



PORT&SHIPPINGTECH
V edizione

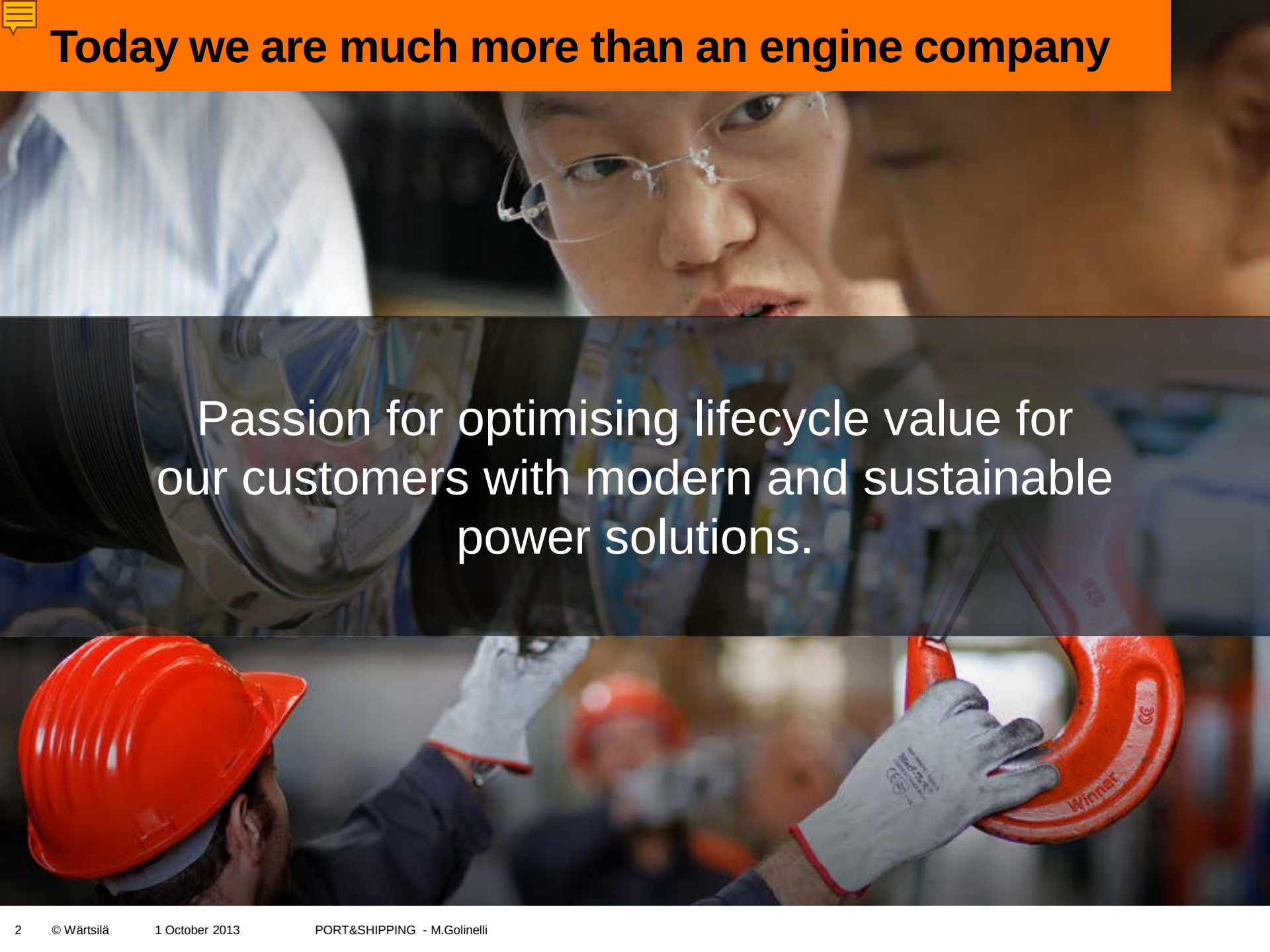
GAS NATURALE LIQUEFATTO: IL FUTURO E' ADESSO

Dr. Marco A.G. Golinelli – Wärtsilä Italia S.p.A
vicepresidente, power plants





Today we are much more than an engine company



Passion for optimising lifecycle value for
our customers with modern and sustainable
power solutions.



Our Mission



We provide lifecycle power solutions to enhance the business of our customers, while creating better technologies that benefit both the customers and the environment.

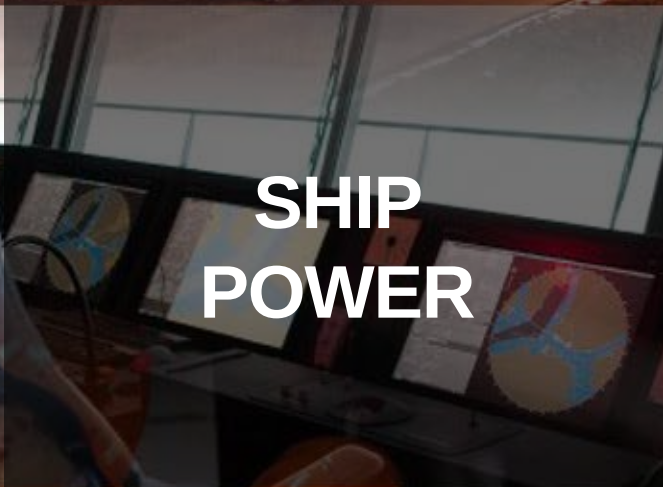
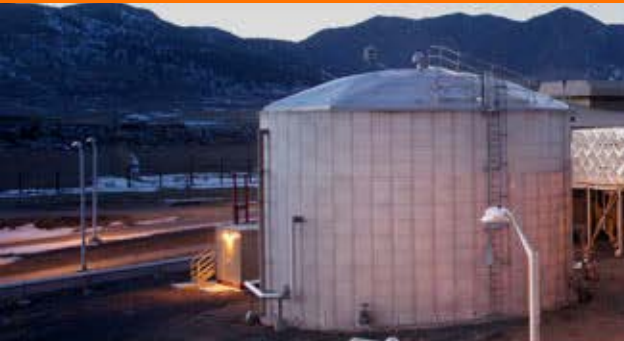


Our personnel

Nearly 19,000 professionals,
114 nationalities in 70 countries,
present in 160 locations



Our business areas



**POWER
PLANTS**

**SHIP
POWER**

SERVICES



This is what we bring to the market



EFFICIENCY

**ENVIRONMENTAL
SOLUTIONS**

**FUEL
FLEXIBILITY**





IL FUTURO E' ADESSO

Global Scenarios of Electricity production and use



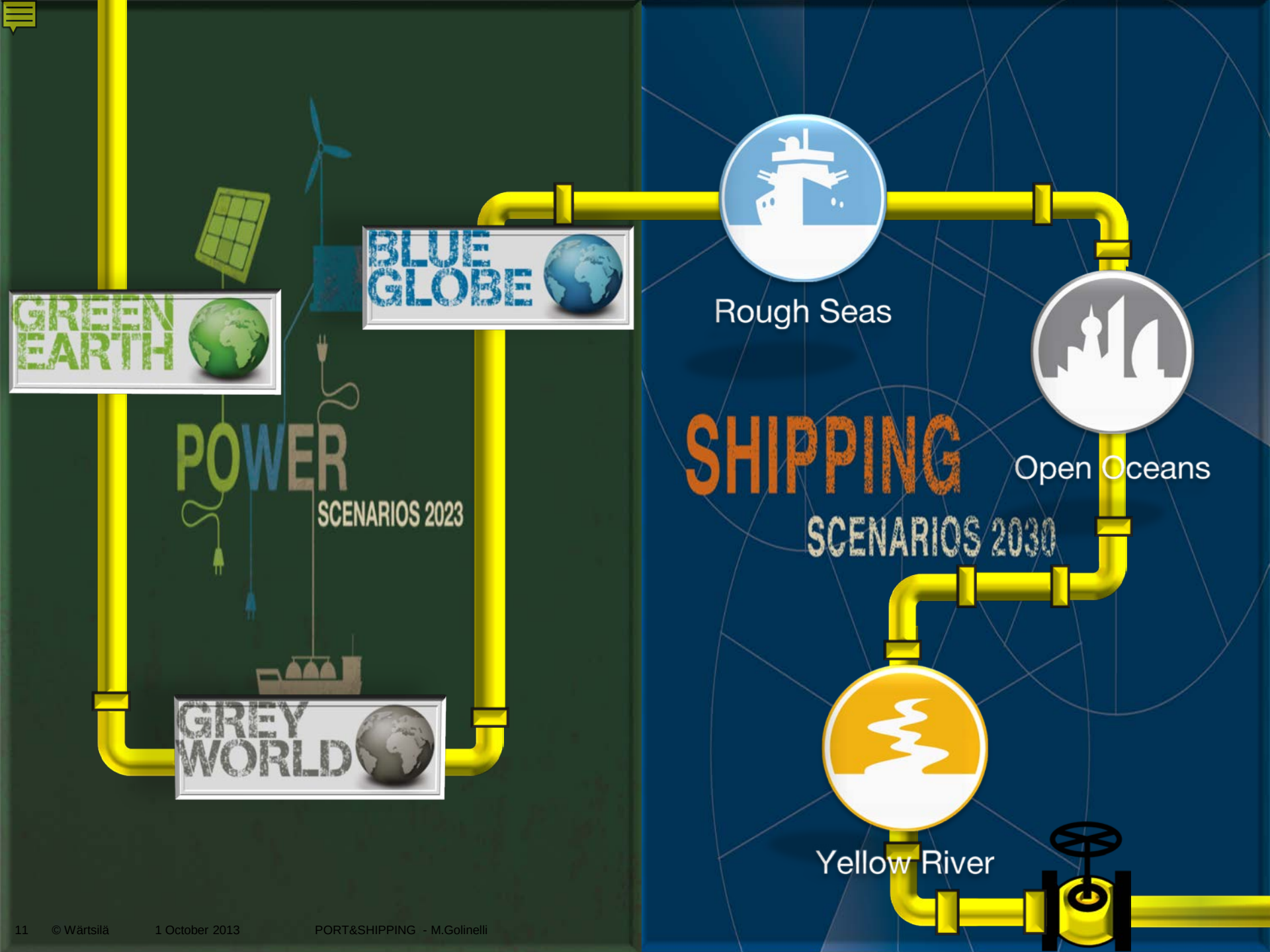


Global Scenarios of Shipping in 2030



SHIPPING SCENARIOS 2030





GREEN
EARTH



BLUE
GLOBE



POWER

SCENARIOS 2023

GREY
WORLD



Rough Seas



Open Oceans

SHIPPING

SCENARIOS 2030



Yellow River





Energy Market trends and drivers

- GDP growth, electrification and increasing standard of living drive the growth of electricity demand
- Demand for sustainability and focus on climate change
- Rapid growth of intermittent renewable generation
- Escalating daily, weekly and seasonal demand fluctuation increases the need for flexibility
- Increasing role of gas, especially as a balancing fuel
- Ageing installed capacity drives investments in new technologies

”

The world needs affordable, clean, flexible and reliable power.





Shipping Market trends and drivers

- Development of the global economy drives marine trade and transportation growth
- Development of oil & gas prices stimulates investments in exploration and production of offshore oil & gas
- Environmental regulations drive demand for environmental solutions and gas as a marine fuel
- Increasing focus on energy efficiency and environmental performance

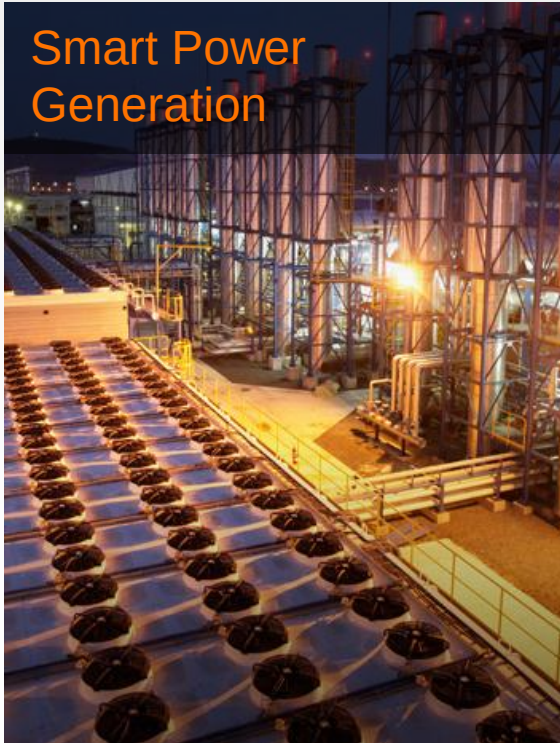
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The development of efficient vessels, environmental solutions and gas technology will be our priority in meeting the evolving needs of our customers.



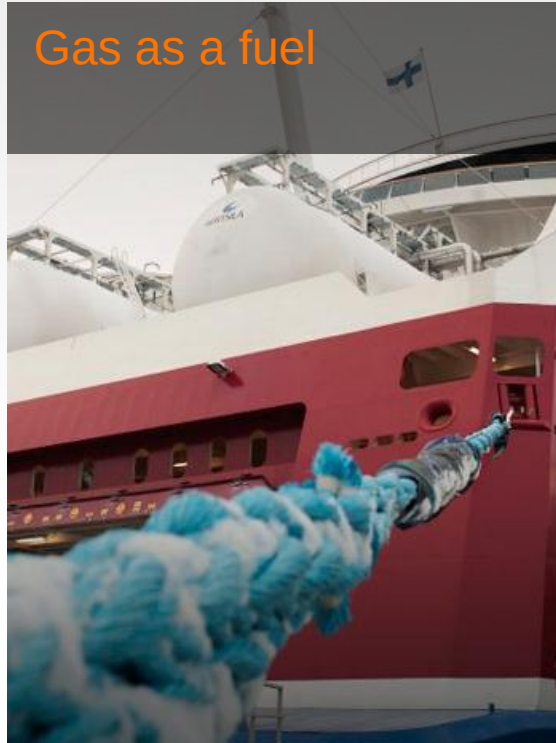
Profitable growth by focusing on three areas

Smart Power Generation



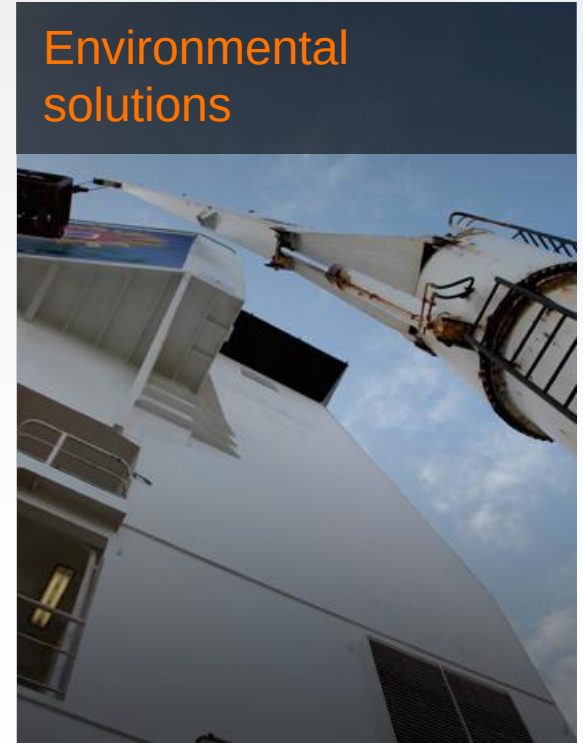
The transition to sustainable and modern energy systems drives the demand for smart power generation.

Gas as a fuel



Economic and environmental reasons increase the growth of gas solutions in marine and power plant markets.

Environmental solutions



Environmental regulation and increased focus on improved efficiency create demand in the marine industry.

Selected Gas references

Seaboard San Giorgio Linde 27.8 MW, Italy
in operation since 2008

7850 MW,
in 44 countries,
275 power plants

Clear leadership in dual-fuel applications

Merchant



LNGC

- 134 vessels
- 539 engines

Multigas Carrier

- 5 vessels
- 20 engines

Conversion

- 1 Chem. Tanker

Offshore



OSV's

- 20 vessels
- 66 engines

Production

- 1 platform
- 8 FPSO's
- 1 FSO
- 33 engines

New orders:

Harvey Gulf;
6 LNG-PSV in Gulf of
Mexico

Clear leadership in dual-fuel applications

Navy



Coastal Patrol

- DF-Mechanical
- DF main and auxiliary engines

Others



TUG

- 2 vessel
- 2 engines each
- Mechanical drive

Guide Ship

- 1 vessel /engine

IWW

- 2 vessel
- 3 engines

Clear leadership in dual-fuel applications

Cruise & Ferry

LNG Cruise ferry

- 1 vessels
- 4 engines
- Complete gas train

LNG ferries

- 5 ferries
- 20 engines
- Complete gas train



Clear leadership in dual-fuel applications

Power Plants



Merchant



Offshore



Cruise & Ferry



Navy



Others



More than 700 engines

More than 250 installations

More than 7,000,000 running hours

Environmental regulation and alternatives

NO_x

Acid rains
Ozone depletion

Tier II (2011)
Tier III in ECA*
(2016)

SO_x

Acid rains

3.5% (2012)
ECA 0.1% (2015)
Global 0.5% (2020)

PARTICULATE MATTER

Impact on air quality

Along with SO_x
reduction

GREENHOUSE GAS

Global warming

Under evaluation
by IMO

BALLAST WATER

Damage to local
eco-systems

Global ballast water
convention

Wärtsilä is developing a multi-solution approach to meet requirements for different owner needs, ship types and operating profiles.

LNG

- Simultaneous reduction of GHG / SO_x / NO_x / PM
- Market: mainly ships with regular routes and limited autonomy requirements operating in ECAs
- Infrastructure development is needed for larger uptake
- Conversion solution available

HFO

NO_x: SCR or wet methods
SO_x: Scrubbers
Market: mostly merchant ships operating a significant time in ECAs

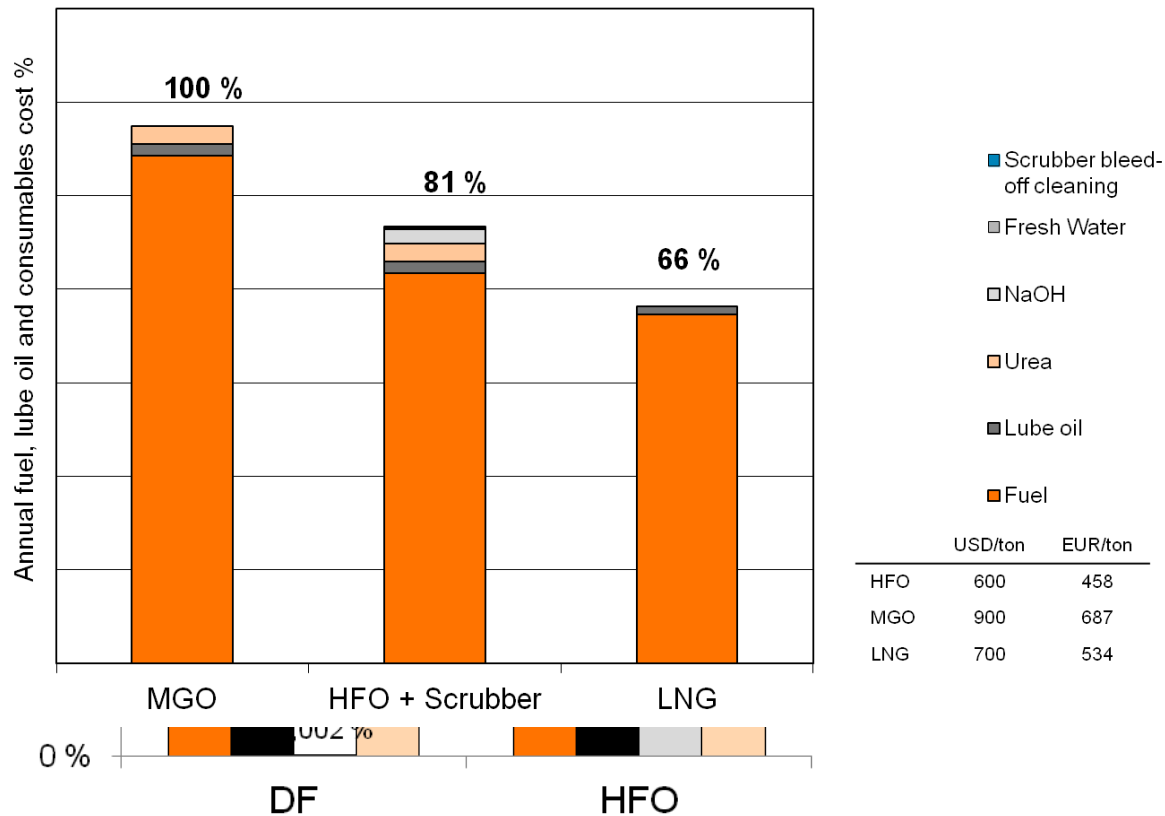
MGO

- NO_x: SCR or primary methods
- Market: ships operating a limited time in ECAs, small ships

*Emissions Control Areas

LNG Comparisons

Cost





E IL GNL?

Conventional LNG supply chain

Upstream
Gas exploration

Gas processing
and Liquefaction

Large scale LNG
shipping

HUB
LNG import and
degasification

Pipeline

End user (NG)



Offshore Wärtsilä's Uniform and Integrated Solutions

Offshore Drilling



Offshore Production



Offshore Service Vessels



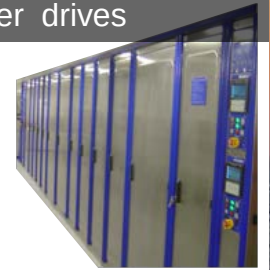
Widest product portfolio
Leading edge solutions

- Concepts
- Applications
- Project execution
- System integration
- Engineering
- Third party supplies

Automation



Power drives



Power distribution



Engines



Propulsion



Ship design





UP STREAM

Exploration & Production (E&P)

FIELD POWER



- Power generation & waste heat recovery
- Gas flaring solutions

PUMPING



- Power generation for electrical driven pumps

MID STREAM

Transmission & Processing

COMPRESSION

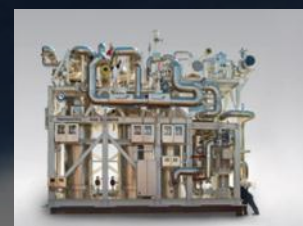


- Power generation for electrical driven compressors

DOWN STREAM

Selling & Distribution

PROCESS



- LNG storage
- LNG re-gasification
- Liquefaction
- Separation
- Power generation

REFINERY



- Power generation & waste heat recovery

Mid and Small scale LNG

Upstream
Gas exploration

Gas processing
and Liquefaction

Large scale LNG
shipping

HUB
LNG import and
degasification

Pipeline

End user (NG)



LNG shipping

Mid-scale storage
and regasification

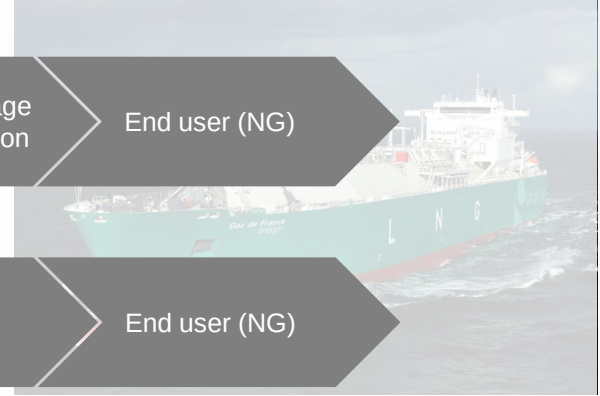
End user (NG)

Truck transport

Satellite LNG
storage plant
(pressurized)

End user (NG)

Ship bunkering



Mid scale LNG

LNG shipping

Mid-scale storage
and regasification

End user (NG)



Small scale LNG

Mid-scale storage
and regasification

Mid-scale storage
and regasification

Satellite LNG
storage plant

End user (NG)

Ship bunkering



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Conclusions



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