Liquid ammonia could become the ‘new LNG’

By Anthony Wright on Feb 29, 2024 | 0 DECARBONISATION

The growth of liquid ammonia could mirror the early rise of the liquefied natural gas (LNG) sector, leading it to develop into the ‘new LNG’.

That is the view of Stephen Harrison — Founder of sbh4Consulting — who spoke with gasworld on the fringes of last month’s European Industrial Gases Association (EIGA) conference, as featured exclusively on gasworld’s ***The 1895 Podcast***.

Ammonia holds major potential as a low- and zero-emission fuel, replacing gasoline, diesel and fuel oil.

“We can burn ammonia, co-fire it on coal-fired power plants. We can burn ammonia on gas turbines a bit like we burn natural gas today,” said Harrison.

“So effectively, liquid ammonia can be the new LNG. And I don’t mean it can be the new LNG tomorrow, it needs time.”

Part of this shift involves repurposing existing LNG infrastructure such as import

terminals, which can be used to transport not only ammonia but hydrogen.

One key benefit of ammonia is its energy efficiency and – when combined with its low vapour pressure and high boiling point – it becomes an ideal hydrogen carrier.

“Once we’ve made hydrogen blue or green, we’ve got a good start to a clean energy vector, but it’s incredibly difficult to transport,” explained Harrison.

“So we incur a cost penalty converting the hydrogen to ammonia, but we save those costs through the infrastructure and the supply chain.”

When hydrogen is converted to ammonia, all of the hydrogen is locked into the ammonia molecule and no hydrogen is lost.

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“My perception is that the vast majority of hydrogen that is produced around the world will be converted to a hydrogen derivative, whether that’s methanol, an e-fuel or ammonia, and my belief is that ammonia could be about 50% of that.”

Research has also shown that hydrogen (2.366%) has the highest daily boil-off gas (BOG) rate and wastes more energy than LNG (0.413%), with ammonia and methanol both being lower than LNG.

This builds the case for ammonia and methanol replacing LNG as the energy carrier of the future, while hydrogen needs effective BOG handling systems to boost its competitiveness.

The dual-pronged nature of ammonia means that it can also be used directly as a fuel for mobility and transport applications or to generate power.

Ammonia has been forecast to play a key role in decarbonising shipping. According to a recent report from Lloyd’s Register, blue and green ammonia will capture between 20-60% of the shipping fuel market by 2050, with an average of 46% across the scenarios.

Hydrogen required to supply ammonia for the shipping industry could represent up to 8.3 – 17.5% of global hydrogen demand in 2050.

Analysis from CRU Group indicates that blue ammonia is set to become more cost

effective than traditional ‘grey’ ammonia in key regions within the next four years as government policy increases carbon costs for companies.

Although such policies will also lead to steep falls in green ammonia costs, green ammonia is likely to remain uncompetitive on a cost basis over the coming three decades.

“From a green ammonia perspective the main challenge is cost,” said Harrison. “Making blue ammonia is significantly less expensive than making green ammonia.”

“I look forward to seeing costs for green ammonia come down and scale increase. I don’t think we necessarily need major technological breakthroughs, it’s really about scaling up and doing good projects in the right place to achieve low cost.”

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