

# The development of LNG bunkering facilities in North-European ports



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As the schedule for the application of the strict sulphur limits (enacted by IMO from 2015) in the emission control areas (ECA) is fast approaching, ports not only find it their responsibility to quickly adapt to the upcoming emission regulations, but they also intend to rapidly respond to port users' environmental needs for obtaining competitive advantage. Liquefied natural gas (LNG) as one of the attractive fuels for ships can help ports to achieve these goals.

This contribution is based on our extensive study on the current development status of LNG bunkering facilities in North-European ports. All ports considered are located within the two European ECAs (The Baltic Sea and the North Sea). Eight ports are included in the study. These ports cover large world-class gateway ports such as Rotterdam, Antwerp, Hamburg and Bremen, and also four medium-sized to smaller ports like Zeebrugge, Gothenburg, Stockholm and Helsingborg (in Sweden). The eight ports all share the traditional 'Hanseatic' culture featuring municipal governance and their port authorities are either public or hybrid public/private. In addition, all eight ports operate according to the 'landlord' model while they intend to go beyond the traditional approach by adding more facilitating and coordinating roles. Although the selected ports all aim for an LNG-fuelled future, the development plans vary in line with different market expectations and operational conditions. The following sections briefly discuss LNG projects in the eight ports. Figure 1 illustrates the timeline of the LNG bunkering facilities planning in these ports.

## Port of Antwerp

The LNG bunkering perspective started in 2011 when the port of Antwerp accepted the invitation to be the leading port for the LNG working group that forms part of the World Ports Climate Initiative (WPCI) in an organisation of the International Association of Ports and Harbors (IAPH). The main objective of this working group is to standardise the port regulations governing LNG, evaluate the bunkering risk perimeters, and raise public awareness. At the end of 2012, the draft 'truck-to-ship bunker checklist' was submitted by the WPCI LNG working group. In December 2012, the first LNG bunkering was successfully operated at the port of Antwerp when the dual-fueled oil tanker Argonon was bunkered via truck. In August 2013, the port was granted a subsidy by the European Commission to build an LNG bunkering station for barges. In September 2013, after completing a public tendering procedure, the port of Antwerp appointed the gas ship owning company EXMAR as its strategic partner for building an LNG bunker ship aiming to realise ship-to-ship bunkering to sea going vessels by 2015. In a first development stage, the bunker vessel will load LNG from the nearby terminals in Zeebrugge or Rotterdam. If the market condition is promising, the port of Antwerp will further extend LNG facilities to on-shore storage tanks or even to a small liquefied plant in the future.

## Port of Zeebrugge

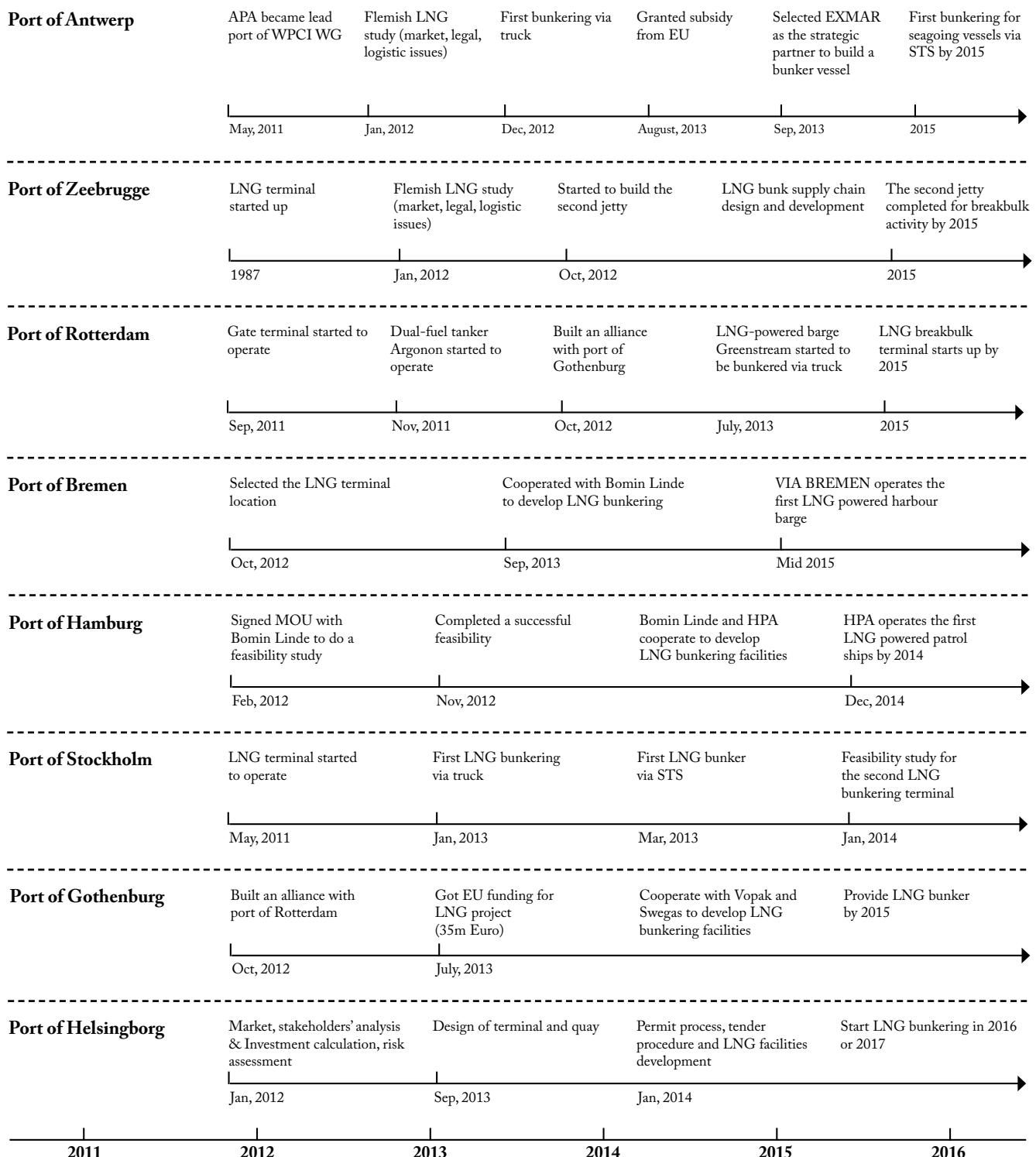
The port of Zeebrugge has a rather favourable position to develop LNG

bunkering since it has operated one of the oldest LNG terminals in Europe since 1987. The promotion of LNG as a ship fuel provides an excellent opportunity for Zeebrugge to strengthen its status as a main gas hub in North-Europe. In order to achieve the goal, the port of Zeebrugge is constructing a second jetty which will enter into service in 2015. The jetty will be able to flexibly load and unload a wide range of LNG carriers, from 2,000 cm<sup>3</sup> (the smallest bunker ships) to 217,000 cm<sup>3</sup> (large Q-Flex and Q-Max types). For LNG bunkering operations, Zeebrugge joined the Flemish LNG study in January 2012 together with the ports of Antwerp and Gent. In September 2013, an international cooperation was established among the ports of Zeebrugge, Antwerp and Singapore for developing LNG bunkering infrastructure together. Currently, the Port of Zeebrugge is perfectly equipped to introduce several pilot projects in the near future in order to kick-start the market development.

## Port of Rotterdam

The port of Rotterdam started to operate LNG bunkering via truck when the dual-fuel oil bunker ship Argonon was christened in Rotterdam in November 2011. From March 2013, two new LNG powered inland barges mainly operating on the Rhine started to be bunkered in Rotterdam. Thanks to the great efforts of the port authority, the municipality of Rotterdam amended the Port Management Regulations to allow LNG to be bunkered to inland ships from July

Figure 1: The timeline of LNG bunkering projects in the eight ports.



Note: APA: Antwerp port authority

WPCI WG: World Port Climate Initiative (WPCI) working group for standardising the port regulations governing LNG

VIA BREMEN: the brand name of port management company for port of Bremen

MOU: Memorandum of understanding

HPA: Hamburg port authority

1, 2013. Therefore, the port of Rotterdam became the first port in Europe where bunkering of LNG was legally regulated. On the other hand, in order to develop LNG bunkering for seagoing vessels, the port is developing a terminal next to

the Gate LNG terminal (which started operations in September 2011) together with Vopak and Gasunie (two of three initiators and partners of Gate terminal) where LNG can be handled as fuel for small seagoing ships, bunker barges and

trucks. The terminal is expected to be operational by 2015. Furthermore, the port of Rotterdam has extended its LNG ambition to be one of main gas hubs and LNG feeder distribution centres in the Europe.

## The ports of Hamburg and Bremen

Both German ports plan for small to medium scale LNG storage tanks particularly for supplying fuel for ships and trucks. After the completion of feasibility studies at the end of 2012, the two ports have been developing LNG bunkering facilities by cooperating with Bomin Linde LNG, a joint venture between Bomin (a bunker supplier) and Linde (a German gas supplier). The port authorities take initiatives to promote the market development of LNG as a ship fuel by investing in LNG-powered port vessels. The two ports hope to start operating these ships by 2015.

## Port of Stockholm

In the beginning of 2013, the port of Stockholm became one of the first ports in the world to offer a LNG bunkering solution to a large passenger ferry. On January 14, 2013, Stockholm refuelled the Viking Grace, a new Viking Line (a Finnish ferry operator) passenger ferry, by LNG truck. Viking Grace is unique as she is the first large passenger ferry in the world to be powered by LNG. In March 2013, the first ship-to-ship bunkering to Viking Grace was realised by a small LNG fuelling vessel, the Seagas, which was converted from a retired Ro-Pax with a 180 m<sup>3</sup> tank onboard. The LNG source for the bunkering operation is mainly from the import terminal in Nynäshamn, south of Stockholm, which is operated by AGA. The infrastructure is the first LNG terminal in the Baltic Sea and came into operation in 2011. However, the LNG bunkering in Stockholm at this moment is specifically designed for Viking Grace. If more LNG-fuelled vessels are brought into operation, the LNG infrastructure needs to be developed further. Currently, the port of Stockholm is looking for the opportunity to build a new LNG infrastructure at port of Kapellskär, a port in the northern part of Stockholm.

## Port of Gothenburg

The port of Gothenburg plays an active role in various collaborative ventures designed to speed up the development of LNG as a marine fuel. In October 2012, the port signed a collaboration agreement with the port of Rotterdam for a cooperation to develop the necessary in-port infrastructure for LNG bunkering. In July 2013, this collaborative project was granted €35.5 million from the EU. Currently, Gothenburg is planning to build a medium-scale LNG terminal with the capacity of around 10,000-25,000cm<sup>3</sup>. Three strategic partners are taking part in the initiative for the terminal: the

infrastructure company Swedegas (the owner of the Swedish gas transmission grid), the Dutch company Vopak LNG (a specialist in LNG storage) and the port of Gothenburg. The terminal will be built adjacent to Vopak's oil facility in Skarvik Harbour and will be ready in 2015.

## Port of Helsingborg

Although the Port of Helsingborg is a rather small regional port located at the narrowest bypass of the Oresund, it is one of the busiest ports in Northern Europe and the biggest ferry port in terms of volume in Sweden. Helsingborg shows great interest in offering LNG or liquefied biogas (LBG) in the port pursuing its environmental targets and improving its green image to the local community. In the beginning of 2012, the port of Helsingborg took the leading position in coordinating the EU funded project 'LNG in Baltic Sea' aiming to establish a stakeholder platform with six other ports in the Baltic Sea to share knowledge and skills on the development of LNG infrastructure. The other ports in the project of 'LNG in Baltic Sea' are the ports of Aarhus (Denmark), Helsinki (Finland), Turku (Finland), Copenhagen-Malmö (Denmark and Sweden), Tallinn (Estonia) and Stockholm (Sweden). At present, various pre-investment studies have been started up and the port hopes to start LNG bunkering operation in 2016.

## Conclusion

The overview of the development progress of LNG bunkering projects in the eight North-European ports shows that the eight port authorities are currently playing a proactive role in facilitating and promoting the use of LNG as a marine fuel. Although the main investors and operators for LNG bunkering facilities are private industrial players, the capital intensive nature of the LNG business and the high risk prevent a smooth market development and create a 'chicken-and-egg' problem. The proactive role of port authorities can help to kick-start the business and promote new innovative applications. In addition, it is noted that the eight ports adopt cooperative development policies with various stakeholders in or outside the port perimeters by establishing strategic alliances or partnerships. This suggests that cooperation is an effective way to reduce and share the uncertainties over availability of infrastructure; LNG demand and price, etc. and help to break the 'chicken-and-egg' dilemma.

The current practices in the above eight European ports on the development of

LNG bunkering facilities could be a vital driver for a quick market introduction of this new LNG application in a global context.

## About the authors

Siyuan Wang joined ITMMA (an institute of the University of Antwerp) as a PhD student under the CONNEC scholarship programme of the European Commission in 2010. She holds a MSc in Transport and Maritime Management from ITMMA and a Master in Maritime Law from Shanghai Maritime University. Her research activities at ITMMA particularly focus on the LNG market.

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## About the organisation



PortEconomics is a web-based initiative aiming at generating and disseminating knowledge about seaports. It is developed and empowered by the members of the PortEconomics group, who are actively involved in academic and contract research in port economics, management, and policy. Since October 2012, Port Technology International and PortEconomics have been engaged in a partnership. [www.porteconomics.eu](http://www.porteconomics.eu)

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