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

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

Helsinki
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Environmental NOx-Agreement 2008 - 2017

• For domestic emission only. Shipping between Norwegian ports.


• Affiliated enterprises are entitled to exemption from fiscal NOx tax of € 2.25 per kg NOx and pay lower rates into the fund.

• Shipping, industry etc. pays € 0.5, Oil and gas production € 1.5

• Affiliated entreprises p.t. is 709, representing 92% of all emissions subject to NOx tax.

• The Fund has about 80 mill. € each year available for support of NOx reducing measures.

• Close to 1 000 applications for support to reduce NOx so far.

• Administration cost of fund is approx. 3% of income.
Based on granted support and applications as of 15 of March 2013.

Over-achievements: tons transferred to next year.
Under-achievements: possible sanctions.
How to get NOx effect:

Fuel consumption × emission factor

= NOx emission in kilos

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

- 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

- Energy efficiency 21%
- Waterbased 1%
- LNG 8%
- Internal Engine Modification 20%
- SNCR 2%
- Turbines 2%
- Ferro 1%
- SCR 45%
- EGR 0%

NOx agreement 2011-2017
Long term achievements
Technology change

- Energy efficiency 11%
- Offshore gas 8%
- SNCR 11%
- SCC 23%
- EGR 1%
- Internal Engine Modification 6%
- LNG 34%
- Turbines 3%
- Ferro 2%

Energy efficiency in ships can be:
- Propellers and nozzles
- Low energy lighting
- 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
Current distribution

- **LNG plant**
- **Export terminal** >20 000 m³
- **LNG carrier** 7500 - 16 000 m³
- **LNG truck 50m³**
- **LNG barge** 500-2000 m³
- **Import terminal** 5000 - 20 000 m³
- **Local storage**
  - Small scale production
- **Industry application**
- **Ship application**
LNG distribution from ships
Future distribution possibility

The gas roundabout
Project Delta Group
Gate terminal equipped to provide LNG for transport

- Competitive service package:
  - Storage, Ship jetty
  - Truck loading facilities

Wide range of LNG suppliers = competition

Melkøya: LNG plant in Northern Norway

Distribution network open to 3rd party

Gate terminal equipped to provide LNG for transport
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 differented 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

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”
Thank you!

For more information, please go to:

www.nho.no/nox or

www.nho.no/nox/english