Maritime Gas Fuel Logistics

Work package 5

Harbour studies

Stockholm

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1 The port of Stockholm

The port of Stockholm holds a moderate position in Sweden as the ninth biggest port when considering amount of goods handled, only handling a seventh of the volumes of Gothenburg. However, Stockholm with Nynäshamn and Kapellskäer is an important landing area of both cargo and passengers.

The numbers from Sweden official statistics (table 10 2006) fails to give the numbers of passengers vessels calling the port, but more than 4.3 million passengers and 188.000 cars leave and arrive the port annually.

The Ports of Stockholm Group comprises the ports in Stockholm, Kapellskär and Nynäshamn. The Port of Stockholm is the central port for freight and passengers to and from Finland, Russia and the Baltic states. The ports at Kapellskär, 90 km north of Stockholm, and Nynäshamn, 60 km south of Stockholm, are the outports which, with their shorter entrance channels, form a supplement to the central port.

The Port of Kapellskär is very important for rapid freight services to and from Finland and Estonia. Today there are ferries lines to Finland, Åland and Estonia There are daily services to Åland from Kapellskär and Paldiski in Estonia is only 10 hours away. The Port of Kapellskär has expansion plans – more RoRo quays and storage areas mainly for ro-pax traffic are planned in the near future.

The Port of Nynäshamn is the mainland port for services to Gotland and has an ideal situation for ferry services to ports in the central and southern Baltic.
The numbers and types of ships that call at the port of Stockholm during the year are listed in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
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1.1 Environmental vision

The Port of Stockholm has an active environmental policy and is a frontrunner in this issue. The environmental vision of the Port of Stockholm is to “be one of the leading ports in environmental issues in Europe, and work to reduce the environmental impact of shipping and the transport sector”.

1.1.1 Emissions

Environmentally differentiated port dues are applied at Ports of Stockholm as a financial incentive to support and encourage shipping companies to try and reduce environmental impact themselves. There is a surcharge for vessels that use bunker oil with very high sulphur content, while vessels that have reduced their nitrogen emissions in various ways qualify for lower port dues.

1.1.2 Noise

Ports of Stockholm focus on sound/noise from cruise liners. If a vessel is perceived as disruptive, where possible there are efforts to reduce the disruption through various measures by contacting the vessel’s captain and discussing opportunities for changing the operating situation or by moving the vessel to another quay-berth. The port also carries out noise measurements, and if values exceed the guidelines the vessel’s captain is contacted and requested to take measures if the vessel intends to call at Stockholm again in future.
1.2 Trends and developments.

A number of development projects are under way in the harbours around Stockholm. Here we will introduce some of the development going on.

1.2.1 Expanding Nynäshamn

Stockholm-Nynäshamn – a port for the environment and the region

The Ports of Stockholm are expanding Stockholm-Nynäshamn, into a modern port for rolling goods and container traffic. This is done due to a growing demand in the region.

Stockholm’s inner city has limited capacity for handling increased transports and the port of Stockholm is unable to accommodate growing container traffic volumes. Furthermore, there is not enough available land to allow port capacity in Stockholm to expand.

Nynäshamn’s coastal location means that large vessels will no longer need to pass through Stockholm’s expansive and environmentally-sensitive archipelago. Entrance routes will be shorter, resulting in time and environmental gains. Heavy lorry traffic through Stockholm’s inner city will also be reduced as goods will instead be freighted via Nynäshamn.

The expansion will be done in stages with start of construction in 2007 and start of operation in 2010. The full development will be completed in 2029.

An industrial park and a logistics centre are being built adjacent to the port. The logistics centre will, among other things, consist of transfer terminals, warehouses and traffic zones. Incoming goods are transferred directly to the terminal, where they are reloaded for transportation by road or rail. This will allow more remote functions to benefit from the port’s strategic location. The area, which is some 100 hectares in size, is owned and will be developed by NCC.
1.2.2 The Värta-Frihamnen Development – creating a new gateway to Stockholm

Alongside the City of Stockholm, Ports of Stockholm is developing a new gateway to the Swedish capital. The Värta Pier in Värtahamnen harbour, in the north-eastern part of central Stockholm, is being expanded to modernise and streamline port operations. This will also release attractive land for new construction in the port area.

At present the area is primarily home to port operations. A large group of actors are involved in the development including shipping line Tallink Silja, the Swedish Road Administration, local transport company SL, energy provider Fortum and of course the City of Stockholm.

2 Major shipping companies operating out of Stockholm

The following table with accompanying information on the shipping companies operating out of Stockholm shows the activity on the respective week-days. As shown in the table there are daily sailing to each destination. For some routes more than one sailing is carried out a day.

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<thead>
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</tr>
</tbody>
</table>

2.1 Silja Line - Tallink

Silja Lines offers daily crossing between Stockholm and Helsinki, Riga, Tallin and Åbo with 8 RoPax vessels. The company has fair mix of new and old vessels; two of them are regarded as probable for replacement in the near future. Based on traffic patterns and age structure of
the fleet, Silja Line is regarded a potential candidate for LNG driven vessels in the near future.

Silja Line operates from the terminal at Värtahamnen which is close to the city of Stockholm.

Tallink operates from the terminal in Frihamnsterminalen with departures to Lines to Tallinn and Riga.

2.2 Viking Line

Viking Line Ferries is an important ferry operator serving the Finnish destinations. The company provides sailings between Stockholm and Helsinki, Langnas, Mariehamn and Turku. The company operates 6 vessels on these lines, most of them of fairly low age; however are 2 vessels expected to be due for replacement in the next 10 years period. However the first of these are probably already in production, as the new Viking ADCC vessel is expected to replace at least one of the older vessels.

The company is assessed to be a potential future candidate for LNG driven vessels in the future.

2.3 Finnlines

Finnlines operates four RoPax vessels between Stockholm and Turku, all of them newer than 20 years. The age structure of these vessels gives no reason to expect a soon replacement of this part of their fleet. However the company operates a number of vessels on other connections, opening for re-shuffle of their fleet if situation should be favourable for LNG.
2.4 Polferries

Polferries operates 2 fairly old RoPax vessels from Nynäshamn to Gdynia/Gdansk with a daily crossing in each direction. Given the strengthening of the Eastern European economy, a replacement of these vessels is not unlikely within the next 5 years.

2.5 Age structure

There are a total of 29 vessels identified as operating on a regular basis on Stockholm and the adjoining ports. The average age of this fleet is of 17.5 years, and there is 8 vessels older than 25 years, and 13 older than 20 years.

The majority of vessels identified in this area are RoPax vessels.

2.6 Potential for other local use

Natural gas as a general energy source has a limited distribution in Sweden. In the western part of the country there is a natural gas grind, but in the Stockholm area there is no natural gas grid. That means that a LNG terminal for bunkering purposes can not be connected to an existing gas grid, but there should be a potential to supply on shore users with natural gas in the form of LNG. Example of potential on shore users are local industry and heavy trucks.

2.7 Summary

Stockholm is regarded as an interesting port due to the high number of RoPax and ferries operating on this port. The RoRo potentials seem on the other hand low. A total of 425.000 tonnes of fuel are estimated used on the lines operating on Stockholm.

3 Potential locations for a LNG terminal

Due to the number of ferry connections and the environmental policy of The Port of Stockholm, this is a promising harbour for the introduction of LNG as a ship fuel. To offer
LNG as a fuel to ships there must be established a small scale LNG terminal for bunkering purposes. This is not a full scale import terminal as seen in Europe, but a small terminal designed for bunkering purposes, and supplied by a small scale LNG shuttle vessel. The choice of location for a LNG terminal for bunkering purposes depend both upon where potential users of LNG are and where there are areas available.

RoPax vessels run on a tight schedule and cannot make an extra stop for bunkering. Thus they need the bunkering to take place at the RoPax terminal. In the same time RoPax terminals often are busy areas where there is difficult to locate a LNG terminal. RoRo vessels and other freight vessels can make extra stops for bunkering, but here as well the preferred solution is to get bunkering services where the cargo is loaded or unloaded.

Due to high activity, limited available areas and harbour locations in short range from residential areas, there is difficult to locate a bunkering terminal close to the harbour terminals. The best options will be to locate a LNG terminal in connection with one of the existing oil harbours in the Stockholm are.

Loudden is an existing oil harbour with systems prepared for petroleum products. The location is within the archipelago and there are no residential areas in the neighbourhood. The location is close to TallinkSilja. There is a decision to close this harbour in 2011, but there is yet no alternative location in place for the oil harbour. The area is administered by the ports of Stockholm.
Another existing oil harbour is Bergs oljehamn, which is located close to Viking and Birka, but this harbour has residential areas within the range of 75 – 100 meters. There is made a decision to close the harbour in 2009.

There is a former oil depot at Stora Höggarn. This is an island in the archipelago of Stockholm which was in use as an oil harbour earlier. There are now plans made by NCC Construction and the real-estate company Fastighets AB Stora Höggarn to reopen this oil harbour as a central oil depot supplying the Stockholm area. There are no residential areas on the island, but there are objections to the plans from users of the recreation areas in the archipelago.

Further considerations is necessary to conclude upon a preferred location for a LNG terminal for bunkering purposes in the Stockholm area, but there are possibilities which constitute potential location for a terminal.

4 Summary

The Port of Stockholm is the central port for freight and passengers to and from Finland, Russia and the Baltic states. The Ports of Stockholm Group comprises the ports in Stockholm, Kapellskär and Nynäshamn. Stockholm is an interesting market for the introduction of LNG
as a ship fuel due to the high number of RoPax and ferries operating on this port. The RoRo potentials seem on the other hand low. A total of 425,000 tonnes of fuel are estimated used on the lines operating on Stockholm.

The Ports of Stockholm has an active environmental policy and is a frontrunner in this issue. Environmentally differentiated port dues are applied as a financial incentive to support and encourage shipping companies to try and reduce environmental impact.

The existing oil harbours Ludden and Berg oljehamn, and the former oil depot at Stora Höggarn are potential locations for a LNG terminal for bunkering purposes. There are however possible obstacles and further studies are necessary before a final conclusion regarding location are made.

Altogether Stockholm represents an interesting possibility in the introduction of LNG as fuel for ships.