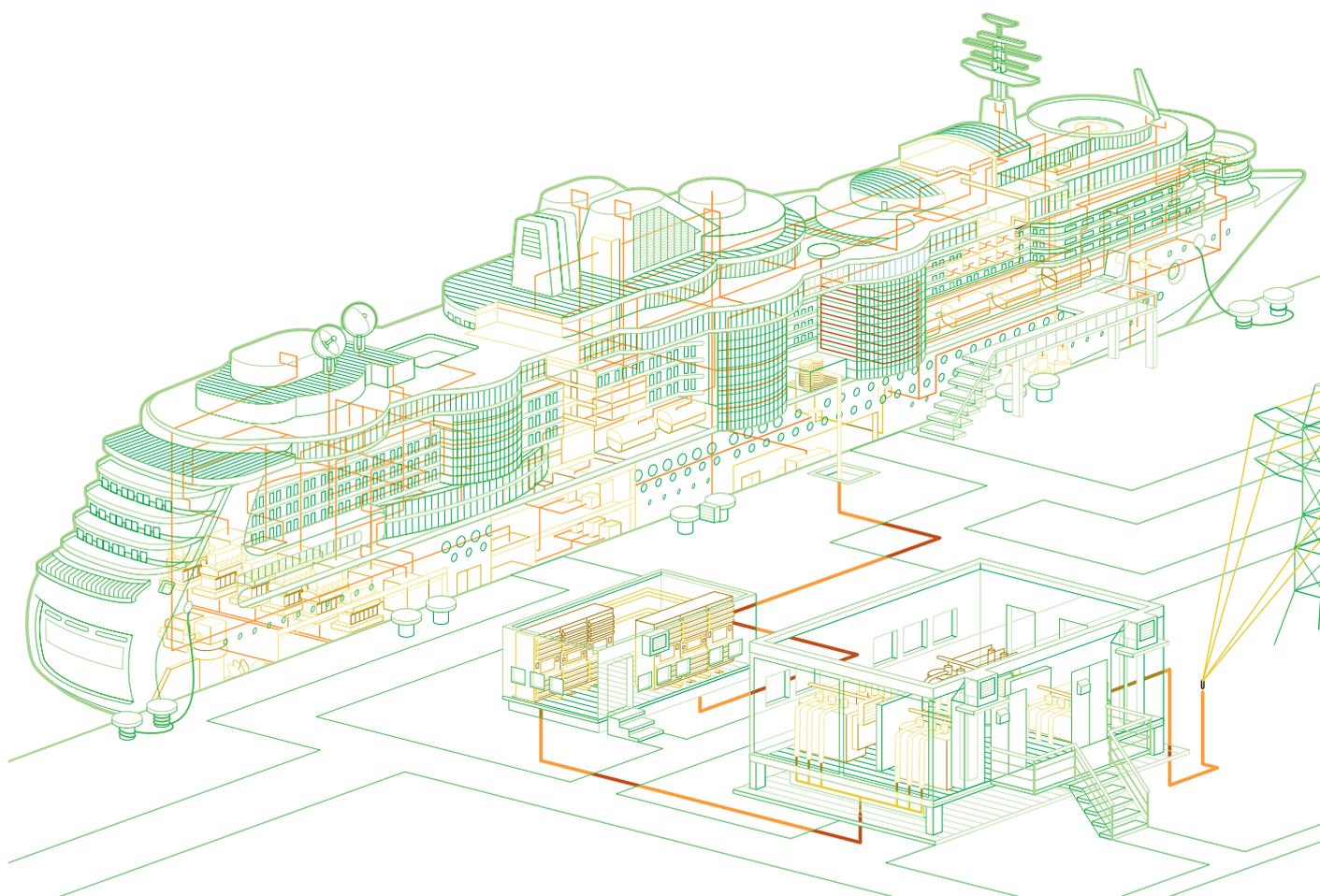


Shore-to-ship power solutions

Navigating towards greener ports



An increasing number of ports are choosing the quickest and most effective route to go green – by installing an ABB shore-to-ship power connection that enables vessels to shut down their diesel engines and use shoreside electricity while in port. This lowers noise pollution, reduces vibration and cuts CO₂ emissions by up to 98 percent.

ABB offers turnkey solutions for the entire chain, from receiving power from the local grid and adapting it to the vessel's requirements, to connecting shore power and integrating onboard systems. The solutions fit container terminals and city ports, and cover single and multiple frequency applications and berth arrangements. Comprehensive services ensure system optimization, and may include network studies to recommend ways to upgrade and strengthen the local grid and port network.

Benefits include:

- Enhanced environment for passengers, crew, dockworkers and local residents
- Minimized greenhouse gas emissions, noise and vibrations
- Reliable and high-quality power supply
- High operational and maintenance efficiency
- Proficient project management

Power and productivity
for a better world™



Selected references

Hoek van Holland, Rotterdam, Netherlands

ABB has installed one of the world's largest, fully integrated turnkey shore-to-ship power systems at the Stena Line ferry terminal. The system is capable of simultaneously powering several vessels while berthed.

- Design, supply, installation and commissioning of complete onshore electrical infrastructure within 12 months
- 6,25 MVA, PCS6000 static frequency converter
- Air-to-water heat exchanger (re-cooling)
- Input/output transformers and MV switchgear
- Substation automation package
- Cable management system

The S2SP system improves the environmental footprint of the port, by cutting fuel consumption and related emissions. ABB also modified the onboard electrical and automation systems of each two ROPAX* and RORO** vessels to receive shore-side power.

Dalian Container Terminal, China

State-of-the-art shore-to-ship power solution for strategic hub, with traffic of over 10 million TEUs*** in 2014 and ranked 14 by the World Shipping Council in terms of volume.

- 2 and 3 MVA, PCS100 static frequency converters
- Power transformers, 50 and 60 Hz MV switchgear
- Control and protection equipment
- Shore connection boxes****

Proven solution helps to meet State Grid of China Corporation's "Energy Substitution Program" targets, mitigating the environmental impact of berthed ships on ports and surrounds, while providing fast return on investment through revenues from electricity sold.

* ROPAX (roll-on/roll-off passenger)
** RORO (roll-on/roll-off)
*** TEU (twenty-foot equivalent units)
**** Supplied by Cavotec, ABB's partner for interface equipment

Ystad Hamn, Sweden

S2SP solution comprising five berths to simultaneously supply up to seven vessels with 50 or 60 Hz power at voltage levels adapted to each vessel's onboard system.

- 6,25 MVA, PCS6000 static frequency converter
- Air-to-water heat exchanger (re-cooling)
- Input/output transformers and MV switchgear
- Substation automation package
- Cable management system

Turnkey solution supporting Ystad Hamn's quest to become the region's greenest port.



Floating LNG storage facility, Delimara, Malta

S2SP solution supplying a floating liquefied natural gas (LNG) storage facility that feeds a new gas-fired combined-cycle power plant, helping to reduce environmental impacts.

- Two 1,500 kVA, PCS100 static frequency converters
- MV and LV switchgear
- Dry-type step-up and step-down transformers
- RTU-based local control system
- Equipment installed in four mobile containers

Flexible standard system, offering expandability to meet growing requirements.

Viktor Lenac shipyard, Rijeka, Croatia

Shore-to-ship power system replacing diesel generator sets. Paralleling of converters ensures better efficiency at partial load and full redundancy.

- Two 1,250 kVA, PCS100 static frequency converters
- MV and LV switchgear
- Isolation transformer
- AC500 PLC-based local control system
- Equipment housed in mobile container unit

The containerized solution improves the shipyard's power quality while reducing fuel consumption, operational and maintenance costs, as well as noise and greenhouse gas emissions.

Geoje Shipyard, South Korea

Shore-to-ship power static frequency converters (SFCs) enabling Samsung Heavy Industries to build, set-up and test the 50 Hz power network and onboard systems of ships, prior to installation of onboard diesel generators.

- Two 5 MVA PCS6000 static frequency converters including auxiliary supply
- Two external heat exchangers and cooling equipment
- Load-side transformers and switchgear
- Local controllers
- System and on-site engineering, testing, commissioning
- Training for operators and maintenance engineers

Apart from adapting the grid power frequency to that of the ships, the SFCs offer reactive power compensation and voltage control, helping to reduce energy costs while stabilizing the grid. In comparison to motor-generator sets, SFCs offer higher efficiency and reduced operating and maintenance costs while ensuring compliance with power quality specifications.



Shore-to-ship power solutions

Turnkey solutions

ABB offers fully engineered and integrated shore-to-ship power solutions ensuring reliable power supply from the public grid and port network to ships while in port. The systems comprise all power, control and protection equipment for the automatic and safe transfer of the ship's load from onboard generation to the shore-side power supply.

ABB's solutions encompass:

- Electrical infrastructure to fit all types of ports
- Connection and control solutions to ensure personnel safety and seamless power transfer
- Electrical infrastructure on ships – retrofits or new installations

Fully engineered and integrated systems

Onshore, ABB's modular solutions comprise the entire value chain from the incoming substation to the cable management system at the berth, and support staged implementation and investment. Compact indoor concepts concentrate all major components in buildings to minimize footprint and ensure smooth dockside operations.

The systems include state-of-the-art components such as switchgear, as well as transformers and frequency converters to match the grid power voltage and frequency to the ship's onboard power system. They also comprise cable management systems and connection boxes, allowing single or multiple vessels to be connected simultaneously.

Onboard, the ABB shore-to-ship power equipment is fully integrated with the ship's electrical and automation system, enabling seamless power transfer from onboard generation to shoreside power.

Static frequency converters

Static frequency converters (SFCs) match the frequency of the port network to those of the vessels.

ABB's highly efficient, low-maintenance SFCs provide a flexible solution for distributed one-to-one connections as well as centralized concepts serving multiple docks and ships. The compact converters can be installed in substation buildings or containers along with the switchgear and transformers for grid connection and voltage adaptation.

The portfolio includes low-voltage PCS100-type SFCs and medium-voltage ACS6000-type SFCs, ranging from 0.1 to 24 MVA.

A full range of services

ABB offers a comprehensive scope of services to ensure that the overall system is optimized both technically and economically. ABB also offers power system studies to assess the impacts of the shore-to-ship power solution on the local grid and recommend optimized solutions to upgrade and strengthen the local grid and port network.

By bringing ABB into the project from an early phase, design and implementation risks are minimized. As the project matures, ABB provides proficient project management as well as training courses at ABB's or customer's premises to optimize the utilization of all assets and investments.

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