

Ammonia Cracking

Converting renewable and low carbon ammonia to hydrogen

What is Ammonia?

Ammonia is a molecule consisting of Nitrogen and Hydrogen (NH₃) which combines a high hydrogen density by volume. Utilized for various sectors (mainly agriculture for fertilizers), a global supply chain infrastructure is already in place for its production, transportation and utilization at large scale.

Why is Ammonia useful in the hydrogen value chain?

Ammonia can be produced with low carbon emissions in regions with abundant renewable sources. The stability of the Ammonia molecule allows transportation at large scale over great distances across the globe. Due to this existing infrastructure and availability, excess energy can be transported to end users across the globe where it can be converted back to hydrogen.

How does Ammonia cracking work?

Ammonia Cracking is a **process** for converting **ammonia back to hydrogen** at scale.

A key element of the Ammonia Cracking process is the **Ammonia Cracker**, which is a **catalytic cracking furnace** in which **the ammonia synthesis reaction is reversed** at elevated temperatures. The resulting cracked gas consists mainly of hydrogen and nitrogen. After a subsequent separation step, **purified hydrogen is obtained**.

What are the specifics of Air Liquide's ammonia cracking technology?

Air Liquide's **highly efficient** Ammonia Cracking process uses Air Liquide's proprietary **next-generation reactor tubes** heat-integration technology. This technology allows for the **highest possible ammonia to hydrogen conversion yield and zero direct CO₂ emissions**.



Visualization of Air Liquide's industrial scale pilot plant for Ammonia Cracking

The first industrial scale pilot plant in Belgium

Announced March 2023

Air Liquide announced the start of construction of an industrial scale ammonia (NH₃) cracking pilot plant in the Port of Antwerp, Belgium.

Renewable and Low Carbon HYDROGEN is a key enabler of a successful energy transition

Air Liquide has announced an ambitious plan to accelerate its development :

> **Sales in hydrogen x3**: our hydrogen revenues will at least triple in size, increasing from 2 billion to more than 6 billion euros by 2035.

> **8 billion euros**: ~ 8 billion euros will be invested in the renewable and low-carbon hydrogen supply chain by 2035.

AIR LIQUIDE Track Record

Air Liquide has developed unique expertise in the mastery of the entire hydrogen chain (production, storage, and distribution)

+60 years experience in Hydrogen