

HANDELSBANKEN SUSTAINABILITY TRENDS WEBINAR

25 NOVEMBER 2020

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ENABLING SUSTAINABLE SOCIETIES WITH SMART TECHNOLOGY

INNOVATING
SINCE 1834

TOGETHER

FOR A SUSTAINABLE
FUTURE

SUSTAINABILITY

for our stakeholders and the environment

SUSTAINABILITY STRATEGY AND TARGETS

Strong focus on reducing environmental impact and on ensuring personnel safety and well-being

HIGH ETHICAL STANDARDS

Values and code of conduct program

DEFINED PROCESSES

Certified QEHS management systems

TRANSPARENCY

Sustainability reporting according to GRI standards

RECOGNISED SUSTAINABILITY WORK

I.a. DJSI and FTSE4good indices

FOCUS ON DECARBONIZATION IN BOTH SHIPPING AND ENERGY SECTORS



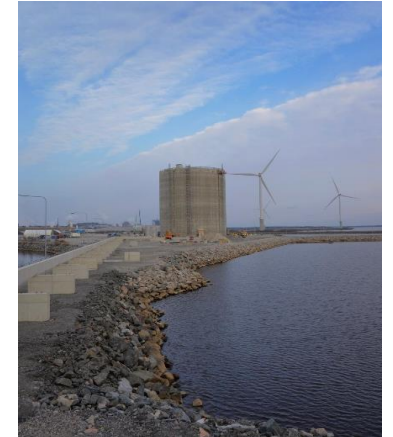
SHIPPING

GHG reduction strategy:

- 40% lower GHG/vessel by 2030
- 50% lower GHG in shipping (total) by 2050

ENERGY

- EU: Climate neutral by 2050
- China: Carbon neutral by 2060
- USA*: carbon free electricity production by 2035, net zero emissions by 2050
- Country Climate Pledges



LEADING THE WAY TOWARDS A SMART MARINE ECOSYSTEM

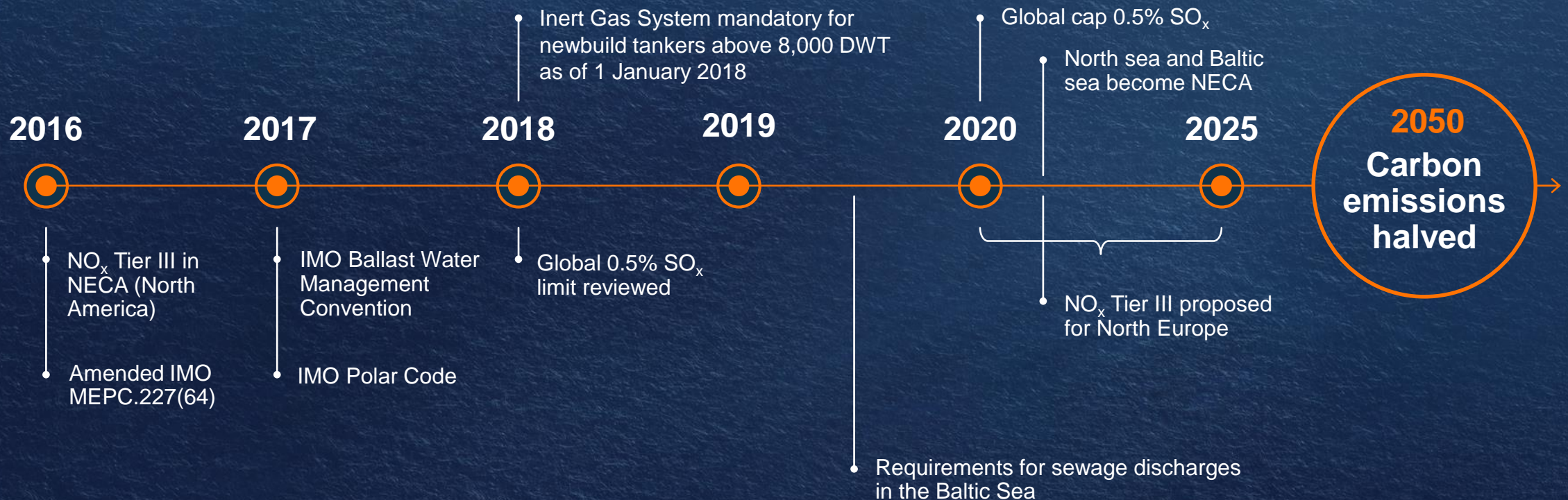
A Smart Marine Ecosystem is about the maritime industry **working together** to address critical challenges and to generate solutions **towards a sustainable future**.

TOWARDS A 100% RENEWABLE ENERGY FUTURE

The energy landscape is in a transition towards more **flexible and sustainable** energy systems. **We envision a 100% renewable energy future.**

* Biden's climate plan

REGULATION DRIVING MARINE EMISSION REDUCTION



TOWARDS A 100% RENEWABLE ENERGY FUTURE

**MITIGATING
CLIMATE CHANGE**

**TARGETS FOR
RENEWABLES AND
DECARBONISATION**

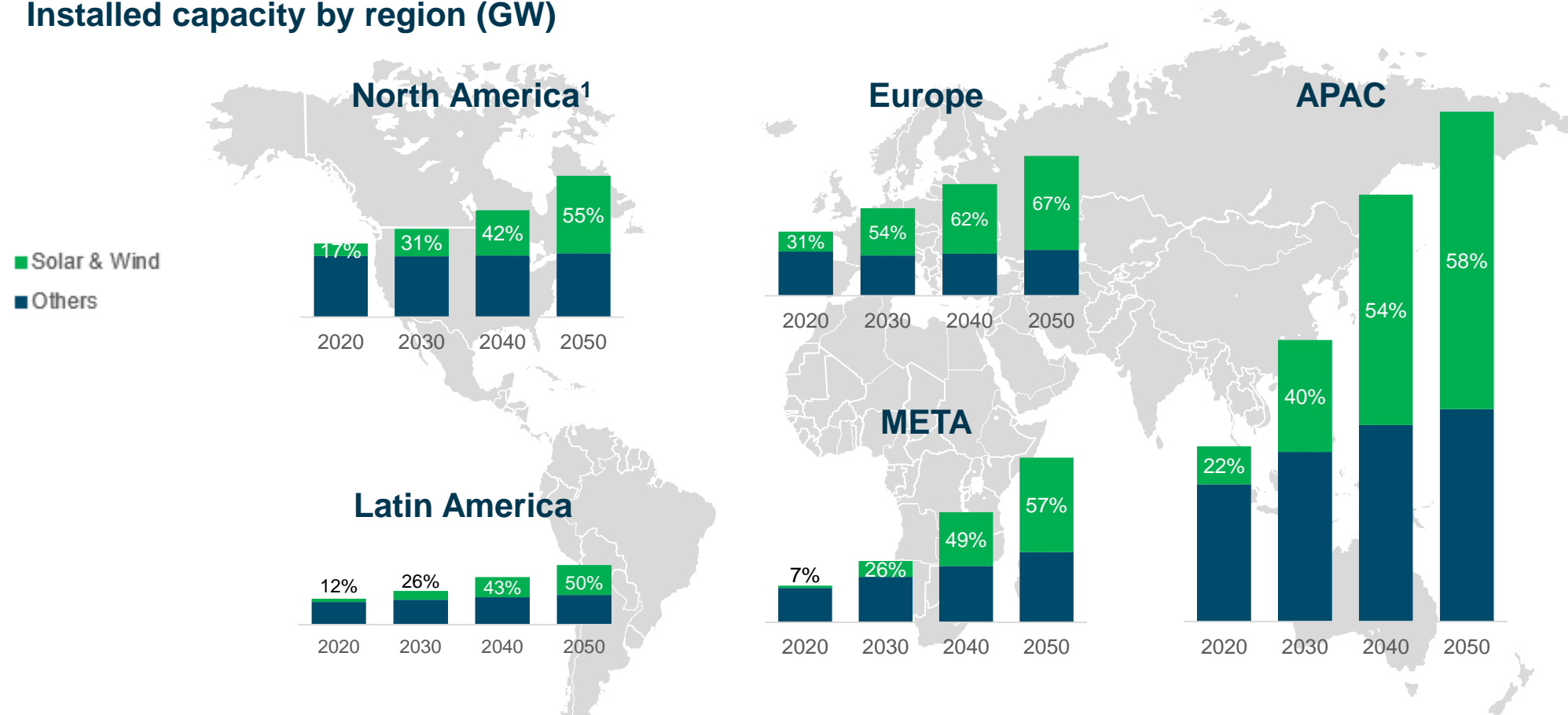
**RAPIDLY DECREASING
PRICE OF RENEWABLES**

**INCREASING
ELECTRICITY DEMAND**

**EMERGING NEW
TECHNOLOGIES**

THE ENERGY TRANSITION IS A GLOBAL TREND...

Installed capacity by region (GW)

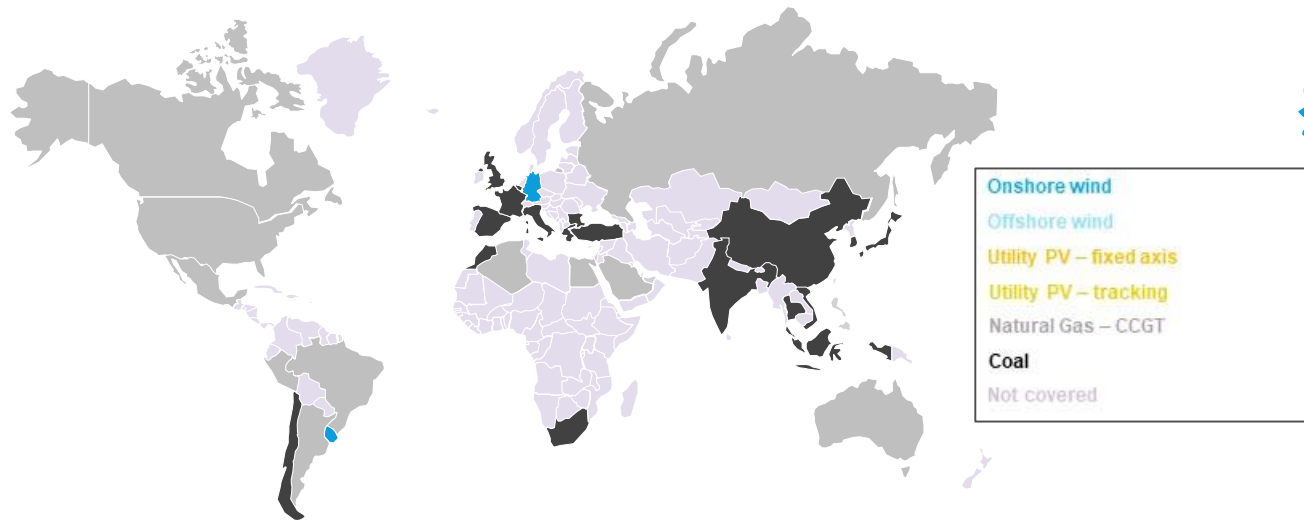


Note 1: Contains only USA and Canada, as Mexico has been included in Latin America. For more information on the regions see the appendix.

Source: BloombergNEF New Energy Outlook 2020

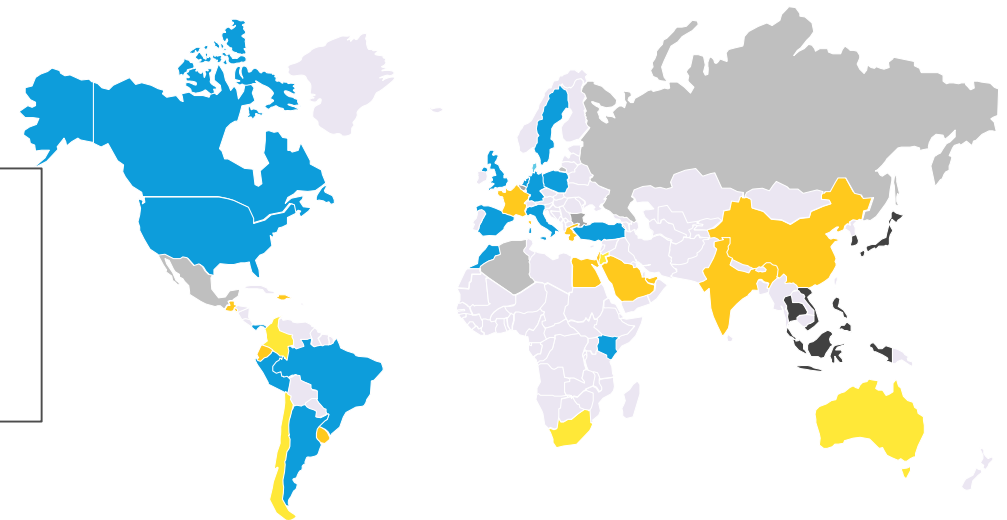
... SUPPORTED BY THE INCREASED COMPETITIVENESS OF RENEWABLES

Most competitive source of new bulk generation in 2014



Note: Reflective of the cheapest benchmark project for each technology and market

Most competitive source of new bulk generation in 1H 2020



Note: Reflective of the cheapest benchmark project for each technology and market

Source: BloombergNEF New Energy Outlook 2020

OUR SOLUTIONS SUPPORT THE ENERGY TRANSITION

FLEXIBLE POWER PLANTS

Flexible power plants utilising modular and future-proof technology to provide the best means of support to the power system.

ENERGY STORAGE AND OPTIMISATION

Energy storage solutions that build a resilient and intelligent power system. Industry-leading software can optimise any of the customer's assets and power systems.

LIFECYCLE SERVICES

Lifecycle services encompass performance and maintenance management as well as operational expertise, leading to safe, reliable, and environmentally sustainable operations.

THE BENEFITS OF FLEXIBILITY IN PRACTICE



Tucson Electric Power, Arizona

- 200 MW flexible gas plant and 10 MW/2.5 MWh energy storage system
- Environmental considerations: improved efficiency, emission reduction and low cooling water requirements
- Provides flexibility and enables expansion of renewable energy



AGL Energy Limited, Australia

- 211 MW power plant
- Enables the retirement of coal and the expansion of renewable energy
- Flexibility improves the reliability and security of energy supply



Kraftwerke Mainz-Wiesbaden AG, Germany

- Flexible 100 MW combined heat and power plant
- Emission reduction thanks to 90% overall efficiency
- Flexibility enables the optimisation of renewable energy

FLEXIBILITY NEEDED TO FULLY UTILISE RENEWABLE ENERGY AND ENABLE THE PATH TOWARDS CARBON NEUTRALITY

CASE GERMANY 5TH JULY 2020

Enough renewable generation to cover load



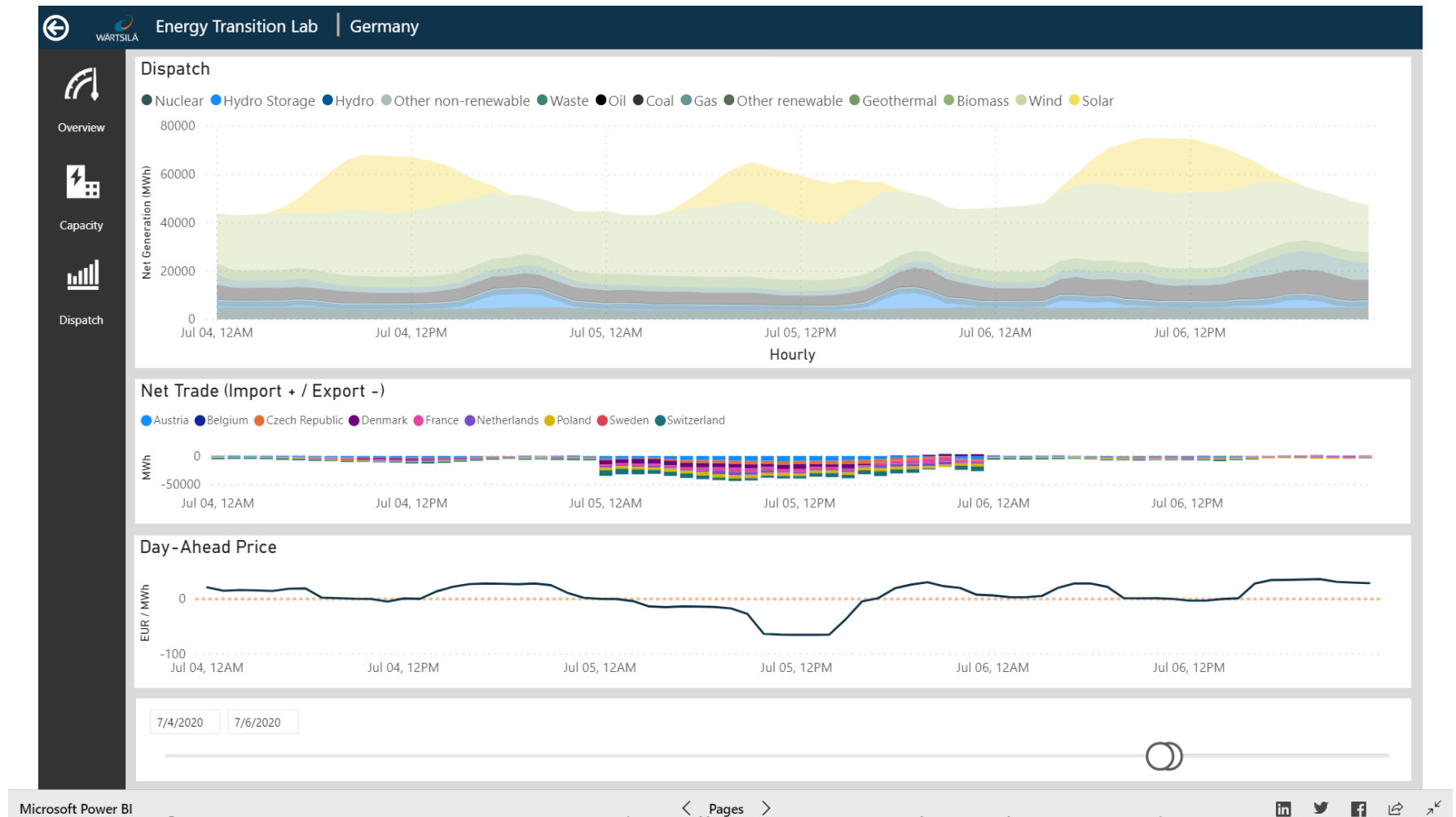
Excess power pushes down market price



Baseload coal and nuclear power is exported with high price tag

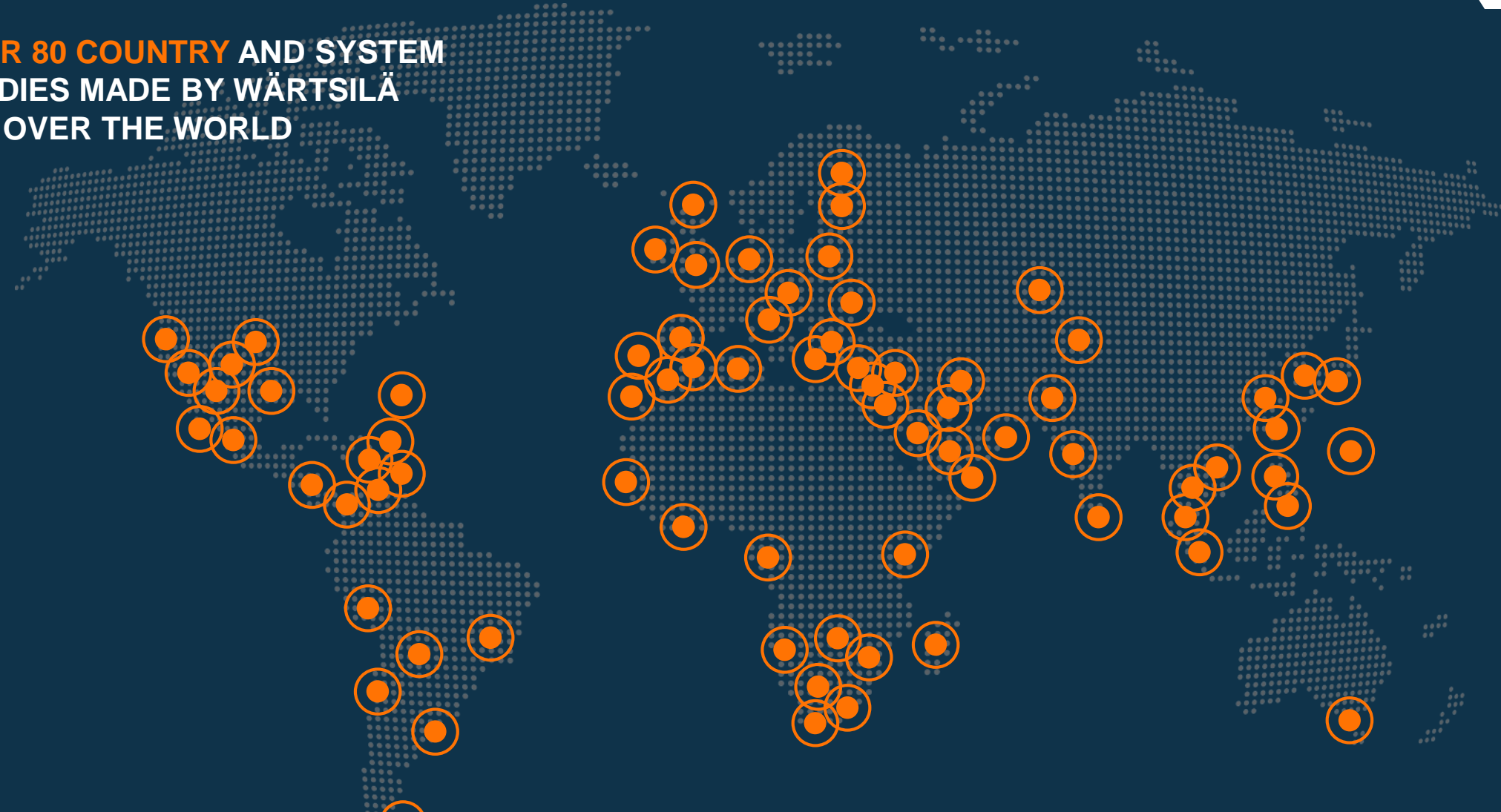



Emission reductions limited



Source: Wärtsilä Energy Transition Lab (<https://www.wartsila.com/energy/transition-lab>)

**OVER 80 COUNTRY AND SYSTEM
STUDIES MADE BY WÄRTSILÄ
ALL OVER THE WORLD**



 = PLEXOS study made by Wärtsilä

INITIAL

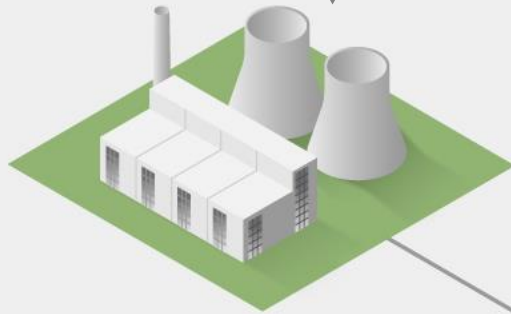
0%

Renewable energy

Thermal only

69 €/MWh_e

100 MW



COST OPTIMAL

76%

Renewable energy

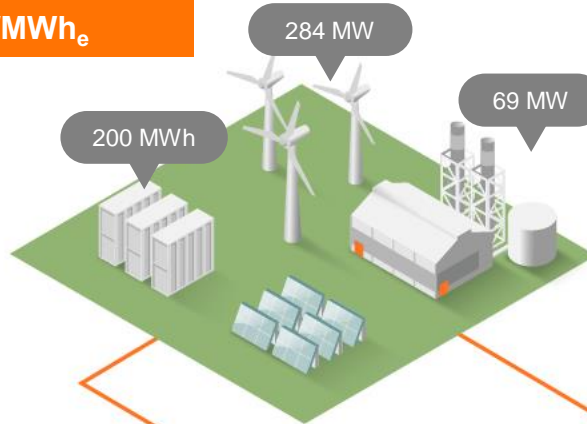
Solar, wind, storage, engines

46 €/MWh_e

200 MWh

284 MW

69 MW



DECARBONISED

100%

Renewable energy

Solar, wind, storage, engines
Running on synthetic fuels (P2X)

78 €/MWh_e

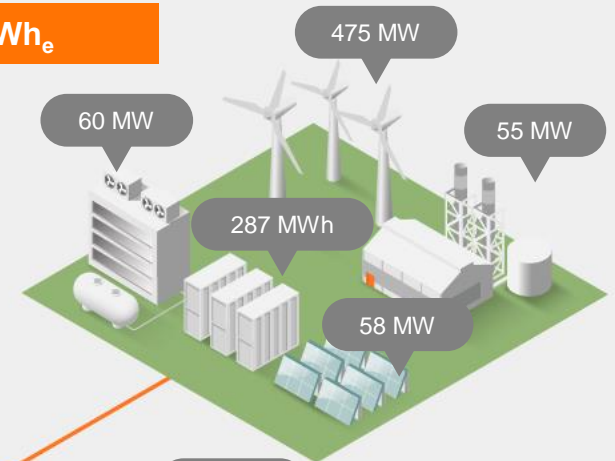
60 MW

475 MW

55 MW

287 MWh

58 MW



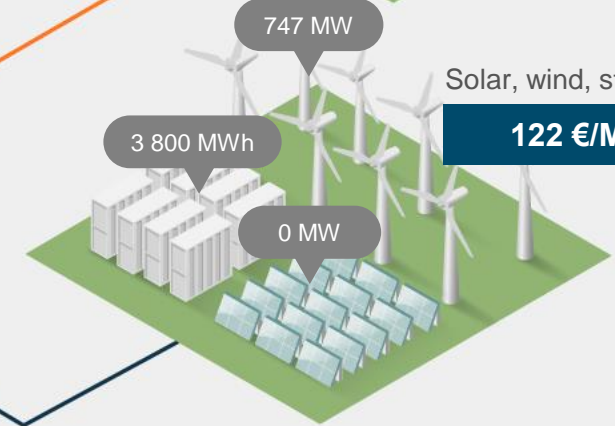
747 MW

Solar, wind, storage only

122 €/MWh_e

3 800 MWh

0 MW



ENGINES

NO ENGINES

CHOOSE YOUR PATH

NOTE: 1. Heat generation assets not shown 2. Price of heat is 33 €/MWh and derived from heat generation with gas boiler and is same in all scenarios, i.e. heat price is not changing

DRIVING SUSTAINABLE SHIPPING



ENERGY SOURCE
AND FUEL FLEXIBILITY



ENERGY EFFICIENT
TECHNOLOGIES



DATA BASED
OPTIMISATION



... ADOPTED IN A SMART MARINE ECOSYSTEM



CONTRIBUTING TO THE MARITIME SUSTAINABILITY AGENDA

MARINE POWER

Creates a commercially viable path towards decarbonisation by providing fuel efficient power systems that can be to run on low-carbon and/or zero-carbon fuels.

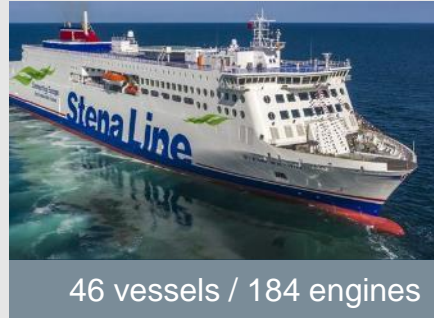
VOYAGE

Provides products and solutions to connect vessels to ports, remove inefficiencies during the voyage, and enhance the safety of operations through autonomy features.

MARINE SYSTEMS

Develops technologies, products, and solutions related to the gas value chain, exhaust treatment and shaft line services, with the aim of enhancing safety and energy efficiency, while lowering emissions

> 2 600 DF engines **> 45 000 000 running hours**



MERCHANT

- LNG Carrier
- Container Vessel
- Chemical/Product Tanker
- LPG Carrier
- Bulk Carrier
- Crude Oil Tanker
- Shuttle Tanker
- RoRo Vessel
- Chemical Tanker
- Product Tanker
- Car Carrier
- Asphalt Carrier
- General Cargo Vessel

CRUISE & FERRY

- Passenger & Cargo Vessel
- Cruise Vessel
- Ferry
- High Speed Passenger Vessel

OFFSHORE

- Offshore Supply Vessel

SPECIAL, OIL&GAS, OTHER

- Inland Tanker
- Dredgers
- Tugs
- Icebreaker
- Inland Container
- Cable layer and repair vessel
- Fishing Vessel
- FPSO
- FSRU
- FLNG Plant newbuild
- FSO
- Fixed Production Platform
- Others (SPAR, navy etc.)

POWER PLANT

- Industry
- Utility
- IPP
- Oil and gas
- Municipal

HYBRID SOLUTIONS SUPPORT THE ACHIEVEMENT OF A CLEANER, SAFER, MORE EFFICIENT, AND PROFITABLE FUTURE

NORTH SEA GIANT

North Sea Shipping AS



RETROFIT

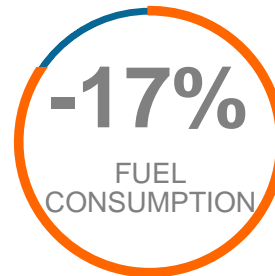


VICTORIA OF WIGHT

Wightlink Isle of Wight Ferries



NEW BUILD



VILJA

Luleå Hamn AB



NEW BUILD



Figures are approximate and based on current operation and usage

WÄRTSILÄ FLEET OPERATIONS SOLUTION ENABLES EFFICIENT SHIP OPERATIONS AND MAINTENANCE OF ASSET CONDITION

Reducing carbon intensity with innovative operational measures



- **Voyage Performance**

- Save up to 10% of fuel (and emissions) by **automatic efficient planning and execution** of routes
- **Just-in-time arrival** unlocks further efficiency by reducing speeding and waiting of vessels before port entry
- Monitoring of efficient use of **auxiliary engines** and **boilers** saves additional fuel
- **Post voyage analytics** feeds back and eliminates inefficient behaviour

- **Vessel Performance**

- Track **hull and propeller condition** to act on any potential efficiency losses
- Monitor **engine performance** continuously

RESEARCH & DEVELOPMENT EMPHASISES IMPROVED ENVIRONMENTAL PERFORMANCE



FUEL FLEXIBILITY
AND FUTURE FUELS



OPTIMISING AND
DECARBONISING
ENERGY SYSTEMS

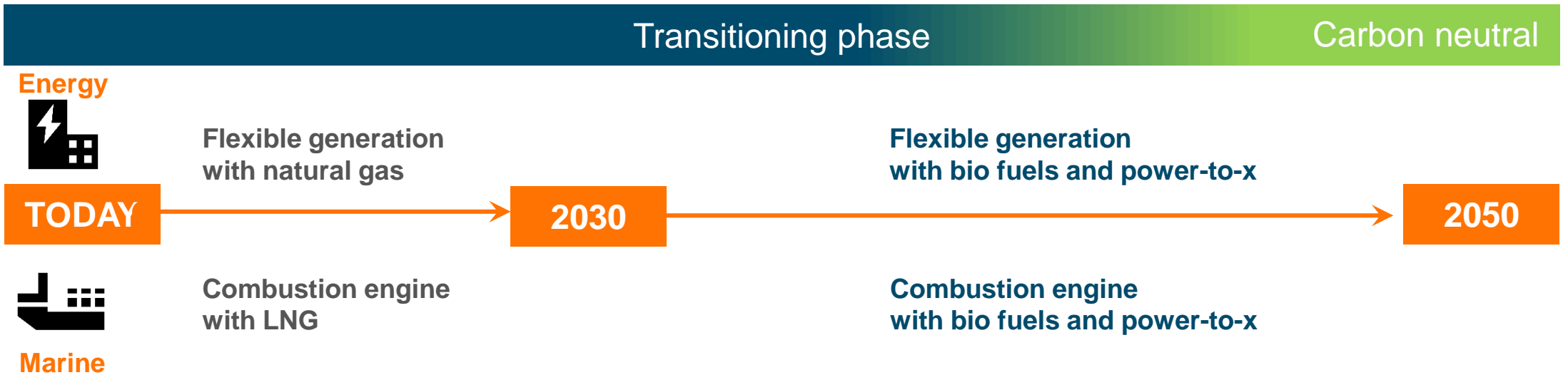
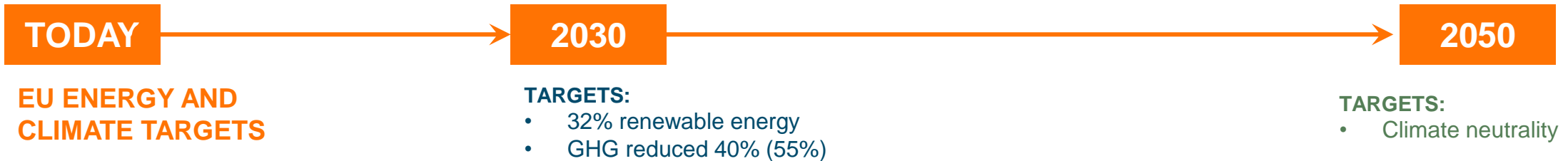


DECARBONISING
SHIPPING



NEW TECHNOLOGY AND
DIGITAL SOLUTIONS

THE ROLE OF GAS IS CRUCIAL AS A BRIDGING FUEL



ENGINE TECHNOLOGY READY FOR FUTURE – TOWARDS SUSTAINABLE FUELS

Technology ready

Fossil liquids

- High energy content
- Widespread availability

Fossil gas

- Cleanest fossil fuel
- GHG reduction 5-20% depending on engine type (well-to-power)
- Widespread availability

Bio and synthetic liquids

- GHG reduction 70-100% depending on source (well-to-power)
- Clear transition pathway as same infra can be used for all fuel types

Bio and synthetic gas

- GHG reduction 70-100% depending on source (well-to-power)
- Clear transition pathway as same infra can be used for all fuel types

Industrialisation needed

Green methanol

- Carbon neutral
- Can be blended with liquids

Under development

Green Ammonia

- No CO2 emissions
- Can be blended with liquids or gases

Green Hydrogen

- No CO2 emissions
- Can be blended with gases

CONCLUSIONS

Environmental awareness and changing energy needs are driving the maritime and energy sector transformation

Flexibility, future fuels and new technologies are key to the achievement of climate targets

Sustainability is central to our strategy and growth ambitions - with our broad offering of solutions we are well placed to support customers in improving their environmental performance

THANK YOU



WÄRTSILÄ