

Biomass gasification: the alternative hydrogen beneficiation pathway

Nithesh Mohun, senior sales engineer at thyssenkrupp Uhde South Africa, talks about the use of proprietary Uhde® PRENFLO biomass gasification technology to produce hydrogen and biofuels from biomass energy sources such as lignocellulosic biomass, which he sees as a bridging technology to full scale green hydrogen and synfuel solutions.

Established in South Africa in 1959, thyssenkrupp Uhde Africa is the local subsidiary of thyssenkrupp AG and a market-leading technology, engineering, construction and service partner for industrial plants and systems. Its portfolio also includes patented chemical process technologies, to produce green hydrogen, green ammonia and green methanol, leading-edge green technology solutions that play a fundamental role in supporting the global shift towards decarbonisation and the clean energy transition.

An alternate decarbonisation pathway is the gasification of biomass, particularly for the production of biofuels such as biodiesel and bio jet fuel. thyssenkrupp Uhde is part of the BioTfuel® project launched by a consortium of companies aiming to achieving the conversion of lignocellulosic biomass into high-quality advanced biofuels via an indirect thermochemical pathway, while simultaneously ensuring minimum impact on the environment.

"This involves gasification, which is the process of taking solids and transforming them into gas, then producing synthetic gas and ultimately advanced biofuels such as bio diesel, sustainable aviation fuels (SAF) and bio naphtha," explains Nithesh Mohun, Senior Sales Engineer

at thyssenkrupp Uhde South Africa.

The biofuels produced are free of sulphur, olefins, oxygenates and aromatics, making them suitable for use as drop-in fuels without the need to modify current infrastructure and vehicles; or as a blend in all types of diesel and turbojet engines without the need for engine retrofits. "The by-products of gasification are also valuable," adds Mohun. "The slag, for example, can be used in roadbuilding, and fly ash in the cement industry."

The gasification processes, which are based on the proprietary Uhde® PRENFLO technology, can be used to gasify a variety of solids including coke, coal, brown coal, petroleum and biomass, which includes materials such as sugar cane off-cuts, grass, wood chips, straw, forest waste and energy crops. "Before introducing these solids or feedstock into one of our PRENFLO gasifiers, which can have a capacity of up to 1 200 megawatts, they have to be reduced into smaller particles," explains Mohun. "The solid plant matter is first broken down to pebble size through a technology known as torrefaction before being milled to produce a powder-like substance, which is then introduced to the gasifier."

"Taking into consideration that the global narrative centres on

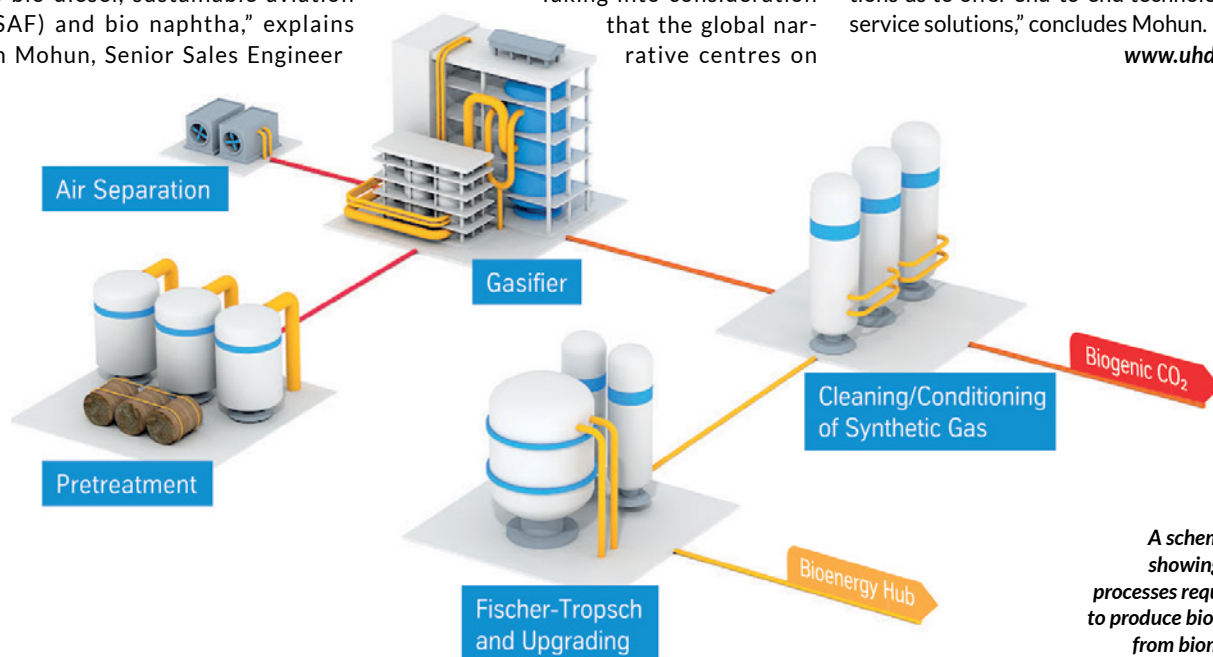


decarbonisation and green hydrogen, the classification of biomass gasification by some as green hydrogen is not accurate," notes Mohun. "Gasification, irrespective of the source material and even if plant based, still produces CO₂, so it cannot be classified as green hydrogen."

"By contrast, green hydrogen is produced by the electrolysis of water based on 100% renewable feedstocks. Thus biomass, together with the carbon capture process, can and should be viewed as a blue hydrogen solution, especially when we introduce the gas treatment process to remove CO₂. However, as the adoption of green hydrogen is still a few years away, gasification can be viewed as a transition technology."

"Based on our Uhde® gasification process, we can design and implement optimised production solutions for the beneficiation of biomass. Our global footprint gives us access to a vast knowledge pool, which, combined with a local presence and experience that spans more than six decades, perfectly positions us to offer end-to-end technology and service solutions," concludes Mohun.

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A schematic showing the processes required to produce biofuels from biomass.