Plug in to green power

ShoreBoX™
Shore connection for ships at berth
Your port makes your city

The majority of large port cities were established to provide vital access to the sea. Now, more than ever, ports are a driving force for economic development, international trade, and cultural exchange. However, ports are often perceived by the local community as a nuisance — especially in terms of pollution. Of particular concern is the pollution generated by ships at berth, which has become unacceptable to today's environmentally aware citizens.

Ships account for

- 90% of the world’s commercial goods transport*
- 2% of global CO₂ emissions**
- 15% of global nitrogen oxide (NOₓ) emissions**
- 6% of global sulphur oxide (SOₓ) emissions**

*www.unctad.org
**United Nations Statistics Division, Millennium Development Goals indicators
Do the ships in your port meet the new environmental regulations?

Global measures to cut ship emissions

International regulations

The IMO
The IMO (International Maritime Organization) acts on SO₂ and NOₓ emissions by:
- Drafting regulations such as the MARPOL 73/78 Convention.
- Marking out Emission Control Areas (ECAs) in conjunction with national governments, primarily in the Baltic and North Seas, as well as around the Atlantic and Pacific coasts.
- Making mandatory in 2013 the Energy Efficiency Design Index (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP) on CO₂ emissions for ships over 400 tons.

Local and federal regulations

The European Union
The EU acts by:
- Proposing environmental regulations, such as Directive 2005/33/EC, which restricts the sulphur content of marine fuel used by ships docked for more than two hours to no more than 0.1%.
- Adopting a Directive of Deployment of Alternative Fuels Infrastructures (DAFI) that establishes the implementation of Shore Connection in all ports by 2025 and makes the standard IEC/IEEE 80005 mandatory.
- Reducing taxes in electricity to vessels at berth as stated by the Directive 2003/96/EC.
- Implementing subsidised programs such as Marco Polo and Trans European Network Transport (TENT T) to co-finance shore connection projects.

China
As part of its five-year plan 2011-2015, the Chinese Ministry of Transport has addressed the pollution problem in ports and identified shore connection as a solution.

California, USA
The California Air Resources Board is a leading environmental body. Its decisions serve as a benchmark for the entire USA.

In California:
- Ships equipped with shore connection systems have been required to use them since January 1, 2010.
- In 2014, ships wishing to dock must have shore connection systems and 50% of the power they use will have to be electrical. This percentage will increase to 70% in 2017 and 80% in 2020.

Proactive organisations
Port associations such as the World Port Climate Initiatives (WPCI) or the International Network of Port Cities (AIVP) encourage members to go for further regulations. They promote technologies and best practices that are better for the environment, the community living around the port, and the port’s competitiveness. As a major green solution for ports, shore connection power supply is supported by several associations.

Ship emissions represent an ever-increasing environmental concern. Around the globe, strong measures are being taken on several fronts to dramatically cut the emissions of berthed ships and, hence, to improve the quality of life for the communities around the port.
Meet environmental regulations in the most profitable way

Today, berthed ships have two different ways to meet environmental regulations: they can either generate their own electricity using clean fuel, or they can connect to power sockets at the port. Research has shown that the latter is the most sustainable solution, in every way.

Reducing port fees

Created by WPCI, The Environmental Ship Index(2) (ESI) measures the quantities of NOx, SOx, PM and CO2 emissions from a ship and gives grades accordingly to assess ship environmental performance. As shore connection is a green technology, ships equipped with the solution receive a higher grade. To promote best practices, several ports are using ESI as a factor when calculating port fees. Greener ships can enjoy fees rebate up to 10%.

Cutting SOx, NOx and PM

One of the main benefits of shore connection systems stems from the fact that electricity generated on land by power plants has a smaller eco-footprint than that produced by ship engines.

Reducing CO2 emissions

The total CO2 emission reduction depends on how the electricity used is produced. In the European Union, the use of shore-side electricity rather than electricity generated by a ship using low-sulphur fuel will cut CO2 emissions by an average of 50% (3).

Elimination of noise and vibrations

The main cause of noise pollution in ports is the use of auxiliary diesel engines to generate electricity on ships. The noise can reach 120 dB near the engines and the associated vibrations are unpleasant for crew, passengers, and port personnel. However, all of this noise is eliminated by using a shore connection system.

Low-sulphur fuel prices on the rise

Global demand for fuel is set to rise significantly. The United States Energy Information Administration forecasts that demand for refined petroleum products will grow by 1.5% per year over the next five years. Current fuel prices make shore-side electricity a financially attractive option (4).

Lower maintenance costs

Motor maintenance costs (estimated at 1.6 €/h/motor) fall sharply when shore-side electricity is used as the main source of power. The annual average saving per ship is estimated at €9,600 (5).

New business

Ports installing shore connections at their berths would provide a new service to ships and so be rewarded. By selling electricity when ships plug in to their shore-connection installations, ports enjoy revenues which enable them to have a return on investment.

Did you know?

Studies conducted by the California Air Resources Board demonstrate that the electrical power supplied by a grid generates less pollution than that produced by a ship – and displays the best cost/efficiency/pollution profile.
Differentiate your port by providing efficient, green energy

Shore connection solutions from Schneider Electric include an EMCS (Energy Management and Control System) and an EMIS (Energy Management Information System) that allow you to track how you meet your environmental obligations all while you establish your port as a provider of clean energy to ships.

Monitor and control the performance of your new installations

The implementation of a shore connection solution in your port will require a new infrastructure, and new operations and processes will need to be put in place. To be able to monitor, control, and ensure best-in-class performance of your new installations, high-performing EMCS and EMIS systems are required.

Our EMCS and EMIS systems not only monitor, control, and ensure high performance of your installations, they also merge the collected data into your port’s operation management and control system and allow you to:

- Get visibility of your energy profile at terminal or port level (or multi-site level) and measure, monitor, and analyse your energy consumption down to load level
- Take energy-management decisions based on relevant, accurate, and reliable data
- Give ships best-in-class energy and services
- Predict your energy consumption
- Negotiate better contracts with utilities
- Sell negawatts* back to the grid
- Collect and report your environmental KPIs

Our EMCS and EMIS systems track and report all the data you need in real time, letting you manage your shore connection systems in an integrated way in relation to the rest of your port’s operations and processes.

Environmental performance indicators

Become an energy provider and supply ships with energy that is:

Safer for people and goods
- Real-time monitoring of your electrical network performance
- Fast reaction in the event of an incident

More reliable thanks to maximised uptime
- Good quality energy, preventing blackouts and maximising continuity of service
- Equipment monitoring, operation diagnostics, and maintenance

More productive through integrated energy management
- Monitor operations efficiency, equipment usage, capacity, and availability
- Manage energy supply services contracts with ships and collect elements to invoice

Greener
- Document how you contribute to the reduction of your port’s carbon footprint all while proving compliance with environmental regulations

* A negawatt is an unused electrical watt that is saved due to energy-efficient electricity usage.

Create a preference for your port, all while you minimise your operational costs and carbon footprint.

Have a green port operation, and show it!

Become an energy provider and create new business for your port!

Offer ships:
- Clean energy
- Safer and more reliable power supply
- Controlled energy costs

Monitor and control the performance of your new installations

More efficient due to minimised operational costs
- Measure and predict your energy consumption
- Strengthen negotiations with utility
- Maximise your infrastructure usage

More productive through integrated energy management
- Monitor operations efficiency, equipment usage, capacity, and availability
- Manage energy supply services contracts with ships and collect elements to invoice

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Become an energy provider and create new business for your port! Have a green port operation, and show it!
Plug your port in to the Smart Grid

Build intelligent infrastructure in your port with Schneider Electric

Around the globe, cities are evolving to become more sustainable and environmentally-friendly with the aim to increase the quality of life of their inhabitants, all while minimising their carbon footprint. As part of these new Smart Cities, ports need to be integrated.

Our shore connection solution will help your port achieve just that. We provide you with a comprehensive shore connection solution and all complementary services around it. As your one-stop partner we provide you with a complete turnkey solution and make sure that any technical, financial, and time-related constraints are met.

Onshore or onboard, we undertake the whole project including dimensioning and design, execution, and post-sales services. From the initial audit that evaluates potential additional power needs, to the start-up and proper function testing and beyond - including operator’s training, installation and maintenance services – we are behind you all the way.

- Maximised continuity of service with proven solutions
- Reduced operational costs onshore and onboard
- Flexible solutions
- Global solutions that can be used everywhere

Our flexible shore connection solutions can be installed at any port and adapted to any berth topology and power need.

Energy management system
ShoreBoX solution
Solution integration into a building
Onboard installation

Build intelligent infrastructure in your port with Schneider Electric
**Turnkey solutions for ports and ships**

We offer you a complete distribution and energy management solution designed to meet the specific requirements of your ports and ships. Our systems can supply a vessel with up to 20 MVA of power.

- **Tested**
  All possible configurations have been tested and results-approved by independent, certified labs.

- **Validated**
  All solutions have been platform-tested. The lifecycle management of each component is documented.

- **Documented**
  In addition to a strong support, our customers receive a full set of documents and training programs to achieve all the benefits from the solution.

**Comprehensive solution including the ship’s onboard installations**

With more than 90 years’ experience in the marine and offshore industry, Schneider Electric has developed an unparalleled expertise in onshore and onboard electrical systems and is capable of providing, executing, and supporting both the onshore and onboard shore connection systems.

With our global marine services we are never far away, and you can always count on maintenance and service of your electrical installations - no matter where your ship is.

All components of the onboard shore connection system are standard and consistent with other Schneider Electric solutions. As they are manufactured in several sites around the world, spare parts will be locally available.

Our onboard solutions are certified and approved by classification societies such as ABS, BV, DNV, CCS.
ShoreBoX range: Integrated solutions to maximise available berth space

Fully packaged in a single box, the ShoreBoX solution has been designed with utmost concern for space and cost optimisation, and provides the highest level of safety, efficiency, and reliability, all while providing best-in-class performance.

Innovative and Efficient
• Best-in-class energy quality and efficiency with GFC (Grid Frequency Conversion) technology. Its disposition within the ShoreBoX consume just the energy needed at any given moment and no more.

Safer and more reliable
• Proven components and systems
• Tested, Validated, Documented architectures
• Compliant with IEC 80005 international standard

Scalable and movable
• Can be relocated when there’s a change in berth configuration
• Different Compact ShoreBoX units can be installed in parallel for further power extension

Simple plug-and-play solutions
• Packaged solutions
• Easy to install
• Easy to maintain

Cost effective
• Standard components
• Optimised footprint
• Minimal commissioning

Power extension through parallel installation:

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Maximised performance and enhanced availability through fully standardised components
Make the most of your installation with our comprehensive services

No matter where your port is located, no matter where your ship is heading, Schneider Electric is never far away with the support you need. With the marine market leader as your partner, you benefit not only from a global presence, but also from our wide range of locally-managed support and services.

Our comprehensive range of services are supported by highly trained and skilled teams that have the experience and dedication required to keep your installations up and running.

**Installation and commissioning**

Installation and commissioning are simplified in the standard offer thanks to the Tested, Validated, Documented architectures (TVD).

These services include:
- Unpacking
- Installation and commissioning
- Power cabling
- Remote monitoring system (RMS) cabling
- Pre startup
- Startup and settings
- Proper operation testing
- Operation training

**Dedicated services to GFC and cooling units**

**Standalone preventive maintenance**

Comprehensive inspection to ensure that components are performing to defined technical and environmental specifications. This service includes all labour and travel expenses with a 7 X 24 scheduling upgrade option, including weekends and holidays, and is available as a stand-alone service or in conjunction with any service agreement.

**Save headaches, time, and money with our Advantage Plans maintenance services**

Our GFC and cooling units maintenance contracts will provide maximised continuity of service and the most efficient operation of your installations. Our contracts are divided into three levels to meet your exact needs.

**Site audits to make sure the installation is possible**

- Installations providing onshore power to ships will have a significant impact on the local electricity supply and, in many cases, the electrical distribution network around the port will need to be strengthened.
- We offer a comprehensive analysis of the system to examine the effects on the local distribution network before installing the shore connection solution.

**Best-in-class project execution for peace of mind**

We offer you complete turnkey projects including:
- Project analysis and management during the design phase
- Project execution in line with your budget, investment, and schedule constraints

**Best-in-class energy efficiency through patented technology**

The Grid Frequency Conversion (GFC) technology, patented by Schneider Electric, is a key element in the shore connection solution.

Grid frequency converters installed in series maximise the solution’s flexibility, and are at the heart of its energy efficiency and energy cost savings.

**Installation upgrades for maximised uptime**

Maximise uptime of your installation through services such as:
- Software upgrades
- Retrofit of obsolete products
- Spare part availability

**Energy management services: proven steps to cut energy costs**

Our experts are available to offer you:
- Energy consumption data monitoring, collection and analysis
- Identification of ways to improve energy usage, leading to cost savings and reduced environmental footprint

With Schneider Electric you have a one-stop partner behind you all the way!
Select the best shore connection solution for your port

More than 100 shore connection solutions have already been installed in a number of ports across the world.

- What is the voltage specifications of your port’s power supply?
- What are your total power requirements?
- Do you need a frequency conversion system?
- How do you plan to manage the power of your installation?
- What type of vessels come into your port?
- How many docks or terminals do you want to equip?
- Do you need to track consumption at each terminal?
- How much space do you have?

The answers to these questions will help you select your installation’s architecture and the most effective method for managing the power supplied to ships.

USA’s largest container port has chosen Schneider Electric

The California-based port is the 3rd largest in the world

- Improved energy visibility, traceability, and accuracy
- Real-time monitoring and control
- Full integration with port information system
- Reduced emissions

Needs
- Succeed as the first US shore connection site
- Comply with strict Californian regulations
- Be the US reference port
- Ensure energy management through an energy management information system

Our solution
- Green: 95% per vessel call reduction of hotelling emissions of DPM, NOx and SOx
- Compliant: meeting Shore Power System and UL standards
- Open: committed to providing shore power infrastructure to all container, cruise, and liquid bulk terminals

WPCI survey Feb. 2010 (55 major ports)

85% of the ports who participated in the survey responded “yes” or “maybe” to the question: “Does your port plan to introduce or expand shore connection systems in the next five to ten years?”
We help ports and ships increase efficiency everywhere

Shanghai, China / Waigaoqiao shipbuilding

Needs
• Ensure secured supply for vessels in a shipyard
• Provide a high-frequency conversion quality
• Be a reference in China

Our solution
• Modular: complete integration of products in container
• Efficient: high-technology grid frequency converter
• OpEx optimised: cost-effective solution compared to fuel

Results
• Secured energy
• Shipyard can focus on its core activities
• High-performance conversion technology
• Reduced OpEx costs due to long-term berthing (large quantities of fuel)

Shore connection supplies power to naval ships

Naval base - FREMM Frigates

Needs
• Customer needs assure a complete and compact solution to supply power to FREMM Frigates (frequency & voltage adaptation), while mooring at the port.
• In order to ensure full electrical supply compatibility with the multi-mission FREMM class ships the solution needed to be:
  • Simple to implement
  • Have a short delivery time
  • Be upgradable to 2 MVA
  • Be movable to an alternate location

Our solution
• Customer-based assistance of Schneider Electric to deliver its ShoreBoX differentiating values: An all-in-one, movable system, short lead times and expertise in energy management.
• 2 ShoreBoXes delivered to customer as a working and tested solution. Each equipped with grid frequency conversion, fire detection systems, power management systems (local LV/MV protection & control), IT Room Management (Cooling control)

Results
• ShoreBoX turnkey solution was installed for two harbor installations, each of 1.5 MVA, with a lead-time of 6 months. The short delivery time is possible thanks to our local presence and to the design of the ShoreBoX.
• Complete ShoreBoX, shore power connection system built with Schneider Electric standard components, integrated and tested at our facilities.
We have helped cut power costs by 50%

Gothenburg port, Sweden / Stena Line ferries

**Needs**
- Equip ships to be able to connect to the existing low voltage shore-to-ship power systems in Gothenburg port ferry terminals
- On board installation with minimum footprint to optimize available space
- Reduce ships' energy costs while at berth, moving from electricity produced onboard, to grid supply

**Our solution**
- Onboard installation for 5 ships, installed and commissioned by Marine Global Group

**Results**
- Minimised footprint onboard
- 50% energy cost reduction on ships while at berth (1)

"Stena Line estimates that thanks to the shore connection solution they have cut their power bill by 50% compared to power produced onboard by ship engines."

Carl Dahlberg, account manager of Marine Global

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ShoreBox helps building green port cities around the world

Bergen, Norway

**Needs**
- Prevent increase of emissions due to steady augmentation of maritime traffic within the North Sea area.
- Comply with established limits of SOx emissions (less than 0.10%) within the Emission Control Area (ECA), or special areas of prevention of air pollution by ships defined by MARPOL 6 from January 2015.

**Our solution**
- Industrialized solution: Integrated and tested in factory and directly shipped to port
- Plug and Play: Minimum onsite civil work. Fully automated ship connection procedure
- Adaptable: Moveable for berth configuration evolution. Right-sized to ship power demand

**Results**
- Ships compliant with ECA requirements at berth
- More attractive green operations zone: respectful of environmental standards and improved working conditions at the port
- Improved energy management; higher accuracy of measures of energy consumed
- Active support to economic growth and social concerns of the city of Bergen

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(1) Supported by the tax incentive programme in place in Sweden