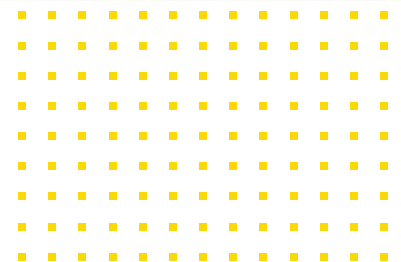


**K-GreenN<sup>®</sup>**

KBR Green Ammonia Technology



# K-GreenN<sup>®</sup>

## Green Ammonia Solutions from the Industry Leader

### MOVING TOWARDS A SUSTAINABLE, CARBON-FREE ECONOMY

Green ammonia offers the flexibility to store energy and help decarbonize the transportation, power, fertilizer and chemical sectors, supporting a reliable renewable energy future.

With a history of 100 years of providing innovative technology solutions and around 50% market share in commercial ammonia synthesis plants, KBR offers its K-GreenN solution, an engineering process and service to produce green ammonia as a long-duration energy storage medium.

### WHAT IS GREEN AMMONIA?

Green ammonia is ammonia produced with no greenhouse gas emissions. The sun, air and water provide the power and elements to create this versatile source of energy, nutrition and chemical feedstock.

Using renewable power, nitrogen is separated from the air, and hydrogen is extracted from water through electrolysis to deliver the pure elements to produce green ammonia.

With the increasing availability of renewable energy, green ammonia offers a flexible way to store energy and transport it for use either as energy or feedstock. Green ammonia offers the following advantages:

- High energy density
- Widely available feedstock
- Zero-carbon fuel
- Existing reliable infrastructure for storage and distribution
- Can be used in fuel cells and thermal engines

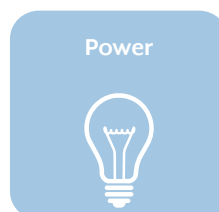
### WHY GREEN AMMONIA?

- Decarbonizing the economy is an important goal for many companies – e.g. many industries are pursuing an EU-wide net zero emissions target for 2050
- Since it utilizes renewable energy, green ammonia is renewable energy and is particularly suited for regions with high solar-intensity and/or wind energy
- Reducing the cost of renewable energy is sustainable only if energy can be stored for delayed consumption
- As the world moves towards a decarbonized economy, hydrocarbon-based energy sources are being replaced by renewables
- Decades of proven, safe production, storage and transportation infrastructure

***Green ammonia is an emerging area for the next wave of growth.  
Are you ready?***

### APPLICATIONS OF GREEN AMMONIA PRODUCTION

Ammonia is the most promising carrier for carbon-free hydrogen due to its high energy density and its transportation infrastructure already in place. Green Ammonia can also be used directly in many industries including



## KBR TECHNOLOGY SOLUTIONS OFFERS

- Complete green ammonia plant: full integrated solution from electrolysis of water to produce green hydrogen, separation of air to produce green nitrogen to the synthesis of green ammonia
- Low-cost add-on electrolyser unit to existing ammonia plants with no ASU and no/minimum modifications required to the existing plants to produce green ammonia
- Unsurpassed ammonia synthesis plant reliability, with lower energy consumption at lower capital cost (due to lower equipment count)
- Various capacities:
  - Demonstration units (<200 MTPD)
  - Small-size green ammonia plants (200-600 MTPD)
  - Large-scale green ammonia plants (600-6,000 MTPD)
- Trouble-free project execution by evaluating:
  - Minimum economic turndown capacity
  - Flexibility in ramp-up/ramp-down
  - Digital solutions for optimized design and entire plant lifecycle (KBR Digital Sustainability Suite)
  - Impact assessment on economical feedstock and product storage requirements
- Proprietary equipment and catalyst
- Process technology licensing, engineering services, and design of the ammonia plants

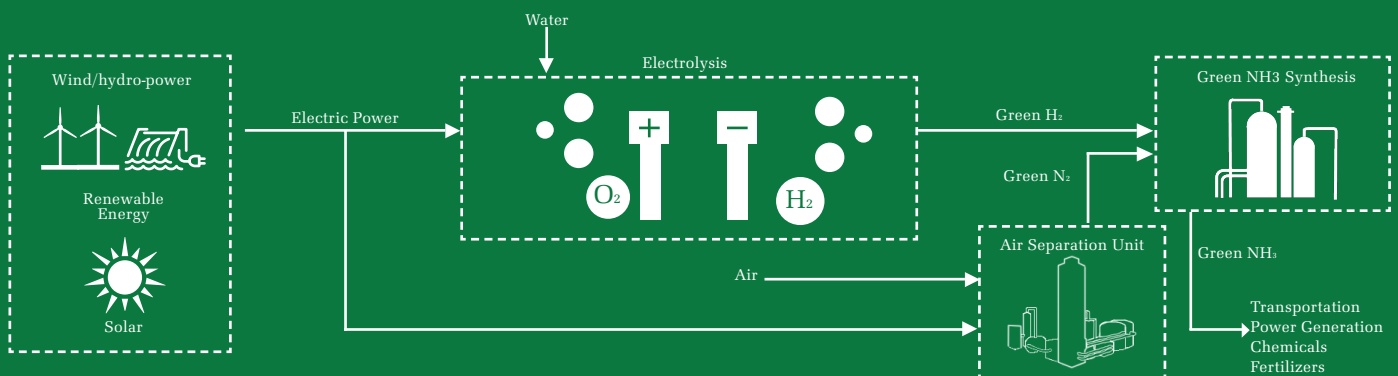
*By 2030, ammonia production in Europe is expected to receive 10% of its need for hydrogen from electrolysis based on electricity from renewable sources, according to Fertilizers Europe 'Feeding Life 2030 Report'.*

## K-GreenN

KBR is the leading ammonia process licensor. We offer the most reliable and energy-efficient ammonia technology at lower capital cost, with more than 75 years of experience and 250 ammonia plants worldwide.

The green ammonia process aims at high efficiency synthesis of CO<sub>2</sub>-free ammonia with optimum integration of intermittent renewable energy, minimizing storage requirements. It includes:

- Hydrogen generation, compression and storage
- Nitrogen generation, compression and storage
- Ammonia synthesis, refrigeration and storage



**...think Green Ammonia, think KBR...**





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