SEA-LNG

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Mr Lionel Mok,
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Dear Sir,

The Climate Bond Initiative recently announced its proposed sector criteria for Green Bond certification of Low Carbon Shipping financing, to align investments in the shipping sector with decarbonisation targets set out in the Paris Agreement. However, it leans towards being technology prescriptive rather than goal oriented; a precarious strategic approach to a highly complex international challenge.

Green bond financing for LNG fuelled vessels, all capable of using Liquefied Bio-methane (LBM) and Liquefied Synthetic-methane (LSM), are at risk of exclusion. Immature and emerging technologies such as ammonia and hydrogen, that will require significant research and development investment over many years if they are to scale safely in the deep-sea maritime environment, appear to be favoured. While these technology pathways are worthy of investment, considering the high level of uncertainty, we believe it makes no sense to exclude an operationally proven, scalable, and existing marine fuel such as LNG and its decarbonization pathway through LBM and LSM. **We firmly believe that LNG in the maritime sector is a crucial tool in helping achieve climate and air quality ambitions today and in the future.**

Regarding greenhouse gas (GHG) emissions, the independent thinkstep (now Sphera) study[1], commissioned by SEA-LNG and SGMF, and peer reviewed by an international panel of academic experts, showed that today **LNG in the maritime sector can reduce GHG reductions up to 21%** compared with current oil-based marine fuels over the entire life-cycle from Well-to-Wake, including methane emissions. **The study has been widely recognised as the most comprehensive analysis undertaken to date on the life-cycle GHG emissions of LNG as a marine fuel compared with current and post-2020 conventional marine fuels.** The analysis was based on the latest primary data available from the main marine engine manufacturers, namely Caterpillar MaK, Caterpillar Solar Turbines, GE Aviation, MAN Energy Solutions, MTU Friedrichshafen, Winterthur Gas & Diesel (WinGD) and Wärtsilä.

[1] Sphera (formerly thinkstep) LNG LCA study attached to this letter.

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Methane slippage is receiving much attention in relation to the GHG benefits of LNG as a marine fuel, and is a factor which was addressed specifically in the Sphera study. Engine manufacturers recognise this as an issue for certain types of internal combustion engines, but not for all of them. It is important to note that LNG-fuelled engines were originally developed in the 1990s to address local emissions i.e. NOx and SOx; GHG emissions were not an area of focus at the time. Since then, **the levels of methane slip, where applicable, have been reduced four times and engine manufacturers continue to invest in R&D to further reduce the slip**[2] in response to both commercial and regulatory pressures. Hence, not only is significant abatement already available, the manufacturers are on a pathway to reduce methane slip even further.

LNG-fuelled ships, with little or no modifications, can use liquid biomethane[3] (LBM) and liquid synthetic methane (LSM), initially as drop-in fuels, allowing the industry to begin to realise significant GHG savings now. These fuels can be transported, stored and bunkered in ports utilizing existing LNG infrastructure. The recent study[4] commissioned by SEA-LNG from CE Delft concludes that both LBM and LSM are scalable solutions for the maritime sector, with estimated sustainable global supplies potentially exceeding the demands of shipping in the future. LBM and LSM will also likely be commercially competitive relative to other low- and zero-carbon fuels.

LNG is a competitive option today and it can act as a strong foundation for future emissions reductions using LBM and LSM as the technologies required to produce them continue to mature. Furthermore, given the immaturity of ammonia or hydrogen propulsion technologies for the marine sector and the absence of supply and bunkering infrastructure, disincentivising the further development of LNG-fuelled shipping could, de facto, create a lock-in to the highly polluting conventional oil based marine fuels for years to come.

The strategic risk associated with a prescriptive approach favouring unproven technology pathways as espoused by the Climate Bond Initiative's proposed criteria should not be understated. Renewable hydrogen and ammonia[5], as with other synthetic, or e-fuels, such as LSM, will require vast amounts of renewable energy. This means both will face the same supply constraints and cost risks. The low energy density of these fuels is another well-known challenge likely to result in significantly reduced vessel productivity levels, counter to decarbonization objectives. Regarding ship and port safety, hydrogen's flammability and ammonia's toxicity cannot be minimized. Whether these safety challenges can be addressed to the satisfaction of flag states, the regulatory environment at national authorities, and ports across the world, is unknown at this time.

[2] For more details, please see the paper attached and submitted by SGMF to the IMO
[3] The conclusions in relation to the huge potential for biomethane is recognised in a recent report published by the IEA (also attached). Liquid biomethane is also known as bio-LNG.
[4] Attached to this letter.
[5] For more details, please see the report attached titled "Comparison of Alternative Marine Fuels" by DNVGL

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For the reasons stated, LNG through the gradual introduction of LBM/LSM offers a realistic pathway for reducing shipping's GHG emissions and we believe it should be recognized accordingly. Today, LNG is operationally effective, safe, scalable to meet shipping's needs, and improves global air quality. The impact of cleaner air on world health is still an important consideration. Importantly, LNG has already started the decarbonization of shipping. Furthermore, the roll-out of LNG safety and operational guidelines, as well as infrastructure, will act as a best practice for the adoption of future alternative marine fuels like ammonia or hydrogen over the longer term. The renewable hydrogen and renewable ammonia pathways, while possibly deserving of policy support, are not ready now and may or may not be viable to successfully serve the vast majority of shipping.

Specifying green investment criteria that favour specific technology pathways risks forcing the shipping industry into non-optimal solutions from environmental, operational, and commercial perspectives and must be avoided. Multiple decarbonization pathways are available to explore for shipping, including LNG to LBM/LSM. Recognizing that shipping's decarbonization is a complex challenge fraught with uncertainty, supporting multiple pathways across the risk spectrum is a far more prudent approach. All options should be on the table.

Yours faithfully,

Peter Keller
Chairman, SEA-LNG