

Is LNG the Answer? The Iberian Approach.



“Poseidon Med II calls at Piraeus”

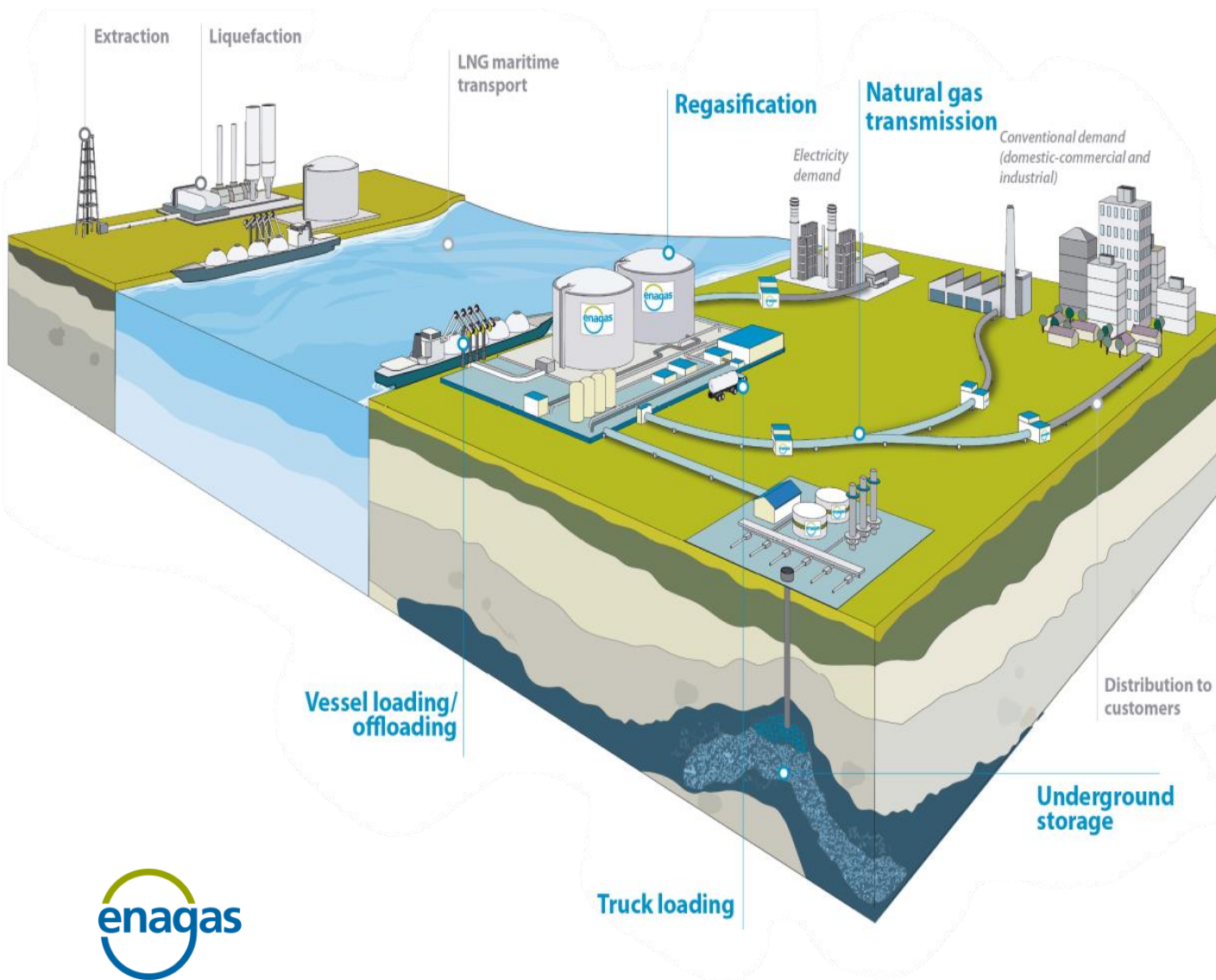
8 December 2016

About Enagas

A midstream company

Leader in natural gas and LNG infrastructures

Major International player as a result of our technological expertise, gas infrastructure construction skills, highly effective operations and maintenance programs and sound financial structure.

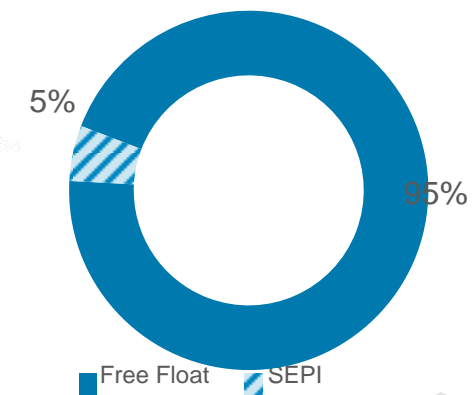


European Union-accredited
independent TSO

Top natural gas transmission company
in Spain

Technical Manager
of Spain's Gas System

Ownership structure

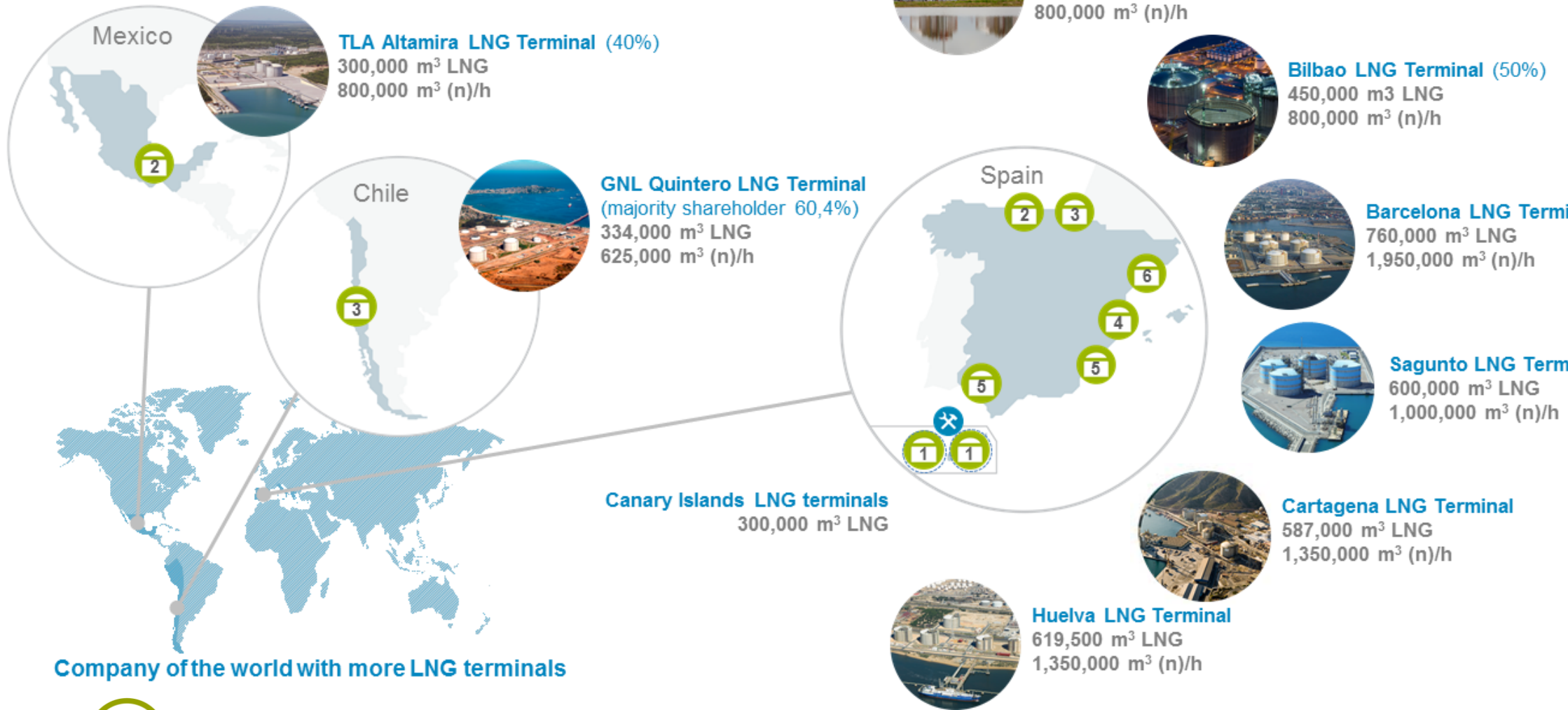


Enagas LNG terminals



Enagás has built 13 LNG storage tanks in Spain since 2002

8 LNG terminals (+2 in development)



Company of the world with more LNG terminals



Enagas Around the World



Mexico

TLA Altamira LNG Terminal
Soto La Marina Compressor Station
Morelos Pipeline

Peru

Transportadora de Gas del Perú (TgP)
Compañía Operadora de Gas del Amazonas (Coga)
South Peru Gas Pipeline

Chile

GNL Quintero LNG Terminal

Spain

6 LNG terminals (+2 in development)
~11.000 km high pressure pipelines
3 underground storage facilities

Sweden

Swedegas

Greece, Albania and Italy

Trans Adriatic Pipeline (TAP)

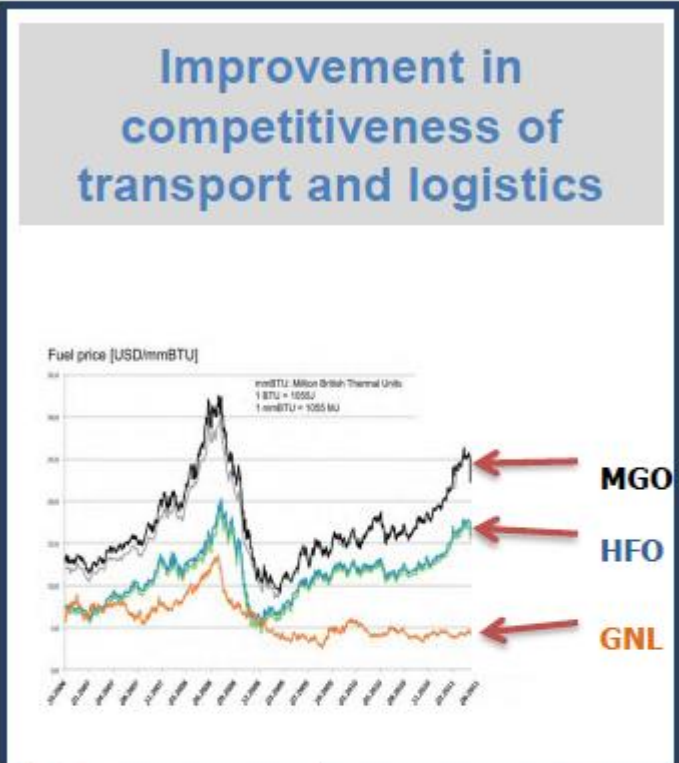
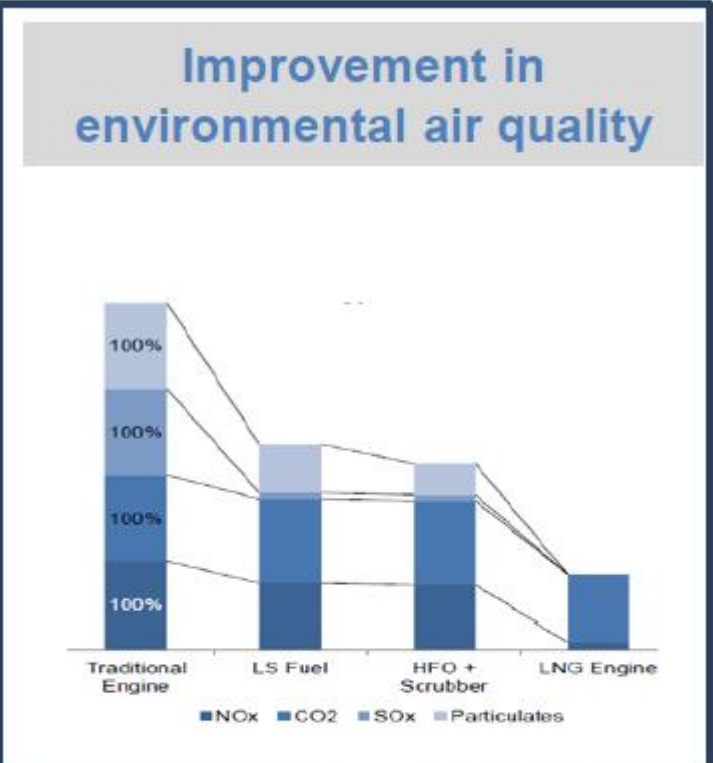




Why LNG in a Port and ... in a big City?



The answers (*):



(*)Answers provided by Port of Barcelona.

Improvement of Air Quality



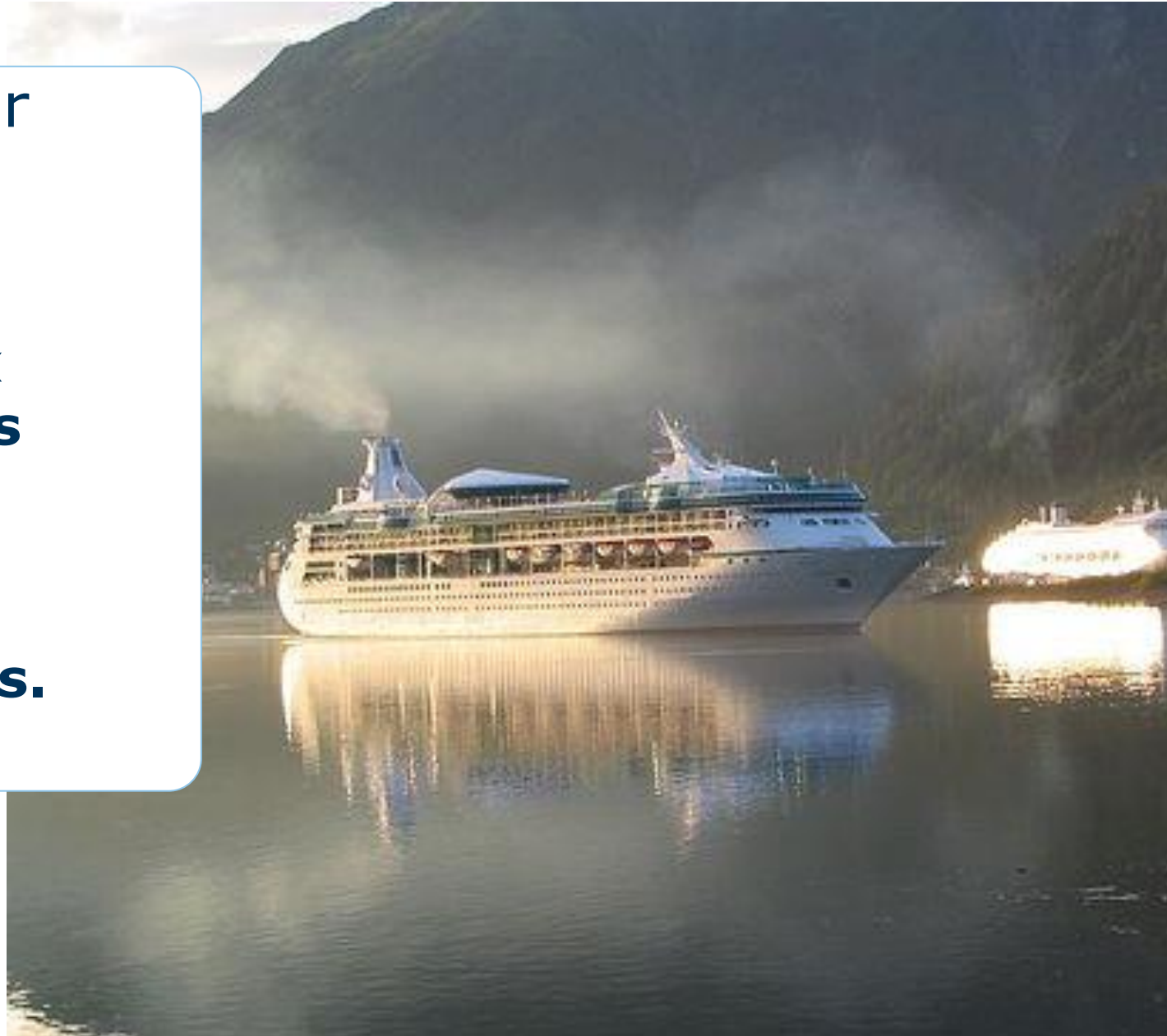
The Maritime Sector responsible of:



18-30% of NO_x world emissions



9% of SO_x world emissions.



Impacting globally and locally



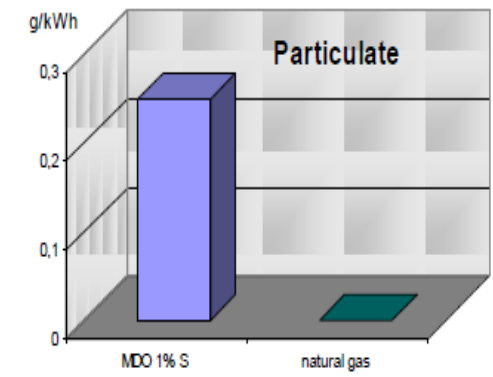
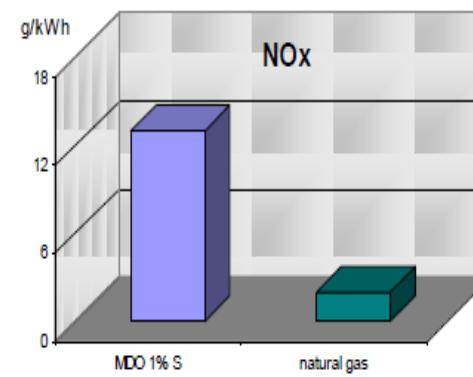
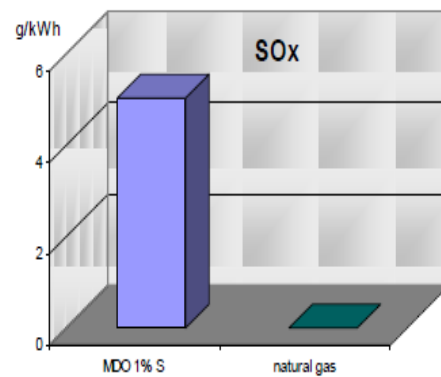
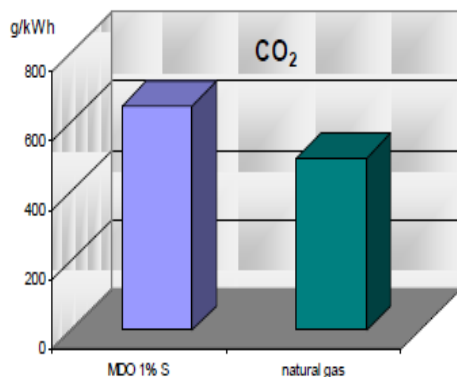
Natural Gas – LNG : a sustainable fuel

The unique complete alternative to maritime fuels



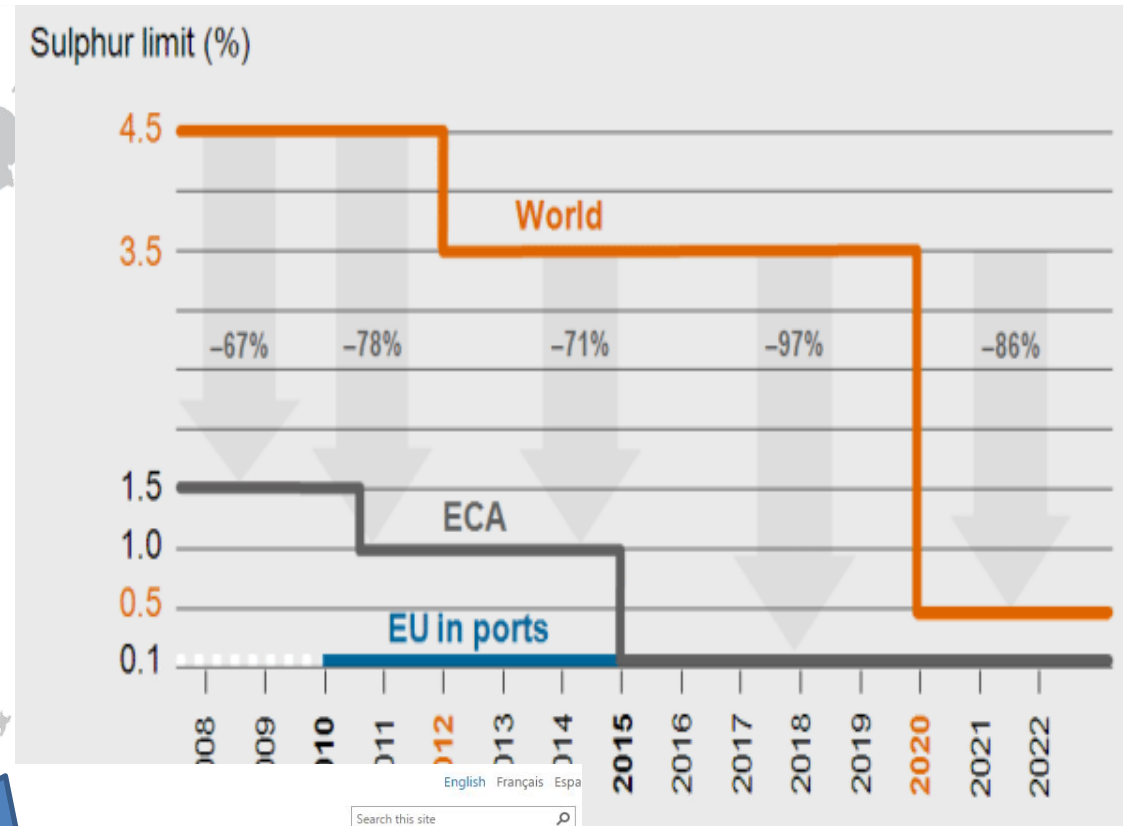
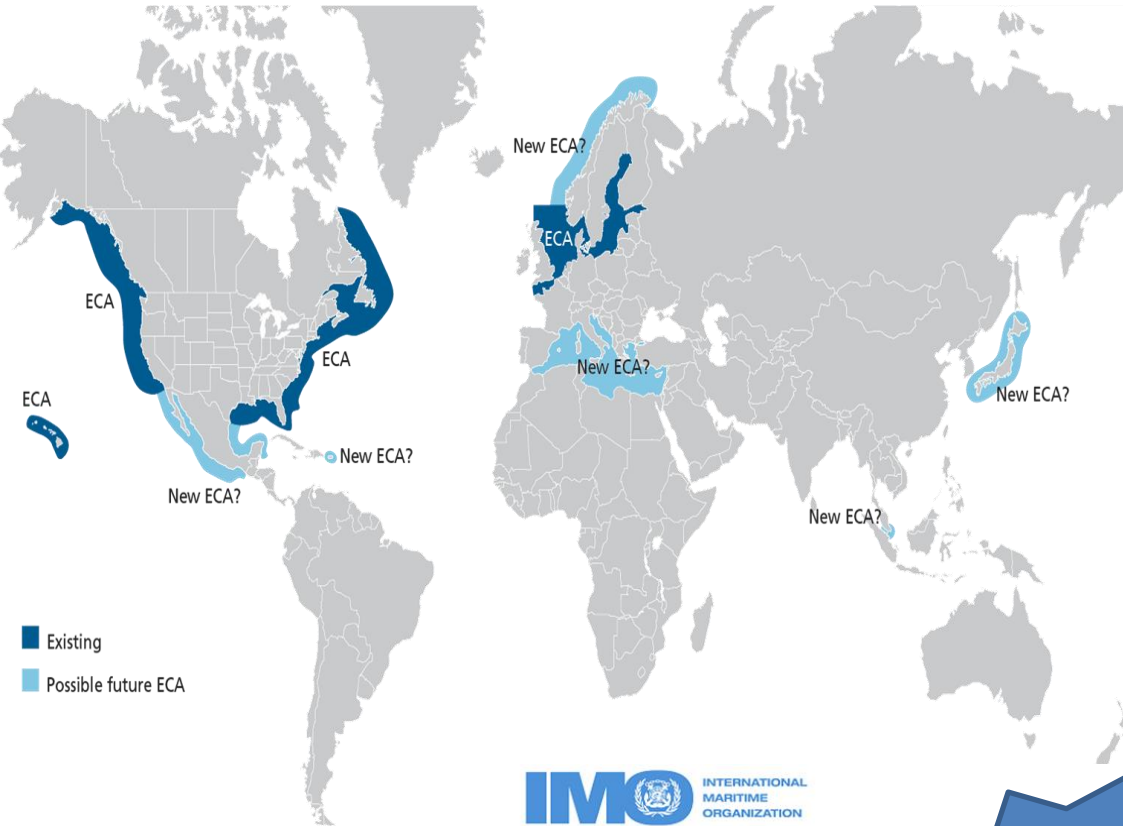
LNG impact vs MDO 1%:

- ✓ **Elimination of SO_x**
- ✓ **Reduction of 90% NO_x**
- ✓ **Elimination of solid particles. PM**
- ✓ **Reduction of +20% CO₂**



Enviromental Maritime regulations

MARPOL – INTERNATIONAL MARITIME ORGANIZATION



NEW

IMO / English / Media Centre / 2020 date for ships to comply with low sulphur fuel oil requirement

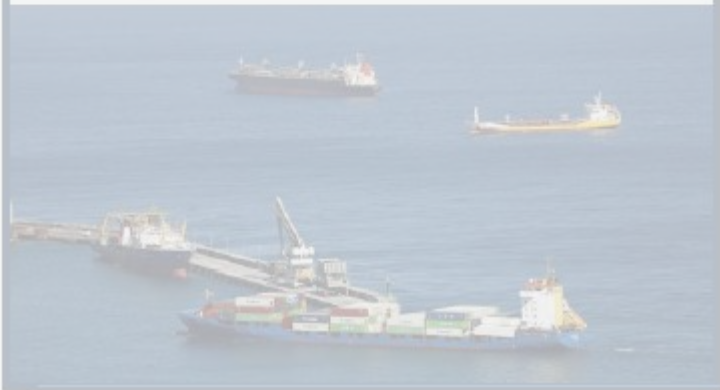
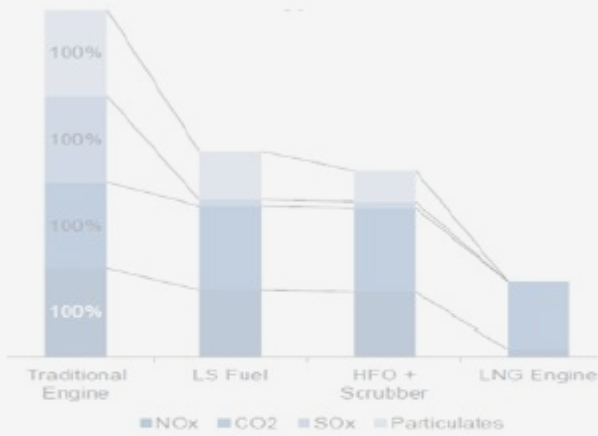
IMO sets 2020 date for ships to comply with low sulphur fuel oil requirement



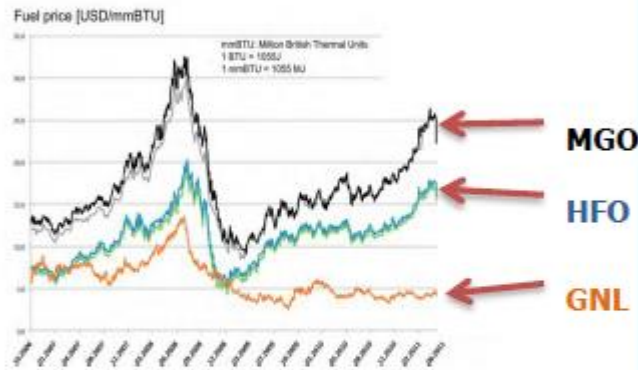
The answers:



Improvement in environmental air quality



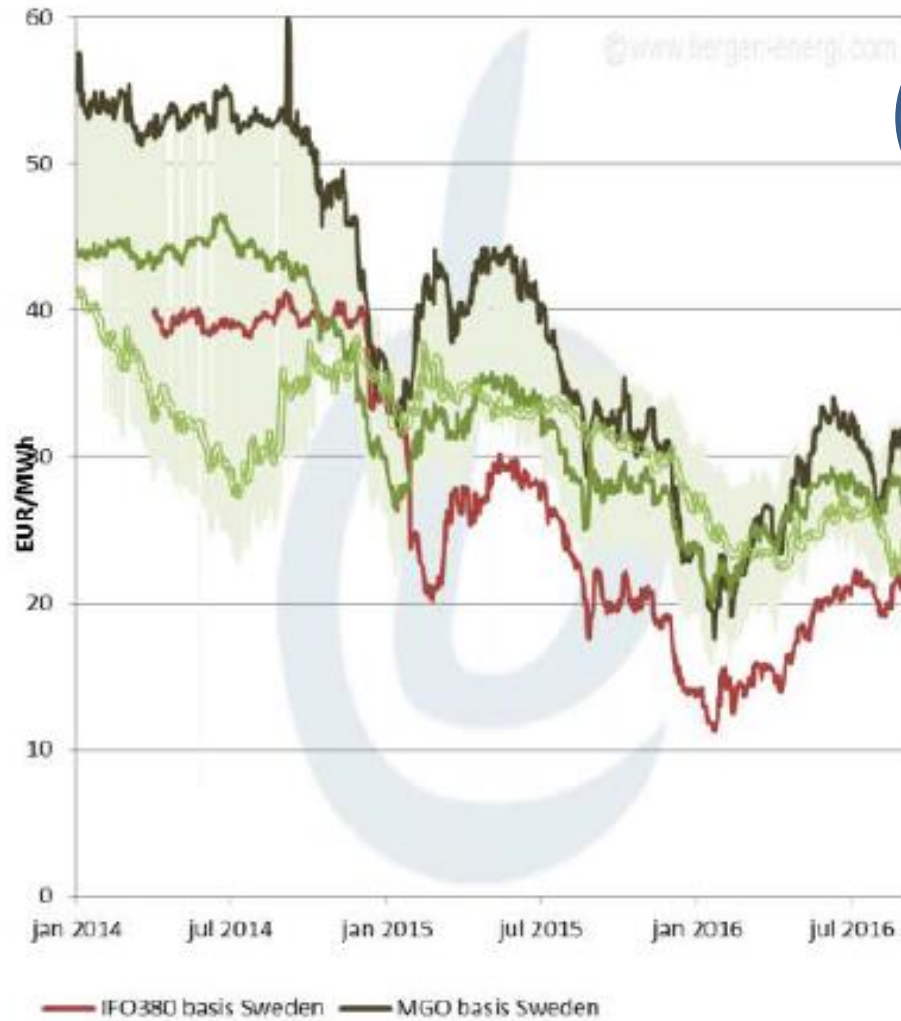
Improvement in competitiveness of transport and logistics



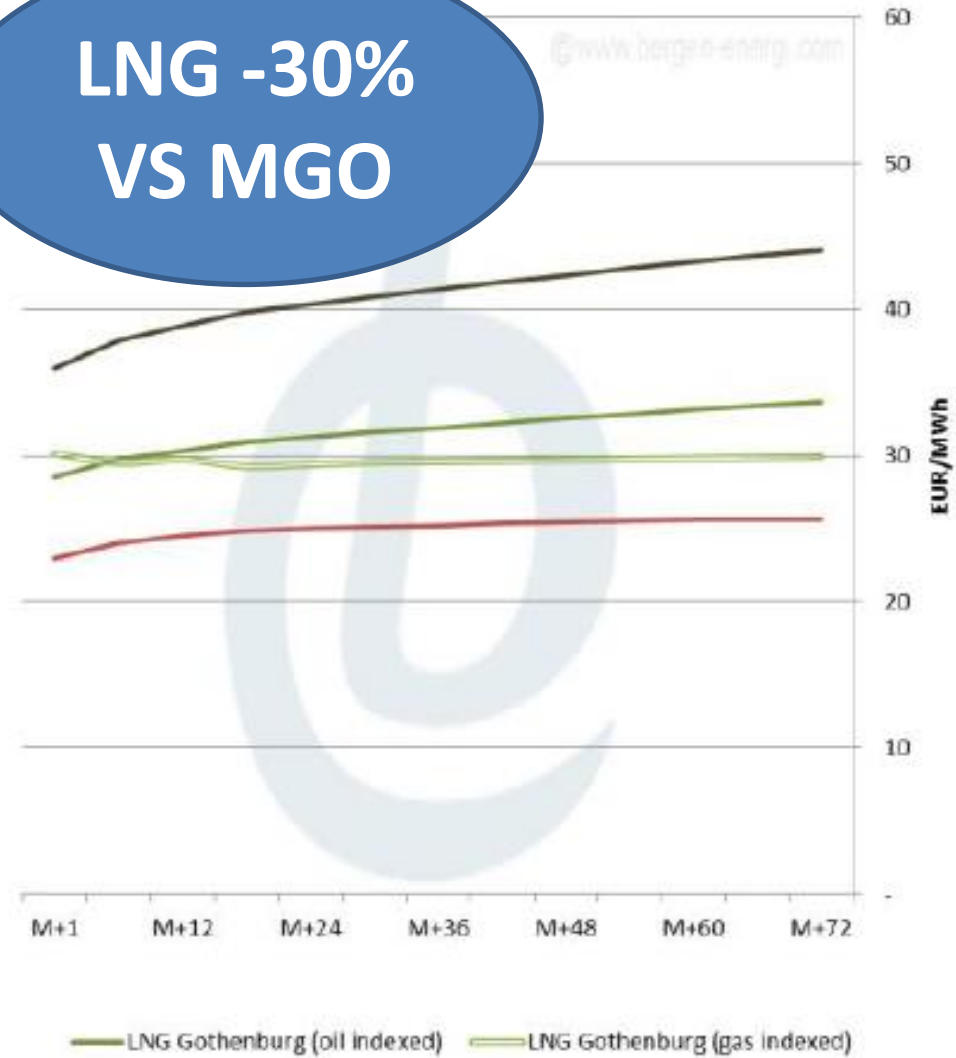
Attraction of ships with LNG



LNG Price Competitiveness



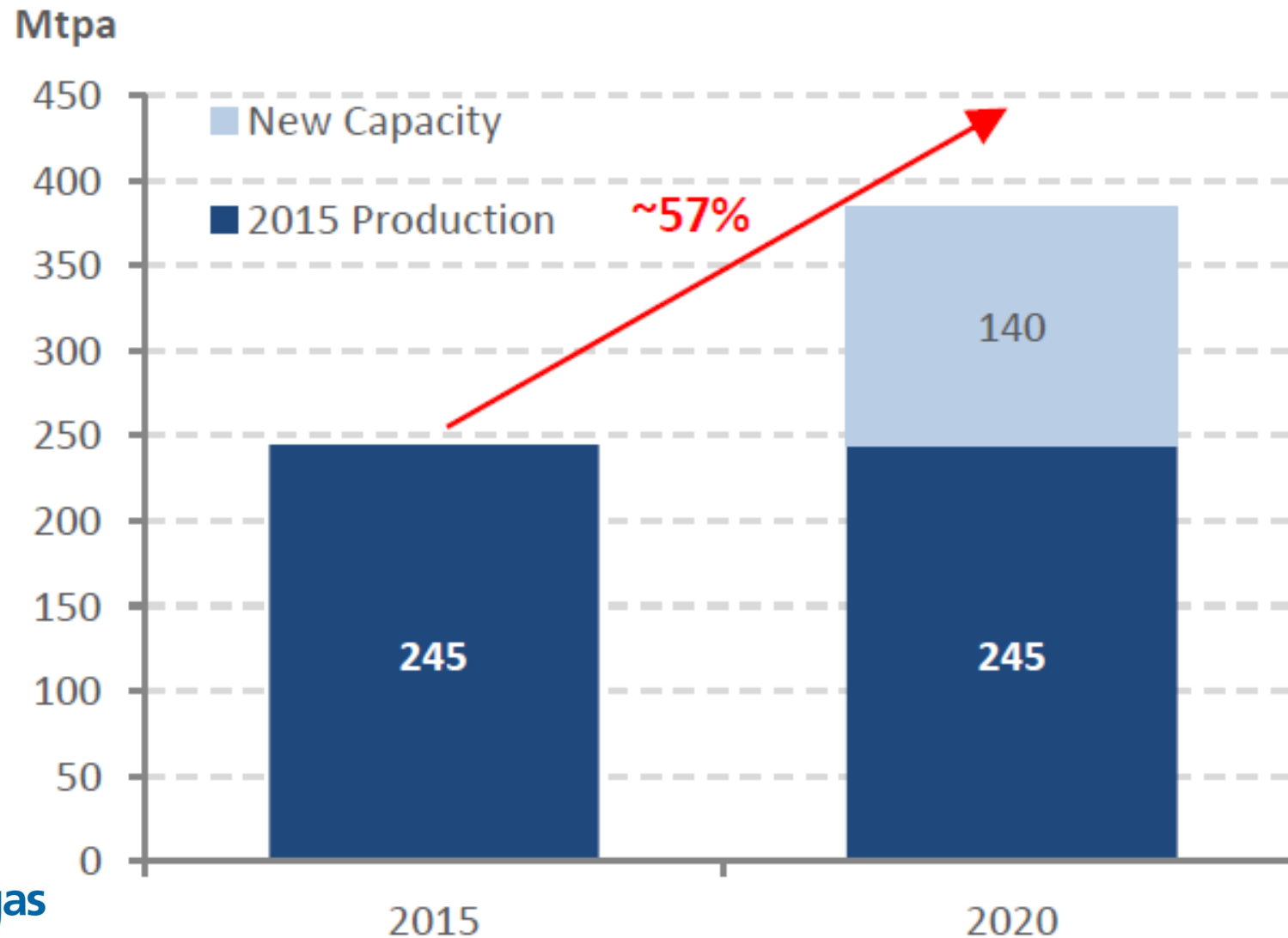
**LNG -30%
VS MGO**



LNG: a high available fuel



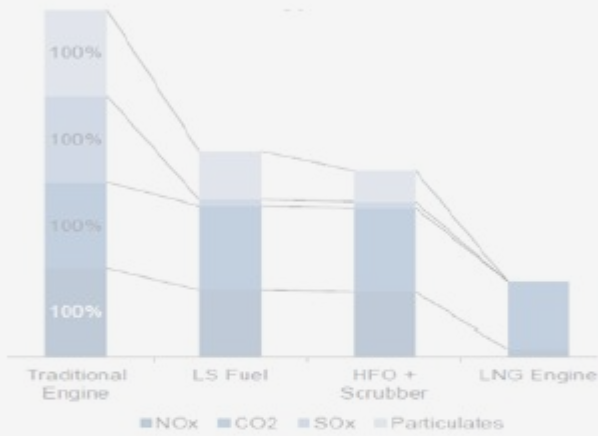
Estimated Production Growth 2015-2020



The answers:



Improvement in environmental air quality



Improvement in competitiveness of transport and logistics



Attraction of ships with LNG



Attraction of LNG fueled ships

Prediction of LNG-powered vessels in Europe.



DNV GL prediction of ocean going LNG-powered vessels in Europe to 2030

Carnival Orders Three More LNG-Powered Cruise Ships

Tuesday September 6, 2016

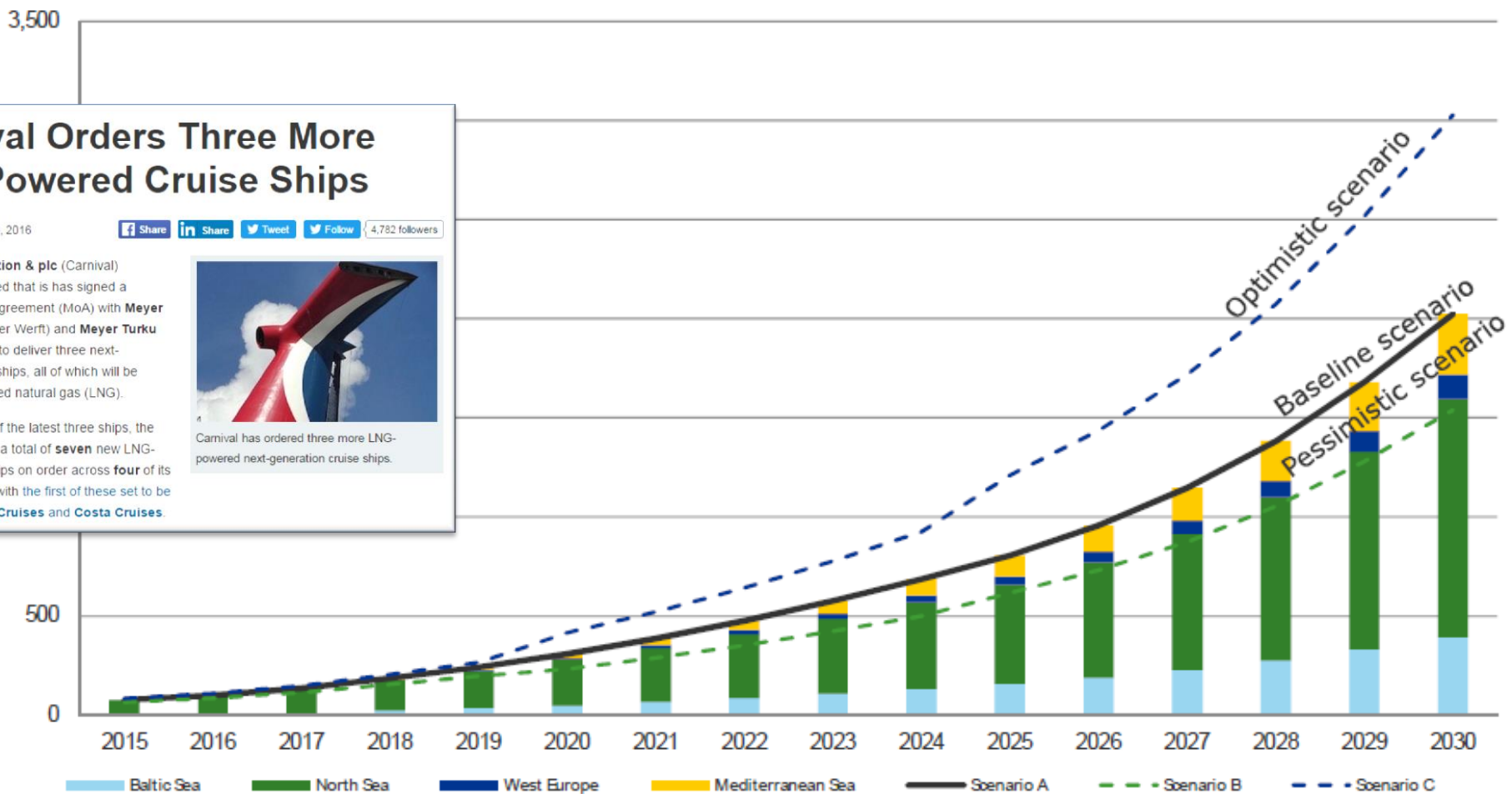
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Carnival Corporation & plc (Carnival) Tuesday announced that it has signed a memorandum of agreement (MoA) with **Meyer Werft GmbH** (Meyer Werft) and **Meyer Turku Oy** (Meyer Turku) to deliver three next-generation cruise ships, all of which will be powered by liquefied natural gas (LNG).



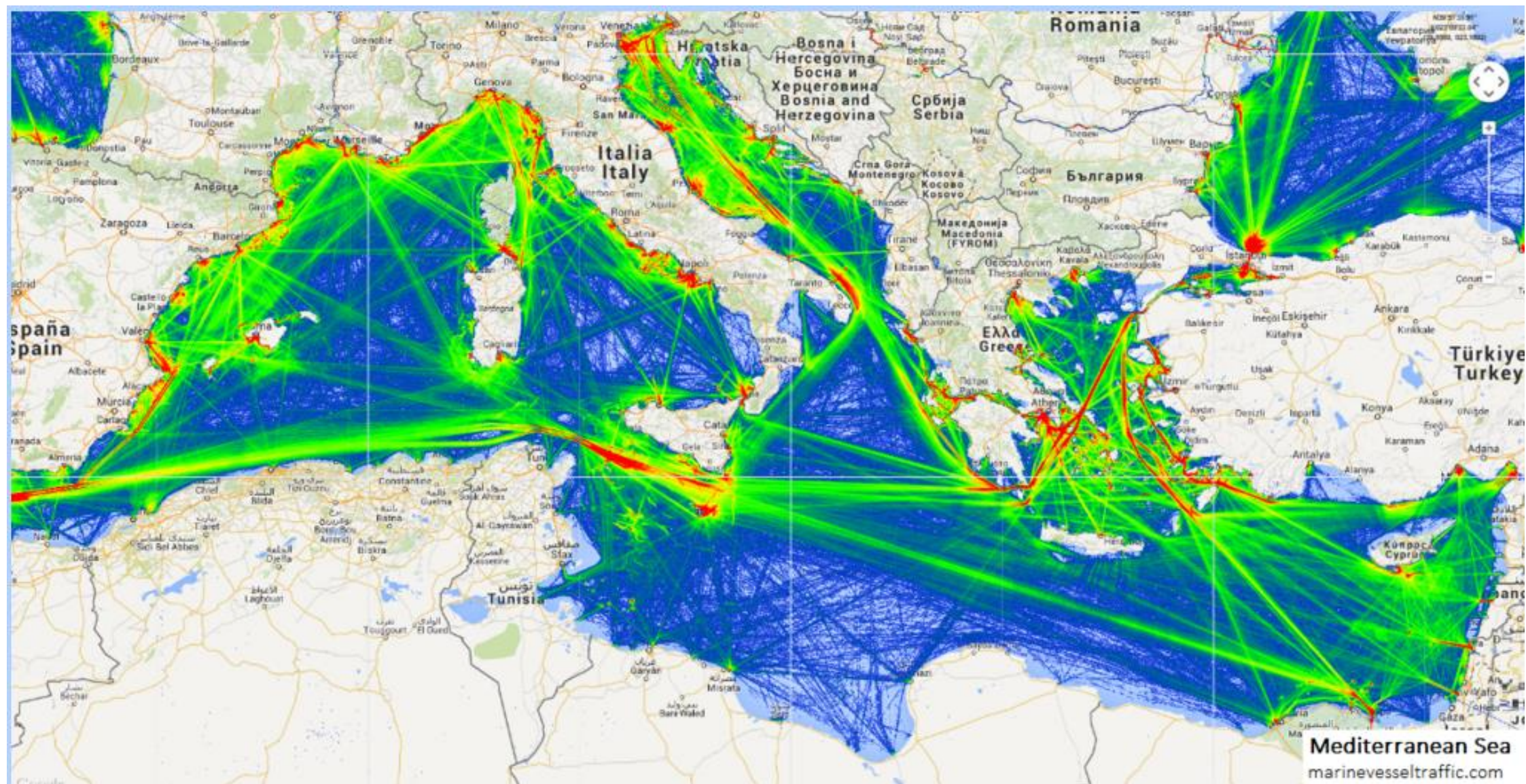
Carnival has ordered three more LNG-powered next-generation cruise ships.

With the addition of the latest three ships, the company now has a total of **seven** new LNG-powered cruise ships on order across **four** of its **10** cruise brands, with the first of these set to be delivered to **AIDA Cruises** and **Costa Cruises**.



Attraction of LNG fueled ships

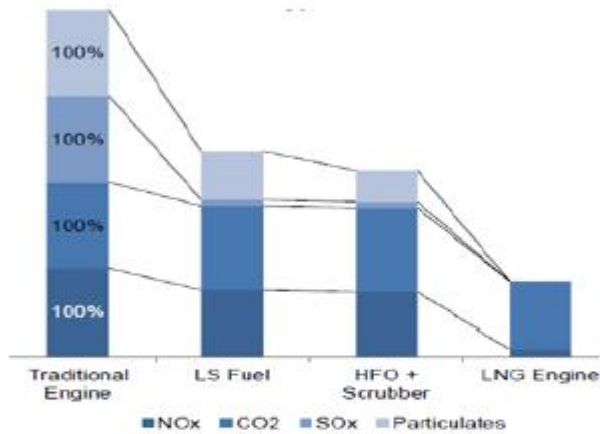
Where to bunker LNG? The competition is open..



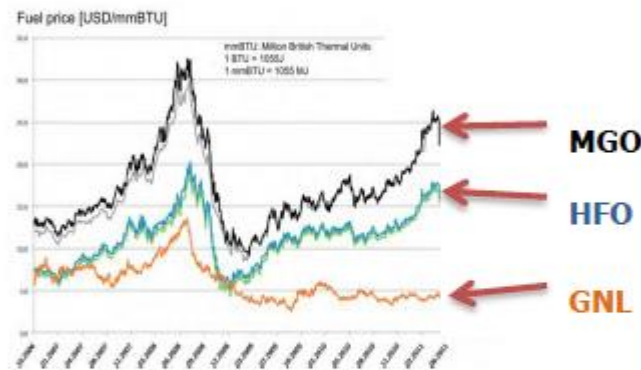
Mediterranean Sea
marinevesseltraffic.com

The answers:

Improvement in environmental air quality



Improvement in competitiveness of transport and logistics

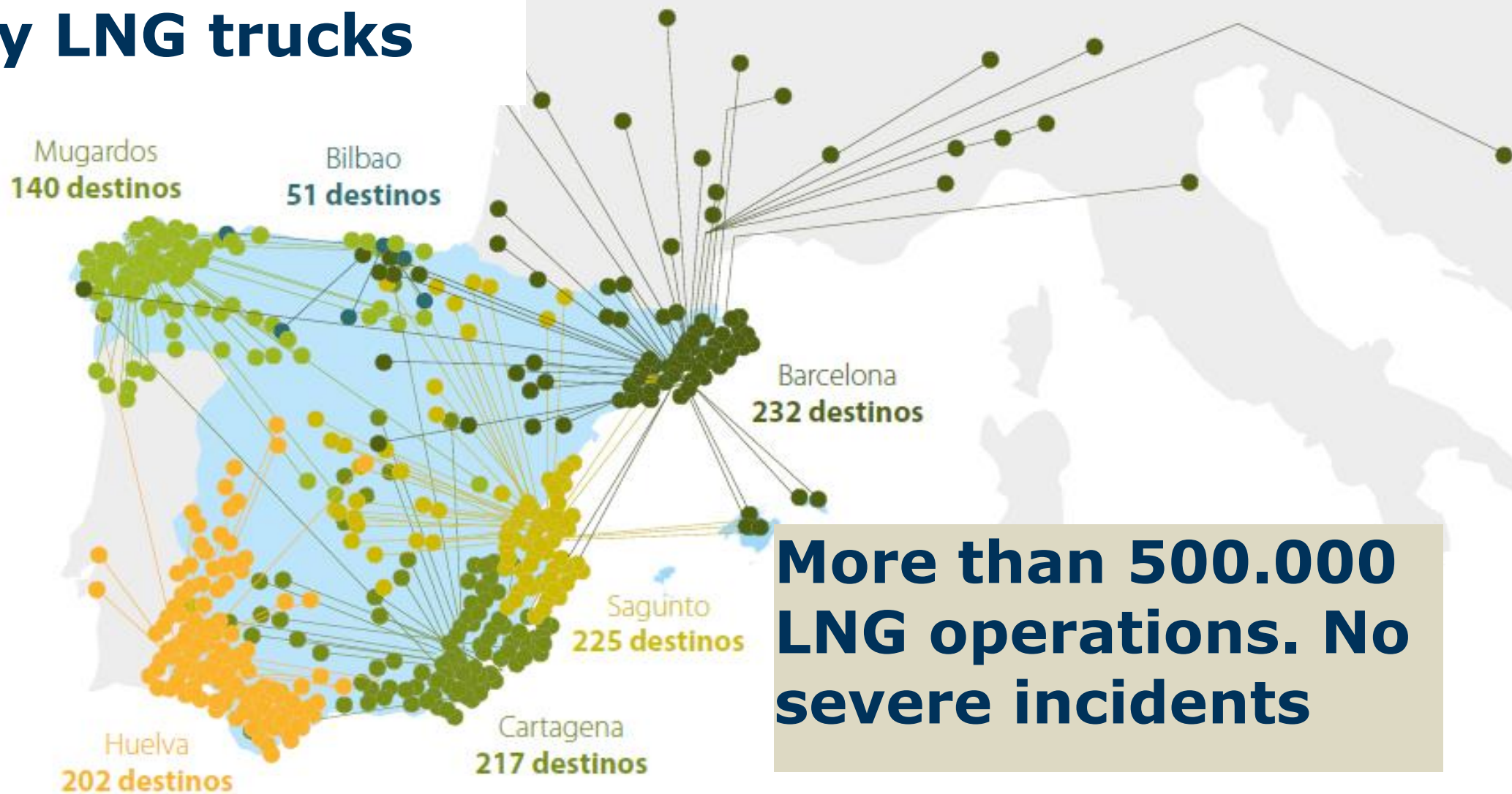


Attraction of ships with LNG

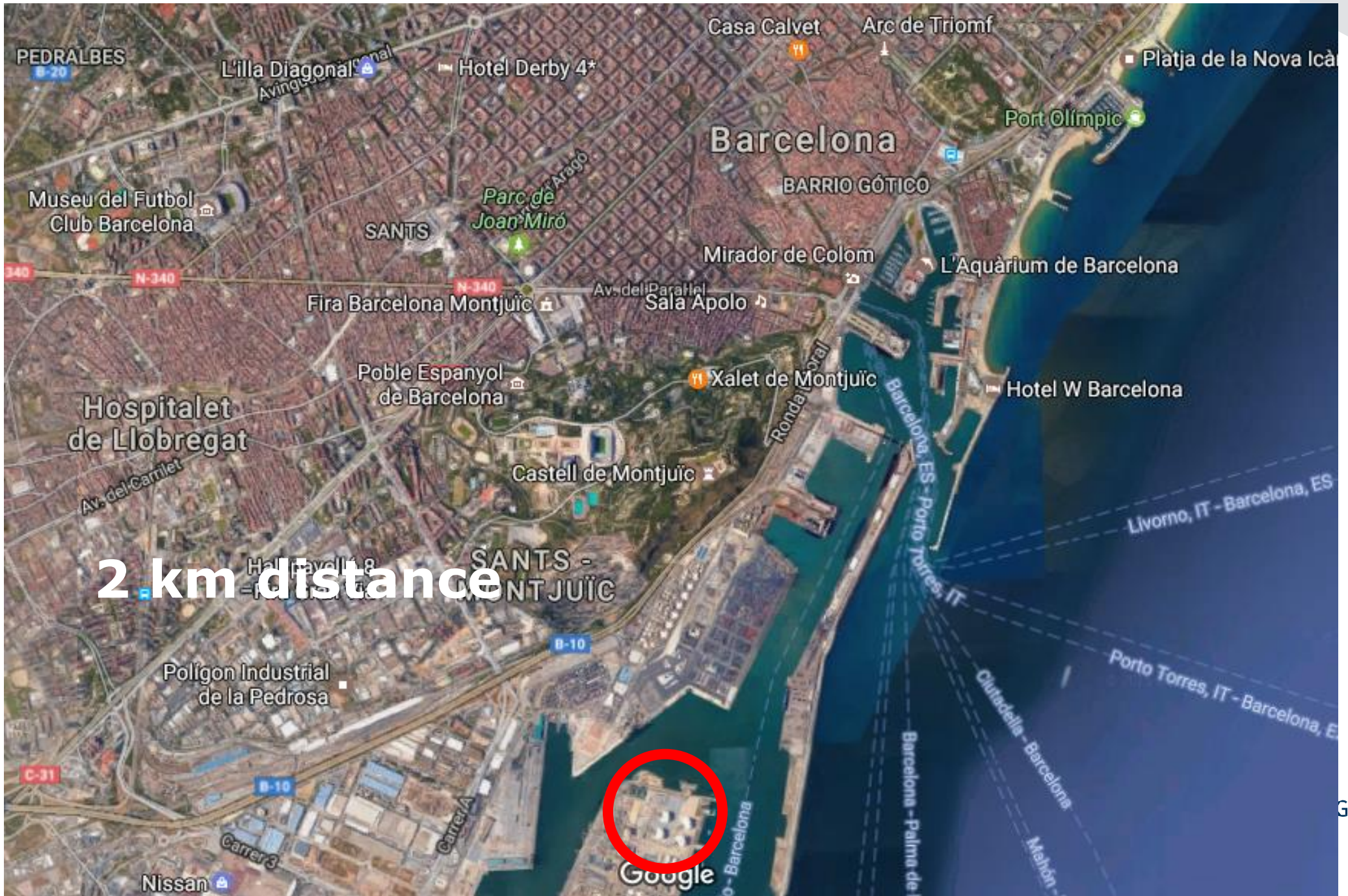


Small Scale Experience

1000 LNG inland plants supplied by LNG trucks



The LNG terminal and Barcelona City





OK... But we need to
develop infrastructures
and regulation



To solve it we promote in the Iberian peninsula this project:



CORE LNGas
hive

OBJECTIVES OF THE PROYECT

DEVELOPMENT OF LNG BUNKERING IN IBERIAN PENINSULA



REGULATION AND NORMATIVE DEVELOPMENT

To make a **proposal of the National Policy Framework**, in view of fulfilling the requirements of the **Directive 2014/94/EU**



INFRASTRUCTURE DEVELOPMENT

To define a **roadmap** and an **investment plan to scale up the results** of the Action

PARTNERS



REGULATION, NORMATIVE, MARKET

TRANSVERSAL STUDIES

NATIONAL POLICY FRAMEWORK

- National Objectives
 - Incentives
- Measures to promote demand
- Observatory

TECHNICAL, SAFETY ENVIRONMENTAL SPECIFICATIONS

- Bunker infrastructures
- Use of LNG in port environment

LNG ADVANCE TRAINING REQUIREMENTS

- Training needs
- Training centers
- Accreditation processes

LNG SOCIAL ACCEPTANCE

- Improve social perception
- Advantages of the product
- Smooth landing of LNG

LNG DEMAND AND SUPPLY CHAIN ATLANTIC CORRIDOR

LNG DEMAND AND SUPPLY CHAIN GIBRALTAR STRAIT & PERIPHERAL REGIONS

LNG DEMAND AND SUPPLY CHAIN MEDITERRANEAN CORRIDOR

- To foresee LNG demand along the Iberian façades of the corridors
- To define the most suitable logistic solution depending on distance and demand
- To analyze different business models

INFRASTRUCTURE, EQUIPMENTS

ADAPTATION OF LNG TERMINALS FOR BUNKERING

**ENGINEERING FOR NEW
DEDICATED LNG JETTY IN
MUGARDOS LNG TERMINAL**



**ADAPTATION FOR LNG SMALL
SCALE SERVICES IN BIG SCALE
JETTY IN BILBAO LNG TERMINAL**



**BARCELONA: DEDICATED LNG
FLEXIBLE HOSES FOR BUNKERING**



**ADAPTATION FOR LNG MIXED
BUNKER/BIG/SMALL SCALE
SERVICES IN EXISTING JETTY.**



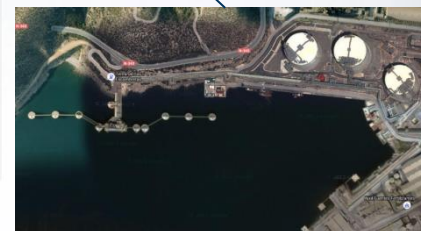
**ADAPTATION FOR LNG
BUNKERING/SMALL SCALE
SERVICES IN REGASIFICATION
PLANT OF SAGUNTO.**



**MULTIMODAL LNG BUNKER
BERTH IN PORT OF HUELVA**



**CARTAGENA: DEDICATED LNG
MOORING JETTY FOR SMALL
SCALE SERVICES**

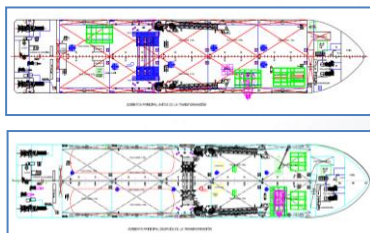


INFRASTRUCTURE, EQUIPMENTS

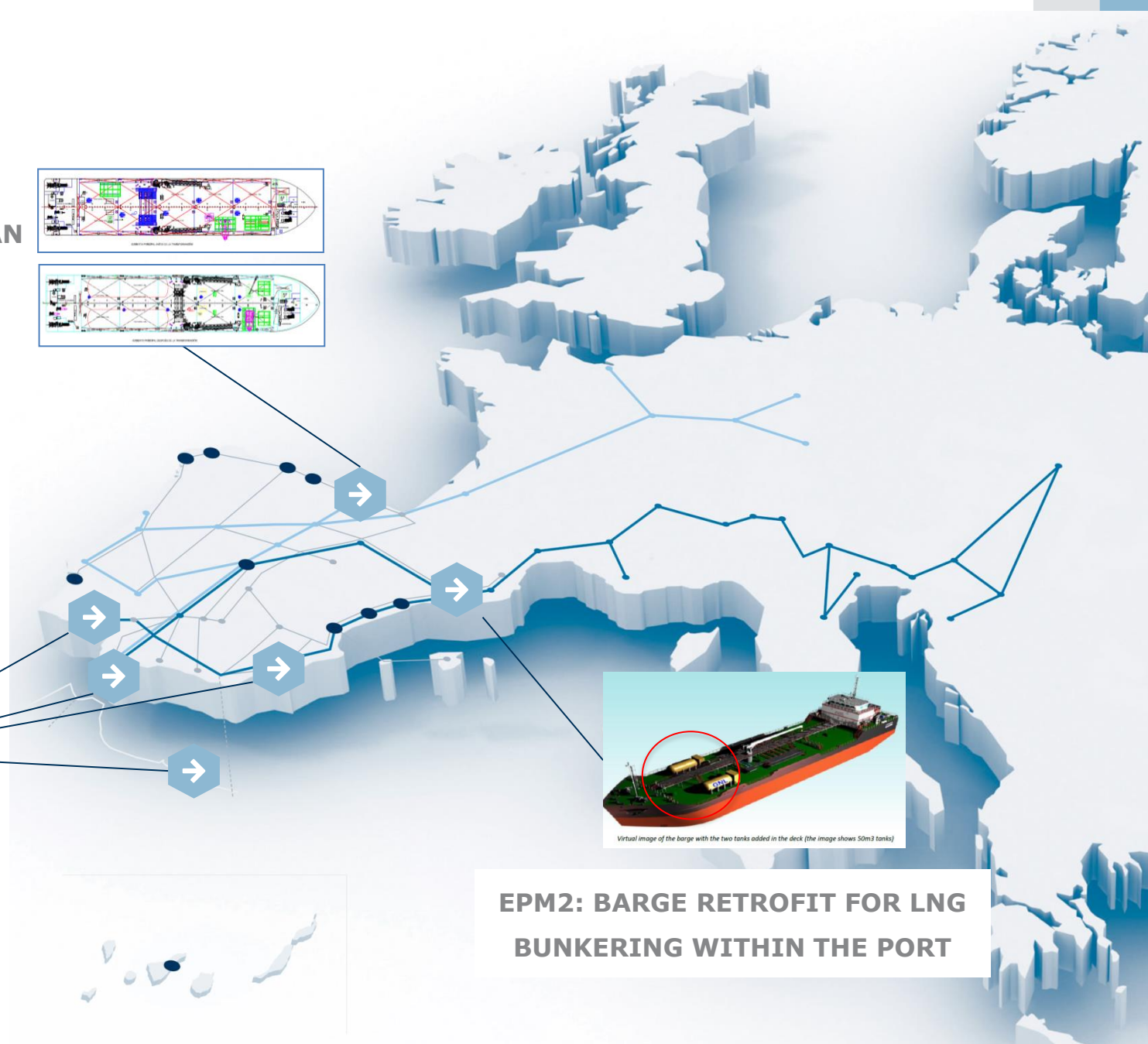
BUNKERING BARGES AND MULTIMODAL LOGISTIC



**BARGE RETROFIT FOR LNG
BUNKERING IN THE CANTABRIAN
COAST**



**EPT2: MULTIMODAL
TRANSPORT FOR LNG
LOGISTICS SUPPLY CHAIN
(RAIL/ROAD/TRAIN)**



Virtual image of the barge with the two tanks added in the deck (the image shows 50m³ tanks)

**EPM2: BARGE RETROFIT FOR LNG
BUNKERING WITHIN THE PORT**



INFRASTRUCTURE, EQUIPMENTS

LNG UTILIZATION IN PORTS



STRADDLE CARRIER RETROFIT.

BILBAO: NEW
TUGBOAT
POWERED BY
LNG.



EV4: TUGBOAT POWERED BY LNG
(BARCELONA)



EV2: RESCUE BOAT POWERED BY LNG



Feasibility and retrofitting study for the conversion of a port terminal's shunting locomotive to LNG traction



EV3: PORT LOCOMOTIVE
POWERED BY LNG (TARRAGONA)

EPT 1: LNG POWERED
ELECTRICITY GENERATOR
MOBILE UNIT FOR OPS.



EPM5: LNG/CNG MIXED STATION
FOR VEHICLES AND SMALL
BOATS)



EV6: TUGBOAT POWERED BY LNG
(VALENCIA)



Ευχαριστώ
Muchas Gracias
Thanks



Enagas invest,
build and
operate LNG
bunkering
infrastructures

Fernando Impuesto

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Commercial Director**

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