



Products, systems and services for water  
and wastewater treatment plants  
Enhanced plant performance, efficiency  
and reliability

Power and productivity  
for a better world™



# Treating water efficiently

## A global challenge

Water and wastewater treatment are key applications in the water cycle and play an important role in filling the gap between supply and demand for this precious resource.

In general, treatment of water and wastewater targets the modification of water quality, either by removal of impurities or by adding substances that adjust water parameters such as pH.



Physical/mechanical, chemical and biological processes are used for treatment, typically in different combinations to produce water in the required quantity and quality. While surface and ground waters are sources for treatment, water contaminated by use or water changed in its characteristics and consistency is treated in wastewater treatment plants.



# Increasing energy efficiency and reducing the cost of water through technology

Distribution and treatment of water and wastewater is directly linked to energy consumption. A considerable amount of energy is used by industrialized and developing economies for operating water and wastewater treatment plants. In some parts of the world, treatment plants are the largest municipal energy consumers.

The share of energy used in water treatment processes can represent up to 50 percent of operational expenditures. A key challenge is the removal of poorly degradable contaminants and micropollutants from wastewater and raw water. These pollutants have already accumulated in surface and ground waters and this trend will continue at an increasing rate, causing problems in many regions where direct water re-use is necessary to ensure water supply to the population.

More advanced water and wastewater treatment technologies are needed to address tighter water quality standards, requiring even higher levels of energy consumption.

While pumping is the most energy-intensive process in water treatment, aeration contributes most to energy consumption in wastewater treatment. Reducing environmental impact while limiting energy costs means that energy efficiency and lifecycle optimization are among the most important challenges at hand.

It is estimated that optimizing electrical systems may deliver potential energy savings of up to 60 percent.



The ABB portfolio includes products, solutions and services covering the entire electrical, control and instrumentation scope for water and wastewater treatment projects. Our objective is to maximize plant efficiency and productivity using drives, soft starters, motors, low and medium voltage switchgears and components, transformers, instrumentation and analyzers, communication, control products and systems including PLC, DCS and SCADA, as well as asset and energy management tools.

ABB operates one of the largest service organizations in the world, with field service engineers that can support you, wherever you are.

We offer a full spectrum of lifecycle services, ranging from diagnosis and verification to consulting, spare parts, equipment repair, training, technical support and remote services.

Our long experience in the water and wastewater industry gives us the process expertise and know-how to support you in identifying and implementing measures that improve and optimize operations, creating measurable performance improvements.

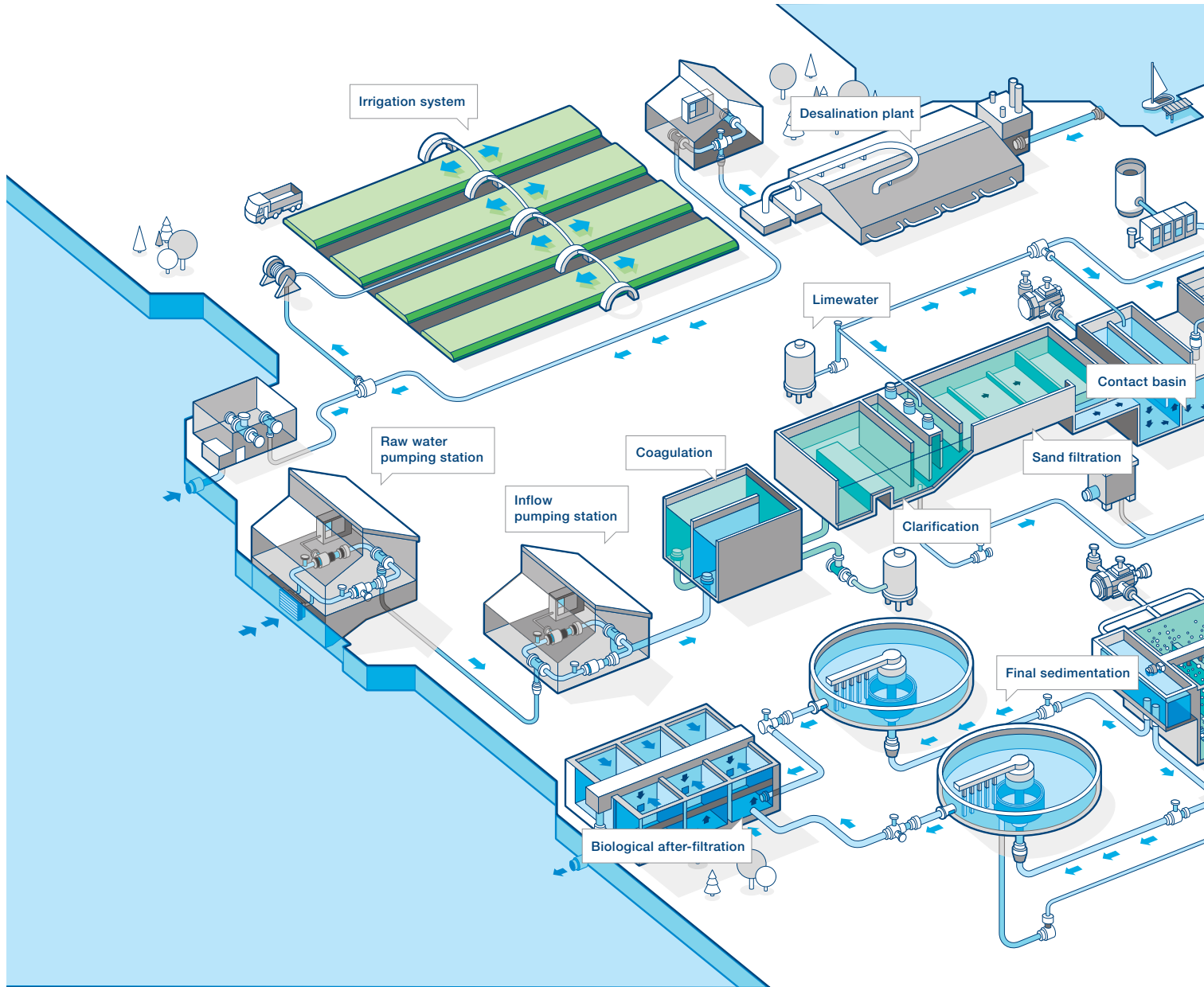
#### **Maximizing your plant efficiency**

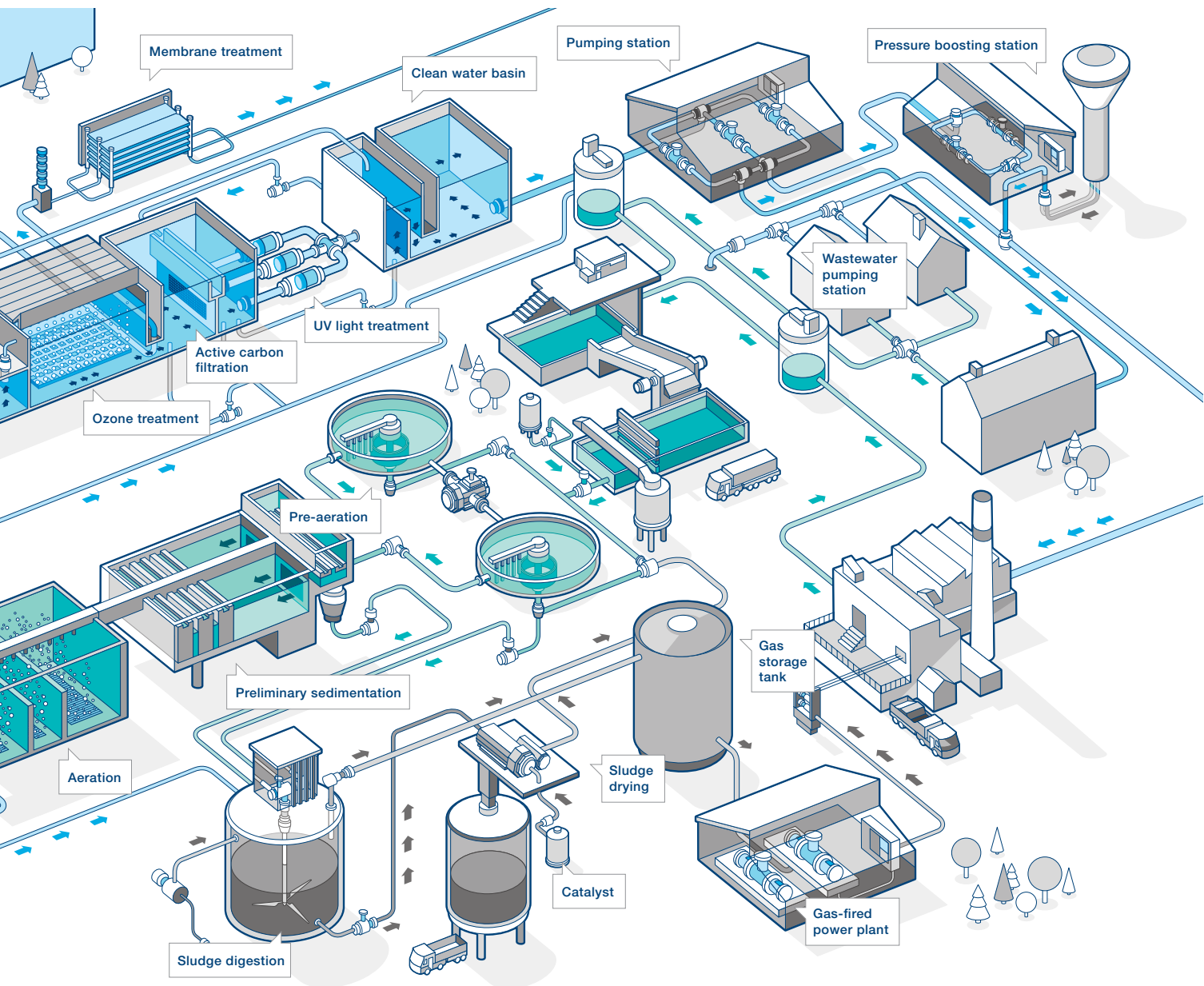
- complete portfolio for instrumentation, control and electrification
- lifecycle management covering: service and maintenance, upgrade and migration, life cycle extension, feasibility studies and optimization
- system integration expertise
- hundreds of references globally
- more than 50 years of experience in the water and wastewater industry



# Water and wastewater treatment

## ABB products, systems and services for all processes





# Power and automation for water and wastewater treatment

ABB combines in-house technology with extensive process know-how to deliver the products that fit your needs and to develop complete engineered solutions such as electrical balance of plant (eBoP) and Instrumentation & Control (I&C) for all types of water and wastewater treatment processes – from the intake to tertiary, advanced processes.

## Higher efficiency at optimized lifecycle cost

Electrical Balance of Plant (eBoP) covers electrical equipment and systems ensuring that the plant runs efficiently, economically, safely and reliably: from the grid connection, substations, medium and low voltage systems to emergency systems and facility management systems. ABB has the knowledge to assess the degree of customization required. We help minimize the entire lifecycle cost and act as single source supplier for all instrumentation, control and electrical products and can also provide energy recovery technologies as needed. ABB is the ideal partner for water and wastewater treatment projects and can take the responsibility for building complete integrated automation and electrification solutions including design, engineering, supply, installation, commissioning, testing, and maintenance services.

### A single interface for power and automation

- definition of integration and customization level as required
- optimal technology selection and sourcing strategy
- minimized risks (technical, commercial, functional, time schedule) and commissioning efforts
- high-quality, standardized documentation
- fast-track project execution

## Motors and drives: choices for increased efficiency

Motors and drives can drastically affect the long-term operational management of water and wastewater treatment plants. This is especially true, considering the fact that pumping and aeration require larger amounts of electrical energy with the electrical energy being a major component of operational expenditures.

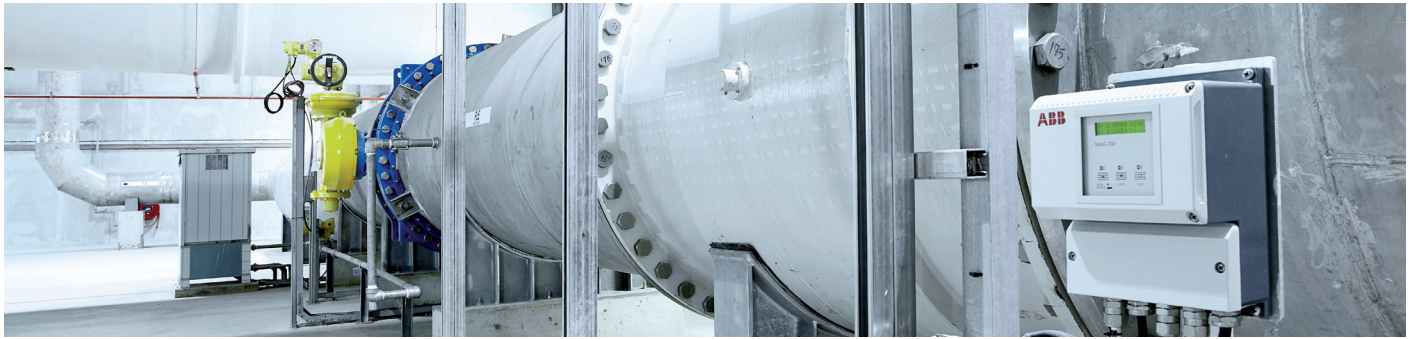
ABB is a world leading supplier of highly energy efficient motors. We deliver a full range of high efficiency and a broad range of premium efficiency as well as super premium efficiency motors. Using our motors will substantially contribute to make your operation more energy efficient. ABB variable speed drives (VSDs) are used to control the motor speed of applications such as pumps and compressors with a typical 30 to 60 percent savings in energy consumption. The use of drives also reduces mechanical and electrical stress on pumps and aeration equipment components.

VSD's in combination with high efficiency motors does not only make water processes in all parts of the water cycle more efficient, but also help reduce maintenance costs.





# From products to integrated solutions



## Instrumentation and control

ABB's distributed control system (DCS), supervisory control and data acquisition (SCADA) and programmable logic controller (PLC) platforms provide an innovative, consistent and comprehensive information management platform for water and wastewater treatment plants. Our control platforms handle all plant operations as well as information management including historian functions, archiving, reporting, performance calculations and optional added-value applications such as pump efficiency monitoring.

The ABB instrumentation and analyzer portfolio includes flow, pressure and level measurement, quality analyzers and recorders. Our products are simple to operate and maintain, and deliver reliable measurements, data, and flexible communication. Our instrumentation and control solutions can be easily integrated to deliver a complete plant automation solution, forming the basis for smarter, better-informed operation and decision making.

ABB supports you in many different ways. For instance, around 50 percent of the electrical costs of a wastewater process plant are consumed by compressor operation for aeration beds. One of the ways we reduce the amount of air required to maintain correct bacteria levels in the beds is to install one or more oxygen monitors in combination with simple changes to the control scheme. This ensures the correct amount of oxygen is present, and can save over 25 percent of total electrical costs.

## Added-value applications

### Pump efficiency monitoring system (PEMS)

PEMS provides rapid and detailed real-time information on pump efficiency. Based on thermodynamic measuring methods using ABB patented components, this solution calculates pump efficiency by processing water temperatures, pressures and the motor power associated with each pump to calculate the flow. Customers are able to monitor the status of their assets and improve maintenance activities.

### Real time monitoring and control

- measurements for flow, pressure, temperature to turbidity, conductivity, pH, dissolved oxygen monitoring and residual chlorine
- monitoring and control – from communication to PLC to DCS and SCADA
- energy-saving technologies that extend asset life
- services including design, engineering, supply, installation, commissioning, testing, and maintenance

# From challenges to projects



Source: Changi Water Reclamation Plant by PUB

## Singapore Changi Water Reclamation Plant

Singapore's national water agency, PUB's Changi Water Reclamation Plant is the cornerstone of the first phase of the Deep Tunnel Sewerage System project. The Deep Tunnel Sewerage System is an efficient and cost-effective solution for meeting Singapore's long-term need for used water collection, treatment and disposal. The first phase of the project features a state-of-the-art, compact and covered used water treatment plant designed to handle 800,000 m<sup>3</sup>/day of used water, expandable to an ultimate 2.4 million m<sup>3</sup>/day. The plant will provide a high standard of treatment for used water before it is discharged through deep-sea outfalls.

ABB was selected for our complete range of high-quality products as well as our ability to deliver equipment as turnkey solution, coupled with a strong local service and support team. Our complete portfolio allowed ABB to be a single point of contact, delivering the fast response time and efficient service essential for a project so critical to Singapore's future. Both the influent and the effluent pumping stations have ABB medium voltage motors and drives installed, providing reliable power for energy-efficient operation of the connected pumps. Power is supplied via two ABB 66kV high voltage switchgears with full redundancy.

Various ABB medium and low voltage systems as well as transformers are used for power distribution to the plant equipment. ABB instrumentation is used to monitor key process parameters.



## Netherlands Dutch water utility, Dunea

Dunea is one of the largest water utilities in the Netherlands, supplying 80 million m<sup>3</sup> of drinking water a year to 1.2 million people in and around The Hague, the third largest city in the Netherlands.

Dunea is using ABB's 800xA extended automation system to transform its aging, multiple-process automation systems into a single system.

This system controls and manages the utility's entire water production and distribution operations from one central control room. The solution is replacing the existing process automation systems at Dunea's five production facilities. Replacing these decentralized systems with a single integrated, operations-wide solution upgrades Dunea to a standard and unified process control system.

This solution significantly improves the company's efficiency, reduces its operating and manning costs, and enhances the reliability of its production process to ensure Dunea's customers receive a steady supply of safe, high quality drinking water.



**Thailand**  
**Metropolitan Waterworks Authority**

The Metropolitan Waterworks Authority (MWA) is a state-owned utility producing and delivering potable water to about 11 million people in Bangkok and its suburbs, Nonthaburi and Samut Prakan. At present, it has a total production capacity of about 5.4 million m<sup>3</sup>/day covering a service area of 1,855 km<sup>2</sup>.

MWA owns and operates four water treatment plants in Bangkok - Bangkokhen, Mahasawat, Samsen and Thonburi. With a production capacity of about four million cubic meters/day, Bangkokhen is one of the world's biggest water treatment plants.

The plant has 18 clarifying basins, each with a capacity of 200,000 m<sup>3</sup>/day. It is based on the solid contact sedimentation water treatment process, in which a constant water flow is required. Raw water flows into clarifiers where chemicals are added.

Variable speed pumps are used for the different water cycle processes, including raw water intake, water treatment, water transmission and water distribution.

Around 50 ABB drives, totaling nearly 60 MW, are installed at MWA's facilities to enhance the performance of these plants and reduce energy consumption and environmental impact.



**UK**  
**Southern Water**

Over 90 ABB industrial drives have been installed at a new wastewater treatment works and sludge treatment centre at Peacehaven near Brighton. Southern Water, will treat the 95 million litres of wastewater produced each day from Peacehaven, Woodingdean, Ovingdean, Rottingdean, Saltdean and Telscombe Cliffs, as well as Brighton and Hove. ABB supplied a range of low harmonic and 6-pulse drives from 1 kW up to 560 kW incorporated into seven motor control centres (MCCs). Five of the MCCs are for the main works and two for the pumping stations at Marine Drive, Brighton and Portobello, Telscombe Cliffs. The MCCs were installed on site in the summer of 2011, with the treatment works scheduled to be fully operational in 2013. ABB also supplied over 36 WaterMaster's, ABB's Electromagnetic flowmeter designed for the water industries diverse requirements. The supplied WaterMasters ranged from 20mm to 600mm and all incorporated Profibus DP, enabling online modification and monitoring of parameters.

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Water Wastewater Treatment - 06/2012  
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