

Water Industrial Sector Initiative

Products and solutions for the water cycle

Desalination Plants

A resource to be protected

ABB solutions for the water cycle

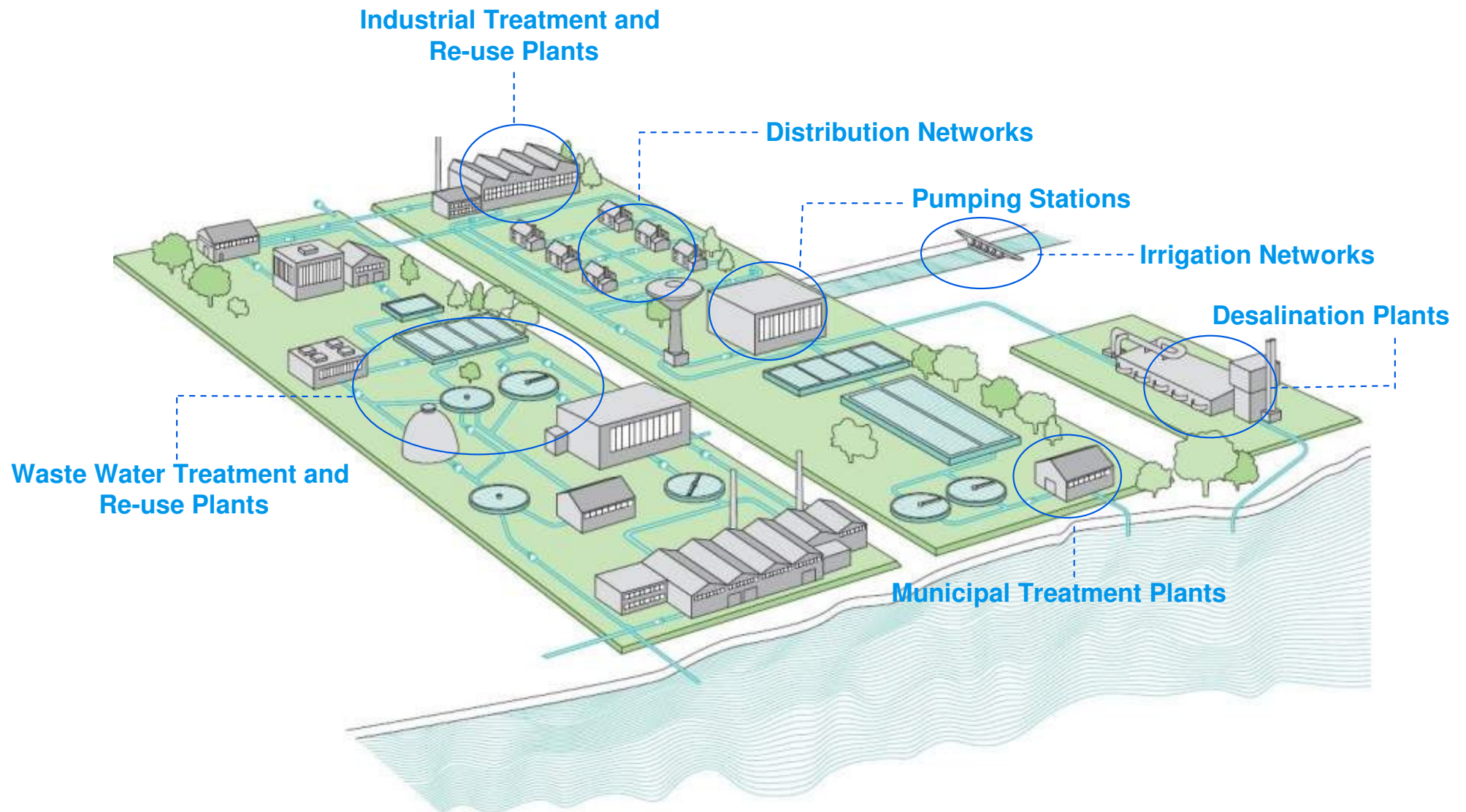


ABB products and solutions for the water cycle

Desalination Plants



ABB technology to reduce the cost of water

- Desalination is one of the key processes in the water industry and plays an essential role to fill the gap between the demand and the availability of water
- RO (Reverse Osmosis), MSF (Multi Stage Flash), MED (Multi Effect Distillation) are the key technologies and are, in some cases, combined in hybrid schemes
- Electricity is a key cost component of desalinated water and can represent more than 20% of Operational Expenditure (OpEx)
- Energy efficiency and life-cycle cost optimization are among the most important challenges for utilities and developers

ABB products and solutions for the water cycle

Desalination Plants



ABB is the ideal partner for medium to large desalination projects as well as for combined water and power plants

- Complete and reliable electrical and automation portfolio
- Energy efficient solutions by advanced motors and drives
- System integration and optimization
- Added-value applications for process monitoring and optimization

ABB products and solutions for desalination plants

Value in a cooperation with ABB



ABB as your partner

- ABB serves:
 - Developers to optimize the entire life-cycle energy costs
 - EPC contractors to provide one single source for instrumentation, control, electrical systems
 - OEM's by delivering efficient motors and state-of-the-art drives
- Overall cost reduction by:
 - elimination of redundant activities
 - elimination of coordination of various suppliers
 - reduction of risk exposure

ABB products and solutions for desalination plants

One manufacturer and one integrated solution

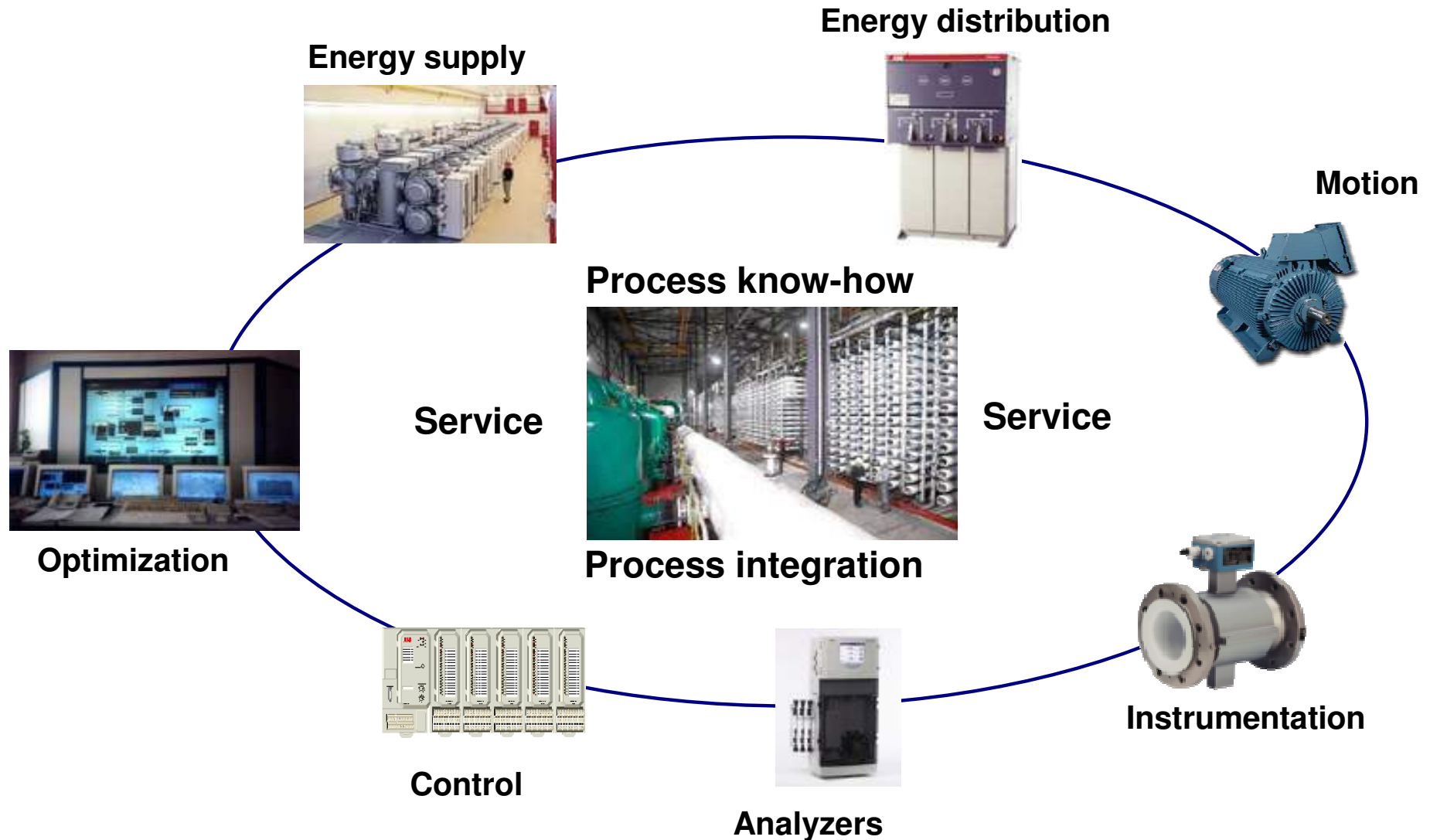


ABB products and solutions for desalination plants

Electrical Balance of Plant (eBoP)



A customized and fully integrated solution including electrical products and services for desalination plants

- eBoP covers electrical equipment and systems from pumps to grid connection, ensuring that the plant runs efficiently, safely, and reliably
- eBoP solutions include: high-voltage substations, grid connections, medium-voltage systems, low-voltage systems, motors, drives, emergency systems, and facility management
- ABB is a single source for design, engineering, supply, installation, commissioning, testing, and maintenance

ABB products and solutions for desalination plants

Instrumentation and control (I&C)



An innovative information management platform for desalination plants

- ABB's distributed control system (DCS) handles all plant operations and all information management incl. historian functions, archiving, reporting, performance calculations
- Field devices, instrumentation, analyzers and control systems are integrated to deliver complete plant automation solutions
- Applications such as Performance Monitoring & Optimization, Pump Efficiency Monitoring System (PEMS) and vibration monitoring add value in order to provide complete solutions

ABB products and solutions for desalination plants

High Voltage GIS Switchgears



HV gas insulated and air insulated switchgears and modules provide the connection to the power grid

- ABB offers a complete range of the most competitive and innovative high-voltage products (50 - 800 kV) on the market

ABB products and solutions for desalination plants

Transformers



**HV and MV transformers
reduce the line voltage**

- ABB is the world leading manufacturer of transformers, offering a full range of products (liquid/dry), fulfilling all widely applied standards, such as IEC, CENELEC, ANSI/IEEE, as well as other local standards.
- ABB transformers have about 60 production facilities around the world with 13,000 employees.

ABB products and solutions for desalination plants

MV/LV Switchgear



**MV and LV switchgear
provide the reliable
energy distribution**

- ABB portfolio includes air-insulated and gas-insulated panels with a choice of gas or vacuum circuit breakers. The voltage range is 0.3 – 40 kV and current ratings cover all possible technical combinations meeting IEC/ANSI and local standards.

ABB products and solutions for desalination plants

Motors and drives



Motors and drives can drastically affect the long term operational management of desalination

- ABB class EFF 1 motors are the most efficient category of motors that provide energy savings up to 20%
- ABB variable speed drives (VSD) are used to control the motor speed of pumps, with a guaranteed 30% to 60% energy savings
- ABB is a leading international manufacturer of low- and medium-voltage AC drives from 370 W to 100 MW

ABB products and solutions for desalination plants

Instrumentation and Analyzers



- Flow and pressure meters
- Water analyzers including ammonia, conductivity, dissolved oxygen, fluoride, pH, phosphate, redox, turbidity, UV nitrate
- Temperature sensors
- Recorders for auditing and quality control requirements

ABB portfolio includes an extensive range of instrumentation for the water industry

ABB products and solutions for desalination plants

Control systems



- ABB is the market leader worldwide for automation equipment
- ABB portfolio includes distributed control systems (DCS) and PLC platforms
- Specific added-value applications have been developed on the top of control platform

The distributed control System 800xA includes the latest state-of-the-art technology for automatic operation and control

ABB products and solutions for desalination plants

Reverse Osmosis: membrane performance monitoring & optimization



To improve energy efficient operation in RO systems means to ensure maximum productivity and sustainable operation

- On-line performance monitoring
 - estimating current membrane fouling status
 - predicting future membrane fouling status
 - displaying the due date for next membrane chemical cleaning or flushing with product water
- RO process operation optimization
 - displaying the current optimal process conditions (flow and pressure set-points)
 - predicting future optimal process conditions
- RO process simulation
 - running what-if scenarios capturing the fouling phenomena
 - using optimizer results

ABB products and solutions for desalination plants

Hybrid desalination: performance monitoring & optimization

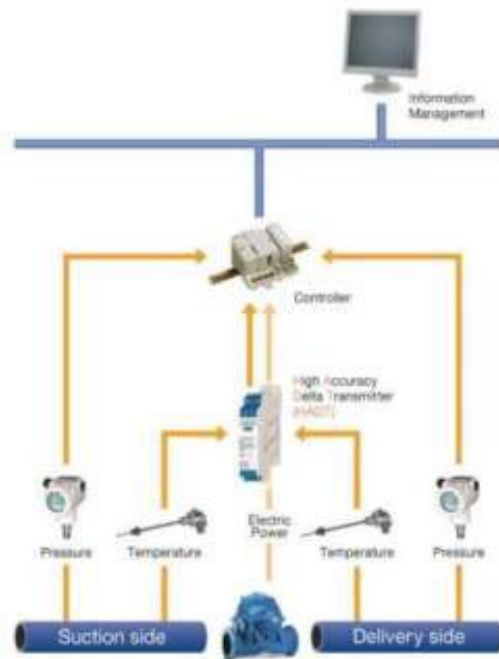


In hybrid desalination, two or more different technologies are used in the same plant

- In combined water and power plants, hybrid desalination gives multiple possibilities of optimization, especially in the area of fuel conservation and efficient use of thermal and electrical energy
- The challenge lies in large range of operation possibilities, which exist in short term and long term operation planning.
- ABB solutions allow economical optimization and address
 - load scheduling
 - hybrid optimization
 - process optimization
 - work process optimization

ABB products and solutions for desalination plants

Pumps Efficiency Monitoring System (PEMS)



- ABB's solution is based on the thermodynamic measuring method with ABB patented components
- Based on measurements of flow, temperature and electric power consumption
- Provides rapid and detailed information on pump efficiency and flow
- Integrates trend displays and uninterrupted long time storage
- Optimizes maintenance intervals and reduces plant shutdown periods

Pump efficiency under control

ABB products and solutions for desalination plants

Engineering and service



- ABB engineers ensure professional design, manufacturing, installation, commissioning of components and complete systems
- ABB has a global network of service centers, which offer a wide range of local after sales-services
- More than 30 years of experience in the water market worldwide
- Trained and certified service technicians are available to support our system and product portfolio
- System and product training can be provided to ensure optimum plant performance
- A range of maintenance contract options can be provided to secure long-term system and product performance

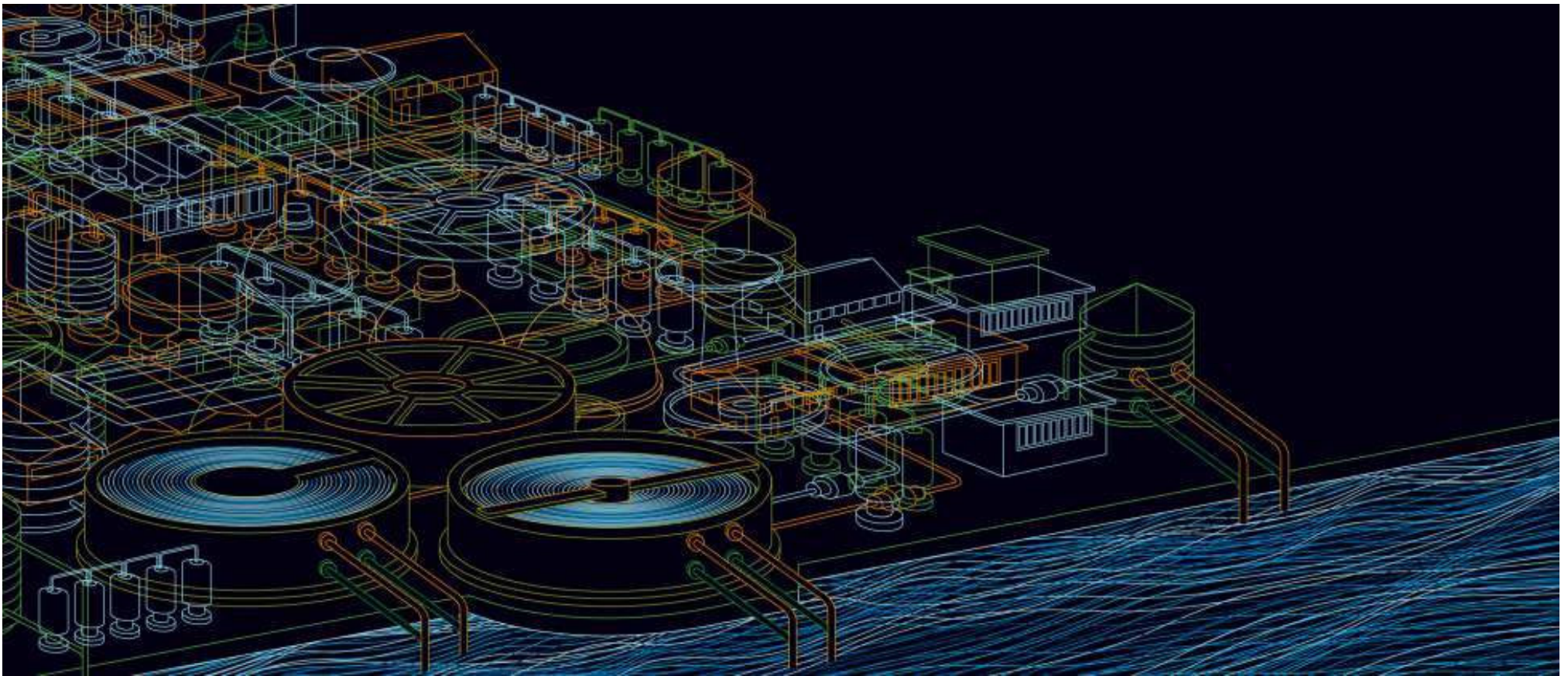


ABB: your flexible partner

Project references

ABB Project references

Magtaa RO Desalination Plant, Oran, Algeria



**The world's largest
Seawater RO plant
(500.000 m³/day)**

Customer

Hyflux Ltd

Country

Algeria

Project Key Data

- Capacity of 500,000 m³/day of drinking water to serve about five million people
- ABB is responsible for design, engineering, supply, installation and commissioning

ABB Scope

Electrical plant system including:

- 220 kV outdoor substation to connect the facility to the Algerian power grid without impacting grid stability
- 33 medium voltage drives to reduce plant electrical losses from a target of 5% to 3%
- Drives will speed up the long plant startup process after maintenance or power-failure related shutdowns, reducing the length of plant downtime compared with the more traditional method of mechanical control

ABB Project references

Tugun RO Desalination Plant, Gold Coast, Australia



ABB was selected for best compliance with:

- Lowest harmonic distortion
- Fastest switching response
- Smallest footprint
- Highest motor efficiencies, lowest noise levels, fastest delivery

Customer

GDC Alliance

Country

Australia

Project Key Data

Capacity of 125.000 m³/day water production to serve about 400.000 people

ABB Scope

- Four 4800 kW water-cooled 3300 V motors
- Four 1060 kW water-cooled 3300 V motors
- Four 800 kW 11000 V motors
- Four 550 kW 690 V motors
- Eight MV drives

ABB Project references

Fujairah combined water and power plant, UAE (1/2)



Customer

Fujairah Water & Power Plant

Country

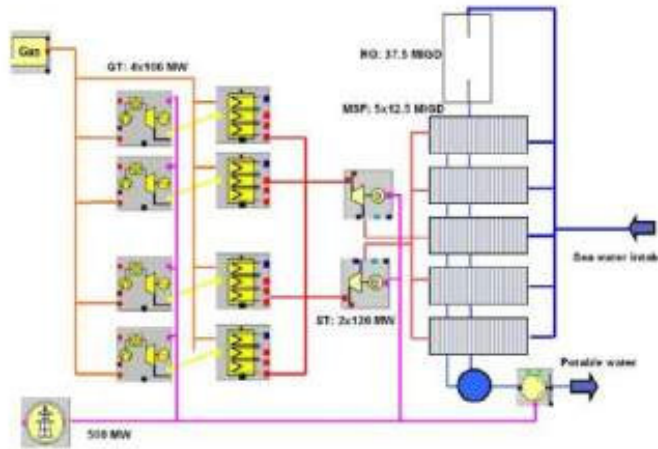
Kingdom of Saudi Arabia

Project Key Data

- Hybrid Plants
- Capacity of about 660 MW gross power and 450.000 m³/day water production
- Four Gas Turbines (GT) 106 MW each, with associated Heat Recovery Steam Generators (HRSG) and 2 Steam Turbines (ST) 119 MW each, at the electrical side
- Five Multi Stage Flush (MSF) distiller, 57.000 m³/day each
- One Reverse Osmosis (RO) Plant (2 stages) with 170.000 m³/day

ABB Project references

Fujairah combined water and power plant, UAE (2/2)



After the implementation of the solution, more than 4% of the total fuel consumption was saved

ABB scope

Performance monitoring and optimization system:

Fuel savings is the aim of the following optimization tools:

- Load Scheduling
- Hybrid Optimization
- MSF Optimization
- RO Optimization
- FD-Fan Optimization

ABB Project references

Yanbu RO Desalination Plant, Kingdom of Saudi Arabia



Hybrid desalination plants use two (or more) different desalination process types in one plant

Customer

SBG-PCM

Country

Kingdom of Saudi Arabia

Project Key Data

- Six trains with high pressure pumps has increased the installed desalination capacity in this area by 50.400 m³/day to a total of approximately 146.000 m³/day

ABB Scope

- 4.16 kV Switchgear (in total 24 feeders)
- Two Transformers 4160/480 V, 4000kVA
- 480V Main Distribution and 480 V Motor Control Centres
- 480/120V UPS
- 120V DC-System
- Distributed Control System
- Plant Operation Training Simulator

ABB Project references

Hadera Desalination Plant, Israel



Customer

IDE Technologies Ltd

Country

Israel

Project Key Data

Capacity of 275.000 m³/day

ABB Scope

- Motors
- Drives
- PLC's

Power and productivity
for a better world™

