

Water Reuse Context & Terminology

Produced through a collaborative process by various workgroups of the WaterReuse Association (WRA), WRA California Section, the California Association of Sanitation Agencies (CASA), and the Association of California Water Agencies (ACWA)

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With water reuse playing an increasingly important role in water supply portfolios throughout the United States, consistent use of terms and their definitions is critical to public education and outreach. Aligning the way we talk about water reuse can go a long way toward helping the public understand how it fits in a community's overall strategy to improve water supply reliability and resiliency.

In 2016, various workgroups of the WaterReuse Association (WRA), WRA California Section, the California Association of Sanitation Agencies (CASA), and the Association of California Water Agencies (ACWA) collaborated to produce a list of terms that could be distributed for use by members of all the organizations. As water agencies throughout California have continued to implement both non-potable and potable water reuse projects, WaterReuse California's Communications Collaborative Group (CCG) recommends that this document be updated to reflect both research and real-world experience talking to community members about reuse.

This revised document provides public education and outreach professionals with an updated framework to discuss water reuse with the public and a glossary to help navigate the technical terms frequently encountered.

One particular phrase, "Toilet-to-Tap," is often used to describe potable reuse projects. While it is totally incorrect, it is most often used by headline writers who want to entice readers of a story about a potable reuse project – and will probably remain in use, especially by those who want to cast aspersions about the potable reuse process. This phrase leaves out the multiple treatment or cleaning/purification steps involved in all potable reuse projects. Multiple alternative phrases have been proposed and used by water reuse professionals and include, but are not limited to: 1) "Toilet-to-Treatment/Purification (*a word that can be repeated as many as five times here depending on the number and type of cleaning the source water undergoes*)-to-Tap." - Not only are there multiple barriers between the source water for a potable reuse project, often recycled water that has already gone through three cleaning processes before the purification process begins, but the product water may be the same quality as distilled water before it goes to a surface water reservoir, a groundwater basin or a drinking water plant or distribution system. 2) "Showers-to-Flowers" for non-potable reuse projects. - Using this phrase creates an opportunity to point out that there are multiple sources of wastewater; not just toilets. 3) "Certified Pre-owned Water" - to reflect how all potable reuse projects undergo rigorous and extensive testing and monitoring to ensure the quality of the product water meets or exceeds the strictest drinking water standards.

Some public opinion research has found that words starting with "re" (such as repurified, recycled or reclaimed) may be viewed more negatively by some communities. However, it is of foremost

importance to be honest and transparent about water supply alternatives. Consequently if “re” words are of concern in your community, it is suggested to first use the accurate terms to describe your project, clearly define those terms and then introduce an alternate term that you may continue to use. For example, first describe recycled water produced through an advanced water treatment process as “purified recycled water” or “purified water”. Then continue to use the term “purified water” in your communications.

As part of the glossary, each technical term has a definition provided with some background context on how the word is used.

Since the conversation about water reuse continues to evolve at a rapid pace, this document is designed to be updated periodically.

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Introduction

All water on Earth is used and reused, over and over, in an elegant water cycle. Water reuse occurs in various ways on a daily basis. It happens when a community's treated or cleaned wastewater is discharged into rivers or other water bodies. If you live in a community downstream of another, chances are you are reusing water from an upstream town.

Scientifically proven advances in water technology allow communities to capture and reuse water for many different purposes. The level of treatment or cleaning employed depends on the water's source, its intended use and how it ultimately gets delivered.

Some communities reuse water to replenish groundwater basins. Others use it to augment surface water reservoirs, often blending it with other water supplies or allowing it to remain in storage for a certain amount of time before withdrawing it and cleaning it again at a drinking water plant. Water also is reused by industries and to irrigate crops or landscapes.

There is no one-size-fits-all approach to taking previously used water and cleaning it so it is suitable for other uses. "Fit-for-purpose" reuse refers to used water that is cleansed to a level that matches its intended reuse. There are many different scientifically proven processes and options in use by communities today to diversify their local water supply portfolios and meet needs. Consumers can be assured that water reuse involves extensive cleaning, rigorous monitoring and testing, and is good for the environment and scientifically proven to be safe.

Increasingly, communities are viewing water reuse as an asset that can augment the drinking water supply. Examples of various projects – known collectively as potable reuse – can be found on the WaterReuse Association website¹.

Scientists, regulators and water experts often use technical language to explain the various processes involved in treating and reusing water, different types of water reuse projects, types of treatment needed for each, and the ways in which recycled or reclaimed water is delivered to a community so that it can be used again.

Terms and Definitions

This glossary represents a list of words that are often used in public information and technical reports prepared by scientists, engineers, and technologists. The terms are grouped into categories based on how they are used in public outreach materials and technical reports, and definitions are provided.

¹ <https://www.watereuse.org/water-reuse-101/global-connections>

Foundational Terms

- **Non-potable Water** is water that is not safe or not palatable to drink and is typically used for irrigation purposes
- **Potable Water** is drinking water. It meets or exceeds state and federal drinking water standards for health and safety. It has been treated or cleaned so that it is safe for human consumption.
- **Recycled Water** generally refers to domestic wastewater that has been cleaned so that it can be used more than once. The terms “reclaimed water,” “reuse water” and “recycled water” are often used interchangeably depending on the local community or region.
- **Reclaimed Water.** See **recycled water**.
- **Treatment** is the term commonly used to describe the cleaning process or steps used to make water from any source safe for its intended use (such as drinking, landscape irrigation, cooling, etc.), or to make wastewater or sewage safe to dispose of in the environment. In both cases, treatment steps are applied to produce a product water that meets specific regulations, such as those associated with the Safe Drinking Water Act in the case of drinking water or the Clean Water Act in the case of wastewater or those regulations promulgated specifically for various types of water reuse. (While commonly used by water and wastewater professionals, the word “treatment” is not always clearly understood or viewed as a good thing by members of the public. Treatment implies chemicals or other substances are added to water rather than the process of removing such substances from water or wastewater. The words clean, cleaned and cleaning are good alternative terms to use in public documents when describing this process.)
- **Water Cycle** describes how water moves on Earth: water evaporates from water bodies (such as oceans, lakes and rivers), forms clouds, and returns to Earth as precipitation (rain or snow). The amount of water that evaporates each year and the amount that falls back to the ground are virtually constant, meaning that the amount of water on Earth does not change. Water reuse solutions essentially use technology to mimic the natural water cycle and create clean water faster and more efficiently.
- **Urban Water Cycle** describes how water moves through an urban community. Water is used for many types of indoor purposes such as cooking, bathing, laundry, flushing toilets, and preparing food or beverages, as well as for commercial and industrial uses. The used water is carried through pipelines (sewers) to a wastewater treatment plant where it is cleaned sufficiently to be reused in the community for multiple purposes.

- **MGD** is the abbreviation for million gallons per day. This term is often used to describe the volumes of water produced or wastewater treated and discharged from a treatment plant.

Technical Terms for Different Types of Water Reuse

- **Beneficial Reuse** is the use of recycled water for purposes that contribute to the water needs, economy and/or environment of a community.
- **Potable Reuse** is the use of purified recycled water for drinking water purposes. The water is purified to meet or exceed federal and state drinking water standards and is safe for human consumption.
- **Non-potable Reuse** is the use of recycled water for purposes other than drinking purposes, such as irrigation and industrial uses.
- **De-facto, Unacknowledged, Incidental or Unplanned Potable Reuse** occurs when water intakes draw raw water supplies downstream from discharges of cleaned water from wastewater treatment plants, water reclamation facilities or resource recovery facilities. For example, if you are downstream of a community, that community's used water is cleaned and then gets put back into a river or stream and is delivered downstream to your community. After further treatment, this previously used and cleaned water becomes part of your drinking water supply.
- **Planned Potable Reuse** is publicly acknowledged as an intentional project to use recycled water for drinking water by using purified recycled water to add to drinking water supplies. It commonly involves a more formal public process and public consultation program than is observed with de-facto or unacknowledged reuse. While potable reuse may further be defined as either **direct or indirect potable reuse**, these terms may be confusing to the public. It is recommended to further define potable reuse by describing how it augments the water supply, e.g. groundwater augmentation, reservoir augmentation, raw water augmentation and treated drinking water augmentation. (These terms are defined on page 9 of this document.) As they are still used, definitions for indirect and direct potable reuse are provided below.
 - **Indirect Potable Reuse (IPR)** involves blending purified recycled water with other environmental systems such as a river, reservoir or groundwater basin, before the water is reused for drinking water.
 - **Direct Potable Reuse (DPR)** involves putting purified recycled water directly into a potable water supply distribution system downstream of a drinking water plant or into the source water supply immediately upstream of the drinking water plant.

Terms to Describe Different Types of Water

- **Purified Recycled Water or Purified Water** has passed through multiple proven advanced treatment or cleansing processes. It has been verified through rigorous monitoring and testing to be safe to add to a community's water supply, including drinking water supplies.
- **Greywater** is the term used to describe water separated from a household wastewater collection system and reused on site, typically for outdoor use. This water can come from a variety of sources such as showers, bathtubs, washing machines and bathroom sinks. It often contains some soap and detergent, but may be clean enough for some non-potable uses. Water from toilets or wash water from diapers is not considered to be greywater. Kitchen sink water is not considered greywater in many states. Many buildings or individual dwellings have systems that capture, possibly clean and distribute greywater for irrigation or other non-potable uses.
- **Raw Water** is surface or groundwater that has not been cleaned or treated to meet federal or state drinking water standards and does not have any of its minerals, ions, particles or bacteria removed. It has not gone through an approved water treatment or drinking water plant process and is typically not safe for human consumption.
- **Recycled Water** generally refers to domestic wastewater that has been cleaned so that it can be used more than once. The terms "reclaimed water," "reuse water" and "recycled water" are often used interchangeably depending on the local community or region
- **Sewage** is the used water of households and commercial businesses that contains human waste. Sewage is a subset of wastewater; if wastewater contains human waste then it is considered to be sewage.
- **Wastewater** is the used water of a community or industry that contains dissolved and suspended matter. There are different types of wastewater: domestic, commercial, and industrial.
 - **Domestic Wastewater (Sewage)** is used water from washing food, dishes, clothes and bodies, and toilet flushing. The used water that goes down the drain or is flushed down the toilet is wastewater. Because a considerable amount of water is used to carry away only a small quantity of waste, domestic wastewater is mostly water. It is referred to as "wastewater" in most places, but can also be called sewage.
 - **Industrial Wastewater and Commercial Wastewater** is the liquid waste generated by industries, small businesses and commercial enterprises and can be discharged to a sewer upon approval of a regulating authority. Some industrial wastewater may require pretreatment before it can be discharged into the sewer system, while some does not. Controlling the release of harmful chemicals into the wastewater

collection system is known as source control. If industrial or commercial wastewater contains human waste it can also be called sewage.

Terms to Describe Water Treatment and Purification Technology or Processes

Each of the following technologies or processes can be used as safety barriers in the water purification process:

- **Advanced Oxidation** is a purification process where powerful oxidants are formed and then used to break down chemicals and disinfect water. The oxidants can be formed using a combination of hydrogen peroxide, chlorine, ultraviolet (UV) light or other materials.
- **Biological Activated Carbon (BAC)** filters are used to remove dissolved organic material. This is done by organics sticking to the filter and by beneficial bacteria, which thrive in a high oxygen environment and live on the filters, eating the organics.
- **Dual Media Filtration** is a filtration method that uses two different types of filter media, usually sand and finely granulated anthracite.
- **Granular Activated Carbon** is a process used to remove chemicals that are dissolved in the used water. The dissolved chemicals stick to the carbon.
- **Membrane Bioreactors (MBRs)** use both biological processes and membrane technology to clean water. First, organic matter and, potentially, nutrients such as nitrogen and phosphorus (depending on the MBR) are removed using biological processes. Next, membranes remove microscopic particles including microorganisms.
- **Multi-barrier Processes** are cleaning processes that consist of several barriers to ensure sufficient reduction and/or elimination of the various substances that need to be controlled and often provide redundancy in case one of the steps does not function as intended. As in all processes, monitoring is important in order to check that the processes are working properly and efficiently. Membrane filtration, reverse osmosis, advanced oxidation, riverbank filtration, soil aquifer treatment, and constructed wetlands all may be parts of a multi-barrier purification process. Not all of these processes are needed in all situations.
- **Ozonation** is the process of applying ozone (O₃) for the disinfection of water and/or the transformation of trace compounds like pharmaceuticals to benign compounds. Ozone (O₃) is a strong oxidant.
- **Reverse Osmosis** is a method of removing dissolved salts and other constituents from water. Pressure is used to force the water through a semi-permeable membrane that transmits the water, but stops most dissolved materials from passing through the membrane. This treatment method is commonly used in desalination, a process that takes salt out of seawater.

- **Soil Aquifer Treatment** is a purification process that occurs when water, including recycled water, soaks into the ground and is cleansed by the physical, chemical and biological processes that naturally occur in soil.
- **Microfiltration** uses bundles of hollow plastic fibers to remove particulate contaminants from water. Under a vacuum, water is drawn through the fibers' minute pores, each approximately 0.2 microns in diameter, and suspended solids, protozoa, bacteria and some viruses are strained out.

Terms to Describe Wastewater Treatment Processes and Products

Wastewater treatment facilities may be referred to by a variety of names including wastewater treatment plants, water reclamation facilities, water recycling plants or resource recovery facilities.

- **Biosolids** are the nutrient-rich organic material produced after treatment of the solids from a wastewater treatment plant. Biosolids can be beneficially used directly as a soil amendment for crops and may also be used as final or alternative daily cover at landfills. Biosolids can also be further processed to make additional products such as a nutrient-rich liquid, dried pellet or compost.
- **Discharge** is the release of effluent (treated or cleaned water) to be safely discharged into the environment, usually in accordance with standards specified in a regulatory permit to prevent environmental harm.
- **Effluent** is the liquid that flows out of something, particularly from a wastewater treatment plant. Depending on the amount of treatment it has had, its quality can vary and can even meet or exceed drinking water standards.
- **Primary Treatment** is a process where solid matter is removed. The remaining liquid may be discharged or subjected to further treatment.
- **Secondary Treatment** is a process where dissolved and suspended biological matter is removed. Secondary treatment may include removal of nutrients such as phosphorus and nitrogen. The resulting water may be used for certain types of irrigation or discharged.
- **Tertiary Treatment** refers to the treatment process following secondary treatment of wastewater that produces high quality water. Tertiary treatment typically uses filtration to remove any remaining suspended matter from wastewater. Tertiary treatment can also involve nutrient removal. The resulting water can be used for a wide variety of reuse applications.
- **Sewage Solids** refers to the residual, semi-solid material that is produced as part of primary and secondary treatment. Sewage solids are further treated by aerobic or anaerobic

digestion and dewatered at a wastewater treatment plant or resource recovery facility to produce biosolids and other byproducts such as methane gas and struvite.

Additional Terms

- **Augmentation** is the blending of purified recycled water with an existing raw water supply such as a reservoir, lake, river, wetland and/or groundwater basin. This process allows the beneficial reuse of purified recycled water for the purpose of creating a potable water supply. The State of California also defines various types of “augmentation” related to direct potable reuse (defined as the planned introduction of recycled water either directly into a public water system or into a raw water supply immediately upstream of a water treatment plant) in Section 13561 of the Water Code. The four types of augmentation as defined in the California Water Code include:
 - **Raw water augmentation** –blending purified recycled water into a system of pipelines or aqueducts that deliver raw water to a drinking water treatment plant that provides water to a public water system.
 - **Treated drinking water augmentation** – directly blending purified recycled water into the water distribution system of a public water system.
 - **Groundwater augmentation** – blending recycled water with another water source and percolating or injecting it into groundwater for replenishment of groundwater aquifers that have been designated as a source of water supply for a public water system.
 - **Reservoir water augmentation** – blending purified recycled water into a water reservoir used as a source of drinking water supply for a public water system.
- **Groundwater Recharge** occurs naturally as part of the water cycle and may be enhanced by using constructed facilities to add water into a groundwater basin.
- **Retrofit** is the process of constructing a separate recycled water pipeline (sometimes referred to as a “purple pipe system”) that allows recycled water to be used for non-drinking purposes. Retrofit can also refer to the process of preparing customer use sites for recycled water use by installing a separate non-potable pipeline.
- **Title 22 Standards** are the requirements established by the California Department of Health Services (now the State Water Resources Control Board) for the production and use of recycled water. Title 22, Chapter 3, Division 4 of the California Code of Regulations outlines the level of treatment required for allowable uses for recycled water. The most typical uses include irrigation, firefighting, residential landscape watering, industrial uses, crop production, construction activities, commercial laundries, toilet flushing, road cleaning, recreational purposes, lakes, ponds and decorative fountains. Section 13550 of the California Water Code is a declaration by the State Legislature that the use of potable water is a waste if recycled water is available.