Ships for transatlantic ethane

What will be the world's largest semi-pressurised/fully refrigerated (semi-ref) gas carriers have been ordered for shipping US ethane to Europe

Evergas, the Copenhagen-based gas tanker operator, got the ethane carrier ball rolling in January 2013 when it ordered the first ships dedicated to transporting this cargo on deepsea routes. The newbuilding contract, which was placed with the Sinopacific Offshore & Engineering (SOE) yard at Qidong in China, covered the construction of four 27,500m³ semi-ref multipurpose gas carriers able to transport LNG, ethylene and LPG as well as ethane. Each ship was priced at US$64 million.

Despite their cargo-handling flexibility, the ships are set to spend the majority of their time carrying ethane as the newbuilding contract was placed on the back of a 15-year charter agreement with the chemical major Ineos. Ineos is switching the feedstock at its steam crackers at Grangemouth in Scotland and Rafnes in Norway to competitively priced US ethane and needs ships to transport the liquefied gas from the new Mariner East export terminal being built at Marcus Hook near Philadelphia.

Evergas, which is part of Luxembourg-based Jaccar Holdings, terms the new ethane carriers its Dragon class ships. Emphasis has been placed on environmental performance in the vessel design and the ships have been specified with a Wärtsilä dual-fuel diesel-electric (DFDE) propulsion system to enable running on LNG. For each ship, Wärtsilä is supplying two of its six-cylinder, in-line 50DF dual-fuel main engines, two 20DF auxiliary gensets, a twin-in-single-out TCH350 gearbox, two shaft generators and a 6.6m diameter controllable pitch propeller integrated with one of its Energopacudders.

Evergas has also contracted Wärtsilä to provide a cargo-handling system that will integrate with the propulsion arrangement on the ships. The cargo-handling package features a reliquefaction plant for the ethane, ethylene and LPG cargoes; cargo pumps; boil-off gas (BOG) compressors; a cargo control system; and an integrated LNG fuel supply system. The latter features a pair of deck-mounted LNG fuel tanks for each ship. Integration of the cargo-handling and fuel gas systems will, amongst other things, enable the cold from the LNG used as fuel to keep the ethane cargo chilled.

The Evergas ships, which are classed with BV, are each being provided with three bilobe IMO Type C cargo tanks, two of 9,686m³ and a smaller, conical-shaped unit forward. At the time the tanks for the inaugural vessels were taking shape at SOE, they were the largest Type C bilobe tanks yet built. However, these units have been surpassed as bigger semi-ref ethane carriers have now been ordered.

The same US shale gas from which the ethane is extracted will be yielding large quantities of...
natural gas, so the availability of LNG bunker fuel for the Evergas ships should not pose a problem. The European LNG bunkering network is also now taking shape.

The orderbook for Evergas Dragon 27500 series vessels for charter to Ineos has now climbed to eight ships, with further pairs being added to the initial quartet in May 2014 and November 2014. SOE will begin delivering the series in 2015.

Navigator Gas was next to join the ethane gas carrier club. In December 2013 the shipowner ordered an LNG-powered, 35,000m³ ethane/ethylene/LPG carrier at the Jiangnan yard in China, along with three options which were exercised in April 2014. Each of the four vessels will be powered by a low-speed MAN ME-GI dual-fuel engine and each is priced at US$78.4 million. The first in the series is due for delivery in April 2016.

TGE Marine Gas Engineering has been contracted to design and supply the cargo-handling and high-pressure fuel gas systems, including the IMO Type C cargo and LNG fuel tanks. Each vessel will have three bilobe tanks, the two largest of which will have capacities in excess of 12,000m³.

In August 2014 Navigator Gas signed a 10-year charter for the first of its 35,000m³ vessels with the chemical company Borealis. Under the agreement, which is scheduled to commence in late 2016, the ship will transport ethane from the Marcus Hook terminal to the Borealis steam cracker at Stenungsund in Sweden for use as feedstock. The drilling company Antero Resources will supply the raw ethane to the Marcus Hook terminal.

The same month that Navigator Gas announced its Borealis deal shipowner Hartmann Reederei of Leer in Germany and engineering consultants HB Hunte Engineering unveiled their Ecostar 36K design for a semi-ref 36,000m³ ethane/ethylene carrier. The principals point out that the vessel's Svelte-bow design, with the accommodation superstructure forward, optimises weight distribution over the ship's length and reduces the demand for ballast water. It also results in an improved sea keeping efficiency at higher transit speeds and improved fuel efficiency.

As with the Navigator Gas ships, the Ecostar 36K vessels will be powered by a two-stroke, dual-fuel MAN ME-GI engine. MAN has an ongoing development programme underway with this engine design and Hartmann reports that its Ecostar 36K ethane ships will have engines able to burn ethane cargo BOG as well as LNG and oil fuel. The vessel will be provided with tanks for oil fuel as well as autonomous gas fuel tanks where LNG or ethane can be stored.

The gas plant for the Ecostar 36K gas carrier has been jointly developed by Hartmann Reederei and HB Hunte. It will be located in a sheltered space behind the superstructure and its components will be provided by AC-INOX.

The vessel's cargo tanks will be a variation on the traditional cylindrical and bilobe Type C tanks. Called the Star-Trilobe design, the cargo tank consists of three cylinders combined into one. Hartmann reports that this approach provides an improvement in space utilisation of almost 30 per cent compared with other Type C tanks utilised on a ship of the same dimensions.

The Ecostar 36K design has been embraced by the Norwegian ship owning company Ocean Yield, which has ordered three such vessels at SOE for delivery beginning in the second half of 2016. The vessels will be used by the Saudi Arabian petrochemical company SABIC to ship US ethane to its revamped steam cracker on Teesside. Hartmann will bare boat charter the trio, and their technical management will be the responsibility of its GasChem Services affiliate.

Source: LPG supplement 2014

---

**ETHANE CARRIER ORDERBOOK (AS OF 1 NOVEMBER 2014)**

<table>
<thead>
<tr>
<th>Owner</th>
<th>Capacity (m³)</th>
<th>In Series</th>
<th>Yard</th>
<th>Gas Carrier Type</th>
<th>Prop'n Syst*</th>
<th>Ship Operator</th>
<th>Charterer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evergas</td>
<td>27,500</td>
<td>8</td>
<td>Sinopacific</td>
<td>semi-ref</td>
<td>DFDE</td>
<td>Evergas</td>
<td>Ineos</td>
</tr>
<tr>
<td>Navigator Gas</td>
<td>35,000</td>
<td>4</td>
<td>Jiangnan</td>
<td>semi-ref</td>
<td>LSDF</td>
<td>Navigator Gas</td>
<td>Borealis**</td>
</tr>
<tr>
<td>Ocean Yield</td>
<td>36,000</td>
<td>3</td>
<td>Sinopacific</td>
<td>semi-ref</td>
<td>LSDF</td>
<td>Hartmann</td>
<td>SABIC</td>
</tr>
<tr>
<td>Jascol/UEC</td>
<td>86,000</td>
<td>5</td>
<td>Sinopacific</td>
<td>semi-ref</td>
<td>tbn</td>
<td>Hartmann</td>
<td>Oriental Energy</td>
</tr>
<tr>
<td>Reliance</td>
<td>87,000</td>
<td>6</td>
<td>Samsung</td>
<td>fully-ref</td>
<td>tbn</td>
<td>Reliance</td>
<td></td>
</tr>
</tbody>
</table>

*DFDE – dual-fuel diesel-electric; LSDF – low-speed dual-fuel
**Borealis has chartered the first of the four Navigator ships