STAMICARBON

ENABLING GREEN AMMONIA: INTEGRATING RENEWABLE HYDROGEN FOR A SUSTAINABLE CHEMICAL INDUSTRY

Mahal Patel, Lead Technology Engineer - Ammonia

NEXTCHEM
MAIRE Sustainable Technology Solutions

ABOUT MAIRE GROUP STRUCTURE

SUSTAINABLE TECHNOLOGY SOLUTIONS

Innovative technologies for the energy transition and decarbonization

NEXTCHEM
MAIRE Sustainable Technology Solutions

STAMICARBON

PROJECT DEVELOPMENT

Support both businesses by developing projects

MET DEVELOPMENT
MAIRE Project Development

INTEGRATED E&C SOLUTIONS

Leader in the field of plant engineering

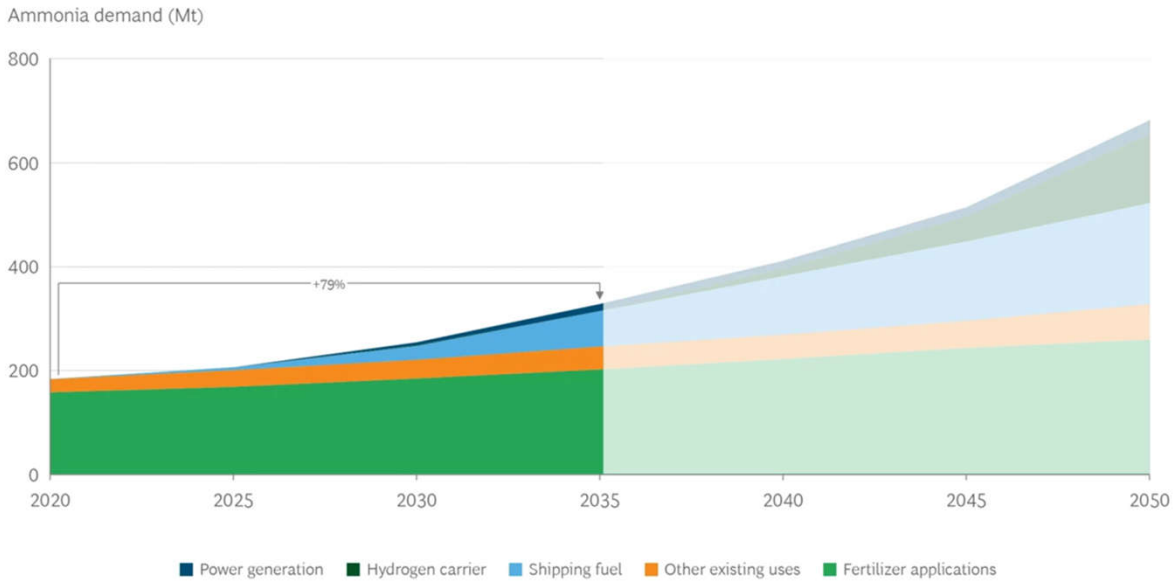
TECNIMONT
MAIRE Integrated E&C Solutions

KT
MAIRE Integrated E&C Solutions

TECNIMONT SERVICES
MAIRE Integrated E&C Solutions

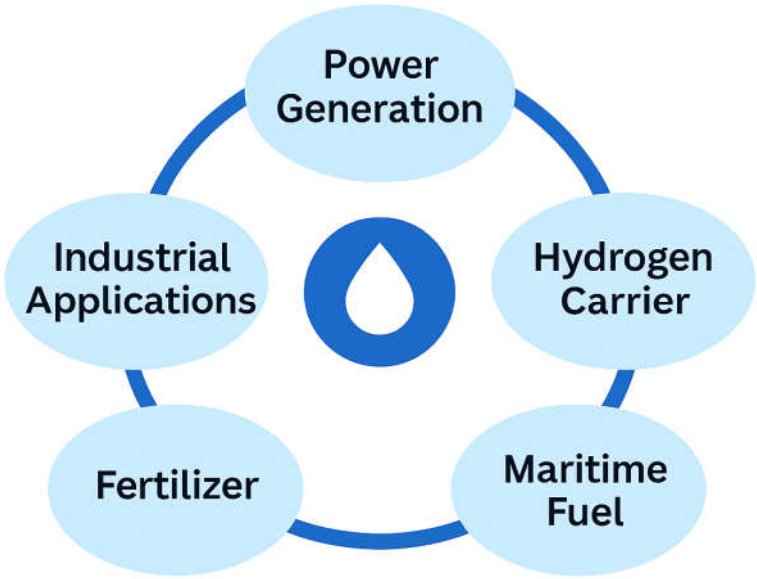
AMMONIA – DEMAND AND USE

Ammonia demand



BCG analysis*, IRENA estimates based on limiting global warming to 1.5 °C above preindustrial levels; power generation using ammonia is limited to Japan

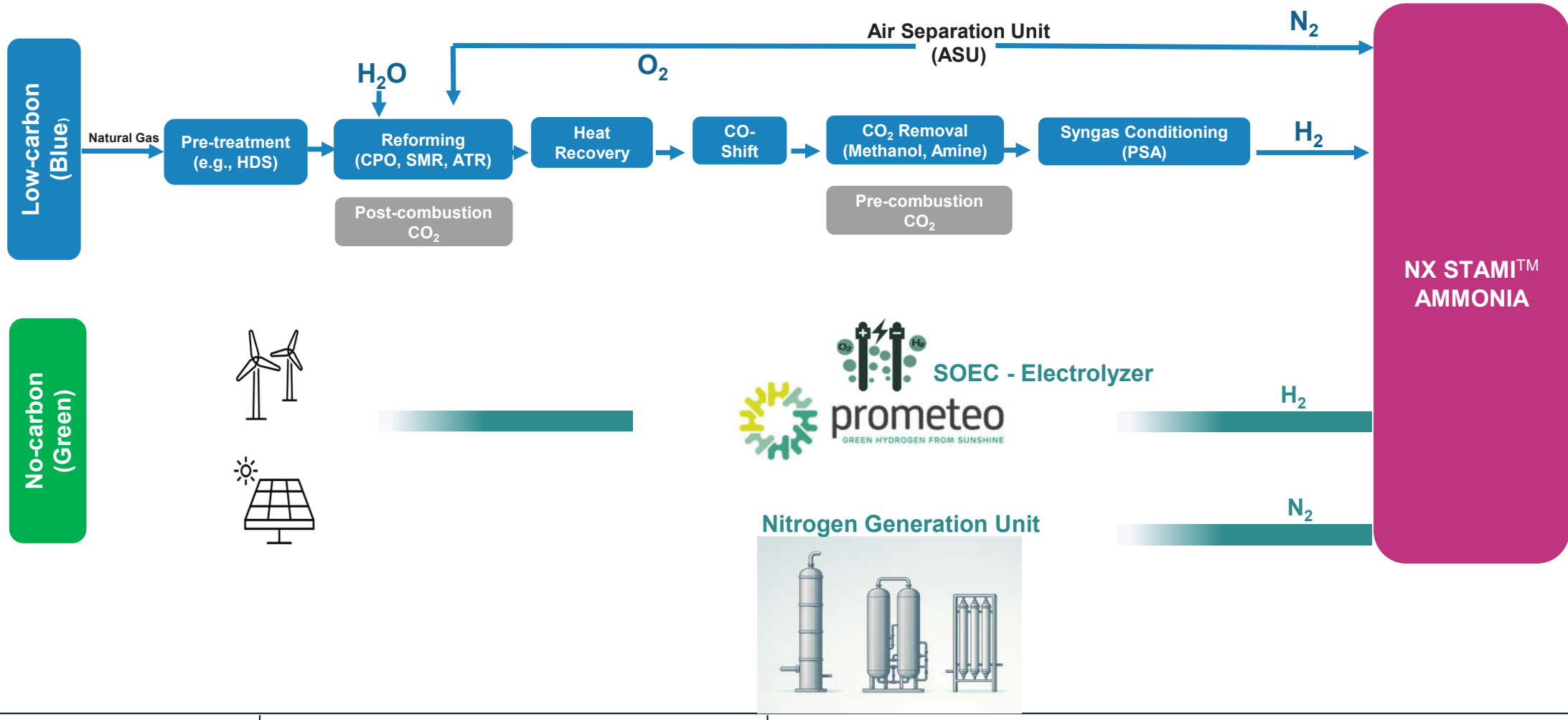
Ammonia utilization



….not just limited to Fertilizer-Industrial application

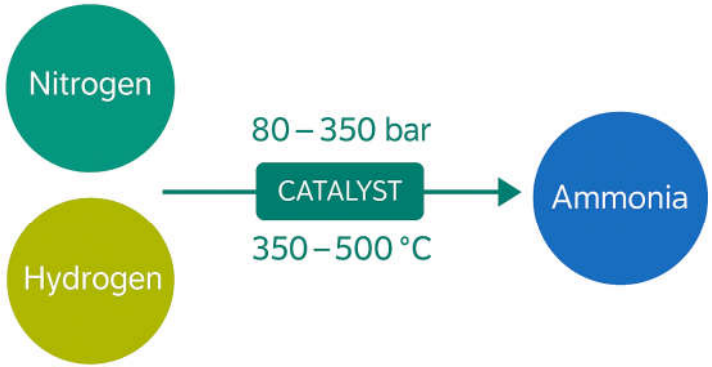
*Source: BGG, Global ammonia demand

DECARBONIZING AMMONIA PRODUCTION



AMMONIA TECHNOLOGY

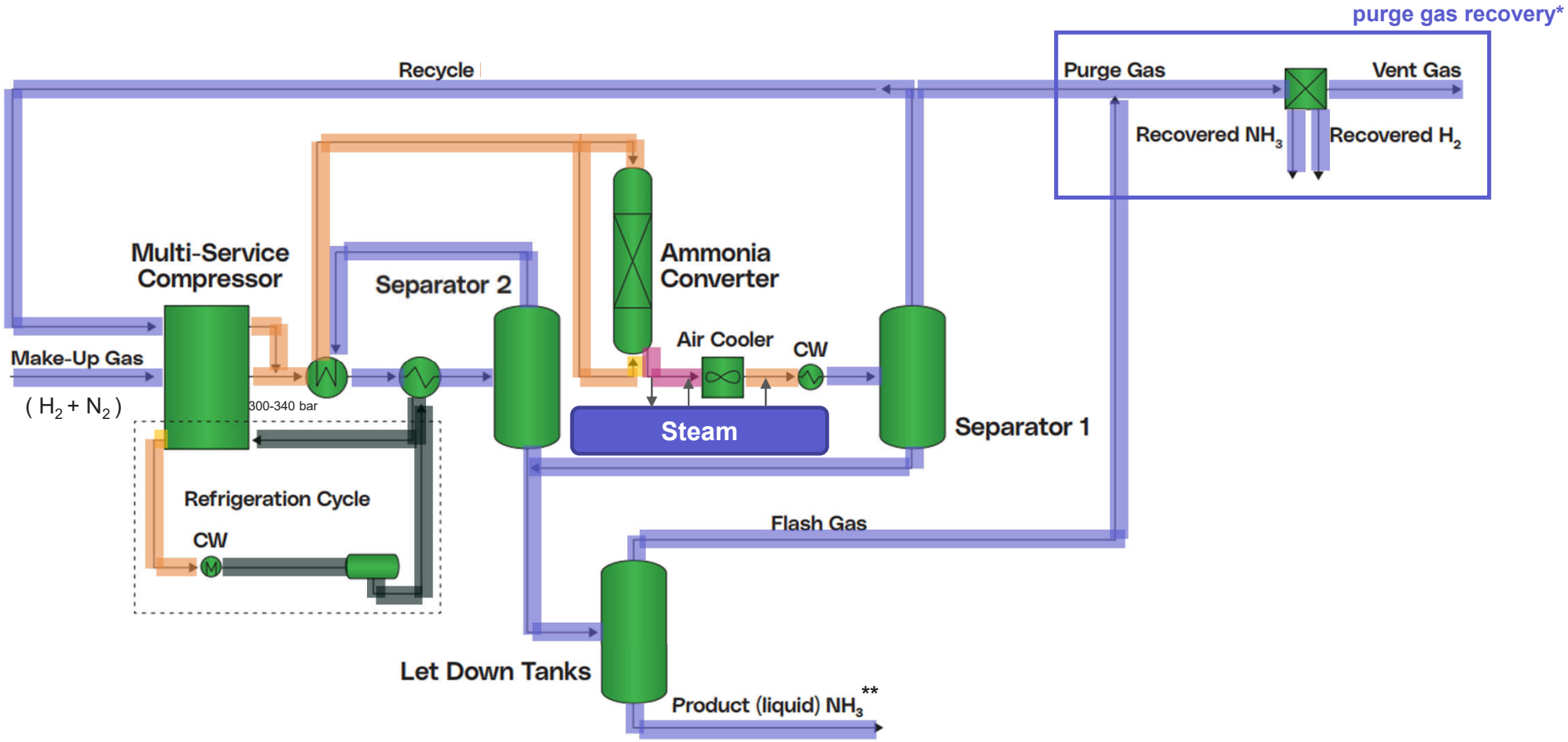
HABER-BOSCH PROCESS



NX STAMI™ Ammonia

- High-pressure synloop
- Medium-pressure synloop

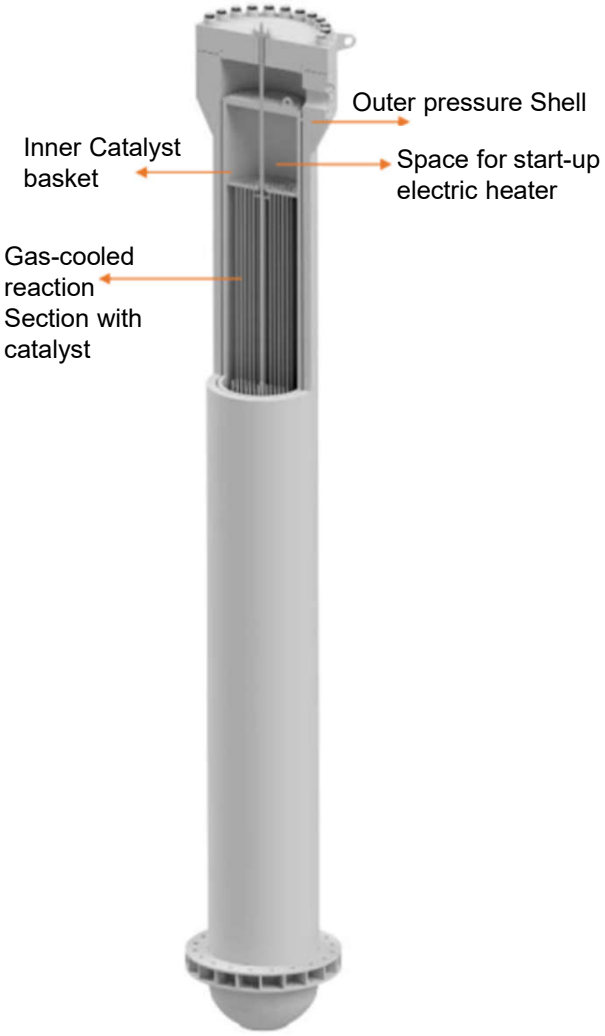
NX STAMI™ AMMONIA – HIGH-PRESSURE SYNLOOP



*Optional

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

NX STAMI™ AMMONIA – PROCESS HIGHLIGHTS



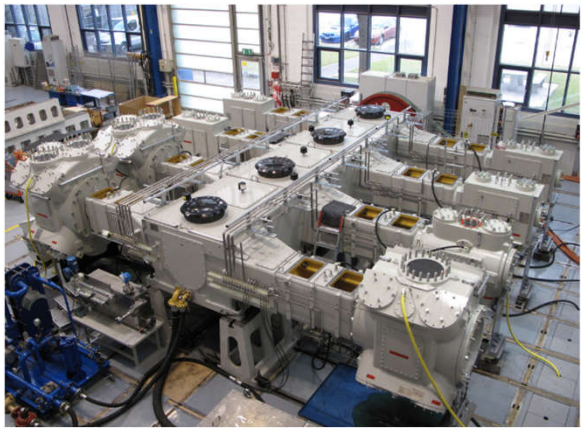
Small Ammonia Converter
Axial flow, cold wall reactor
E-heater, catalytic bed: gas-cooled tubular converter design
Suitable for any equivalent Fe catalyst available in the market

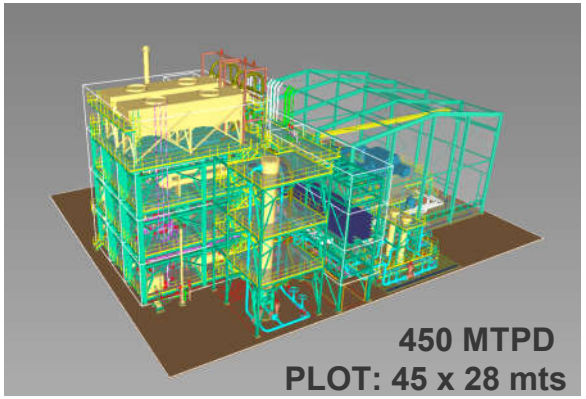
Very low iron-based catalyst volume
3-4 times lower than traditional plant at same capacity

Multiservice reciprocating compressor
Single compressor for multiple services – single shaft
3 fluids : syngas, recycle and refrigeration fluid

Flexibility in operation
Intermittency– up to 10% turndown

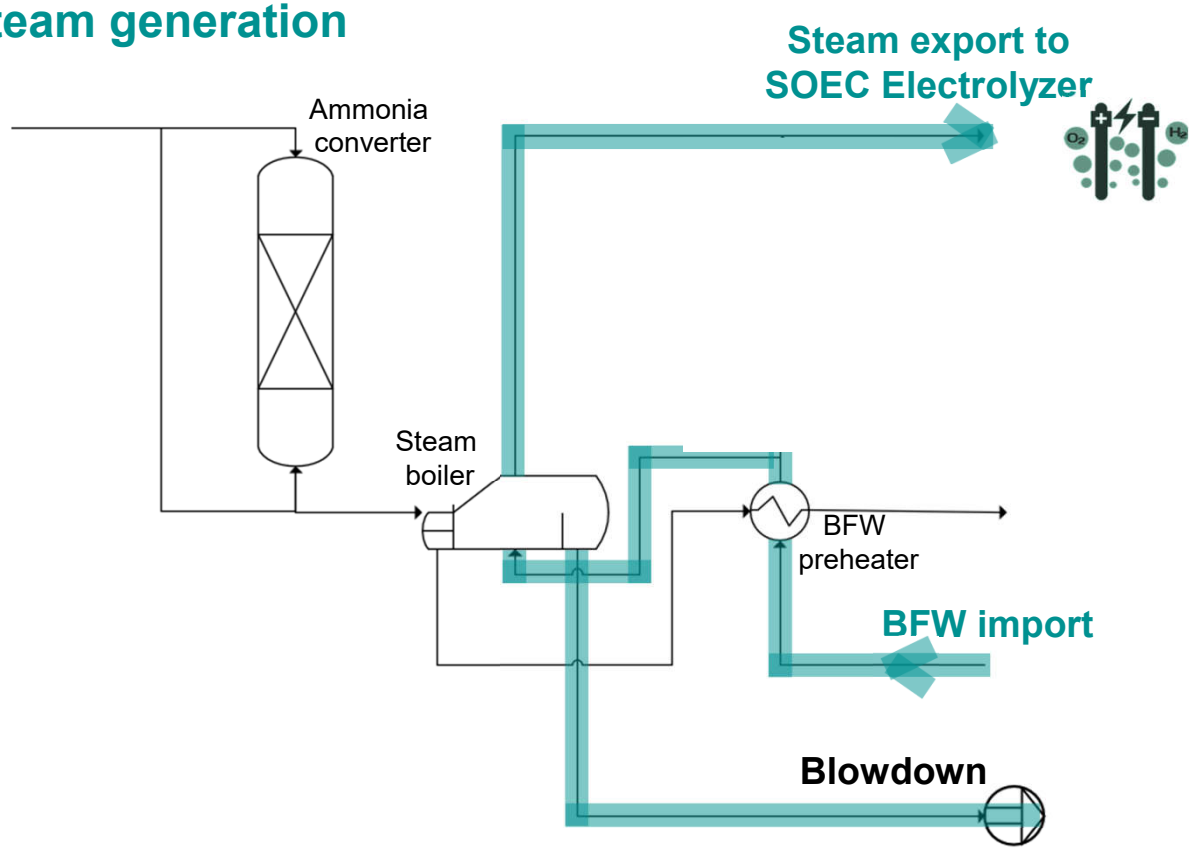
Modular design


Multiservice compressor by Burckhardt Compression during MRT



NX STAMI™ AMMONIA - STEAM

Steam generation



Steam quality: Any quality of steam is possible

NX STAMI™ AMMONIA ADVANTAGES

- Strong technology reference plants
- High pressure operations > 300 bar
- H_2 single pass conversion ~32%, low recycle & H_2 efficiency up to 99.9%
- Fully electrically driven, proven single shaft multi-service reciprocating compressor
- Low CAPEX (< 30% vs peer) & attractive OPEX
- Lean design & minimum number of equipment

AMMONIA – PRODUCT CHARACTERISTICS

Typical Consumption/Production	Warm NH_3*	Cold NH_3**
Power at shaft (kWh/tNH_3) H_2, N_2 at 30 barg	-320	-370
Steam production, 17 barg	+1100 kg/tNH_3	

Ammonia product specification	Value
Ammonia, wt% min.	99.5-99.8
Water, wt% max.	0.2-0.5
Oil, ppmw max.	5

Ammonia storage	Typical pressure (bara)	Design temperature (°C)	Capacity, ton Ammonia
Pressure storage (*warm ammonia)	16-18	Ambient	150 to max. 1500
Low-temperature storage (**cold ammonia)	1.1-1.2	-33	4500-45000

Ullmann's Encycloepedia

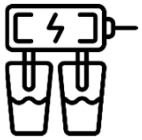
AMMONIA – UREA COMPLEX

Carbon capture and utilization (CCU)

CO_2

NX STAMI™ Urea

NX STAMI™ Ammonia



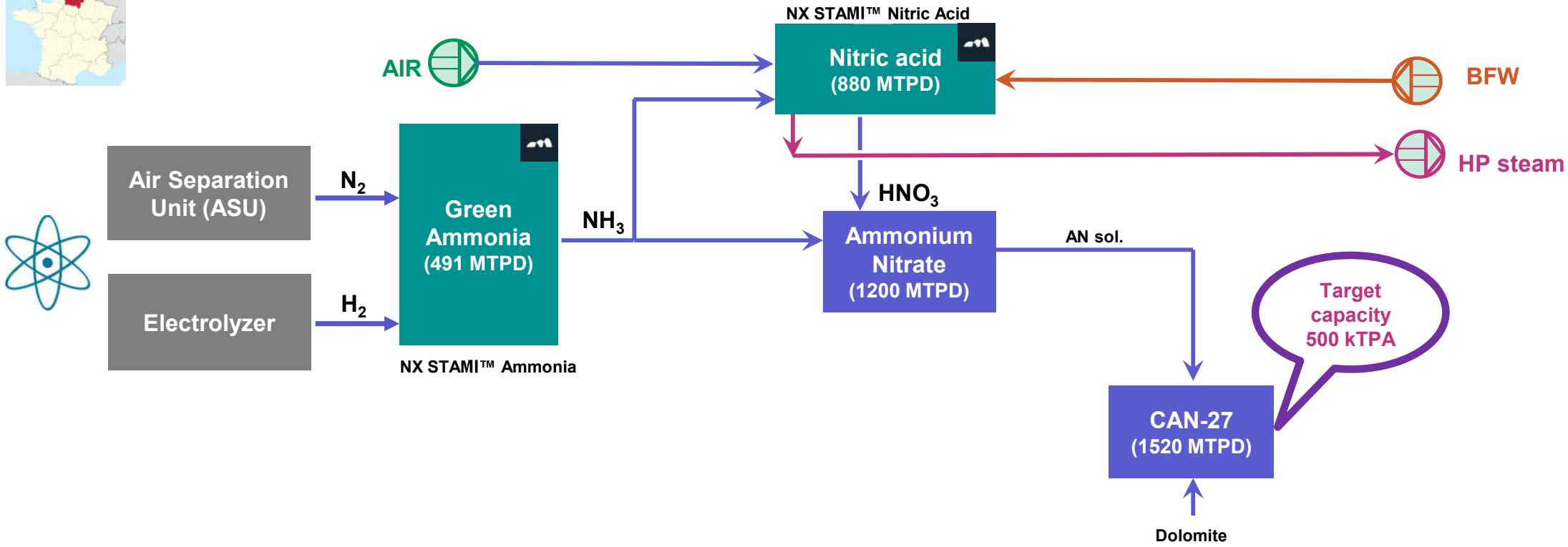
SOEC Electrolyzer

NH_3

100 MTPD urea

FERTIGHY -GREEN AMMONIA TO FERTILIZERS (CAN)

Country: France



Courtesy: Pixabay, Wikipedia

NEXTCHEM

MAIRE Sustainable Technology Solutions