WATER + WASTEWATER

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Water + Wastewater

Nearly a quarter of the City Government's greenhouse gas emissions result from the electricity required to pump, treat, deliver, collect, and clean water. After wastewater is treated, the leftover 'sludge' emits greenhouse gases. The emissions related to water and wastewater can be reduced by: 1) reducing demand, 2) increasing efficiency in water conveyance, and 3) improving treatment plant efficiency.

Adaptation

Climate change may affect both Benicia's wastewater system and water supply. Sea level rise may impact the City's wastewater treatment plant, located roughly 30 feet above sea level and adjacent to the Carquinez Strait. The plant relies on gravity during low tide and uses pumps to discharge during high tide. Sea level rise will result in greater reliance on pumping, which will lead to increased emissions, unless modifications are made.

Higher temperatures and changes in the timing and amount of snowmelt from the Sierra Nevada Mountains will also affect Benicia's water supply by reducing its availability. The City has a detailed Water Shortage Contingency Plan. The plan addresses up to a 50 percent cutback due to catastrophic events. Depending on future water availability and sources, the City may have to adjust plant processes for the quality of the water being treated, which may increase costs and emissions.

Co-Benefits of Water Objectives

- Water independence and security
- Economic benefits from sale of biosolids and/or use as fertilizer on City property
- Operating/utility cost

Objective WW-1: Reduce the Amount of Water Consumed 20% by 2020

DEMAND MANAGEMENT

Water demand management involves measures that promote the efficient use of water, including conservation, volume reduction, and timing of water usage. Reductions in water demand reduce emissions because less energy is used to pump, treat, deliver, and collect water. Under the green building ordinance, new construction will be required to use water conservation fixtures such as waterless urinals, low-flush toilets, and low-flow faucets, helping further reduce future demand. Recommended strategies, which are described in more detail below, include developing alternative water sources for irrigation, and upgrading residential, commercial, and industrial units to become more efficient.

Water and Wastewater Objective Table	Emissions Reduction Type	Emissions Reduction
Objective WW-1: Reduce the Amount of Water Consumed 20% by 2020	City	
Objective WW-2: Reduce the Amount of Emissions Resulting from Pumps and Lift Stations	City	
Objective WW-3: Reduce the Amount of Emissions Resulting from Water and Wastewater Plant Operations 95% by 2020	City	

Existing Actions

The Urban Water Management Plan outlines many of the water reduction programs that the City currently implements. The City has appointed a water conservation coordinator to oversee the implementation and monitoring of water conservation programs. Benicia has a program to assist homeowners with upgrading to more efficient water fixtures such as plumbing retrofits, low-flow showerheads, aerators, and toilet displacement devices. To encourage water conservation, the City meters water usage on a tiered system. Additionally, the City prohibits certain water uses such as the washing off of paved areas with water, and requires controllable leaks to be repaired. The City addresses water use efficiency through education programs in public schools, periodic bill inserts, conservation pamphlets, and irrigation booklets for the public.

The City and the Valero Refinery have conducted a feasibility study for a recycled water project for the refinery. The Water Reuse Project would supply up to 2 million gallons per day of recycled water from the City's wastewater treatment plant for use by the refinery as cooling tower make-up water. However, at the direction of the City Council, this project has been put on hold pending funding in the approximate amount of $40 million.

In 2004, the City installed smart irrigation controllers, which use weather data to properly adjust watering times, at the Benicia Community Park (BCP) leading to a 21% reduction in the parks water use. In 2008, a similar smart irrigation controller was installed at Joe Henderson. Recently, the Skillman Park has received a similar retrofit making it compatible to the smart irrigation system.

As part of a joint venture with the Solano County Water Agency, the City offers rebates to residences that replace inefficient washing machines and toilets with high efficiency models. Rebates are available of up to $200 for replacing inefficient washing machines and up to $125 for replacing inefficient toilets. In 2007, 88 Benicia residents received rebates for replacing washing machines and 6 residents received rebates for replacing in efficient toilets. In 2008, 173 washing machines rebates and 59 high efficiency toilet rebates were issued to Benicia residents.

The City has an existing water audit program for commercial, industrial, and institutional consumers (CII) through its membership with the Solano County Water Agency (SCWA). SCWA pays for a majority of the program and the City pays the remainder. This is a no cost program for CII customers.

In May 2009, the City Council approved funds from the VIP settlement agreement to expand educational water conservation programming offered to grades 3 through 6 to include K-3 graders, which will include puppet shows to engage the students in water wise practices.

In August 2009, the California Building Standards Commission (BSC) lifted California's mandatory permit requirement for household graywater systems. Under the new regulations, residents can install small (under 250 gallons per day) washing machine and single-fixture systems without obtaining a building/construction permit by meeting a list of 12 conditions set by BSC. Residential systems with a capacity over 250 gallons per day (gpd) and *indoor* sysyems still require a permit. However, local jurisdictions may choose to expand this exemption to include all small systems, large-scale systems (over 250 gpd), and indoor systems. For indoor systems, local jurisdictions have the ability to establish treatment standards. In all cases, the permit exemption is limited to residential applications.

◆ Strategy WW-1.1. Cash for Grass Rebate Program

Cash for Grass Rebate Programs help property owners convert water-thirsty grass to a water efficient landscape. The City would offer property owners a dollar amount per square foot of grass removed and replaced with water efficient landscaping. Other communities have offered a square footage rebate of $0.50 - $1.50. Every square foot of grass replaced with water-smart trees, shrubs and flowers can save an average of 30 gallons of water per year.[32]

Implementation Actions

- Develop program guidelines, funding mechanism and outreach materials;
- Launch program.

CO2EMT Reduction Range

- Unknown reductions.

32) City of Roseville. (2009) Cash for Grass program. http://www.roseville.ca.us/eu/water_utility/water_conservation/for_home/cash_for_grass/default.asp

◆ Strategy WW-1.2. Permitting for Graywater Reuse Systems

Establish appropriate graywater system permitting exemptions for residential applications pursuant to regulations set by the California Building Standards Commission (*see Existing Actions*).

Implementation Actions

- Determine appropriate permit process (or lack thereof) for residential graywater systems;
- Determine what, if any, treatment standards should be allowed for indoor graywater reuse;
- Establish an outreach program to educate residents on graywater permitting standards.

CO2EMT Reduction Range

- Unknown reductions.

What is Graywater?

Graywater is untreated household wastewater from washing machines, bathroom sinks, showers and bathtubs. Graywater systems retain water on-site for irrigation purposes, thereby reducing water demand.

◆ Strategy WW-1.3. Implement Residential Rainwater Collection

Create a policy to support permitting and regulation of residential rainwater systems. Develop a program to distribute rainwater barrels to homeowners to capture water runoff from homes.

Implementation Actions

- Adopt a policy and permit process to regulate residential graywater and rainwater catchment systems;
- Develop rainwater barrel distribution program; identify funding source and secure funding; implement program.

CO2EMT Reduction Range

- 1%-2% of Objective WW-1.

◆ Strategy WW-1.4. Require Commercial Rainwater Collection

Create a policy that requires collection, storage, and use of rainwater from commercial roof surfaces for on-site landscape irrigation uses and establish a financial incentive program to assist property owners. Concurrently, distribute information regarding rainwater collection systems to commercial property owners and assist them in securing financial support for implementation.

Implementation Actions

- Develop an education and outreach program for commercial property owners, brokers, etc;
- Adopt a policy to require collection and reuse of rainwater at industrial and commercial properties;
- Establish a financial assistance program using VIP Settlement funds.

CO2EMT Reduction Range

- Unknown reductions.

◆ Strategy WW-1.5. Incentives for Residential Plumbing Fixture Upgrades

Plumbing retrofits, low-flow showerheads, aerators, and toilet displacement fixtures are responsible for significant water savings. The City should increase the funding and scope associated with existing incentive programs to increase water efficiency and conservation.

Implementation Action

- Establish a financial incentive program using VIP Settlement funds.

CO2EMT Reduction Range

- Unknown reductions.

◆ Strategy WW-1.6. Incentivize water conservation

The existing tiered billing structure could be modified to include more significant incentives for water conservation; however, this must be approached extremely carefully to account for the financial realities of water conveyance. Incentives could include tiered rebates and/or a restructuring of the existing billing structure.

Implementation Actions

- Conduct fiscal analysis to determine feasibility of implementing recommended incentive(s);
- Determine appropriate incentive(s) for water conservation;
- Implement incentive program;
- Notify customers through existing billing statements of new incentive program.

CO2EMT Reduction Range

- 98%-100% of of Objective WW-1.

◆ Strategy WW-1.7. Develop a Businesses Outreach Program

Create a businesses outreach program on water conservation to provide reduction strategies to businesses within the Community. This program is defined in more detail in the Industrial and Commercial section.

Implementation Action

- Develop business outreach program.

CO2EMT Reduction Range

- Unknown reductions.

Objective WW-2: Reduce the Amount of Emissions Resulting from Pumps and Lift Stations

CONVEYANCE

Increased efficiency of water and effluent conveyance reduces the energy used at pump stations and associated greenhouse gas emissions.

Existing Actions

The City has planned for a number of water and wastewater infrastructure upgrades in the next five years, including improvements to water lift stations, digester cleaning, pump station improvement, and water line upgrades. In addition, the City has a service line replacement program for deteriorating pipes. Replacing aged pipes saves water, which decreases the energy used for pumps, resulting in greenhouse gas reductions.

◆ Strategy WW-2.1. Incentives for Residential Lateral Upgrades

Create an incentive program funded by the VIP Settlement funds to repair laterals on private property. During winter months, rainwater seeps into the sewer system primarily through leaks in residential laterals. This unnecessarily increases demand on the wastewater treatment plant.

Implementation Action

- Establish a financial incentive program through the VIP Settlement Agreement funds for residents to repair laterals on private property.

CO2EMT Reduction Range

- 100% of Objective WW-2.

Objective WW-3: Reduce the Amount of Emissions Resulting from Water and Wastewater Plant Operations 95% by 2020

TREATMENT

Upgrades to the water and wastewater plant operations will improve energy efficiency, thus reducing greenhouse gas emissions. Emissions related to the wastewater treatment plant include the energy for operations and emissions associated with the production of sludge.

Existing Actions

The City is continually improving operational and system efficiencies for its water and wastewater plants. The wastewater treatment plant has achieved significant efficiency through equipment upgrades, use of gravity flow for discharge rather than pumping at low tide, and pumping at non-peek hours when possible. The wastewater treatment plant switched to a cogeneration system that powers boilers with off-gassed methane. The plant reduces greenhouse gases by capturing and using methane produced by bio-solids.

In 2008, the City and the Valero Refinery drafted a preliminary design and environmental documentation for a water recycling project. The water reuse project would supply up to 2 million gallons per day of recycled water from the City's wastewater treatment plant for use by the refinery as a coolant. However, such a project is not financially feasible at this time.

In 2008, the City commissioned a feasibility study for renewable energy production at select water and wastewater facilities.

◆ Strategy WW-3.1. Install Renewable Energy Systems

The City conducted a feasibility study for wind and solar electrical production at the water and wastewater treatment plants, as well as at pump station locations (see Energy Production section). All of these stations are dependent on electrically driven motors that consume large amounts of electrical energy. Providing alternative power, such as solar or wind, will result in reduced emissions.

Implementation Actions

- Secure funding via enterprise funds, or a Power Purchase Agreement model, to provide capital for wind and solar production;
- Assess renewable energy options/technologies for water and wastewater facilities.

CO2EMT Reduction Range

- 100% of Objective WW-3.

◆ Strategy WW-3.2. Class A Biosolids Process

Assess the feasibility of developing a program to produce class 'A' biological solids at the wastewater treatment plant. Biosolids can be used as fertilizer or in a cogeneration system. Class 'A' biological solids are nearly pathogen-free prior to land application, and are therefore safe for human contact. Producing class 'A' biosolids would divert 2,079 tons of biosolids annually from the landfill. The City's wastewater treatment plant does not currently have the ability to produce class "A" biological solids. Facilitates for incineration would have to be added at the plant or the biosolids would have to be taken to a facility for processing, which would require transportation.

Implementation Actions

- Conduct feasibility study;
- Implement project, if deemed feasible.

CO2EMT Reduction Range

- Unknown reductions.

◆ Strategy WW-3.3. Water Reuse Project

Develop a recycled water system, beginning with Valero to decrease the demand on water supply, treatment and conveyance, thereby reducing greenhouse gas emissions.

Implementation Actions

- Identify potential public and private partnership opportunities;
- Secure funding for project development, estimated at approximately $40 million;
- Begin project development, including necessary environmental review and engineering design.

CO2EMT Reduction Range

- Unknown reductions.