NEXTCHEM | STAMICARBON

# STRONG ROOTS, NEW POSSIBILITIES

## NX STAMI™ AMMONIA

# A NEW PERSPECTIVE ON THE INDUSTRY

## ENABLING THE TRANSITION TO SUSTAINABLE ENERGY

Ammonia stands as one of the world's most vital commodities. It's crucial for applications ranging from fertilizers to diverse industrial processes. Yet, its promise extends far beyond its current uses. Ammonia is emerging as a key enabler of the energy transition, and its role as a hydrogen carrier is expanding rapidly in decarbonizing hard-to-abate sectors.

The global production of ammonia is projected to increase substantially in the coming years. The question is not whether consumption will grow, but rather if it will grow in line with the global population and economic expansion, or if it will accelerate even faster as it becomes an indispensable component of the low-carbon economy.

### Did you know?

With a low boiling point of -33.34°C, liquid ammonia is easy to store and transport to chemical plants, where it can be used as feedstock. So, ammonia is a practical way to transport renewable energy. And the infrastructure is already in place. There's a worldwide network of ports, well-established shipping routes and storage facilities.

# TECHNOLOGIES THAT MAKE THE DIFFERENCE

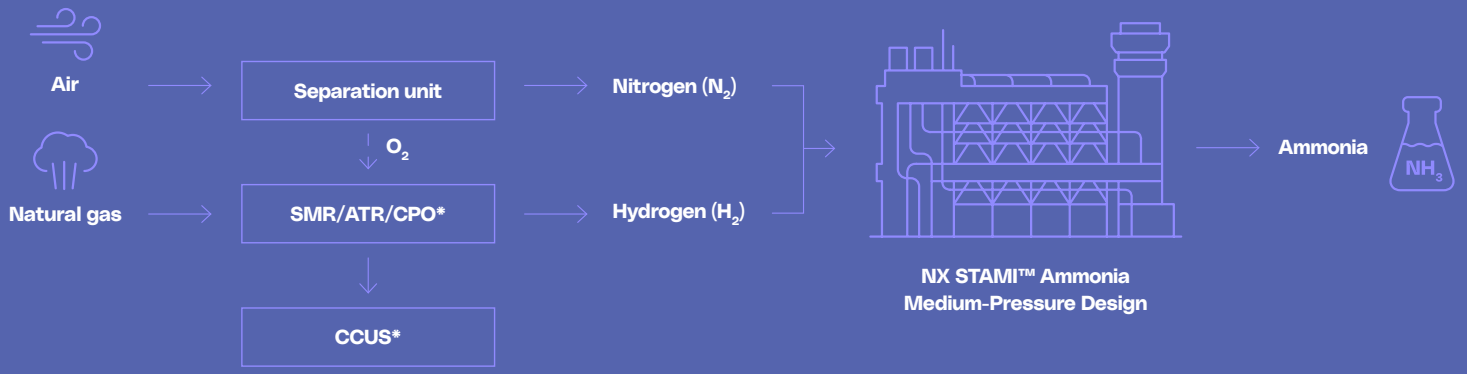
Stamicarbon is proud to support this transition with future-proof, innovative solutions. Our ammonia technology portfolio includes two distinct designs, each tailored to specific project scales, feedstock types, and sustainability goals.

Whether your priority is small-to-medium scale production from renewable electricity or large-scale ammonia from fossil sources with carbon capture integration, we have the solution to match your needs.

| | NX STAMI™ Ammonia High-Pressure Design | NX STAMI™ Ammonia Medium-Pressure Design |
|---|---|---|
| Production Scale | 50–500 MTPD of ammonia | 50–3,500 MTPD of ammonia |
| Feedstock to Produce Hydrogen | Renewable electricity (solar/wind/hydro/geothermal/ Nuclear) | Renewables or fossil fuels with Carbon Capture Utilization and Storage |
| Advantages | Modular design, small footprint, fully renewable process | Efficient ammonia production at low cost |
| Use Case | Decentralized production of green ammonia in renewables-rich regions | Large-scale production, e.g. integrated into major fertilizer complexes |

# TRADITIONAL AMMONIA

A traditional ammonia plant uses hydrogen and nitrogen as feedstocks to synthesize ammonia. Hydrogen is typically produced on-site from fossil fuels via steam methane reforming (SMR), autothermal reforming (ATR), or catalytic partial oxidation (CPO), while nitrogen is separated from the air. These two gases are then combined in a medium-pressure, high-temperature catalytic reaction known as the Haber-Bosch process. This process can be made significantly more sustainable by integrating carbon capture, utilization, and storage (CCUS), which prevents carbon dioxide emissions from being released into the atmosphere. Instead, these emissions are captured for other uses or storage, and the resulting low-carbon product is referred to as 'blue' ammonia.

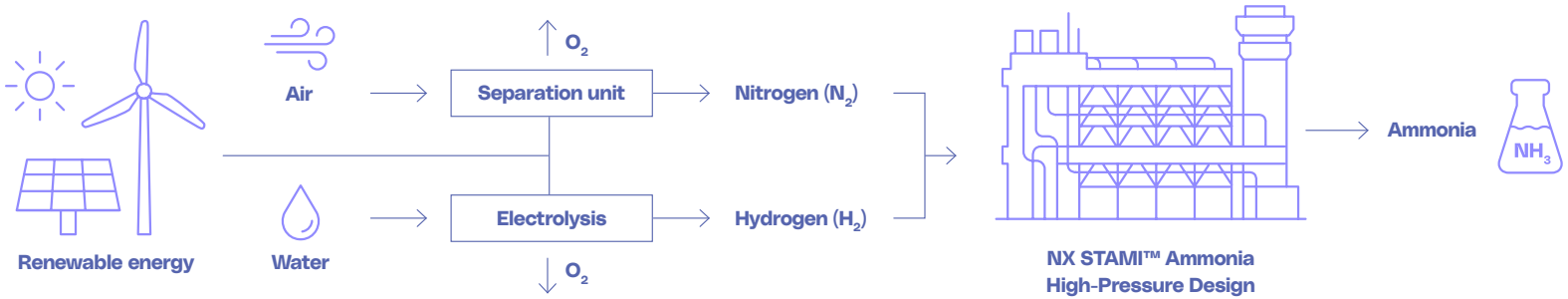



* Designs for these technologies can be provided by NEXTCHEM

# GREEN AMMONIA PRODUCTION

Ammonia can be produced by using renewable electricity to power electrolyzers, which split water to create hydrogen and oxygen. The nitrogen needed for ammonia synthesis is extracted from the air using an air separation unit.

The temperature and pressure needed for the hydrogen-nitrogen reaction during the ammonia synthesis loop are also powered by renewable electricity. The output is carbon-free ammonia, also known as ‘green’ ammonia.



NX STAMI™ Ammonia Medium-Pressure Design is a proven and cost-effective solution.

# MEDIUM PRESSURE, HIGH CAPACITY

To meet the growing demand for low-cost and high-efficiency ammonia production, Stamicarbon offers the NX STAMI™ Ammonia Medium-Pressure Design.

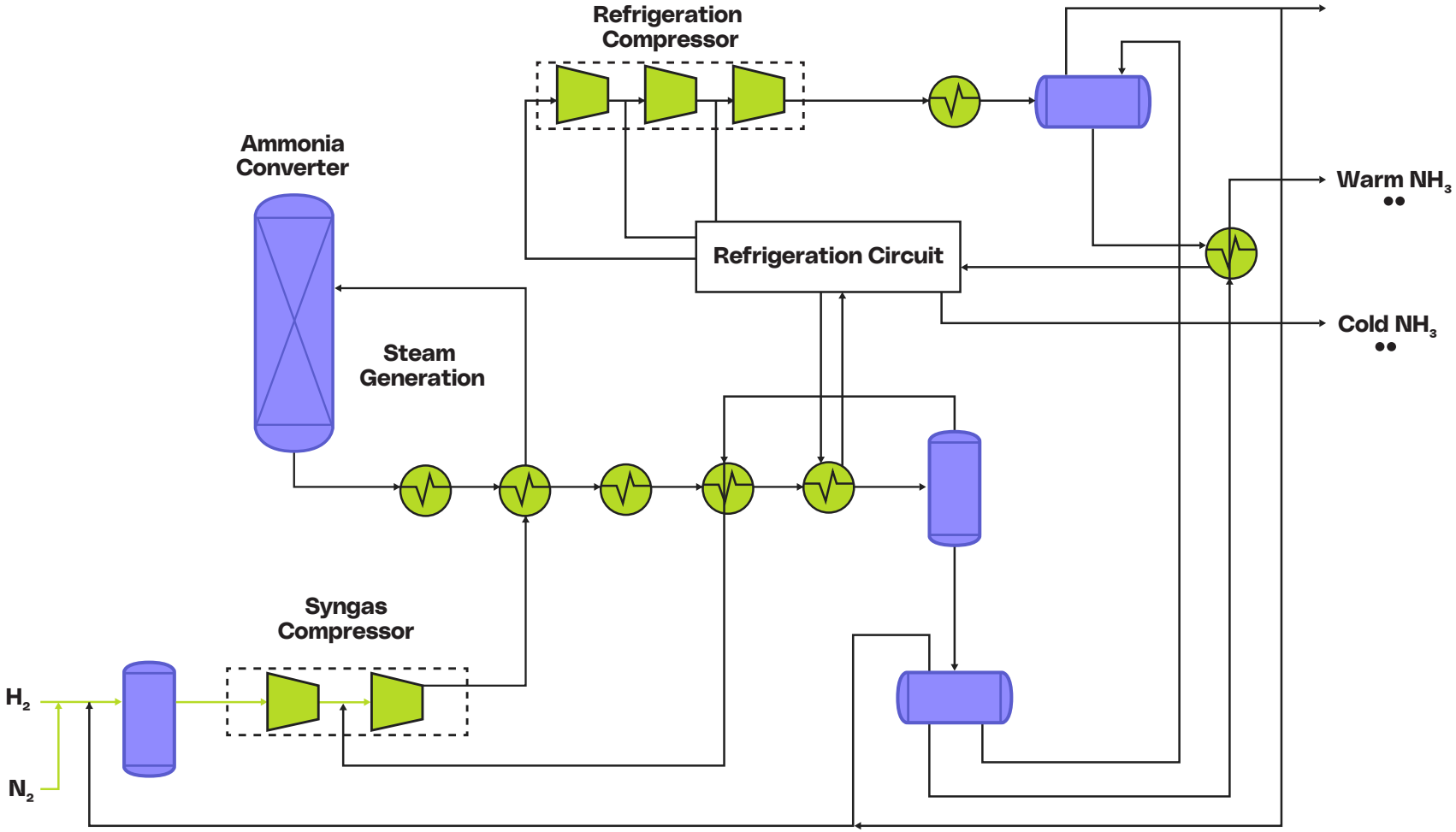
Designed for capacities ranging from 50 to 3,500 MTPD, and scalable to even larger sizes, this process provides flexibility to match specific customer needs.

With 45+ industrial references, NX STAMI™ Ammonia Medium-Pressure Design is a proven and cost-effective solution for conventional ammonia production.

NX STAMI™ Ammonia Medium-Pressure Design features a multi-bed, radial-flow reactor with a low pressure drop configuration.

This has been optimized to allow high per pass conversion with the minimum possible catalyst volume and can be customized based on operating variables.

The system is notable for its superior temperature control in the first bed, allowing for a more efficient converter operation and a longer expected catalyst lifespan.


Refrigeration Compressor
Ammonia Converter
Warm $NH_3$
Refrigeration Circuit
Cold $NH_3$
Steam Generation
Syngas Compressor
$H_2$
$N_2$

# SMALL FOOTPRINT, BIG IMPACT

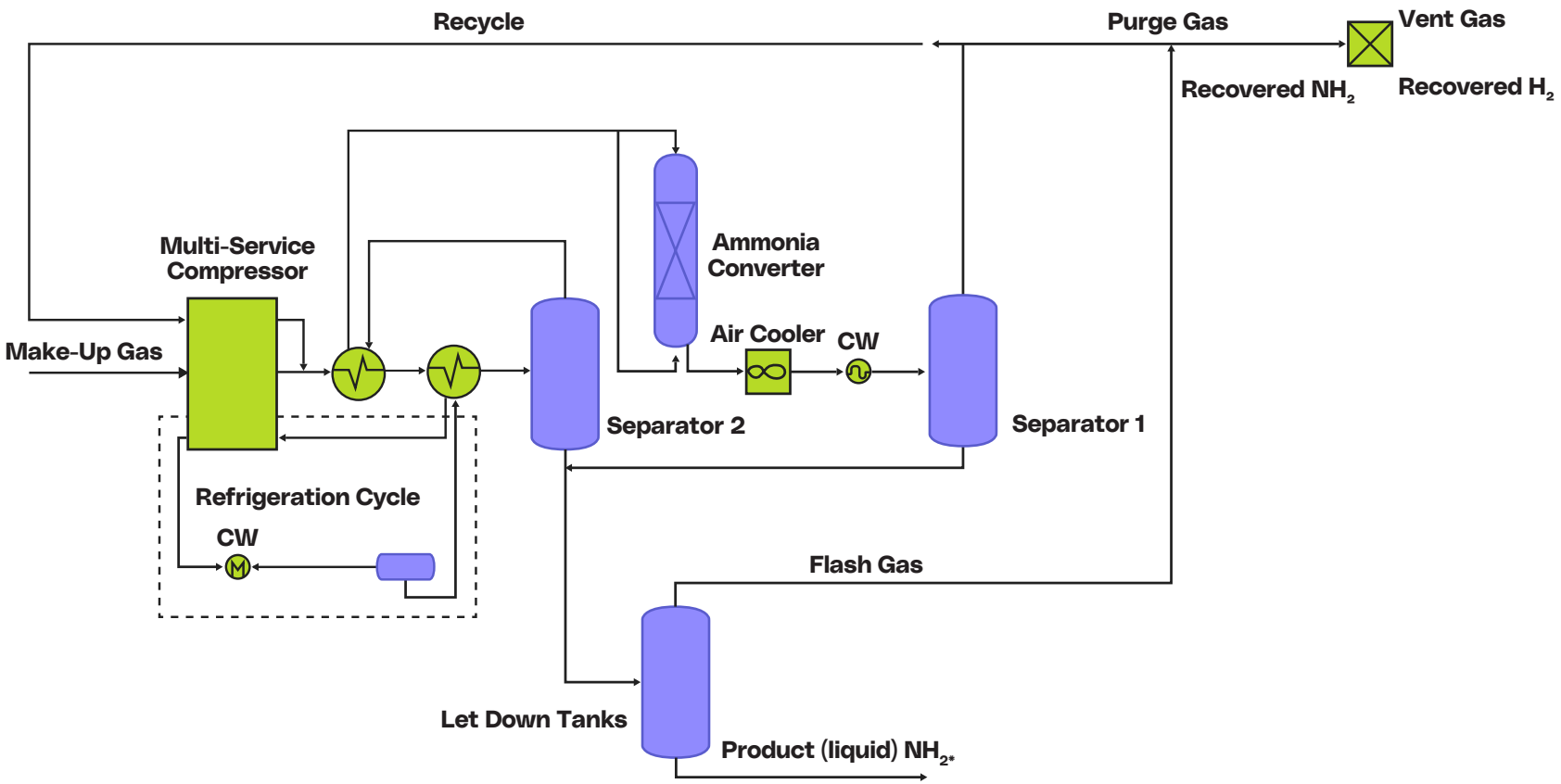
To enable ammonia production from renewable energy sources with minimal environmental impact, Stamicarbon offers the NX STAMI™ Ammonia High-Pressure Design.

Designed for small- to medium-scale green ammonia plants with capacities from 50 to 500 MTPD, this technology features a modular setup and compact footprint, making it ideal for decentralized applications.

Operating with a single reciprocating compressor minimizes equipment requirements and delivers substantial CAPEX savings.

With four plants already in operation, NX STAMI™ Ammonia High-Pressure Design has the strongest reference base in the sub-500 MTPD segment – more than any other licensor.

Designed for small- to medium-scale green ammonia plants.




*warm (ambient temperature) or cold ammonia (-33 °C)

The ammonia synthesis loop operates at a high pressure, increasing conversion efficiency while reducing the need for costly refrigeration systems.

The ammonia converter used in this process features a single axial flow catalyst bed design. Heat exchange tubes submerged in the catalyst bed allow for excellent temperature control, preventing adverse effects such as catalyst sintering.

The process flow begins with make-up gas, a mixture of hydrogen and nitrogen from an upstream electrolyzer and nitrogen generation unit. This gas is compressed in an electrically-driven reciprocating compressor to over 300 bar, with the recycle stream also recompressed to the same pressure.

The high-pressure synthesis loop allows for single-stage ammonia condensation using cooling water, eliminating the need for a refrigeration compressor.

# WHY PARTNER WITH STAMICARBON

- Proven leader in nitrogen fertilizer technology with deep expertise in urea, nitrates, and ammonia
- Seamless integration with other NEXTCHEM technologies to maximize energy efficiency and reduce emissions
- Lifecycle support approach – from plant design and engineering to revamps and ongoing support
- Materials expert and reliable partner for tailored high-quality equipment supply
- Leader in digital solutions for fertilizer plants, such as a dedicated technology training simulator and process monitoring tool
- Experts in ammonia storage inspections and maintenance, ensuring long-term safety and reliability

Whether you're just starting out or expanding your operations in ammonia, we're here to help you grow.

# SUSTAINABLE TECHNOLOGY SOLUTIONS

As part of NEXTCHEM, we deliver pioneering solutions that span the entire nitrogen value chain – from feedstock to the final product. Working alongside our sister companies, we integrate complementary technologies and services to support your project, from design and engineering to optimization and ongoing support. This ensures maximum efficiency and sustainability.

# WE ARE STAMICARBON

# WHAT CAN WE DO FOR YOU?

Stamicarbon, the nitrogen technology licensor of NEXTCHEM (MAIRE Group), designs and licenses fertilizer plant technologies, specializing in urea, green ammonia, and nitric acid. As part of NEXTCHEM, Stamicarbon leverages the capabilities and expertise of a world-leading engineering group. In total, Stamicarbon has licensed more than 260 urea plants and realized more than 100 revamping and optimization projects. Applying more almost 80 years of knowledge and experience, Stamicarbon offers you tailored solutions and services to maintain, improve and optimize plants in every stage of their life cycle, with a focus on sustainable fertilizer production. As pioneers with a higher purpose, Stamicarbon's vision is to help enable the world to feed itself and improve the quality of life. Stamicarbon is headquartered in Sittard, The Netherlands, and operates worldwide.

Questions?
Would you like to know more? Talk to us - we're here for you! Contact our experts at **www.stamicarbon.com.**

**Stamicarbon**
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