



# The age of LNG is here

Most cost efficient solution for ECAs

Tor Svensen, President DNV  
08 June 2010

# What is keeping us back from using LNG for ships?

- At DNV we struggle to understand:
  - why the shipping industry is not moving faster
  - why shipowners are not seeing the opportunity
- LNG as fuel for ships:
  - is commercially viable
  - will address important environmental concerns

LNG  
THE NEW FUEL  
FOR SHORT SEA  
SHIPPING

# The age of LNG is arriving...

- Technically no obstacles
- Safe
- Economically better
- Environmentally a winner



# European ECAs - a real challenge

## ECA (Emission Control Area) requirements:

- Maximum level of sulphur in fuel, all ships:
  - 1,0% by 1st July 2010
  - 0,1% by 1st January 2015
- Nitrogen emission for newbuildings:
  - 80% reduction in NOx emission from 2016

## EU fuel requirements now:

- 0,1% sulphur in ports and inland waterways



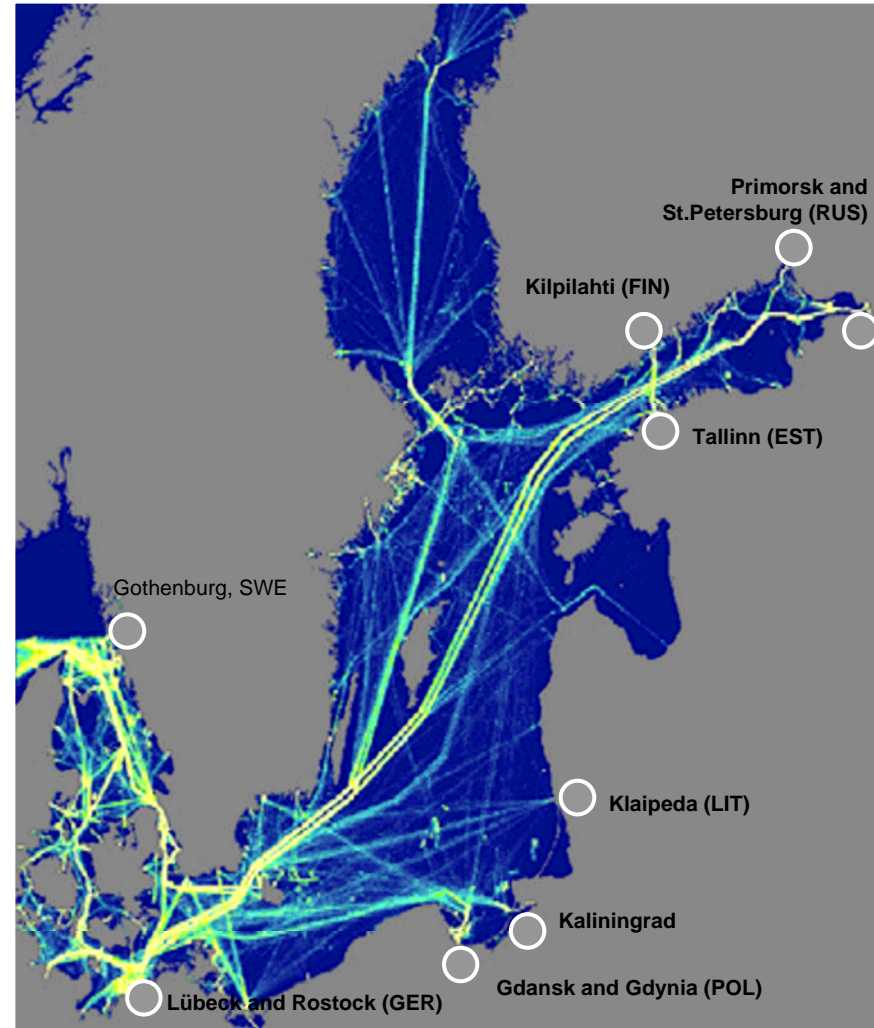
# More ECAs to come...

- North American coasts designated as ECA
  - Starting Aug 2011
  - SO<sub>x</sub>/NO<sub>x</sub>-control from 2015/2016



# The DNV Baltic Report findings

- More than 2,000 ships operating at any time
- Annual ship emissions:
  - SOx: 135 000 tonnes
  - NOx: 400 000 tonnes
  - CO2: 19 million tonnes
- Ship emissions equals all land-based NOx and twice the SOx emissions from Denmark & Sweden combined



# A typical Baltic Sea cargo ship

## Yearly emissions, tonnes/year

	SOx	NOx	CO2	Particle emissions
<b>With LNG fuel:</b>	<b>0</b>	<b>31</b>	<b>5 500</b>	<b>0</b>
<b>With low-sulphur HFO (LS380 with 1% sulfur):</b>	<b>50</b>	<b>180</b>	<b>7 250</b>	<b>4</b>

547 TEU container vessel (5000 GT) Propulsion power 3960 kW

# Technically no obstacles and it is safe

- LNG technology safe and well proven
  - 40 years of LNG tanker operation
  - Used as marine fuel since 2001, now in 20 ships
  - Ongoing research to further improve technical and economical aspects

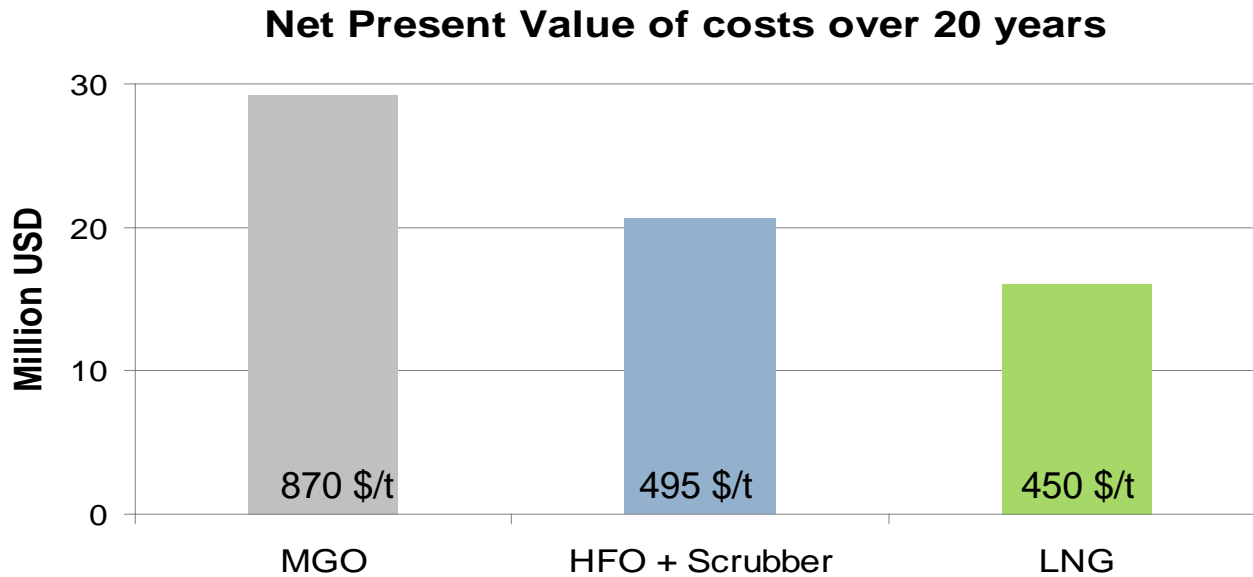




# Economically better – over 20 years

- Alternatives to meet the future ECA requirements
  - Low sulphur fuel (0,1% sulphur), install scrubbers, switch to LNG
- LNG saves
  - 45% lower than MGO
  - 22% lower than HFO with scrubber

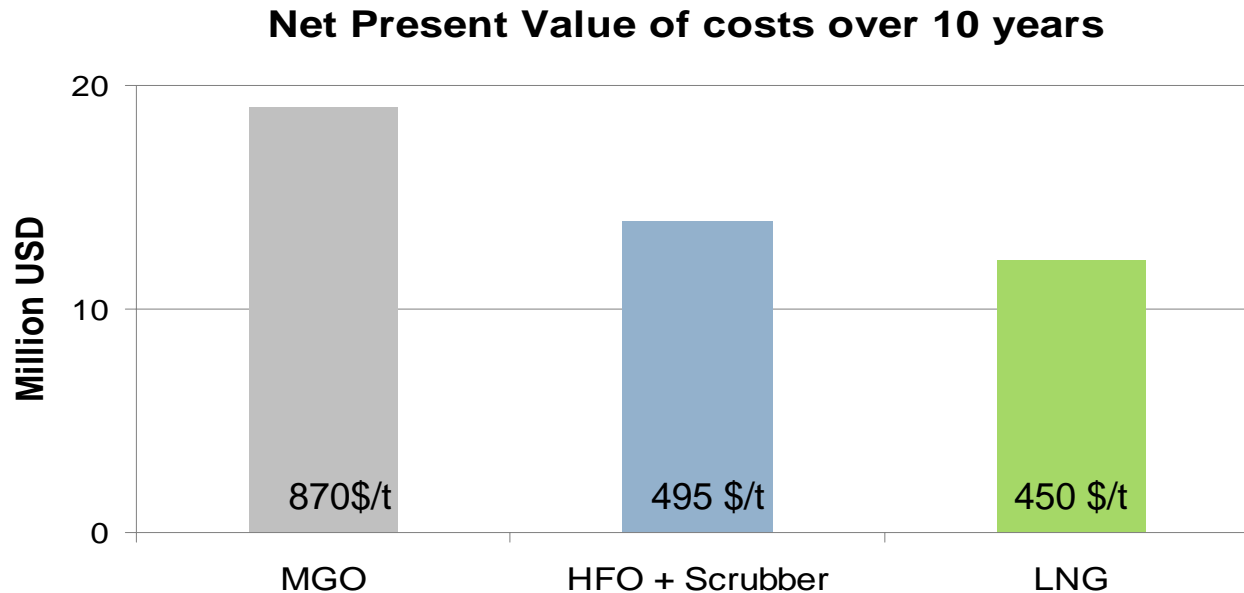
Ref the DNV Baltic Report



# Economically better – over 10 years

- Alternatives to meet the future ECA requirements
  - Low sulphur fuel (0,1% sulphur), install scrubbers, switch to LNG
- LNG saves
  - 35% lower than MGO
  - 12% lower than HFO with scrubber

Ref the DNV Baltic Report



# Environmentally a winner



# What must happen NOW:

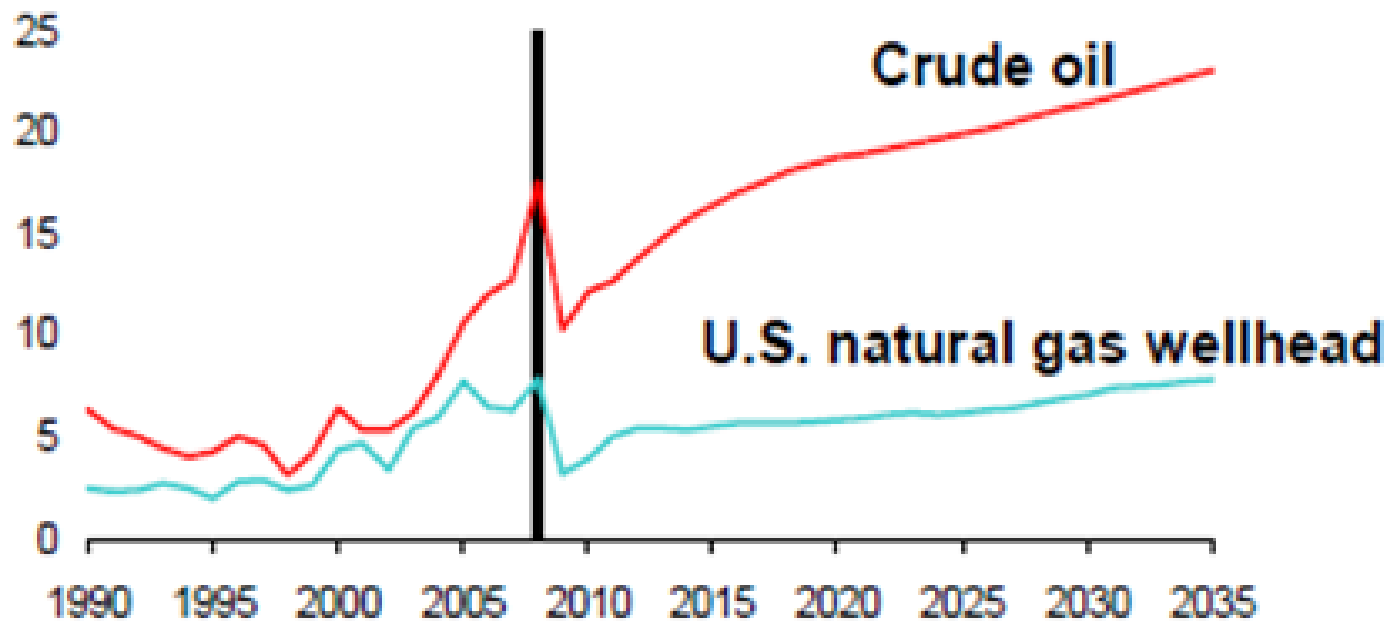
- EU and governments to be frontrunners
- Publicly owned ships to run on LNG
- LNG fuel to be easily available
- LNG fuel to be available at a fair price
- Shipowners to start ordering new ships running on LNG
- Short sea shipping is the most obvious start
- The DNV Baltic Report confirms this



# Actual prices and expected price development

## Oil and natural gas prices

2008 dollars per million Btu



# Summing up

## Short sea shipping is the ideal case for LNG fuel

- DNV will actively influence the whole shipping industry including governments and regulators
- DNV will continue to invest in technology and competence to support the transformation to LNG
- DNV will assist shipowners in developing business cases for LNG



# DNV is world leader on LNG as fuel

DNV has proven rules for LNG since 2001



The world's ships on LNG fuel built to DNV class!\*

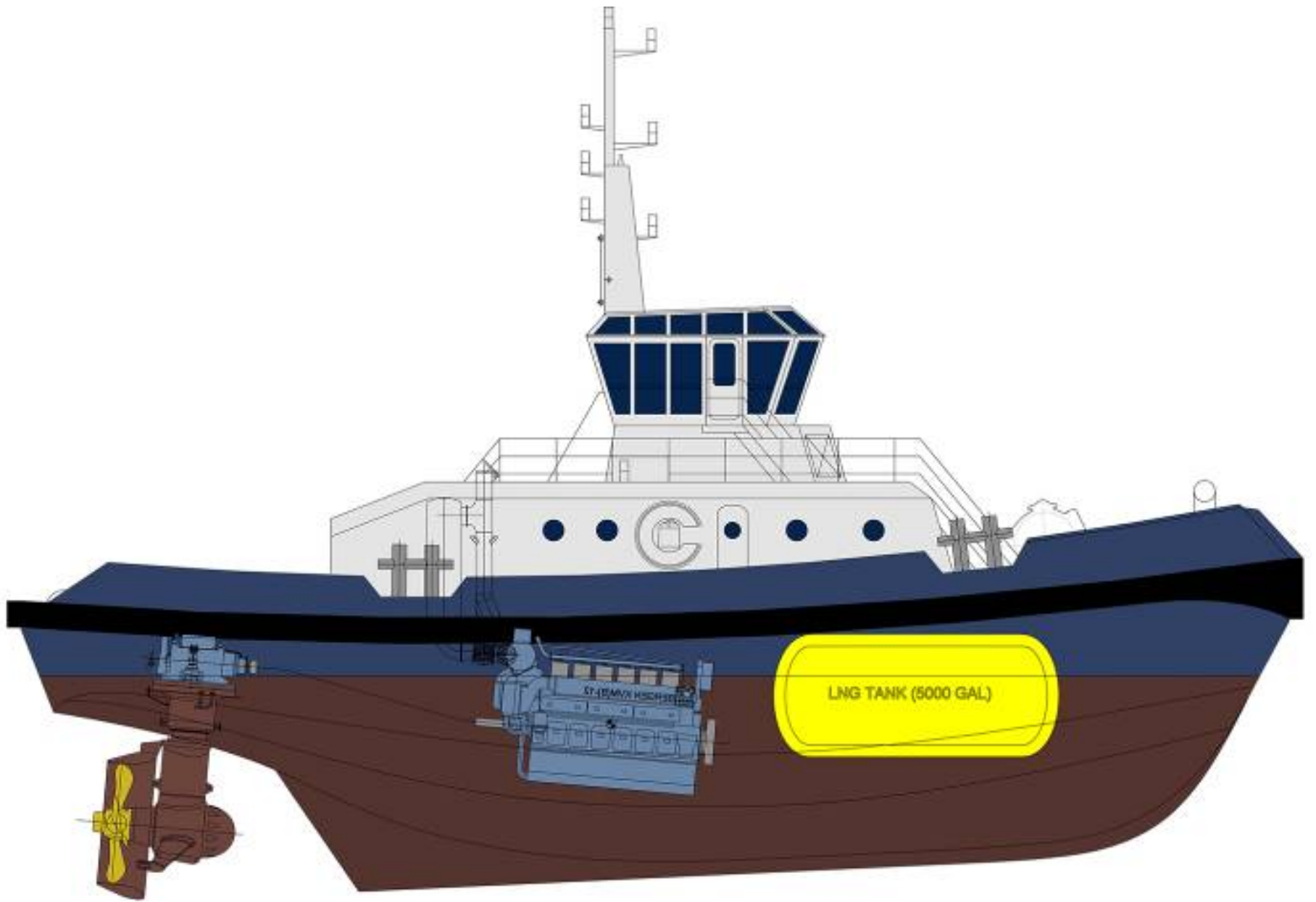
# LNG fuelled vessels in operation, some more examples



Viking Queen















# Safeguarding life, property and the environment

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