



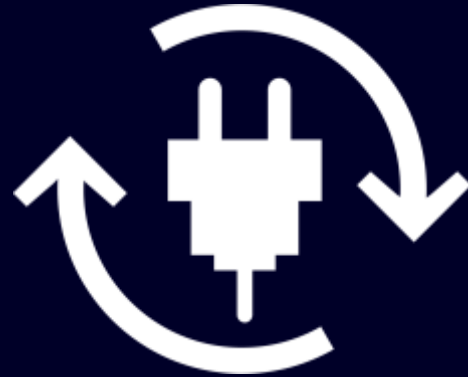
SIHARBOR: the shore connection system for berthed ships

Shore-side power supply for eco-friendly ports

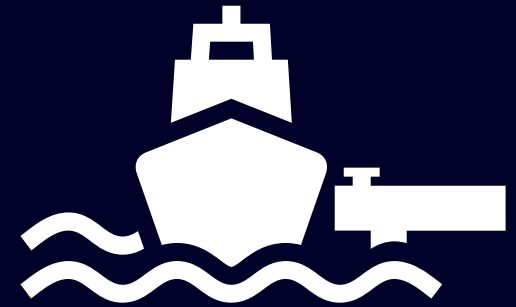
Reliable power supply that complies with ever stricter environmental regulations



Climate protection



Reliable power supply

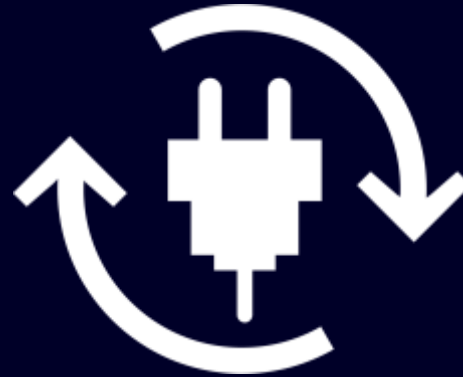


Emission-free berthing

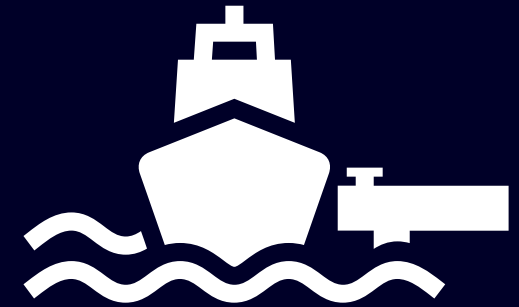
Reliable power supply that complies with ever stricter environmental regulations



Climate protection

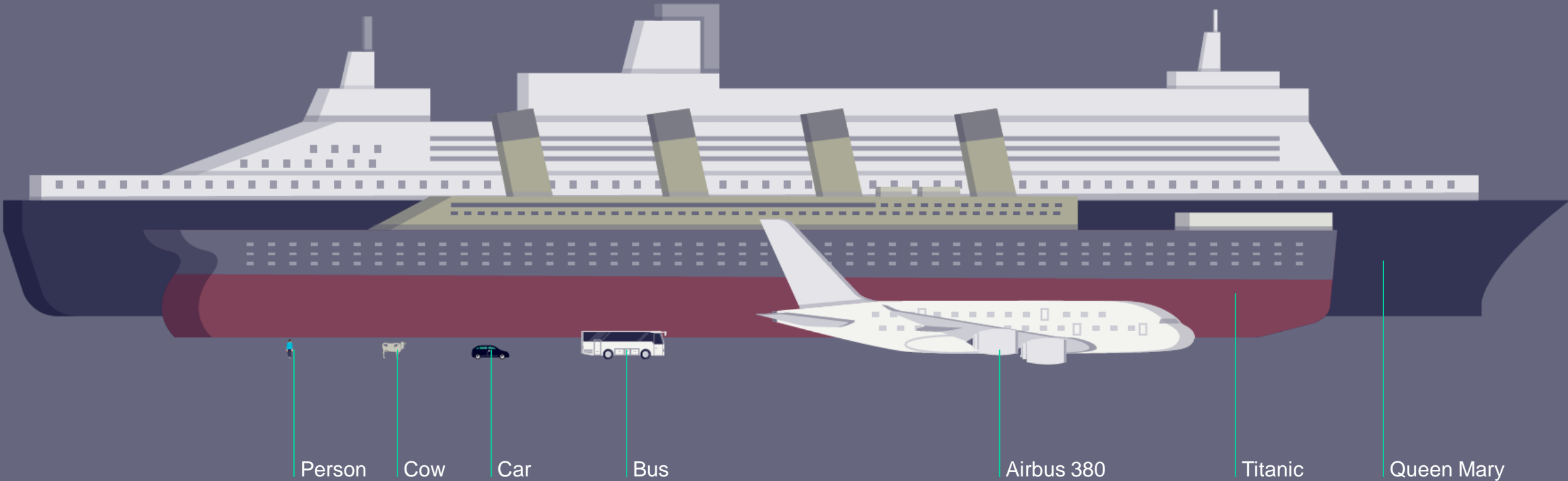


Reliable power supply

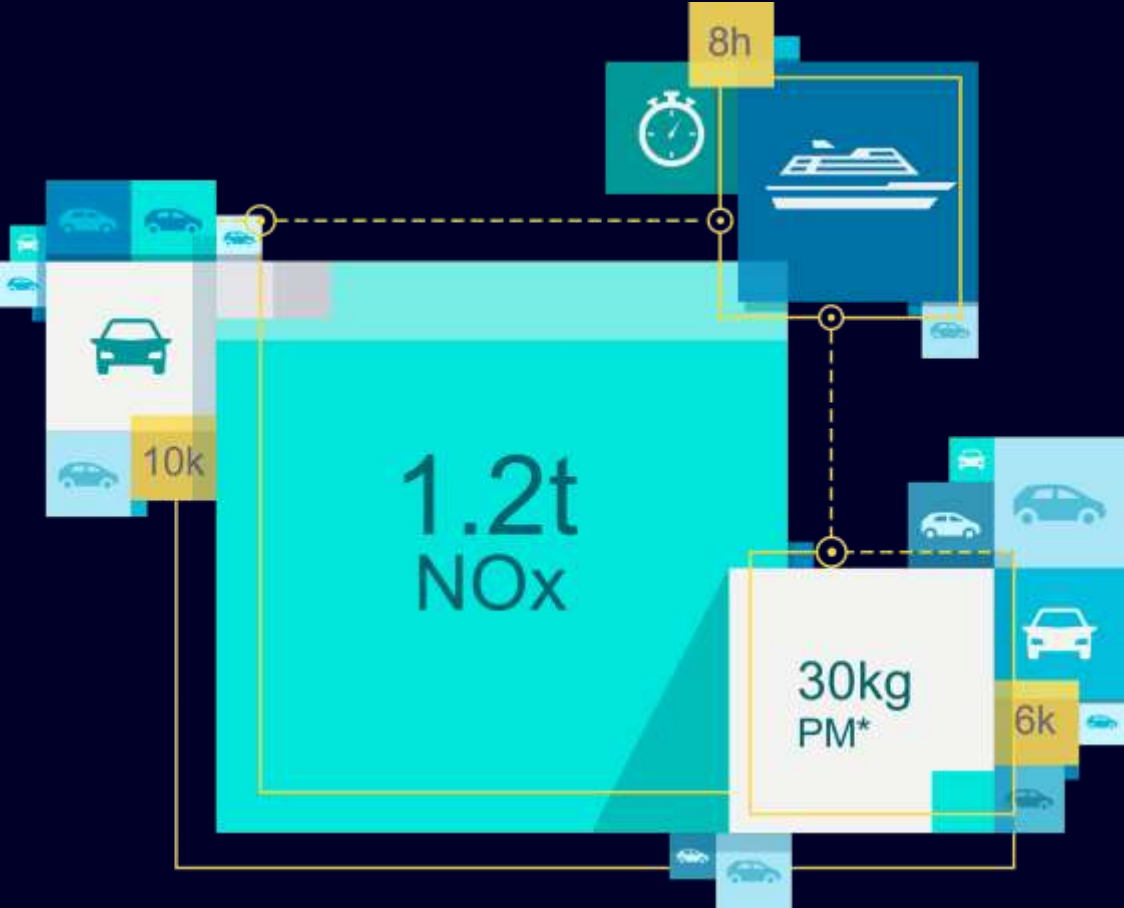


Emission-free berthing

Great challenges require great solutions



Cruise ships in harbors: an environmental challenge



In the 8 hours that a cruise ship is berthed at harbor, it emits as much **NOx** as 10,000 cars do over the same time – and emits as much **PM (particulate matter)** as 6,000 cars traveling a distance of 1,000 km.

Shipping-related environmental pollution in harbors



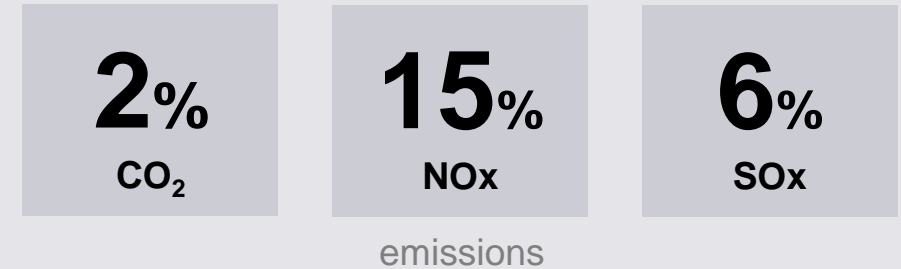
The situation

- Shipping traffic is continuously rising – as is the number of ships docking at ports.
- Activities on board a berthed ship require power.

The problem

- On-board diesel generators are permanently in operation while docked.
- Fuel combustion causes environmental pollution and poses real health risks to residents in the port area.

Global pollution by ships:



The solution

Power from the plug and socket for a sustainable environment in port areas – a solution that **will pay for itself the more often it is utilized** by berthed vessels.

SIHARBOR: meeting the needs of a wide range of stakeholders



Differing regulations worldwide



"Go green" is not only a global trend in shipping, but is also required by the IMO. There are also corresponding national regulations all over the world, but they often differ from country to country.

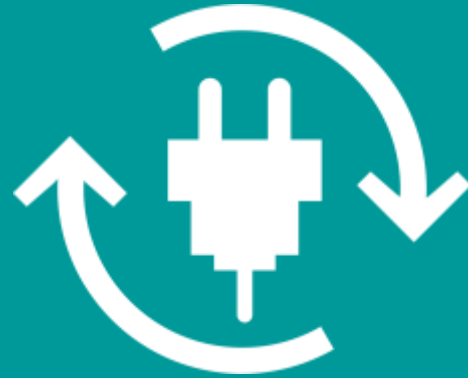


- **Government subsidies**
- **Tax reductions**
- **Electricity tariff adjustments**
- **Bonus programs for "green" ships**
(reductions in berthing tariffs)

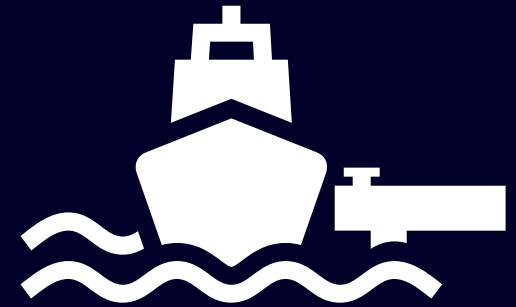
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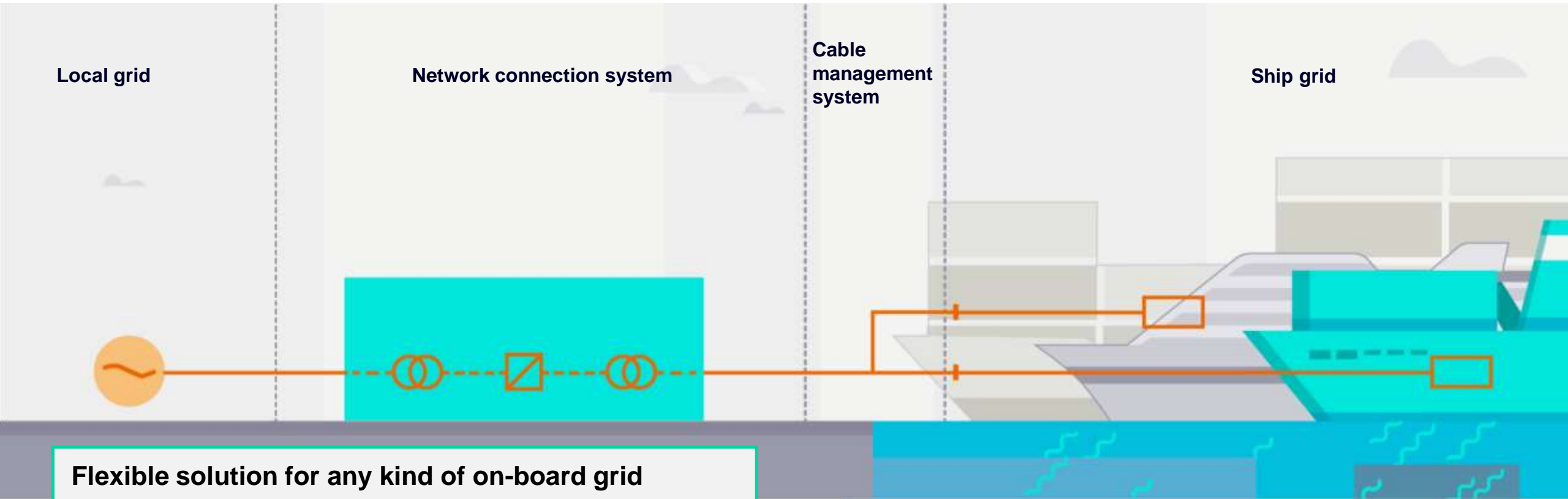


Reliable power supply



Emission-free berthing

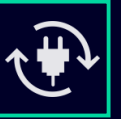
SIHARBOR – system description with frequency conversion



**Flexible solution for any kind of on-board grid
(4 of 5 vessels operate with 60 Hz)**

**Conforms to the international standards
IEC/ISO/IEEE 80005 and IEC 62613-2**

Perfectly matched components for a reliable power supply



For all voltages and frequencies

- Adaptation to all performance classes, voltages, and frequencies
- Galvanic isolation via isolating transformer

Power converter system

- Connects two or more medium-voltage AC grids of different voltage, phase sequence, and frequency
- For any required transfer voltage
- Appropriate layout for each kind of electrical grid

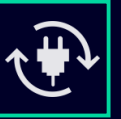
Compact and highly efficient power supply solution, including:

- Frequency converter
- Control and HMI
- MV switchgear
- Can be integrated in an E-house or existing electrical building



**Efficient solutions
for ports and ships**

Siemens contributes to the international standardization process



High voltage shore connection

International Standard

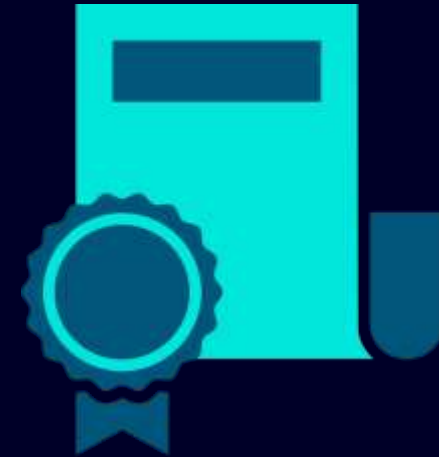
IEC/ISO/IEEE 80005-1



Low voltage shore connection

Communication shore - ship

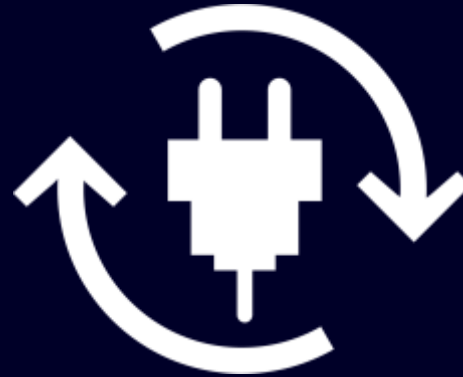
Plugs and sockets



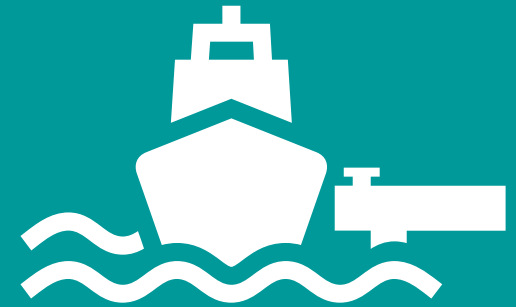
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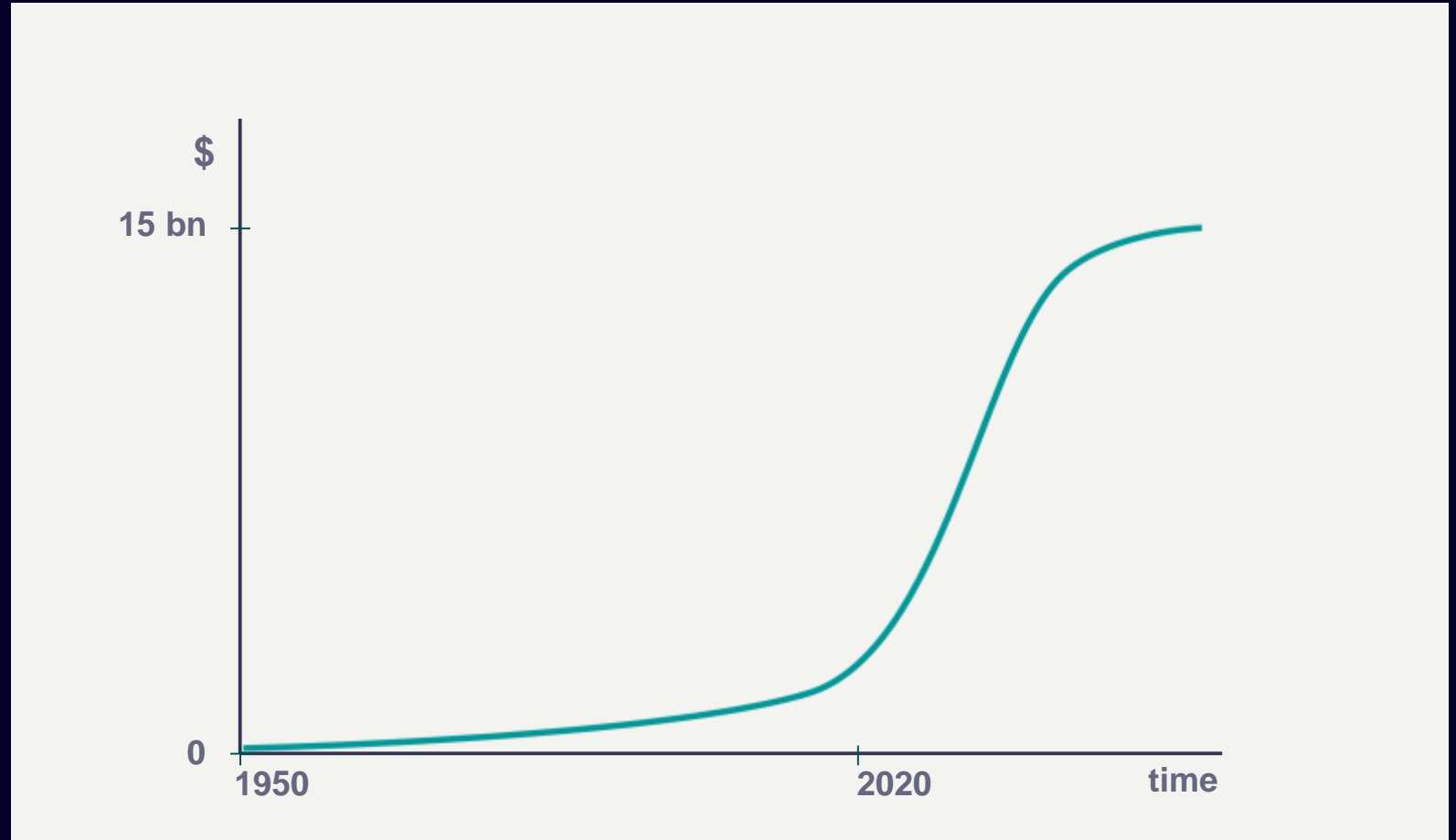


Emission-free berthing

Distinct market dynamics



- Environmental and economical awareness
- Upcoming legislation and regulation
- Local funding programs
- Technological maturity
- Port expansion projects
- Newly built vessels are already equipped



Source: T&D Europe

Versatile application for a large variety of ships



0-3
MVA

3-10
MVA

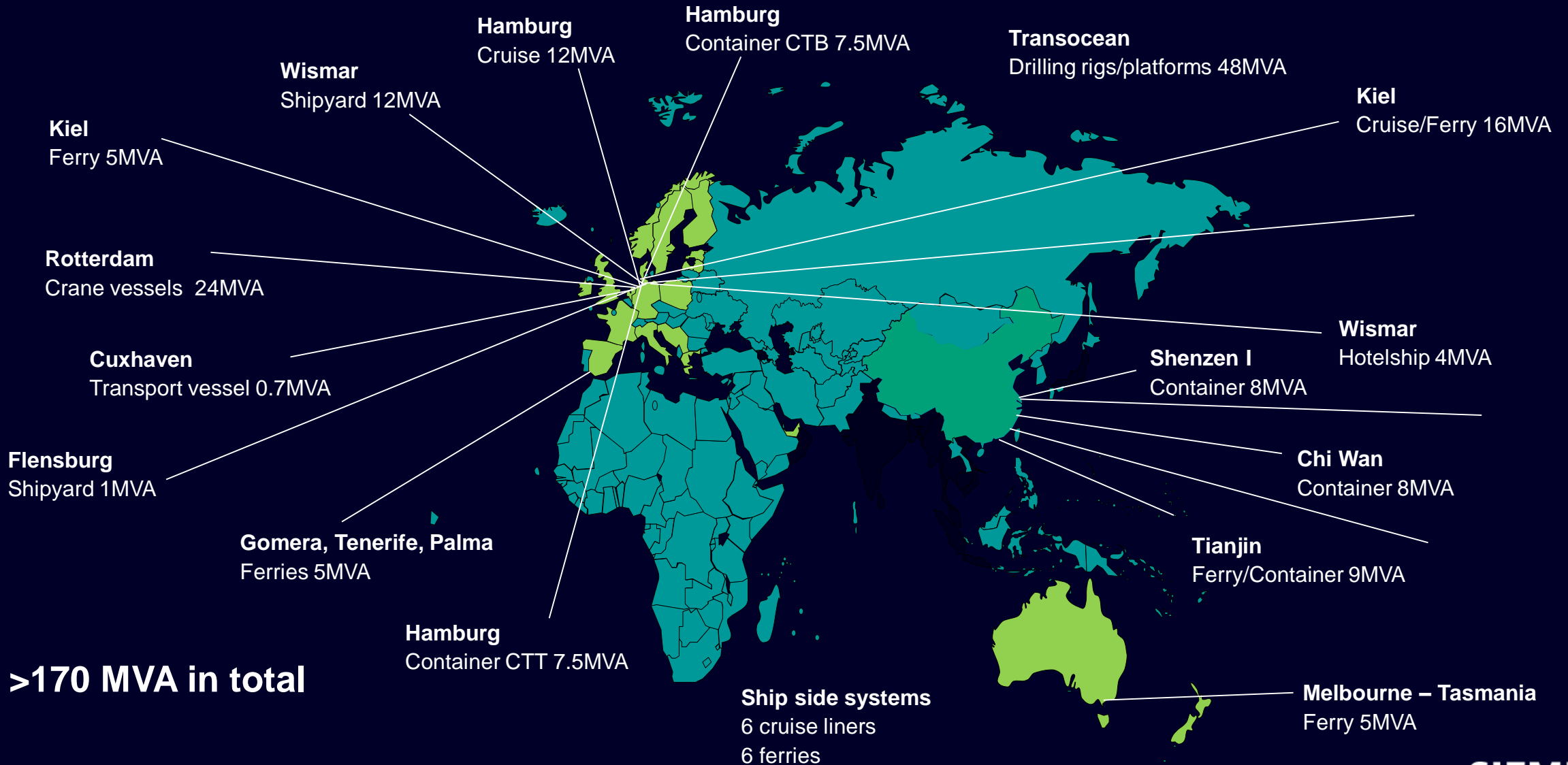
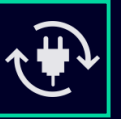
3-7.5
MVA

10-16
MVA

>16
MVA



References



State-of-the-art solutions from the technology leader



A pioneering spirit, innovative strength, and years of experience make Siemens the ideal technology partner for all aspects of onshore power supply. This combination is the basis for pioneering solutions that make a decisive contribution to greener harbors.

Best-fit technical solutions for specific application requirements

Optimized solutions ensure best lifecycle revenue and cost saving opportunities



Financing support

System dimensioning through the use of innovative calculation and simulation tools

Technical performance guarantee and after-sale support

SIHARBOR – a smart Investment for the future



From an economic point of view, SIHARBOR also brings clear benefits. In this context, success depends on various – not only economic – factors

- The longer the average plant runtime per annum...
- The higher the achievable price for 1 kWh sold to ship...
- The higher the subsidies...
- Regulation
- Political pressure (local/regional/national)

...
the faster
the ROI

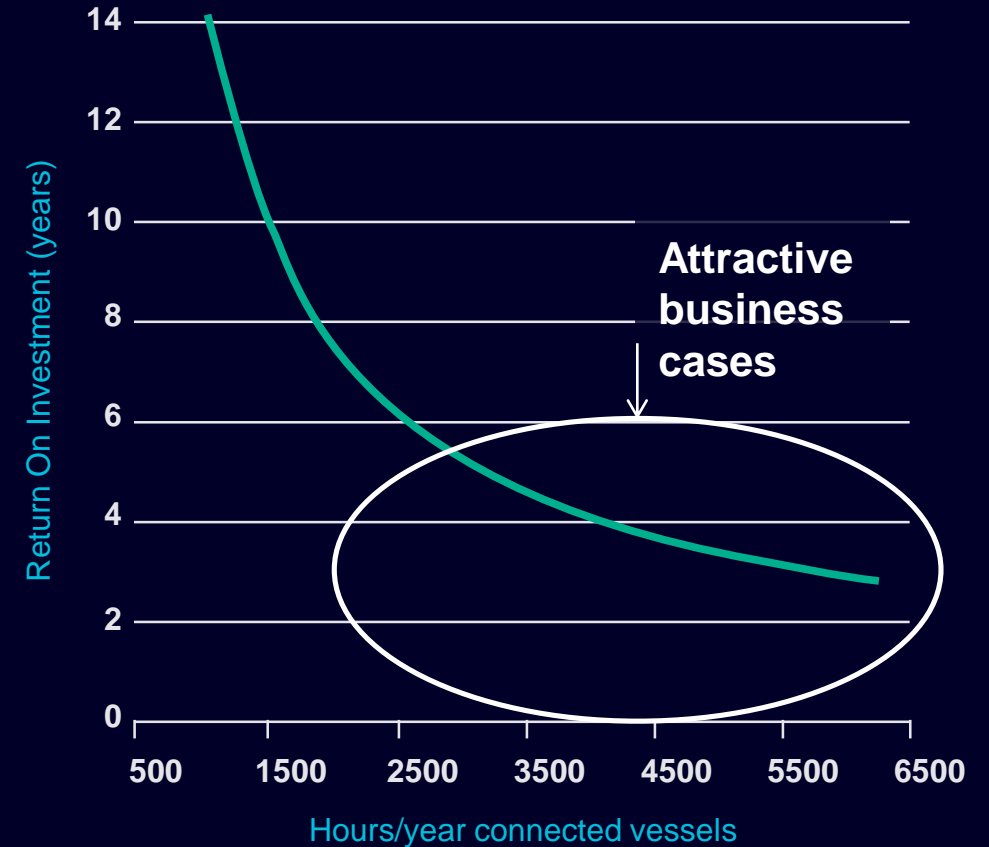


Chart calculated with €6Ct/kWh
(Avg Vessel Power Gen of €8Ct/kWh)

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