

THE LNG SUPPLY WAVE

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Skangas

The focus

- LNG cleanest fuel for marine
- LNG is available and technology is sound
- Gas is available in vast quantities
- Skangas has invested heavily in the Nordic LNG logistics
 - Production plants, terminals and ships
- Complying with the future

LNG plays a significant role in cleaner marine transport

- One large container ship, powered by 3% sulphur bunker fuel, emits the same amount of sulphur oxide gases as 50 million diesel-burning cars
- In Bergen, Norway, the emissions of ships at berth in the port are estimated to cost the city between €10 – 22 million
- In the world's top 100 ports, roughly 230 million people are exposed directly to the harmful emissions produced by shipping.
- The use of LNG in marine transport can deliver significant environmental, economic and social benefits

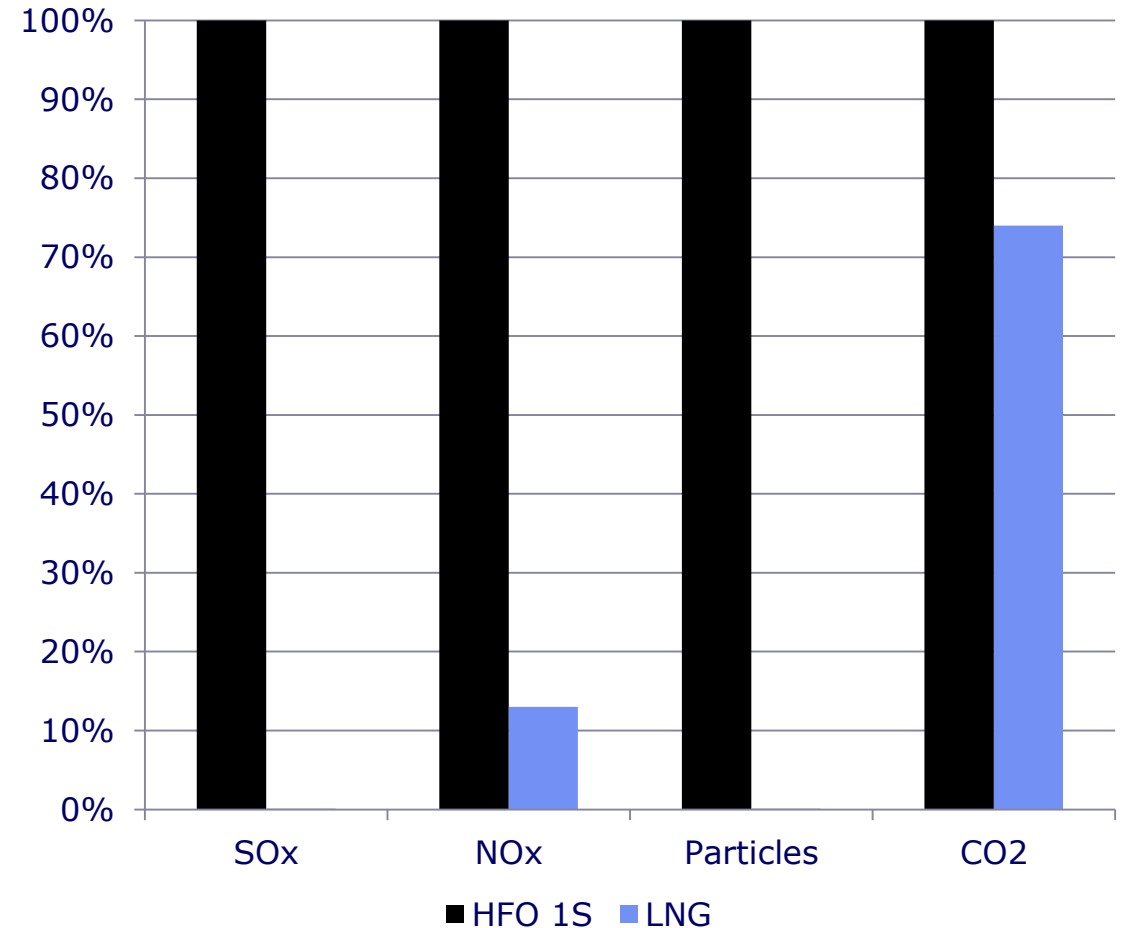


Source: International Gas Union (IGU)
March 23, 2017

LNG - the cleanest fuel for marine

- Nearly no SOx
- NOx reduction of 85-90%
- CO2 reduction of 20-30%
- No particles
- Cleaner work environment

Emissions of LNG vs Heavy Fuel Oil



Yes, LNG is available!

LNG accessibility and LNG infrastructure

- High accessibility to LNG
- Medium accessibility to LNG
- No accessibility to LNG

Large scale terminals

- Existing/under construction
- Planned

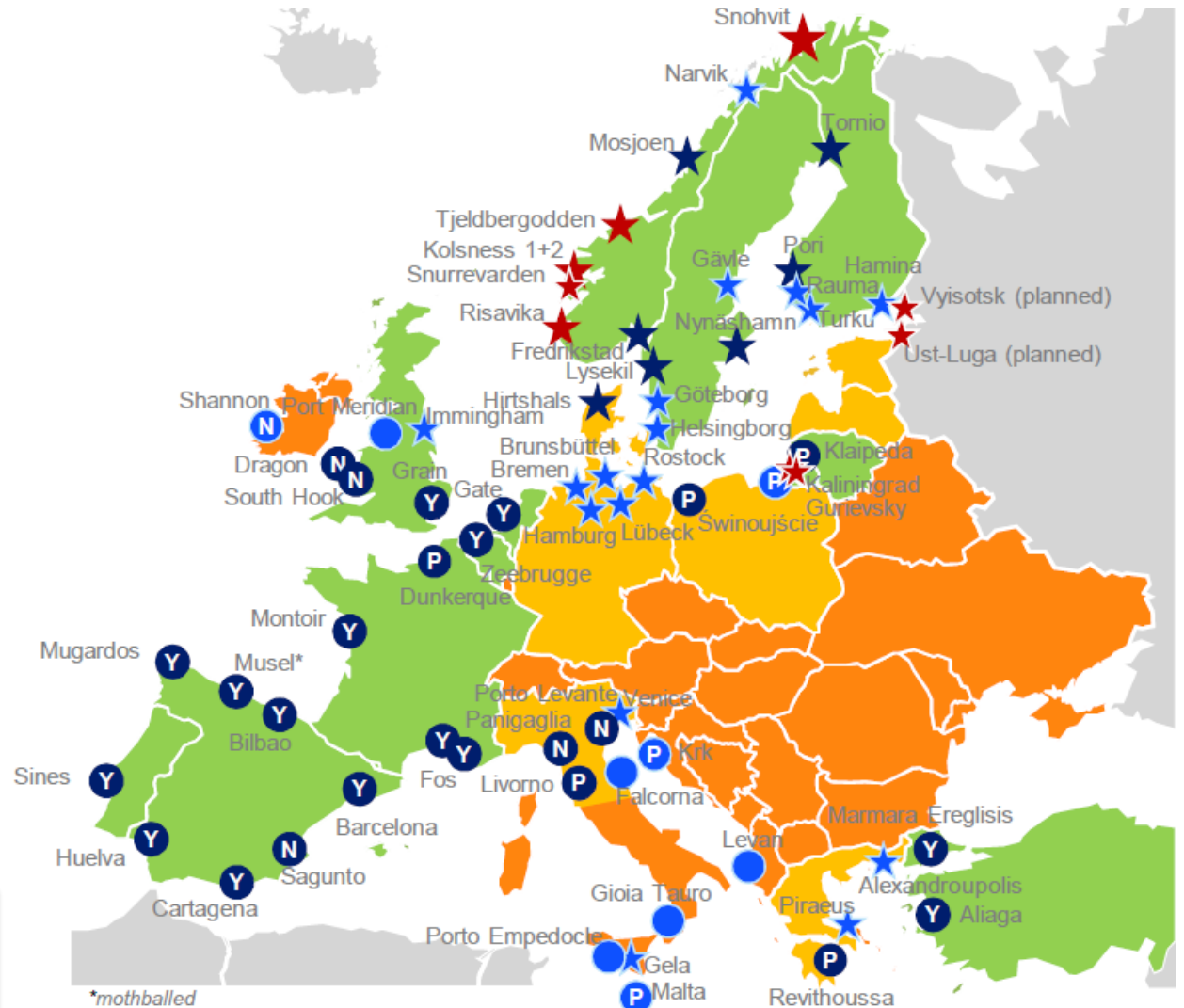
With Smaller scale LNG services:
Y=existing / P=planned / N=no

Smaller scale LNG terminals

- ★ Existing or under construction
- ★ Planned

- ★ Liquefaction

The most recent Skangas terminal in Pori, Finland, was opened September 2016



Technological sound

- Today a large diversity of ship types operates on natural gas:
 - The engine technology is available for a wide range of ship types and sizes
- Per December 2016 120 gas fuelled ships are in operation world wide
 - 40-60% split between single fuel gas engines and dual fuel gas engines
- Several gas engine suppliers:
 - Wärtsilä, Rolls Royce, MAN, Caterpillar, Mitsubishi, Niigata...



Source: SINTEF, 2017
Photo: Wärtsilä

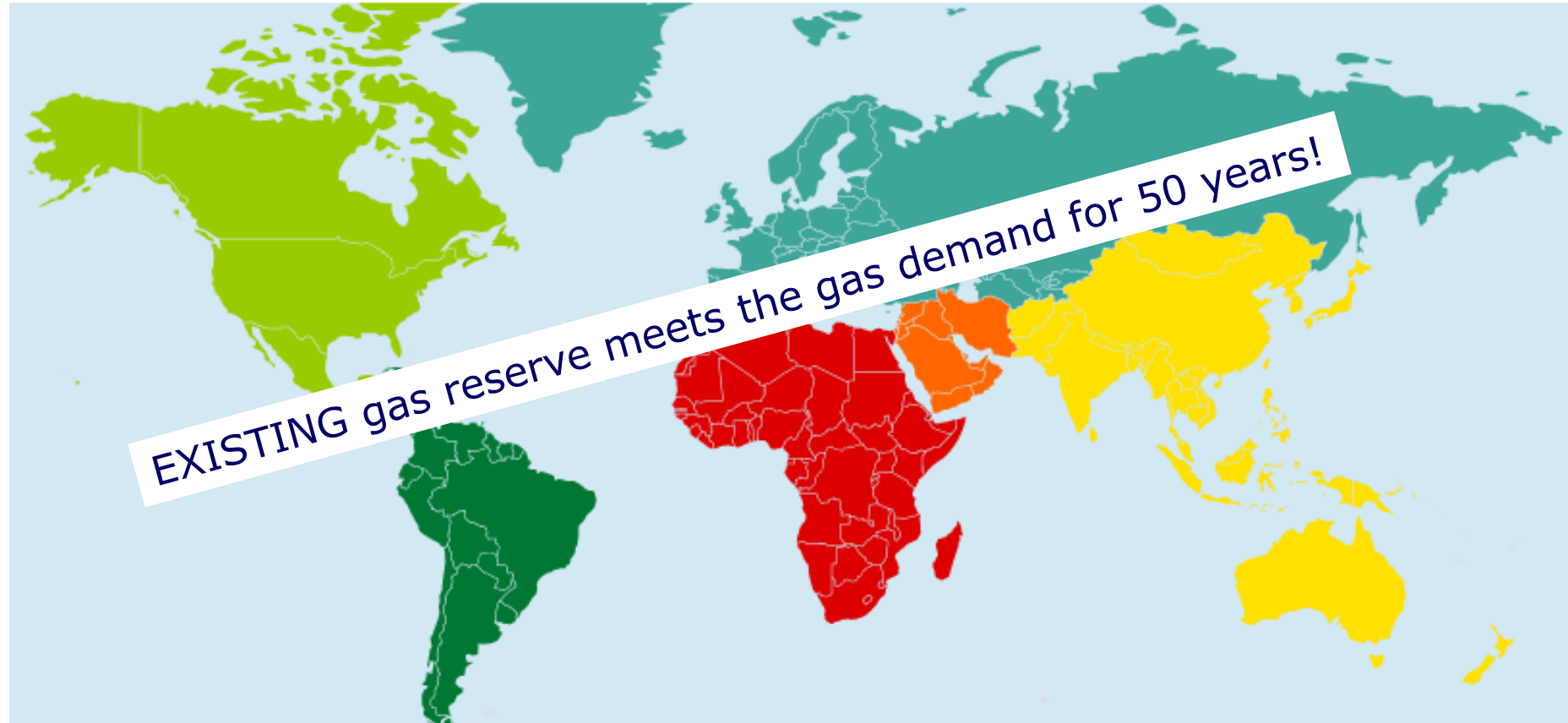
Natural gas - an inexhaustible resource?

2016

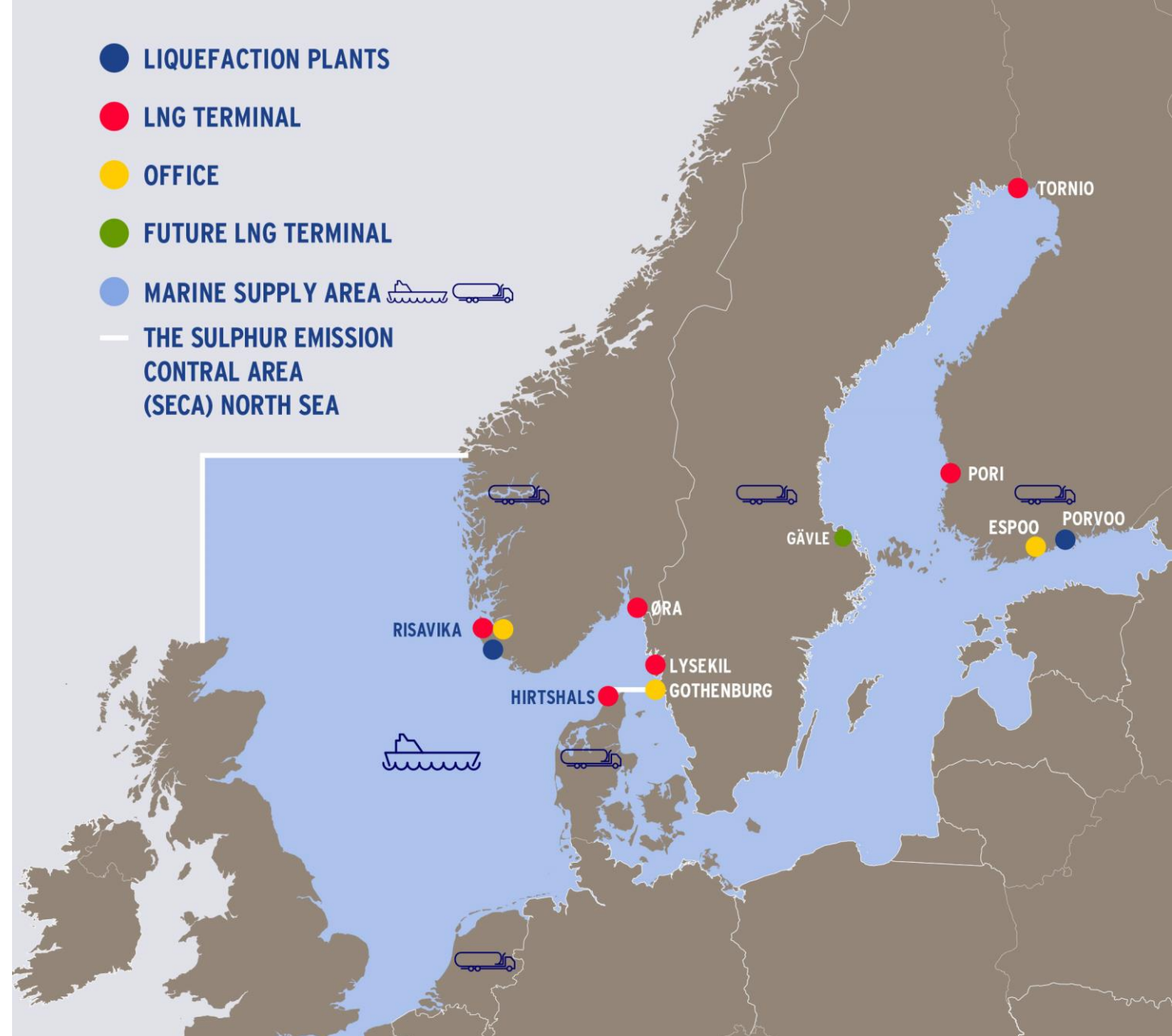
Natural gas > Reserves

World	186.57
North America	11.13
S. & Cent. America	7.59
Europe & Eurasia	56.69
Middle East	79.38
Africa	14.25
Asia Pacific	17.54

Natural gas reserves in trillion cubic meters (tcm)



10 years investments in LNG logistics



Our LNG portfolio

Liquefaction plants	Risavika	Design capacity: 300,000 t/y
	Porvoo	Design capacity: 20,000 t/y
Other supply	3 rd party FOB	
Terminals	Risavika	30,000 m ³
	Øra	6,400 m ³
	Lysekil	30,000 m ³
	Pori (2016)	30,000 m ³
	Tornio, Manga*(2018)	50,000 m ³
Ships	Coral Energy	15,600 m ³
	Coralius	5,800 m ³
	Coral Energice (late 2017)	18,000 m ³
Trucks	20 Trailers	22.5 ton
	5 Jumbo Trailers	30.0 ton



*Skangas 25% share

Our feeders/bunkering vessels and trucks



× 25

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Our investment -> the marine's benefit



Ship to ship LNG bunkering



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Sailing towards 1 January 2020

- Global Sulphur limit of 0.5% m/m
- How can ships meet lower Sulphur emission standards? IMO answer:
 - “Ships can meet the requirement by using low-Sulphur compliant fuel oil. An increasing number of ships are also using gas as a fuel as when ignited it leads to negligible Sulphur oxide emissions.”



Let's sail on the wave of

LING