CRYOGENIC INDUSTRIES

FROSTBYTE

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With every second that passes, the world is becoming a smaller place. The rapid advancement of technology and transportation has made it possible to access nearly seamlessly any part of the globe. As the world becomes more connected, whether it be for goods or people, the importance of transportation cannot be overlooked. Transportation has opened access to markets that were unreachable a century ago and will continue to be a growing part of society. The advances in transportation wouldn't be possible without corresponding advancements in fuels like energy for transportation is delivered in many different forms but is rooted in the world of hydrocarbons and petroleum.

Transportation of goods and people annually consumes around 111 exajoules (105 quadrillion BTUs) of energy. Most of this energy is consumed in forms of petrol and diesel, each holding roughly 38% of the market share. Jet fuel accounts for roughly 11%, fuel oil roughly 8% and natural gas roughly 3%. By the year 2040, world transportation is projected to consume 158 exajoules (150 quadrillion BTUs) which is a 42% increase above today's figures. One of the fuels which will help power this growth is natural gas, which is projected to have an 11% market share in 2040. As of today, roughly 61% of transportation energy is used for the movement of people while the remaining 39% is used for the movement of goods.

When it comes to international movement for high volumes of good maritime shipping is the preferred choice. Nearly 13 exajoules (1 quadrillion BTUs) of energy, mostly fuel oil and diesel, is consume annually by ships transporting goods. To put this in perspective, tha roughly equivalent to burning 86

Figure 1. World transportation sector energy consumption by source

2 (2020 – 2025) and a 30% reduction for ships built in phase 3 (2025 and
EH\RQG 7KH H[DFW UHGXFWLRQ YDOXHV FDQ EH IRXQG LQ 0$532/ $QQH[9,
DQG DUH GHSHQGHQW RQ WKH W\SH RI WKH VKLS DQG GHDGZHLJKW 2QH ODVW I
DQG OLNHO\ PRVW FRQFHUQLQJ LV VSHFLÀF WR 2WWR F\FOH QDWXUDO JDV HQ
‘methane slip’. This is simply incomplete combustion which results in
PHWKDQH EHLQJ VHQW RXW ZLWK WKH H[KDXVW JDV 7KLV LV D VLJQLÀFDQW F
EHFDXVH PHWKDQH LV URXJKO\ WLPHV ZRUVH WKDQ &2

2WWR F\FOH ZKLFK PDNHV WKH 'LHVHO F\FOH PRUH HIÀFLHQW EXW FDXVHV JUHDWHU $s previously mentioned, the Otto cycle WKH (*5 ORZHUV WKHVH SHDN F\OLQGHU WHPSHUDWXUHV ZKLOH WKH 6&5 FKHPLFDO\ HOLPLQDWHV 12 &2
is reduced 25% when using LNG as fuel and methane slip is