

Ocean Wastewater Discharge in the State of California Report and Inventory Prepared by Heal the Ocean

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<http://www.healtheocean.org/>

Additional References, Summaries, and Sources

Water Reclamation

CALFED Bay-Delta Program website (accessed October 2009).

California and federal agencies program administered by the California Bay-Delta Authority. The program is developing and implementing a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta System. From WR 2030: "As part of this function, the Authority evaluates water supply options that could relieve stress on the Bay-Delta System, including water recycling. The [Program] is developing the best available scientific information, using world-class science and peer review, to guide decisions and evaluate actions that are critical to its success."

<http://calwater.ca.gov/index.aspx>

NASA Advanced Life Support Systems Group Uses Water Reclamation Prototype. NASA Tech Briefs web site (2007) October 01 (accessed August 2009).

Dynaflow Inc. has developed a prototype water reclamation and disinfection unit for NASA Advanced Life Support Systems.

<http://www.techbriefs.com/component/content/article/2283>

Reclaimed Water – Studies, Fact Sheets, etc.

Parsons, Lawrence, Reclaimed Water for Homeowner Irrigation. University of Florida IAS Extension website (accessed October 2009).

Rather than establishing national water reuse standards, the EPA determined that comprehensive federal guidelines --along with state regulations -- would increase implementation of water reuse projects. Hence, states have established their own water reuse regulations. In Florida, the Florida Department of Environmental Protection (FDEP) established these water quality standards and regulates reclaimed water. Florida has been a leader in the production and use of reclaimed water for several decades. In 2007, 430 reuse systems in the state supplied a total of more than 663 million gallons per day (mgd) of reclaimed water. Several large water reclamation systems -- including systems in St. Petersburg, Tallahassee, and Orlando -- have provided reclaimed water to irrigate landscapes and agricultural crops for more than 20 years.

<http://edis.ifas.ufl.edu/HS1157>

Reclaimed Water: Pure sense., FAQ, Colorado River Municipal District website (accessed October 2009).

How does reclaimed water taste? Will our water be softer? Is this water safe? How are germs removed from reclaimed water? What about chemicals from pesticides and pharmaceuticals? Do other cities and water districts use reclaimed water? What happens if something goes wrong at the plant? What if a filter tears, or an ultraviolet light burns out? Does the proposed system produce any by-products? How much will this cost? Who will pay for the facilities? How soon will this happen? How can I learn more?

<http://clients.freese.com/crmwd/faq.cfm>

Rodriguez, C., et al., Indirect Potable Reuse: A Sustainable Water Supply Alternative. International Journal of Environmental Research and Public Health (2009) March, 6 (3), pp. 1174–1209. Published online 2009 March 17. doi: 10.3390/ijerph6031174 (accessed October 2009).

Benefits of reclaimed water including financial benefits, water conservation, habitat protection, environmentally friendly discharge, and increased availability of water.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2672392/>

Sewer to Spigot: Recycled Water by Anjali Athavaley, Wall Street Journal (2008) May 19, featured on California Coastkeeper Alliance website (accessed October 2009).

Cities ranging from San Diego to Denver already recycle wastewater for irrigation and industrial use. Some communities, such as the Tampa Bay area of Florida, desalinate seawater, which is generally more expensive than recycling. Many cities are also pushing water-conservation initiatives such as implementing restrictions on when residents can water lawns or offering rebates for high-efficiency washers and toilets.

<http://www.cacoastkeeper.org/news/sewer-to-spigot-recycled-water>

Water Recycling and Reuse: The Environmental Benefits. U.S. EPA Region 9 website (accessed October 2009).

Water Recycling Decreases Discharge to Sensitive Water Bodies In some cases, the impetus for water recycling comes not from a water supply need, but from a need to eliminate or decrease wastewater discharge to the ocean, an estuary, or a stream.
<http://www.epa.gov/region09/water/recycling>

Reclaimed Water – Treatment Plants

CH2M HILL to design, build and operate US\$127m water reclamation facility for Spokane County, WA. Environmental

Expert.com (2009) April 17.

8-million gallon-per-day water reclamation facility expandable to 24 mgd and to use state-of-the-art membrane bioreactor and nutrient removal treatment to reduce phosphorus levels in the effluent to below 50 parts per billion.

<http://www.environmental-expert.com/resultEachPressRelease.aspx?cid=3951&codi=48848&lr=1&word=wastewater%2breclamation>

Essex & Suffolk Water Utility, UK, website (accessed October 2009).

Water reclamation since 1997. Up to 10% of drinking water supply since at least 2003. Essex & Suffolk Water provide water mains and services in the Essex & Suffolk area dealing with the whole process from initial enquiry to design, construction, administration, inspection and connection.

www.eswater.co.uk

Groundwater Replenishment System Building on Success of Other Reuse Projects, Orange County information sheet (circa 2006).

The Groundwater Replenishment (GWR) System is a new, planned water purification project unlike previous projects because of its high level of water purification. Using one of the world's most advanced water purification systems, the GWR System will produce water that is very similar to or better than bottled water quality before it is used as a seawater barrier and to augment the groundwater supplies.

http://www.gwrssystem.com/about/pdf/0312gwrs_whitepaper.pdf

Inland Empire Utilities Agency (IEUA), Recycled Water FAQ, website (accessed October 2009).

The demand for water in southern California exceeds the available supply. The State of California Water Plan and the Metropolitan Water District Integrated Water Resources Plan for southern California recommend the use of recycled water to alleviate future water shortages. For southern California, imported water and storm water supplies are not reliable especially during drought years. Recycled water provides a safe, cost effective and reliable supply of high quality water.

<http://www.cbwm.org/docs/IEUA%20FAQ%20RW%20June%202006.pdf>

Singapore National Water Agency (PUB) website (accessed October 2009).

In just four decades, Singapore has overcome water shortages despite its lack of natural water resources, flooding and pollution in its rivers in the 1960s and 1970s. Driven by a vision of what it takes to be sustainable in water, Singapore has been investing in research and technology. Today, the nation has built a robust, diversified and sustainable water supply from four different sources known as the Four National Taps (water from local catchment areas, imported water, reclaimed water known as NEWater and desalinated water).

<http://www.pub.gov.sg/about/Pages/default.aspx>

Torreele, Veurne-Ambacht, Belgium. Water Reclamation Plant, Online brochure.

The sewage treatment plant at Wulpen provides treated wastewater to the water treatment plant at Torreele, which produces a total of 2500 million litres of purified recycled water per year. At Torreele water undergoes ultrafiltration, reverse osmosis and ultraviolet disinfection treatment. The treated water is then added to an infiltration basin where it filters through the sand dunes to the groundwater, which provides the local drinking water supply.

http://www.iwva.be/docs/torreele_en.pdf

Groundwater Replenishment at the Montebello Forebay Spreading Grounds, Johnson, T. WRD Technical Bulletin (2008) 14, Winter (accessed October 2009).

The Intermunicipal Water Company of the Veurne region (IWVA) reuses wastewater effluent for groundwater recharge of an unconfined dune aquifer since July 2002. The 'Torreele' reuse plant has a production capacity of 2,500,000 m³/y. Due to the sensitive environmental nature of the dune area, the quality of the infiltration water is subject to stringent standards. The combination of membrane filtration techniques proved capable of producing this quality and enabled a sustainable groundwater management of both dune water catchments owned by the IWVA.

<http://www.wrd.org/engineering/groundwater-replenishment-spreading-grounds.php>

Van Houtte, Emmanuel, Verbauwhede, Johan, Operational experience with indirect potable reuse at the Flemish Coast. Desalination, (218) 1-3, 5 January (2008), pp.198-207.

Torreele project in the Veurne coastal region of Belgium in operation since 2002. The Intermunicipal Water Company of the Veurne region (IWVA) reuses wastewater effluent for groundwater recharge of an unconfined dune aquifer since July

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West Central Florida Water Reclamation Facility Wins Earle B. Phelps Award Using Severn Trent Services' TETRA DeepBed Filtration Technology. Water Online (2007) August 21 (accessed August 2009).

<http://wateronline.com/article.mvc/West-Central-Florida-Water-Reclamation-Facili-0001?VNETCOOKIE=NO>