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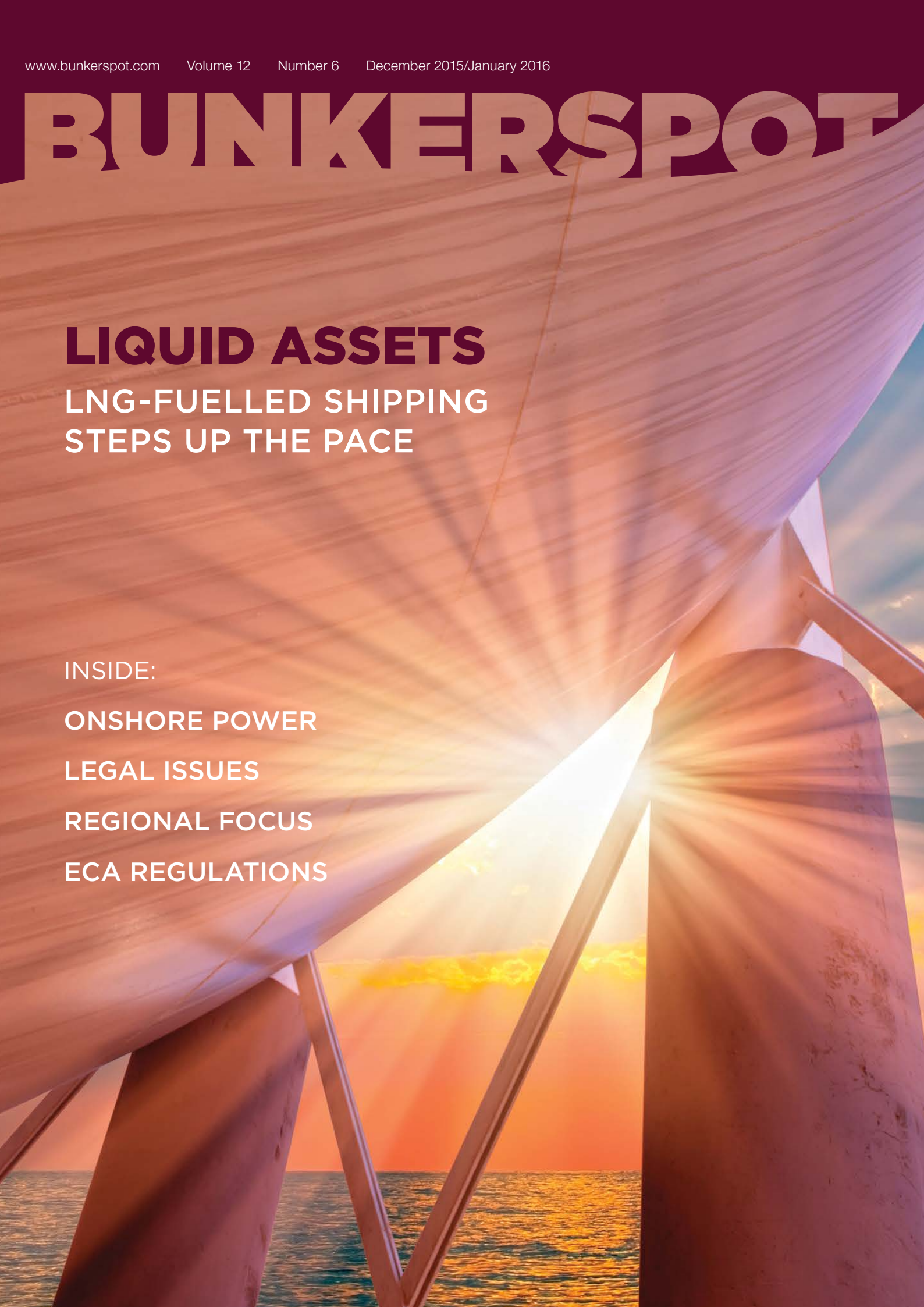

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Cold temperature behaviour in marine distillate fuels has become a serious operational concern since the turn of 2015. Michael Banning of Innospec explores the reasons behind the issue, and reviews different techniques to assess cold flow properties

Since 1 January 2015, the 0.1% maximum sulphur limit inside emission control areas (ECA) has meant that the demand for marine distillate fuels has grown considerably. This legislative change has led to an increase in onboard storage requirements for distillate fuel. Subsequent changes of tank allocation (from low sulphur heavy fuel oil (LSHFO) to marine gasoil (MGO)) have meant that this fuel may now be more exposed to ambient conditions and the risk of fuel solidification has increased.

In ISO 8217, the only specification for established cold flow test methods in DMA/DMZ grades is Pour Point (PP). This can be defined as the lowest temperature at which the fuel will continue to flow.

However, the PP does not correlate well to vessel operability, as when the fuel becomes solid it is no longer pumpable, and may in fact need to be removed from the tank by hand.

ISO 8217 does stipulate another parameter as a measure of cold flow characteristics, Cloud Point (CP), but this only applies for DMX grade. The Cloud Point can be defined as the temperature at which wax crystals start to visibly form in the fuel and a clear and bright fuel becomes hazy. Again, this parameter does not correlate well to vessel operability, as when the fuel passes the CP it can still be pumped without any major issue.

A widely-used test for automotive diesel fuel

'Cold Filter Plugging Point and its relevance to the marine market has been recently ratified by the release of a CIMAC Guideline, *Cold Flow Properties of Marine Fuel Oils*'

which was developed to be a more accurate measure of vehicle low temperature operability is the Cold Filter Plugging Point (CFPP).

This can be defined as the lowest temperature at which the fuel can be drawn through a filter within a specified time. As with automotive fuel, this parameter is likely to correlate more closely to operability on a ship, as this is a measure of when wax crystals forming within the fuel may block filters and the fuel becomes un-pumpable.

CFPP and its relevance to the marine market has been recently ratified by the release of a CIMAC Guideline, *Cold Flow Properties of Marine Fuel Oils*. However, as CFPP is not specified in ISO 8217, it is often not tested; so this useful piece of information is not available on the bunker analysis report (unless previously requested).

It is not possible to determine the CP and CFPP from knowing the PP as the correlation is very broad, but the CFPP will typically not be more than 5°C below the CP in a fuel which has not been treated with cold flow additive. It is also interesting to note that, on occasion, the CFPP can be at the same temperature as the CP.

With the increased use of marine distillate fuels over 2015, many testing laboratories, recognising the potential issues facing their customers, have also started to report CP in their standard bunker analysis. This means that the crew now have a valuable piece of information when deciding how to handle the fuel onboard.

Given the loose correlation between CP and CFPP in untreated fuels, crews should be aware that issues may occur when the tested CP is close to their ambient conditions.

To meet the increase in demand for marine distillates, suppliers may have brought new blending streams online. This has resulted in a trend for heavier distillates with higher final boiling points being introduced into the marine pool, therefore affecting its cold flow characteristics.

In some cases, fuels with a measured CP >30°C have been reported, and it seems as through this trend is on the increase.

During the first quarter of 2015, approximately 10% of distillate fuels sold in the marine market have shown a CP >6°C, and this has risen to 14% in Q2 and 17% in Q3 (source: Intertek ShipCare Quality data Q1-Q3 2015). This alarming trend means that crews need to be very aware and cautious of the cold flow properties of the fuel they are using. It is also interesting to note that in each quarter, over 50% of the fuels with a CP >6°C have come from the Amsterdam, Rotterdam, Antwerp (ARA) region.

Innospec has introduced a new product to address this issue, Octamar Winter. This is a cold flow improver additive specifically formulated for aftermarket application in marine distillate fuels. It has been developed using globally sourced marine fuels to produce a robust and broad response across DMA/DMZ grade distillate fuels.

Octamar Winter can be manually dosed into the storage tanks, and typical responses are reductions of 10°C and 15°C for CFPP and PP respectively (note: additives have little or no influence on CP temperature).

Like many other Octamar products, these benefits have been independently verified by Lloyd's Register. Octamar Winter is the latest addition to the Octamar distillate additive range. Octamar LI-5 Plus, also Lloyd's Register verified, is a multi-functional additive to improve lubricity, oxidation and thermal stability, corrosion resistance, whilst preventing injector fouling.

Although fuel quality has changed and continues to change, mostly for the better with regard to emissions, unfortunately these changes can also create new challenges for the end user. As such, there is an obvious need for fuel additive technology to continue to evolve in line with changes in fuel quality.

Innospec Fuel Specialties is an expert in fuel additive technology.

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