returned to the groundwater supply.

Pricing that imposes higher charges for the use of potable water.

For example:

- The **EU** Water Framework Directive requires that, by 2010, Member States must ensure that their water pricing policies are structured to provide incentives for water efficiency.
- The Balearic Islands in **Spain** are considering modifying their water pricing structure to penalize high volume consumers.

St. Petersburg, Florida, U.S. imposes a per-gallon charge for the use of potable water and a flat per-acre fee for the use of recycled water in irrigation.

- **San Antonio, Texas** and **Tucson, Arizona (U.S.)** have lower charges for recycled water. In Tucson, recycled water pricing is set to recover approximately 80% of cost, with users of potable water paying the difference.
- In **New York, New York, U.S.**, buildings with recycled water systems pay \$1.52 per 100 cubic feet of water vs. \$2.02 per 100 cubic feet.

Regulatory relief by eliminating certain requirements for users of recycled water.

For example: landscape areas irrigated with recycled water are exempt from the approval requirements of the **Cerritos, California, U.S.** Water Conservation in Landscaping Ordinance.

*Reclaimed water in **St. Petersburg, Florida, U.S.**, as in many other communities, is not subject to the same restrictions on use as is potable water. For example, during water shortages, lawn irrigation is limited to one day per week for most households – while users of recycled water have no limitations on lawn watering.*

Additional incentives for water recycling and reuse include government procurement of water recycling and reuse equipment, requirements that government buildings and operations maximize their recycling and reuse of water, and structuring of water rights to reduce use of potable water.

Mandates and Regulation

Water recycling and reuse programs are not limited to encouraging the use of recycled water through education, incentives, and the elimination of barriers to reuse, although these are often the first steps for many communities. Those communities facing severe water restrictions due to natural water scarcity, population growth, or resource overuse frequently adopt laws requiring the use of recycled water. A number of communities have taken these actions on their own, while others are responding to state or regional mandates.

There are two common approaches to mandating the use of recycled water: (a) requirements targeting the supply of recycled water by regional or local wastewater treatment or water supply districts; and (b) requirements affecting the use of recycled water by residents or businesses.

Wastewater Treatment and Water Supply Utilities

In most communities, recycled water is provided by the community's wastewater treatment district or utility as these organizations are best positioned to deliver high quality recycled water. Not only do the districts have a large volume of wastewater, they often are the only ones with the capacity to carry out the level of treatment necessary to meet water quality standards.

*In **Florida, U.S.**, regional water management districts must assess their water resources and designate areas where water is or will be in short supply within the next 20 years. In these areas, recycled water is required for certain types of uses such as golf courses and farms. The water management districts also must provide funding for the development of recycled water systems.*

Communities may require treatment districts to develop plans for recycled water, to encourage the use of recycled water among their customers, or even to provide recycled water to certain types of users. Some local governments couple the

wastewater treatment utility mandates with restrictions on the local water supply utility. These regulations typically restrict the use of potable water, forcing water users to rely on recycled water and creating more customers for the local water reuse program.

***California, U.S.** requires its Department of General Services and Department of Transportation to install piping appropriate for recycled water use in any of their landscape irrigation projects if they are notified by a recycled water producer that recycled water will be provided for those projects within 10 years.*

For example:

- Applicants for national water licenses in **Mexico** must include treatment and reuse options in their applications.
- **Hesse, Germany** requires its public water systems to encourage water recycling among users.
- **California, U.S.** indirectly mandates water recycling by its local water districts by defining the use of potable water for certain uses such as golf course irrigation as a waste of resources. Thus communities such as **Santa Barbara, California** prevent the use of potable water on golf courses when reclaimed water is available so as to comply with the State mandate against wasting resources.

Residents and Businesses

Ensuring that wastewater treatment districts are prepared to supply recycled water is a prerequisite to any community's program, but a community must also ensure that there are users for the recycled water. Thus the second category of regulation targets water users themselves, either mandating the use of recycled water or prohibiting particular uses of potable water thereby forcing water reuse. Some of the most common requirements are:

- Restricting potable water to human or food related uses.
- Requiring the use of recycled water for certain large volume activities such as landscape and agricultural irrigation.
- Using local permitting and development codes to require the provision of the infrastructure necessary for recycled or grey water reuse, such as the installation of dual piping systems and other systems in new buildings or developments that allow the use of recycled water now or in the future.
- Requiring water recovery systems for high volume water users and dischargers such as car washes.

For example:

- New suburban communities in **Sydney, Australia** must install dual piping systems allowing for the delivery of recycled water to 160,000 homes.
- **Singapore** requires water recovery systems at locations where vehicles are washed, including construction sites.

*The government of **New South Wales, Australia** has developed a **Building Sustainability Index** that requires water reuse and conservation in new homes. First required as part of the development process for single family homes in Sydney, use of the Index requires a 40% improvement in water efficiency. Similarly, **Western Australia** is proposing mandatory water efficiency measures for all new homes including plumbing that allows for the use of recycled water in toilets and grey water use on lawns and gardens.*

- Applicants for water usage certification in **New Jersey, U.S.** must demonstrate that they will be using the lowest appropriate quality water in order to receive approval from the state.
- **Edmonton, Canada** and **Petro-Canada** worked together to supply the company with recycled water when new water regulations forbid increases in fresh water withdrawals. **Petro-Canada** needed for its operations.

Conclusion

More and more communities are facing acute water scarcity issues. Many are choosing water recycling and reuse as one part of their response.

The major types of policies for encouraging water recycling and reuse described in this paper – education, barrier removal, incentives, and mandates – provide a menu of options for communities to address their unique water resource needs. As illustrated by the examples provided above and in the appendix, choosing from this menu depends on various factors of any particular community, including: time horizon for program implementation; governmental structures and processes to promulgate and implement such programs; resources, including both funding and expertise; and degree of “buy-in” from relevant stakeholders and policymakers.

While the needs and circumstances of different communities vary greatly, the menu presented in this white paper should provide comfort that others are adopting policies to promote water recycling and reuse around the world.

Appendix – Matrix of Policy Examples and Additional Information

Location	Program	Description
Education and Outreach		
Australia		
Federal	Guidelines for Water Recycling	<p>The Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) and Augmentation of Drinking Water Supplies (Phase 2) were recently released for public comment. The guidelines are intended to support recycling of water that has traditionally been discarded.</p> <p>These guidelines will inform the development of regulations and address the public health and environmental concerns associated with grey water and recycled water reuse.</p>
Victoria	Environment and Resources Efficiency Plan www.epa.vic.gov.au/bus/erep/default.asp	<p>A new program designed to encourage energy and water efficiency; expected to deliver \$85m in net savings to large organizations across the state. The Environment and Resources Efficiency Plan requires all large users of water and energy, including shopping centers, hospitals, sporting facilities, and universities, as well as commercial and industrial sites, to audit their resource use.</p> <p>These users need to register with the Environment Protection Authority if they trigger certain thresholds. About 250-300 large sites in Victoria will need to register by March 31 2008. Action to reduce water, energy, and waste will be required if the cost to the organization can be recovered within three years or less.</p>
Canada		
Toronto	Water Department www.toronto.ca/water/index.htm Water Efficiency Coordinators	Coordinators work with industry and residents to provide ideas and resources.
Mexico		
National Water Commission ("CONAGUA").	Water Culture Program	State and Municipal water utility systems and CONAGUA develop programs on water reuse for the general public. CONAGUA provides up to 50% of the costs associated with the local implementation of these programs.
Mexican Center for training on water management and treatment. ("CMCAS").	Recycled Water Program	CMCAS train technicians, managers, and engineers of local and state utility systems on the best practices and the use of new technology including water recycling and reuse.
Most municipal and state water systems	Recycling Programs	Most water utility systems provide training on water conservation and water reuse alternatives. However, water recycling itself is generally limited to systems that have already developed the required infrastructure most notably those areas of water scarcity (in the Northern part of Mexico).
Singapore		
Public Utilities Board	Watermark Award www.pub.gov.sg/home/index.aspx	Award given by Board in recognition of water usage and conservation.

Location	Program	Description
National Environmental Agency	Lee Kuan Yew Water Prize	Award recognizing outstanding contributions towards solving the world's water problems.
National Environmental Agency	Singapore Green Plan	Award to individuals and entities that are role models of environmental protection and sustainability including water recycling.
National Environmental Agency	Public Education and Information http://app.nea.gov.sg/cms/htdocs/category_sub.asp?cid=40	Outreach programs include: <ul style="list-style-type: none"> • TV/Internet/Newspaper tips • Water audit program for commercial users • NEWater Visitor Centre, to advocate to the public about recycled water • Encouraging companies to replace potable water with recycled water
Spain		
National Autonomous Communities	Public awareness campaigns http://www.mma.es/ (See the Training and Environmental Education, Media, and the A.G.U.A. programs)	Campaigns referring to rational use have been launched in newspapers and other media by the Ministry of Environment and Departments of Environment of the 17 Autonomous Communities.
United States		
USEPA	Water Efficiency Leaders Award	Annual award and recognition program. Recognizes public and private entities for water conservation and recycling efforts.
All		Generally all municipalities with reclamation/reuse programs have some type of public education program including brochures and web based information on how to access the community's recycled water program. They also recognize various recycled water projects/users in these materials and on their web site
California (Northern) Eastern Municipal Water District	Recycled Water Program www.emwd.org	Provides information for landscaping, industrial, and agricultural businesses on applying to use recycled water. A wide variety of uses are permitted, including crop and landscape irrigation, construction site management, and industrial processes.
New Jersey	Wastewater Reuse Program www.state.nj.us/dep/dwq/reuseff.htm	The NJDEP Division of Water Quality maintains a website on the state's Wastewater Reuse Program, which contains useful information, including detailed guidelines entitled "Reclaimed Water for Beneficial Reuse Technical Manual," (www.state.nj.us/dep/dwq/techmans/reuseman.pdf) among other materials and links.
Austin Water Utility, Water Conservation Division, Texas	Water Efficient Equipment and Design, a Guide for Non-Residential Construction and Development www.ci.austin.tx.us/watercon/downloads/EquipmentGuide.pdf	The Guide provides information on equipment and design practices that lead to additional water savings above regulatory requirements. It is targeted at new commercial and institutional construction projects, including major renovations of existing facilities.

Location	Program	Description
Remove Barriers		
Canada		
British Columbia	British Columbia, 2006 BC Building Code www.housing.gov.bc.ca/building/code	BC Plumbing Code permits grey and black water systems.
Ontario		Ministry of the Environment approved the treatment of sewage wastewater for surface and subsurface irrigation of golf courses.
Italy		
Federal		Federal laws set purification standards for recycled water and limit the use of recycled water to: <ul style="list-style-type: none"> • Irrigation • Street washing, building heating and cooling and other “urban uses” • Industrial uses (no contact with food or cosmetics)
Spain		
National	Reuse of recycled water	National law provides basic regulation of recycled water, including: (i) permitted and prohibited uses; (ii) quality standards (depends on the use); (iii) conditions to run treatment plants; (iv) conditions to use recycled water. Permitted uses include: urban irrigation, irrigation of gardens, parks, and golf courses, agricultural irrigation, industrial vehicles washing and industrial uses. Reuse of water is not allowed for drinking purposes, the food industry, hospitals, refrigeration towers in most cases, ornamental use, and other uses that may entail risk for human health or danger to the environment.
United States		
Arizona	Recycled Water Permitting www.azdeg.com	The State environmental agency provides different levels of permitting depending on the end use of the recycled water, the level of potential contaminants, and the exposure to humans. For example: Industrial wastewater with a sewage component or which is used for crops or food products requires a permit while industrial wastewater that is recycled or used only in industrial processes typically does not. A general permit allows 400 gallons per day of gray water use for irrigation in single family homes with no notification requirements. Other types of reuse require notification but may still operate under the general permit.
California		Barriers to reuse: <ul style="list-style-type: none"> • Industrial plants that use recycled water are subject to California Department of Health Services inspections and tests that are otherwise not required. • Using recycled water in a building for toilet flushing requires dual plumbing to keep the recycled and potable water separate. Health Department and building code requirements prevent the retrofitting of buildings, so the use of recycled water is often limited to new construction or irrigation.
Santa Clara Valley Water District, California		Provides a general permit for certain users of reclaimed water, allowing them to submit notification only.

Location	Program	Description
City of Cerritos, California www.ci.cerritos.ca.us/citygov/publicworks/recycledwater.html	Water Conservation in Landscaping Ordinance www.codepublishing.com/ca/cerritos.html	Landscaped areas irrigated with reclaimed water are exempt from the requirements of the Water Conservation in Landscaping Ordinance, including the requirement for approval of landscape plans for new developments and periodical audits.
Clark County Water Reclamation District, Nevada www.cleanwaterteam.com/waterreclamation.html	Reclaimed water program therightwater.com (A member agency of the Southern Nevada Water Authority)	Reclaimed water is available on a case-by-case basis for a variety of applications, including: irrigation of golf courses and landscaped areas at public facilities; use as a coolant in generators at power generation stations; and dust control Note: Reclaimed water is availability-based in the District, and not legislation- or program-driven.
Oregon	Revision of recycled water use regulations Oregon Administrative Rules www.deq.state.or.us/regulations/rules.htm	The state of Oregon amended its recycled water use rules to: <ul style="list-style-type: none"> • Expand the list of beneficial purposes for which recycled water may be used; • Remove potential regulatory barriers and language that unduly stigmatizes recycled water; • Clarify the requirements for a recycled water use plan; • Clarify the requirements for coordination with the human resources and water resources departments; • Allow for innovative and improved treatment technologies; and • Update the bacteria rule language pertaining to effluent limitations for recycled water.

Incentives

Australia		
Federal	National Urban Water and Desalination Plan	<p>One election policy of the newly elected government is the introduction of a National Urban Water and Desalination Plan which would involve either a tax credit or a grant. The tax credit structure under discussion is as follows:</p> <ul style="list-style-type: none"> • A 10% Water Tax Credit: • Capped at \$100 million a project – will support up to \$10 billion worth of eligible up-front capital costs for approved desalination, water recycling, and storm water capture projects. • Would provide support at the level of 10 per cent of eligible up-front capital costs, and would be on top of existing depreciation allowances. • Where the project proponent of a water infrastructure project is a government-owned business that does not pay income tax, support will be in the form of a cash payment. <p>Grants for approved desalination, water recycling, and major storm water capture projects developed by the private sector, local governments, and State and Territory Governments.</p>
New South Wales www.nsw.gov.au/water.asp	Rebates for rainwater tanks www.sydneywater.com.au/EnsuringTheFuture/WaterSchool/RebateSchools.cfm	Offers rebates of up to \$650 for installing a rainwater tank at an existing home. In addition, schools can take advantage of the Rainwater Tanks in Schools Rebate Program, which offers a rebate of up to \$2,500 to schools that install a rainwater tank. The rebate is available to all primary and secondary schools, public and private, connected to the Sydney water system and helps reduce the cost of purchasing and installing a rainwater tank.

Location	Program	Description
Italy		
Emilia Romagna Region	Regional water guidelines and Private Incentives	Regional guidelines for water conservation, water management, and reuse include: <ul style="list-style-type: none"> • Financial incentives for installing water reuse devices for agricultural purposes. • Local strategies including public education and promotion of the use of recycled water. • Grant funds for water reuse in the petrochemical industry. • Economic incentives are granted to private companies for constructing new facilities and implementing new technologies which improve water reuse and water saving. The incentives range from 30%-40% of the costs based on the size of the company.
Mexico		
CONAGUA	Evaluation of new concession titles	Applicants of new concession titles for the use of national waters must include the treatment and reuse of water and the volume that could be reclaimed in their application.
CONAGUA, local governments, and water utility systems.	Joint investment in the infrastructure required for the reuse of water.	Water utility companies may jointly invest/finance the infrastructure required for the reuse of water.
SHCP	Tax Incentives	Income tax regulations permit the accelerated depreciation of assets used for the reuse of water.
Singapore		
	Taxation	Water fees include a water conservation tax of 30% to 45% of the water tariff. The water conservation tax is waived for recycled water.
	Water Pricing	Recycled water may be used for non-potable purposes and the tariff is lower than for potable water use.
Public Utilities Board www.pub.gov.sg/home/index.aspx	Water Efficiency Fund www.pub.gov.sg/conservation/water_efficiency_fund.aspx?l1=3&l2=32	Co-funds cost of recycled water use feasibility studies. Provides up to 50% of capital cost of water recycling facilities. Also will fund a company for every cubic meter of water saved up to a cap.
Spain		
National	Environmental tax deductions	Environmental investments are entitled to a corporate tax deduction of up to 10% on investments in fixed tangible assets used to protect the environment. Water reuse is not specifically mentioned but would appear to be consistent with the intent of the deduction.
National	National Hydrologic Plan	Allows and encourages water reuse. Establishes an urban water management model which includes the use of recycled water for: <ul style="list-style-type: none"> • Irrigation of gardens, parks, and golf courses • Agricultural irrigation • Industrial vehicle washing and other industrial uses
National / Autonomous Communities	"Getting the prices right" – Water prices	The price of water has increased as a result of the new EU Framework Directive. Member States, such as Spain, are required to ensure that the price charged to water consumers, for the abstraction and distribution of fresh water, and the collection and treatment of waste water, reflects the true costs.
Balearic Islands	Water pricing	Currently reviewing water pricing structure and may modify to penalize high volume consumers.

Location	Program	Description
United States		
Tucson, Arizona www.tucsonaz.gov/water/index.htm www.wateruse.org	Water pricing www.tucsonaz.gov/water/rates.htm Additional information available on reclaimed water, water conservation, including grey water use.	Reclaimed water is cheaper than potable water. <ul style="list-style-type: none"> Reclaimed water rate recovers 73-85% of service costs with the remaining percentage paid by potable water users. Potable water fees increase as the volume used increases while reclaimed water is a flat fee. <p>Made to two school districts for capital costs associated with reclaimed water. Funded installation of dual piping in a neighborhood which was an early adaptor (not an ongoing program –an example of government funding of pilot programs).</p>
California State Water Resources Control Board	Water Recycling Funding Program www.waterboards.ca.gov/recycling/fundingsources.html	Promotes the reuse of treated municipal wastewater by providing technical and financial assistance. Eligible projects must be economically feasible; result in a statewide public benefit; and achieve recycled water targets (state-wide goal of recycling is 1,000,000 acre-feet/year by 2010). The current level of funding is about \$59 million (from various state bond issues) for construction loans and grants, planning grants, and research. Of this total, \$47.6 million is available for construction, \$10 million for planning, and \$1.3 million for research. http://www.waterboards.ca.gov/recycling/fundingsources.html http://www.waterboards.ca.gov/recycling/docs/strategicplan2007.pdf
California State Water Resources Control Board	Water Recycling Construction Program www.waterboards.ca.gov/recycling/construction.html	Grants are provided for facilities planning studies to determine the feasibility of using recycled water. The grant will cover 50 percent of eligible costs up to \$75,000. Only public agencies are eligible to receive a facilities planning grant. http://www.waterboards.ca.gov/recycling/docs/guidelines2004.pdf
Metropolitan Water District of Southern California	Local Resources Program See application guidelines www.mwdh2o.com/mwdh2o/pages/business/BDE_LRP_ApplicationPackage.pdf	The program provides a sliding-scale incentive, paying local water agencies up to \$250 for every acre-foot of water that is recycled, recovered, or returned to the groundwater supply.
Metropolitan Water District of Southern California	Water Savings Performance Program, Process Improvements www.bewaterwise.com/rebates_industrial.html (in collaboration with other Southern CA Water Agencies, see map of member agencies, including the Municipal Water District of Orange County)	Provides financial assistance to public, commercial, industrial, and institutional entities for documented water savings that meet the minimum qualifying criteria. Qualifying process improvements include installation of equipment to capture, treat, and reuse water that would otherwise be discharged to the sewer. Based on the project cost and water savings, the program pays the lesser of: <ul style="list-style-type: none"> \$3.00/1,000 gal of actual water saved for a 1 year monitoring period; or 100% of the project's water-related process improvement costs.

Location	Program	Description
San Jose and Santa Clara Valley Water District, California	Water Efficient Technologies Program (WET) www.slowtheflow.com/whatswet.html	WET offers rebates of up to \$50,000 (or 50% of the project cost, whichever is less) to commercial, industrial, and institutional businesses for the implementation of process and equipment changes which reduce the company's wastewater discharge. Sample projects include: reclamation and reuse of rinse waters; and reuse of process water in fume scrubbers. Rebates are based on wastewater flow reduction. Eligible projects must reduce wastewater flows to the sanitary sewer system by at least 100 ccf (hundred cubic feet) per year. (1 ccf is equal to 748 gal.).
Los Angeles, California Department of Water and Power	Water pricing www.ladwp.com/ladwp/cms/ladwp001149.pdf	Charges for recycled water service are set by contract. The City has entered into contracts for delivery of recycled water in which the charge was 80% of the charge for potable water.
Denver Water, Colorado	Commercial, Industrial & Institutional Incentive Program www.denverwater.org/cons_xeriscape/conservation/Commercial_IndustIncentivePrgm.html	Commercial and industrial water users may receive \$4,500 (up to \$40,000) per acre-foot of water saved over a one-year period resulting from the installation of new water-saving equipment or introduction of water reuse applications including process water reclamation systems. Projects must meet a minimum savings requirement of 300,000 gal/year in order to qualify.
Denver Water, Colorado	Commercial, Industrial & Institutional Rebates www.denverwater.org/cons_xeriscape/conservation/Commercial_IndustIncentivePrgm.html	The program offers various rebates for commercial customers including the Single-Pass Cooling Rebate of \$450 for commercial customers using single-pass or once-through cooling systems (e.g. air compressors, X-ray processing, or hydraulic equipment) that install a closed-loop system that recycles cooling water, or replaces single pass water cooled equipment with air-cooled options.
Florida South Florida Water Management District	Alternative Water Supply Funding Program	Provides grants to cities, community development districts, and other water users of up to 40% of project construction costs for alternative water supplies including reclaimed water. (All of Florida's five water management districts provide construction grants for water reclamation activities.)
St Petersburg, Florida www.cms.stpete.org	Reclaimed water program http://cms.stpete.org/default.asp?page=1528 Restrictions on water use: http://cms.stpete.org/default.asp?page=1426	Reclaimed water is available for agriculture and golf course irrigation as well as residential lawn irrigation. Reclaimed water is not subject to the same use restrictions as potable water during drought or the dry season when, the use of potable water for lawn irrigation is restricted to 1 day/week while reclaimed water lawn irrigation is not restricted (residents are asked to limit watering to 3 days/week on a voluntary basis). Jupiter, Collier County, and Cape Coral, Florida and San Antonio, Texas similarly all have less restrictive rules for reclaimed water. Charges for potable water are per-gallon while reclaimed water is a flat fee based on the size of the property. (The City is looking to change this due to overuse of reclaimed water.) San Antonio, Texas also charges less for recycled water.
Las Vegas, Nevada	Water Waste Regulations and Manmade Lakes and Manmade Water Features Regulations www.lvwd.com/html/ws_waste_ordinances.html	May not use water from the public water district for cooling refrigerators, ice plants, ice machines, cooling plants, air-conditioning machines, engines, etc. However, the use of water for the above cooling purposes is not prohibited if it is collected, recooled, and reused, and is not permitted to flow into a sewer or cesspool or onto the ground. Potable or shallow aquifer groundwater may not be used for the purpose of filling or refilling a manmade lake; or a manmade decorative feature, unless the water is recirculated.

Location	Program	Description
New Jersey www.state.nj.us/dep/watersupply/	Corporate Business Tax credit concerning the reuse of treated effluent in industrial facilities www.njleg.state.nj.us/2000/Bills/PL01/321.PDF	A one-time tax credit against the Corporate Business Tax for the purchase of effluent treatment or conveyance equipment is available for industrial facilities (up to 50% of the cost). Treatment equipment includes any equipment that is used exclusively to treat effluent from a primary wastewater treatment facility, for reuse in an industrial process. Conveyance equipment includes equipment used to transport effluent to the facility in which the treatment equipment is installed, and also to transport the product of that further treatment to the site of the reuse.
New Jersey	Exemption from Sales and Use Tax for recycling, effluent treatment, and conveyance equipment www.njleg.state.nj.us/2000/Bills/PL01/322.PDF	Treatment or conveyance equipment that is purchased to allow reuse of wastewater effluent from an industrial operation is exempt from the State's Sales and Use Tax. The definitions of "treatment equipment" and "conveyance equipment" are the same as for the purposes of the Corporate Business Tax credit program above.
New Jersey	The New Jersey Environmental Infrastructure Financing Program www.state.nj.us/dep/dwg/mface.htm#finance	Revolving loan program which provides zero percent interest rate loans to local government units for up to half the allowable project costs and a market rate loan for the remaining allowable costs. Eligible wastewater projects include facilities for the treatment and beneficial reuse of sewage and water treatment system sludge. Note: generally, state revolving loan programs are severely underfunded and do not allow for expenditures on "green infrastructure."
New York City, New York	Comprehensive Water Reuse Program, New York City Water Board Water and Wastewater Rate Schedule http://nyc.gov/html/dep/html/ways_to_save_water/index.shtml www.nyc.gov/html/dep/pdf/waterrates.pdf	Residential, commercial, and mixed-use buildings with a Comprehensive Water Reuse System (CWRS) are provided rate incentives. CWRS includes both black water and grey water systems. The water rate for a CWRS building is \$1.52/100 cubic feet vs. \$2.02/100 cubic feet for other buildings.
Town of Cary, North Carolina townofcary.org/depts/pwdept/reclaimhome.htm	Bulk Water Program www.townofcary.org/depts/pio/bwindex.htm	Non-potable, reclaimed water is available at no charge to approved customers who have completed a training course. Customers must take at least 250 gallons and are responsible for hauling the water themselves. Water rates are lower for reclaimed water and the town's outdoor watering restrictions do not apply to reclaimed water.
Texas	Water-related Exemptions from State Sales and Use Tax http://secure.sos.state.tx.us/pls/pub/readtac\$ext.TacPage?sl=T&app=9&p_dir=N&p_rloc=19776&p_tloc=&p_ploc=1&pg=6&p	Equipment, services, or supplies used solely for water recycling and reuse are exempt from sales and use tax.

Location	Program	Description
Texas	Property Tax Exemptions Regarding Certain Water Conservation Initiatives www.window.state.tx.us/taxinfo/proptax/tc06/ch11b5.htm#11.32	Local governments may exempt from taxation part or all of the assessed value of property on which approved water conservation initiatives have been implemented.
Austin, Texas	Water Use Management Ordinance http://www.ci.austin.tx.us/watercon/summer.htm	Water conservation regulations contained in the ordinance do not apply to reclaimed water.
Austin, Texas	Water Conservation Program, Commercial Incentive www.ci.austin.tx.us/watercon/systemaudits.htm	The Commercial Incentive Program offers rebates up to \$40,000 to industrial, commercial, and institutional water users towards the cost of installing new equipment and processes that conserve water at existing facilities. The City also offers rebates for specific items such as efficient landscape irrigation equipment. Eligible projects include the reuse of high quality rinse water, and combined process or storm water reuse for landscape irrigation.
San Antonio, Texas	Large-Scale Retrofit Rebate Program, San Antonio Water System (SAWS) www.saws.org/conservation/commercial/retrofit.shtml	The program offers rebates of up to 50% of the cost of water-saving equipment rebates to commercial, industrial, and institutional water users for implementing water saving processes or installing water saving equipment. The amount of the rebate is determined by water savings, the life of the equipment and the installed cost. Eligible equipment include process water reclamation systems and air conditioning condensate capture and reuse.

Mandates and Regulation

Australia

All States	Water Restrictions	Water restrictions are currently in place in all major cities of Australia in response to the severe drought. There are different stages, starting at Stage 1, for the least restrictive, going up to as far as Stage 8. Water inspectors patrol streets in several cities, and impose fines or turn off water systems. Compliance with these restrictions has forced Australians to adopt innovative water recycling and reuse actions.
States (Victoria/ Queensland/NSW/ Western Australia) & Commonwealth (Murray-Darling Basin)	Water Trading	In many parts of Australia, rural water use is managed through water access entitlements and water allocations. A water access entitlement, such as a water license, refers to an ongoing entitlement to exclusively access a share of water. A water allocation refers to the specific volume of water that is allocated to water access entitlements in a given season. Water trading is the process of buying, selling, leasing, or otherwise exchanging water access entitlements (permanent trade) or water allocations (temporary trade). Australian water markets are still developing and have, so far, been dominated by temporary transfers, partly owing to the lack of secure water entitlements. Reference materials: The Department of the Prime Minister and Cabinet National Water Initiative Water Trading Study, June 2006, provides detailed information on water trading in Australia. www.environment.gov.au/water/publications/action/pubs/nwi-wts-full-report.pdf Further information on the State schemes can be found at www.agriculture.gov.au/browse/resources/water/trading .

Location	Program	Description
New South Wales	BASIX – Building Sustainability Index www.basix.nsw.gov.au/information/index.jsp www.build.qld.gov.au/smart_housing/news/updates/2004/aug/page6.asp www.basix.nsw.gov.au/information/whats_new.jsp	The Building Sustainability Index encourages recycling water, rainwater tanks, and water conservation to improve the water efficiency of all new homes by 40 per cent better than existing housing stock. Since July 2004, the BASIX assessment has become a mandatory part of the development approval process for new housing in New South Wales. The Index started in Sydney in 2004 and then was rolled out to the rest of New South Wales. www.sydneywater.com.au/SavingWater/RecyclingandReuse/RecyclingAndReuseInAction/FutureProjects.cfm
New South Wales	Recycled water initiatives in new suburbs	State Governments are increasingly requiring “new” suburbs to adopt dual reticulation systems. For example: <ul style="list-style-type: none"> • Western Sydney Recycled Water Initiative • Rouse Hill Recycled Water Area • Hoxton Park Recycled Water Scheme
Victoria	Environment and Resources Efficiency Plan	See Education and Outreach
Western Australia	5 Star Plus building initiative www.5starplus.wa.gov.au/	The 5 Star Plus building initiative seeks to mandate water efficiency measures on all new houses starting in 2008, including: <ul style="list-style-type: none"> • plumbing to toilets to allow for alternative water supply at a later date • plumbing drainage to allow easy recycling of grey water at a later date for use on lawns and gardens • an alternative water supply for appropriate non-potable use in houses with high water demand
Western Australia	Recycled water target	Victoria is one of a number of States which has set a recycled water target – 92% reuse of treated waste water by 2011 and 100% beneficial use of all recycled water supplies thereafter.
Canada		
Alberta		Energy and Utilities Board has imposed water reuse obligations on proposed projects in the oil sands. 100% reuse obligation.
Victoria Capital Regional District, British Columbia	BC Municipal Sewage Regulation	Requires new and existing public buildings be retrofitted to operate two water systems providing for reuse of grey water for toilets and certain other functions.
European Union		For information regarding European Union regulations and directives regarding: Water Protection and Management: http://europa.eu/scadplus/leg/en/s15005.htm Water Framework Directive: http://europa.eu/scadplus/leg/en/lvb/l28002b.htm

Location	Program	Description
Germany		
Hesse	State water laws	<p>Public water supply systems must take measures to reduce potable water consumption. The Hesse State Water Law requires operators of public water supply systems to encourage the following measures:</p> <ul style="list-style-type: none"> • Reduce supply systems water losses to an unavoidable minimum. • Exploit process water and runoff rain water. • Direct high water demand businesses to use process and surface water. • Encourage efficient use of water by appropriate structuring of pricing. • Advise water users on measures to save water. <p>Public authorities may request the operators of supply systems report on which measures they take to improve the efficient use of water.</p>
Italy		
Lombardy Region		Rain water collection and storage systems are required for new buildings and renovation of old buildings.
Mexico		
CONAGUA	National Water Law and National Water Program.	CONAGUA is required to develop the incentives for the development of the infrastructure for the reuse of water.
Singapore		
National	<p>Handbook on Application for Water Supply</p> <p>www.redas.com/einformation/pu/handbook/pub/000515.htm</p>	<p>The Handbook serves as a single source for water supply matters, containing mandatory requirements and non-mandatory recommendations:</p> <ul style="list-style-type: none"> • Water recovery systems for washing of vehicles at construction sites and other premises where washing of vehicles are required; • Setting up a water recycling system, where possible, to reclaim processed water for reuse in the production process and other non-potable purposes such as cooling, irrigation, etc.; and • Recycling facilities shall be incorporated into any bath which has a capacity, measured to the overflow level of the bath, exceeding 250 liters.
	Public Utilities Regulation	<p>The regulations prohibit:</p> <ul style="list-style-type: none"> • The installation of any cooling system which is of once-through design; • Any cooling system in which the cooling water is not recycled; or • Any bath having a capacity, measured to the overflow level of the bath, exceeding 250 liters which does not incorporate recycling facilities or has a drain plug for direct discharge of water.
United States		
California	<p>The Water Recycling Act of 2006</p> <p>www.owue.water.ca.gov/recycle/laws/AB371-2006.pdf</p>	The Act requires the State Dept. of General Services and Dept. of Transportation to install piping appropriate for recycled water use in any of their landscape irrigation projects if they are notified by a recycled water producer that recycled water will be provided for those projects within 10 years.

Location	Program	Description
California	Water Recycling in Landscaping Act of 2000 www.owue.water.ca.gov/recycle/laws/SB2095-2000.pdf	Requires any local or private entity that produces recycled water and determines that within 10 years it will provide recycled water within the boundaries of a local agency, to notify the local agency of that fact. Within 180 days of receipt of notification from a recycled water producer, the local agency shall adopt and enforce a recycled water ordinance. The local ordinance shall at least <ul style="list-style-type: none"> • state at least that it is the policy of the local agency that recycled water determined to be available shall be used for non-potable uses; • designate the areas that can or may use recycled water; • establish general rules; and • establish, among others, that the use of the recycled water is determined to be available in new industrial, commercial subdivisions located within the designated recycled water use areas. These provisions shall require a separate plumbing system to serve non-potable uses.
California	Water Code www.leginfo.ca.gov/cgi-bin/calawquery?codesection=wat&codebody=&hits=20 www.owue.water.ca.gov/recycle/laws/laws.cfm	The use of potable domestic water for certain specific non-potable uses, including, but not limited to, golf courses, parks, industrial, and irrigation uses, is a waste or an unreasonable use of the water, if recycled water is available which meets certain conditions. The state thus indirectly mandates the regional water boards to promulgate rules that encourage or mandate the use of recycled water. http://www.leginfo.ca.gov/cgi-bin/displaycode?section=wat&group=13001-14000&file=13550-13557
Santa Barbara, California	Water Efficient Landscape and Reclaimed Water Use Regulations www.santabarbaraca.gov/Documents/Municipal_Code/03_Individual_Titles/SBMC_TITLE_14/Water_and_Sewers.pdf	The regulations declare that it is the policy of the City of Santa Barbara that reclaimed water be used wherever it is available. Pursuant to the State Water Code, the City of Santa Barbara requires that a person or public agency not use water suitable for potable domestic use for the irrigation of greenbelt areas when reclaimed water is available.
Florida	Water Reuse Program, Department of Environmental Protection: www.dep.state.fl.us/water/reuse/index.htm www.dep.state.fl.us/water/reuse/apprules.htm	State law requires water management districts to assess their water resources and designate water resource caution areas where the water supply is limited or will face critical shortages within the next 20 years. Recycled water is required for certain types of users such as golf courses and farms unless they can show that using reclaimed water is not feasible. Districts must provide funding for development of alternative water supply systems. The State has established a Water Protection and Sustainability trust Fund to help fund conservation and reclamation projects.

Location	Program	Description
Las Vegas Valley Water District	<p>Las Vegas Valley Water District Services Rules, 2008</p> <p>www.lvwd.com/assets/pdf/serv_rules_fulldoc.pdf</p> <p>(A member agency of the Southern Nevada Water Authority)</p>	<p>All large-scale turf and landscape irrigators (e.g. golf courses, landscape areas) and appropriate non-residential users must use non-potable water (recycled/reclaimed) when and where it is available.</p> <p>Note: Recycled water is not generally available.</p>
New Jersey	<p>Department of Environmental Protection, Water Supply Allocation Rules</p> <p>www.nj.gov/dep/watersupply/NJAC7_19.pdf</p> <p>www.state.nj.us/dep/dwg/techmans/reuseman.pdf</p>	<p>The permittee of a water supply allocation permit or temporary dewatering permit is required to investigate the feasibility of water reuse if the diverted water is used for non-potable purposes.</p>
New Jersey	<p>Agricultural, Aquacultural, and Horticultural Water Usage Certification</p> <p>www.nj.gov/dep/watersupply/NJAC7_20A.pdf</p>	<p>The applicant for a water usage certification must demonstrate that the water used is the lowest quality water that is appropriate for the intended use.</p> <p>For non-edible agricultural, aquacultural, or horticultural products, and where feasible, the Department may require the use of reclaimed water for irrigation or other purposes.</p>
San Antonio, Texas	<p>Water Conservation and Reuse Ordinance</p> <p>www.municode.com/resources/gateway.asp?pid=11508&sid=43</p>	<p>The Ordinance creates the following mandates in connection with water reuse:</p> <ul style="list-style-type: none"> • Cooling towers not utilizing recycled water must operate a minimum of four cycles of concentration. • Vehicle wash facilities using conveyORIZED, touchless and/or rollover in-bay technology must reuse a minimum of 50% of water from previous vehicle rinses in subsequent washes. • Golf courses, other than those utilizing recycled water for irrigation, must comply with residential irrigation requirements on areas other than tee boxes, fairways, and greens. <p>Gray water, treated wastewater, and water reuse are exempted from some provisions of the Drought Management Plan.</p>