Powering the Energy Future



Powering the green energy future with LNG & lower emissions



Welcome to issue 2 of the Chart LNG Newsletter where we share insights about how LNG is contributing to our energy future by enabling society to produce more energy to meet increased demand while still moving towards a lower carbon future. LNG is simply natural gas that has been refrigerated. Positive effects of burning natural gas instead of coal and oil are the reduction of both CO₂ and NO₂ emissions and the elimination of SO₂ and particulates.

Globally, the total number of Natural Gas powered Vehicles (NGVs) is > 27 million and includes those fueled by LNG, CNG and Bio-methane (RNG).

Overall, Europe is the most developed market accounting for 27% of the total number of NGVs and 16% of the global fueling stations ... and it continues to grow.



There are obvious advantages of a fueling station that offers all 3 fuels (LNG, CNG and Biomethane) through a single installation. Storing and using LNG in liquid form, allows for the production of CNG at pressures up to 5500 PSI with very low energy requirements. A 15 HP LCNG system can replace a 200 HP compressor based system which are generally used on CNG stations. Further, as LNG is purified during the liquefaction process, additional pretreatments, such as dehumidifiers are not required.

It is also worth noting that natural gas derived from LNG is a more consistent quality than pipeline supplied gas and permits more effective engine operation of natural gas powered vehicles.

Chart continues to build stations to contribute to the fueling infrastructure for NGVs and recently introduced new designs for compact stations to serve the full range of NGVs in accordance with Euro VI requirements.

As well as focusing on safety and reliability, the stations are also designed to offer maximum operator comfort and filling times consistent with equivalent diesel vehicles. All attendant features are covered in our short video <u>LNG fueling stations – the next generation</u>.

Shipping News - International Maritime Organization (IMO) Fuel Sulphur Regulation

On January 1, 2020, enforcement of the IMO Marpol Annex VI regulation on limiting bunker fuel sulphur content to 0.5% will begin. Currently, the average sulphur content in marine fuel is 3.5%. Adding LNG into the marine fuel mix is gaining support as a preferred solution for meeting this fast approaching environmental restriction.



Choosing to convert existing ships to run on dual fuel using LNG is a growing solution to meet the new IMO regulation. 1300 vessels have been converted to run on dual fuel, with additional vessels expected to be added by 2020.

Vessel operators and owners are challenged to meet requirements for lower sulphur dioxide (SO2), NOX and particulate matter. There are multiple diverse options in the market to help meet the 2020 emissions regulations. Emissions regulations for additional NOx reductions loom on the horizon and add to equipment and fuel selection challenges. The deadline of January 2020 is just one key date in moving the marine industry to more environmental friendly shipping.



The global LNG bunkering infrastructure is in its relative infancy but anticipated to develop rapidly to keep pace with demand. Chart has already supplied solutions and equipped numerous bunkering stations in public ports, as well as for private marine fleets.

A recent addition to LNG bunkering is at the Port of Jacksonville in the United States, which will fuel incoming LNG powered container and ConRo ships.

Small-scale LNG

Chart would like to congratulate Shell, Gasnor and the Government of Gibraltar following the official opening of the small-scale LNG regasification terminal that enables Gibraltar to switch from diesel fueled power generation to cleaner burning natural gas, via a newly commissioned 80 megawatt gas-fired power plant. Five HT1000 cryogenic vessels, designed and built by Chart Ferox in Decin, Czech Republic, provide 5000m³ of LNG storage and are part of Chart's scope for the cryogenic section, which also includes vaporizers, the loading arm and other specialty equipment. As well as supplying the principal equipment Chart was also responsible for its transportation, site construction, commissioning and start-up.



Update from LNG 19

The 19th International Conference and Exhibition on LNG highlighted the challenges and successes in the industry and this year came to China for the first time.



It was an honor to present two papers at the technical conference. One of those papers, explaining how Chart's IPSMR® liquefaction process technology is the key to right sizing mid-scale LNG, is neatly summed up in this <u>short animation</u>.



Join our LNG101 Workshop

As the LNG market continues to develop, the cross pollination of ideas between Chart and our customers drives much of our innovation and applications and we thank those who actively participated in our previous workshops. Our next LNG101 workshop is October 1st and 2nd, 2019 and we will also offer an optional day for visiting our brazed aluminum heat exchanger manufacturing facility in Wisconsin.

Due to demand, space is currently limited to Chart customers and partners. For details and registration contact <u>Cathy.Dols@ChartIndustries.com</u>

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