Four pillars of port sustainability

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In today's port arena, authorities and planners are tasked with ensuring ports investments and operations are durable and fit to future challenges. The need to combine efficient, lucrative operations with a productive and sustainable future is one of the major demands terminal planners are facing.

The success of contemporary port operations relies on four essential pillars: environmental development, compliance to international standards, energy management, and the ability to readapt to rising trade flows. A solution for ports that builds on these pillars is ship-to-shore connection technology. It enables ports to become innovative and ecologically viable managers of energy.

Shipping trade will continue to increase in the framework of global strategies (such as Blue Growth by the European Commission (EU), Green Freight and Logistics in Asia by the Asian Development Bank (ADB), and Green Marine in the US) which seek to increasingly shift land and air freight towards sea following specific actions for sustainable development.

Developments in port design and port operations, especially in shore connection, rely on following the four pillars of port sustainability which are exemplified in this article through the example of the Port of Bergen.

Environmental development

Ports must collaborate to find novel ways to reduce emissions and noise within their areas of operation; innovative energy management is vital in an industry of large polluters and consumers of energy within cities, so the industry must act collectively now.

An ever-increasing number of port authorities around the world are planning to take up this challenge by implementing key infrastructure developments such as shore connection at their ports in order to promote the optimisation of mobility by reducing the emissions generated in the area completely.

Environmental regulations

Regulations have been drawn up by international organisations and pioneering countries, and today, numerous international strategists regard the shipping industry's continuous growth as problematic. As a result, revisions are made regularly in order to enforce tighter emission limits.

On January 1, 2015, the IMO's latest limits on the sulphur content of fuel used by vessels operating in Emission Control Areas (ECAs) came into effect. Under the latest phase of the sulphur directive, the maximum amount of sulphur in fuel permitted in ECAs has been lowered from 1.5% to 0.1%. A big step forward has also been made this year in Europe with a new directive established concerning the deployment of alternative fuel infrastructures. Under this directive, it will be mandatory for European ports to implement shore connection systems by 2025.

To help boost the development of green technologies, European institutions have also voted in favour of appropriate funding programs. Under the TEN-T program, ports willing to invest in shore connection can benefit from up to 20% EU funding. Also, the funding rate goes up to 50% for studies, and a funding call has been open since September 2014 and will close by the end of February 2015. This is the right time for ports to invest in shore connection.

Port of Bergen

Bergen, as one of the most important port cities in Norway, has already put into action the first phase of implementation of shore-side power for Offshore Supply Vessels. ShoreBoXTM by Schneider Electric is the solution that has been chosen for this project, which cuts emissions produced by vessels at berth to 0%. This measure allows ships at Bergen to be fully compliant with environmental regulations at berth. This first pilot project for LV Shore Connection could be duplicated in other OSV ports in Norway and Scotland. It's a new market that is moving towards green technologies.

Complying to international standards

The rapid growth of shore connection applications at international level has led standardisation organisations to develop global referenced processes. Already published standards concern high and medium voltage power supplies for vessels. These standards specify general requirements on shore side installations, ship-to-shore connection and interface equipment, ship requirements, system control and monitoring as well as testing of the installation. They include requirements for various types of vessels such as RoRo vessels, cruise ships, container vessels, LNG carriers and tankers.

During recent years a strong demand has risen for a standard solution that comprehends low voltage vessels in order to allow interoperability from different vessels and ports. Therefore, a low voltage shore connection system (LVSC) is under development to meet this new standard. In order to permit the development of the first low voltage shore connection installation, a Public Available Specification (PAS) of this new standard was released in August 2014.

Preparing for the future

Design guidelines address specifications for the electrical and mechanical interfaces, power ranges and safety of shore connection. For the developing standard, the PAS deals with LV shore and ship distribution systems, control, monitoring, interlocking and power management systems, ship-to-shore connection and interface equipment, test and operational sequences.

These guidelines should be taken into account by engineering companies, ports and ship owners in the design and installation of shore connection systems in order to be prepared for the forthcoming enforcement of this standard at the end of 2016. In its effort for a green development, the Port of Bergen in Norway will be the first port in which offshore supply vessels will comply with this new standard.

Adapting to increasing trade flows

Whereas at one time terminals were designed with minimal above-ground infrastructure to provide the flexibility to adapt with a mode of operation, modern ports are predicated on automated equipment with inherently fixed infrastructure. This calls for a great amount of research to be developed to offer smart infrastructure solutions as port traffic increases.

Schneider Electric's engineering expertise makes it possible to serve single and multiple berth arrangements and it is adaptable for any berth topology, frequency and power conversion. An example of this adaptation to future port needs could take place at the Port of Bergen, which is set to undergo a first phase of implementation of shore connection for Offshore Supply Vessels. This could be adaptable to serve higher needs of power and be customised to local electrical distribution.

Smart energy management

The large logistical and industrial facilities of ports offer the potential to increase energy efficiency. Managing and optimising the use of energy today is a crucial element in building smart port infrastructure. A shore connection installation allows ports to optimise their energy consumption, and facilitates additional sources of income for the port as well as savings for the vessels. The Port of Bergen would firmly improve its energy management with a shore connection facility as it could have the energy information available at hand to optimise and identify the critical points of their energy consumption. Furthermore, they would generate additional sources of income through the selling of electricity to berthing vessels.

In the future, ships connected to shore power will benefit from the technology of digital communication, which drastically simplifies daily operations and allows for better control on both ship and shore side. Therefore, electrical connection becomes easier to handle and requires less man power to operate and reduces the risks associated with unexpected events.

About the organisation

Schneider Electric is the global specialist in energy management, proving expertise in smartgrid development, turnkey solutions, and end-to-end services that can help you establish a best-in-class, green port operation.

With its Shore Connection solution ShoreBoXTM, Schneider Electric enables ports and terminal operators to meet environmental regulations in the most efficient way, all while they optimise their costs with a full range of support.

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