

NÆRINGSGLIVETS  
**NOx-fond**

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

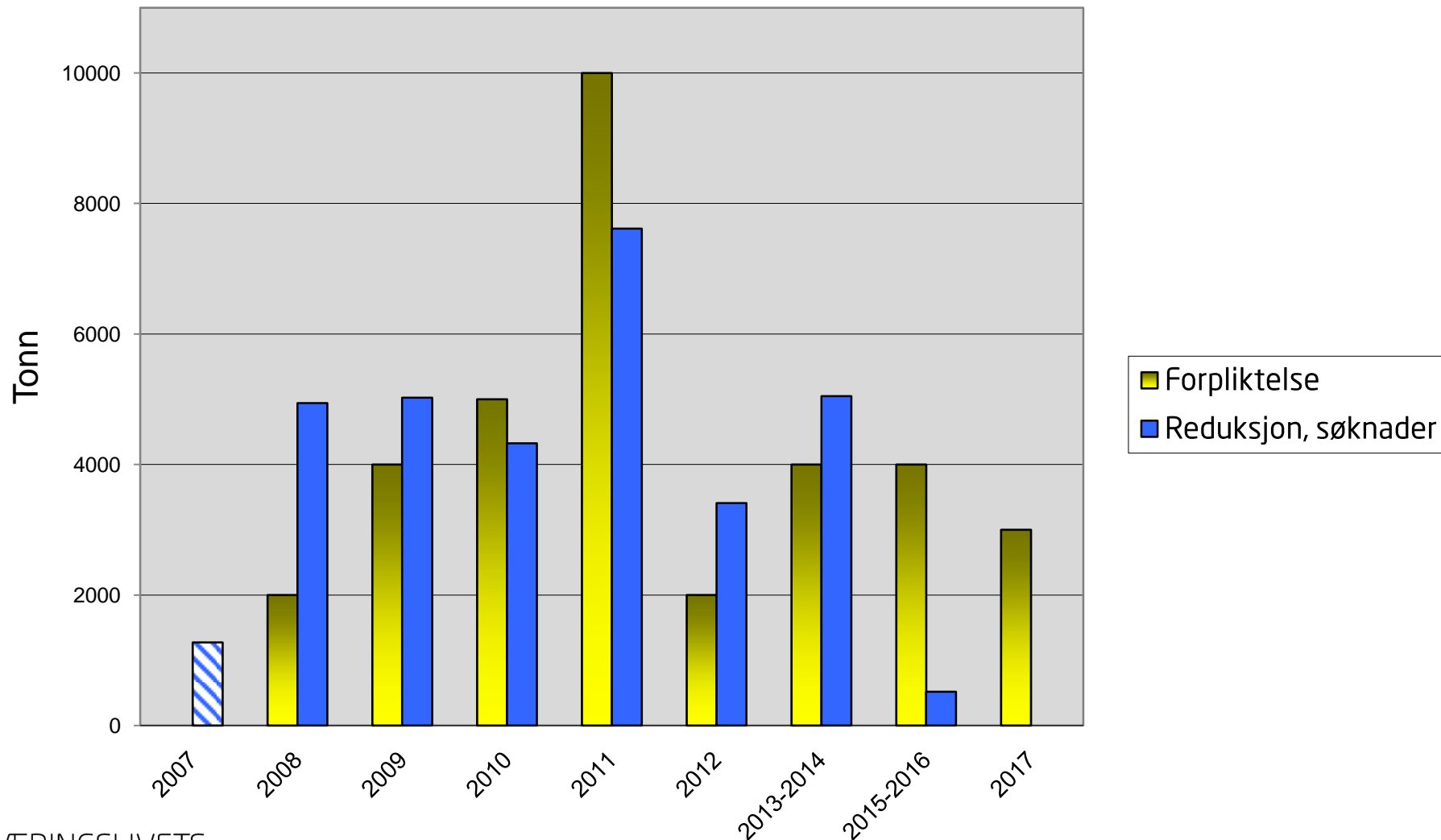
**Geir Høibye, Manager  
The Business Sector's NOx Fund**

**NHD Risavika  
28<sup>th</sup> of June 2012**

# Environmental NOx-Agreement 2008 - 2017

- Agreement between 15 business organizations and the Ministry of the Environment. Approved by ESA (Efta Surveillance Authority (Brüssels))
- Affiliated enterprises are entitled to exemption from fiscal NOx tax of € 2,05 per kg NOx and pay lower rates into the fund.
- Shipping, industry etc. pays € 0,5, Oil and gas production €1,3
- 680 affiliated enterprises by 27. of June 2012
- The Fund has about 70 mill. € each year available for support of NOx reducing measures
- Close to 900 applications for support to reduce NOx so far.

# NOx reductions and commitments



# 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



# How to get NOx effect:

Fuel consumption x emission factor

=

NOx emission in kilos



## Viking Lady

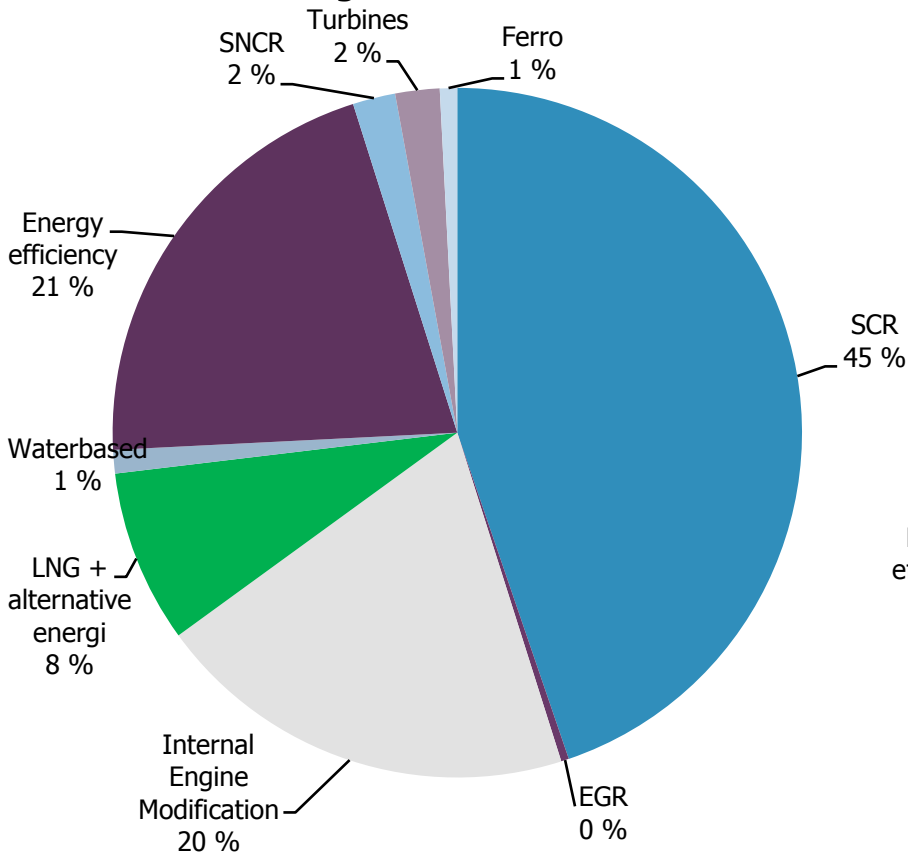
- LNG-powered
- Fuel cell installed
- "*The world's most environmentally friendly ship*"

# Support rates projects (2011-2017)

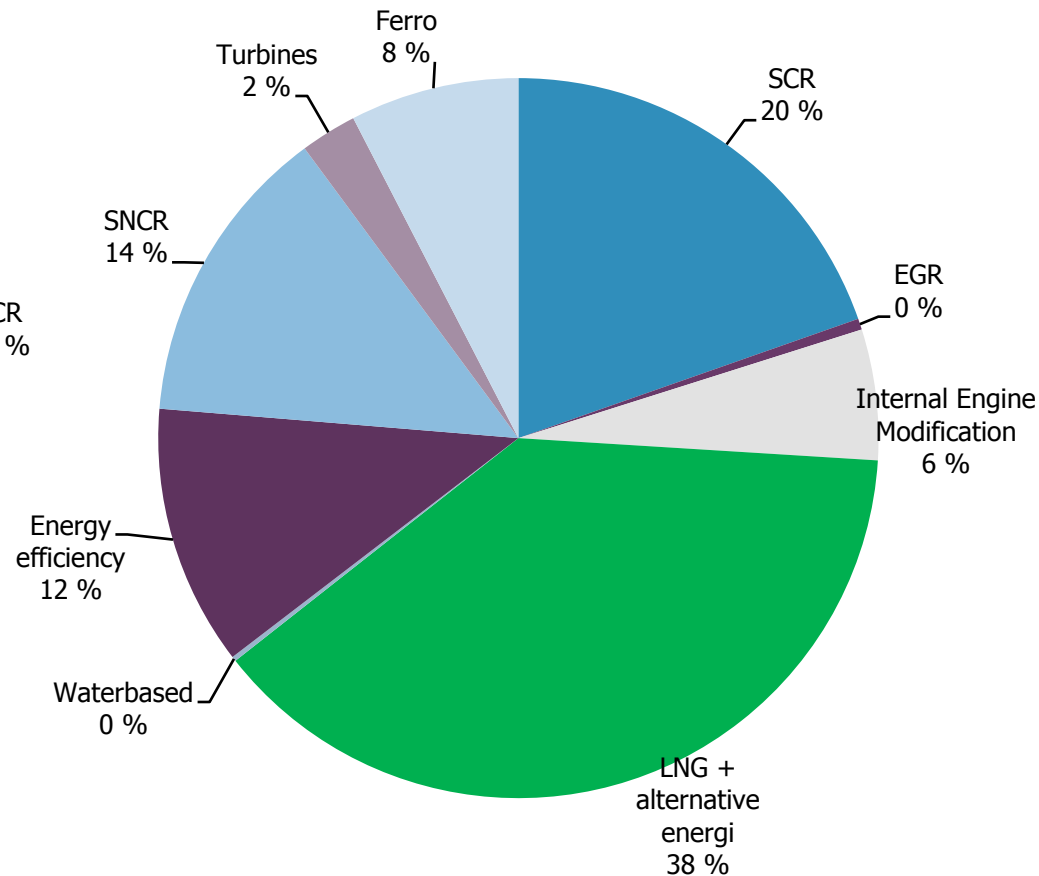
- Support to cover additional costs of investing in gas/LNG propulsion in shipping (up to 80 % of investment cost and up to **€ 44** per kilo NOx reduced) in 2011 – 2015
- Most measures could receive up to 80 % of investment cost and up to **€ 28** per kilo NOx reduced
- SCR measures could receive up to 60 % of investment cost and up to **€ 13** per kilo NOx reduced
- Support possible for LNG infrastructure from 2011
- Improved support rates for LNG has resulted in more LNG applications

# Reduction from NOx measures

**NOx Agreement 2008-2010**



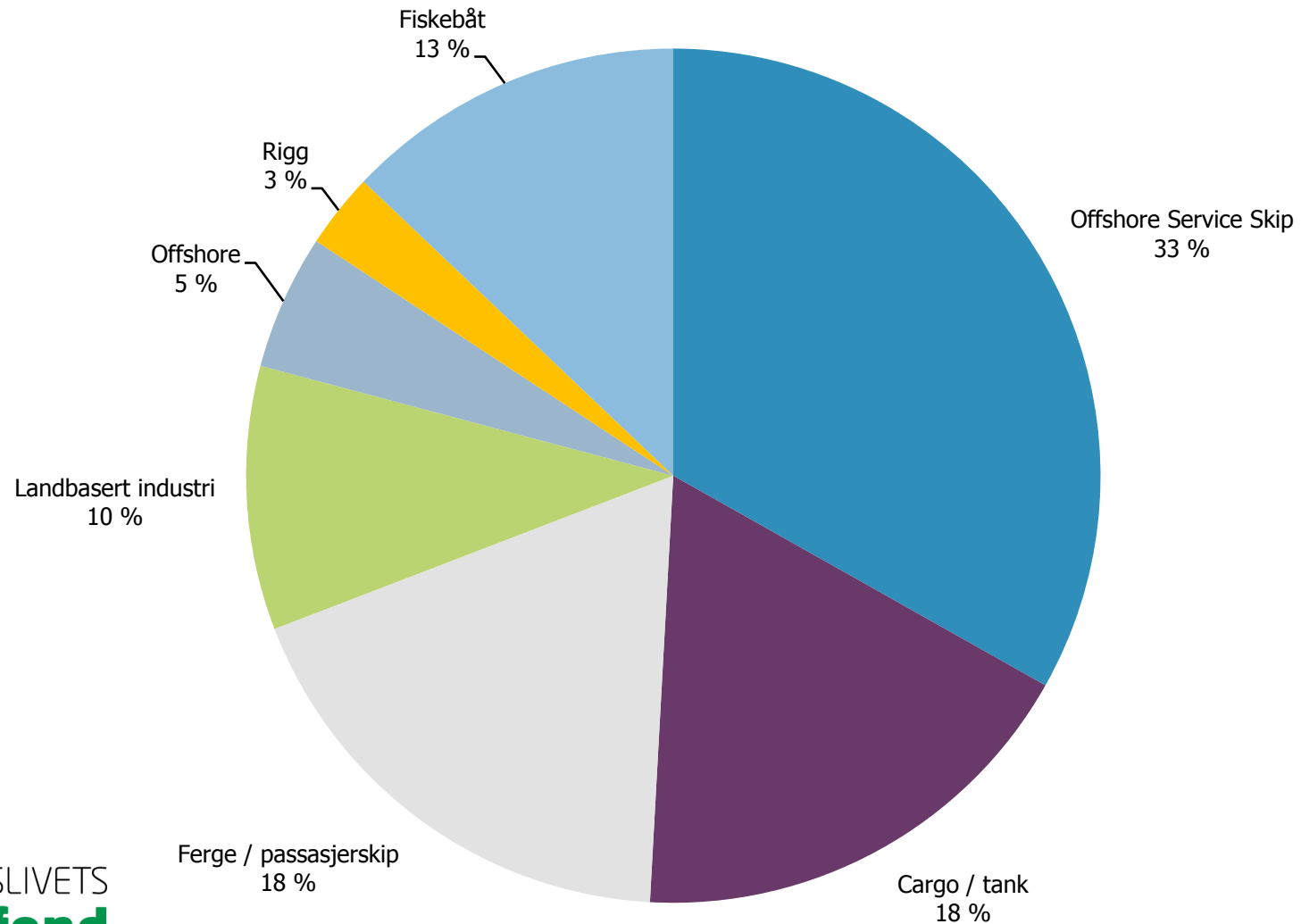
**NOx-Agreement 2011-2017**



**Energy efficiency in ships can be:**

- Hybrid/diesel-electric propulsjon
- Propellers and nozzles
- Low energy lightning
- Weight reduction
- Frequency converters

# NOx-reduction by sectors (2008-2017)



# LNG propulsion of ships

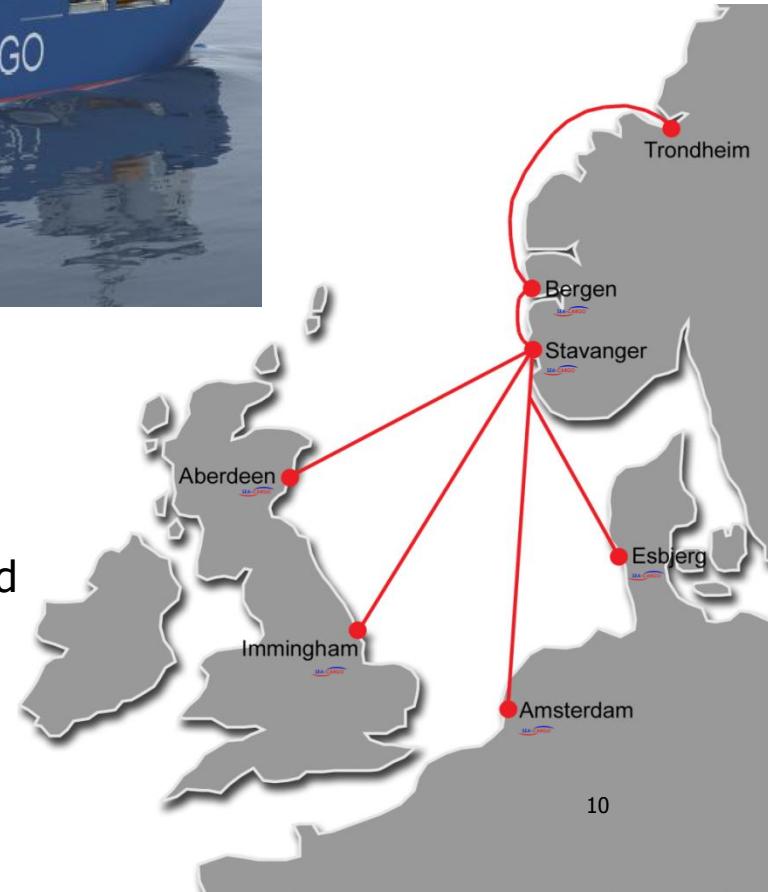
- In 2008 only 3 ships except ferries were running on LNG
- The NOx Fund has granted support to **41 ships**, converted to LNG or new buildings. Have **4** more applications as well.
- 10 -12 LNG ships will start sailing in 2012
- LNG in various ship segments
  - Ferries
  - Cargo
  - PSVs
  - Ro-pax
  - Tankers
  - Tugs

# Gas propulsion

Sea-Cargo revised contract from diesel to LNG



- 2 ships with 200 and 146 tons of NOx reduction. Start sailing in 2012/2013
- Granted € 9,5 mill from the NOx Fund
- 80 % of additional cost covered by the NOx Fund
- Rolls-Royce gas engine



# Tarbit Shipping's "Bit Viking"

Transport of oil products on the Norwegian coast

- 2 x 500m<sup>3</sup> LNG tanks
- Retrofit conducted october 2011
- No operational challenges post retrofit



# Bit Viking

LNG Retrofit in progress

NOx-reduction: 479 tons

Cost of measure: € 7,2 millions

NOx Fund support: € 6,1 millions

80 % support from the NOx Fund

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 % support from the NOx Fund



# More ships on LNG



## Normand Arctic (PSV)

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



## Boknafjord

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

# More ships on LNG

## Viking Prince (PSV)

- 161 tons of NOx reduction
- Started sailing in March 2012
- Granted 80 % support (€ 4,6 millions)
- Dual Fuel engines from Wärtsilä
- The sister ship Viking Princess enters into service September 2012



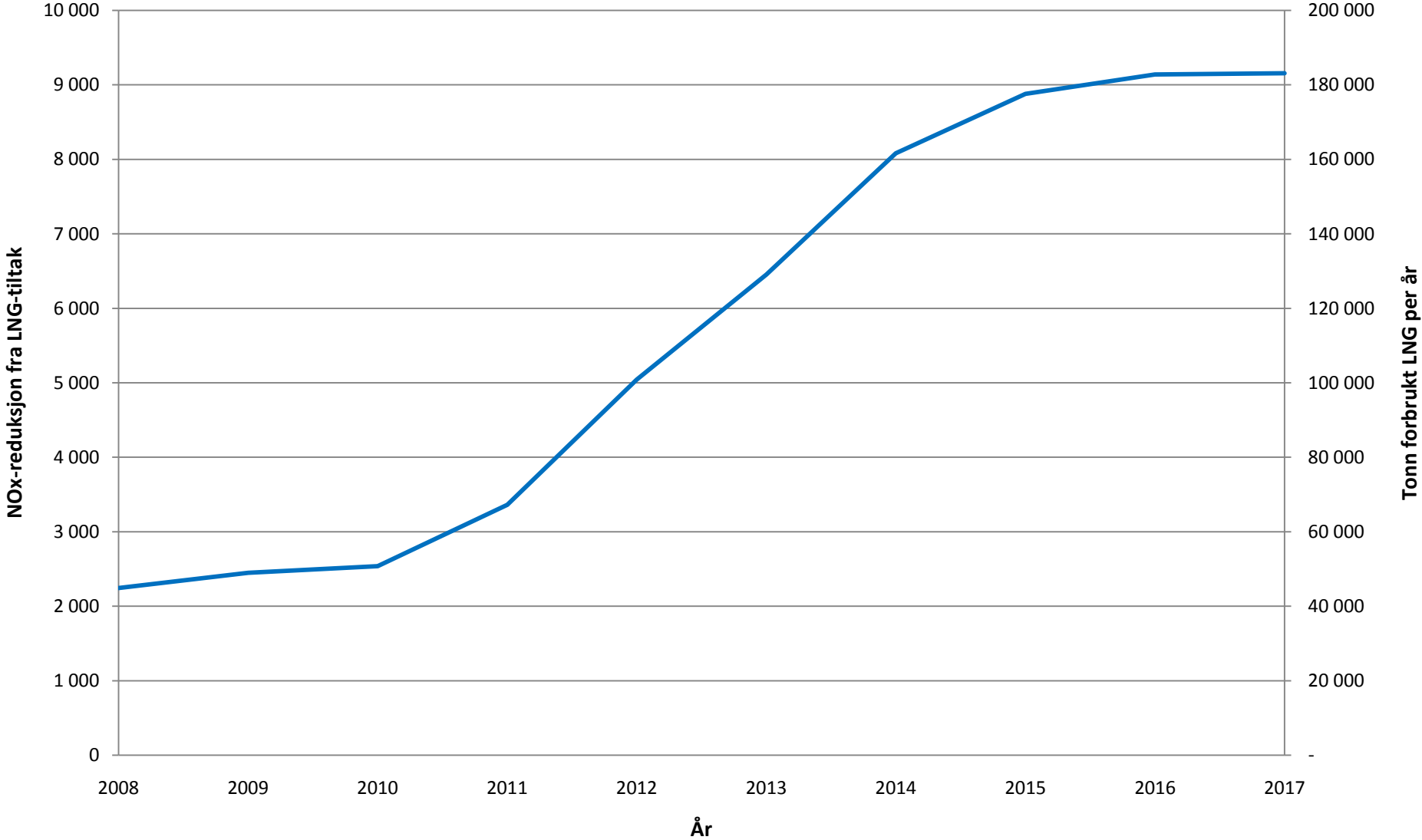
## Fjordline ferries x 2

- 321,8 tons NOx-reduksjon x 2
- Granted support from the NOx Fund (€ 11 millions) x 2
- Rolls-Royce gas engines
- Bergen-Stavanger-Hirtshals
- Comes into service april/may 2013

# Development of LNG as fuel

- In 2008 only 3 % of maritime fuel sold in Norway was LNG. In 2016 it can be 16 %
- By 2020 DNV and MARINTEK expect 1/3 of maritime fuel in Norway could be LNG
- The NOx Fund can support LNG infrastructure
- The NOx Fund works to improve the functioning of the LNG market in Norway

# LNG-used and NOx-reduction in Norway





Norwegian gas

Nord Stream

Zuidwending gas storage

North-South network expansion

BBL UK pipeline

Gate terminal

Export/Transit (Belgium-France-Italy)

Gas and sustainability



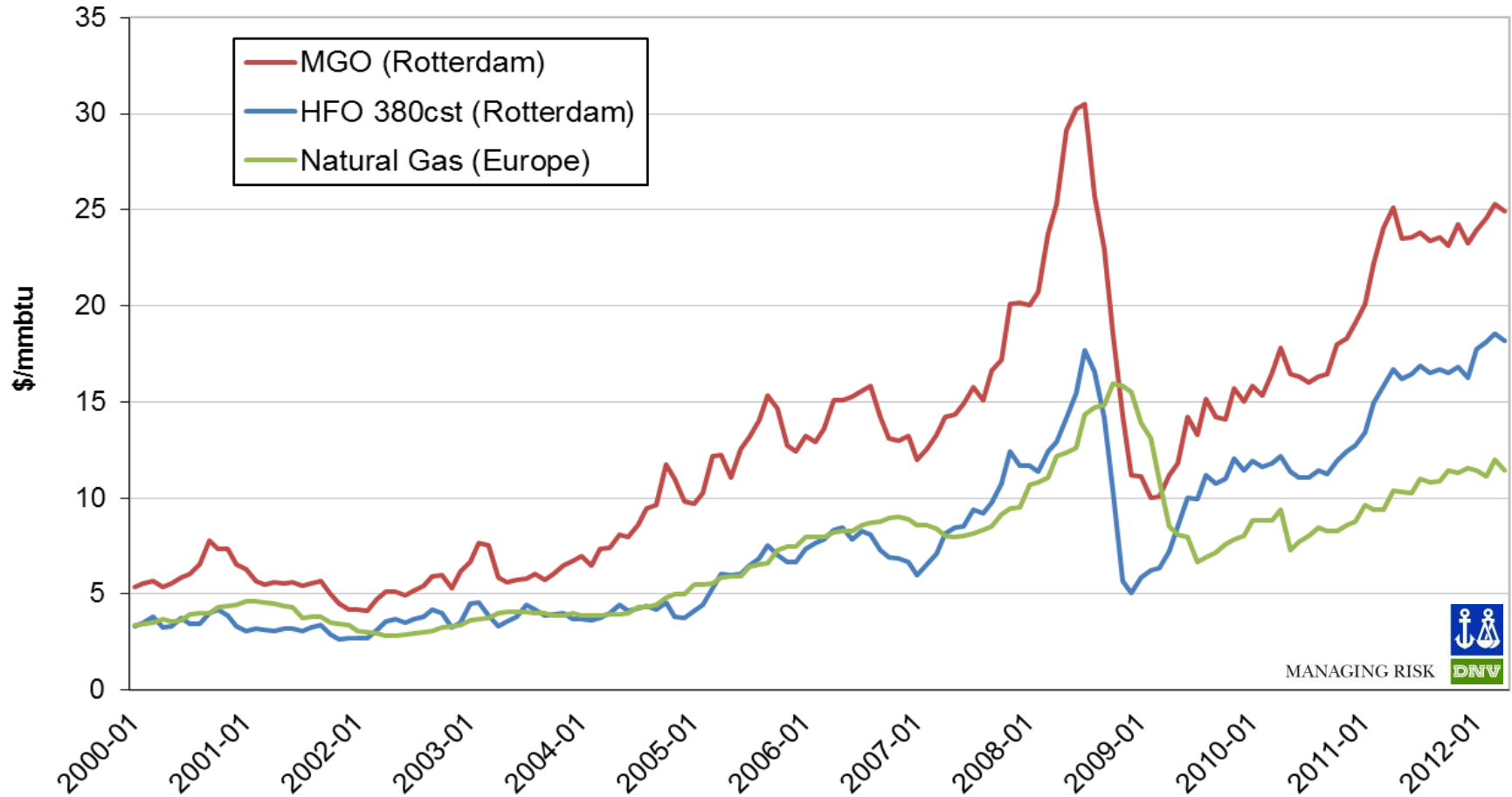


### Gate terminal to be equipped to provide LNG for transport

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

# Prices of fuel and gas in Europe

Fuel prices Europe



Sources: Clarksons Intelligence and World Bank (Average border gas import price)



LNG distribution from ships

# LNG distribution by containers?

55 -100 m<sup>3</sup> ISO approved containers available.  
LNG price delivered in Norway could be very competitive.





# Bio-fuel company aims to tap rich stream of waste for raw material

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**ERIC MARTIN** London

Construction could begin as early as January on a small-scale plant in the Netherlands that will make LNG out of agricultural waste such as beet leaves and straw.

Dutch company Bio-Ethanol Rotterdam (BER) plans for the output to be used as fuel for domestic heavy trucks, as well as for the shipping industry. The plant at the port of Delfzijl will have a liquefaction capacity of about 100 tonnes per day or 36,500 tonnes per annum.

[www.ber-rotterdam.com](http://www.ber-rotterdam.com)

**While preparing for production, we are working to create our own market with bio-LNG shipping projects:**

# Thank you!

For more information, please go to:

[www.nho.no/nox](http://www.nho.no/nox) or

[www.nho.no/nox/english](http://www.nho.no/nox/english)

