Operation of gas engines for marine

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CONTENT OF THE PRESENTATION

- Gas engines for marine
  - Drivers for using gas as fuel for the marine engines
  - Wärtsilä engine types for gas operation

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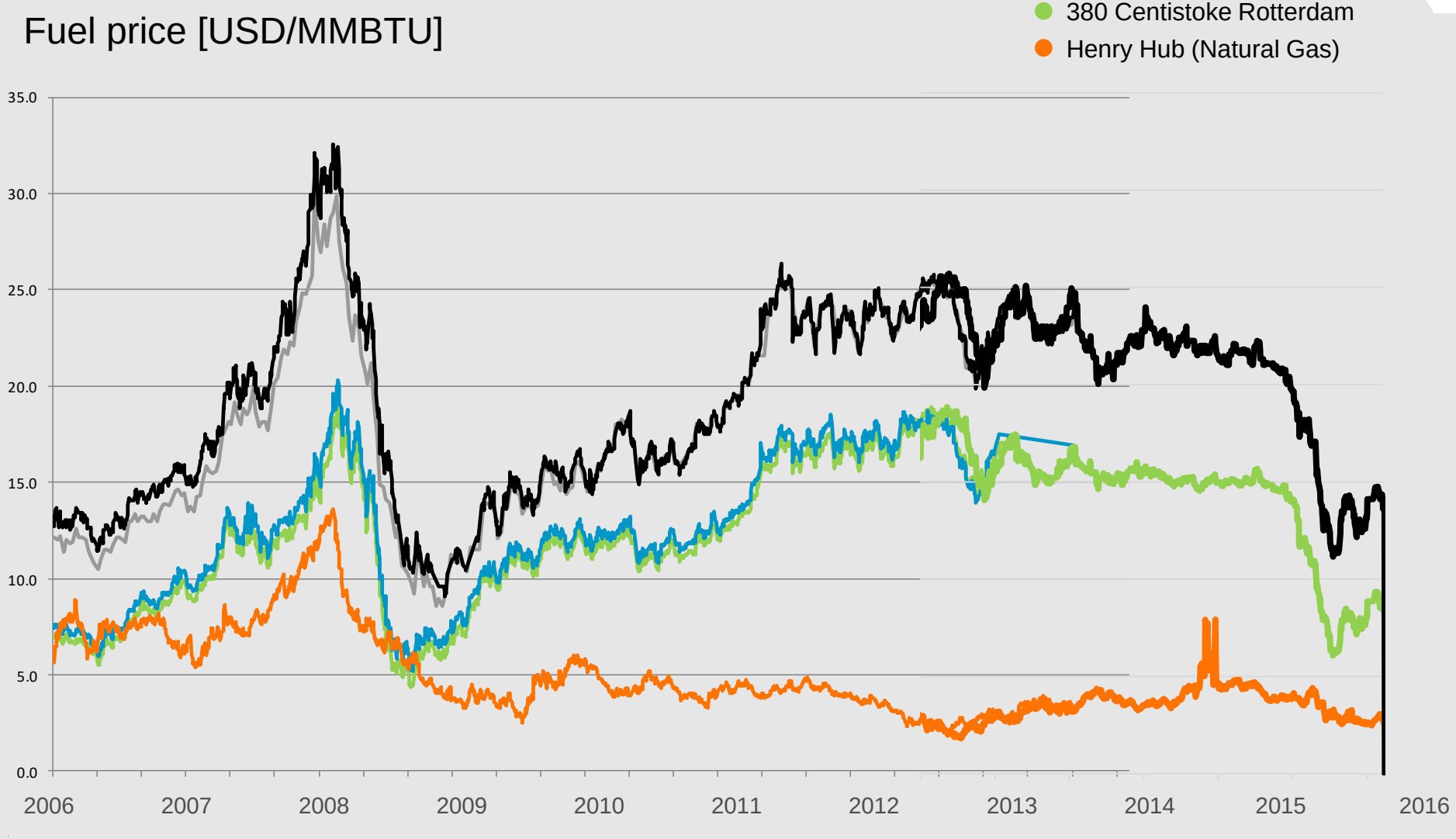
Regulation drivers - Impact on the environment

Driving trends: fuel price development



Source: bunkerworld.com; LNG OneWorld.com

Where to go?

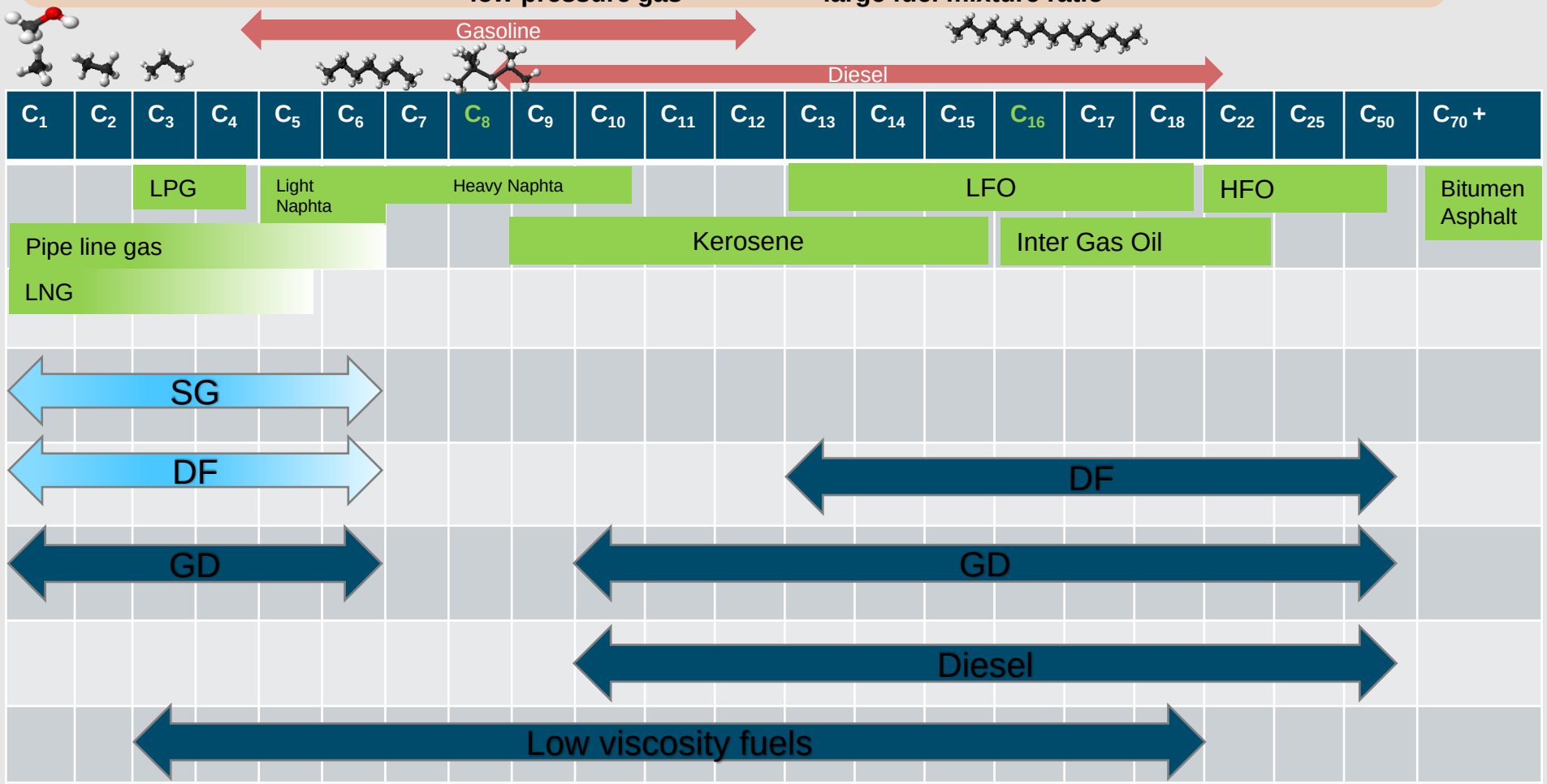
Hydrocarbon variations in Wärtsilä ICE

SG = Spark Ignited
- Otto process
- Fuel: gas
- low pressure gas

DF = Dual Fuel
- Otto process + pilot
- Diesel process
- Fuel: gas + liquid fuels
- low pressure gas

GD = Gas Diesel
- Diesel process + pilot
- Fuel: gas + liquid fuels
- high pressure gas
- large fuel mixture ratio

Diesel
- Diesel process
- Fuel: MDO, HFO and Crude oil



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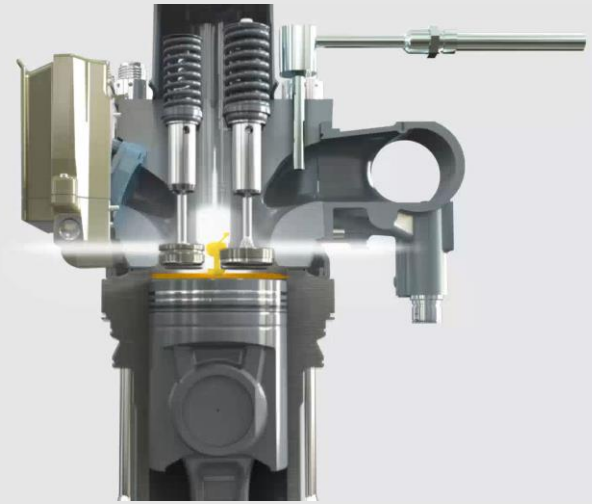
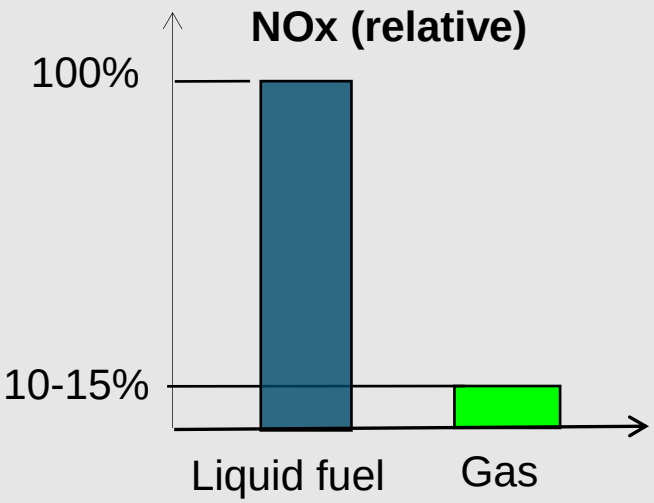
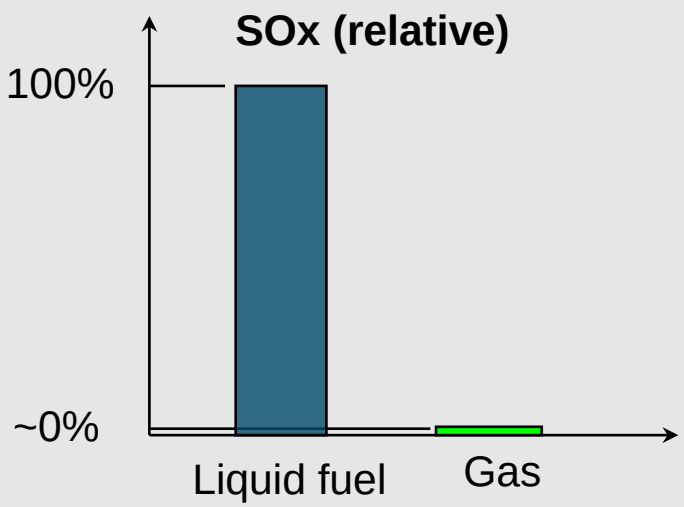
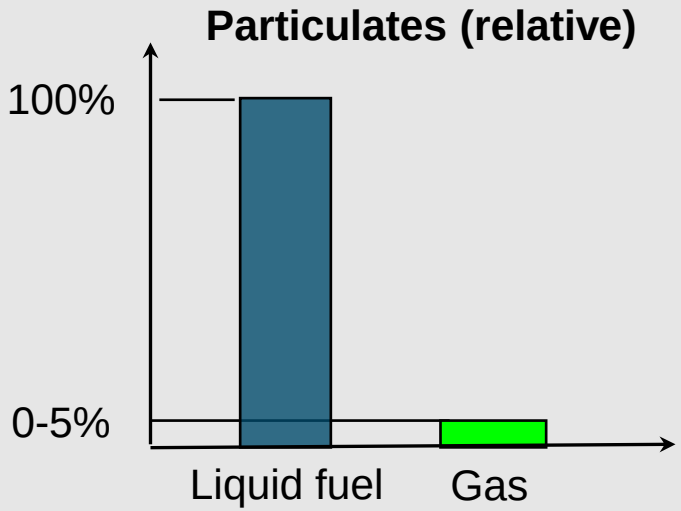
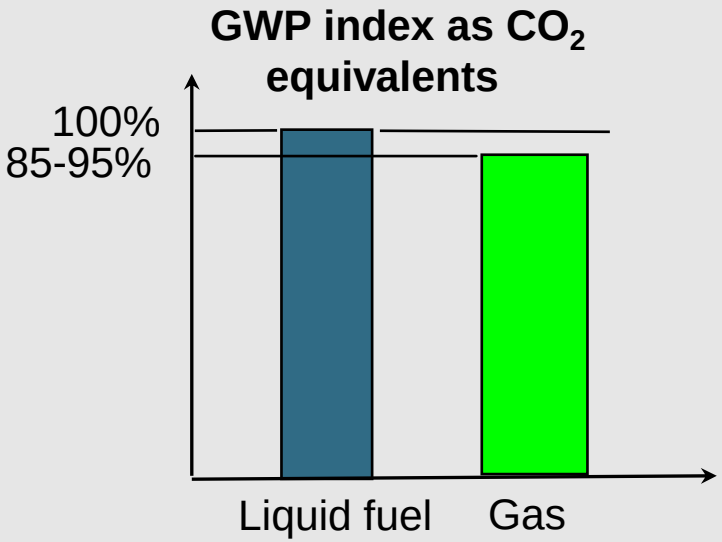


Why lean burn gas engines ⇨ Low emissions





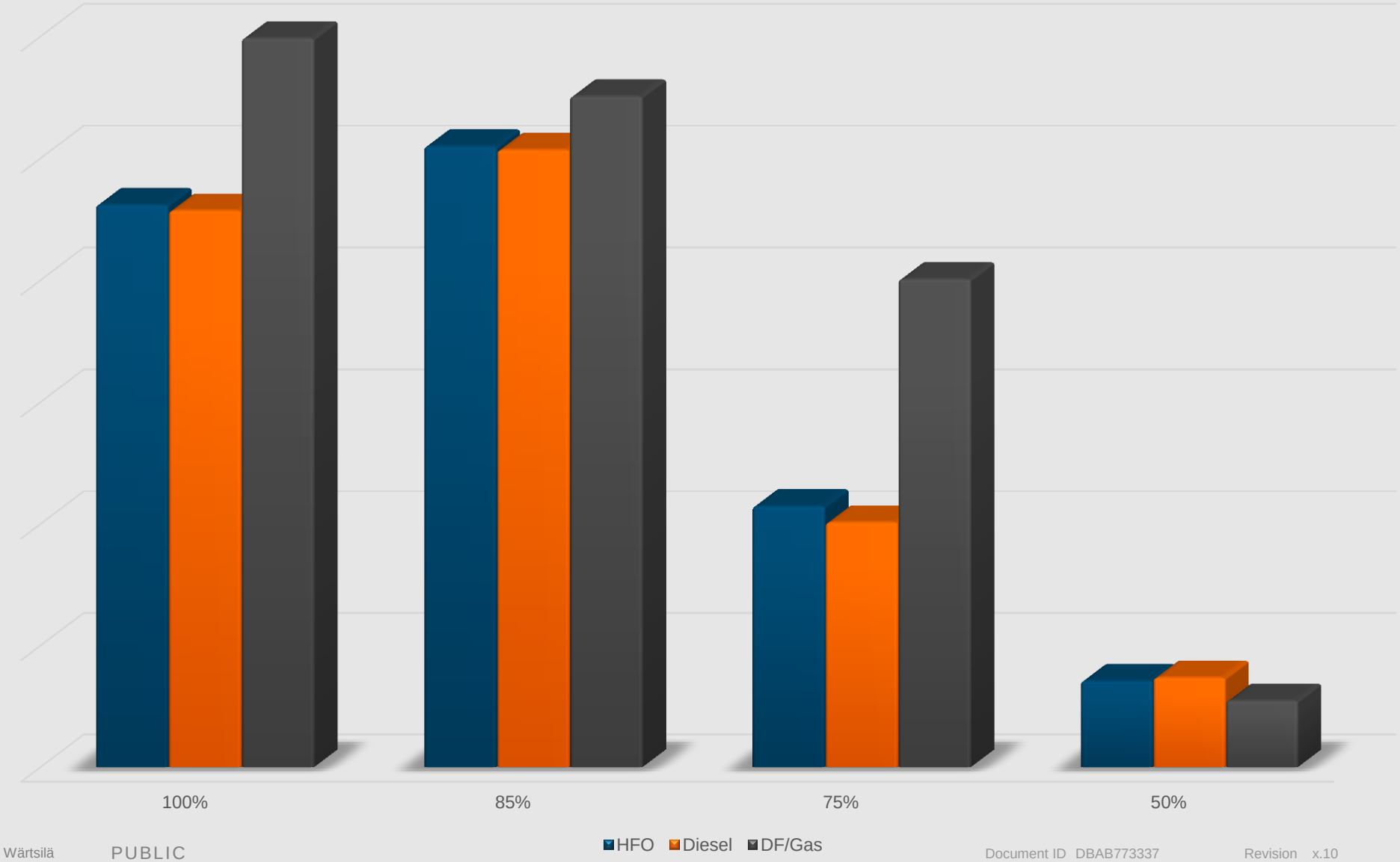




GWP = Global Warming Potential

Why lean burn gas engines ⇨ High efficiency

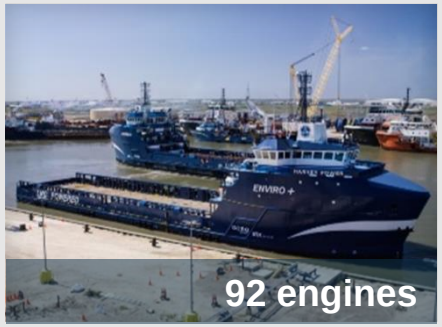
Efficiency comparison between Wärtsilä engine operating on different fuel



> 1,870 DF engines, > 22,000,000 running hours

1104 engines

96 engines



92 engines

73 engines

505 engines

MERCHANT

Ship type	Vessels
LNG Carrier	272
Tanker	29
Container Carrier	10
RoRo/ General Cargo	5
LPG Carrier	4
Bulk Carrier	2
Car Carrier	2
Other	6

CRUISE & FERRY

Ship type	Vessels
Passenger & Cargo	12
Ferry	9
Passenger	4

OFFSHORE

Unit type	Units
OSV	19 Production
Platform	5
FSO	2
FPSO	1
Other	1

SPECIALS

Ship type	Vessels
IWW	18
Tug	6
Dredger	4
Navy	2
Icebreaker	1
Cable Layer	1
Other	2

POWER PLANT

Application	Plants
Urban	57
Industry	37
Mining	4
Oil & Gas	2
Other	3

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