ROLE OF GAS IN ELECTRIFIED EUROPE

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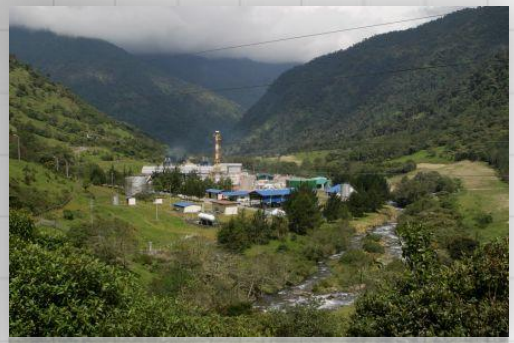
This is Wärtsilä

Gas burning technologies



GAS-DIESEL (GD)

DUAL-FUEL (DF)

1987

1992

SPARK-IGNITION GAS (SG)

1995

Dual-Fuel Portfolio for marine applications

WÄRTSILÄ **20DF**

6L20DF 1.0 MW

8L20DF

9L20DF

WÄRTSILÄ **34DF**

6L34DF

9L34DF

12V34DF

16V34DF

20V34DF

WÄRTSILÄ **50DF**

6L50DF

8L50DF

9L50DF

12V50DF

16V50DF

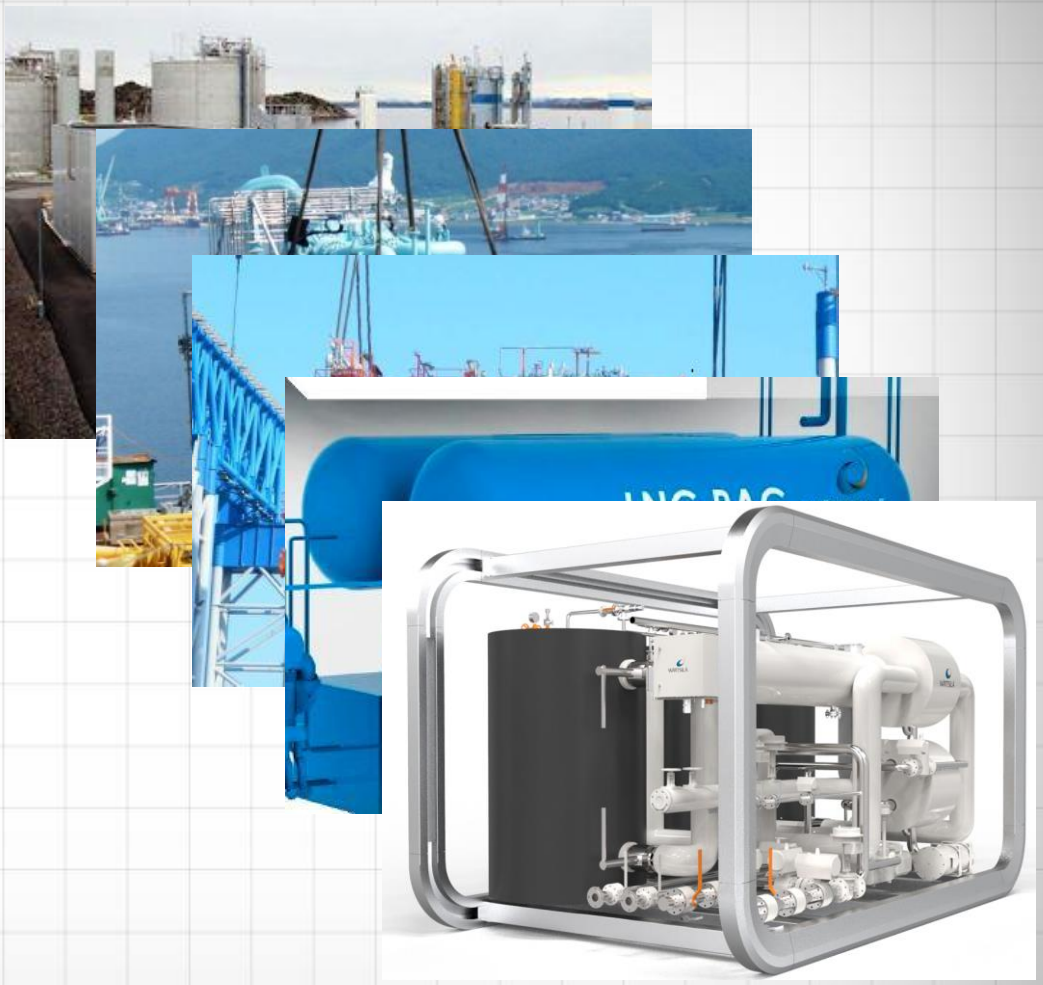
18V50DF 17.55 MW

0 5 10 15

Electrical & Mechanical applications

Gas handling equipments

- LNG Liquefaction
  - Small Scale 30-500 ton/day
  - Mini Scale 5-50 ton/day
- LNG Reliquefaction
- LNG Regasification
- Gas onboard handling
- GasReformer



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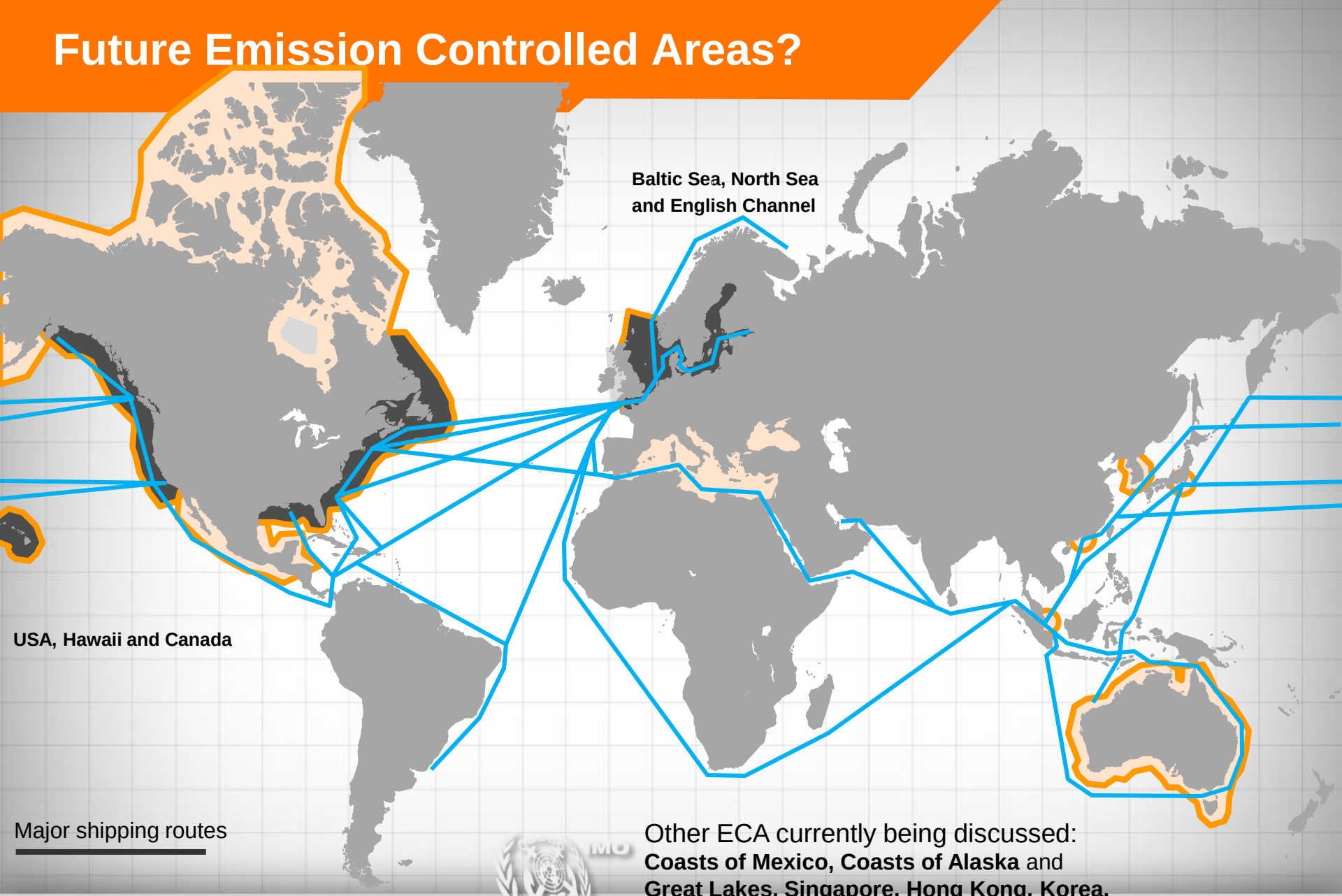
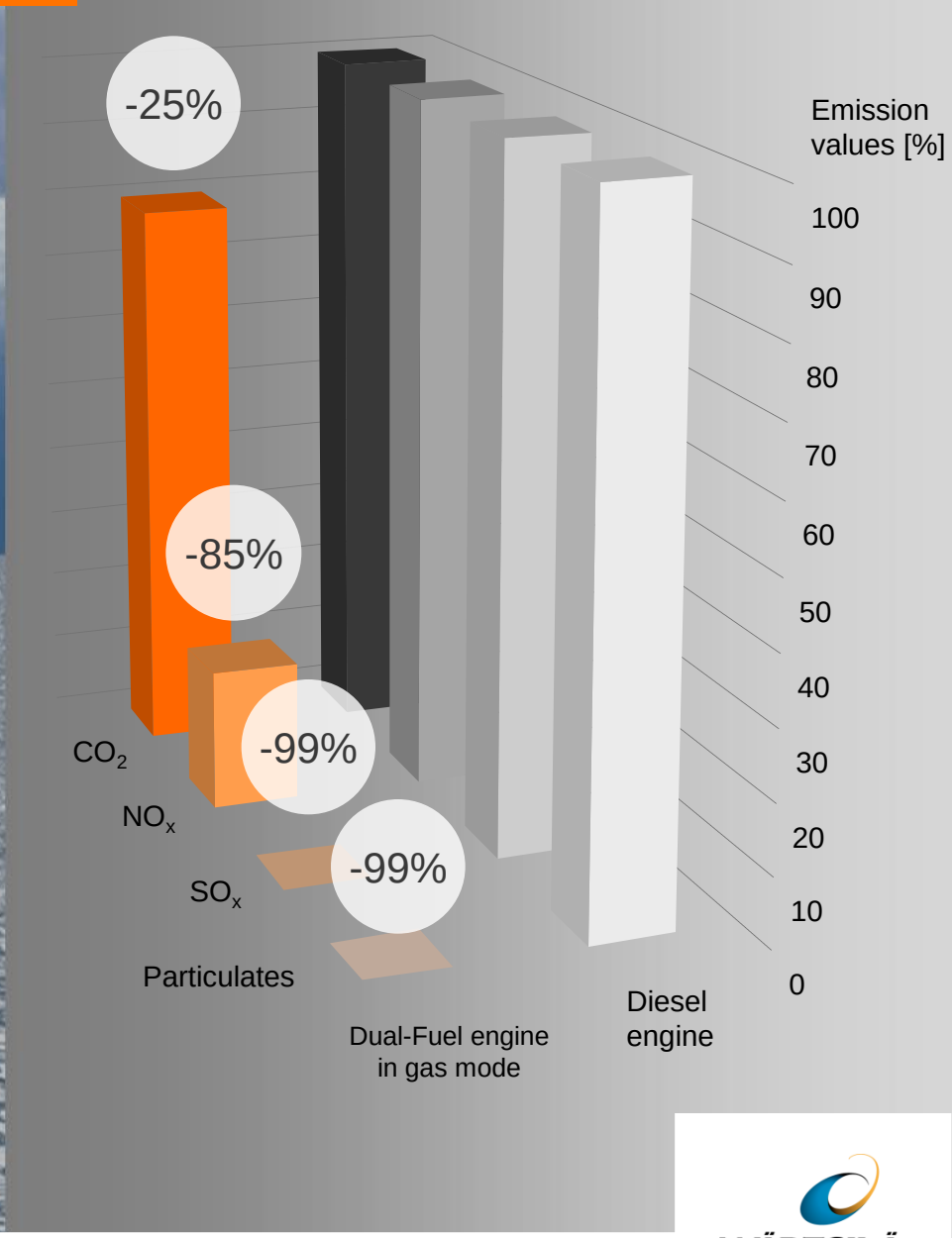
Future Emission Controlled Areas?



Other ECA currently being discussed:
Coasts of Mexico, Coasts of Alaska and **Great Lakes, Singapore, Hong Kong, Korea, Australia, Black Sea, Mediterranean Sea** (2014)**, Tokyo Bay** (in 2015)

Natural Gas As Marine Fuel



Dual-Fuel applications - References

Power Plants

DF Power Plant
- 57 installations
- 225 engines
- Online since1997

Merchant

LNGC
- 121 vessels
- 481 engines

Conversion
- 1 Chem. Tanker
- 2 engines conv.
- Complete gas train
- Complete design

Offshore

PSVs/FPSOs
- 20 vessels
- 93 engines
- Online from 1994

New orders:
- Harvey Gulf; the first 5 LNG-PSV to be operated in the Gulf of Mexico!

Cruise and Ferry

LNG ferries
- 1 vessels
- 4 engines per vessel
- Complete gas train
- 2800 passengers
- In service early 2013

Navy

Coastal Patrol
- DF-propulsion
- DF main and auxiliary engines

Others

TUG
- 2 vessel
- 2 engines each
- Mechanical drive

FPSO
- 1 vessel
- 6*18V50DF

→ 6 segments → 210 installations → > 7’000’000 running hours

Gas fuelled vessels in the Baltic

Coral Methane
15´600 cbm LNG carrier
Yard: Neptune Werft
Owner: Anthony Veder
Delivery: Jan 2013
Amount of vessels: 1
Engines: 1* Wärtsilä 8L50DF
+ 2 * Wärtsilä 6L20DF

Picture: A Veder

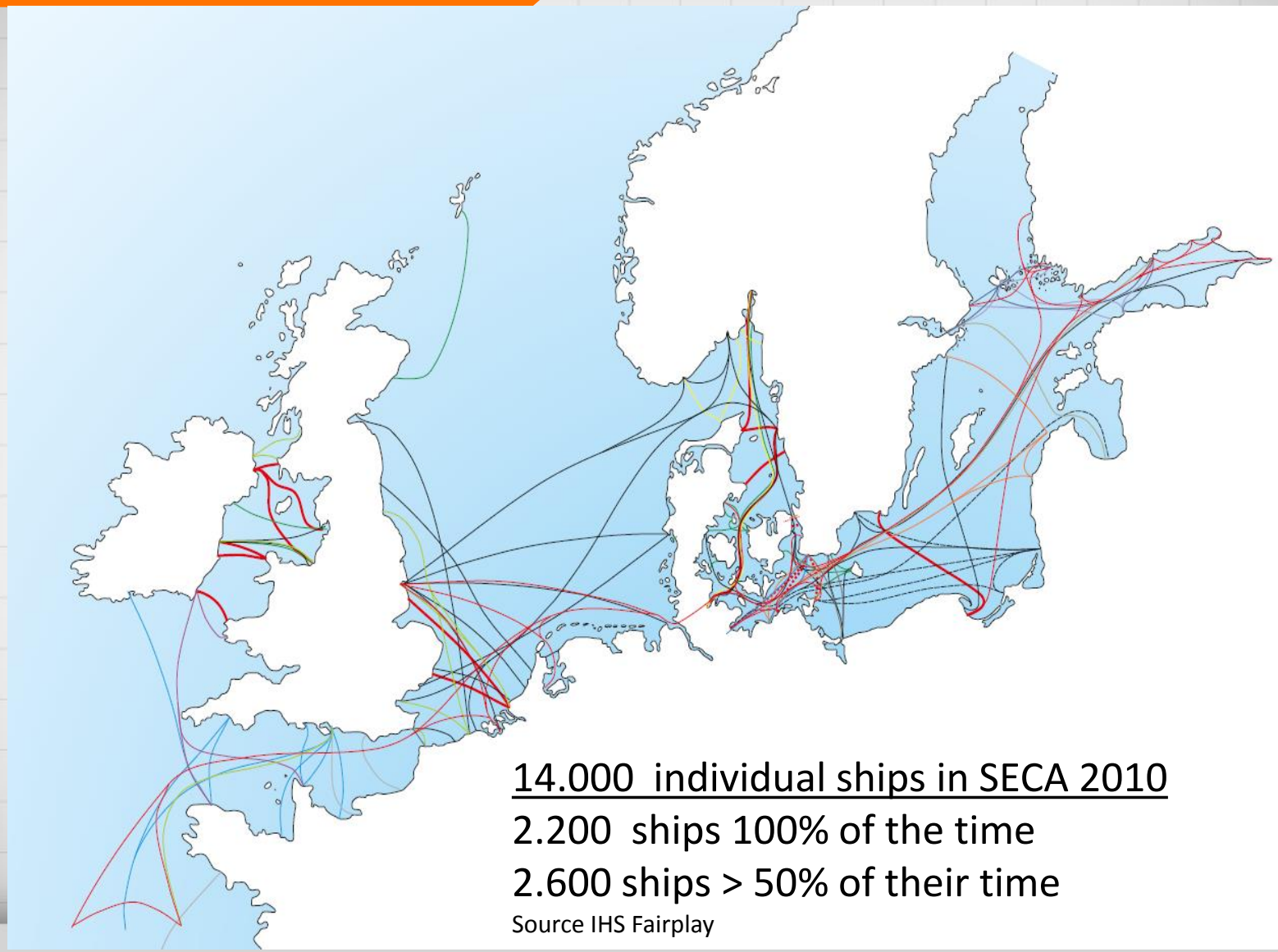
Viking Grace
2´800 passenger Cruise ferry
Yard: STX Turku, Finland
Owner: Viking Line
Delivery: Jan 2013
Amount of vessels: 1
Engines: 4* Wärtsilä 8L50DF

Picture: Viking Line

UVL10
Offshore patrol vessel
Yard: STX Rauma, Finland
Owner: Finnish Border Guard
Delivery: November 2013
Amount of vessels: 1
Engines: Wärtsilä 34DF & 20DF

Picture: STX Europe

There are many ships affected



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Energy consumption in Shipping

Bunker consumption	MDO Million ton per year (as per today)	LNG Million cubic meters per year (all energy converted to LNG)	Number of ~155´000 m³ LNG shipments per year
European ECA area (Baltic Sea, North Sea, English Channel)	10-15	20-30	130-200
Baltic Sea	4-5	8-10	52-66
Traffic to Finland	2,2	4,5	29

Viking Grace consumption of LNG is estimated to 22,500 tonnes (50 000 m³) annually, or about 60 tonnes (133 m³) per day

This alone is slightly more than 1% of the total energy consumption used for traffic to and from Finland

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Passenger ferries from Finland

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Solution for retrofit for Ro-Ro/-Pax vessels

CHALLANGE:
Could the gas provider be the owner of the tanks

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Small scale LNG Liquefaction

Reference project - Sköldvik

Sköldvik

- LNG plant in Finland
- Peak Shaving
- LIN from existing air separation plant used for liquefaction
- EPCIC contract with Gasum
- LNG production capacity 55 tons/day
- First LNG in July 2010
- Includes Pre-treatment, Liquefaction & Storage

LNG distribution chain

LNG Terminal

LNG Feeder

LNG Container feeder

LNG Ferry

LNG Ro-Lo

LNG Tug

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THANK YOU

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