



# Ports of Stockholm meets new environmental requirements with LNG



# Tougher regulations demand new solutions

Shipping faces major challenges when the international environmental requirements become tougher. Ports of Stockholm is one of the first ports in the world to offer a bunkering infrastructure solution to provide a large passenger ferry with LNG – a new vessel fuel with many environmental advantages.

Investing in shipping is good for the environment. But, just like other vehicles, vessels release exhaust gases.

The environmental impact from shipping comes mainly from sulphur and nitrogen emissions, which can lead to acidification and eutrophication in our oceans, but carbon dioxide and particles are also released. Within shipping we are constantly working to reduce our environmental impact.

Within the next few years, international regulations governing how much sulphur and nitrogen emissions can be released by vessels will become more stringent. Complying with the new regulations will be a great challenge. This will require major investments in technologies such as catalytic converters and exhaust gas purification systems, or in new methods for more efficient energy consumption, including vessels

using slower speeds. Another method is to change from using traditional heavy oils to using alternative vessel fuels. LNG, Liquefied Natural Gas, complies with the new regulations and has many environmental advantages. LNG releases almost no sulphur and nitrogen emissions are 85 percent less than traditional vessel fuels.

LNG also has zero particle emissions and carbon dioxide emissions are around 20 to 30 percent lower. LNG is a vessel fuel with great potential.

In time LNG could also pave the way for the increased use of liquefied biogas, which is a completely fossil-free fuel. When LNG becomes more widely available, the market for biogas could also increase.

The gases have much in common, such as the safety practices and infrastructure for providing the fuels.



# An established energy source

LNG is short for Liquefied Natural Gas and is just that, natural gas in liquid form. It is not just a single product but is instead an entire solution for the efficient transport of natural gas to areas that do not have gas pipelines. By cooling natural gas to a temperature of  $-162$  degrees Celsius the gas becomes a liquid. In liquid form the gas takes up only  $1/600$  of its original volume and this makes it easier to transport and store. But this naturally means that the gas must be kept at a low temperature throughout the entire transport process.

Natural gas is not a new fuel. It is in use around us on a daily basis. Twenty five percent of global energy supply and twenty percent of Europe's energy supply comes from natural gas. In comparison, only 2 to 3 percent of Sweden's energy supply comes from natural gas,

with the exception of southern and western Sweden which has a natural gas grid. In these regions natural gas provides around 20 percent of total energy.

Natural gas and biogas, in liquid or in gas form, is already used on a daily basis, in the form of town gas in our homes and as fuel for 35,000 vehicles on our roads. It is also used by industries in the manufacture of medicines, food products and plastics.

Using LNG as a vessel fuel is a relatively new concept, but one that has huge potential for future development. There are currently around 35 vessels in the world that are driven by LNG. Most of these operate on local shipping routes in Norway, but around the same number of new vessels are currently on order.



# A safe fuel

LNG has been handled safely for decades and very few accidents have been associated with the fuel. It is transported by supertankers across the world's oceans and the volumes that are handled in Sweden today are very limited in comparison.

LNG in its liquefied form cannot burn or explode. To become flammable the natural gas must return to its gas form and needs to be mixed with the correct proportion of air.

As natural gas is lighter than air it rises, so if a leakage did occur it would rise and then

dissipate unlike Liquefied Petroleum Gas which is heavier than air and so remains close to the ground if a leak occurs.

LNG bunkering is performed with a large number of safety measures in place.

There are technologically advanced systems that are used today that cause bunkering to stop automatically if any amount of leakage is detected. Cold burns can be caused by coming into direct contact with the very cold liquid, so protective safety equipment is important for those handling the gas.



# LNG in Ports of Stockholm

In 2013 Viking Line introduced a completely new vessel into service, the M/s Viking Grace. The vessel is unique, as it is the world's first large passenger ferry to run on LNG. Viking Grace operates on the Turku – Stockholm route and LNG bunkering, the refilling of the vessel with fuel, takes place while she is at berth in Stockholm.

LNG bunkering of a full-size passenger ferry has never been done before. For this reason, logistics and safety procedures have been developed in close collaboration between AGA, the supplier of the gas, Viking Line, who invested in the new vessel, Ports of Stockholm and the relevant authorities.

LNG is transported from the AGA LNG terminal in Nynäshamn to Stadsgården in Stockholm, where Viking Grace arrives early in the mornings. Bunkering, which AGA and Viking Line are responsible for, is performed around six times each week using a purpose-built bunkering vessel that draws up alongside Viking Grace. Ship-to-ship bunkering is used as a method because the ferry only stays at berth for one

hour. Bunkering from tanker trucks can not be performed in such a short time. Ports of Stockholm's role, in addition to having been involved in the preparative work, is as the contact point for all who are involved in the bunkering process, as well as if an unforeseen situation should arise.

LNG bunkering in Stockholm is specifically designed for Viking Grace. If more LNG vessels are brought into operation, resulting in an increased demand for the fuel, the LNG infrastructure needs to be developed further. Ports of Stockholm is participating in an EU funded project, LNG in Baltic Sea Ports, where seven ports around the Baltic Sea are working together to examine LNG infrastructure solutions. For Ports of Stockholm this is a matter of the long-term possibilities for providing LNG on a larger scale and at more sites at our ports.

The hope is that more vessels and ports will invest in LNG and an expanded infrastructure for the bunkering of this environmentally friendly vessel fuel of the future.



## Would you like to know more about LNG in Ports of Stockholm?

For more information please visit:

[www.stoport.com](http://www.stoport.com)

[www.aga.com](http://www.aga.com)

[www.vikinggrace.com](http://www.vikinggrace.com)

[www.lnginbalticseaports.com](http://www.lnginbalticseaports.com)

### The new environmental requirements

- The Baltic Sea region has been identified as a particularly sensitive Emission Control Area (ECA) where new and more stringent rules are being introduced to regulate emissions into the air and into the sea, as well as the energy efficiency of new vessels.
- From 2015 onwards the fuels of vessels in the North Sea and the Baltic Sea may only contain 0.1 percent sulphur. This has been decided by the International Maritime Organization (IMO).
- Within the next few years the regulations for nitrogen emissions and waste will also become more stringent.
- Each day there are around two thousand vessels crossing the Baltic Sea. That does not include those in port. That is a large number of vessels that must convert to cleaner fuels and reduce their emissions.
- The emission limits only apply to areas designated as ECAs. For the other sea regions in Europe and for the world's oceans the limits are less stringent.

LNG   
in Baltic Sea Ports



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