Addressing North America's Most Pressing Water Issues.

It is a challenging time for U.S. communities as they strive to ensure an uninterrupted quantity and quality of water, while meeting regulatory and environmental requirements. Siemens Water Technologies helps municipalities manage their water in these times of aging infrastructure, water scarcity, rising energy costs and reduced budgets. Siemens offers sustainable solutions that reduce demand on fresh water supplies, meet regulatory requirements, and save energy. Siemens can also help customers maximize available dollars through upgrades, retrofits and expansion of existing technologies.

Regional Employees	4,000
Regional Locations	16 regional centers of competence 9 manufacturing sites
Regional Service Network	80 branches
Number of Global Installations	More than 200,000
Technologies/Service Offerings	More than 900
Patents & Trademarks	2,142
Global Headquarters	Warrendale, PA, USA

Answers for the Environment

Americans are among the world leaders in water use, according to published statistics. In the U.S., each person uses an average of 182 gallons per day for domestic purposes. Population growth, drought conditions and the rapid spread of urban areas and industry pose serious challenges to a sustainable fresh water supply. Siemens is helping municipalities and industry meet this challenge with innovative water management technologies and services.

- Siemens' membrane filtration and conventional technologies treat more than 2.5 billion gallons of water per day for water reuse and reclamation, helping to reduce the demand on potable water sources worldwide.
- Our products and services can help customers retrofit, upgrade or expand their plant to solve aging infrastructure, population demands or impending regulations.
- Siemens ultraviolet (UV) disinfection systems provide a safe and cost-effective alternative to chlorination.
- Siemens protects the world's oceans through 750 onshore and offshore produced water treatment systems, treating about 6 million barrels of water per day.

- Through the use of thermal reactivation, Siemens reduced the volume of spent carbon sent to landfill by over 36 million pounds in 2010.
- Siemens recycled more than 2.5 million pounds of ion-exchange resin in 2010, which resulted in metal recovery and reuse of resin, thus minimizing waste.
- Siemens' composting technology converts more than 500,000 tons (450,000 tonnes) annually of biosolids, source-separated organics, municipal solids waste and other organic residues into high-quality compost.

Industry Leading Advancements

- **Advanced oxidation.** Siemens' VANOX™ system effectively removes total organic carbon (TOC) in point-of-use ultrapure water treatment systems for semiconductor applications.
- **Activated carbon.** Siemens' AquaCarb™ CX Series of coconut-shell-based activated carbons can be considered as an alternative to coal-based activated carbon for surface water treatment where taste and odor removal, disinfection byproduct (DBP) or DBP precursor removal, and TOC removal are required. The product also serves as a premium performance choice for groundwater applications.
- **Biological Nutrient Removal (BNR).** Siemens' VertiCel™ process can be retrofitted into wastewater treatment plants that are facing new, more stringent BNR requirements and a need to conserve power. Power costs of the process are 20-30% lower than other BNR processes.
- **Chlorination.** Named one of the most significant technological advances of the 20th century by *Life* magazine, Siemens invented the chlorinator to disinfect drinking water in 1913.
- **Continuous deionization.** The first to commercialize the CDI® system, Siemens has more than 2,000 continuous deionization systems in operation worldwide. Siemens continues to make improvements to its continuous deionization offering.
- **Dewatering.** Siemens acquired Industrial Process Machinery (IPM) in 2010, allowing Siemens to offer IPM filter presses worldwide and add to its mining solutions portfolio.
- **Double-pass RO.** Siemens developed the double-pass reverse osmosis (RO) technology, changing the way semiconductor manufacturers treat water.
- **Membranes for reuse.** Memcor® membrane systems are used worldwide to treat secondary and tertiary wastewater for reuse applications, such as irrigation and recreation and for industrial uses. In 1990, membrane technology from Siemens was used in the first municipal wastewater reuse installation.
- **Mobile water treatment services**. Siemens was the first to introduce mobile water treatment to the industry more than 35 years ago. In addition to North America, Siemens also offers mobile services in Europe, Middle East and Southeast Asia.
- **Wastewater treatment.** Siemens installed its first wastewater treatment equipment in the 1890s. It has since installed equipment at more than 26,500 treatment plants worldwide.

Innovation

Siemens Water Technologies has seven R&D centers and more than 150 people dedicated to R&D throughout the world. R&D scientists focus on waste reduction, energy and process efficiency, desalination and water reuse.

- As a result of an R&D initiative that commenced in October 2008, Siemens has been working on an advanced desalination technology that reduces energy consumption by half compared to systems currently available. A demonstration plant has been built in Singapore to treat 50 m^3 of seawater per day to drinking water quality. The results of the pilot facility show that the new process – a combination of electrodialysis and continuous electrodeionization – not only functions in the laboratory, but also on a larger scale. Siemens will build a full-scale system in cooperation with Singapore's Public Utilities Board (PUB) by 2013.
- In 2010, Siemens commissioned a 1.0 million liter/day membrane bioreactor (MBR) testing facility at the Changi Water Reclamation Plant in Singapore to validate new design parameters. These parameters include increased energy savings, lower system maintenance and even more efficient operation. This testing has been successful, and is scheduled to continue.
- Siemens is working on developing a micro-media column at its global R&D headquarters. This product is designed to remove selected contaminants including selenium, chromium, mercury and arsenic down to the parts-per-trillion level. It will help municipalities and industrial plants meet new regulations that require a reduction in contaminant levels.
- Research is underway at Siemens' global R&D headquarters on a new process that extracts energy from municipal wastewater, resulting in a lower sludge yield. Since June 2010, a pilot facility has been treating about half a cubic meter of wastewater per day, and also operating in an energy-neutral manner. To further develop this process on a larger scale, a pilot plant is scheduled to begin operating in 2011.
- Siemens is working with Aramco Overseas Company, B.V., a subsidiary of Saudi Aramco, to commercialize the EcoRight™ MBR system. The system is designed to meet very stringent wastewater discharge requirements, particularly for wastewater reuse. Siemens is currently operating a pilot plant at a Saudi Aramco refinery, where wastewater from the existing oil/water separator is being treated with the EcoRight system. The MBR effluent is then fed directly to a reverse osmosis system, to allow the water to be reused as boiler feed, cooling water and other process water. This can ultimately result in significant reduction in the use of valuable desalinated seawater and well water for the facility. The EcoRight system at the plant is exceeding expectations for reduction in oil, COD, TOC and other parameters. The EcoRight system will be commercially available before the end of 2011.
- Siemens has partnered with PERF (Petroleum Environmental Research Forum) to pilot test the Petro™ MBR system for viability in treating refinery wastewater.
- Siemens has reconfigured its Memcor CP membrane filtration product line to allow for reduced installation requirements and lower costs. The CP uses Memcor L20V PVdF ultrafiltration membranes to provide up to 50% more membrane area in the same footprint than previous pressurized module designs and to reduce equipment costs by up to 20%.

Efficient, Smart Solutions for Customers

Municipalities

Every day, Siemens delivers water treatment or services to hundreds of thousands of communities and individual homeowners worldwide.

- **Orange County, California.** Siemens supplied one of the largest Memcor membrane systems ever to the Orange County Water District (OCWD) in California for its groundwater replenishment (GWR) project. The OCWD won the 2008 Stockholm Industry Water Award for its pioneering work. The District chose Siemens a second time in 2010 to provide a membrane system for the GWR expansion.
- **Great Lakes Region.** Siemens has provided membrane technology to over 35 Great Lakes water treatment plants, to ensure high-quality drinking water for these communities. Our Memcor low-pressure membrane systems help municipalities meet the filtration requirements of the Long-Term 2 Surface Water Treatment Rule. These systems are ideal for upgrading or expanding aging conventional filtration systems, as they can be installed in existing basins with no change in building footprint.
- **New York City.** Siemens supplied high-purity water systems using reverse osmosis and continuous deionization for producing 80% of the steam used in New York City for heating and cooling.
- **Amsterdam, New York.** This city had an aging filter system that had been struggling to meet effluent water quality treatment goals. Disinfection by-product precursors and low pH were key problem areas. The city selected the Trident® process for a pilot test, and found that it produced effluent with turbidity of less than 0.1 NTU and pH of 5.3. The city ultimately purchased seven Trident systems.
- **Aurora, Colorado.** The Peter D. Binney Water Puri fication Facility in Aurora, Colorado, a state-of-the-art water purification and recycling system, is using four CONTRAFAST® high-rate sludge thickening clarifiers to reduce total hardness in the water by approximately half. The systems were chosen because of the ability to process 50 MGD in a very small footprint.
- **Bloomfield, New Mexico.** The city is using the Trident HS package treatment system from Siemens to comply with the Interim Enhanced Surface Water Treatment Rule for turbidity levels. The Trident system offered the city a lower life-cycle cost, ability to meet regulatory standards, ease of operation and maintenance, and easy expansion for future water demand. Moreover, the system is producing water with turbidity less than 0.1 NTU, well below the 1.0 NTU regulatory standard.
- **Las Vegas, Nevada.** The River Mountain Water Treatment Facility has installed nine Siemens' OSEC® Electrolytic Chlorination Systems to alleviate safety concerns associated with using chlorine gas or commercial sodium hypochlorite solutions.

- **Peru, Indiana.** Peru Utilities needed to upgrade its two wastewater treatment facilities to reduce operations costs and expand capacity, and also needed to upgrade its old main plant to handle storm water flows as high as 26 MGD, and prevent combined sewer overflows. The city upgraded the main wastewater treatment plant from 4-8 MGD using a BioFlowsheet+ solution from Siemens. The design required only minimal modifications to the existing plant. The upgrade also reduced aeration energy costs by a factor of 3:1, saved the plant about $50,000 a year for natural gas, and reduced waste sludge disposal by a factor of 10:1.

- **New Brunswick, New Jersey.** The largest surface water membrane plant in New Jersey is using the Memcor CS submerged membrane system to provide exceptional treated water quality along with operational flexibility, especially during periods of high water turbidity and iron. Coupled with the existing gravity filtration system, the submerged membrane system has expanded the capacity from 18 MGD to 20.7 MGD, and is designed for future expansion to 24 MGD, along with the ability to convert existing gravity filters to granular activated carbon for taste and odor control.

- **Modesto, Calif.** The city will use a Siemens Membrane Bioreactor (MBR) system at the Jennings Road Water Quality Control Facility. The MBR system will help meet new state discharge permit requirements. Once operational in early 2016, the system will be the largest Siemens MBR installation in North America and the second largest worldwide.

Industry

Siemens serves more than 90% of the Fortune 500 manufacturing companies, including approximately 100,000 industrial customers.

- **Fresno, Ohio.** Siemens provided Pearl Valley Cheese, Inc. with wastewater treatment equipment at its Fresno production facility. The system is designed to convert waste material generated during cheese production into a reusable biogas generated in the wastewater treatment process.

- **Victorville, Calif.** A water treatment system at the new Dr. Pepper Snapple Group bottling plant provides a sustainable, cost-effective solution that meets the plant's stringent ingredient water specifications. Designed to recover more than 90% of the water, the Siemens system includes a reject recovery reverse osmosis unit and a backwash recovery system.

- **Pennsylvania.** A Siemens system is treating Flue Gas Desulfurization (FGD) wastewater at the Keystone Power Station, de-saturating the wastewater and removing suspended solids and heavy metals from the scrubber waste stream so the water can be safely discharged.

- **Columbia, South Carolina.** A university is using 15 Labostar™ laboratory water treatment systems from Siemens for research applications in multiple laboratories.

- **Western U.S.** Siemens is providing a produced water treatment system for a major oil company's site. The system, consisting of on-site mobile equipment and services, recycles flowback water through a treatment process to provide a source of "frac" water for reuse. The Siemens' produced water treatment system supports the customer's green objectives by conserving fresh water and avoiding greenhouse gas emissions.

- **Hobbs, New Mexico.** A power plant in this town is using a CONTRAFAST system from Siemens to treat cooling tower blowdown water for reuse at the site. This high-rate solids contact clarifier is removing silica and other solids, and is softening the water. The effluent from the clarifier is returned to filters and then reused in the cooling towers. This environmentally friendly solution reduces demand for supply water and saves money on waste disposal costs.

Global Presence

Siemens Water Technologies has major business hubs in Australia, Brazil, China, Europe, Singapore, Saudi Arabia, and the United States. Eighty-five percent of the U.S. population, and most of the U.S. industrial bases, are located within 100 miles of a Siemens Water Technologies service branch. In addition, the company's global R&D headquarters is based in Singapore.

SkyJuice Foundation. Siemens supplies ultrafiltration for the SkyJuice Foundation's SkyHydrant™ water filtration units that have provided clean drinking water to more than 300 remote areas worldwide, which previously had no access to clean drinking water.

Siemens AG. Siemens is a global electronics and engineering company with about 400,000 employees worldwide. For over 160 years, the company has stood for technical achievements, innovation, quality, reliability and internationality.

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