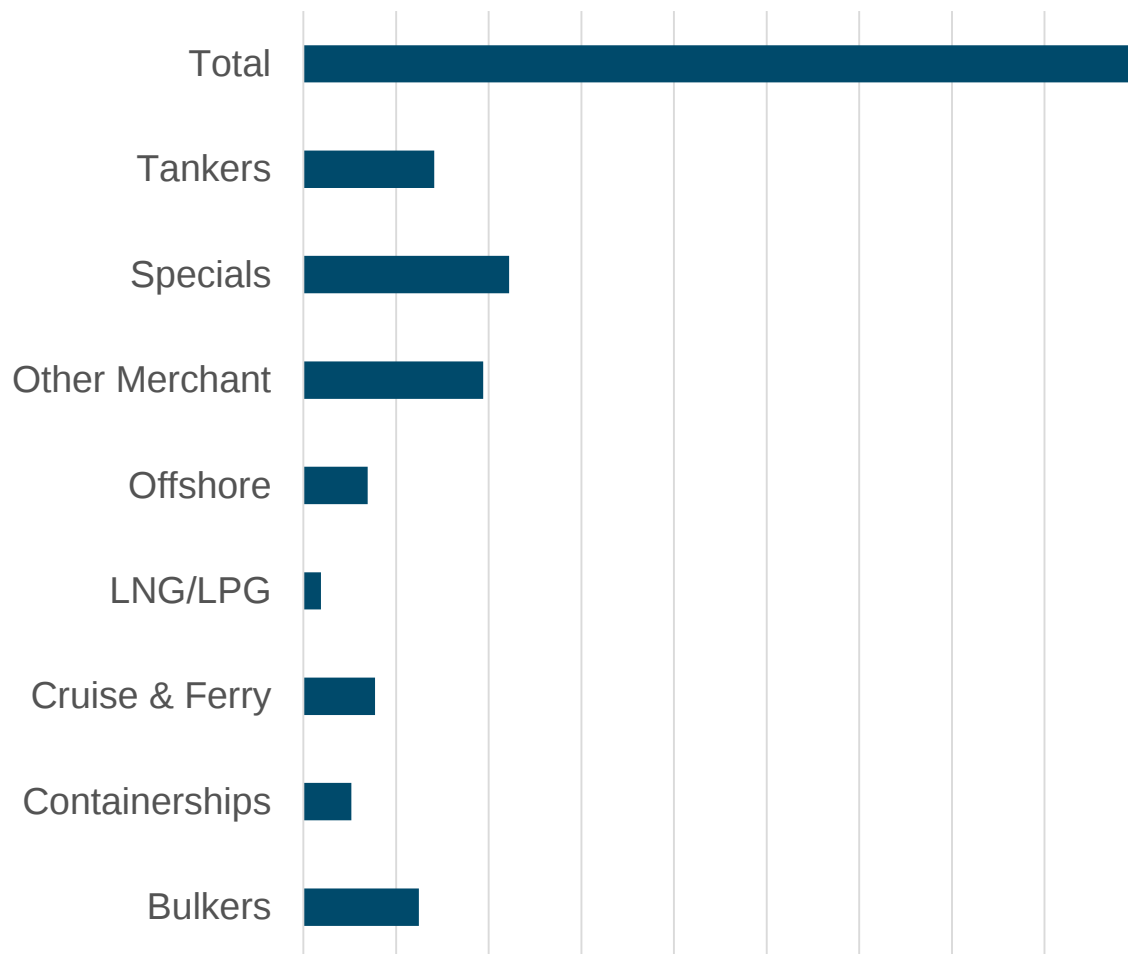


POWERING A SUSTAINABLE MARITIME FUTURE

KORMARINE 2019

DeukKi Ha/ Sales Manager/ Marin Business

MAIN SHIP TYPES



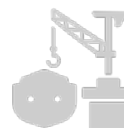
90% of world trade



Global shipping fuel bill around
\$100 BILLION

+ 2 000

Amount of **NEW VESSELS**
built yearly



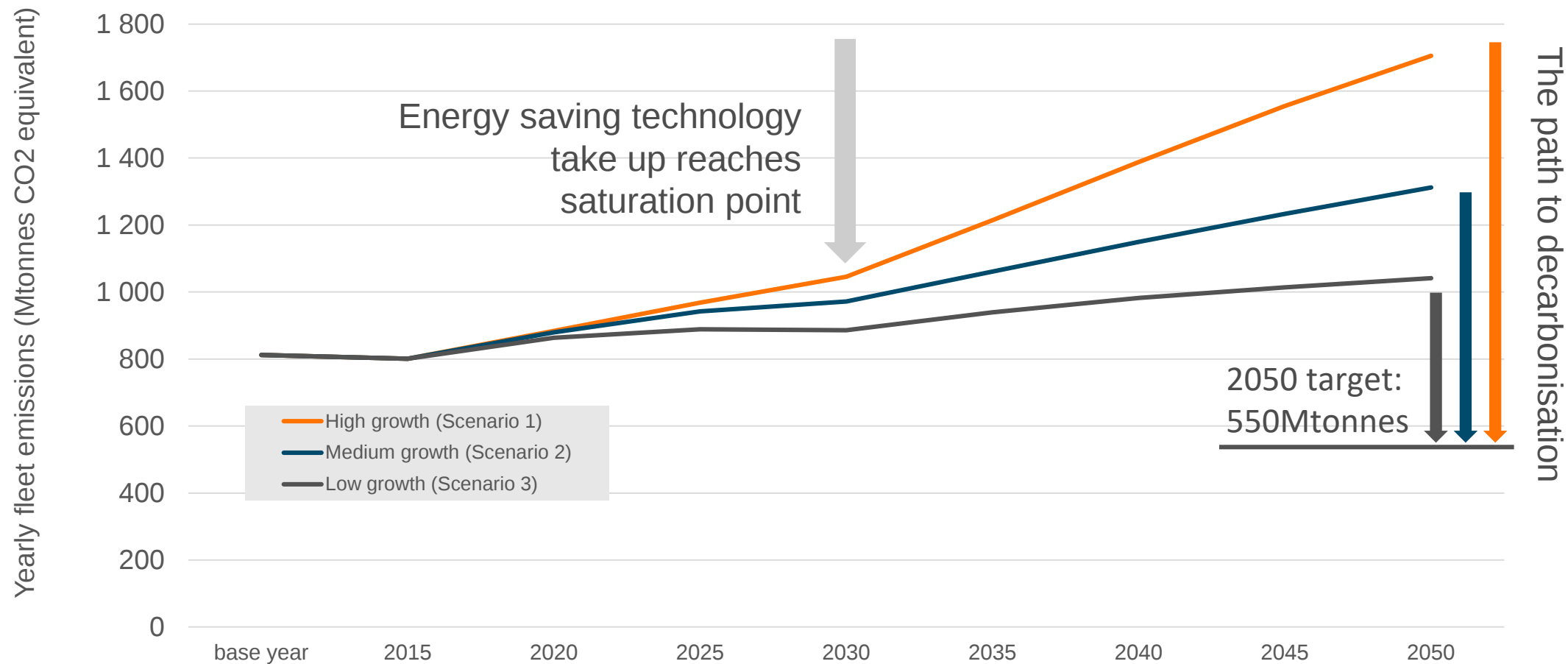
Main **SHIPYARD** countries:
Japan / China / South Korea



Main ship **OWNER** countries
Greece / Japan / China

Sources: Clarkson's, Wood Mackenzie, Bloomberg, Wärtsilä internal analysis

EMISSIONS WILL INCREASE



Source: In-house modeling based on CE-delft data as used by the IMO

GLOBALLY SET INDUSTRY TARGETS

2020

0.5%
SO_x

2030

40%
GHG



2050

50%
GHG



70%
GHG



MEETING THE TARGETS BY TURNING TECHNOLOGY INTO SOLUTIONS



DATA



ENERGY
EFFICIENT
TECHNOLOGIES



ENERGY
SOURCE

SMART MARINE ECOSYSTEM

CONNECTING SMART VESSELS TO SMART PORTS

VOYAGE
MANAGEMENT

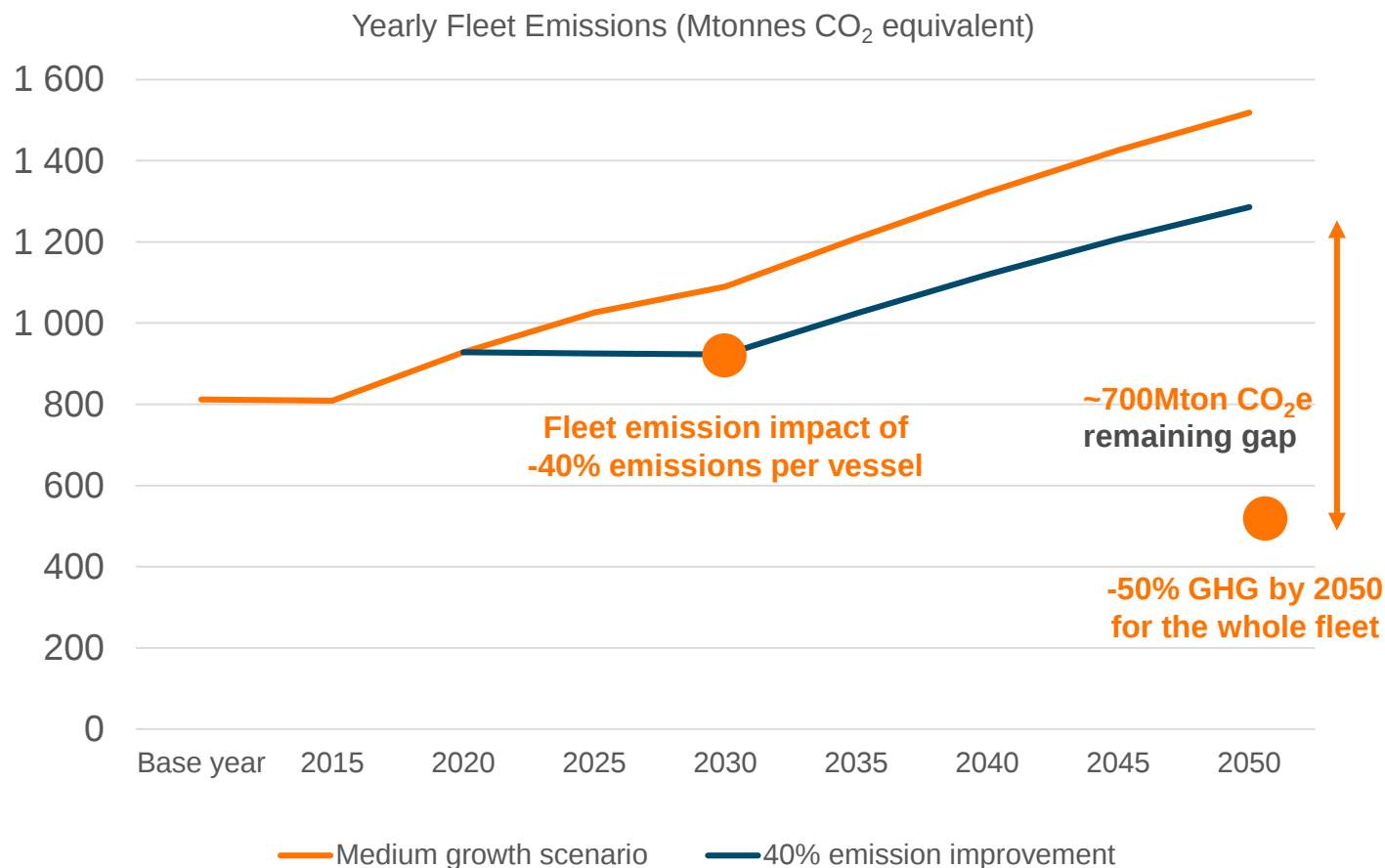
ENERGY
MANAGEMENT

ASSET
MANAGEMENT



PLANNED TRANSITION ON FUELS TO DECARBONISE THE MARITIME INDUSTRY

A SUSTAINABLE FUTURE REQUIRES CLEANER FUELS



DATA, TECHNOLOGY AND THE ENERGY SOURCE WILL TAKE US TO 2030

Use of data in operation

- Increase fleet efficiency
- Increased asset utilisation

Energy storage and savings technologies

- Energy production optimisation
- Energy consumption optimisation
- Hybridisation (batteries, fuel cells, etc)

Energy source

- LNG
- Biofuels
- Renewables (wind, solar, etc.)

SUSTAINABLE FUELS AND ADVANCED TECHNOLOGIES WILL TAKE US TO 2050

- Solar
- Bio/synthetic fuels for the combustion engine
- Comprehensive optimisation of the logistic chain with shared capacity
- Waste recovery
- Carbon capture
- Carbon credits

COMBUSTION ENGINE + LNG AS A FUEL

IS A FUTURE-PROOF SOLUTION **TO 2030**



COMBUSTION ENGINE + BIO/SYNTHETIC LNG

TO 2050

COMPLEMENTARY ENERGY SOLUTIONS



**BATTERIES
& STORAGE**



FUEL CELLS

Ammonia / NH₃
Hydrogen / H₂
Methane / CH₄



WIND & SOLAR



**WASTE
RECOVERY**

