

Weighing LNG as a Marine Fuel Alternative

The marine vessel industry is racing to become ready for the new emissions regulations set to become law as a result of the International Maritime Organization’s (IMO) Marine Environment Protection Committee (MEPC 66) meetings that wrapped up earlier in April 2014. The new regulations call for reductions in nitrogen oxides (NOx) in emissions control areas (ECAs) under the MARPOL Convention and are set to come into enforcement in 2016. These regulations are driving a move toward liquid natural gas (LNG) as power for the marine shipping industry. Costs for bunker fuel have also been steadily rising, and when combined with stricter environmental laws such as those recently adopted, the balance may have tipped heavily in favour of this alternative fuel. But what are the advantages of this fuel source, and are the challenges manageable?

Advantages of Using LNG as a Fuel in the Marine Transportation Sector



Image Via Flickr: [jmt-29](#)

In order to become compliant with the new emissions regulations set to come online in the coming years, ship owners will be required to either choose low-sulfur diesel (a scarce resource relatively speaking that costs twice as much as LNG) or look to scrubber technology similar to that used in coal power plants. As a third option, many are looking to LNG as the low-emissions fuel for marine vessels.ⁱ

There are three main reasons LNG has so many benefits for the industry. First, LNG has been touted as a cleaner burning fuel (though there is some debate on this point when you look at the full lifecycle of the fuel). In particular, LNG, when used as ship fuel, cuts sulfur oxide (Sox) emissions by 90 percent and NOx emissions by 95 percent, going a long way to meeting tougher emissions regulations. It is also lower carbon, emitting between 20 to 25 percent less carbon dioxide than conventional fuels. While greenhouse gases have not yet begun to be regulated in the industry, they more than likely will in the coming decades, making this fuel source strategic for future emissions standard compliance.ⁱⁱ Finally, the use of LNG as a marine fuel can reduce particulate matter emissions by 85 percent, further boosting its low-emissions status.ⁱⁱⁱ

What’s more, LNG is also lower cost compared to shale fuel resources such as bunker fuel, one of the dirtiest and heaviest forms of petroleum in the world. According to several industry experts, LNG may be

as affordable as heavy fuel oil (HFO).^{iv} A recent study called Liquefied Natural Gas: A Marine Fuel for Canada's West Coast showed that for the six vessels analyzed, fuel costs were reduced by 50 percent or more, and that the payback for initial investments in these vessels could be paid back in as few as six years.^v

Aware of these benefits, already some ship builders and fleet owners have jumped on board the LNG movement, despite that fact that it is an extremely young solution as far as the seagoing vessels are concerned. As one example, Harvey Gulf Marine placed an order in 2011 for the first LNG-powered ocean support vessel (OSV) in the US, with a total of six ordered by now. The company is betting that the reduced costs of these vessels will allow them to secure above average rate charters for its LNG fleet, with five-year charters already secured for three of its vessels.^{vi}

To date, the two largest LNG ships to be ordered are container ships that are being built for TOTE Inc. – vessels that will be delivered in 2014 and 2016. The design for these two ships won the Next Generation Ship Award in June 2013 in Oslo.^{vii}

These are just a few of the more recent developments in the LNG marine fuel space, but interest is definitely increasing. By some estimates, the demand for LNG as marine fuel for ships deployed in trade routes in the ECAs will reach 1 million tonnes by 2020 and increase quickly to 8.5 million tonnes by 2025. While Europe is set to rely heavily on their own domestically-product natural gas, operators in Asia Pacific will use LNG imports.^{viii}

Obstacles and Uncertainties for Ship Owners to Switching to LNG Fueled Engines



Image Via Flickr: [roseannadana](#)

Up until recently, there has been a nearly non-existent supply chain for LNG to the shipping industry. In fact, at this time, though the technology for producing and operating LNG engines is well-known and available in the industry, the application of this technology to the marine industry is relatively new. Regulatory development for the building or conversion of existing vessels to use LNG has lagged as a result. To overcome this dearth of structure, regulators are actually seeking the advice of industry leaders due to the fact that there are no legacy regulations or practices from which to draw up

new ones.^{ix}

What's more, there is currently a lack of bunkering infrastructure and ship design that can handle LNG as a fuel. Thanks to the work of several industry leaders, this is beginning to change. As of June 2013, there were draft ISO standards for the design and operation of LNG bunkering and 24 performance objectives. Manufacturers are also working to help develop the technology, with companies like DNV GL creating their own Recommended Practice for the worldwide adoption of LNG as ship fuel.^x

As John Grubic, the LNG business development manager of Shell International, recently said, developing bunkering infrastructure will require focused investment, yet the industry isn't known for making these types of investments with the expectation that demand will follow naturally. Yet there is a need for leaders to take the plunge and develop bunkering facilities. Shell is already trying to fill part of the void and has developed and operates LNG powered barges in the Rhine, with plans to develop nodes in the US and Europe. They'll be looking at developing facilities where existing bunkering hubs already exist, such as in Singapore and Rotterdam.^{xi}

Likewise, Harvey Gulf Marine has also done some work in developing bunkering infrastructure. They've recently broken ground on a bunkering facility in the port of Fourchon, Louisiana which will be the home of the first bunkering facility in the US.^{xii} At this point, their stations are supplied with LNG brought in by truck for the purposes of powering their own fleet, though they are not opposed to looking at ways to facilitate the fueling of vessels outside of their fleet if needed.^{xiii}

Conclusion

The topic of LNG as a fuel source for marine vessels has only really been seriously discussed in the last two years, making this a rapidly developing sector. Though the current fleet of LNG-powered ships is only 42, this number is set to triple by the end of this year, with experts suggesting that the number of these vessels in service could reach more than 1,800 by 2020.^{xiv} As such, it looks as though LNG as a marine fuel will not be simply a fad, with hundreds of millions of dollars already being committed to its introduction in the industry.

How quickly LNG will spread as the leading fuel in the marine industry will depend on several factors such as the speed of expansion of ECAs as well as international regulations. LNG supply and pricing as well as infrastructure development will also play key roles. Time will tell how dominant this fuel alternative will become. If it continues to be low-cost, and other suitable alternatives are not perfected in the coming years, it is likely that LNG engines will be the technology of choice for new vessel construction in the future.

Maryruth Belsey Priebe



Maryruth can't help but seek out the keys to environmental sustainability - it's the fire that gets her leaping out of bed every day. With green writing interests that range from sustainable business practices to net-zero building designs, environmental health to cleantech, and green lifestyle choices to social entrepreneurship, Maryruth has been exploring and writing about earth-matters and ethics for over a decade. You can learn more about Maryruth's work on JadeCreative.com.

Sources

ⁱ Dodge, E. (2014, January). *Growth of LNG Fuel in Maritime Shipping*. Retrieved April 21, 2014, from The Energy Collective: <http://theenergycollective.com/ed-dodge/329406/growth-lng-fuel-maritime-shipping>

ⁱⁱ *LNG as ship fuel*. (2013, December 12). Retrieved April 21, 2014, from DNV-GL: <http://www.dnvgl.com/news-events/features/lng-as-ship-fuel.aspx>

ⁱⁱⁱ *Study: Canada to benefit from marine use of LNG*. (2014, April 4). Retrieved April 25, 2014, from Hydrocarbon Processing: <http://www.hydrocarbonprocessing.com/Article/3327733/Study-Canada-to-benefit-from-marine-use-of-LNG.html>

^{iv} *LNG as ship fuel*. (2013, December 12). Retrieved April 21, 2014, from DNV-GL: <http://www.dnvgl.com/news-events/features/lng-as-ship-fuel.aspx>

^v *Study: Canada to benefit from marine use of LNG*. (2014, April 4). Retrieved April 25, 2014, from Hydrocarbon Processing: <http://www.hydrocarbonprocessing.com/Article/3327733/Study-Canada-to-benefit-from-marine-use-of-LNG.html>

^{vi} *Driving the adoption of LNG as a marine fuel*. (2014, February 21). Retrieved April 25, 2014, from Seatrade Global: <http://www.seatrade-global.com/news/americas/driving-the-adoption-of-lng-as-a-marine-fuel.html>

^{vii} Dodge, E. (2014, January). *Growth of LNG Fuel in Maritime Shipping*. Retrieved April 21, 2014, from The Energy Collective: <http://theenergycollective.com/ed-dodge/329406/growth-lng-fuel-maritime-shipping>

^{viii} Adamchak, F. (n.d.). *LNG as Marine Fuel, Poten & Partners*.

^{ix} Graykowski, J. E. (2014, March 1). *LNG as Marine Fuel*. Retrieved April 25, 2014, from Pacific Maritime Magazine: <http://www.pacmar.com/story/2014/03/01/features/lng-as-marine-fuel/227.html>

^x *LNG as ship fuel*. (2013, December 12). Retrieved April 21, 2014, from DNV-GL: <http://www.dnvgl.com/news-events/features/lng-as-ship-fuel.aspx>

^{xi} *Driving the adoption of LNG as a marine fuel*. (2014, February 21). Retrieved April 25, 2014, from Seatrade Global: <http://www.seatrade-global.com/news/americas/driving-the-adoption-of-lng-as-a-marine-fuel.html>

^{xii} Dodge, E. (2014, January). *Growth of LNG Fuel in Maritime Shipping*. Retrieved April 21, 2014, from The Energy Collective: <http://theenergycollective.com/ed-dodge/329406/growth-lng-fuel-maritime-shipping>

^{xiii} *Driving the adoption of LNG as a marine fuel*. (2014, February 21). Retrieved April 25, 2014, from Seatrade Global: <http://www.seatrade-global.com/news/americas/driving-the-adoption-of-lng-as-a-marine-fuel.html>

^{xiv} Dodge, E. (2014, January). *Growth of LNG Fuel in Maritime Shipping*. Retrieved April 21, 2014, from The Energy Collective: <http://theenergycollective.com/ed-dodge/329406/growth-lng-fuel-maritime-shipping>