

# Experience of DNVGL with LNG fuelled vessels and the IGF code in our rules

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18 October 2016

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# Content

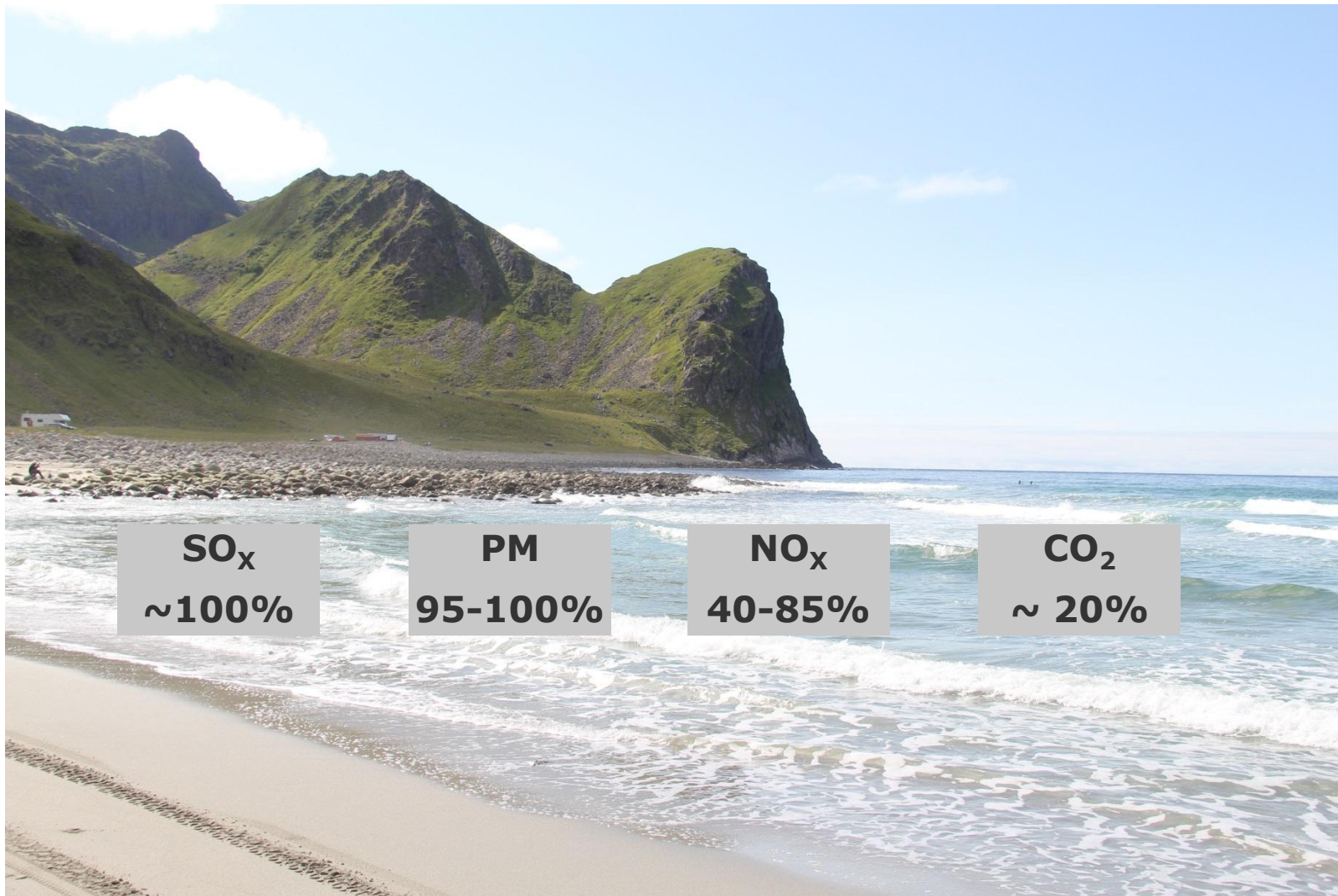
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- Background
- Experience with LNG as fuel – some indications
- Bunkering of LNG
- IGF-Code
- Summary



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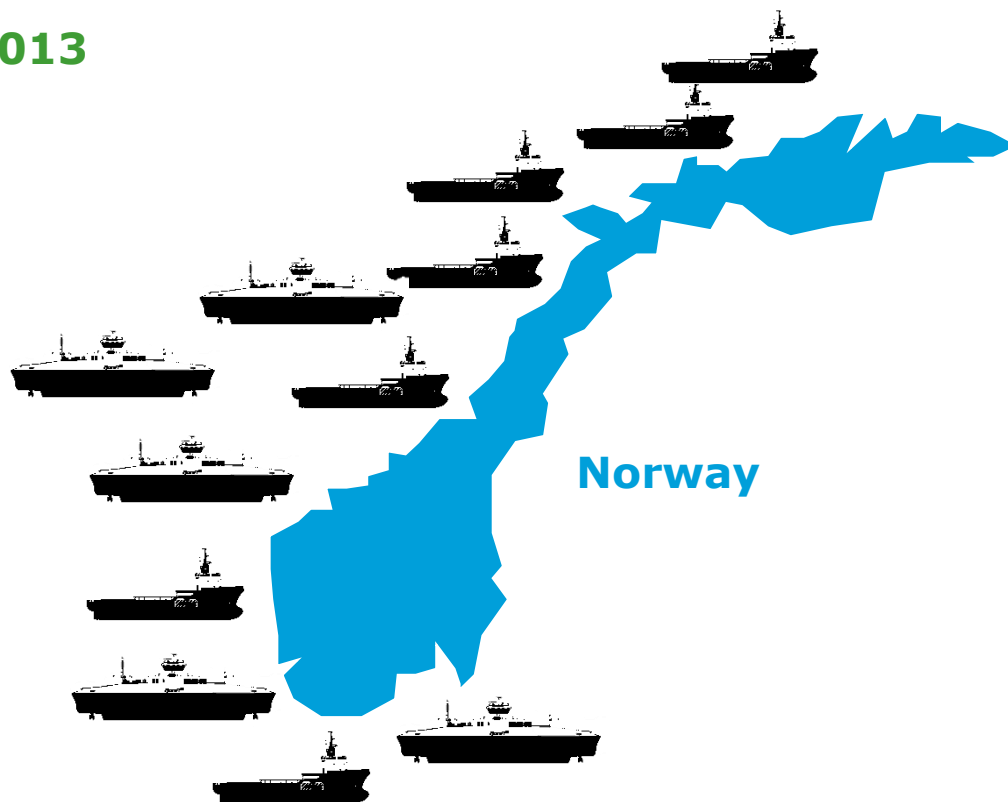
## Potential emission reductions when using LNG as fuel



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## The development trend is moving from LOCAL ...

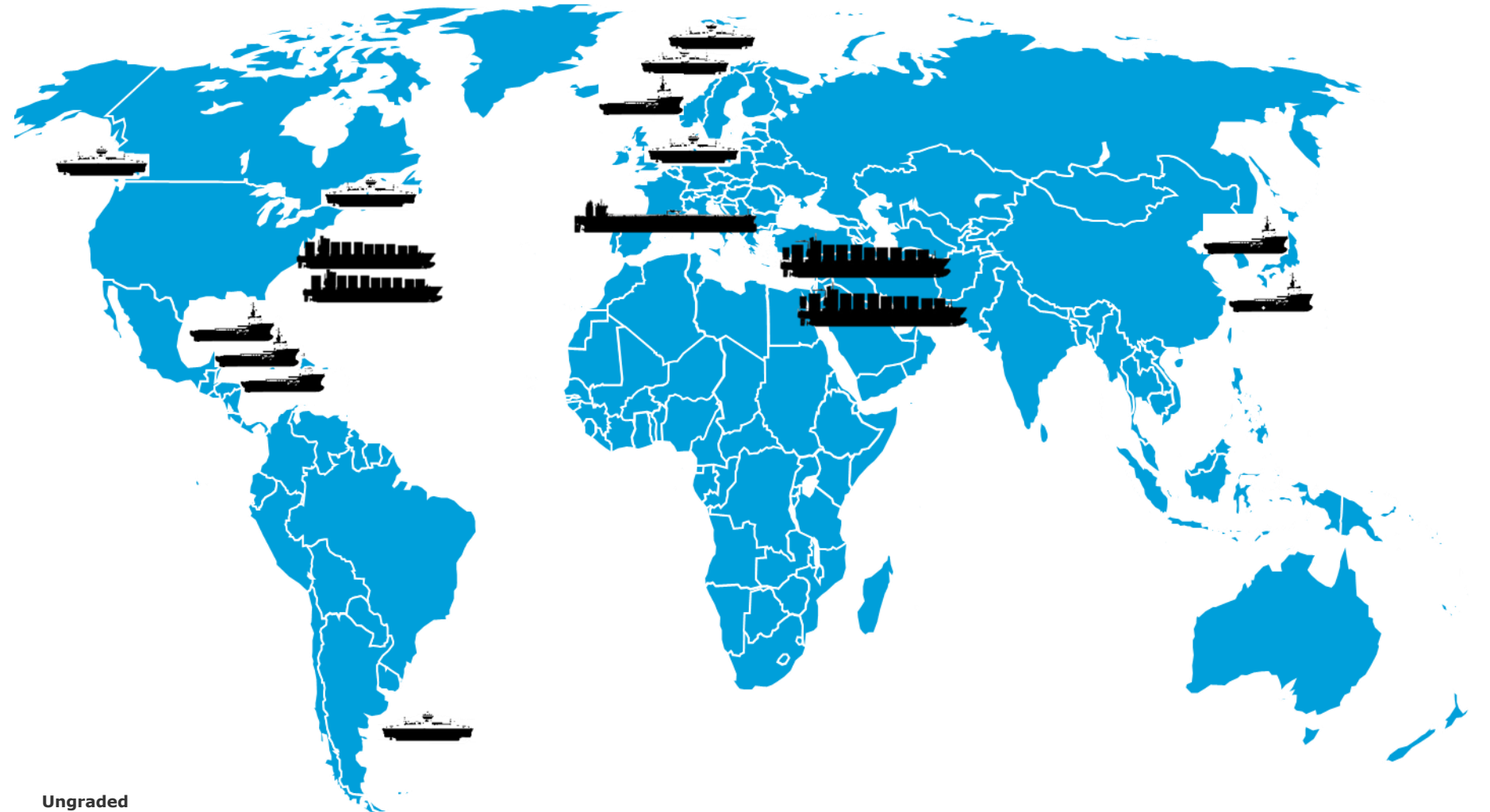
2000 – 2013



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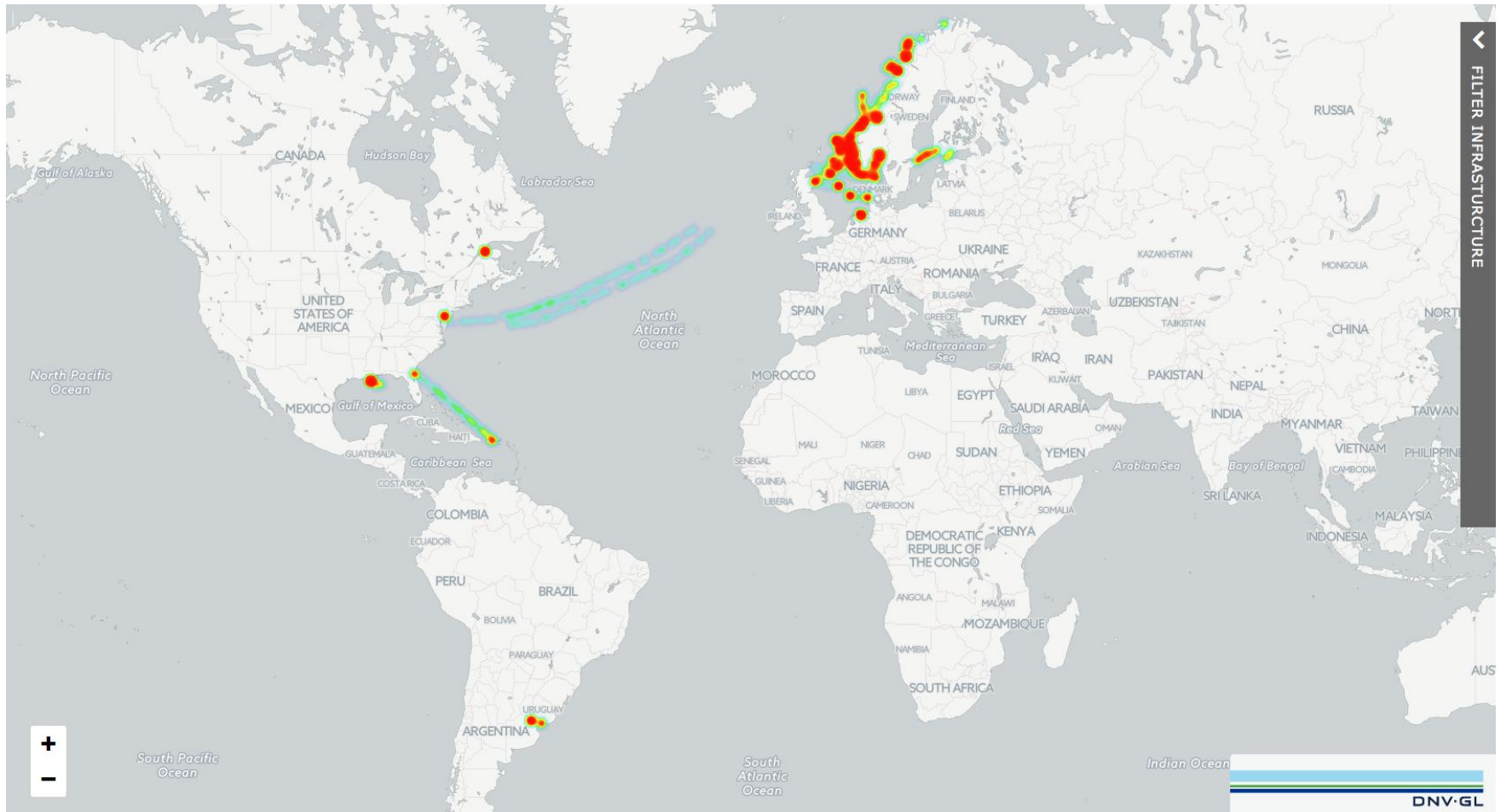
... to GLOBAL

2013 – ...



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# AIS data from LNGi shows that LNG fuelled ships are already covering a large area

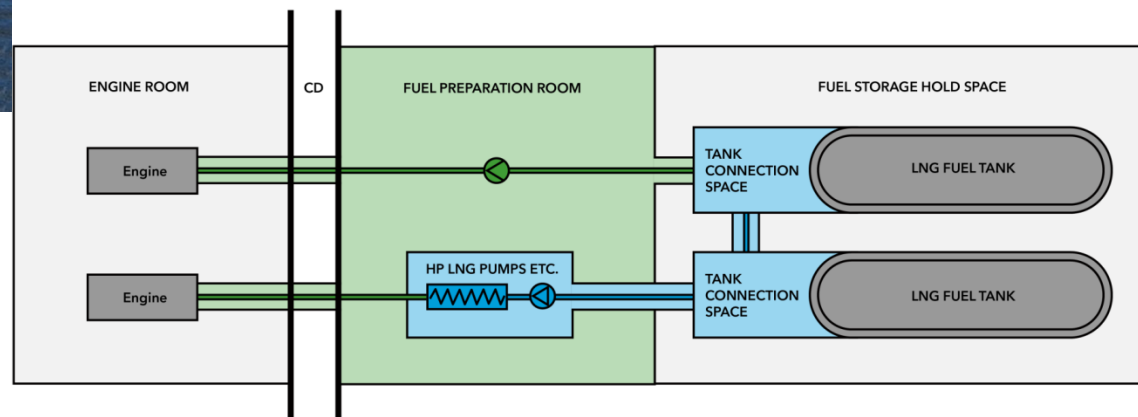




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*The heat map is based on the LNG fuelled fleet's AIS positions from 25.05.2016-31.05.2016*



## LNG fuel installation – larger ships

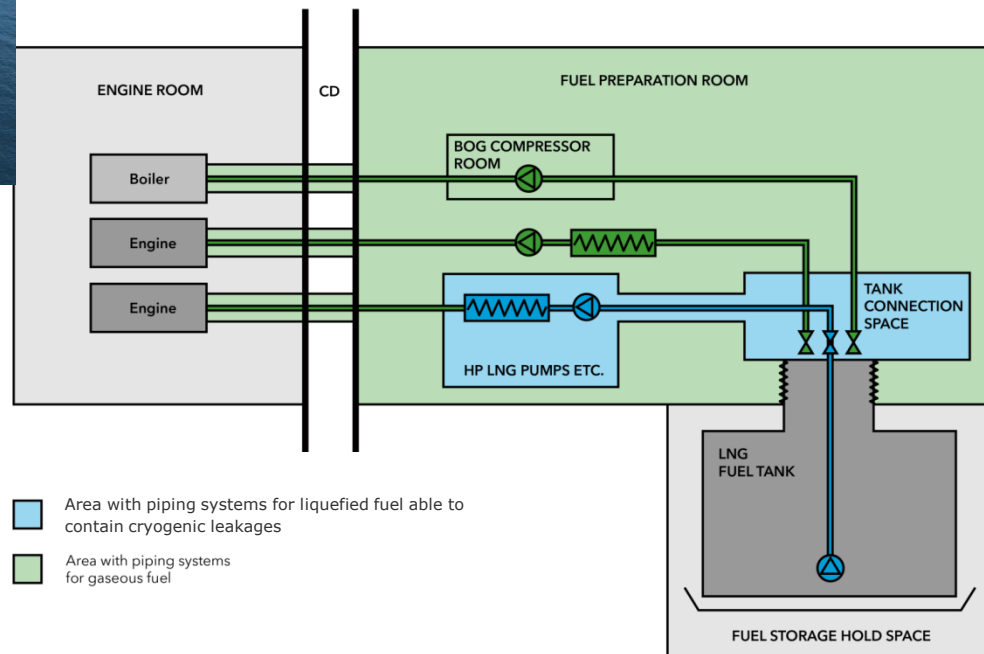


-  Area with piping systems for liquefied fuel able to contain cryogenic leakages
-  Area with piping systems for gaseous fuel

DNV GL / COWI MEDIA 2014

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# LNG fuel installation – larger ships



DNV GL CORP MEDIA 2014

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## LNG engines: Some technical indications:



**Indications only!  
Continuous development**



- Silent ship
- Lower lub-oil consumption
- Higher fuel efficiency
- Clean and tidy engine room
- Fuel sourcing from two energy markets can save costs
- Less deposits, corrosion
- No fuel separator, “no oil spill” and oil residues to take care

- LNG quality (methane number) appears important
- More load steps required when going from 0 to 100% load
- Some children’s deceases have been observed; usually solved quickly by suppliers

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## Maintenance of LNG engines vs diesel engines, indications:



**Indications only!  
Continuous development**



- Apparently longer maintenance intervals (4 stoke, pure LNG engines)
- Less deposits in engine and exhaust gas boilers
- Proud seafarers take good care of equipment
- Spare part costs may appear a little high
- 2 sets of fuel valves adds costs (for Dual fuel engines)
- Gas fuelled engines and gas systems add complexity and need for special spare parts
- More complex engines and gas systems require a higher skilled crew

# Alternatives for LNG Bunkering



From road trucks



Shore LNG storage tank



Portable Gas fuel tank

Ship to ship LNG transfer SIMOPS!

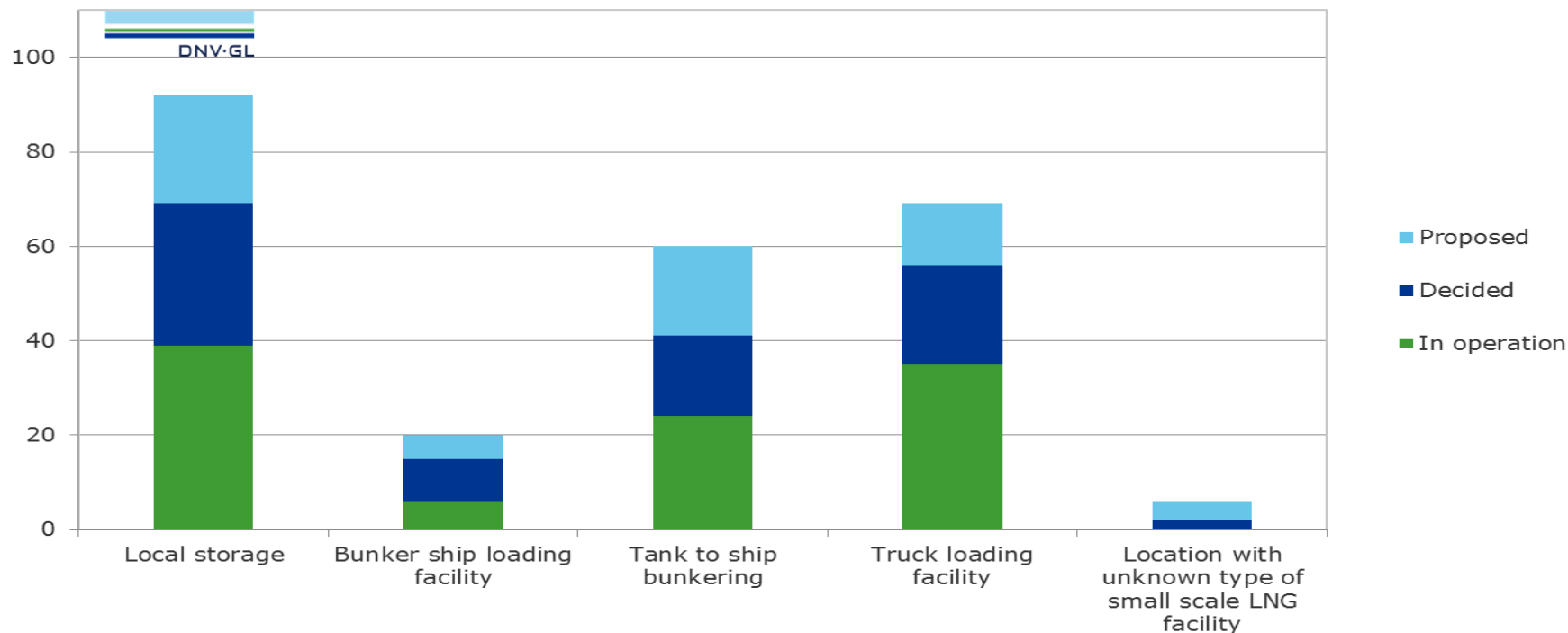


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# All types of LNG supply facilities are being developed\*

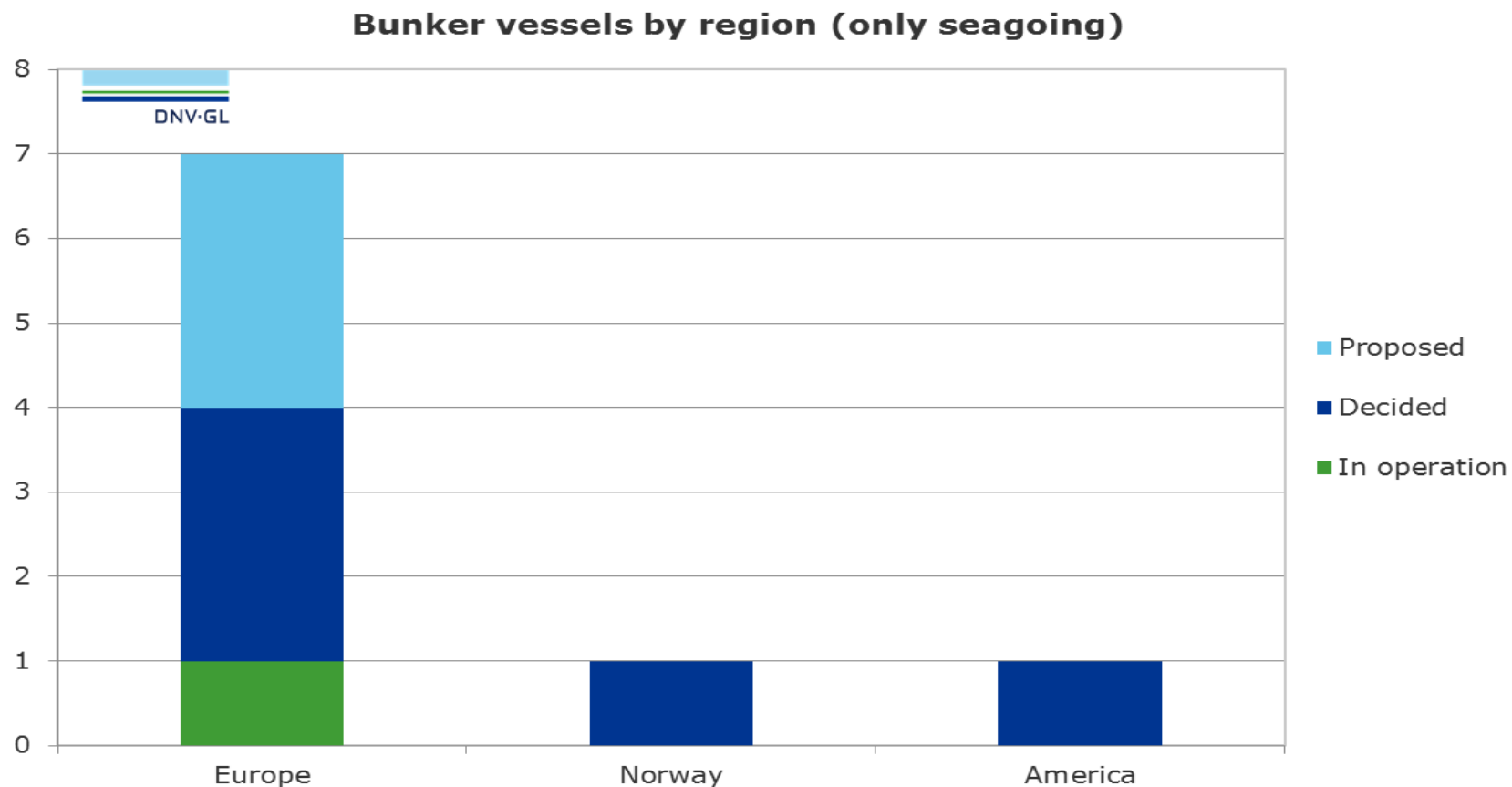
Type of facility worldwide



\*Some locations have several types of facilities, which is why the number of facilities is higher than the number of locations.

- Local storage – An intermediary LNG storage
- Tank to ship bunkering – A local storage where an LNG fuelled ship can bunker directly from shore
- Truck loading facility – A terminal where LNG trucks can load LNG
- Bunker Ship loading facility – LNG terminal accessible by small LNG carriers

## Within end of 2017 there will be 7 LNG bunker vessels in operation\*



\*In the LNGi map bunkering barges for inland waterway vessels are also shown, but these projects are not counted here.

# First LNG Fuelling for Aida Prima in Hamburg on 7<sup>th</sup> of May 2016

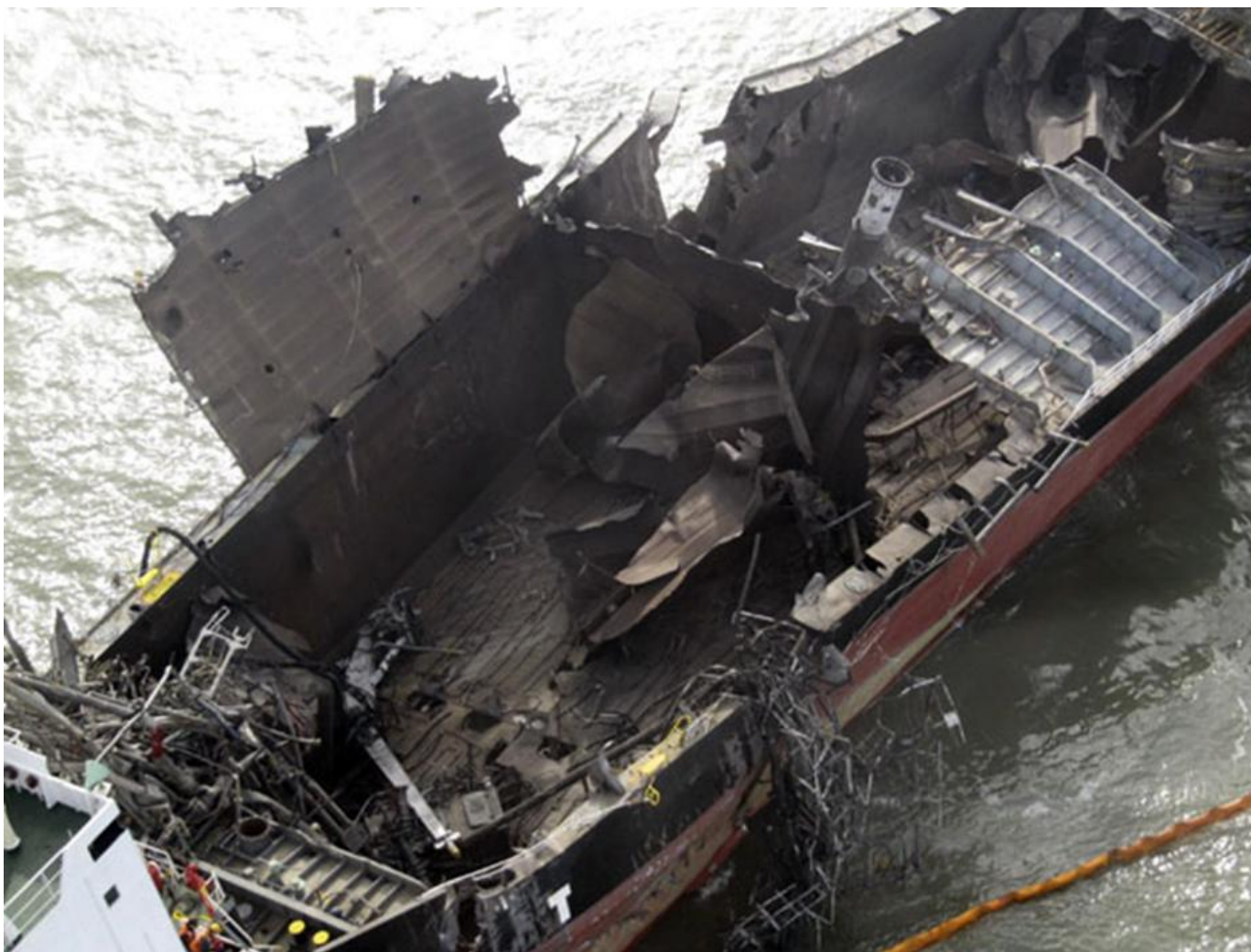
- Actual gas consumption of the dual fuel engine is supplied by onshore LNG truck;
- DNV GL contribution:
  - Safety studies
  - Permission management with authorities (ports, states, flag)
  - Technical project management for AIDA



Source: Aida

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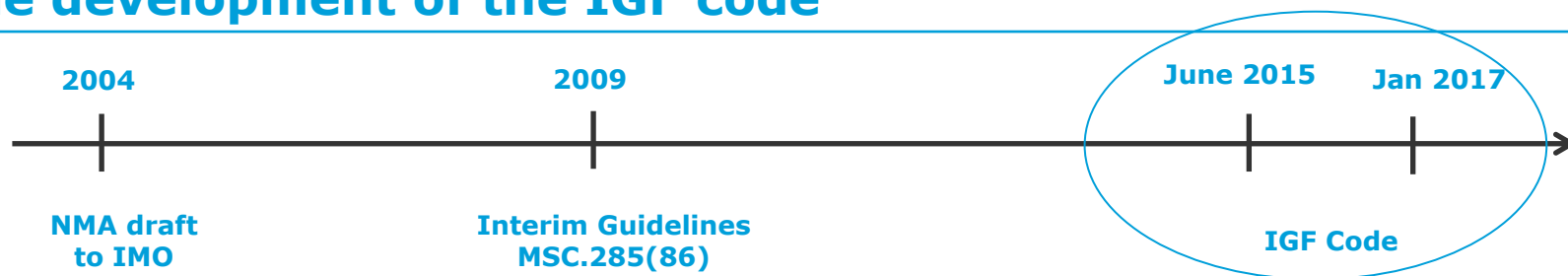




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# The development of the IGF code



- The IGF Code was adopted by IMO in June 2015 (MSC95) and will enter into force 1 January 2017
- Mandatory for all gas and other low flashpoint fuel ships
- Detail requirements for natural gas
- Other low flashpoint fuels allowed, approval based on alternative design approach
  - More detailed provisions for methyl/ethyl alcohol fuels and fuel cells is under development in IMO correspondence groups now

**Note! Some flags already require compliance**

# New DNV GL Rules for GAS FUELLED SHIP INSTALLATIONS

- The new DNVGL Rules for Gas fuelled ship installations are **covering** the requirements in **the IGF Code**.
- *Pt.6 Ch.2 Sec.5 GAS FUELLED SHIP INSTALLATIONS – GAS FUELLED*
  - Class Notation **Gas fuelled**
  - Published October 2015 and entered into force January 2016



## RULES FOR CLASSIFICATION

Ships

Edition October 2015

### Part 6 Additional class notations

#### Chapter 2 Propulsion, power generation and auxiliary systems

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## Pt.6 Ch.2 Sec.5 Gas fuelled ship installations - Gas fuelled

- 1 General requirements
- 2 Materials
- 3 Ship arrangement
- 4 Fuel containment systems
- 5 Piping systems
- 6 Ventilation systems
- 7 Fire safety
- 8 Electrical systems
- 9 Control, monitoring and safety systems
- 10 Gas turbines and boilers
- 11 Manufacture, workmanship and testing

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### **Ship's gas fuel system** - covering all aspects of the installation

Main items:

- Fuel system from bunkering connection up to and including the gas consumers.
- Arrangement and location of tanks
- Arrangement and location of spaces with piping and components containing fuel
- Hazardous areas
- Control, monitoring and safety systems for the fuel installation
- Manufacture workmanship and testing

The bunkering processes and crew training is not part of scope.

# DNV GL Rules for gas fuelled ships – Main principles

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## **Segregation**

Protect gas fuel installation from external events

## **Double barriers**

Protect the ship against leakages

## **Leakage detection**

Give warning and enable automatic safety actions

## **Emergency shutdown**

Reduce consequences of a leakage

## Summary

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- LNG as ship fuel has the potential to improve the environmental footprint of ships significantly
  - With 86 ships running and 93 on order the practical prove for LNG as fuel has been done
- The technology for propulsion, storage and bunkering of LNG as fuel is available on the market now
- With 7 bunker vessels on order the infrastructure for LNG supply starts to become available in the years to come
- The IGF Code was adopted by IMO in June 2015 (MSC95) and will enter into force 1 January 2017
  - Class rules covering the IGF-Code are already available

# Thank you for your kind attention!

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