

Air Liquide and KBR to offer ATR-based low-carbon ammonia and hydrogen technologies

Air Liquide, through its Engineering & Construction Division, will work with KBR to offer fully integrated low-carbon ammonia solutions based on Autothermal Reforming (ATR) technology. Air Liquide is a world leader in ATR technology, one of the most suitable solutions for large-scale production of low-carbon hydrogen (H₂), which is then combined with nitrogen (N₂) to produce low-carbon ammonia (NH₃). The solutions provided with KBR, the world leader in ammonia technology, will also contribute to the development of a global low-carbon hydrogen market as, when transformed into ammonia, hydrogen can be easily transported over long distances.

Air Liquide will provide its unique and proprietary expertise in Autothermal Reformer (ATR), and KBR its mastery and world leadership in ammonia production technology. Air Liquide has established its leadership in oxygen-based ATR technology through nearly seven decades of experience. Since 1943, KBR has licensed, engineered, or constructed over 250 grassroots ammonia plants worldwide. The Air Liquide and KBR solutions can achieve outstanding energy efficiency and world-leading reliability with a production process which also allows for a carbon capture rate of up to 99% in highly integrated industrial facilities when combined with carbon capture technology.

The global ammonia market size reached Ca. 78 billion US dollars in 2022 and is projected to surpass 129 billion US dollars by 2030; it is expected to grow by 6.5% per year on average between 2022 and 2030, according to Precedence Research¹. Today, ammonia is mainly used as a fertilizer for agriculture.

In the longer term, Air Liquide and KBR will work together to contribute to the development of low-carbon hydrogen as a key enabler of the energy transition. Ammonia can be easily transported over long distances and a global supply chain infrastructure is already in place for the production, transportation and utilization of ammonia at large scale. Once transported, ammonia can be converted back into hydrogen to contribute to the decarbonization of industry and mobility. In March 2023, Air Liquide announced the construction of an industrial scale ammonia cracking pilot plant in the port of Antwerp, Belgium. Using innovative technology, this plant will make it possible to convert, with an optimized carbon footprint, ammonia into hydrogen.

Michael J. Graff, Executive Vice President, Air Liquide Group, said: *“Through this new offering, Air Liquide and KBR will combine their renowned respective expertise to provide efficient, reliable and competitive solutions for the production of ammonia and help the sector engage its low-carbon transition. These will enable customers to grow their business with an optimized carbon footprint, while also contributing to the development of the global hydrogen market. This further illustrates Air Liquide’s commitment to sustainable development, supporting customers in industry and mobility to decarbonize their products and operations. This is a core element of our ADVANCE strategic plan, which inseparably links financial and extra financial performance.”*

“We are excited to align with Air Liquide to further expand KBR’s low-carbon ammonia offerings for energy transition,” said **Doug Kelly**, KBR President, Technology. *“Our differentiated ammonia synthesis technology has been the preferred choice for decades, with complete solutions for low-carbon and renewable ammonia with large-scale capacity of up to 10,000 MTPD. The addition of Air Liquide’s ATR technology further complements our low-carbon ammonia offerings as we work to promote technology solutions to decarbonize the world.”*

¹ <https://www.precedenceresearch.com/ammonia-market>

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A world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 73 countries with approximately 67,100 employees and serves more than 3.9 million customers and patients. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902.

Taking action today while preparing the future is at the heart of Air Liquide's strategy. With ADVANCE, its strategic plan for 2025, Air Liquide is targeting a global performance, combining financial and extra-financial dimensions. Positioned on new markets, the Group benefits from major assets such as its business model combining resilience and strength, its ability to innovate and its technological expertise. The Group develops solutions contributing to climate and the energy transition—particularly with hydrogen—and takes action to progress in areas of healthcare, digital and high technologies.

Air Liquide's revenue amounted to more than 29.9 billion euros in 2022. Air Liquide is listed on the Euronext Paris stock exchange (compartment A) and belongs to the CAC 40, CAC 40 ESG, EURO STOXX 50, FTSE4Good and DJSI Europe indexes.