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A new lease of life: PSV conversions meet

Continuing low demand for PSVs has led the market to look for creative ways of dealing with the over-supply. Tor-Ivar Guttulsrød, of ABS Europe, considers some of the options

The offshore vessel market is emerging at a glacial pace from a downturn that is widely recognised as having depressed earnings and values across asset classes and in all major demand centres.

While different segments of the market have been hurt to varying degrees, the overall contraction in demand for anchor-handlers and PSVs remains high. Even the recently-improving oil price has done little to immediately alleviate the problem of excess offshore tonnage, much of it in cold lay-up or still docked at the shipyard where it was built.

This problem has stimulated some creative minds to evaluate options that can give these assets a new lease of life, in particular proposing conversions of PSVs to enable them to operate in new markets and niches very different from their original purpose.

In addition to being newly-built, these vessels are usually of high quality construction, equipped with dynamic positioning (DP) systems and controlled by operators employing well-trained crews used to working at close quarters in challenging weather conditions.

A PSV conversion not only means that owners have the potential to cover the financing costs associated with the vessel's construction, but also creates new business opportunities that might generate stable returns in the long term.

This trend echoes the genesis of the floating production storage and offloading (FPSO) market: to manage high project costs, operators preferred to convert existing tonnage rather than contract for newbuildings. This process would often uncover some challenges along the way but by thinking creatively it also proved the business case and the technical feasibility of such projects.

There are a number of applications that immediately lend themselves to offshore vessel conversion, centred around flexible supply of fuel and power. In all cases, they reflect a need to supply 'green' energy, often using LNG or low sulphur diesel.

▲ *Norway's Seatres has designed a concept using a PSV as the platform for temporary floating power generation*

In the bunkering sector, the increasing number of vessels that will use LNG as fuel post-2020 is driving demand for LNG bunkering vessels. Development in island economies and other remote locations is also increasing the need for delivery of flexible and low-pollution offshore energy supplies.

This can be either in the form of conventional power generation on a floating platform, or as a floating storage and regasification unit (FSRU) that provides gas to shore, fed by a storage vessel supplied by LNG carriers. PSVs present a stable platform with plenty of space for a regasification or storage system on deck, while DP enables a safe approach to the target vessels and bunkering operations in a variety of sea states.

The projects are also interesting as they serve complementary markets. Demand for LNG bunkering can be identified in all main shipping centres on a global basis and can help to expand the provision of LNG as fuel, even where dedicated bunkering capacity does not yet exist.

For vessel-based power, the traditional areas of growth – West and East Africa and Southeast Asia – are being supplemented with new demand from the Caribbean, Arabian/Persian Gulf and the Eastern Mediterranean.

The two main markets are new 'frontier locations' which do not yet know how much capacity they will need 10-20 years ahead but have an immediate requirement that could stretch to five years or more. The other is territories that have a more mature economy but want to build new capacity, or transition to renewables, and need a stable and efficient supply in the meantime.

Demand for LNG bunkering is being driven by increasingly stringent environmental regulations; this is creating demand for alternatives such as LNG which generate much lower emissions than even conventional low sulphur fuel oils.

Advances in small scale LNG shipping and LNG bunkering, including ship-to-ship transfers, has proven the concept as well as the demand for this type of project. While they still require a high degree of commitment in terms of investment and technology deployment, the opportunity afforded by using an existing platform can contribute to a lower total cost of ownership.

These economics contributed to the foundation of Norway-based Cryo Shipping, whose managing director Nicholai Olsen agrees that the high newbuilding price for small scale LNG feeder and LNG bunker vessels makes the depressed valuations of PSVs the ideal platform for conversion.

He said: "PSVs are a good opportunity for conversion because we can obtain an asset built to a high technical standard, which is well maintained and built for rough conditions. Adding the technology of an LNG bunker vessel is a wrap-up solution driven by the market with a lower total project cost and 100 per cent in compliance with the IGC Code."

Cryo Shipping is working on multiple projects and Olsen says it is ready to move into commercial contracts with a shipyard for the conversion of a first LNG bunkering vessel.

Fellow Norwegian company Seatres has designed a concept using a PSV as the platform for temporary floating power generation. Partner and chief technical officer Harald Vartdal says there are many developing locations that either do not have electricity available or the supply is inadequate or unreliable.

A converted PSV with onboard power generation plant would solve a lot of these problems, since construction and assembly of the power generation system can be done offsite and the vessel can relocate once shore-based supply is established.

Seatres draws on Vartdal's previous experience in mobile LNG power generation projects to overcome the intermittent nature

industry's need for innovative solutions

of renewables using low sulphur diesel or LNG to provide a consistent low-emission power source.

"Our concept is to use dual fuel generators, so we start on diesel and convert to gas when it is available," Vardtal said. "Our team have a background in the FPSO market so are used to converting vessels and are familiar with the technical requirements," Vartdal added. "We have worked on the concept for two years and we are pursuing projects with potential customers."

A third concept for PSV conversions is as a floating regasification unit (FRU) working in combination with a conventional LNG carrier as a floating storage unit (FSU) supplying natural gas to an onshore power station or other consumers. Until recently, this kind of project has tended to be carried out on large LNG carriers, not least because of the scale required to achieve necessary return on investment.

Co-founder of Dreifa Energy, Jostein Ueland, believes there is a niche to be found between the full-scale FSRU and a small-scale LNG project. At the high end, because the choice of shipyard is limited and storage and regasification capacity significant, the project cost can easily reach US$300m.

"For these projects the trend is to take a long term view on payback but what we commonly see is that these assets use a fraction of their design capacity for long periods of time, at which point there is a risk that they become difficult to push through a final investment decision or are subject to political interference," Ueland explained.

Projects that focus on the very small scale providing tonnage for single consumers are exciting but commercially challenging because of the need to develop the entire value chain from scratch. It can also be harder to justify the use of LNG for economic reasons alone because of the resulting high unit costs. Faced with a combination of soft and hard factors, the majority of projects simply never happen. Dreifa is targeting projects with LNG demand of 0.5 to 1.5m tonnes a year and which have either an existing consumer requirement for low development risk or a strong degree of confidence getting the project started.

"This means we can be an interim, start-up solution which can come in quickly and at lower cost so that customers can get their feet wet and judge when they need to go to full scale," he added. "At that point we can exit and they can put in more capacity but still avoid having to front-load capex and destroying the project economics."

▲ *Dreifa is targeting smaller LNG projects, by offering interim, start-up solutions*

From a technical perspective, the execution of this type of vessel conversion is likely to follow a well-understood and established path from concept, through pre and actual front-end engineering design to detail design, then to fabrication, installation and operation.

Having a high quality asset available for conversion – even one that is potentially in distress – provides a strong starting point because all parties to the project have visibility on the current status and the required outcome in terms of safety, technology and operation issues.

For class, the process will likely involve concept evaluation, preliminary planning and advice, approval in principle, basic and detailed design approval, fabrication survey, installation, start up survey and survey after construction.

To enable the safe conversion and operation of this type of vessel requires class to work closely with the flag state and owner to maintain class on the vessel, and extends to approvals of the equipment installed on board, typically requiring extended risk impact studies on safety and application of the appropriate IMO regulations.

For example, if the ship is gas-fuelled it is necessary to apply the Code for Gas Fuelled ships (IGF Code), but if it is carrying LNG, it may be subject to the IGC Code.

Cryo Shipping's Olsen says a conversion involves a number of challenges, as PSVs are subject to different construction rules and technical requirements, especially in areas such as damage stability. "These are much tougher for gas carriers than for PSVs, even though they operate in rough conditions, so not all conversions are straightforward. Some designs are more favourable than others, so it requires quite a lot of study," he said.

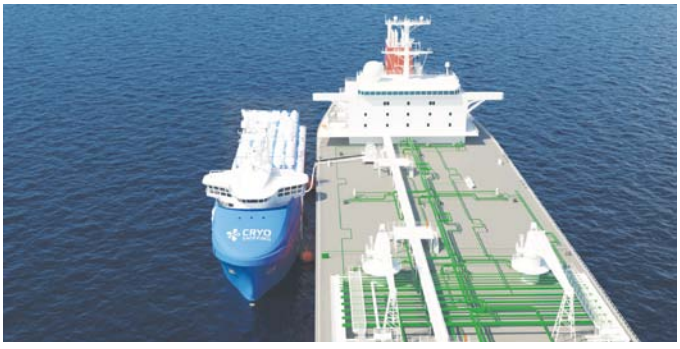
Olsen's team worked through a long list of items – including fire safety, ventilation, gas detection and electrical equipment – in order to do a thorough job. "We know that many others have looked at this idea and rejected it when they realise it is more difficult than they realise. It's not a case of just putting tanks on deck then removing them when the OSV market picks up."

Vartdal says the floating power concept presents no dramatic technology challenges. "We don't see any very significant issues and many issues are being clarified with class. We have also had good discussions with industry and the feedback is that this is a good concept with potential applications where it can support economic growth."

Dreifa Energy acquired its first PSV last year and plans to install a scaled-down 3 x 75 MMSCF open-loop regasification plant with a dual fuel diesel generator and handling for boil-off gas on its 893m^2 of deck space.

Ueland said: "We have completed three engineering stages and have our first AIP. We have pre-invested in the re-gas module and have spent six months negotiating with shipyards to get the list down to a handful of contenders, so we are ready to push the button."

● *Tor-Ivar Guttulsrød is Director, FSRU & FLNG, Global Gas Solutions, at ABS Europe.*



◀ *Cryo Shipping is ready to move into commercial contracts with a shipyard for the conversion of a first LNG bunkering vessel*