VERY LARGE ETHANE CARRIERS: AN OPPORTUNITY FOR SHIPPING

Aditya Aggarwal, ABS director, Global Gas Development, provides an overview of ethane market trends, and examines the opportunities this presents for the market

The fracking boom that started in 2005 marked a turning point for natural gas production in the US, although the impact on the natural gas liquids (NGL) sector was overshadowed by the tectonic shift in global natural gas markets. Ethane is separated from the natural gas stream along with other hydrocarbon liquids such as propane, butane, iso-butane and natural gasoline and is a critical feedstock for the petrochemical industry. Surplus shale-based ethane production in the U.S. has created a market for exports to India and China of this valuable commodity.

As production has increased, so too have carrier capacities. Prior to 2015, Ethylene was traded in smaller parcels and transported in a handful of semi-pressurized gas carriers with maximum capacities of around 22,000m^3. At the time, dedicated ethylene carriers of up to 37,000m^3 were sufficient for the emerging ethane trades. However, the success of Reliance Industries' six ABS classed 87,000m^3 Very Large Ethane Carriers (VLEC) helped to transform the gas sector, opening the door to U.S. ethane exports to feed new ethane crackers in China.

The current liquefied ethane market is small but there are undeniable signs that trading volumes will grow significantly, which will require greater dedicated VLEC capacity. In addition to Reliance's six VLECs, two slightly smaller 85,000m^3 VLECs were ordered for Jaccar Holding. While China is looking to more than double its ethylene production capacity by 2022, Chinese companies are seeking to substitute domestic naphtha with imported ethane as a feedstock for the production of ethylene.

Infrastructure development to meet ethane demand is already progressing on the US Gulf coast. In 2018, Energy Transfer Partners and Satellite Petrochemical USA Corp. announced plans to construct a new export terminal on the U.S. Gulf Coast to supply feedstock for Satellite's ethane cracker in China. In January 2019, Houston-based American Ethane Co. broke ground on a new ethane export terminal in Beaumont, Texas. The project will potentially transport 7.2 MTPA of US ethane to China.

The cost of ethane along with the liquefaction and transportation had previously been viewed as too expensive to export. However, the shale gas development in the US has resulted in a surplus capacity of ethane. This abundance of US ethane has led to lower prices and made it a cheaper alternative to naphtha, whose price is linked to that of crude oil. Furthermore, the development of the next generation of bigger VLEC designs will make it cost-effective to transport large volumes of liquefied ethane. Carriage of ethane using conventional LNG carrier technology posed challenges but the new VLEC designs can accommodate the higher density and temperature ethane cargo by reinforcing the cargo containment system.

The development of new gas engine technology capable of burning ethane as fuel also offers significant environmental and fuel cost reductions. MAN Energy Solutions' dual-fuel ME-GIE two-stroke engine is a development of the ME-GI natural gas engine that is designed for burning ethane. Operating according to the Diesel combustion cycle in gas mode the

New VLEC designs that allow flexibility between ethane and methane cargoes have emerged, as VLEC have outgrown LPG terminals", said Aditya Aggarwal

ME-GIE engine offers greater flexibility on fuel options with capability for burning ethane, LPG or natural gas. ABS has a long standing approval history with the MAN slow speed DF engine that stretches back to the mechanical injection engine of the early 1990's and with many ABS MAN DF engine type approvals in place. The world's first ME-GI engine orders were for ABS Classed container carriers, the world's first ME-GI engine in operation was ABS classed LNGC conversion and most recently the world's first conversion of an ME-GI engine to ME-GIE ethane burning engine was undertaken in July 2018 on the Navigator Aurora ethane carrier.

On the regulatory front, the revised IGC Code permits the use of ethane as fuel upon successfully demonstrating equivalent level of safety as that achieved through the prescriptive requirements for the use of natural gas as fuel.

Owner and charters are always looking to mitigate contractual risks. This requires the VLECs to be designed with multi-cargo flexibility to allow the option to carry an alternate cargo. The current designs focus on carriage of ethane and propane. However, as new projects require higher carriage capacity, the VLEC themselves outgrow the ability to load at an LPG terminal. This has resulted in new VLEC designs that allow flexibility between ethane and methane cargoes. Multi-cargo capability on the VLECs hold a significant promise to not only reducing contractual risk for vessel owner but also lowering the total supply chain costs for the charters. The successful delivery and operation of the existing VLECs demonstrate that collaboration is critical and selecting the right project partners is important to eliminate uncertainties such as delivery schedule and costs.