
**Making a world
of difference**

ABB Energy Industries

As we look ahead to a sustainable future, ABB is making a world of difference today with safer, smarter and more sustainable solutions for tomorrow's world.

In this overview, we celebrate our inspiration. We invite you to discover some of the success stories that highlight our focus on delivering value for our customers.

[FOR MORE INFORMATION, CONTACT US](#)

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1 We are improving people's lives by making the use of our planet's resources safer, smarter and more sustainable.

2 We are engineering innovative and integrated solutions that digitalize, automate and electrify industry.

3 We are connecting our people and technologies to help customers succeed for life and communities to advance.

A LOOK BACK AT MAKING A DIFFERENCE

INNOVATION TO TRANSFORM THE ENERGY FUTURE

HELPING THE WORLD'S CITIES MEET THE NEEDS OF CLEAN WATER

REDUCING CARBON INTENSITY FOR INDUSTRIAL OPERATIONS

TRANSFORMING THE FUTURE OF WORK

ABB SUSTAINABILITY HIGHLIGHTS

OIL AND GAS, TECHNOLOGY, COLLABORATION

Subsea JIP – Norway



Cleaner, leaner, more sustainable offshore operations



Reliable and safe transmission of electrical power up to 100 MW over a distance of 600km and to depths up to 3,000m



Faster project execution with a longer lifecycle

ABB's pioneering subsea power distribution and conversion technology system is now commercially viable, bringing groundbreaking potential for cleaner, safer and more sustainable offshore oil and gas production, following the completion of a 3,000-hour shallow water test in late 2019.

The project

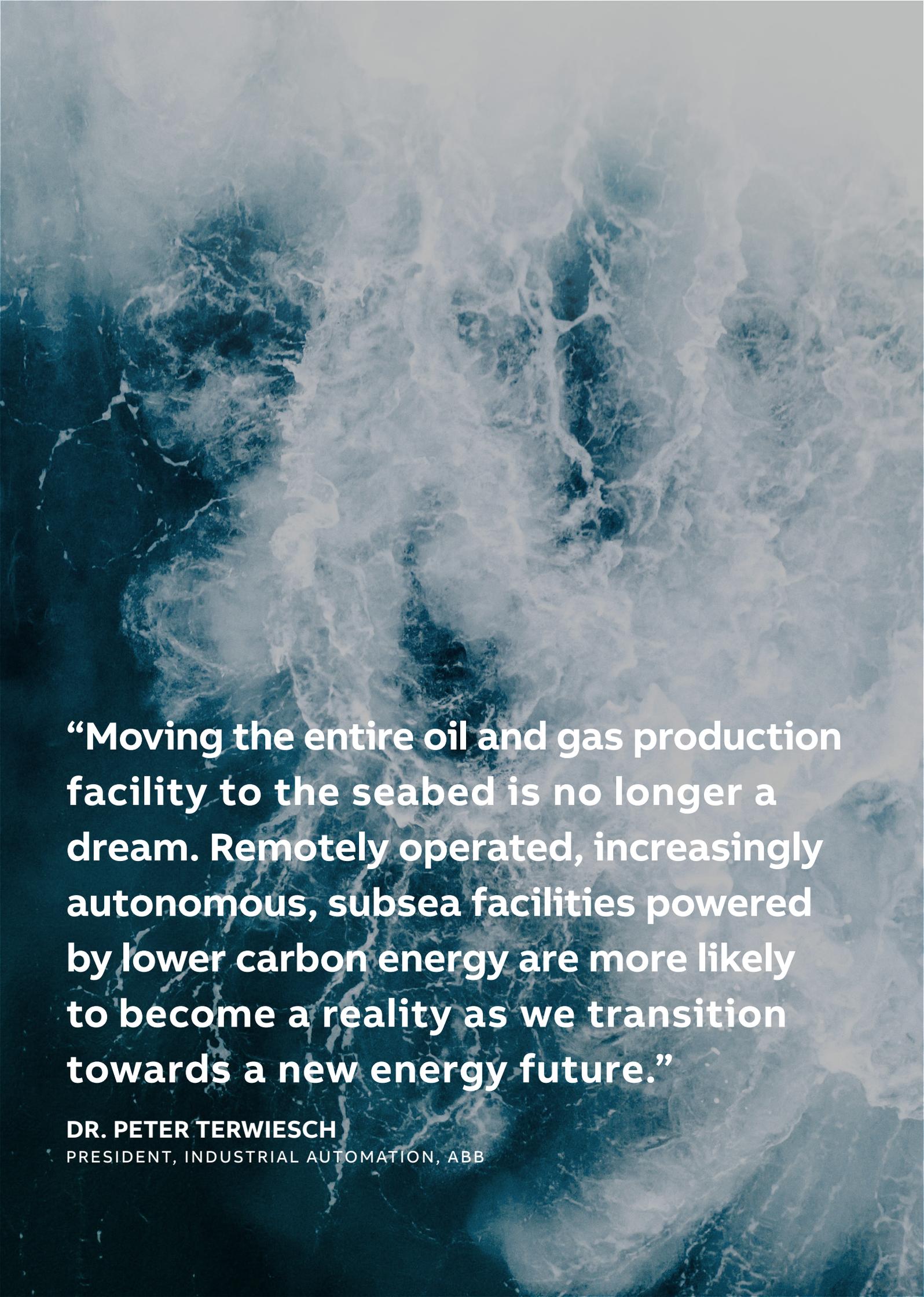
In 2013, ABB entered into a five-year joint industry project (JIP) with Equinor, Total and Chevron to research and develop state-of-the-art subsea power technology. The main focus of the partnership was to design and deliver subsea transmission, distribution and power conversion systems for underwater pumps and gas compressors that could be used for upcoming and existing oil and gas processing fields in the Norwegian Continental Shelf (NCS), the Gulf of Mexico and several other global offshore regions.

The technology

ABB's complete subsea power distribution and conversion system includes a step-down transformer, medium voltage variable speed drives and switchgear, control and low voltage power distribution, and power electronics and control systems. The new subsea electrical infrastructure and equipment is controlled with ABB's all-in-one ABB Ability™ 800xA system, which can collect real-time data, permitting condition monitoring and predictive analytics to optimize performance and productivity.

Benefits

- The system gives oil and gas operators access to a reliable, safe power supply of up to 100MW to remote distances as far as 600km offshore, and is designed to withstand harsh underwater conditions.
- Extraction from deep-water reserves becomes easier when pumps and compressors are moved to the seabed, increasing production of oil and gas from new and existing fields while lowering costs.
- With subsea operations, oil and gas producers may realize about 20-30 percent savings on overall expenses over a 30-year operational life, as well as 25 percent faster project execution and completion.
- Having oil and gas processing facilities on the seabed reduces overall maintenance, with substantial cost savings. The subsea power solution could offer CAPEX savings of more than \$500 million, for example, if eight consumers, such as pumps or compressors, are linked through a single cable over 200 km from other infrastructure, according to a specific field development case.

An aerial photograph of a turbulent ocean with white-capped waves, serving as the background for the text.

“Moving the entire oil and gas production facility to the seabed is no longer a dream. Remotely operated, increasingly autonomous, subsea facilities powered by lower carbon energy are more likely to become a reality as we transition towards a new energy future.”

DR. PETER TERWIESCH

PRESIDENT, INDUSTRIAL AUTOMATION, ABB

CHEMICALS, TECHNOLOGY

Sadara – Saudi Arabia



Optimised cost and reduced risk as Main Automation Contractor (MAC)



Reduced complexity and improved outcomes with world-class project delivery



Economies of scale with a single unified automation architecture for the 26 state-of-the-art manufacturing units



Plant efficiency, reliability and safety with ABB's integrated automation solutions

The project

The Sadara petrochemical complex is the largest facility to be built in one phase. It produces amines, glycol, polyethylene, polyol and isocyanates, enabling many new downstream applications and adding new value chains to transform Saudi Arabia's existing chemicals industry landscape. Sadara Chemical Company, which is a joint venture between the Saudi Arabian Oil Company and Dow Chemical, installed ABB's software and hardware systems to operate and manage the facility, which has an annual output of 3 million tonnes.

The technology

Highly skilled engineers from ABB delivered the complete automation systems, allowing the petrochemical complex to begin production, on schedule, in 2015 and achieve full production in late 2017. ABB's 800xA distributed control (DCS) operate 26 state-of-the-art manufacturing units, optimizing performance and driving efficiency at the \$20 billion Saudi chemical plant.

ABB also installed a range of electrical equipment, and instrumentation, as well as the process analysers, which will maintain a record of various chemical reactions at the facility. Additionally, plant managers can use ABB's electronic Shift Operations Management System (eSOMS) to operate

and maintain their assets. ABB created 1:1 copies of physical plants in a digital twin that improved testing, training and startup, as well as operations.

Benefits

- With well-established domain and digital expertise, ABB is able to provide much better economies of scale, while delivering operational excellence and innovative technologies at competitive prices. ABB's integrated solutions will help ensure plant efficiency, reliability and safety.
- ABB, as main automation contractor (MAC), can support a multitude of complex, interlinked tasks that are essential to executing global mega projects. The scalable design of ABB's solutions allow users to expand and integrate technologies of the fourth industrial revolution.
- ABB is closely involved with its customers, collaborating at all levels of complex projects, from concept through to long-lifecycle plant operation, which greatly benefits chemical companies as they evolve and embrace digital innovations. Building the facility of tomorrow begins today by employing forward-thinking strategies and cutting-edge technologies.

[LEARN MORE ABOUT SADARA](#)

In Jubail, Saudi Arabia, ABB's software and hardware systems operate and manage Sadara, the largest greenfield chemical complex ever constructed in a single phase.



POWER AND WATER, TECHNOLOGY

Mälarenergi – Sweden



Intelligent solutions for district heating and water supply networks



Higher efficiency at waste-to-energy plant



Quicker, more effective and smarter management with ABB Ability™

ABB and Mälarenergi have joined forces to implement digital technologies and employ IIoT expertise to increase efficiency, boost productivity, enhance stability and promote sustainability for Sweden's fifth-largest city, which has more than 150,000 residents and thousands of businesses.

The project

State-owned utility Mälarenergi operates hydropower plants, the local power grid, a waste-to-energy plant (Unit 6), district heating and cooling networks, water and wastewater treatment plants, a water distribution network and a fiber-optic network in Västerås. Integrated systems and information exchange will help reduce emergency response time, promoting safety and elevating living standards.

The technology

ABB is developing for Mälarenergi an all-in-one smart management system based on the ABB Ability™ platform that will connect equipment and systems across Mälarenergi's diversified operations, providing deeper visibility and detecting improvement areas, as well as allowing information sharing and creating new service opportunities. Information from water, district heating, roads, lights and property owners provides a better overview of resources and situational awareness, which will help the utility to provide quick crisis response and useful resolutions.

ABB Ability™ Collaborative Operations centers will use ABB Ability™ data for quicker and more effective management of the utility through remote condition monitoring and pre-

ventive analytics, ensuring optimization and coordination of maintenance activities. ABB's technologies will promote new ways of communication, case management and crisis management in Västerås.

Eventually, ABB has installed low and medium-voltage motors and 200 variable speed drives to control the speed of motors while saving power, improving performance and enhancing efficiency.

Benefits

- ABB's state-of-the-art solutions will allow Mälarenergi to benefit from an all-in-one platform, with more knowledge, correlated information and overarching visibility.
- Advanced control and monitoring of the water plants and networks supports supplying clean, palatable water to Västerås. With big-data visualization, the national utility will be able to identify and reduce water leakage, which currently stands at 20 percent in the city.
- Data on consumers' district heating usage will provide insights about functioning of plant assets, enabling informed decisions. Advanced asset management will drive productivity and ensure sustainability across the distribution grid. Also, optimizing power sources will result in energy and cost savings.
- Digital technologies will provide Västerås' citizens with increased visibility about their utilities, encouraging open dialogue on energy and waste management to foster a cleaner and greener future.

INFOGRAPHIC

VIDEO: SMART CITIES



ABB and Mälarenergi have joined forces to implement digital technologies and employ IIoT expertise to increase efficiency, boost productivity, enhance stability and promote sustainability in Västerås, Sweden.

POWER, TECHNOLOGY

Enel Green Power – Italy



Energy savings and efficiency gains with predictive maintenance



Higher reliability and availability with asset performance management

As part of a three-year agreement, ABB is innovating to deliver predictive maintenance solutions to Enel Green Power, a global leader in the green energy sector, as the company looks to reduce maintenance costs and extend the life of its assets, while improving uptime and operational performance.

The project

Enel Green Power, one of the biggest Italian utilities, will move from hours-based maintenance to predictive and condition-based maintenance, leveraging the ABB Ability™ asset performance management solution at 33 hydroelectric plants within its fleet, totaling 100 units generating 25.26GW.

The technology

With deep-domain expertise and highly skilled engineers, ABB is positioned to enable digital transformation for Enel Green Power. Using predictive maintenance and asset performance management, the electricity producer will be able to optimize maintenance, improve stability and increase efficiency across its power generation facilities.

With newer equipment and systems, it is essential to study functioning early on to ensure efficiency, stability and reliability. Industry 4.0 digital technologies will help in sustainable power generation, which supports competitive electricity rates for end users.

ABB's digital technologies will analyze more than 190,000 signals with the deployment of 800 digital asset models, which will help optimize performance, reduce unexpected downtime and result in effective maintenance that will re-

sult in lower operational costs and higher productivity.

The asset performance solution gathers large volumes of data on certain key performance indicators to detect faulty assets, which enables Enel Green Power to properly plan for equipment maintenance, replacement or repair.

Benefits

- Understanding how equipment and systems are functioning is key to lowering energy usage and operational costs. With ABB's advanced asset management technology, Enel Green Power will get a real-time overview of the health of its assets across its hydropower plants.
- Enel Green Power's personnel will also gain higher visibility into equipment and systems' performance, allowing them to easily transition from hours-based to condition-based and predictive maintenance.
- Continuously monitoring plant assets can help energy companies extend the life of their assets and schedule maintenance only when something goes wrong. Maintenance can be scheduled based on the actual condition of plant equipment and systems, preventing unexpected downtime and unnecessary risks, while lowering energy usage and reducing costs.



Dolomites, Italy.

OIL AND GAS, OFFSHORE, TECHNOLOGY

OKEA collaboration – Norway



With live data, operational efficiency enables better decisions



High-quality operational data is available safely and securely in the cloud in milliseconds with Edge technology



Collaborative innovation utilizing cloud-based analytics tools running on a ‘Software-as-a-service’ (SAAS) business model.



Artificial intelligence, machine learning, creative problem-solving, expertise and collaboration can inspire more progress.

Global technology leader ABB and Norwegian fast-growing oil and gas producer OKEA have signed a Memorandum of Understanding (MoU) agreement to support OKEA achieve substantial productivity gains using agile and dynamic business models.

The collaboration

ABB is, and will continue to be, a key partner for OKEA in realizing their ambition to operate the Draugen field, in the southern part of the Norwegian Sea, until 2040. Draugen was commissioned in 1993 and produces around 20,000 barrels of oil a day.

The MoU was designed for OKEA to leverage ABB’s global digital leadership and industry experience in sustaining lean and optimized operations for the future – with responsive new business models to maximize operational excellence, reduce time-to-value and support cost-effective field developments at a time of high technological change in offshore operations.

The technology, so far...

In a world-first endeavor, ABB and oil and gas operator OKEA have collaborated on the world's first streaming of high-quality real-time data from such a facility, which is an important

contribution for optimization. Unlike conventional digital twins of such systems, the data stream is transmitted right from the heart of the platform’s devices, assets, and control system, without any sort of filtering or intermediate storage in databases. This solution enables a significant efficiency improvement in how OKEA will be able to work with data on operational optimization, with live, high-quality data directly from the source, safely available, anywhere and at any time. From Draugen, around 5000 tags, as well as alarms and events, are streamed. Using Edge technology, the data stream with ABB Ability™ EdgeInsight is compressed at site, without any loss of data quality, and transmitted via radio. The operational data updates are available in the cloud in milliseconds.

Benefits

The collaboration showcases Business. Data. Intelligence and Inspiration, with OKEA supported in their strategy to maintain an efficient organization and scale production by leveraging ABB’s expertise in autonomous operations, digital solutions and advanced services.

ABB & OKEA DIGITAL PARTNERSHIP

VIDEO: BUSINESS DATA.
INTELLIGENCE. INSPIRATION.

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Draugen oil platform,
Norway. ABB and OKEA
have collaborated on the
world's first streaming
of high-quality real-time
data from such a facility.



“This strategic collaboration enables ABB to leverage its expertise in oil and gas. With ABB Ability™ solutions and innovative business models, we will support OKEA to realize its ambitions and long-term strategic plans.”

PER ERIK HOLSTEN
MANAGING DIRECTOR, ABB NORWAY

[ABB OKEA WEBSITE](#)

[ARTICLE: THOUGHT LEADERSHIP](#)

CHEMICALS, AUTOMATION

Shanxi Lu'an – China



Improved security and reduced risk with ABB's systems seamlessly integrated across production facilities



World-class engineering and site commissioning services



Enhanced operational safety and standards with operator training simulation for employees

ABB is the main automation vendor for the Shanxi Lu'an coal-to-liquid fuels project, and is delivering integrated automation and safety systems to reduce risk and optimize timing, safety and security.

The project

The Shanxi Lu'an coal-to-liquid fuels project is located in Changzhi, China, and brings a construction capacity of 1.8 Mt/a of liquid. It is a vital benchmarking initiative to support China's positioning as a leader in the modern coal-to-liquid fuels sector.

The technology

ABB's fully integrated systems have been installed across Lu'an's production facilities, including the power plant, coal gasification, purification, synthetic oil, sulfur recovery, air separation and tank farm. ABB has also provided engineering and site commissioning services for the project. An operation training simulator has also been supplied to upskill employees in a safe environment.

Benefits

- ABB has added significant value for this project, interfacing with multiple Chinese engineering, procurement and construction companies to deliver a range of automation and safety systems — including DCS, safety instrumented systems and gas detection systems, involving approximately 60,000 I/O (input/output) points.
- The automation systems, installation, commissioning and after-sales support have been completed on time and on budget by ABB in China. ABB's interface management will ensure a consistent, compatible solution that lowers risk.

[VIEW PLANT SPECIFICATIONS](#)

[ABB CHEMICALS WEBSITE](#)



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OIL AND GAS, TECHNOLOGY

QCLNG – Australia



Production and transportation efficiency for the world’s first coal seam gas to LNG project



Reduced lifestyle costs with remote operations



Higher availability

ABB has a long-term service agreement (LTSA) with QGC, a wholly owned subsidiary of BG Group, to provide planned and unplanned maintenance for the upstream and mid-stream facilities at Queensland Curtis Liquefied Natural Gas (QCLNG). ABB was selected as the Main Automation Contractor (MAC) for this project.

The project

Located in Queensland, Australia, QCLNG is the world's first plant to convert gas from coal-seam into liquefied natural gas. Coal-seam gas is natural gas extracted from coal beds. It provides the same amount of energy as coal, but carbon dioxide emissions are 40 percent lower. QCLNG is a priority project for QGC because it involves expanding exploration and development in southern and central Queensland. The upstream facilities stretch across the Surat Basin, where the coal-seam gas is gathered and transported along a 540-kilometer underground pipeline to the LNG plant on Curtis Island near Gladstone.

The technology

ABB’s comprehensive services include an on-site team to maintain ABB’s 800xA Integrated Control and Safety Systems (ICSS). The contract also covers spare parts management for QCLNG’s upstream collection and transportation facility, as well as for the midstream liquefaction and export facility. ABB provided integrated automation, safety and telecommunications systems and related equipment for the upstream coal-seam gas project.

| Fact Box | |
|--------------------|---|
| Customer | QGC |
| Site | Curtis, Australia |
| Customer need | Reliable and integrated control and safety system |
| Scope | <ul style="list-style-type: none"> Power and automation systems Long-term service agreement |
| Application | Liquefied natural gas |
| Commissioning year | 2014 |



ABB has a long-term service agreement with QGC to provide planned and unplanned maintenance for the upstream and midstream facilities at Queensland Curtis Liquefied Natural Gas (QCLNG)

POSH GIANT II
SINGAPORE

WATER, TECHNOLOGY

Al Ghubra – Oman



ABB Ability™ Symphony® Plus enhances plant performance



Optimizing power consumption leads to lower operational costs



Easy-to-use HMI increases reliability and safety

More than 80 percent of the Sultanate of Oman is covered by desert and clean drinking water is not easily available. As the economy develops and population grows, the Arabian country is relying on its desalination plants to meet increasing demands for fresh water.

The project

The Al Ghubra Seawater Desalination Plant, located at the port of Muscat, uses reverse osmosis (RO) technology to produce 191,000 cubic meters of potable water daily, catering to about 800,000 people. After a detailed study at Al Ghubra, ABB installed its ABB Ability™ Symphony® Plus as the human-machine interface (HMI) solution, which integrates and communicates with field devices and electrical equipment via HART, MODBUS and IEC 61850.

The technology

ABB Ability™ Symphony® Plus – a state-of-the-art distributed control system (DCS) – will improve energy efficiency and boost productivity at the desalination plant, helping Oman to meet its drinking water requirements, which are expected to rise by nearly 6 percent every year.

The digital platform can carry out monitoring, diagnostics, maintenance, protection and optimization of assets for plant systems and processes, increasing availability, lowering risk and reducing costs at Al Ghubra, which is one of the largest RO facilities in the Persian Gulf.

Benefits

- ABB's instrumentation, automation and electrical solutions have helped some of the largest and most complex desalination plants to embrace digital transformation and the evolving energy mix of today.
- Recognized as the world's leader in DCS technology, ABB has delivered 7,000 Symphony installations, 5000 of which are in power and water. The intelligent, easy-to-use HMI provides operators with an in-depth overview of plant systems and processes, resulting in faster reaction times and informed decisions.
- Nations across the world are increasingly setting up desalination plants to meet the growing demand for clean drinking water, which is becoming a scarcity with an expanding global population.
- ABB is supporting the delivery of several desalination technologies, such as RO, MSF (multi-stage flash) and MED (multi-effect distillation) to produce fresh water at optimal costs, aiming to produce fresh water for human consumption.



ABB's instrumentation, automation and electrical solutions have helped some of the largest and most complex desalination plants to embrace digital transformation and the evolving energy mix of today.

OIL AND GAS, OFFSHORE, TECHNOLOGY

Aasta Hansteen – Norway



Operational efficiency gains with ABB Ability™ System 800xA



Enhanced productivity with virtual start-up of the plant saving 2700 man-hours



Effective system integration

The project

Located in 1,300 meters of water in the Norwegian Sea, about 300 kilometers west of Sandness-jøen, Aasta Hansteen is Norway's deepest field development. It comprises two subsea templates connected to a Spar platform with Norway's first steel catenary risers.

Aasta Hansteen is operated by majority-partner Equinor, along with Wintershall, OMV and ConocoPhillips. It holds about 51 Bcm of dry low CO² content recoverable gas reserves that will be transported through the Polarled pipeline to Shell's onshore gas plant, Nyhamna.

The technology

ABB has installed integrated safety and automation, electrical and telecommunication systems based on ABB Ability™ System 800xA to Equinor's Aasta Hansteen. The platform includes a condition monitoring system for over 100,000 maintenance conditions from 4,000 pieces of equipment, tools for alarm management and alarm rationalization, delivery of several safety critical applications, data storage solution to store all alarms and events easily, and third-party system integration of essential data traffic.

The ABB Ability™ System 800xA simulator was used to help lower risk and prevent unplanned shutdowns, while driving safety, productivity and energy efficiency gains.

Benefits

Aasta Hansteen will strengthen the position of Equinor and the Norwegian Continental Shelf (NCS) as a long-term, reliable supplier of gas to Europe and the United Kingdom. ABB's flagship digital platform reduced manual interventions by 98 percent, saving more than a month in commissioning. Production availability can increase corresponding to one or two days of production as full productivity is reached faster with each start-up. The production value per day is approximately US\$5 million.

VIDEO: FAST START-UP AT AASTA

—
Aasta Hansteen platform.



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Roar Lindefjeld and
Bo B. Randulff

abb.com/energy-industries