

Joint meeting SSS and MoS Focal Points and SSPC – Brussels 16-17 November 2011

LNG Northern Europe

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Outline

The goal of the LNG infrastructure work, partners and organizational set-up

An infrastructure of filling stations and deployment in ships

- **The pilot project** – in headlines
- **The infrastructure project** – the main part

Results up to now - the infrastructure project

The way forward - the infrastructure project

What will the infrastructure project deliver?

Background – Shipping and the green challenge

ECA provisions on fuel oil from 1 January 2015 in North European waters

- Competitiveness of shipping
- Competitiveness of regions

Green demands will increase in the future

- A basic condition

Shipping must be developed as the green alternative/part of the transport chain

Regulations a major driver!

LNG as a competitive fuel

New fuels is needed

Technology neutrality

LNG is an obvious alternative

- Transport, storage and distribution of natural gas (1:600)
- Focus on **the LNG supply chain**

A facilitating LNG infrastructure is needed

- "Hard" on marine filling stations
- "Soft" on regulations, industry standards, etc.

How can we create this infrastructure?

An infrastructure of filling stations and deployment in ships – the overall project

AN EU TEN-T Motorways of the Sea project

- LNG as fuel for international short sea shipping
- Total costs 26 mill. euro

A pilot project – Fjord Line Danmark A/S

- 9.0 mill. euro from TEN-T

An LNG infrastructure project

- 0.6 mill. euro from TEN-T

A combined top-down and bottom-up approach

The full-scale pilot project

Supporting and developing a transport corridor

- From the South Western part of Norway
 - ... to the Northern part of Jutland
 - ... and further to the Continent

Ports

- Hirtshals base port
- Bergen, Stavanger, Langesund

The project

- Conversion of two new cruise ferries under construction for LNG
- A full-scale pilot project
- Deployment in international short sea shipping
- An extensive measuring programme
- A maritime LNG infrastructure is needed!!

Partners – the Infrastructure project

States: Belgium, Denmark, Finland, Norway and Sweden

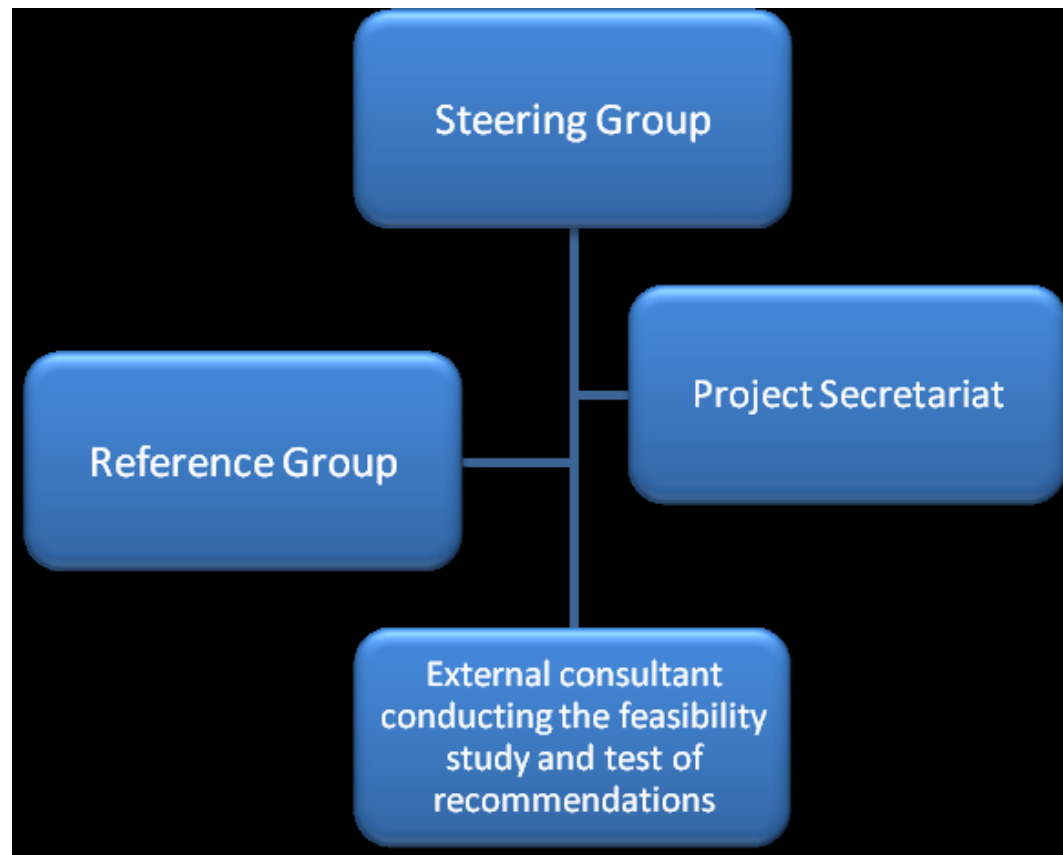
Regional: Council of Nordic Ministers

Ports: Port of Hirtshals (DK), Port of Zeebrugge (BE), Szczecin and Swinoujscie Seaports Authority (PL) and Port of Rotterdam

LNG terminals and gas distribution companies: Fluxys (BE), Gasum (FI), Gasunie (NL), Energinet.dk (DK), Energigas Sverige (SE), Gasnor (NO) and GazpromLNG (RUS)

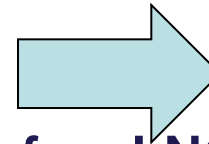
The maritime cluster: Germanischer Lloyd (DE), Bureau Veritas (DK), MAN Diesel and Turbo (DK), Lauritzen Kosan A/S (DK)

Project organization chart



Goals of the LNG infrastructure project

Identify and analyse critical enablers



Recommendations on establishment of an LNG infrastructure

- The LNG supply chain
- "Hard" on marine filling stations
- "Soft" on regulations, industry standards, etc.
- Validated through the industrial project partners

Relevant for central stakeholders

- Shipowners, ports, LNG providers, equipment manufacturers, industry organizations, countries, EU, IMO, etc.

The business case as target – the LNG supply chain

Innovations on LNG

The LNG infrastructure project

- Central enablers for the use of LNG as a starting point
- From enablers to recommendations!!!!!!!!!!

Safety

Local municipalities and public awareness

Technical possibilities for fuelling ship engines with LNG

Fuelling of other means of transport than ships from "maritime"
LNG filling stations

LNG filling station dimensions

Economy as seen by a ship, a port and an LNG provider

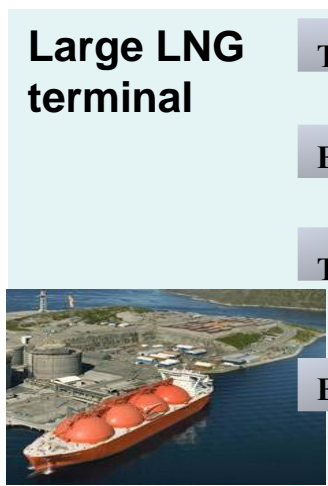
The LNG market

The potential of LNG

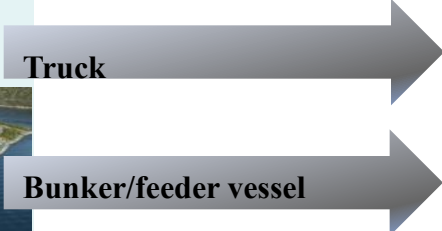
Time schedule for reports

1. **Inception** – available
1. **Baseline** – available
1. **Draft feasibility report** – beginning December 2011
 - ❖ Economic and financial aspects
 - ❖ Technical and operational aspects
 - ❖ Safety aspects
 - ❖ Draft recommendations
2. **Test of recommendations**
3. **Draft final report** - 27 February 2012
 - ❖ Recommendations

Photo: Gasunie



Large LNG terminal



Intermediary LNG Terminal

Onshore, e.g.

- Tank
- Container

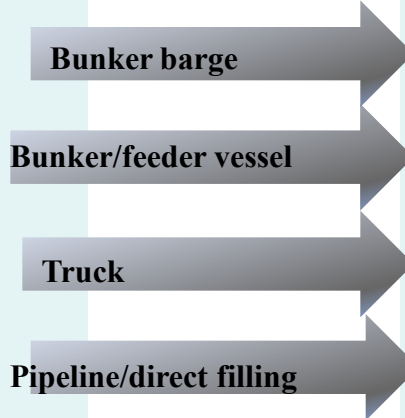
Offshore, e.g.

- Vessel
- Barge

Small-scale liquefaction plant



Photo: SSPA



End users

SHIPS

Trucks

Cars

Industry/power generation

Gas grid

Etc.

Photo: Gasunie



Gas pipeline

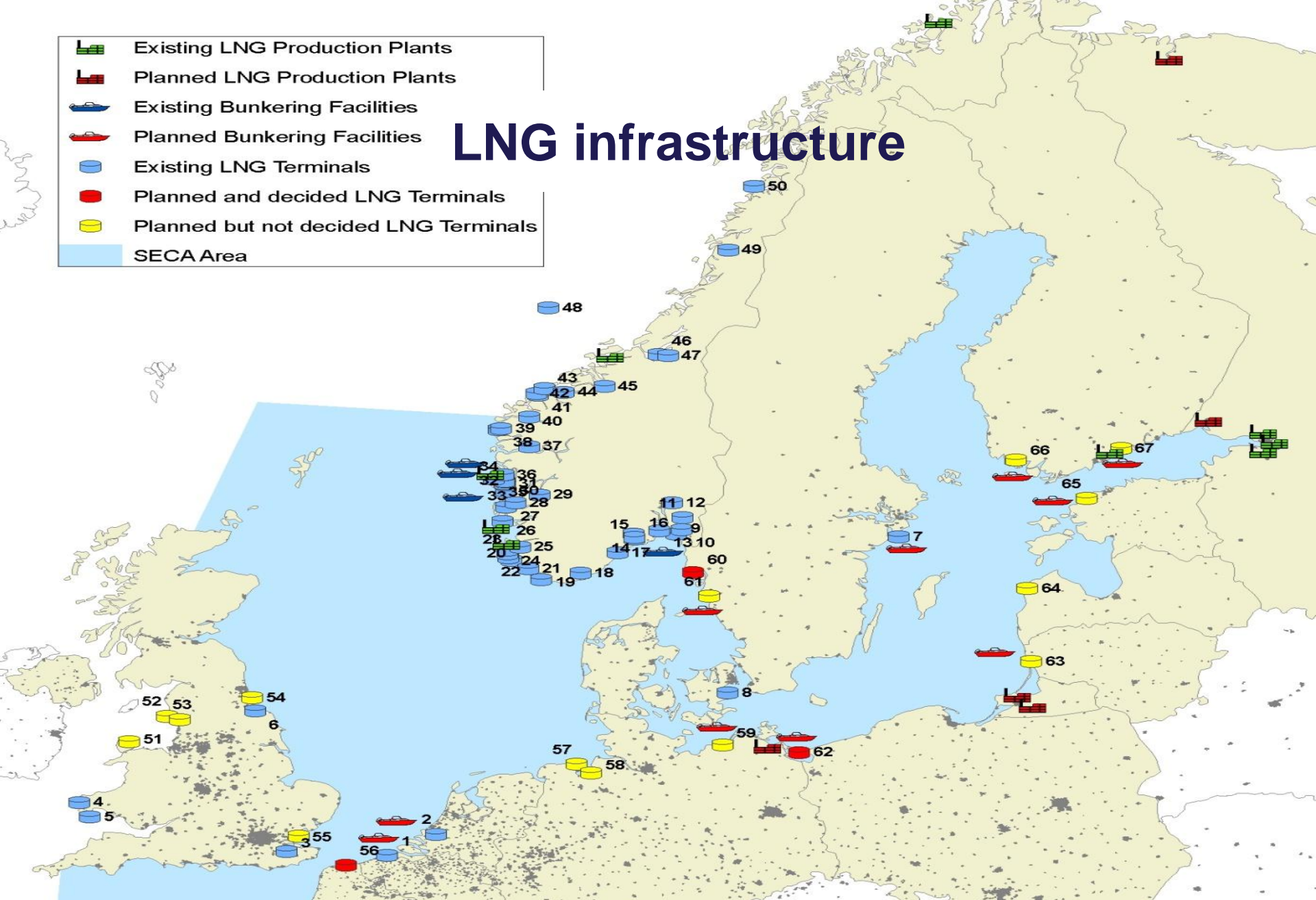


Photo: SSPA



LNG infrastructure

- Existing LNG Production Plants
- Planned LNG Production Plants
- Existing Bunkering Facilities
- Planned Bunkering Facilities
- Existing LNG Terminals
- Planned and decided LNG Terminals
- Planned but not decided LNG Terminals
- SECA Area



Results up to now – availability and demand

The demand for LNG will increase

- 2- 4 mill. tons of marine LNG fuel from 2020 estimated

LNG availability will not be a limiting factor

LNG infrastructure

- Import terminals serve the gas network
- The key for LNG as marine fuel is small-scale LNG supply chains
 - Terminals (intermediate)
 - Jetties, especially for import terminals
 - LNG feeder/bunker vessels and barges
- First movers are needed to gain momentum in the LNG supply chain

Maritime demand drivers

- Regular shipping lines within the ECA area
- Competitive prices via small-scale LNG supply chains

Results up to now – a shipowner's perspective

ECA compliance strategies/the 2015 ECA regulation

- LNG
- Scrubbers
- MGO

Different LNG solutions/flexibility

- Mono or dual fuel systems
- Larger tanks imply a payload problem

A competitive price development for LNG is expected

- Greater investment costs for LNG
- The pay back period?
- The secondhand market and LNG fuelled ships?

The fuel market

- Oil: A competitive short market and an efficient infrastructure exist
- LNG: Shorter contract periods as now are needed and an efficient infrastructure must be built
- Who can transform from long to shorter LNG contract periods?

Results up to now – Regulations and permits

Regulations missing

- For small-scale LNG infrastructure
- For movement of small-scale LNG vessels in ports
- For bunkering

Permit processes for LNG terminals

- Plans for interaction and communication with stakeholders are needed
- Time-consuming – start as early as possible

Adaption of large-scale regulations to small-scale regulations

- Implies overregulation

The way forward – the infrastructure project

Shipowners' compliance strategies

Bunkering

- Ship-to-ship at quay or at sea
- Tank truck to ship
- Tank to ship (direct filling)

Scenarios for LNG coverage

- Terminal systems (small, medium and large)
- Integration of land-based end users
- Ships/barges as part of the supply chain

Investors and operators

- Public utilities/public sector
- Private companies

Key characteristics for location of filling stations

The business case as a horizontal issue

What does the LNG infrastructure project deliver?

Validation through industrial partners and port authorities

- From a port cluster point of view!

”Soft ” infrastructure recommendations

- Missing regulation, standardization, best practice, etc.
- Regulation, etc. must be appropriate (no overregulation)
- **Who is the ”problem owner” and what must be done?**

Hard infrastructure recommendations

- Possible components and investment cost indications
- Migration thinking/increasing demand
- Business opportunities

Business case thinking

- The overall aim: Investments in the LNG supply chain, including shipowners

Thank you for your attendance

Further information on

www.dma.dk

North European LNG Infrastructure Project