

Power-to-X, green chemicals and engineering a sustainable tomorrow

Nithesh Mohun, Business Development Lead for Green Chemicals at thyssenkrupp Uhde Africa, talks about the benefits of green ammonia, Power-to-X and sustainability.

Established in South Africa in 1959, thyssenkrupp Uhde Africa is the local subsidiary of thyssenkrupp Uhde GmbH. "Underpinned by a global footprint and local presence, we are a market-leading technology, engineering, construction and service partner for industrial plants and systems," says Nithesh Mohun of thyssenkrupp Uhde Africa.

Combining over 100 years of global experience with over 63 years of local African know-how, thyssenkrupp Uhde Africa is a specialist provider of a range of advanced chemical technologies and integrated, environmentally friendly EPC (engineering, procurement and construction) solutions and services. "We provide the full range of services for fertiliser, petrochemical, oil and gas, and green chemicals," says Nithesh Mohun.

Power-to-X and green chemicals

The starting point of the green chemical value chain is hydrogen. "Hydrogen is viewed as an enabler of the green chemicals value chain. Traditionally, hydrogen is produced using the fossil fuel-based steam-methane (CH₄) reformation process. While this process sets the price benchmark for competitive hydrogen production, its main drawback is the fugitive production of greenhouse gases, primarily carbon dioxide."

"The sustainable alternative to fossil fuel-based hydrogen is green hydrogen. This is produced by splitting water into pure hydrogen and pure oxygen through the application of renewable electricity in a process known as electrolysis. An electrolyser is the equipment that uses electrolysis to split water (H₂O) into its two elemental gases, hydrogen (H₂) and



oxygen (O₂). The hydrogen produced can be classified as 'green' as there is little to no carbon dioxide released during the electrolysis process or in the process of producing the electricity used," he explains.

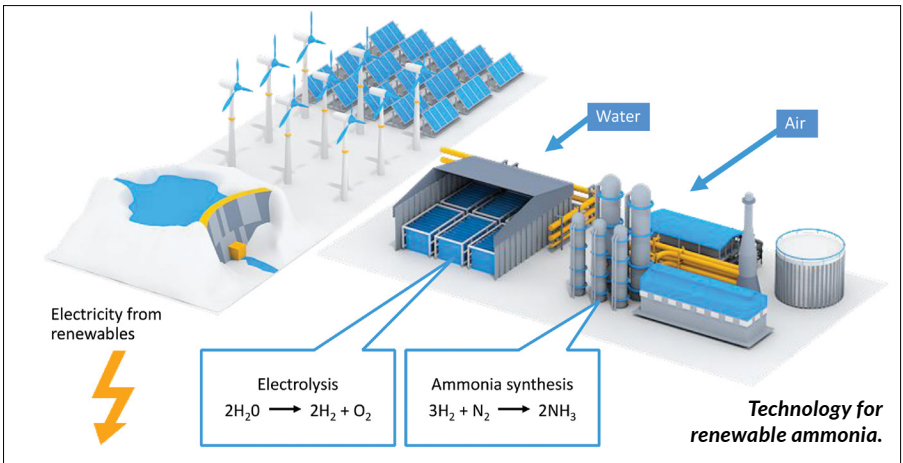
"By leveraging the transformative potential of green hydrogen, thyssenkrupp Uhde is championing the development and implementation of green technologies. This includes technologies to produce green ammonia, green methanol, sustainable aviation fuels and green fertilisers, amongst others. In industry, this is commonly referred to as Power-to-X applications, where X represents a hydrogen

derivative or any of the above chemicals," Mohun adds. He highlights a diagram showing the integrated nature of thyssenkrupp Uhde's solutions that use renewable power to produce Power-to-X chemicals. "We offer holistic and customised solutions using proprietary and seamless technologies that are based on delivering best possible productivity and cost performance," he says, adding, "These are modular solutions that enable decentralised production of green chemicals, and modularisation affords the plant owner faster delivery, safer work environments and appreciable cost savings."

Ammonia as a hydrogen carrier

Ammonia or NH₃ consists of one part nitrogen to three parts hydrogen and is typically made using the Haber-Bosch process, which combines pure nitrogen from the air with hydrogen in a high temperature reactor.

The development of this process was one of the most important in human history, having prevented mass starvation when supplies of the natural nitrogen-rich fertilizer, guano, began to run out towards the end of the 19th century. And it continues to be the key chemical for manufacturing fertilisers that are essential for high-yield food production for an ever-increasing global population. Ammonia is currently also in the spotlight for its potential as a hydrogen storage medium, or green fuel. The maritime industry is expected to be an early adopter of green ammonia to replace diesel in marine combustion engines, although the engines needed for this are still in the early



phases of development. Mohun continues: "The use of ammonia as an energy carrier and means of transporting hydrogen has many advantages. Firstly, it is more energy-efficient to transport than hydrogen. Secondly, ammonia can be used to transport larger amounts of energy over long distances in less space. Thirdly, we already have a globally established infrastructure for transporting ammonia that is safe and efficient."

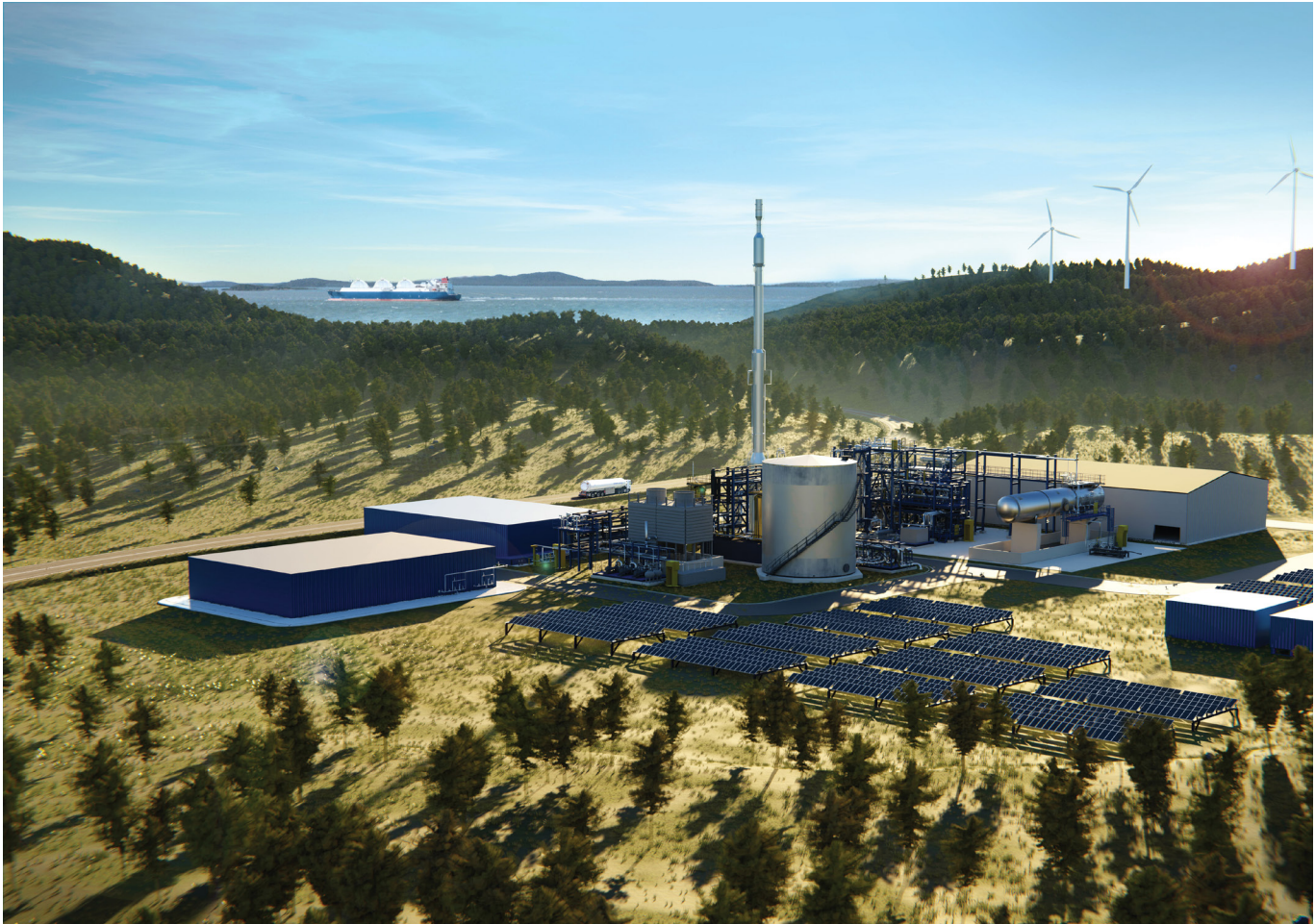
"Green ammonia is, therefore, increasingly being produced for export markets for consumption in Europe and Asia. "South Africa, with its favourable solar and wind profiles, has the potential to produce green ammonia very competitively," Mohun adds.

Driven by sustainability

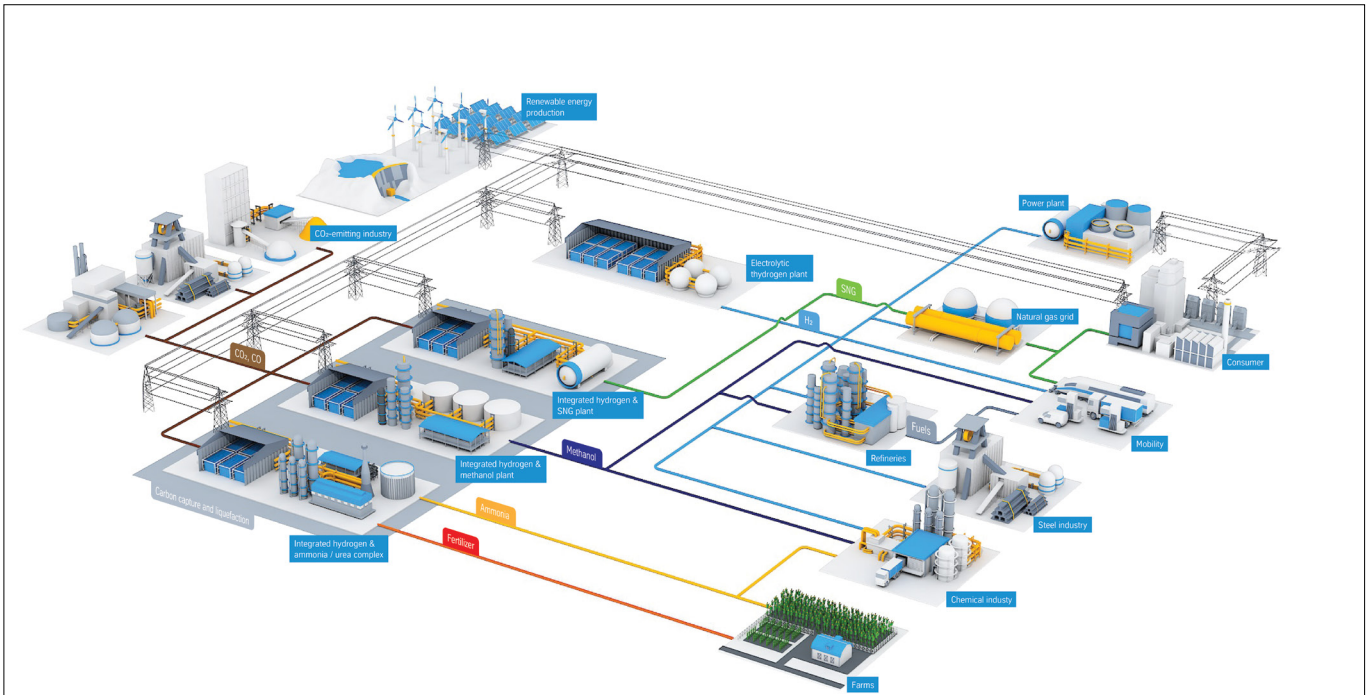
thyssenkrupp has a strong sustainability focus. "Prioritising our climate and the need

to create a liveable planet for ourselves and future generations is what drives us to create innovative and sustainable technologies. But we do not just talk-the-talk, we also walk-the-walk. The non-governmental organisation CDP (formerly Carbon Disclosure Project) has, many times over, named thyssenkrupp as one of the world's best companies in climate protection," he points out. "thyssenkrupp Uhde Africa has been serving the production needs of clients across the African continent since 1959. Our project successes and track record across the continent is attributed to our global expertise, local knowledge and service excellence. We know Africa. With our green technology portfolio, we aim to become the leading EPC and clean technology solutions provider in sub-Saharan Africa (SSA)," he concludes.

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Green ammonia has significant advantages over hydrogen in that it is easier to store and handle, and is also seen as a safer way to transport hydrogen itself.



thyssenkrupp Uhde's proprietary know-how, developed over nearly a century in the industry, enables the company to deliver safe, efficient and environmentally sustainable Power-to-X solutions – including but not limited to green ammonia, green methanol, sustainable aviation fuels and green fertilisers.