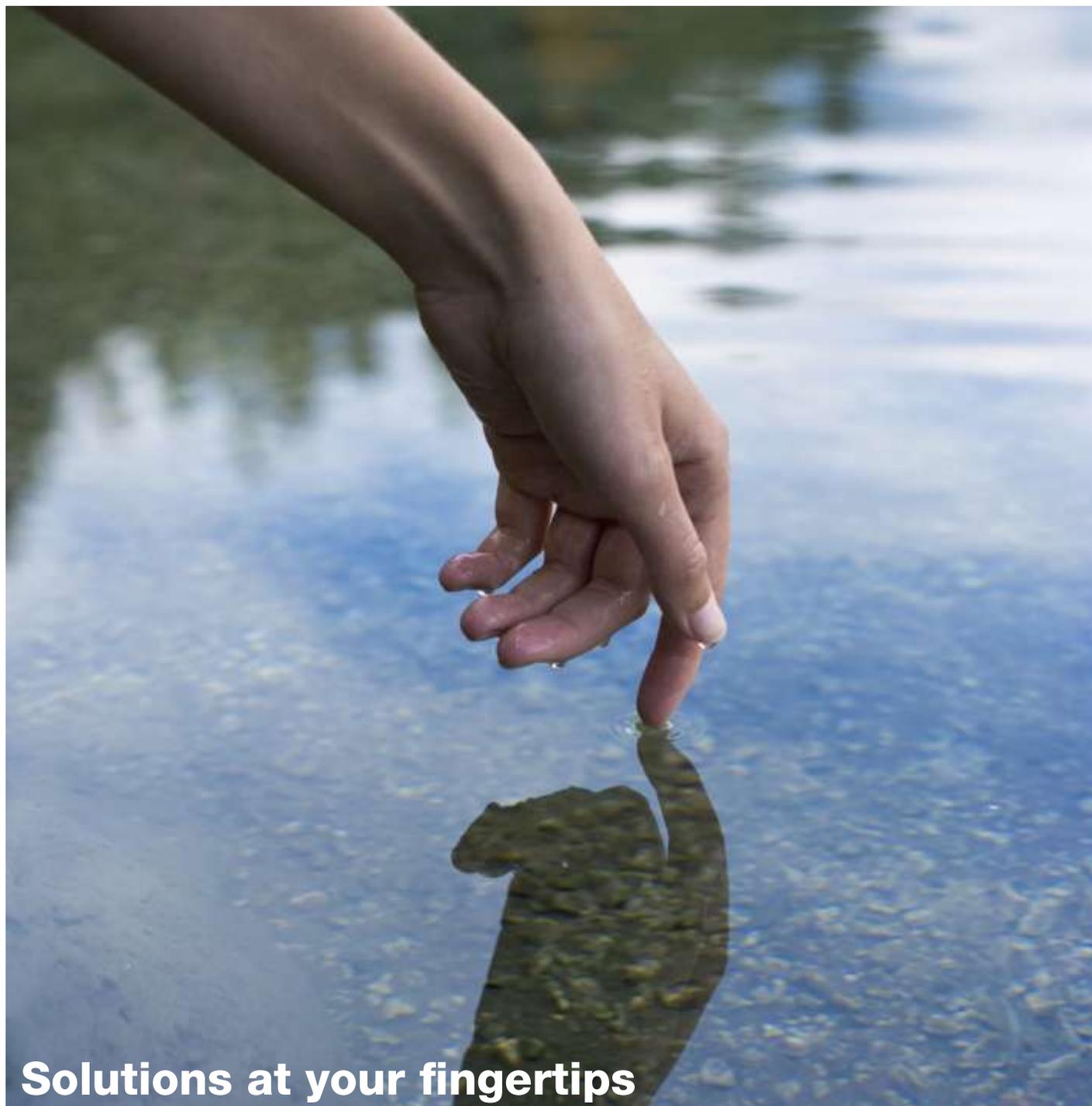


# Products and solutions for the complete water cycle

Enhanced performance, efficiency and reliability



**Solutions at your fingertips**

**ABB**

# A Resource to be Protected

## Every drop counts

A world without water? It's unthinkable. Water is an essential resource for our ecosystems and the key factor supporting development activities from agriculture and industry to energy. And yet, our planet is facing a real crisis in water resources. Climate alterations and population increases are changing the balance of supply and demand. According to predictions, by 2030 the world's population will be over 8.1 billion. Since 1950, the need for water has trebled and it will double again by 2050.

## A challenge for the future

To be in step with future requirements, it is therefore essential to find more effective methods to preserve and use water.

This challenge can be met only by paying more attention to the complete water cycle for domestic, industrial and agricultural uses. We must transport water in the most efficient way, reduce energy consumption, reduce losses and improve treatment quality and efficacy before and after use: these are the key challenges.



A Resource to be Protected

**Less than 3% of global water is fresh water**

**More than 1.2 billion people cannot preserve drinking water**

**1/6 of the global population does not have access to safe water**

**In the next 30 years, more than 14% of the water supply will be destined for agriculture**

# A Choice That Means Savings

## ABB: a leader worldwide

For nearly 50 years, ABB has been equipping thousands of water plants and networks, providing products, systems and services in over 100 countries worldwide. ABB provides expertise and solutions for all activities related to the water lifecycle, from water intake to re-introduction into the environment.

## Attention to energy and resources

ABB products and solutions are designed to improve the performance of water plants and networks. Our high efficiency motors and variable speed drives improve energy efficiency by up to 60%. ABB Water Leakage Management solutions help utilities to monitor and reduce losses from distribution networks. Irrigation solutions help to monitor and optimize water consumption in agricultural applications.

ABB expertise helps customers by addressing their needs and building up complete solutions.



**A Choice That Means Savings**

- 50 years of experience in the water sector**
- A presence in over 100 countries worldwide**
- Energy efficiency and protection of water resources**
- A brand oriented to durability**
- Compliance with international standards**

# From Single Product to Complete Solutions



**From products to turnkey solutions**

**Maintenance and field services**

**Repair, refurbishment and retrofitting**

**Complete know-how, from product engineering to testing**

## The ideal answer for every kind of plant

Thanks to its various business units, ABB is ready to meet any demand coming from the main water management fields, including water transfer systems, distribution networks, irrigation networks, pumping stations, desalination plants, urban treatment plants and industrial treatment plants.

ABB goal is to optimize the employment of water and energy resources and to manage the integrated water cycle with efficiency and effectiveness.

## A complete portfolio

ABB provides complete solutions for the electrical and automation processes: drives and motors; instrumentation; control products and PLCs (programmable logic controllers); low-voltage, medium-voltage and high-voltage switchgears and components; transformers; SCADA systems (Supervisory Control and Data Acquisitions); DCS (Distributed Control Systems); communication networks; optimization and Asset Management solutions.

The products and solutions portfolio is completed by a wide range of services in engineering, consulting, construction and maintenance. ABB is the ideal partner for ICE (Instrumentation, Control and Electrification).



From Single Product to Complete Solutions

# ABB Knows What Customers Want

## From engineering to maintenance

With its wide range of products, systems and services, ABB can follow the whole lifecycle of plants, from engineering to construction and maintenance. ABB supports end users in identifying the best solutions for their specific needs, including new projects, extensions, revamping, maintenance and asset optimization. ABB supports consulting companies during the design phase and EPC contractors during tendering and operational phases with a wide range of products and with tailor-made systems and solutions.

## How to achieve integrated management

The integration of advanced hardware and software solutions allows water utilities to achieve integrated and efficient plant management. From field measurements through plant automation to network management solutions, ABB integrated solutions deliver effective asset management in the long term, reducing supply costs and optimizing resources.



**Reduce costs of water supply**

**Reduce consumption of energy**

**Monitor the quality of water**

**Keep water networks under control**

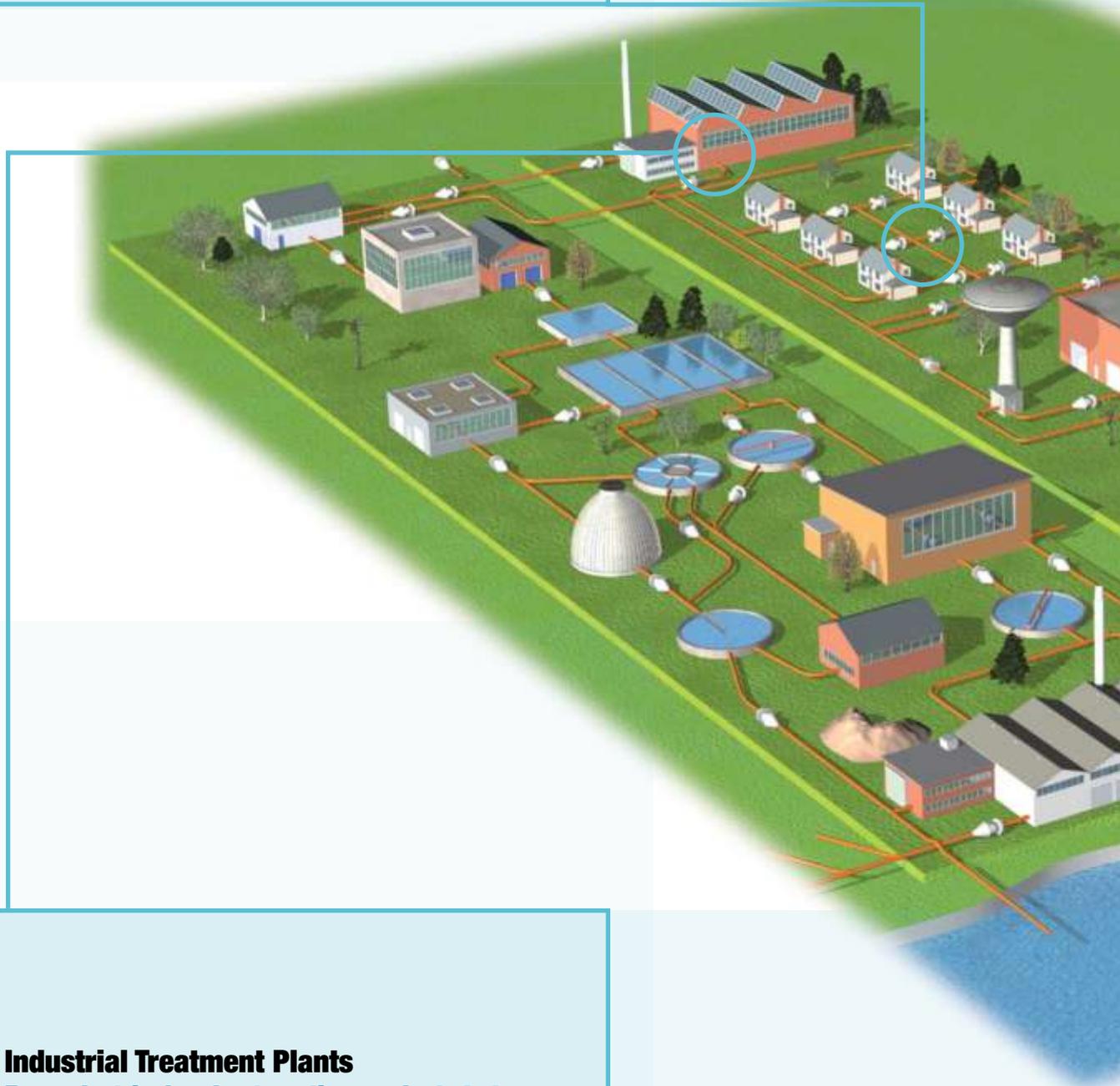
**Increase plant performance**

**ABB Knows  
What Customers Want**

# Complete Coverage of All Key Processes

## Urban Treatment Plants

Wide range of products covering electrical and automation processes for urban water and wastewater treatment plants. Integrated ICE solutions (Instrumentation, Control and Electrification), including plant optimization.



## Industrial Treatment Plants

From electrical and automation products to turn-key projects including electrical and mechanical scope for industrial water and wastewater treatment plants.

# key processes

## Pumping Stations

From electrical and automation products to turnkey projects, including electrical and mechanical scope. Advanced drives and motors for energy savings.

## Irrigation Networks

Integrated solutions, from plant automation to hydrant control, to completely manage energy and water resources in agricultural applications. Consumption and irrigation programs under wireless control.

A Complete Coverage of All Key Processes

## Distribution Networks

Network Management solutions for real-time monitoring and control of distributed water systems. Asset Management applications to help customers make decisions about plant operations.

## Desalination Plants

Wide range of products covering electrical and automation scope for RO (Reverse Osmosis), MSF (Multi-Stage Flash) and MED (Multiple-Effect) plants. Integrated ICE solutions (Instrumentation, Control and Electrification) including plant optimization.

# Open to Any Application

## Water distribution networks

ABB provides advanced SCADA (Supervisory Control and Data Acquisition) solutions to allow real-time monitoring and control of distributed water systems. Because we integrate plant automation systems and field instrumentation, all the typical parameters (flow, pressure, level and quality) are under control.

By combining field information with ABB's Water Leakage Management application, utilities can constantly monitor network performance and define their maintenance strategy.



### Bangkok: integrated solution for leakage management

ABB supported Bangkok Metropolitan Waterwork Authority (MWA) in managing the health of its wide and complex water distribution network, consisting of 4 regions, 15 branches, and 1000 district metering areas. ABB designed, installed and commissioned the advanced control system, flow meters and remote terminal units, and set up a Water Leakage Management software application. MWA is now able to monitor the network's performance according to the international

BABE and IWA methodology.

This allows the utility to continuously estimate non-revenue water, to detect new bursts earlier by analyzing regularly sampled flow and pressure data, to differentiate between background leakage and bursts and to develop appropriate repair strategies.

## Pumping Stations

ABB provides engineered packages and turnkey projects, including electrical and mechanical scope (pumps, hydro-mechanical components).

Better management of pumping stations enables a significant saving in energy consumption. That is why ABB developed a complete range of products and solutions covering the electrical and automation processes.



### Abu Dhabi: long-range power and control

ABB assisted Abu Dhabi Water & Electricity Authority (ADWEA) with complete electrical, control and instrumentation support of the Shuweihat Water Transmission Scheme, one of the most important projects for ensuring adequate supplies of water in the United Arab Emirates. Water is transferred from the Mirfa Pumping Station to the Mussafah Pumping Station and further on to the Unit IV Pumping Station and Distribution Network in Abu Dhabi.

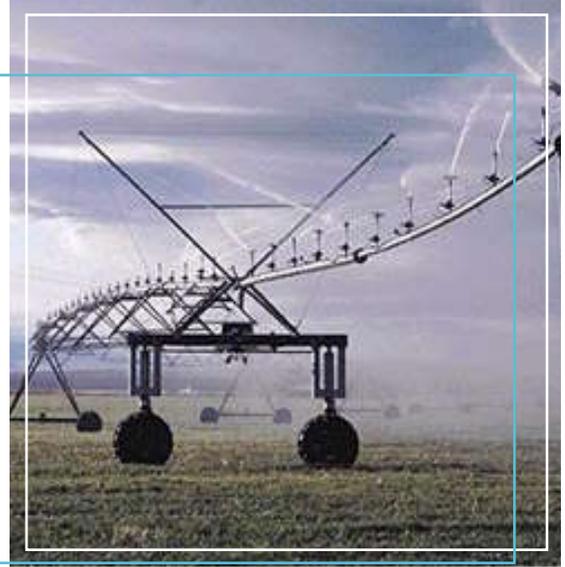
The system includes a parallel double pipeline 1600 mm in diameter.

Each pipeline is 250 km in length, with a transfer capacity of 100 million gallons of water per day. The system integrates a wide range of ABB solutions: power, distribution and phase shift transformers, busducts, switchgears, motors, cubicles, frequency converters and DC/UPS systems. SCADA and telemetry solutions are essential for integrated and centralized management of the plants.

# Application

## Irrigation networks

About 80% of potable water is used for irrigation purposes, and a rational use of this precious resource is crucial. ABB integrated solutions, from plant automation to hydrant control, ensure the complete management of energy and water resources in agricultural applications: primary network (main supply), secondary network (zone supply) and tertiary network (districts supply) up to the hydrants. Fully stand-alone remote stations enable complete management of the process – including irrigation programs, water consumption management and energy management – from the utility control center or from any kind of remote device.



### Canal de Zujar: 21,000 hectares under control

With 95 km of open channel and 27 m<sup>3</sup>/s capacity, Canal de Zujar serves 21,141 hectares, 10 sectors and 10,791 districts in Badajoz area (southwest of Spain). ABB's integrated solution, based on 2 control centers, 4 concentrators and 7,934 Remote Terminal Units (RTU), allows the management of all operations related to irrigation, including opening and closing hydraulics valves, water counter reading, pressure reading, water consumption metering, volumetric or quota irrigation

programs and viewing of alarms. All the units are connected via wireless and are powered by solar panels. The system can handle several irrigation programs on a per day basis, by demand or by climatology optimization. Operators can see or modify any data or any irrigation program from any place at any moment, directly from a PC or using a wireless connection through mobile phones.

## Desalination plants

Desalination plants play a more and more essential role in water production in those areas where increasing demand outpaces the availability of natural resources. In some cases combined desalination and power plants are the flexible solution to produce both water and energy. Hybrid desalination plants use two or more different desalination processes in one plant; these plants have a complex system structure, which allows multiple possibilities for optimization. ABB's portfolio includes a wide range of products covering electrical, automation and optimization processes for RO, MSF, MED and hybrid desalination plants. ABB is the ideal partner for EPC contractors needing engineered ICE solutions (Instrumentation, Control and Electrification).



### Yanbu: power and control for reverse osmosis

The desalination plant of Yanbu (Saudi Arabia) benefits from an ABB electrical and automation solution for efficient water treatment based on reverse osmosis. The plant, which consists of six trains with high-pressure pumps, has increased the installed desalination capacity in this area by 50,400 m<sup>3</sup>/day to reach a total of about 146,000 m<sup>3</sup>/day. The

ABB engineered solution includes switchgears, transformers, electrical distribution, motors, UPS and control system. Thanks to the DCS (Distributed Control System) and the Plant Operation Training Simulator, everything is now running smartly and efficiently.

# Open to Any Application

## Urban treatment plants

Wastewater coming from urban facilities, if well treated, can significantly reduce the impact of pollution on the environment and can also be re-used for agricultural, industrial or urban purposes. Water and wastewater treatment plants in major cities across the world have benefited from ABB's advanced power and automation technologies: drives, motors, transformers, electrical distribution, control systems and instrumentation, including specific devices for on-line water quality measurement.



### Dubai: treated water for 500,000 inhabitants

The Dubai Waste Water Treatment Plant, located 25 km from the city of Dubai, provides a mechanical stage, a biological stage, sand filtration and chlorine disinfection, sludge treatment and thermal drying of the water.

ABB delivered a complete electrical and automation system, includ-

ing switchgears, motor control centers, transformers, instrumentation, control and telemetry system.

The current volume of the plant is 130,000 m<sup>3</sup>/day, sufficient for 500,000 inhabitants, expandable to 200,000 m<sup>3</sup>/day.

## Industrial treatment plants

Many industrial applications need large amounts of water that is treated before and after use: oil and gas, petrochemical, pharmaceutical, pulp and paper, power generation, steel, food and beverage and chemical industries are all water consuming. ABB products and solutions add value to all their water treatment activities, including filtering, de-oiling, desalting and water conditioning.



### Hassi R'Mel: complete oily water treatment plants

Sonatrach chose ABB to build two oily water treatment plants in Hassi R'Mel (Algeria). These two plants, with a capacity of 500 m<sup>3</sup>/d, have been designed for filtering (by double stage sand and carbon filters), de-oiling (including mechanical separation, CPI, flocculation and flotation), desalination (reverse osmosis) and water conditioning.

ABB provided the turnkey plants: oily water treatment and filtration units, desalting and water conditioning units, electrical and automation systems and services, including engineering, procurement, fabrication and construction, commissioning and startup.

# Advanced Optimization

# Optimization

## Improving plant performances

ABB has developed solutions for all fields related to the water lifecycle. These solutions have been designed to optimize all main processes involved in a plant's management. The advanced optimization solutions from ABB address the need for real-time optimization of plants and networks. These solutions support optimization of operations, lifecycle maintenance and utilization of capital assets.

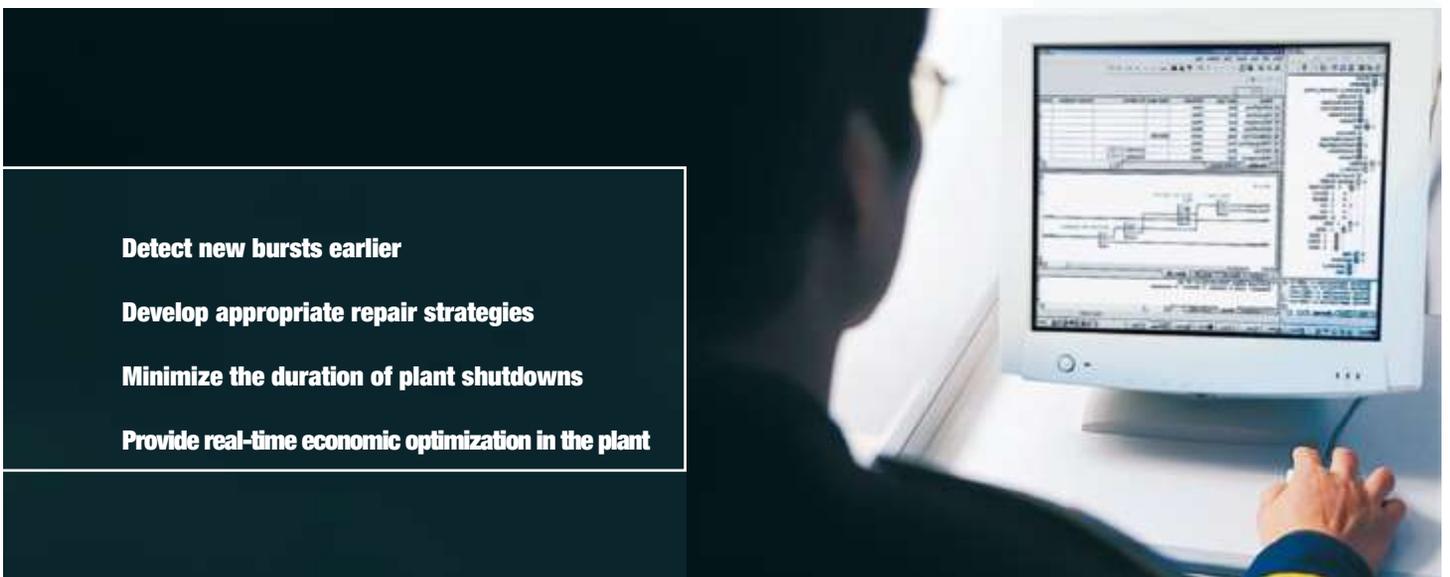
## Water leakage management

ABB Water Leakage Management software allows the facility to monitor and manage losses throughout the water networks and therefore to reduce non-revenue water.

Water utilities can quickly identify any new loss thanks to correct analysis of data related to flow and pressure, allowing facilities to choose the right strategy to increase revenues and thus improve profits.

## Pump efficiency and monitoring

The Pump Efficiency Metering System (PEMS) provides rapid and detailed real-time information on pump efficiency. ABB's solution, based on the thermodynamic measuring method with ABB patented components, integrates trend displays and uninterrupted long-time storage. This allows the facility to optimize maintenance intervals and minimize the duration of plant shutdowns.



**Detect new bursts earlier**

**Develop appropriate repair strategies**

**Minimize the duration of plant shutdowns**

**Provide real-time economic optimization in the plant**

# From Power...

# from power...



**From Power...**

- Substations**
- High, medium and low-voltage systems and equipment**
- Protection devices**
- Transformers**
- Motors**

## Energy when needed

ABB is a worldwide leader for products and solutions related to power generation, transmission and distribution. Our staff provides the global know-how to build and update any kind of electrical system: from high-voltage substations and medium-voltage switchgears to low-voltage power centers and motor control centers.

## Maximum efficiency

ABB is a leader for high efficiency motors; class EFF 1 motors – the most efficient category of motors – provide energy savings up to 20%.

To control the motor speed of pumps, ABB offers variable speed drives (VSD) that deliver from 30% to 60% energy savings and reduce mechanical and electric stress on pump components.

Even pumps that operate at constant flow benefit from the soft-start and soft-stop functionality of a VSD, thereby placing less stress on the motor and pump.



# ... to Field Control

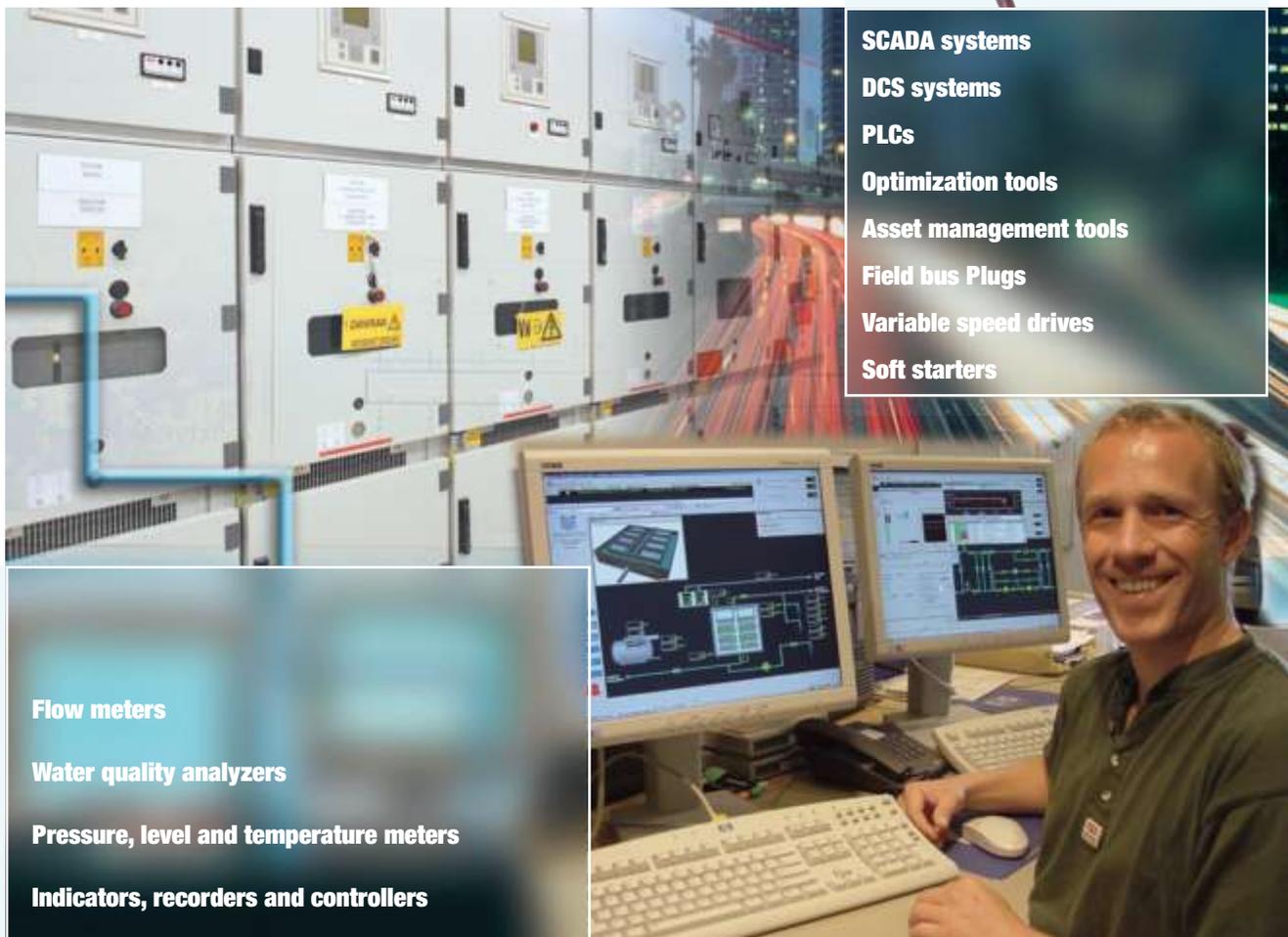
## More intelligence in plants and networks

The ABB portfolio includes a wide range of advanced and flexible automation and control products: variable speed drives and soft starters, programmable logic controllers (PLC), remote terminal units (RTU), communication devices and human machine interfaces (HMI).

ABB can provide complex automation and control solutions from engineering to startup: distributed control systems (DCS), supervisory control and data acquisition systems.

## Measurements reliability

To control water, it is essential to adequately monitor all physical, chemical-physical and microbiological parameters. That is why ABB designed a wide range of instrumentation, including pressure, level and temperature meters, recorders, controllers and on-line analyzers for parameters like pH, conductivity, turbidity, dissolved oxygen, residual chlorine, ammonia, nitrate, fluoride, phosphate, chloride and silica.



- SCADA systems**
- DCS systems**
- PLCs**
- Optimization tools**
- Asset management tools**
- Field bus Plugs**
- Variable speed drives**
- Soft starters**

- Flow meters**
- Water quality analyzers**
- Pressure, level and temperature meters**
- Indicators, recorders and controllers**

# The Benefits of Integrated Management

## A new level of performance

Operators of water utilities need to have the right tools to share all distributed information in a real time environment and to manage information centrally, thus facilitating quicker decision making.

Enhanced by ABB's new family of integrated software and hardware solutions, ABB's control and automation systems place companies in the best position to optimize their processes, plants and enterprise operations. Software and hardware solutions represent a complete line of high-quality products for data acquisition, automation, supervisory and control activities, all fully integrated.

Products and systems for water are designed to work stand-alone or as part of a completely integrated solution, enabling enterprises to implement new functionalities as operational needs evolve.

ABB's commitment to open standards facilitates the integration of activities and the interface with existing automation components and information systems, creating an additional layer of investment protection.

**Centralized information analysis**

**Real-time sharing**

**Easy integration of all automation components**

**Remote control and on call-programs**

**Optimized management of maintenance programs**

**Water resources management**



# ated management

## A complete platform for decision making

The complete portfolio of ABB solutions for power and automation is designed for the highest level of performance and secure data flow from field to control center and provides total support for remote monitoring, system diagnostics, alarm reporting, historical archiving, data analysis and asset management.

ABB offers integrated platforms and leading-edge programs, which give facilities access to strategic information and help them make strategic choices to optimize operating and management costs.

## Access to data, anytime, anywhere

ABB solutions are based on modern communication infrastructures like fiber-optic backbones, dedicated telephone lines, advanced wireless networks (GPRS, UMTS, WI-Max) radio and satellites. The most suitable networks and data acquisition devices (RTUs and PLCs) are used to ensure accurate and complete data collection and remote monitoring for pressure regulation, valve positioning, overflow measurement, pump control, leak detection, modeling and power consumption.





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