

Newbuild OSVs Take on Fuel of the Future



Interest in applying gas to power vessels working offshore is rising in North America, with several companies making the switch to LNG as a way to showcase environmental stewardship and realise substantial operating savings.

BY ROY BLEIBERG

From offshore support vessels (OSVs) servicing the energy industry to containerships delivering consumer goods, LNG is presenting itself as an attractive fuel with both commercial and environmental promise.

The first in a series of six LNG-powered OSVs, the *MV Harvey Energy* entered service in the US Gulf of Mexico in February 2015, when the first gas fuel bunkering procedure using this vessel was carried out.

While these events are among those paving the way for LNG fuel growth in North America, several near-term challenges tied to regulatory requirements and support infrastructure need to be overcome before LNG fuelled vessels become mainstream. ABS is working with US regulators and industry to develop written regulations and processes to address the technical challenges related to the design, construction, fuelling, and operation of this next generation of support vessels.

Developing Regulations

Shipbuilding is a challenging job for the most basic of ships, but adding new technology to the process requires even more reliance on industry partnerships and collaboration with regulators.

When Harvey Gulf International Marine LLC decided to adopt LNG as a fuel and build the first LNG powered OSVs in the US, there were no established US regulations in place. Other forward-thinking companies in the US had approached the US Coast Guard (USCG) regarding the use of LNG as a fuel, but the USCG had not yet established regulations to support the application of LNG as an alternative marine fuel.

Harvey Gulf and the associated ship designer Vard Marine submitted a proposal to the USCG that would help the federal agency establish an equivalent level of safety comparable to that which is required for traditional OSVs. The partners turned to the published government standards in addition to the *ABS Guide for Propulsion and Auxiliary Systems for Gas Fueled Ships* (ABS GFS Guide). Upon receipt of a formal request to

use these standards as a design basis, the USCG agreed to the proposal and provided a design basis letter outlining the requirements to establish an equivalent level of safety.

Eventually, the USCG would use the knowledge gained from the Harvey Gulf request along with those from other US vessel operators to establish a formal Policy Letter applicable to gas fuelled ships. With that, the regulatory framework was set for US flag LNG fuelled vessels, and the difficult part of designing and building the vessel could begin.

Defining the Scope

Since other types of vessels, such as LNG carriers, have used dual fuel engine technology for many years, there are many areas in the world in which the installation of LNG dual fuel engines and associated systems is well understood. In the US, however, experience with dual fuel engines and LNG systems is limited. In addition, unlike the standards and requirements that apply to LNG fuelled LNG carriers, requirements for gas fuelled ships in the US are in their infancy.

While it might seem that a simple



The Harvey Energy OSV will bring supplies to Shell's deepwater Gulf of Mexico assets, including the Olympus platform (pictured), which began producing from the Mars B field development in February 2014 (photo: Shell)

transfer of requirements from one region to another would be a solution, the fact is that requirements established for one part of the world may not be adequate for the expansion of gas as a marine fuel to the worldwide marine community.

Effective communication during the design and construction phase among the designer, shipyard, equipment suppliers, owner, USCG, and class society was critical to ensuring the applicable requirements were properly addressed and implemented in the inaugural project taken on by Harvey Gulf.

Close co-ordination and open communication among the organisations promoted consistency between the reviews and ultimately a better understanding by all parties of the systems, associated hazards, and best practices to promote safety. ABS provided a series of technical training programs aimed at enhancing understanding of the design, operational, and regulatory aspects of using LNG as a fuel. And ABS surveyors experienced with LNG systems helped support the installation, testing, and commissioning of the LNG fuel gas systems.

It is important to note that resolving difficult technical issues falls to all parties. No one entity has all of the answers, but by working together, it is possible to find practical solutions.

Applying Regulations to Design, Construction

ABS played a significant role in facilitating the approval process. Based on the ABS GFS Guide and feedback from the designer and equipment suppliers, ABS established a document register needed to support the fuel gas system plan

Acknowledgement

This article was prepared with the approval of the Gastech organisers and is based on a technical paper presented at the Gastech 2014 conference in Seoul, South Korea, from 24-27 March, 2014.



In February 2015, Harvey Gulf became the first US shipowner and the first US bunkering facility operator to conduct LNG fuel transfers – the company requested guidance, input, and support from worldwide leaders in the LNG industry for bunkering procedures and crew training, enlisting ABS to assist with training procedure reviews (illustration: Harvey Gulf International Marine LLC)

review. The document register was then annotated to include the specific plans required for information, review, and approval by ABS as well as plans that require independent review and approval by the USCG Marine Safety Center.

The ABS GFS Guide provides tables that outline the level of review and approval required by ABS for fuel gas equipment, which can include design review; material certification; survey during fabrication and

testing at the factory; and survey during installation, testing, and commissioning at the shipyard.

ABS worked with the USCG, designer, and equipment suppliers to help identify the plans required for submission to the USCG and the level of inspection needed. Once the USCG is made aware of the level of ABS plan review, level of material testing, and level of survey, highlighting the ABS “hold points” for the equipment, the

USCG can better assess the level of involvement needed for acceptance or approval of each piece of equipment.

There are differences between Class requirements and the USCG Policy Letter. The use of European and other international standards typically recognised by Class are not necessarily acceptable to the USCG and may need to be evaluated to establish an equivalent level of safety.

In this first-of-a-kind project, ABS surveyors and USCG Inspector worked to keep the lines of communication open so the scope of involvement by each organisation was well understood.

Bunkering Gas Fuelled Vessels

As the first LNG as fuel initiatives under US flag, these projects required innovative design specifications, but there also would be a requirement for fuelling stations. That meant evaluating bunkering infrastructure at a time when US requirements for bunkering gas fuelled ships, crew training for personnel on-board these vessels, and waterfront facilities were under development.

Study Outlines LNG Bunkering Regulations

Growing potential for LNG fuelled vessels in North America is creating the need for better understanding of the applicable regulatory framework. ABS and its affiliate ABS Group have taken the lead in providing guidance with the publication of the March 2014 report *Bunkering of Liquefied Natural Gas-Fueled Marine Vessels in North America*. The first edition of the report presented an integrated approach to addressing the federal, state, provincial, and local requirements that could impact LNG bunkering infrastructure in North America and presented a recommended process for meeting those requirements and obtaining approval for LNG bunkering projects.

The primary objective of the study was to present implementation aids, check lists, processes, and regulatory information to support owners and operators of LNG fuelled vessels, LNG bunkering vessels, and waterfront facilities at various stages in the decision-making processes.

Included in the ABS bunkering report are requirements of various regulatory bodies, including the International Maritime Organization, US Coast Guard, Transport Canada, US Environmental Protection Agency, and the many state and local authorities that may be involved in a bunkering project.

A second edition of the report was published in March 2015. Major updates include important lessons learned from first adopters of LNG fuelled vessels and LNG bunkering projects; a “roadmap” guide to the associated regulatory, stakeholder, and technical issues; and a port directory highlighting on-going projects and local development processes.

The report is available on the ABS website, www.eagle.org.

LNG Fuel Firsts

With more than 50 years' experience delivering industry firsts, ABS is a pioneer in the safe transport and handling of gas in the marine and offshore industry, including the largest and most innovative gas carriers in service:

- First LNG carrier (conversion) and first purpose built LNG carrier.
- First LNG carrier in China.
- First VLEC (Very Large Ethane Carrier).
- First CNG carrier.
- First LNG carrier to use LNG boil-off as fuel.
- First US LNG fuelled ship.
- First LNG fuelled large container vessel and first ME-GI order.
- First LNG fuelled container vessel in Baltics.
- First LNG fuelled vessel in China.
- First LNG fuelled ME-GI engine in operation (Q-max conversion).

At yearend 2014, ABS also provided the LNG industry with a new *Guide for LNG Fuel Ready Vessels* (LNG Fuel Ready Guide) addressing technical standards for vessels that can potentially convert to gas propulsion in the future.

The new ABS LNG Fuel Ready Guide published in early 2015 formalises the process of converting a vessel to LNG fuel, providing detailed review and approval requirements and associated class notation.

The USCG has issued two Policy Letters for LNG bunkering in the US. The first letter applies to transfer operations and training for personnel working on US and foreign vessels that use natural gas as fuel and carry out LNG transfers in US waters. The guidelines outline procedures for fuel transfers, training, safety drills, and use of specialised equipment.

The second Policy Letter includes guidance for transfers from tank vessels and barges, waterfront facilities handling LNG (such as such as storage tanks, mobile tank trucks, and rail cars), and portable tanks containing LNG that are transferred to vessels for use as fuel.

Going Forward

Each gas fuelled vessel will differ in its design and equipment and solution providers, so every vessel will have unique challenges; a solution that works for one vessel might not work for another. However, the experience gained by all parties for the first US flag OSVs using LNG as a fuel will make all future projects potentially even more successful.

As natural gas becomes a more sustainable and economical fuel

source for the marine and offshore industries, ABS is working closely with industry and regulatory bodies, including the USCG, to verify vessel compliance with applicable standards, class society rules, and regulations that promote safety and consistency in the application of the new requirements for gas fuelled vessels. ■

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