NEXTCHEM

UNFOLD
STAMICARBON
15TH SYMPOSIUM 2026

ENABLING DECENTRALIZED AMMONIA PRODUCTION WITH NX STAMI™ HP SYNLOOP – BEYOND THE BASE CASE

Mahal Patel

AGENDA

01 INTRODUCTION AND OBJECTIVE

02 NX STAMI™ AMMONIA HP SYNLOOP - BASE CASE

03 PROCESS ALTERNATIVES AND INTEGRATION

04 KEY TAKEAWAYS

01

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INTRODUCTION & OBJECTIVE

INTRODUCTION

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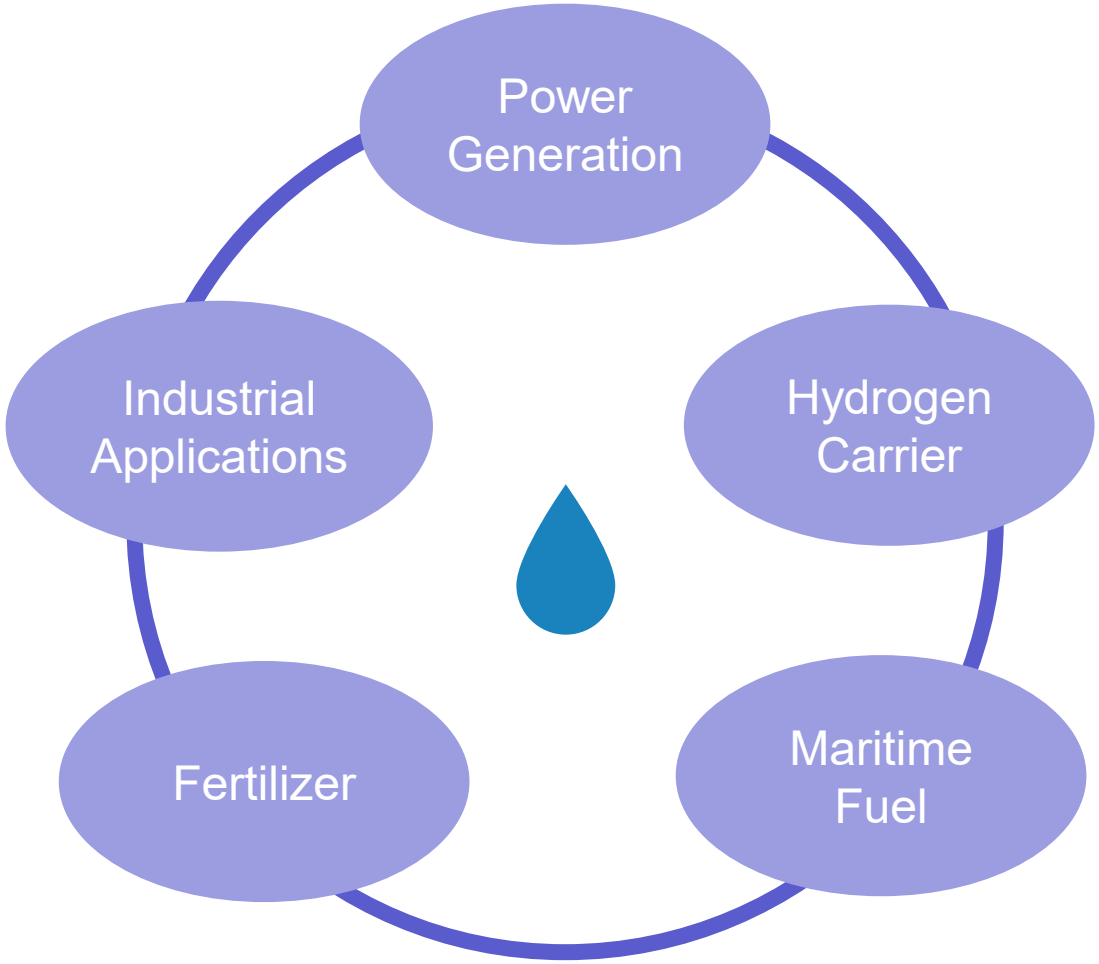

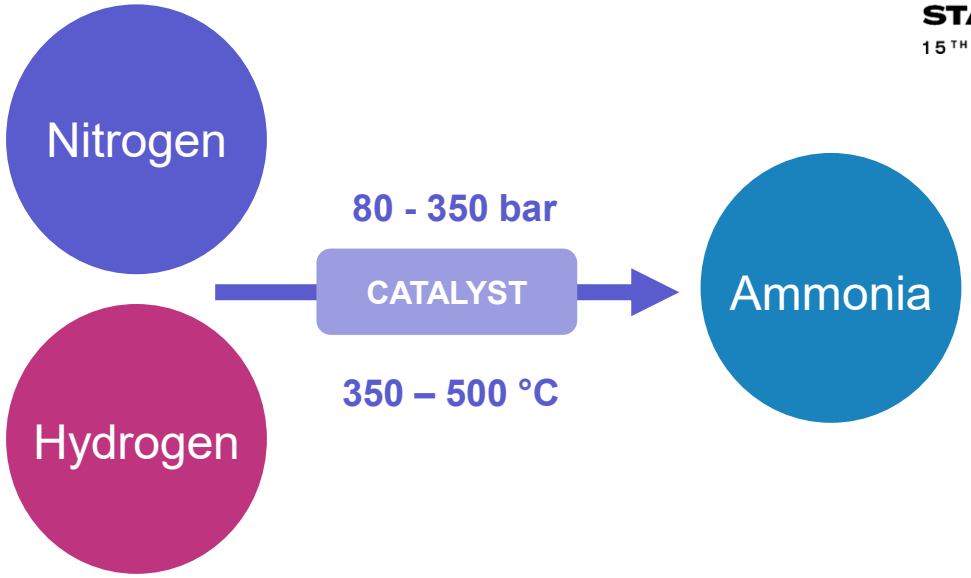

NX STAMI™ AMMONIA HP SYNLOOP

- High pressure (HP) operations > 300 bar
- Capacity: 50-500 MTPD
- Skid mount (optional)
- Decentralized production

….not just limited to Fertilizer-Industrial application

OBJECTIVE OF THE PRESENTATION

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TO PRESENT THE NX STAMI™ AMMONIA HP SYNLOOP AND PROCESS ALTERNATIVES

Base Case	Configuration routes depending on customer needs
Retaining all benefits of HP Ammonia synloop	Process alternatives for • Product flexibility • Energy integration and lower OPEX • Green hydrogen ready • Integration – upstream, downstream units • Lower CAPEX • Emissions minimization

02

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NX STAMI™ AMMONIA HP SYNLOOP- BASE CASE

WHY THE BASE CASE?

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Standalone, lean configuration

- Standalone ammonia synloop
- No steam generation
- No integration

Target application as fertilizer

- Warm ammonia → direct application, to fertilizer as urea/nitrates

Technology positioning: small-to-mid scale ammonia plants

- Lean design
- Low CAPEX
- Skid mounted, when required

NX STAMI™ AMMONIA HP SYNLOOP

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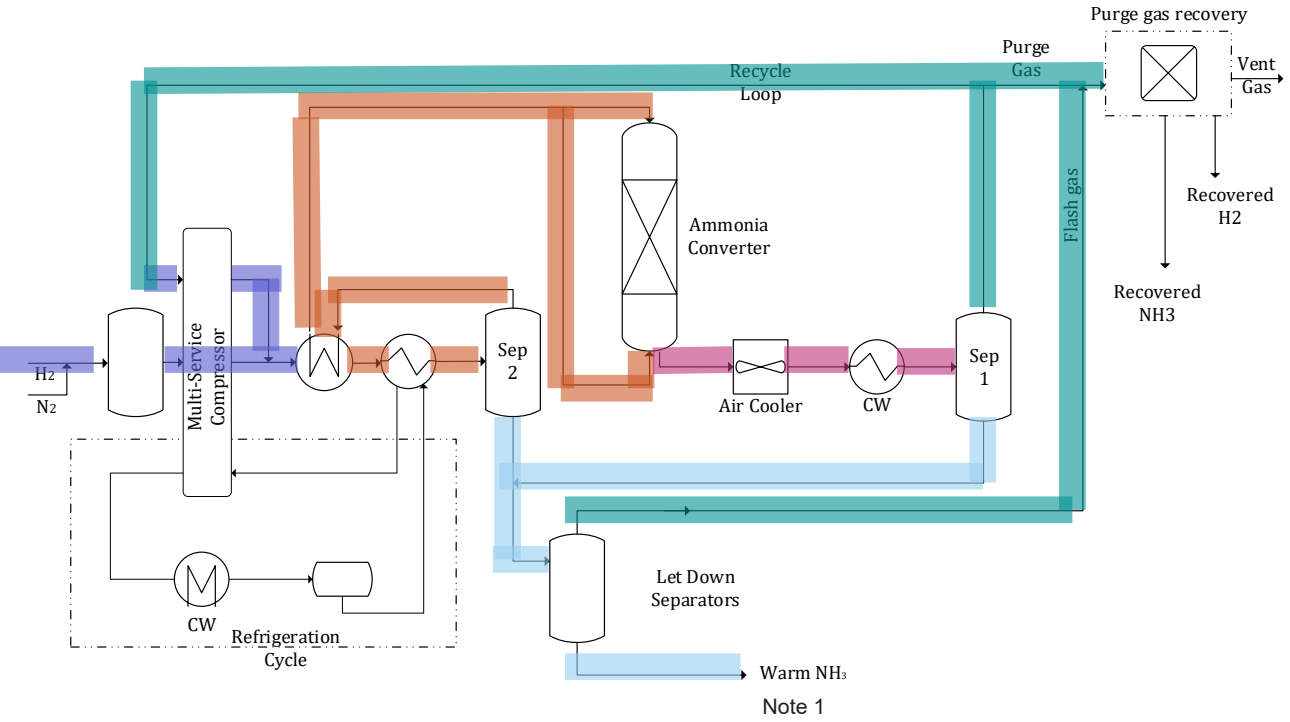
BASE CASE



Compression

Multi-service reciprocating compressor compresses above 300 bara.

Ammonia Synthesis and Conversion

Single pass H2 conversion ≥32% and NH3 ≥23.5%.

Cooling and Condensation

condensing 85% ammonia in the product separator.

Energy Efficiency and Design

hydrogen efficiency >99.5%

Minimal equipment, and closed refrigerant-based and boost.

Note 1- Warm ammonia (ambient temperature)

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EQUIPMENT

Ammonia Converter

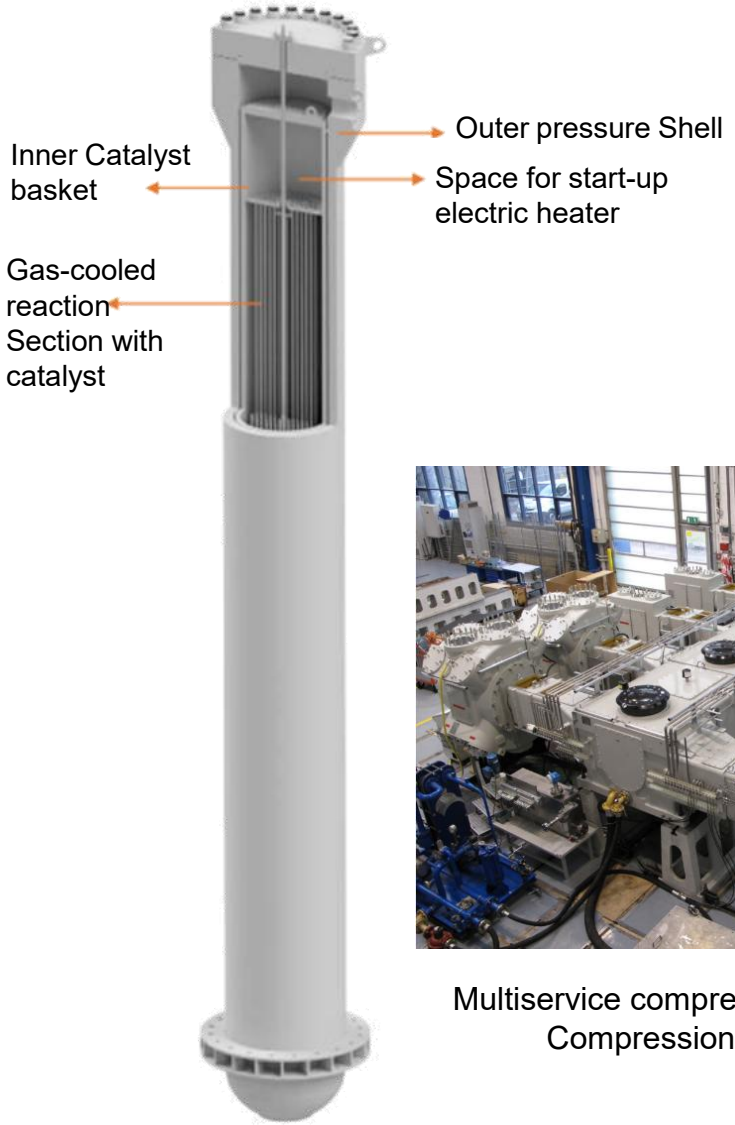
- Axial flow, cold wall reactor
- E-heater, gas-cooled tubular converter design

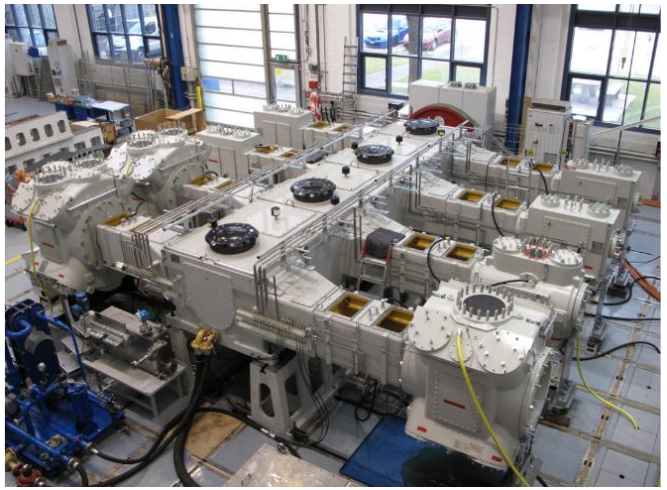
Iron-based Catalyst

- Suitable for any equivalent Fe catalyst available in the market

Multiservice reciprocating compressor

- Single reciprocating compressor – multiple services
- 3 fluids : syngas, recycle and refrigeration fluid





Multiservice compressor by Burckhardt Compression during MRT

PROCESS ALTERNATIVES AND INTEGRATION

ALTERNATIVE A

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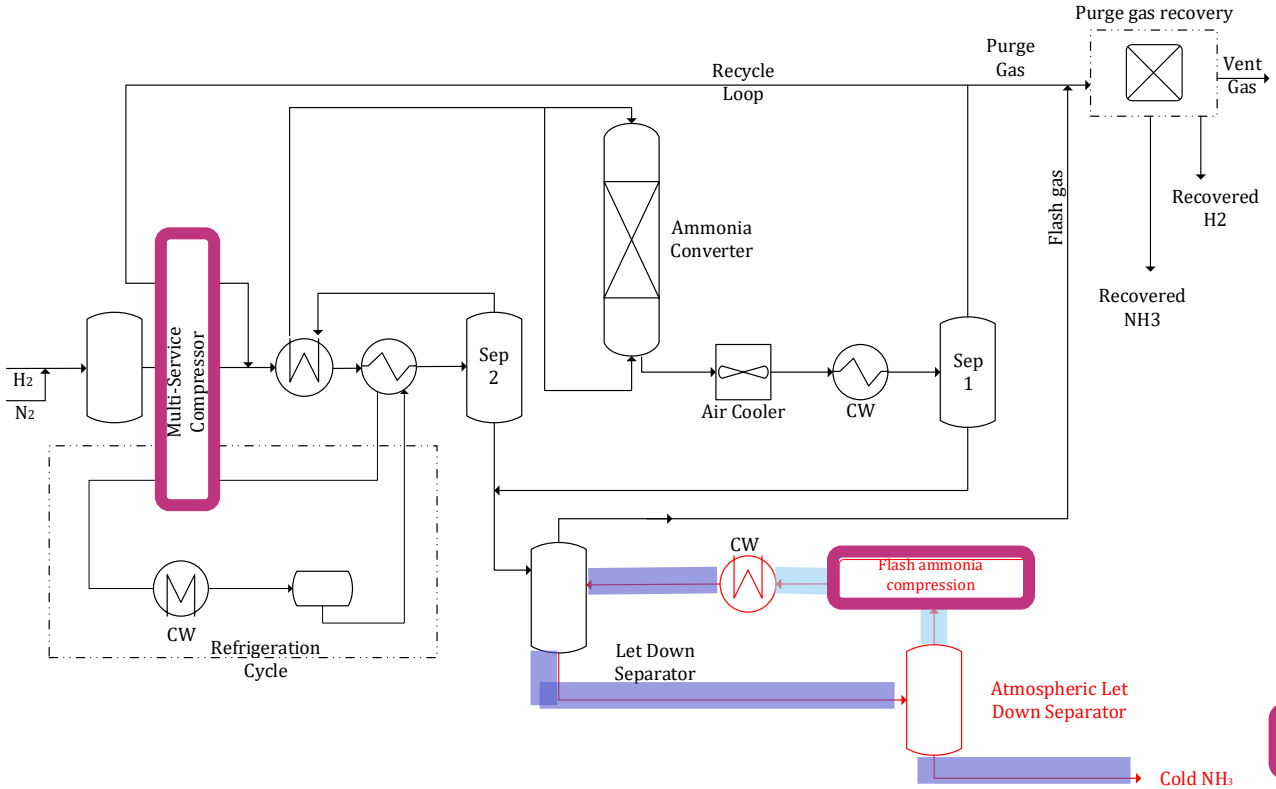
COLD VS WARM AMMONIA PRODUCT



Warm Ammonia (ambient temperature)

- Directly for urea and nitric acid plants.

Cold Ammonia (-33 °C) to storage

- Storage / export as energy vector

Flash-Ammonia Cycle

- Compresses and condenses flashed vapor, eliminating sub-zero refrigeration needs in cold ammonia production.

Single multiservice reciprocating compressor

- Single compressor handles flash-ammonia recycle

ALTERNATIVE B

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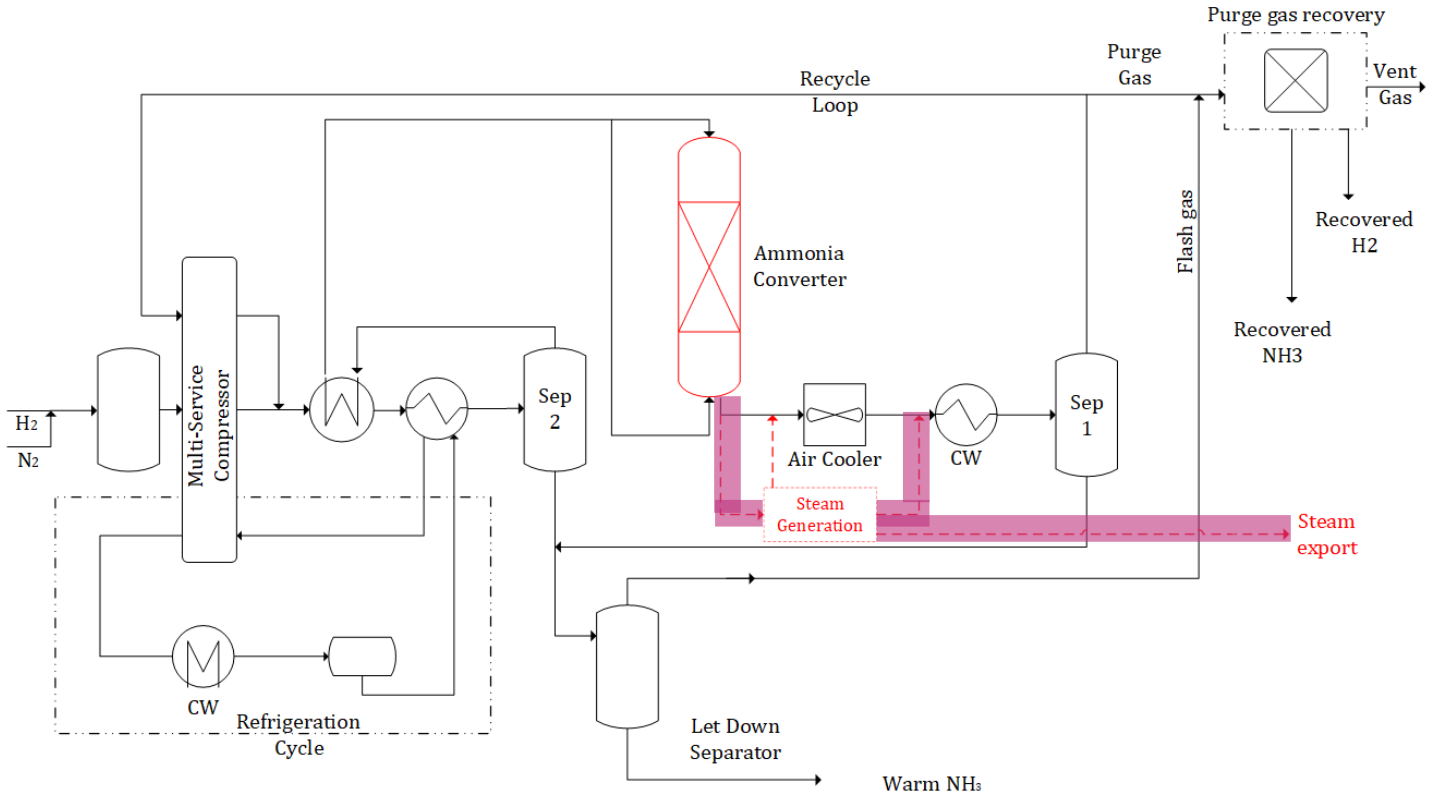
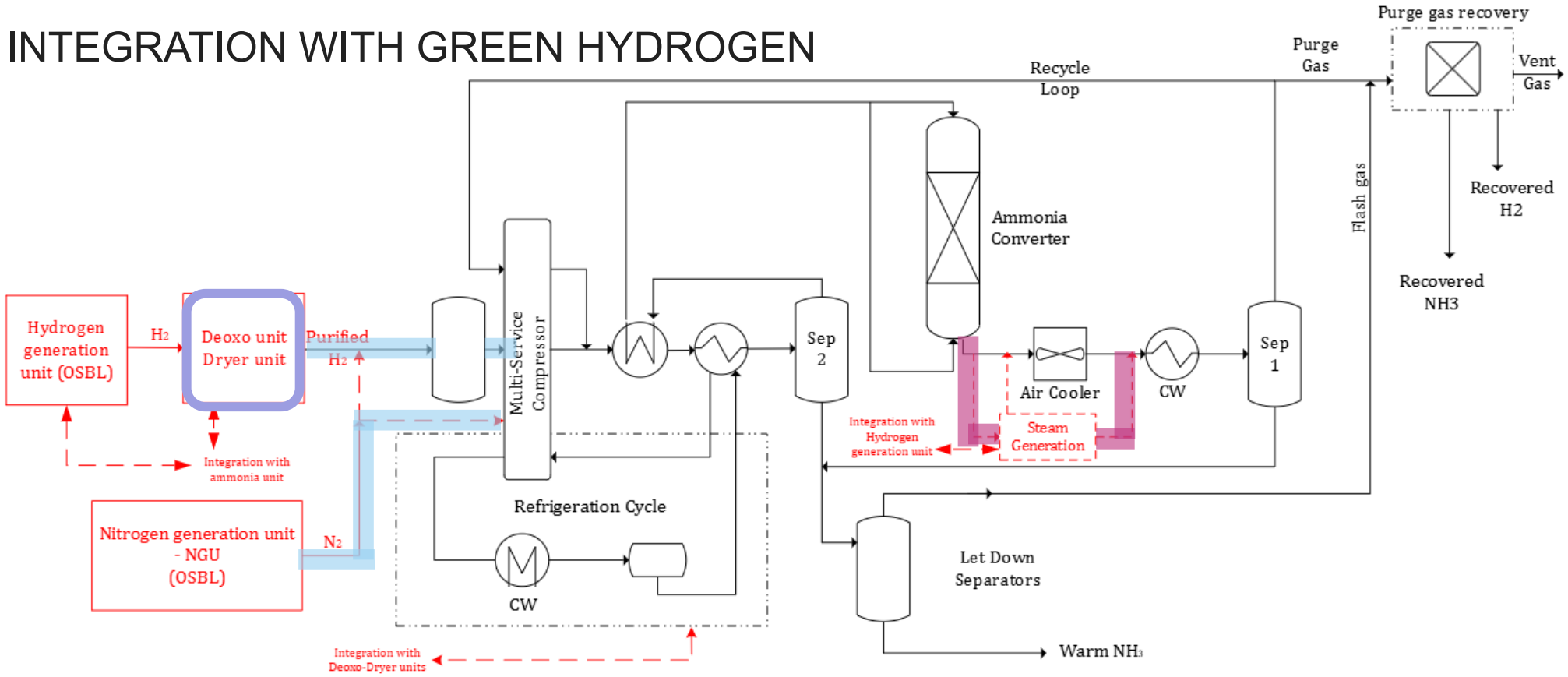
STEAM GENERATION



- Steam generation for energy-integrated plants
- 1060–1180 kg steam per ton NH_3 (18 bara saturated)
- Steam exported to electrolyzer, urea-melt or steam turbine generator (STG)
- 30–35% reduction in specific power consumption

ALTERNATIVE C

INTEGRATION WITH GREEN HYDROGEN



Stringent Purity Controls

Deoxo and drying units to protect ammonia catalysts, ensuring impurities stay below 10 ppmv.

Hydrogen and Nitrogen pressure

Effective utilization of available H_2 and N_2 pressure with compressor

Integration for Efficiency

Heat integration with front end lowers overall plant energy consumption

ALTERNATIVE D1

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EMISSION REDEUCTION - INTEGRATION WITH NITRIC ACID

Integration of Ammonia and Nitric Acid Plants

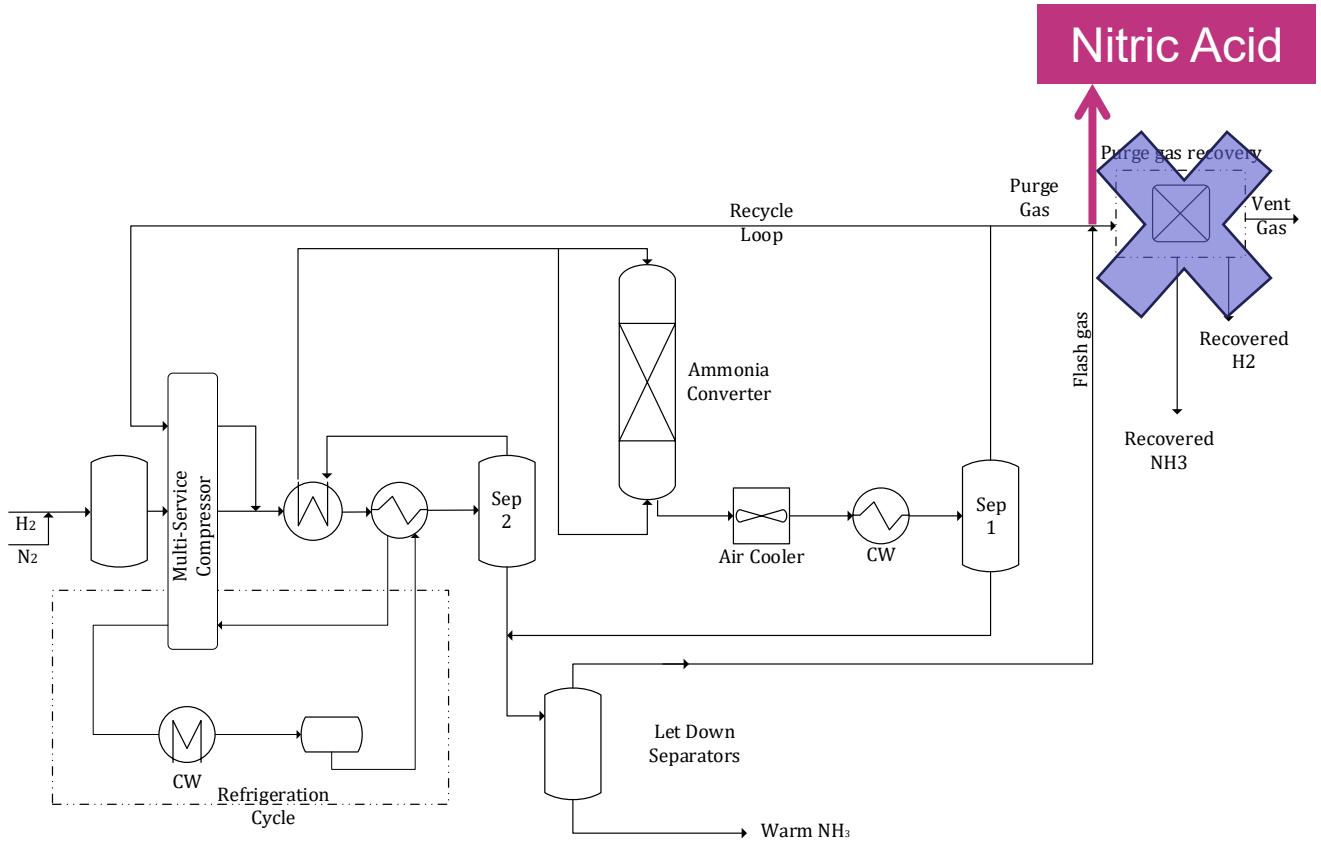
- Directly linking ammonia synthesis with nitric acid production eliminates need for separate purge gas recovery unit

Purge Gas Re-routing

- Purge gas containing ammonia is rerouted to the nitric acid plant's ammonia burner; decreases the demand for ammonia

Operational Benefits

- Simplifies operations
- No continuous emissions
- Lower CAPEX



Presentation "Integration of ammonia, urea and nitrates for sustainable fertilizer production " (Luca Amicucci)

ALTERNATIVE D2

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EMISSION REDUCTION FOR STANDALONE AMMONIA UNIT

Nitrogen Generation Unit (NGU)

- Cryogenic separation for nitrogen: 50-500 MTPD with N_2 purity ≥ 99.99 ppmv

Argon (Ar) Level Impact in nitrogen

(a) Low argon ≤10 ppmv allow elimination of continuous purge completely

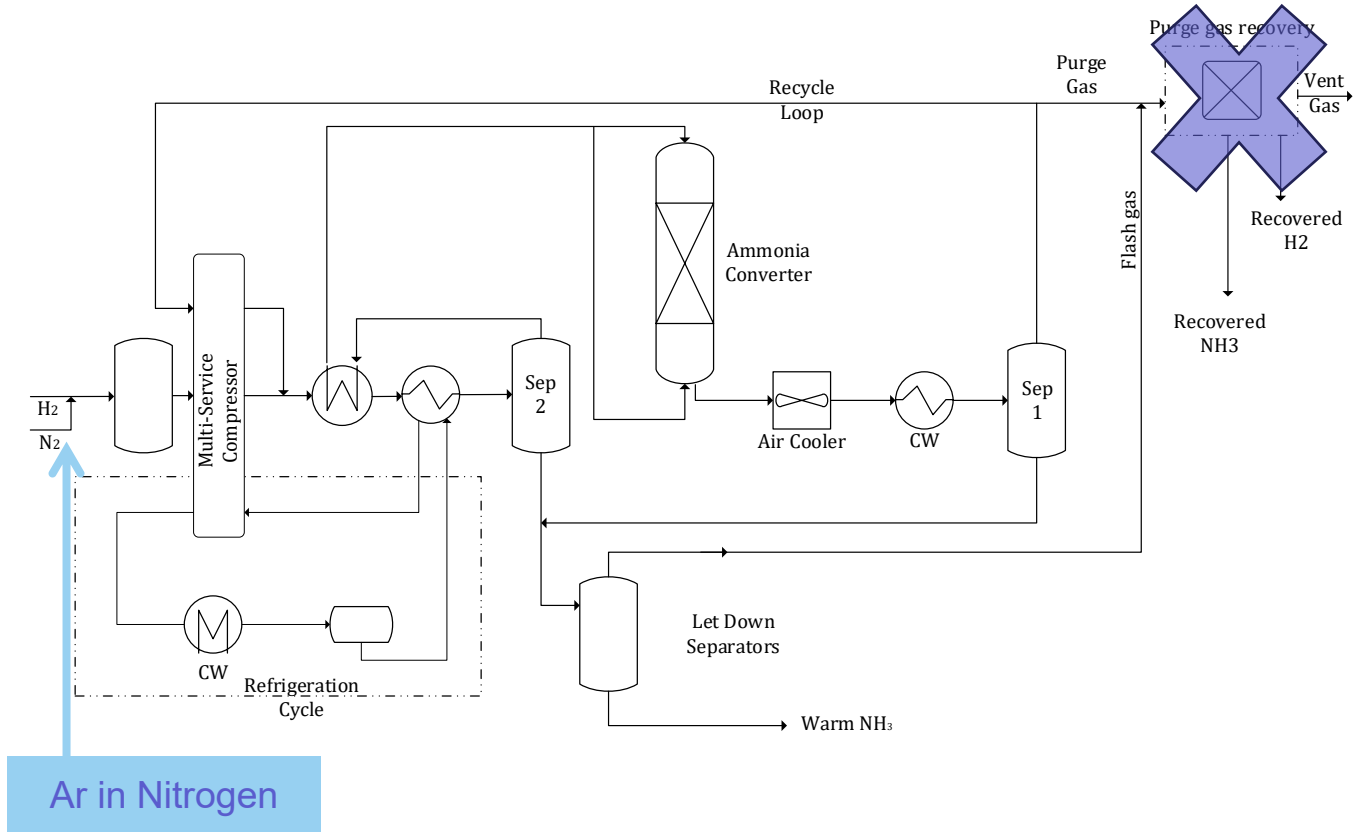
(b) Argon ≤100 ppmv allows discontinuous purge

Purge Minimization Strategy

- Minimizing purge helps reduce emissions and improve hydrogen efficiency

Dynamic Simulation Use

- Dynamic simulation using Technology Training Simulator (TTS) determines optimal purge intervals for intermittent purging systems.



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KEY TAKEAWAYS

KEY TAKEAWAYS

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	CHECK BOX	BENEFITS
Alternative A **Warm/Cold Ammonia**	☑	• Product flexibility
Alternative B **Steam generation**	☑	• Steam generation and integration • Lower OPEX
Alternative C **Integration with green hydrogen**	☑	• Deoxo-dryer; energy integration • Feed pressure flexibility of H_2, N_2
Alternative D1 **Integration with Nitric acid**	☑	• Emission reduction • Lower CAPEX
Alternative D2 **NGU-Standalone ammonia unit**	☑	• Emission reduction • Lower CAPEX • Higher H_2 efficiency

STAMICARBON'S COMMITMENT

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WE LISTEN

WE ADAPT

WE DELIVER

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THANK YOU

QUESTIONS?

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