Port of Helsingborg; LNG in Helsingborg

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Co-financed by the European Union
Trans-European Transport Network (TEN-T)
Why Helsingborg?

Helsingborg is a **strategic site**

- 3 million heavy goods vehicles passes by every year
- Appr. 50 000 ships passes by every year
- Good conditions in Öresund for bunkering
- Industries that could use LNG/ CNG

- City of Helsingborg has a **great environmental awareness**
  - The air quality in the centre of Helsingborg is a problem
  - LBG production in a large scale
Main corridors where modal shift may occur due to new IMO regulations
Source: COMPASS The COMPetitiveness of EuropeAn Short-sea freight Shipping compared with road and rail transport, commissioned by European Commission DG Environment, 2010

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Market area - transports
Overview of the Ports LNG Projects

- LNG in Baltic Sea Ports Project I – HELGA I (Studies)
- LNG in BSP II – HELGA II (Design multi functional bunker ship)
- HEKLA – LNG project in cooperation with Klaipedos Nafta
Goal

- To establish a LNG/LBG infrastructure in the south of Sweden
Performed work in Helsingborg:

- Market, Profitability analysis, sourcing, location and stake holder’s analysis.
- Basic Design of the terminal and quay and investment calculation.
- Risk assessment project and check of process for permits
- Design of terminal and quay
- Preparation of permits and tender documents
Key success factors

- Location that fulfill all parameters
- The shipping segment is crucial for critical volumes
- Control of the value chain before a final decision of business model
- The terminal must be established in steps and co-financing from EU is required.
- Co-operation with partners and stakeholders necessary for making an reliable infrastructure
Step 1,
✓ A liquefaction plant condensing LNG/ LBG from the grid with limited storage capacity.
LNG to heavy vehicles and small ships.

Step 2,
✓ Extended storage capacity of 3000 – 5000 m$^3$ (steel tanks)
✓ Rebuilding of existing berth
✓ A multifunctional bunker vessel
LNG to heavy vehicles, industry and ships

Step 3,
✓ A full 15 000 m$^3$ storage (full containment type)
✓ Decommissioning of steel tanks
LNG to heavy vehicles, industries and ships

Step 4,
✓ New Jetty suitable for feeder vessels up to 40 000 m$^3$
LNG to heavy vehicles, industries and ships
Step one - HEKLA, Liquefaction plant
Step two
Step three
Step four
Project activities:

Activity 2. LNG in Helsingborg:

- Develop a design for a multi-purpose LNG bunker ship in the area
  
  - The objective of this activity is to design a multifunctional bunker ship solution in south of Sweden
  
  - The multi-function ship will be able to provide – LNG bunkering; MGO bunkering & Other ship supply services
  
  - LNG bunker ship study will describe the following: size, number fuel tanks, type of bunker fuel that the ship shall carry (the ship shall be running on LNG), type of other services that should be performed by the ship and crew, etc.
Scenario 1A
Description: An existing bunkering ship will be retrofitted to carry MGO, LS HFO and, as the new part, LNG. The total cargo fuel capacity of the ship shall be 2000-3000 m³. The LNG capacity shall be 500-1000 m³, the first being the basis for calculations. Investering: ca 50 - 70 milj SEK.

Scenario 1B
Description: As Scenario 1A but converting the main and auxiliary engines to gas fuelled. The engines can be dual-fuelled engines or gas engines (i.e. spark-plug installed for ignition).
Investering: ca 70 – 90 milj SEK.

Scenario 2
Description: A new bunker ship carrying LNG, MGO and HFO with high flexibility to adjust to new market conditions. Tank volume 2000-3000 m³ (MGO, LS HFO and LNG in total). As adjustable to a new market situation the ship shall be classed for worldwide trade.
Investering: ca 210 -220 milj SEK
Scenario 3
Description: A new self-propelled bunker barge for LNG and MGO. T
Some possibilities for a restricted service notation that has to be further agreed with the class and authorities.
Investering: ca 130 -140 milj. SEK

Scenario 4
Description: Retrofitting an existing bunker barge to carry MGO and LNG. An existing tug boat will transport the barge. LNG tank shall be approximately 500 m3 and the MGO tank approximately 500 m3. The tug is hired from external company when needed and could differ from time to time. The tank type can be one large type-C or several 40” ISO containers. It is assumed that it is not an articulated barge and tug as the tugs in Helsingborg Port shall be used.
Investering: ca 72- 75 milj. SEK
**Scenario 5**

**Description:** A 2nd hand transport barge is acquired and equipped with 40” ISO insulated LNG containers in the deck. The concept enables the client, as a supplement to their own LNG plant, to import LNG from external sources in containers that are landed in Helsingborg port. The containers can be transported by container ships arriving in Helsingborg where the infrastructure in the port allows the containers to be unloaded, stored and loaded onto the bunker barge. On-board the barge the containers are stowed in guides with bridges for access to the connection hoses if loaded in 2 tiers. Taking the stability of a barge into consideration 2 tiers (layer) of containers is assumed to be max without an actual barge selected. This means that free slots can be incorporated in order to allow filled LNG tanks to be taking on-board without removing the normal installed containers.

The capacity of the barge is assumed to be 500 m3 LNG gross for normal installed containers. The gross warm volume of one container is 43.5 m3; hence 12 containers to be installed on-board.

**Investing:** ca 63 - 65 milj. SEK
MULTIFUNCTIONAL BUNKERSHIP

DESIGNED BY ODENSE MARTIME TECHNOLOGY A/S

SHIP - GENERAL

The purpose of the vessel has been to design a highly flexible platform that enables the operator to:

- Start with a small number of LNG storage tanks and increase the number of LNG storage tanks as the market develops.
- Transport a large amount of diesel bunker on-board enabling a diesel bunker trade in the beginning (more tanks than the shown can be installed if requested).
- Carry a number of 40” ISO gas containers on the upper deck enables the operator to provide LNG to ports very fast e.g. between a ferry departure and arrival. The containers are designated as “swift containers”
- The open deck installation allows a high degree of independent design of the top-side

The vessel shall be designed and constructed as an environmentally friendly, all welded steel ship with gas/diesel electrical twin thruster propulsion.

The engine room is located below the superstructure aft. The forward mooring platform is located on the foc’sle deck.
10 GENERAL DESIGN

MAIN DIMENSIONS

- Length over all: 95.3 m
- Length between perpendicu-lars: 93.10 m
- Breadth moulded: 18.0 m
- Depth moulded: 6.0 m
- Design draft moulded: 3.5 m
- Scantling draft moulded: 3.5 m
- Air draft (from baseline): Approx. 21.6 m

DEADWEIGHT

- Deadweight at design draft: Abt. 2,082 t

SPEED

The speed is subject to final power predictions but is expected to provide a service speed on 8-10 knots with 15% sea margin, on the design draught 3.5, in calm weather and with clean hull. For details of the propulsion platform, see Section 6.
MANOEUVRING MACHINERY AND EQUIPMENT

401 RUDDER
The ship is equipped with two (2) steerable thrusters with integrated gearbox serving as rudders.

404 THRUSTERS
One (1) bow thruster:
- El-motor 690 kW with frequency drive
- Fixed pitch propeller, diameter app. 1.2 m

DIESEL ENGINES FOR PROPULSION

601 MAIN ENGINE
Two (2) 4-stroke generator sets are installed for supplying power to the electrical propulsion system and auxiliary systems. The engines are of the dual-fuel type with integrated double wall piping designed for running on natural gas with pilot diesel fuel or running on diesel. When running on natural gas the engines fulfils TIER III. The engines also serves as BOG removing devices.

FUEL
- Natural gas or diesel.
- The engines are capable of running at low sulphur DO with a viscosity of minimum 1.8 cSt at engine inlet.
HEKLA – Development of LNG bunker Network

HEKLA – Helsingborg & Klaipėda LNG Infrastructure

Real investment;

Helsingborg – Construction of LNG liquefaction plant
Klaipeda – Construction of on-shore LNG reloading station

An important step forward towards creating the LNG bunkering infrastructure network in the BSR.
LNG demand forecast
Base scenario HBG terminal

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REALITY 2016

ROAD TRANSPORT

MARITIME TRANSPORT

Dual fuel engines
VERY LOW MGO PRICE

Waiting for heavy LNG Vehicles