

NÆRINGSGLIVETS
NOx-fond

The Norwegian NOx Fund – how does it work and results so far

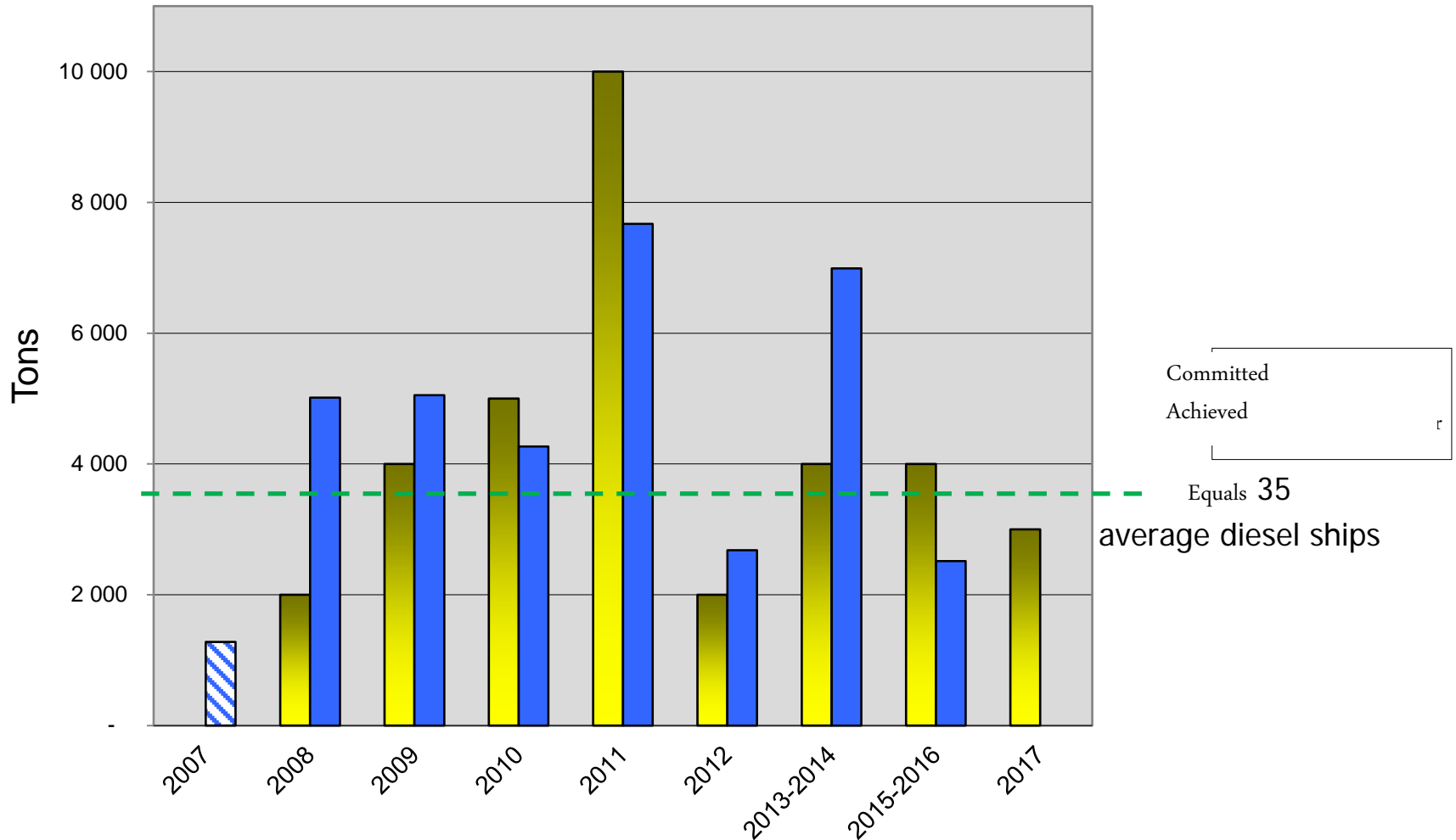
Tommy Johnsen, Head of Fund
The Business Sector's NOx Fund

Helsinki
11th April 2013

Environmental NO_x-Agreement 2008 - 2017

- For domestic emission only. Shipping between Norwegian ports.
- Agreement between 15 Norwegian business organizations and the Ministry of the Environment. Approved by ESA (Efta Surveillance Authority), Brussels. 2008.
- Affiliated enterprises are entitled to exemption from fiscal NO_x tax of € 2,25 per kg NO_x and pay lower rates into the fund.
- Shipping, industry etc. pays € 0,5, Oil and gas production € 1,5
- Affiliated enterprises p.t. is 709, representing 92% of all emissions subject to NO_x tax.
- The Fund has about 80 mill. € each year available for support of NO_x reducing measures.
- Close to 1 000 applications for support to reduce NO_x so far.
- Administration cost of fund is approx. 3% of income.

NOx reductions and commitments



How to get NOx effect:

Fuel consumption x emission factor

=

NOx emission in kilos



Viking Lady

- LNG-powered
- Fuel cell installed
- "*The world's most environmentally friendly ship*"

Support rates projects (2011-2017)

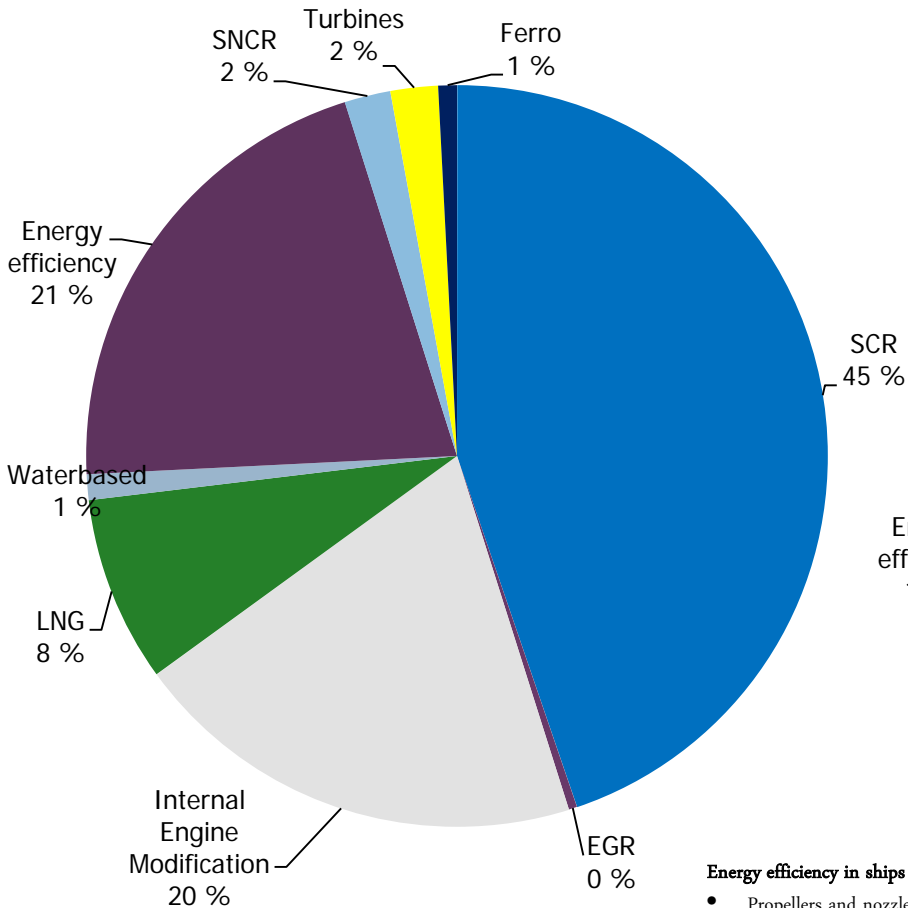
- Support to cover additional costs of investing in gas/LNG propulsion in shipping up to 80 % of investment cost and up to **€ 44** per kilo NOx reduced
- Low-NOx engine modifications could receive up to 80 % of investment cost and up to **€ 28** per kilo NOx reduced better than Tier II
- SCR measures could receive up to 60 % of investment cost and up to **€ 13** per kilo NOx reduced
- Support possible for LNG infrastructure
- Improved support rates for LNG has resulted in more LNG applications

Reduction from NOx measures

NOx agreement 2008-2010

Short term achievements

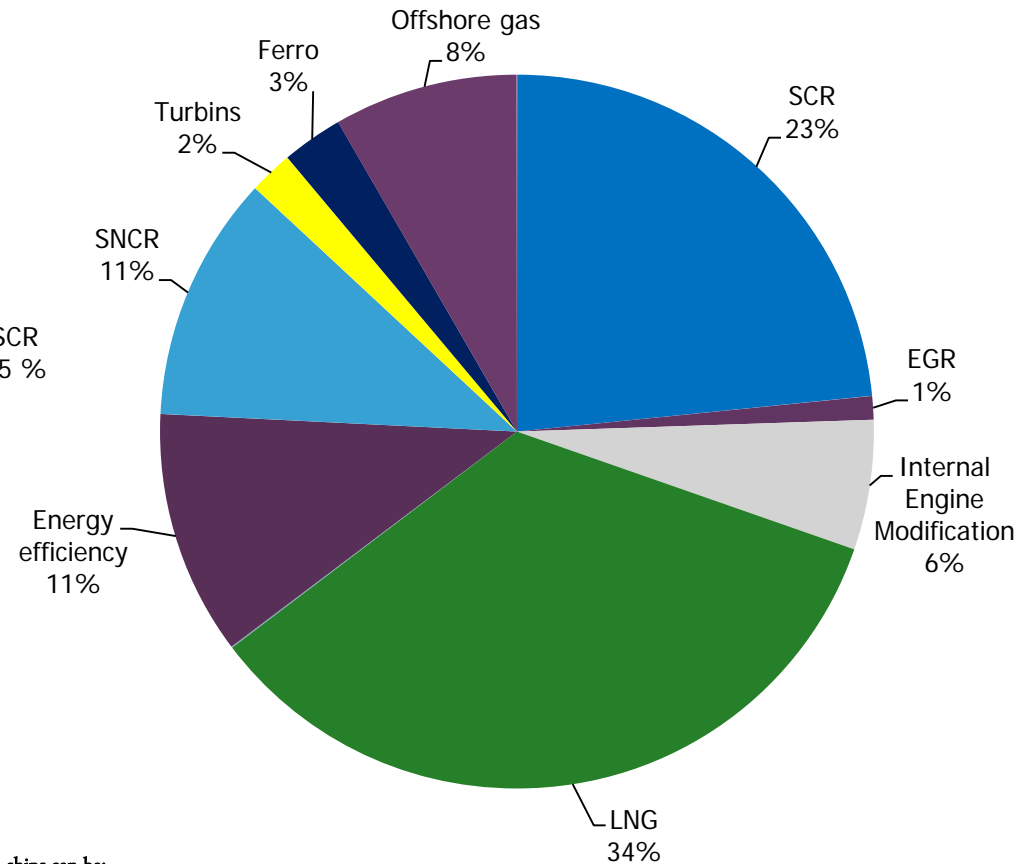
Cost efficient



NOx agreement 2011-2017

Long term achievements

Technology change



Energy efficiency in ships can be:

- Propellers and nozzles
- Low energy lightning
- Weight reduction
- Frequency converters
- Waste heat recovery

LNG propulsion of ships

- In 2008 only 3 ships except ferries were running on LNG
- The NOx Fund has granted support to **49 ships**, converted to LNG or newbuilds
- In total Norway will have nearly 75 LNG ships in a few years time (incl. Ferries on Government demand)
- 12 LNG ships started sailing in 2012
- LNG in various ship segments
 - Ferries
 - Cargo
 - PSVs
 - Ro-pax
 - Tankers
 - Tugs

Tarbit Shipping's "Bit Viking"

Transport of oil products on the Norwegian coast

- 2 x 500m³ LNG tanks
- Retrofit conducted october 2011
- No operational challenges post retrofit



Bit Viking

LNG Retrofit in progress

NOx-reduction: 479 tons/yr

Cost of measure: € 7,2 millions

NOx Fund support: € 6,1 millions (80%)

Engines pre retrofit:

2 x Wärtsilä W6L46B

Engines post retrofit:

2 x Wärtsilä 6L50DF



NSK's cargo ship "Høydal"

Operation from Summer 2012

- 90 tons NOx reduction
- Additional cost of LNG propulsion: € 3,6 millions
- NOx Fund support: € 2,8 millions (80%)



More ships on LNG



Normand Arctic (PSV)

- 142 tons of NOx reduction
- Granted € 5,3 million (80%)
- Dual Fuel engines from Wärtsilä
- Started sailing 2012



Boknafjord

- Worlds largest LNG ferry
- 213 tons NOx reduction
- Granted € 3,7 million (80%)
- Rolls-Royce gas engines
- Entered service Dec. 2011

More ships on LNG

Viking Prince (PSV)

- 161 tons of NOx reduction
- Started sailing in March 2012
- Granted € 4,6 millions (80%)
- Dual Fuel engines from Wärtsilä
- Sister ship Viking Princess in service Sept. 2012



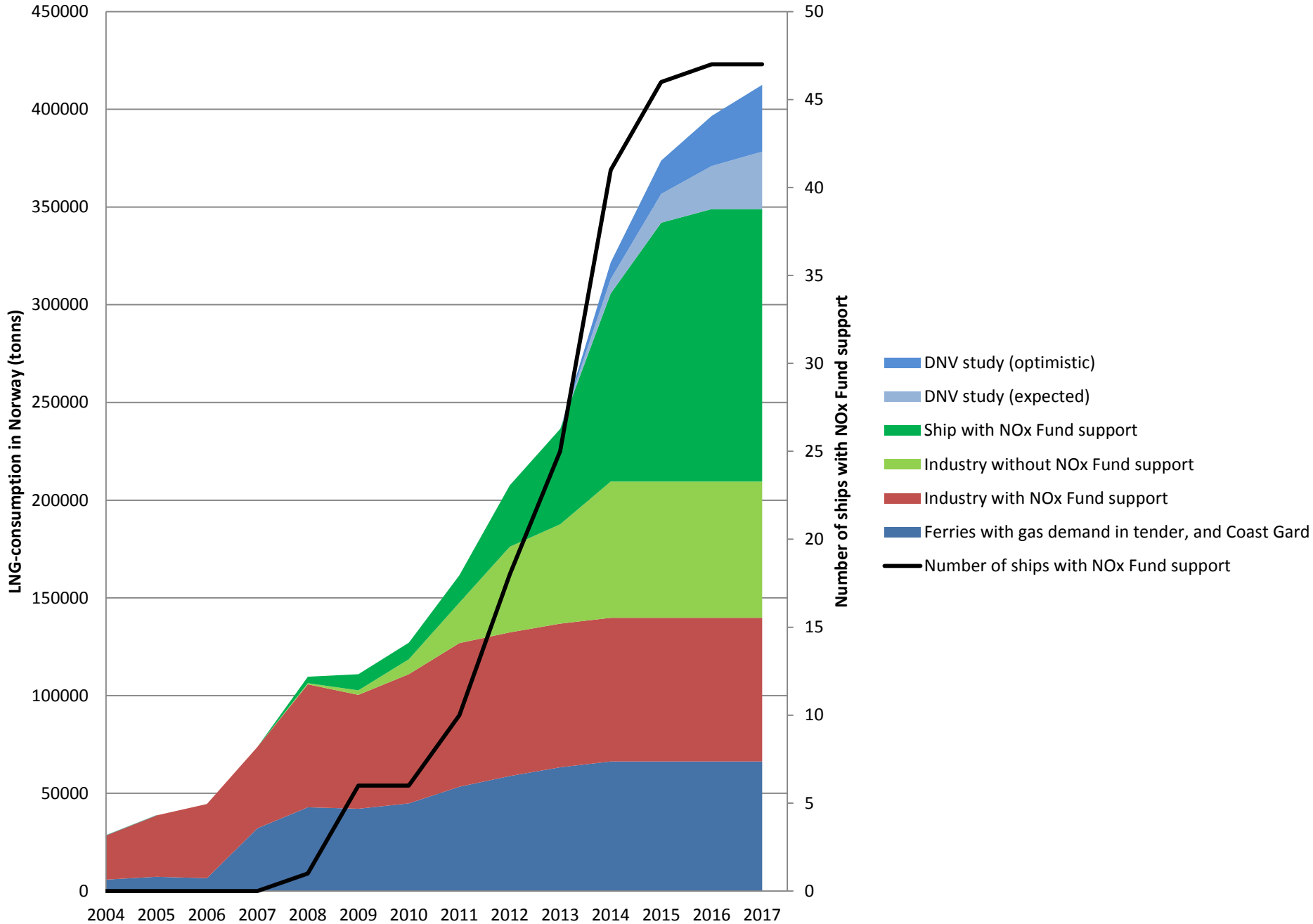
Fjordline ferries x 2

- 321,8 tons NOx-reduksjon x 2
- Granted € 11 million x 2 and from EU's TEN-program
- Rolls-Royce gas engines
- Will operate Bergen-Stavanger-Hirtshals
- Comes into service 2013

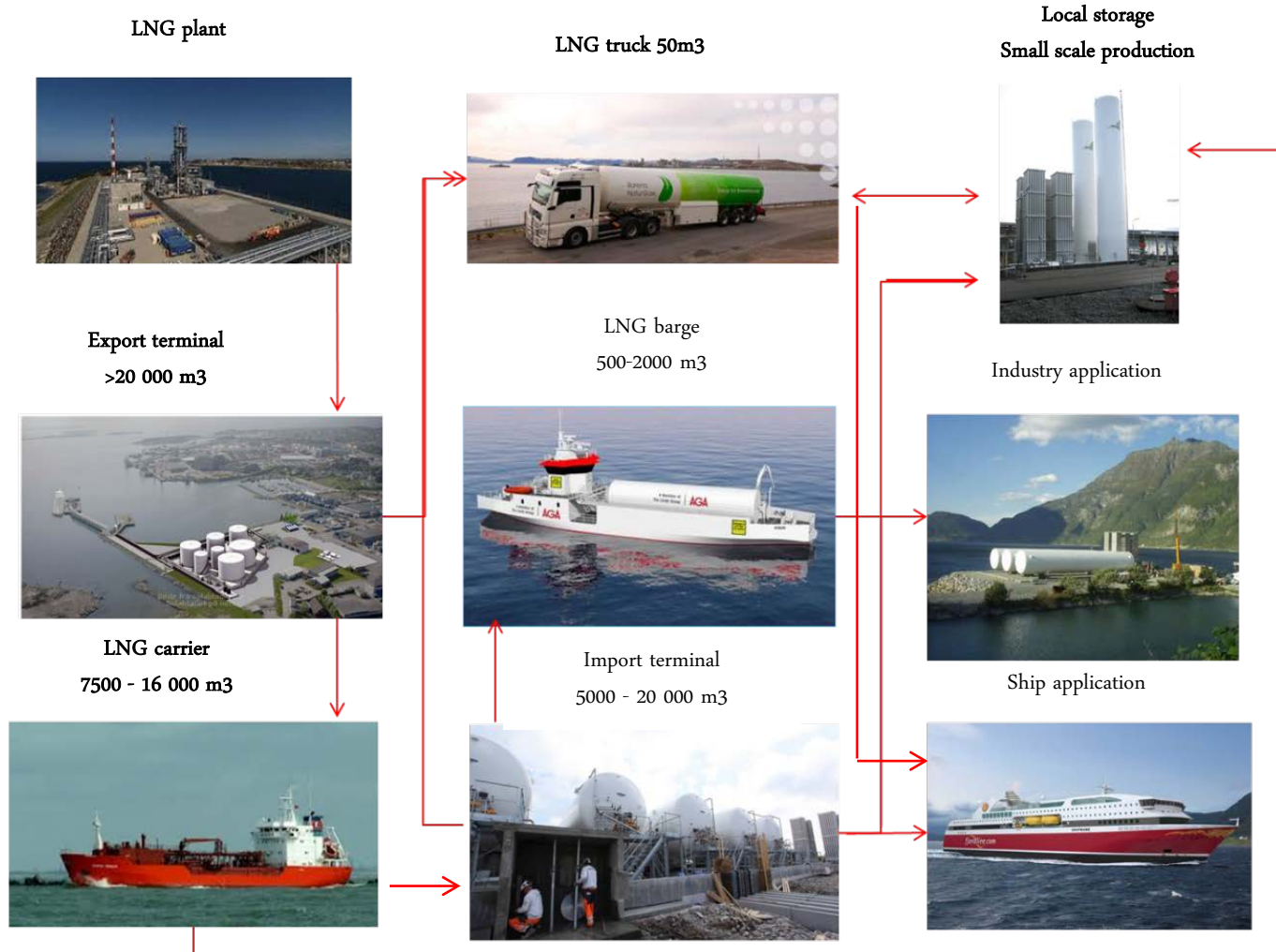
Development of LNG as fuel

- In 2008 only 3 % of maritime fuel sold in Norway was LNG
- By 2016 DNV expect 1/4 of maritime fuel in Norway to be LNG
- The NOx Fund can support LNG infrastructure
- The NOx Fund works to improve the functioning of the LNG market in Norway

LNG-consumption in Norway 2004-2017



Current distribution





LNG distribution from ships

Future distribution possibility

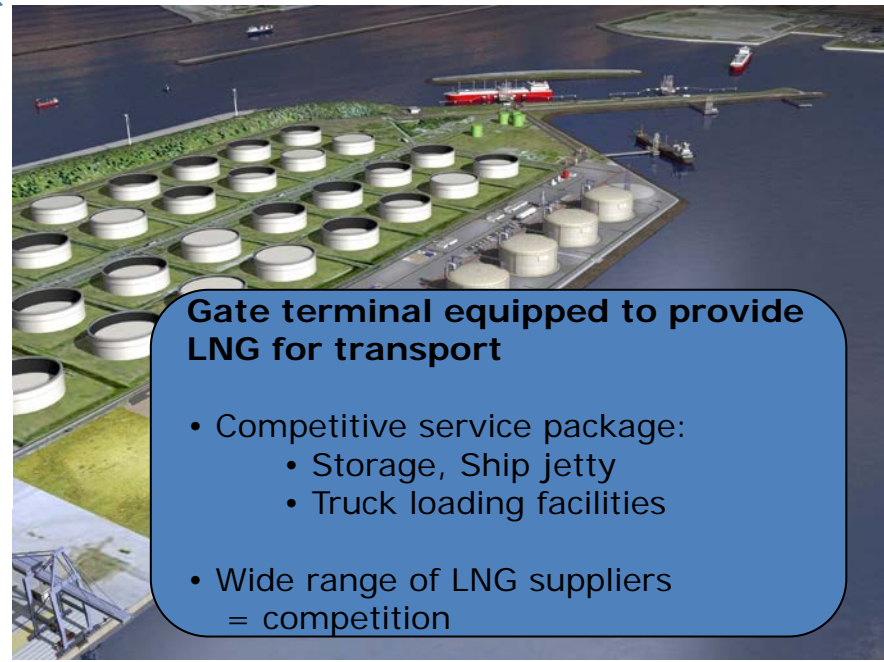
Distributionsterminaler for LNG i Norge, 43 st



Melkøya: LNG plant in Northern Norway



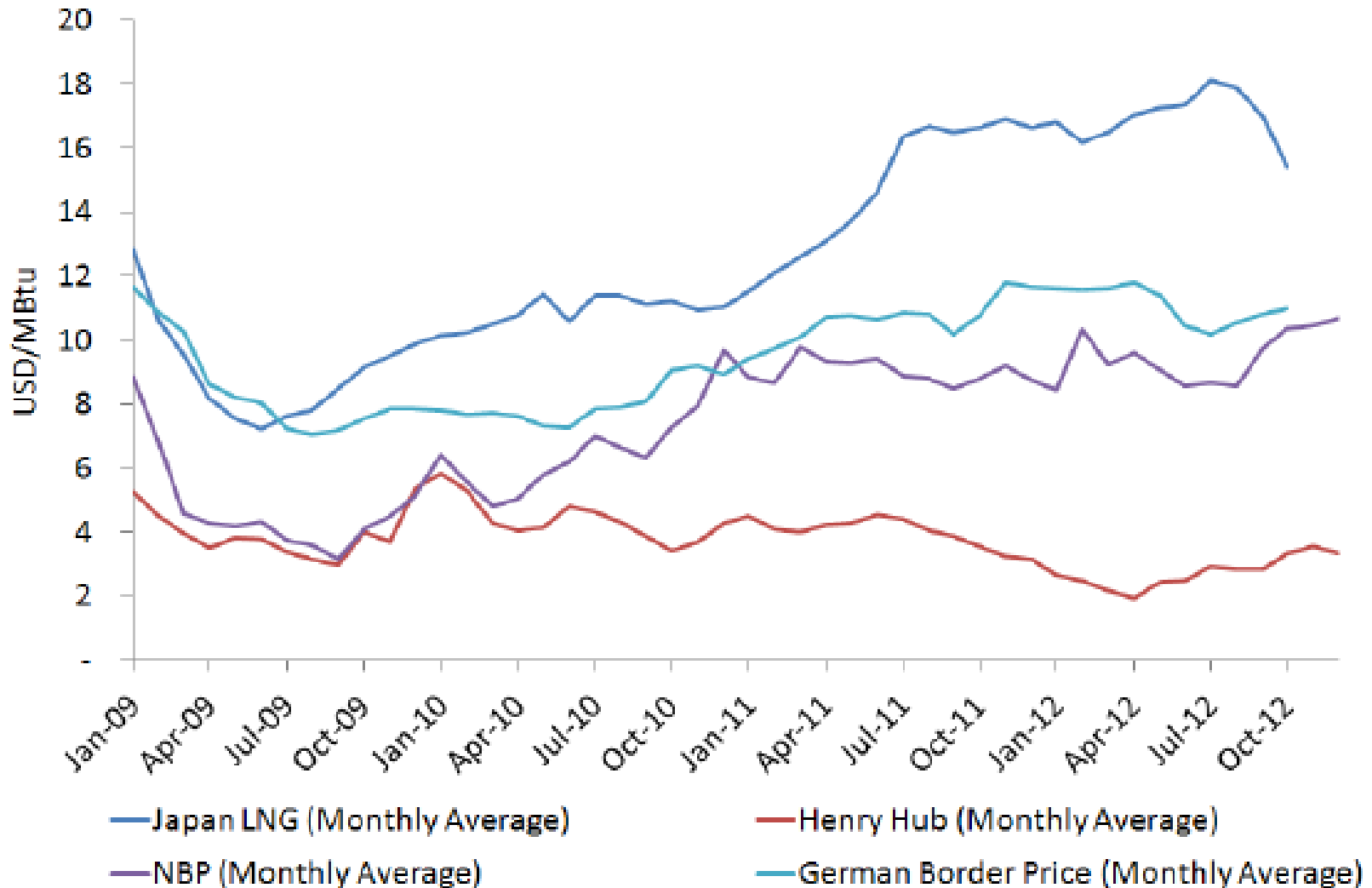
gasunie



Gate terminal equipped to provide LNG for transport

- Competitive service package:
 - Storage, Ship jetty
 - Truck loading facilities
- Wide range of LNG suppliers = competition

World Gas Markets 2009 - 2012



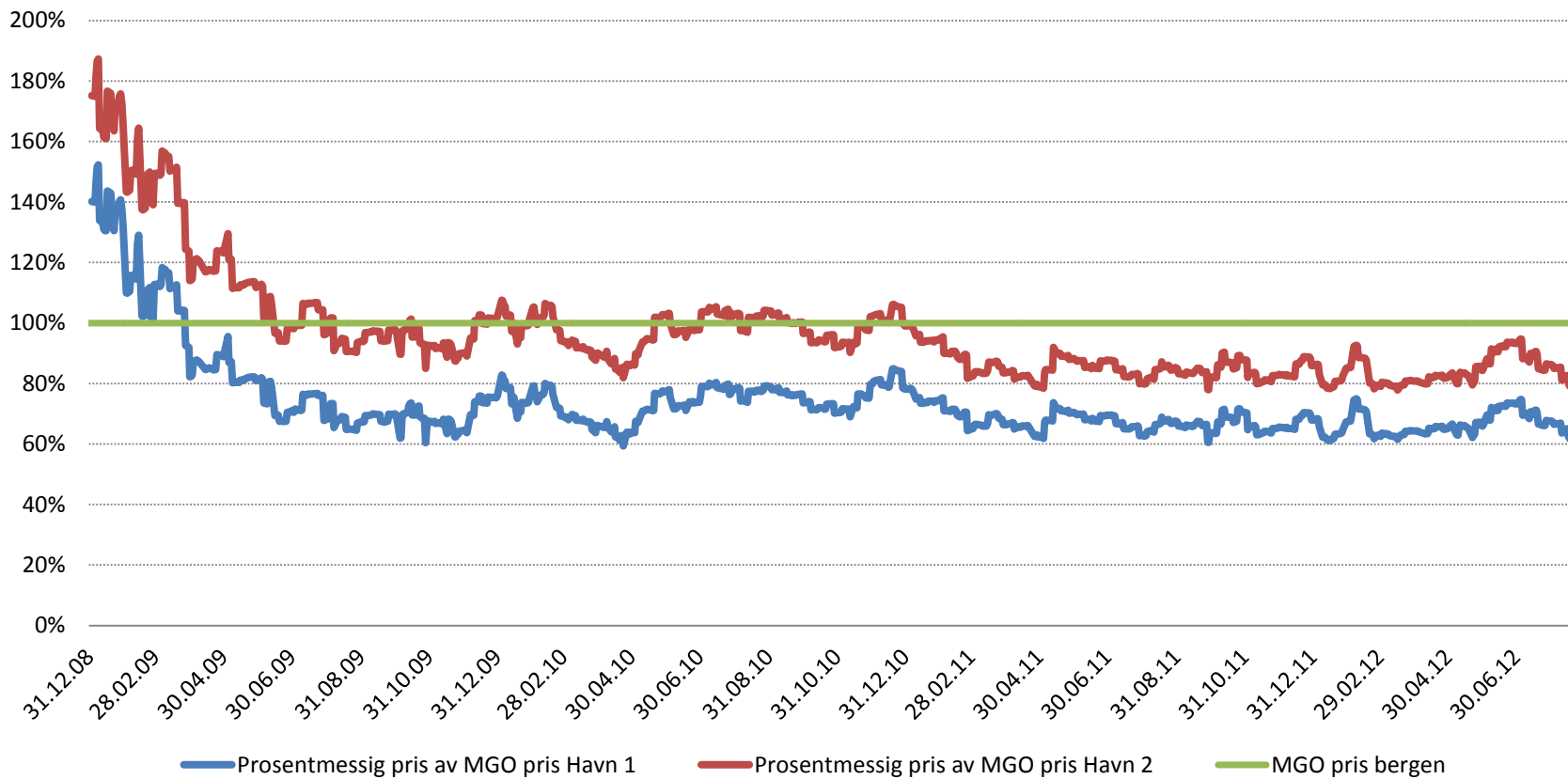
Source: ICE, EIA, IEA, German Customs, Japanese Customs.

A typical LNG contract in Norway 2013

- TTF – price in € per mmbtu + %
- €/MWh differentiated by harbour
- Local fees for transportation by LNG lorry

TTF=Title Transfer Facility (the Netherlands)

LNG vs MGO prices Norwegian West Coast



The NOx-fund, simulation of LNG contracts, March 2013

EU want more NOx-funds

- "...the Commission services will explore ways to encourage a bottom-up approach in encouraging the industry and public sector to set-up and manage a fund – similar to the **Norwegian NOx Fund approach** – by charging operators for emissions and then using the available funds for abatement technology, research etc"

"Pollutant emission reduction from maritime transport and the sustainable waterborne transport toolbox"

Commission Staff Working Paper 16.9.2011



Thank you!

For more information, please go to:

www.nho.no/nox or

www.nho.no/nox/english

