ICHCA INTERNATIONAL
65th ANNIVERSARY
CONFERENCE 3-4 OCT
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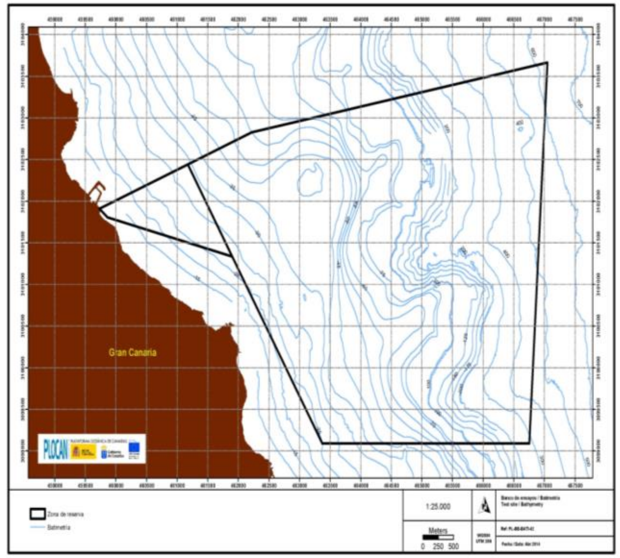
LAS PALMAS 2017



Protecting our oceans and blue economy
The research agenda

José Joaquín Hernández Brito - PLOCAN Manager

EUROPE

Notes:

1. Whilst every effort has been made to ensure the accuracy of this map, La Tene Maps are not liable for any errors or omissions whatsoever.

2. As there are different licencing regimes in each country the system shown is simplified to allow comparison between countries. A magenta area is a an area which is licenced and where an offshore wind farm may be built subject to getting all the necessary planning permissions and consents. Orange areas are areas which have been applied for. Green areas and symbols are areas which companies have proposed as wind farm areas and are working towards making an official application. Yellow outlined area are development areas for wind and solid yellow are tender areas (Denmark France and Netherlands).

3. Wind symbols are only used on this map where the necessary consents are in place. Black is built, Blue is under construction, Grey is consented (planning permissions in place). A green symbol is used to show a wind farm proposal and is usually used where the area is not determined or the area is so small that the symbol represents it better.

4. The map does not show areas which could be licencesd in the longer term.

5 All boundaries and limits are indicative rather than absolute. Not to be used for navigation. The bathymetry shown on this map is approximate.

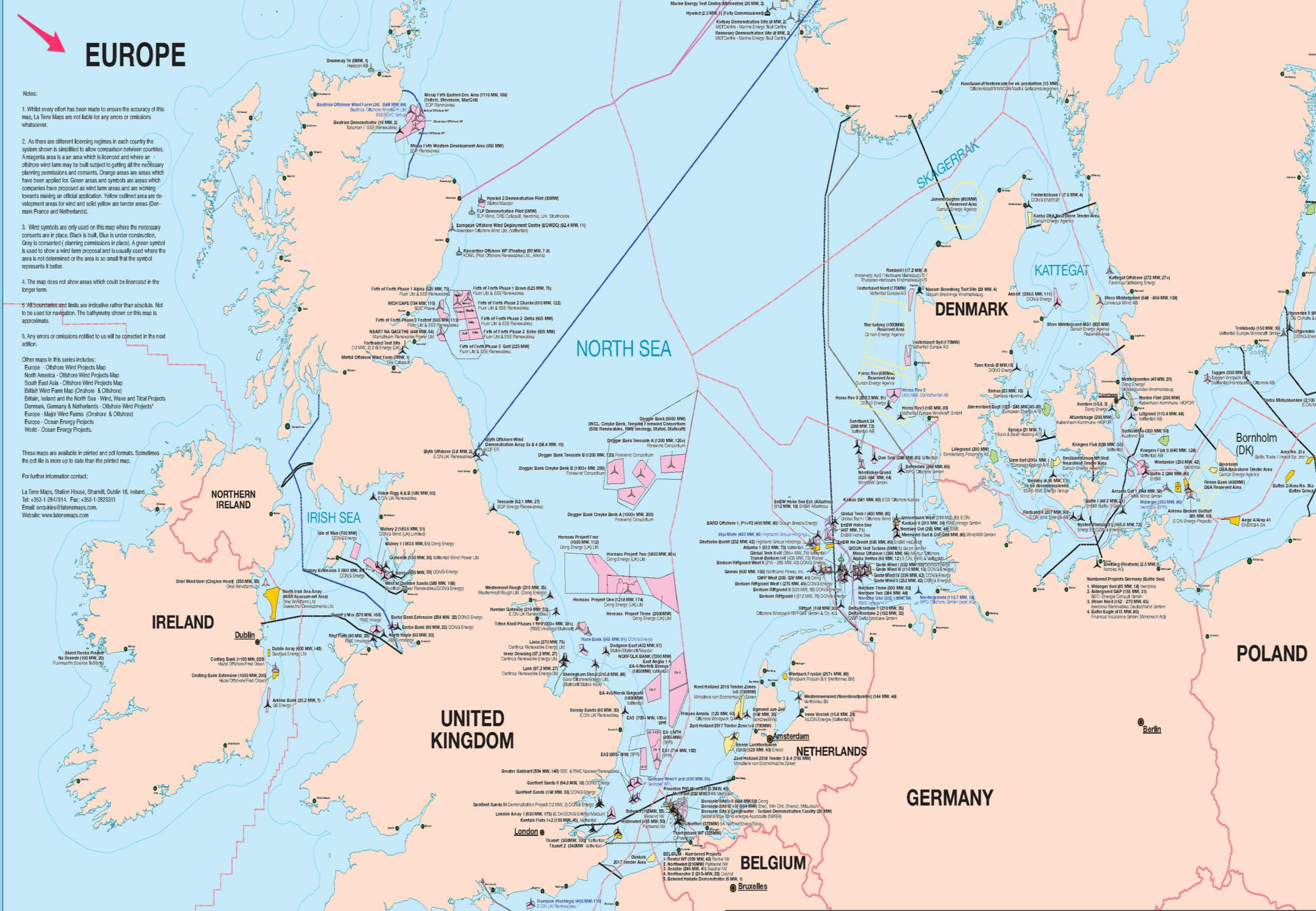
6. Any errors or omissions notified to us will be corrected in the next edition.

Other maps in this series includes:
- Europe - Offshore Wind Projects Map
- North America - Offshore Wind Projects Map
- South East Asia - Offshore Wind Projects Map
- British Wind Farm Map (Onshore & Offshore)
- Britain, Ireland and the North Sea - Wind, Wave and Tidal Projects
- Denmark, Germany & Netherlands - Offshore Wind Projects*
- Europe - Major Wind Farms (Onshore & Offshore)
- Europe - Ocean Energy Projects
- World - Ocean Energy Projects.

These maps are available in printed and pdf formats. Sometimes the pdf file is more up to date than the printed map.

For further information contact;

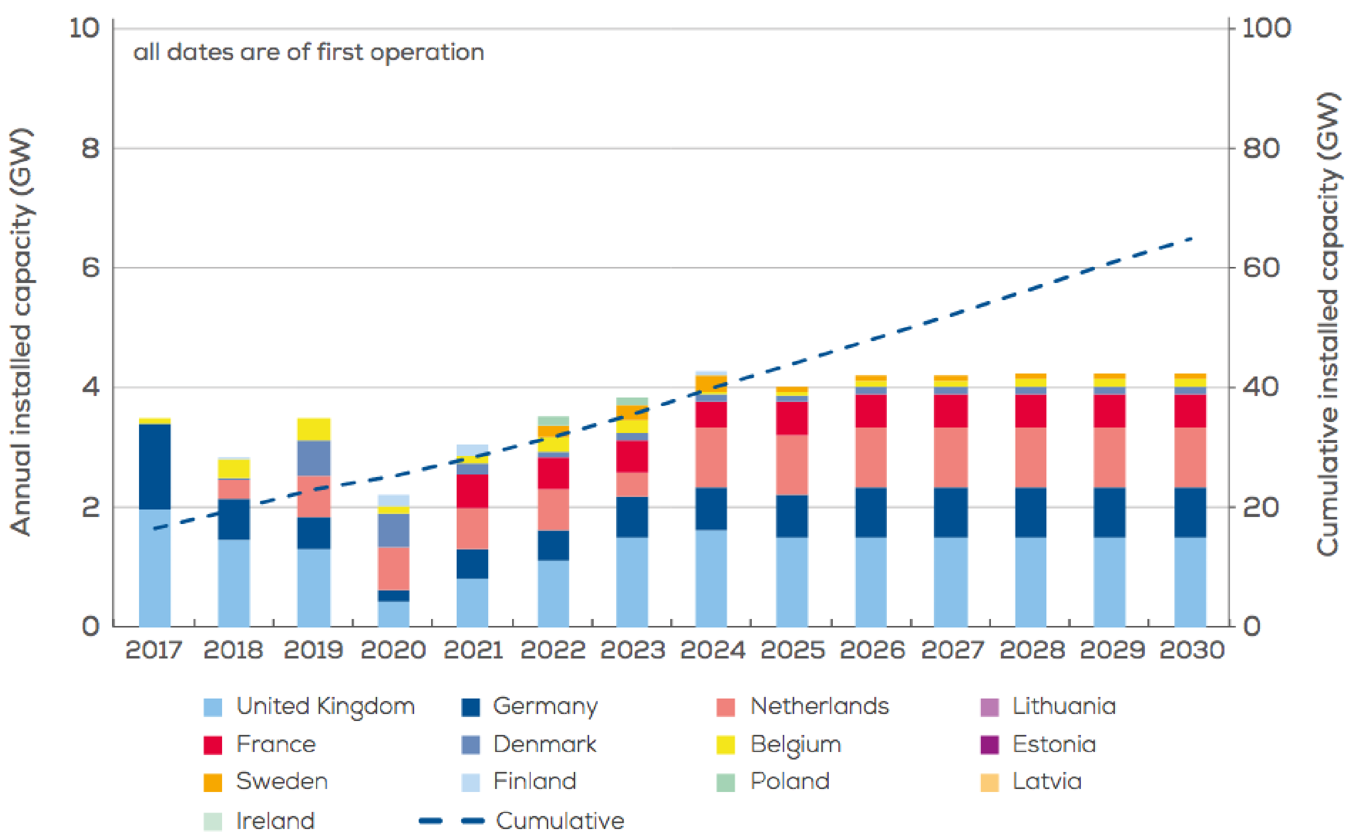
La Tene Maps, Station House, Shankill, Dublin 18, Ireland.
Tel: +353-1-2847914. Fax: +353-1-2826311
Email: enquiries@latenemaps.com.
Website: www.latenemaps.com



Protecting our oceans and blue economy

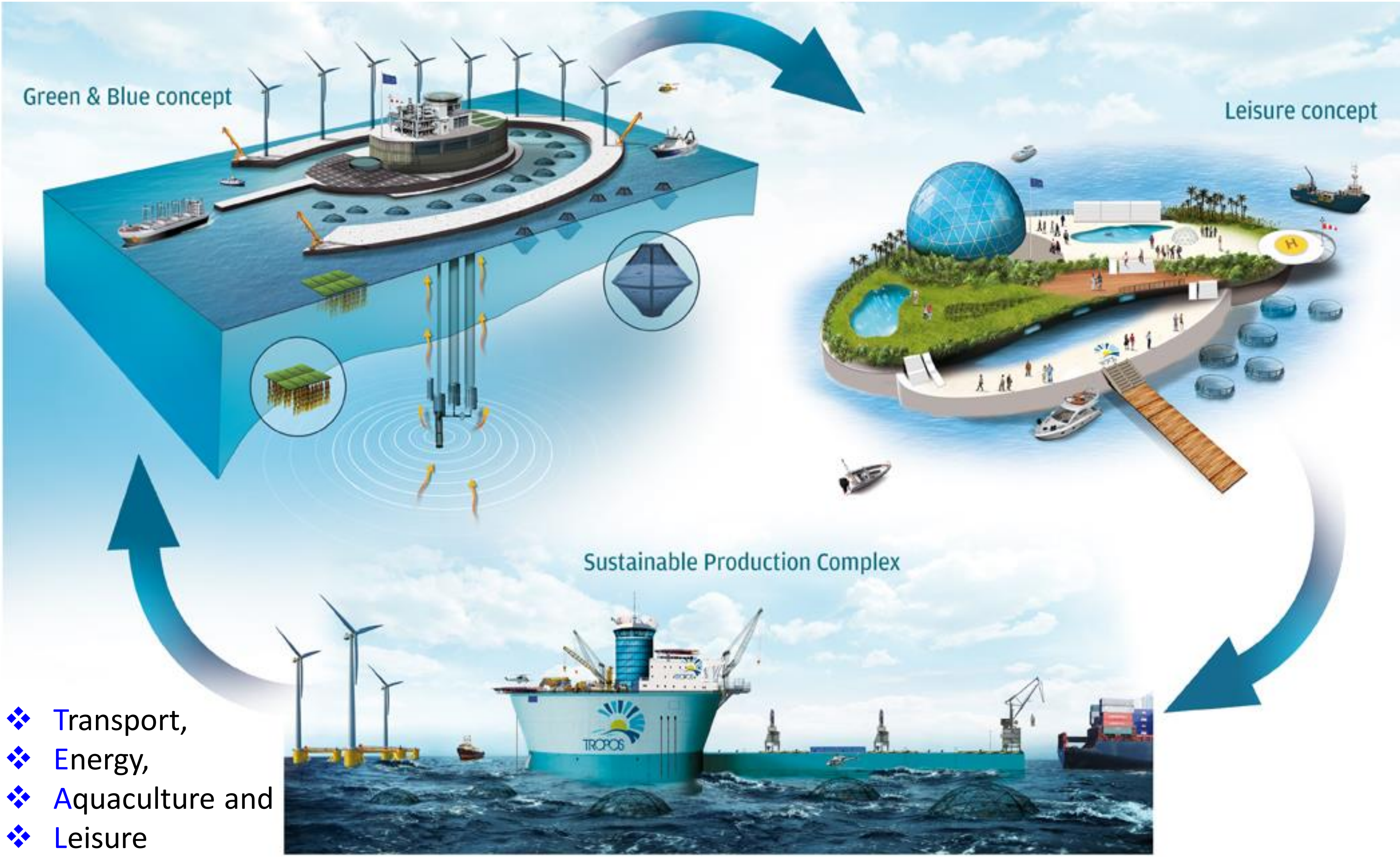
Tend for the near future: Increasing protection of the oceans and enabling a blow growth economy

Installed capacity in the baseline scenario to the end of 2030 for the EU member states in all sea basins



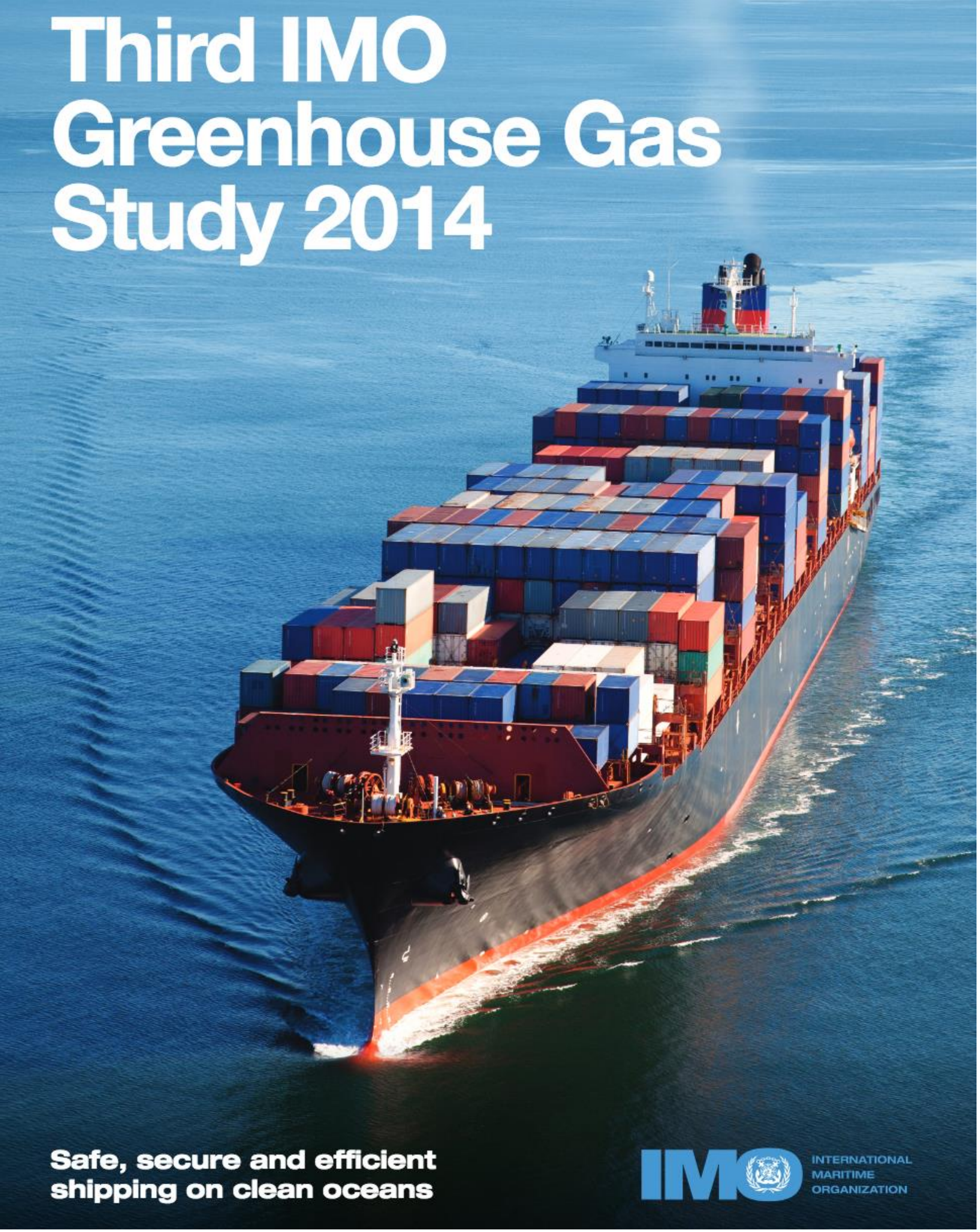
Source: BVG Associates for WindEurope

Modular multi-use deep water offshore platform harnessing and servicing Mediterranean, subtropical and tropical marine resources (TROPOS PROJECT)



- Transport,
- Energy,
- Aquaculture and
- Leisure


TROPOS
SUSTAINABLE
SERVICE HUB

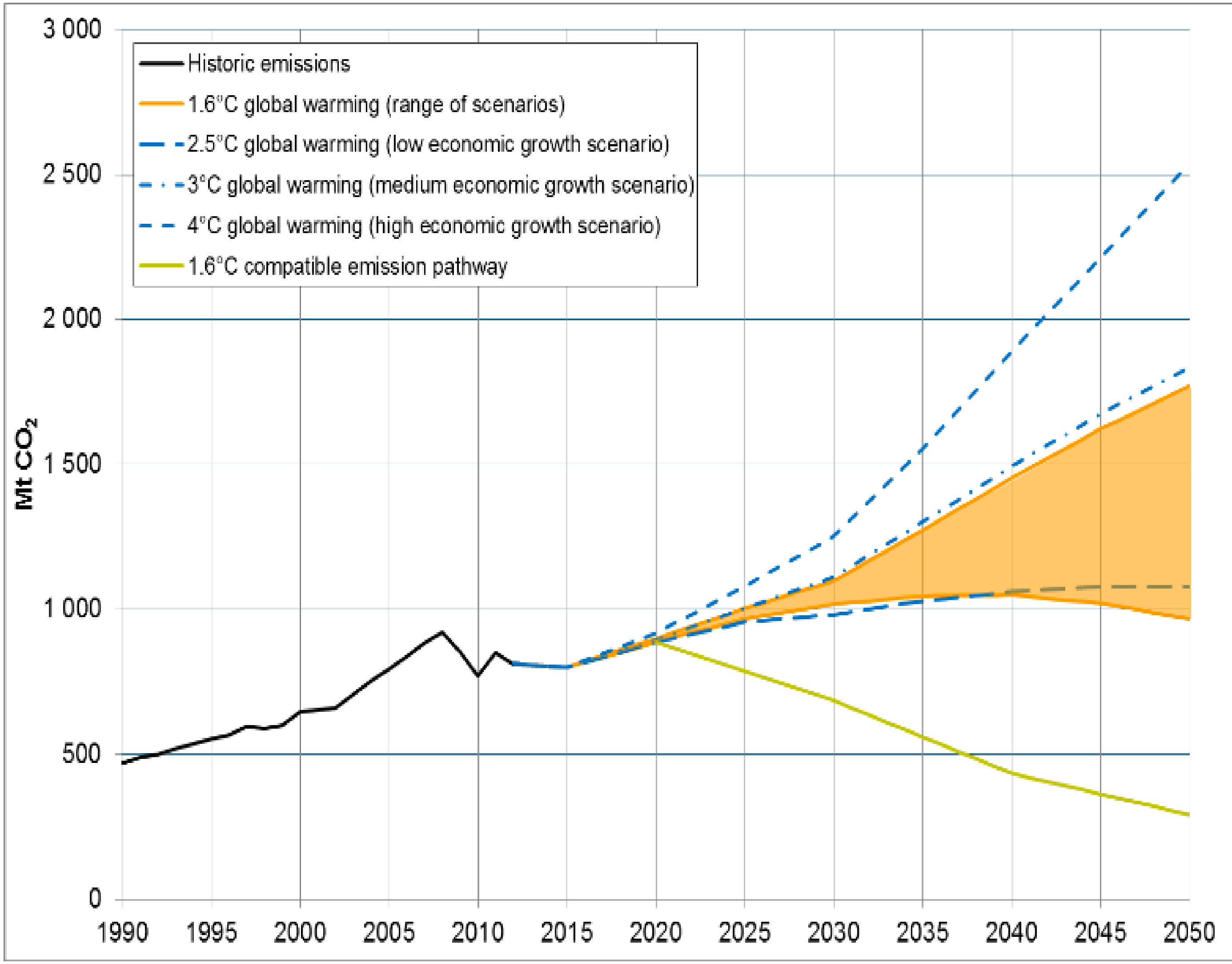


Maritime transport emits around 1000 million tons of CO_2 annually and is responsible for about **2.5% of global greenhouse gas emissions** (3rd IMO GHG study).

Shipping emissions are predicted to **increase between 50% and 250%** by 2050 – depending on future economic and energy developments.

This is not compatible with the internationally agreed goal of keeping global temperature increase to below 2°C compared to pre-industrial levels, which requires worldwide emissions to be at least halved from 1990 levels by 2050.

Historical projected and permissible CO2 emissions from maritime transport under different forecasts



Marine and maritime economy:
is the shipping sector going to decarbonize on a trajectory aligned with the rest of the economy?
…
decarbonization of shipping by the second half of the century

Notes: The projections are based on the expected demand for international shipping under the different economic scenarios and do not consider emission budgets. The green line shows a pathway for the shipping sector that would be compatible with the Paris Agreement (see Cames et al. 2015, the pathway shown here is based on constant share of RCP 2.6 CO_2 emissions).

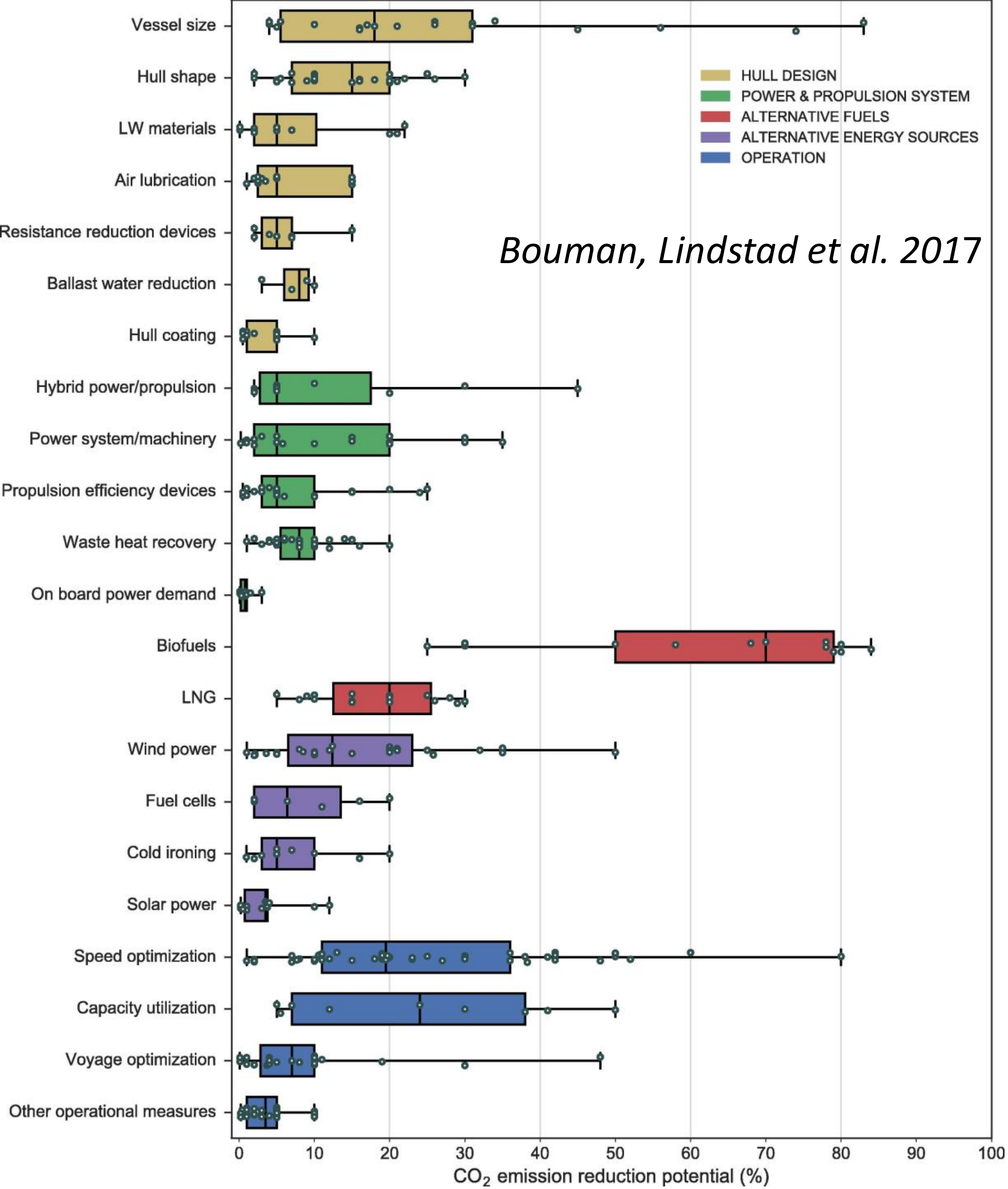
Source: IEA 2014, IMO 2009, IMO 2015a, CE Delft & Lee 2017, Cames et al. 2015

If shipping were a country it would be the world's 7th biggest emitter

Tracking Clean Energy Progress: 2017

Tracking Clean Energy Progress examines the progress of a variety of clean energy technologies towards interim 2°C scenario targets in 2025. Click on any of the technologies to find out more:

International Energy Agency



The research

ELSEVIER

Transportation Research Part D: Transport and Environment

Volume 52, Part A, May 2017, Pages 408-421

State-of-the-art technologies, measures, and potential for reducing GHG emissions from shipping – A review

Evert A. Bouman [a], Elizabeth Lindstad [b], Agathe I. Rialland [b], Anders H. Strømman [a]

"Based on the reviewed studies, we conclude that a significant emission reduction over 75% is achievable by swift adoption and combination of a large number of individual dependent and independent measures.

"In other words, it is possible to reduce GHG emissions by a factor of 4–6 per freight unit transported with current technologies within 2050"

ESSF SUB-GROUP on Research, Technological Development & Innovation

Objectives

- Review existing and new technology options and solutions for the reduction of shipping emissions in view of the regulatory requirements, but also with a long-term perspective towards zero emission and pollution ships

- Contribute to Strategic Research and Innovation Agendas with the aim to set research, innovation and deployment priorities in support of the Sustainable Waterborne Transport Toolbox

Big Data and ICT

- ✓ Data and connectivity: in all the aspects during the life-cycle of modern vessels and fleets.
- ✓ Efficiency monitoring and optimization of routing and ship operations: collection of high-frequency, high-volume, versatile environmental, navigation, performance and condition, both for the hull and all machinery..
- ✓ Fleet management, collision avoidance, and monitoring of high-risk cargos transport to avoid accidents.
- ✓ Big data management and stewardship, developing effective data management platforms and business models that will tackle ownership, intellectual property and security of data by third-party vendors. Ship data management and storage
- ✓ Mechanisms for the effective cooperation of industry stakeholders should also be promoted alleviating technology barriers.
- ✓ New sensors, improve measurements accuracy, stability and consistency, with focus technologies on wireless sensor networks, micro-electro-mechanical systems (MEMS) and optimal virtual sensing systems.
- ✓ Measurements and data management onboard, time synchronization, and fast / reliable data transfer onshore over the internet in a cost-effective manner on 24/7 model, able to sustain the global fleet is also a focus
- ✓ Coupling of the data streams with intelligent data analytics and model-based computer tools with sophisticated algorithms of ship and systems behavior predictive capabilities will lead to preventive diagnostics and "almost" real time operational optimization.

Alternative Fuels

- ✓ Engine technology (e.g. combustion efficiency, blending, methane slip);
- ✓ Compatibility with maritime use (e.g. long storage, corrosion, water infiltration, high salinity environment, ship movement, limited options for accident management);
- ✓ Life-cycle environmental impacts;
- ✓ Safety issues in handling procedures and storage;
- ✓ Supply and feedstock availability (e.g. refinery capacity, demand from other modes of transport, bunker availability at every port);
- ✓ Distribution constraints (e.g. availability of storage and transport capacity, storage and transport costs);
- ✓ Retrofit and conversion costs;
- ✓ Port storage and bunkering infrastructure (e.g. technical challenges, infrastructure development);
- ✓ Market constraints and pricing (e.g. price levels, legal constraints, policy, and impact of incentives)

Alternative Powering

The demonstration of a hybrid electric propulsion configuration on an offshore supply vessel in Europe has shown impressive results in emissions and fuel consumption reduction…

- ✓ Developing and demonstrating further hybrid electric, solar, wind and other radical alternative powering technologies for shipping.
- ✓ Energy harvesting and storage technologies that are proven in other industries or currently emerging should be investigated for maritime use.
- ✓ Developing next generation fuel cell technology considered in an integrated system level to improve efficiency and emissions reduction.
- ✓ Distributed power systems and, in addition, further exploration of heat and energy recovery methods, degassing, thermoelectric generators, thermal storage, and other should be performed.

The new technologies and fuels increases the complexity of ship systems and operations. The continuous development of methods and smart computer tools able to assess and optimise such complex systems and operations with respect to performance, environmental foot-print, safety, and costs at an integrated systems perspective is mandatory.

Environmental technologies

- ✓ Improving the environmental performance of seagoing vessels
- ✓ Improve sustainability targets further research and development is required to achieve further reductions in NO_x, SO_x, and CO_2 emissions through engines and systems improvement
- ✓ Technologies affecting the micro and nano-scale of components and systems for emissions reduction and adaptive control.
- ✓ Continuous reduction of methane slip from LNG/dual-fuel engines
- ✓ Development and demonstration of new technologies for the detection and reduction of particulate matter and black carbon emissions as well as noise, above and below waterline.
- ✓ C02 capture and utilization technologies in shipping should also be investigated.

Logistics

- ✓ Logistics networks optimization, improvement of service reliability methods and ICT support tools, decision support tools for multi-objective optimisation of fleets and service at the strategic, tactical and operational levels, as well as port-vessel synchronization.
- ✓ Big data analytics will have a key role in the improvement of such concepts and potential applications should be identified and implemented, especially when linked with real-time ship AIS data.
- ✓ Port infrastructures are also a significant part of the European shipping value chain.
- ✓ Availability of cold ironing facilities, alternative fuels like LNG, advanced ICT tools for vessels operations and berthing, and cargo handling in an environmentally friendly and cost-effective manner is of key importance.

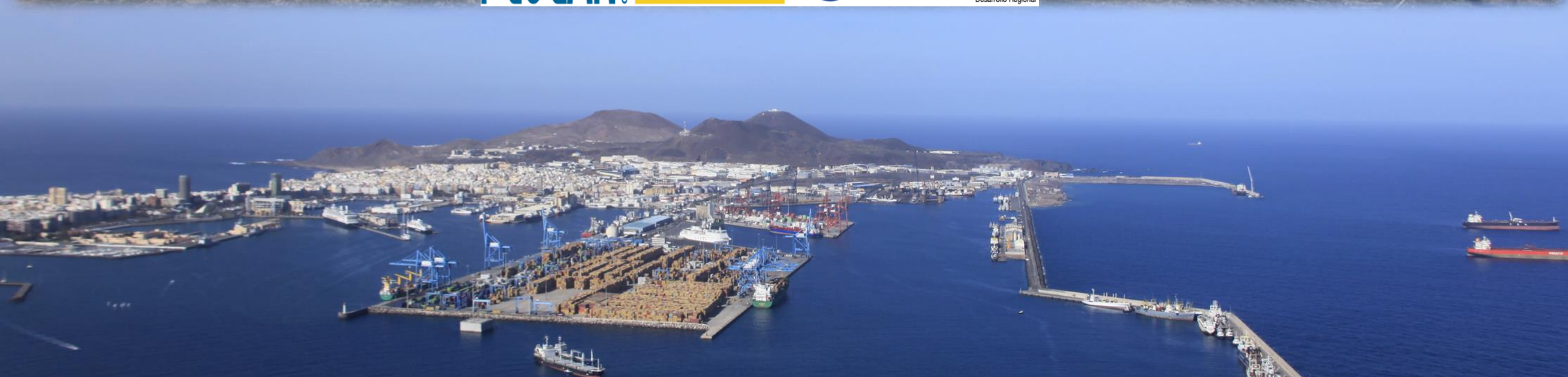
Production Processes and Business Models

- ✓ Development of new production processes and business models that are capable to improve technology, quality, and product diversification while controlling better costs and having better ability to adapt to the more rapid changes of the global and shipping business environments.

- ✓ New alliances and product co-evolution should also be exploited strengthening the European ship-building and shipping industry, departing from traditional competitiveness and silo mentalities.

- ✓ R&D in business plans and the relation between investments in R&D and performance of companies in the maritime industry, taking into account the importance of R&D to remain competitive at a global.

IN THE 22ND CENTURY



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GRACIAS THANK YOU
ARIGATO SHUKURIA GRAZIE MEHRBANI BIYAN SHUKRIA DANKSCHEEN TASHAKKUR ATU YAQHANYELAY SUKSAMA TINGKI GOZAIMASHITA EFCHARISTO JUSPAXAR KOMAPSUMNIDA PALDIES BOLZİN MERCI