

Water industry

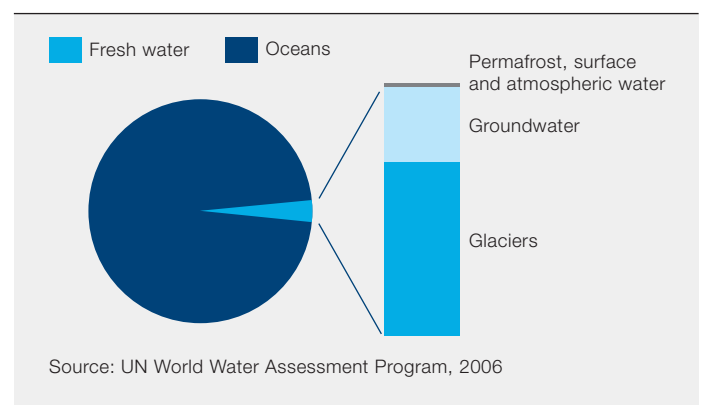
Caring for a precious resource



Water is the basis of life. As the world's population grows and its standards of living increase, the world's finite water resources must be carefully managed. ABB's portfolio and expertise cover water transmission, distribution and irrigation networks, desalination plants, and water and wastewater treatment plants.

Less than 3 percent of the world's water is fresh, and about 70 percent of that is locked away as snow and ice, or in deep groundwater aquifers, which are underground channels and basins.¹

We mostly rely on water from lakes, rivers and shallow groundwater aquifers, which we share with the world's ecosystems. Fresh water keeps us alive, so you would expect this resource



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to be very carefully managed. Yet in many parts of the world a staggering 30 to 40 percent of the water supply is lost due to leaky pipes, breached canals and illegal tapping.²

Pollution of our water from runoff and industrial discharge also threatens this essential resource in some parts of the world, while melting glaciers threaten to remove a system of natural water storage for millions of people, according to the United Nations Environment Programme.

Demand vs supply

Global exploitation of our groundwater resources has intensified dramatically since 1950. Aquifers now supply half our drinking water, 40 percent of industrial water and more than 20 percent of irrigation water.³

A combination of factors including population increases, industrialization, climate change and increasing food production is expected to increase water use by 40 percent by 2020.⁴

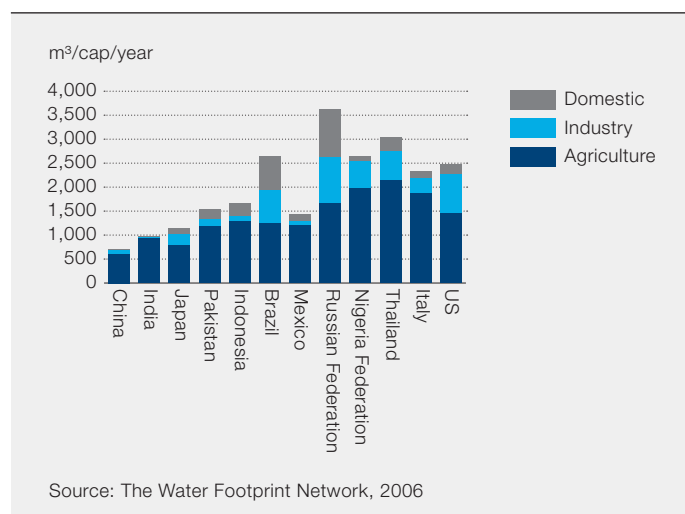
On the positive side, more than half the world now has clean piped water in their homes, and use of unimproved water is steadily declining, according to a report from the United Nations Children's Fund (UNICEF) and the World Health Organization.⁵

However, water use now exceeds annual average replenishment in parts of West and South Asia, North China and North America. More than half of the regions studied in the UN's world water assessment program currently suffer moderate or severe water shortages.

The "water footprint" measures the amount of water that a country, company or individual uses each year. This includes the water needed to produce goods: the water withdrawn from surface as well as ground water and soil water. For a cup of coffee, for example, an average of 140 liters of water is needed, 2,700 liters for a cotton shirt, 16,000 for a kilo of beef. On a global scale, each individual has an average water footprint of 1,250 cubic meters a year. Americans use twice that amount, Chinese or Indian citizens much less.

Source: The Water Footprint Network

Following current demand trends, the UN predicts that by 2025 nearly 2 billion people will suffer absolute water scarcity, and two-thirds of the world's population will experience water stress as they try to balance the competing demands of agriculture, industry, domestic use, energy and the environment. Agriculture accounts for about 70 percent of all water consumption, and up to 95 percent in developing countries.



That use is increasing. The UN Food and Agriculture Organization says that from 1962–98, irrigated farmland expanded by nearly 2 percent a year, increasing by almost 130 million hectares. The FAO says it takes between 2,000 and 5,000 liters of water to produce one person's daily food.

A multi-billion dollar market

The world may not be running out of water, but it is not always available when and where we need it. Water needs to be managed carefully, and ABB products, systems and expertise can help preserve and protect this essential resource.

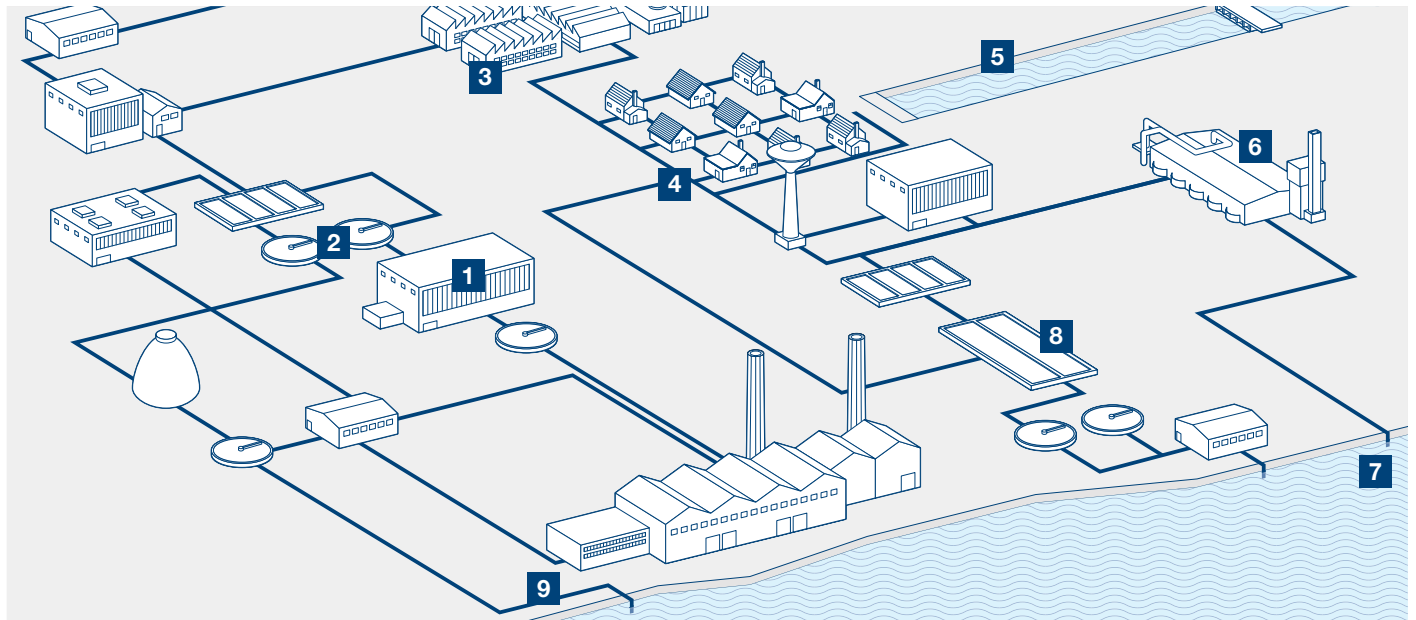
The global water market was worth about \$580 billion in 2009, and the water equipment and services market is expected to grow at about 6 percent annually. The drivers of this growth include increasing demand for good quality fresh water, the need for new and upgraded infrastructure, and the need to improve the efficiency of water delivery systems, particularly with respect to energy consumption.

A key area where radical improvement is needed is water quality. In many populated areas, over-exploitation and contamination have transformed potable water into a chemical cocktail unsuitable for human consumption or use. Inefficient transport and distribution systems also contribute to poor water quality, reduced access and increased waste.

For 2010, total capital expenditure in the sector is expected to be around \$200 billion, of which ABB could potentially capture

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- [1] Pumping stations
- [2] Wastewater treatment plants
- [3] Industrial treatment plants
- [4] Distribution networks
- [5] Irrigation networks
- [6] Desalination plants
- [7] Water capture
- [8] Raw treatment plants
- [9] Water discharge

about 5 percent. In 2009, ABB booked orders worth \$900 million in the water sector.

Most of ABB's water business is in the Middle East and Asia (55%), with the remainder in Europe and the Mediterranean (40%), and the Americas (5%).

ABB currently provides products and systems for water transmission, distribution and irrigation networks, desalination plants, and water and wastewater treatment plants. ABB's customers include utilities, EPC (engineering, procurement and construction) companies, system integrators, and pump manufacturers.

Using new and improved technology, ABB is helping water utilities to enhance water quality and improve water distribution systems in the areas that need it most. ABB technologies are also used to help in the treatment of wastewater.

ABB has identified growth areas in Asia, the Middle East and North Africa, where large investments in new water infrastructure are on-going, and in Europe and North America, where the focus is on improving energy efficiency and raising the performance of existing infrastructure. In the US, it is estimated that annual investments of \$23 billion will be needed over the next 20 years to maintain water infrastructure at the current service level and to comply with stricter standards. France and the UK will have to increase their water spending as a share of gross domestic product (GDP) by about 20 percent to maintain water services at their current levels.⁶

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ABB: technology for critical processes

ABB's product and systems portfolio includes solutions for the key water applications, such as desalination plants, long-distance water transport, and water treatment plants. ABB can draw on its complete power and automation portfolio to serve this sector, including expertise in energy- and water-efficiency.

- ABB drives and motors enable significant energy savings and maximize reliability and availability, particularly in energy-intensive operations such as pumping and desalination applications.
- ABB instrumentation allows the monitoring of all physical, chemical and biological parameters, including flow, pressure, level and temperature meters, recorders, controllers and online quality analyzers (eg, pH, conductivity, turbidity).
- ABB control systems use advanced software to keep water flowing from giant desalination systems through pipelines, hundreds of kilometers long, to the consumers' taps, guaranteeing that plants and networks are operating at optimal levels and are monitored constantly.
- ABB switchgear, transformers and motor control centers provide reliable power to vital water infrastructures as well as treatment plants.
- Water distribution and irrigation: ABB can deliver complex projects including SCADA (supervisory control and data acquisition) systems and specialized advanced software applications such as leakage and pressure management, energy management, wireless hydrant control and irrigation program management.
- Municipal and industrial water and wastewater treatment: ABB can offer complete energy-efficient engineered ICE solutions.
- Oily water treatment: ABB has patented a specialized oil-water separation technology, which allows it to develop turnkey plants with less pollution and lower investment and operational costs.

ABB's history and expertise in water treatment plants and distribution networks mean it can play a primary role in the construction of ambitious infrastructure projects worldwide. These include giant desalination plants, complex water transportation systems and innovative irrigation schemes.

ABB's products have been developed and adapted to fit the specific requirements of the water market.

Application oriented approach: from products to complete solutions

ABB's product portfolio encompasses a wide range of services such as consulting, design, engineering, construction, commissioning and maintenance, providing complete solutions in the following areas:

- Water desalination: ABB can support EPC contractors offering complete energy-efficient engineered ICE (instrumentation, control and electrification) solutions to minimize the cost of desalinated water. These include specific performance monitoring and optimization tools designed for reverse osmosis as well as thermal processes.
- Water transportation: ABB can deliver energy-efficient turnkey pumping stations, including mechanical, hydro-mechanical, electrical and control systems in complex water transfer schemes.

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ABB references

- ABB is responsible for the design, engineering, supply, installation, and commissioning of the electrical plant system for the Maagta project, the world's largest reverse osmosis desalination plant, currently under construction in the western Oran region of Algeria. This plant has the capacity to serve about 5 million people per day, producing 500,000 m³ of drinking water. ABB's delivery to Maagta includes a 220 kV outdoor substation that will connect the facility to the Algerian power grid and ensure that the plant receives a reliable supply of electricity, without impacting grid stability; and 33 medium-voltage drives that will reduce electrical losses in the plant from the benchmark target of 5 percent to just 3 percent.
- ABB supported Abu Dhabi Water & Electricity Authority (ADWEA) by delivering the complete electrical, control and instrumentation system for the Shuweihat Water Transmission Scheme, one of the most important projects in the United Arab Emirates, to ensure adequate supplies of water. The system includes two pipelines running in parallel, each measuring 1.6 meters in diameter. Each pipeline is 250 km long and has a transfer capacity of 375,000 m³ / day. ABB's solution integrates a wide range of ABB products, including medium- and low-voltage switchgear, power, distribution, and phase-shifting transformers, motors, variable-speed drives, direct current (DC)/uninterruptible power supply (UPS) systems, automation systems, and field instrumentation – all under the control of SCADA and telemetry systems, which allow centralized management of the plants.
- ABB supplied the complete electromechanical solution for a number of lift irrigation⁷ projects in the state of Andhra Pradesh in southern India. These projects are designed to irrigate nearly 800,000 acres of parched land and benefit thousands of farmers in the Krishna River and Godavari River basins. ABB equipment includes substations and power transformers, drives, instruments and SCADA network control systems.
- ABB's water-cooled motors and drives power the first large-scale desalination plant in eastern Australia, located at Tugun on the Gold Coast of Queensland. The plant has the capacity to deliver 133 million liters of potable water every day to an area severely affected by drought. ABB equipment powers and controls the reverse osmosis, energy-recovery and booster pumps.

Further reading: www.abb.com/water

¹ UNEP Global Environmental Outlook 4, 2007

² Ibid

³ World Business Council for Sustainable Development, Facts & trends, water

⁴ World Water Council, 2006

⁵ Progress on Drinking Water and Sanitation-UNICEF and WHO, 2008

⁶ OECD Managing Water for All: An OECD perspective on pricing and financing – key messages for policy makers, 2009.

⁷ Lift irrigation pumps water from a river or lake to a main delivery chamber situated at the highest elevation in the area to be irrigated. Users are connected to the chamber and draw water from it.