NEXTCHEM

UNFOLD
STAMICARBON
15TH SYMPOSIUM 2026

SYNGAS PRODUCTION & CARBON CAPTURE (FRONT-END AMMONIA)

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AGENDA

01 MAIRE INTEGRATED ORGANIZATION

02 HYDROGEN/SYNGAS PRODUCTION

03 CO_2 CAPTURE

04 CONCLUSIONS

1. MAIRE INTEGRATED ORGANIZATION

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MAIRE

Sustainable Technology Solutions

NEXTCHEM
MAIRE Sustainable Technology Solutions

- Stamicarbon
- KT Tech
- GasConTech

Project Development

MET DEVELOPMENT
MAIRE Project Development

Integrated E&C Solutions

TECNIMONT
MAIRE Integrated E&C Solutions

KT
MAIRE Integrated E&C Solutions

TECNIMONT SERVICES
MAIRE Integrated E&C Solutions

2. HYDROGEN PRODUCTION

VARIOUS TECHNOLOGIES

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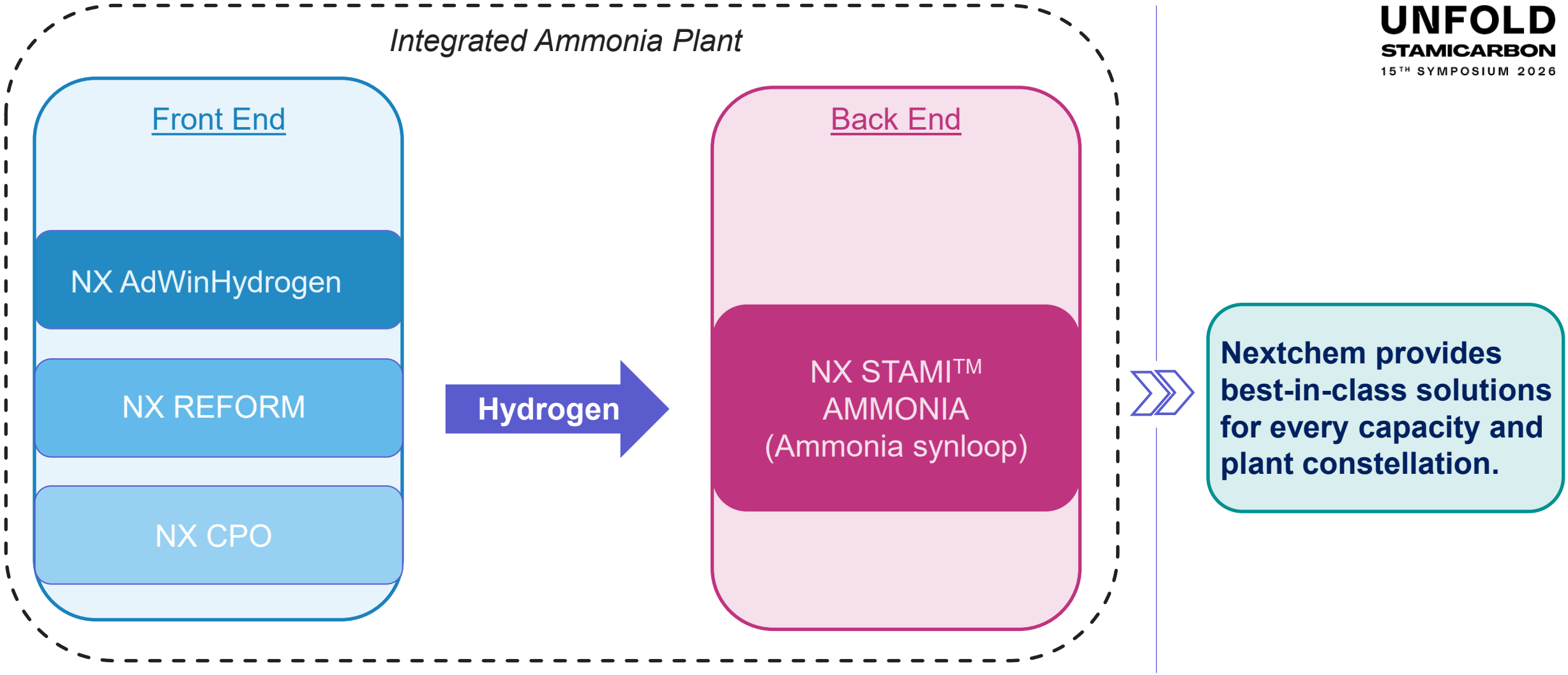

2.1 ADWINHYDROGEN®

MAIN PROCESS STEPS

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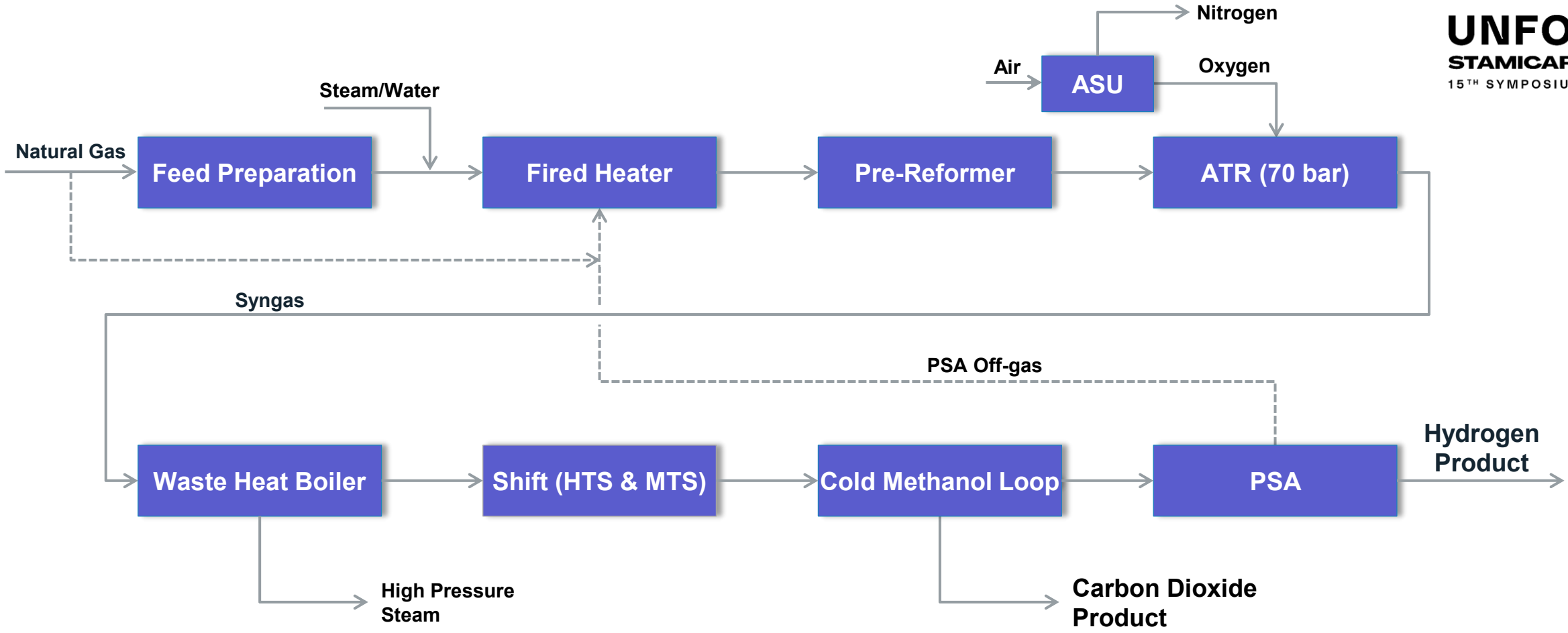
- AdWinHydrogen® technology enables hydrogen and carbon dioxide production with considerable economic advantages, particularly at large capacities equivalent to 2,000 mtpd to 7,000 mtpd of ammonia, which can be achieved in a single train front-end.
- Natural gas and/or other short-chain hydrocarbons are converted to syngas in a Catalytic Partial Oxidation (ATR) process; at a high feed stock flexibility.
- Carbon dioxide is removed via a physical-wash process that employs the proprietary Cold Methanol Loop (CML) technology.
- Hydrogen and carbon dioxide are produced with highest purity.

2.1 ADWINHYDROGEN®

GENERAL ARRANGEMENT



Robust and proven equipment integrated within a high-pressure hydrogen production arrangement.

2.1 ADWINHYDROGEN®

REDUCED CO_2 EMISSIONS

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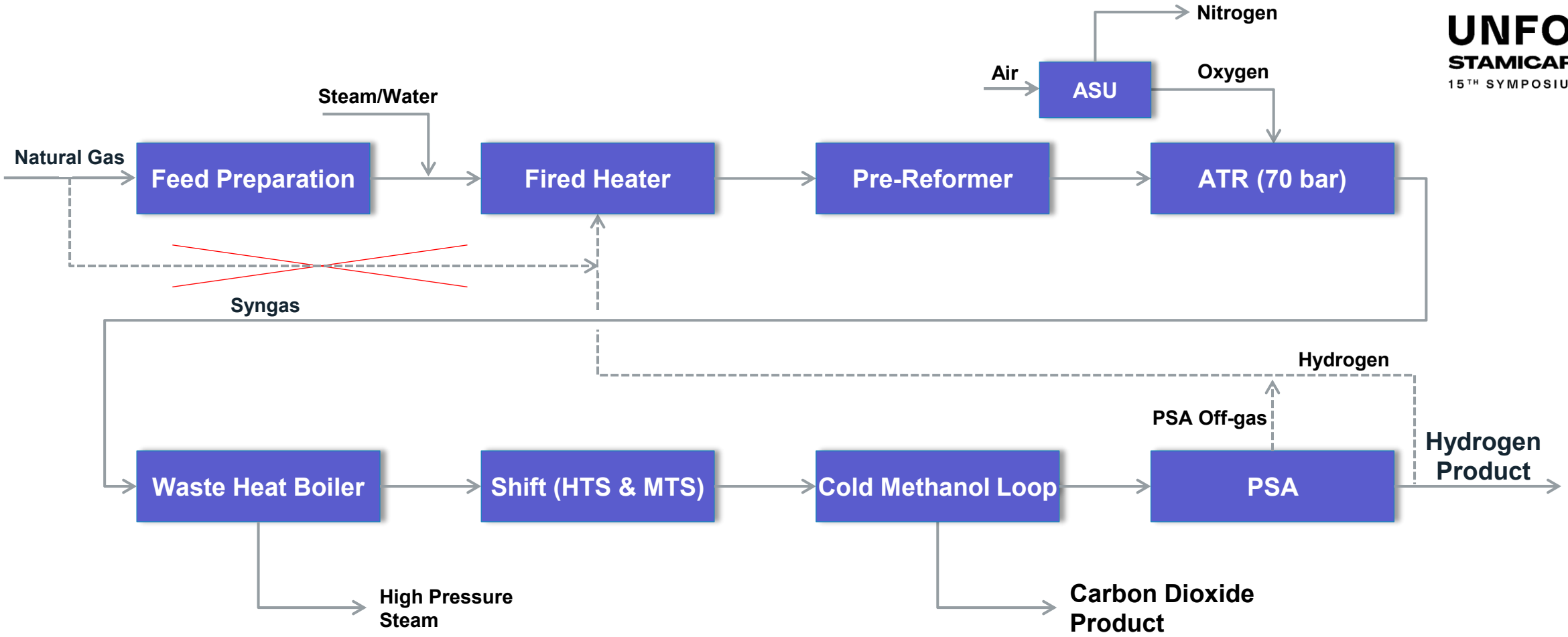

This process configuration enables CO_2 capture rates exceeding 90%.

2.1 ADWINHYDROGEN®

MINIMIZED CO_2 EMISSIONS

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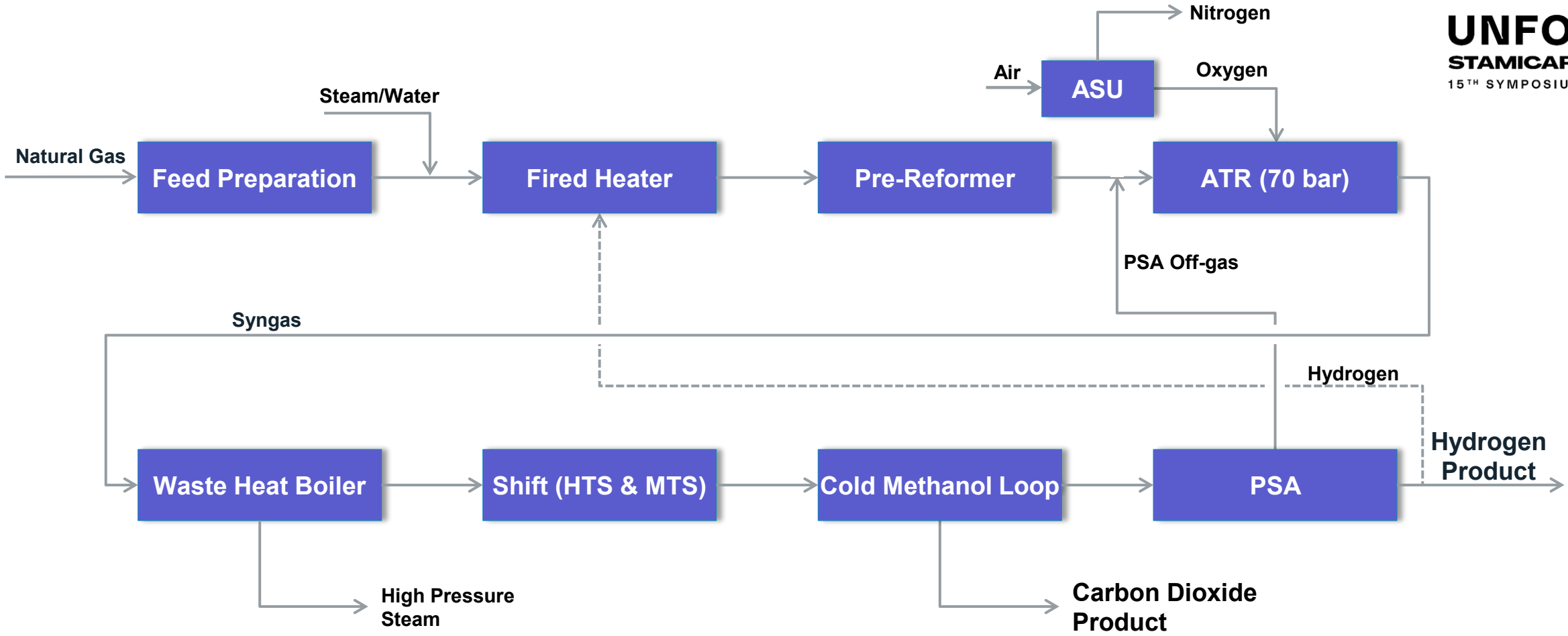

With this advanced process configuration, the CO_2 recovery rate can be increased by a further 80%, enabling overall recovery rates exceeding 98%.

2.1 ADWINHYDROGEN®

COMPARISON OF DIFFERENT TECHNOLOGIES

	Conventional Processes	AdWinHydrogen®	Improvements
Reforming	Combined Reforming (primary Reformer (SMR) & secondary Reformer) or low-pressure ATR	Catalytic Partial Oxidation (ATR)	⇒ No Steam Reformer ⇒ Lower energy consumption ⇒ Small ATR reactor due to high pressure
Syngas Compressor	high Δp	lower Δp	⇒ Smaller and simpler compressor ⇒ Improved reliability
Carbon Capture	Amine based system	Cold methanol loop – physical wash system using methanol as absorbent solution	⇒ Physical wash system is used which leads to lower energy consumptions ⇒ Gas drying is not required ⇒ No need for further CO_2 treatment
Hydrogen Fine Treatment	Methanation	Hydrogen PSA/Membrane	⇒ Minimum purge stream in the ammonia synloop due to pure hydrogen ⇒ Significantly reduced recycle flow rate in the ammonia synloop due to pure hydrogen
GHG emissions	Standard arrangement with high emissions	Advanced arrangement with hydrogen as fuel gas	⇒ virtually no CO_2 emissions ⇒ CO_2 as by-product

2.1 ADWIN® SUITE

CURRENT PROJECT

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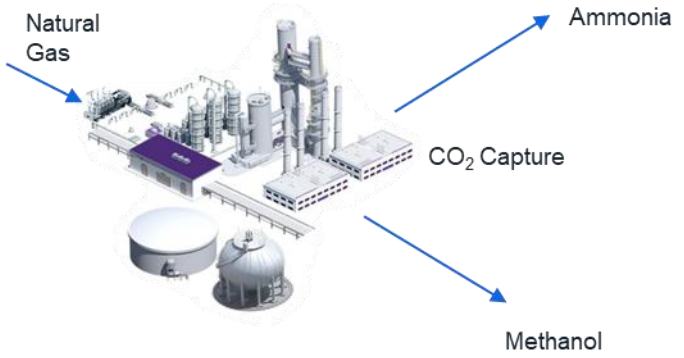
Project Location	West Africa
Project	Three world-scale complexes
Scope of Work	PDP & License & Prop. Equipment
PDP	KOM April 2026 / FEED execution in parallel



2 Ammonia & Urea Complexes

Technology	NX AdWinHydrogen® & NX Stami Ammonia & NX Stami Urea
Production Capacity	6,000 MTPD NH_3 10,500 MTPD Urea

Co-production Methanol & Ammonia

Technology	NX AdWinCombined® & NX Stami Ammonia
Production Capacity	2,000 MTPD MeOH 3,000 MTPD NH_3

2.2 NX REFORM™

MAIN FEATURES

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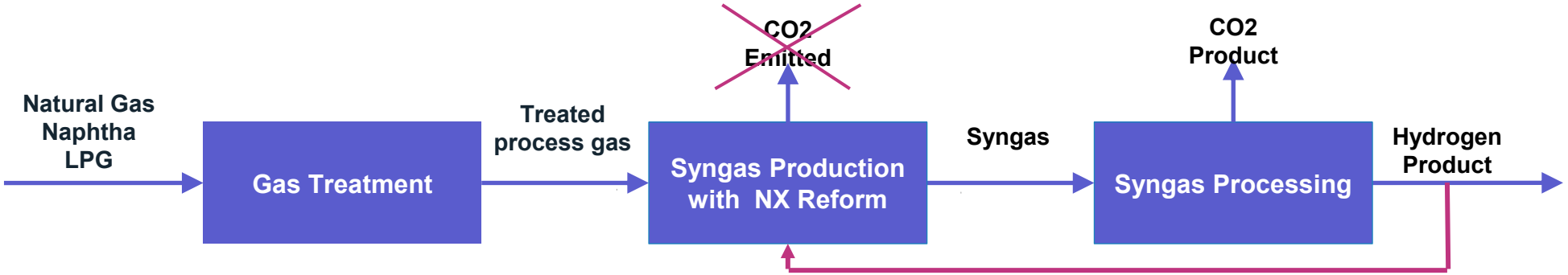
- NX Reform™ is the most applied technology for H2 and syngas production.
- NEXTCHEM can rely on more than **60 Hydrogen Production Units** based on NX Reform™ technology, executed and currently in operation.
- Plants are tailored on Customer needs with the highest efficiency and designed for very high **reliability (>99%)** and turnaround up to 6 years.
- Pre-combustion and/or post combustion **carbon capture integrated solutions** applicable up to 95%.
- Advanced arrangement with hydrogen as fuel gas: Potential no CO2 emission in flue gas



2.2 NX REFORM

BOX TYPE TOP FIRED REFORMER

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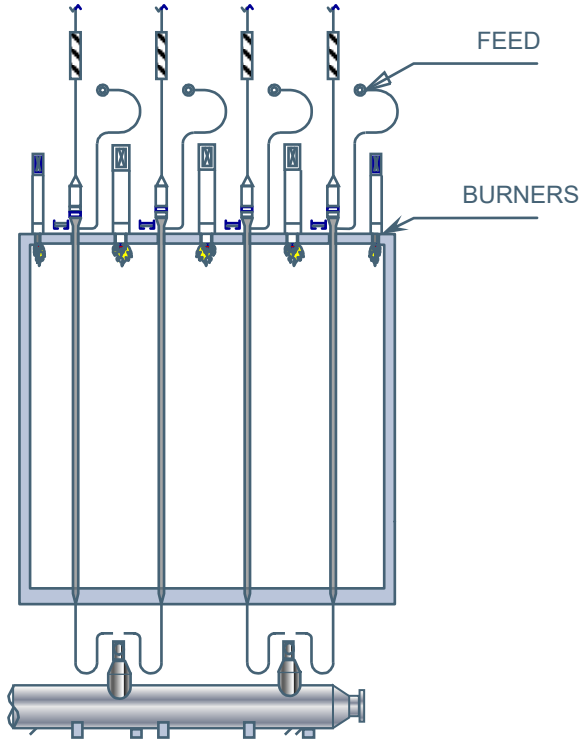
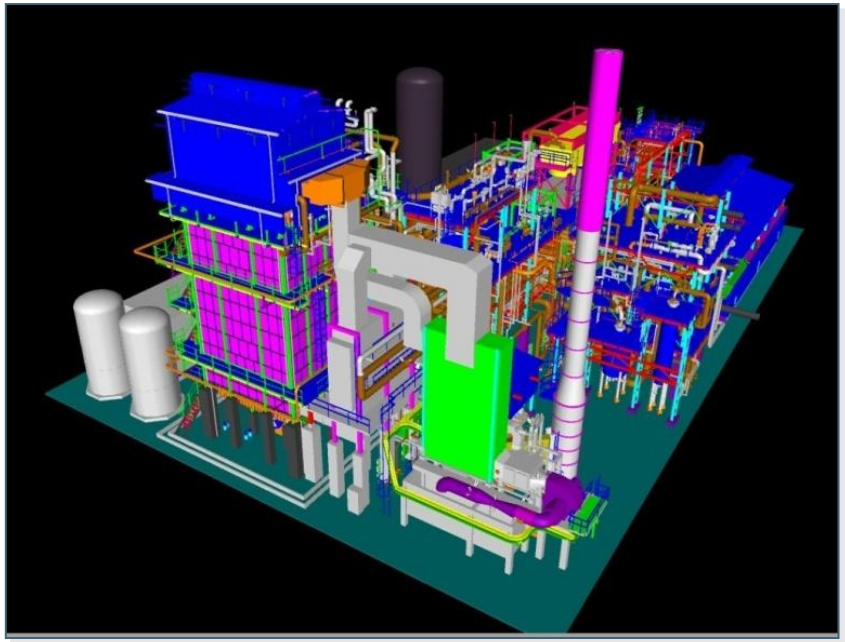
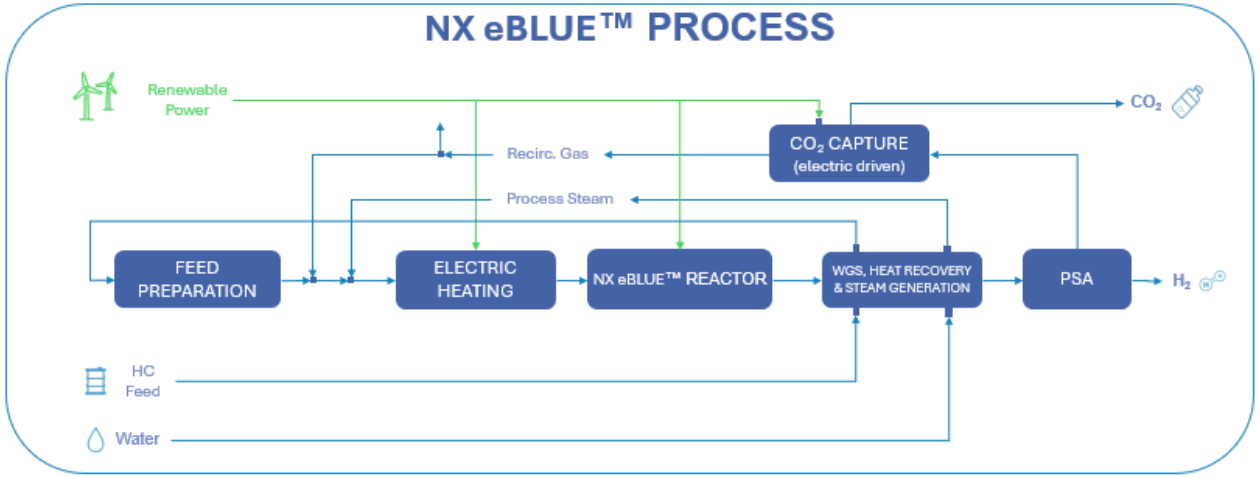


- Compact solution
- Reduced heat losses
- Optimized heat flux profile that suits the reaction
- Convection heat optimization:
- Export steam as required
- Self-sufficiency in steam for smooth start-up and safe (emergency shut-down
- Higher reliability due to natural circulation steam generation
- Shock tube boiler
  - Low tube metal temperature despite of shock radiation
  - Protection of subsequent process coil against overheating



2.2 NX REFORM

NX eBlue™: electrified SMR

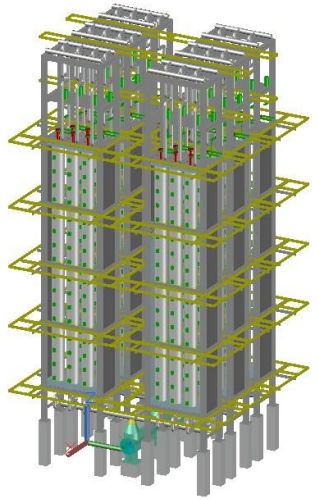


NX eBlue™ has the potential to act as a CO_2 negative technology when utilizing biogenic feedstocks such as biogas, and its process can be adapted to serve as a front-end for methanol synthesis and various other syngas-derived chemicals.

2 CH_4 kg / H_2 kg

17 ekWh / H_2 kg

5.5 CO_2 kg / H_2 kg



Rendering of NX eBlue™ Reactor

NX eBlue™ Test Pilot

2.3 NX CPO

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- NX CPO™ (Catalytic Partial Oxidation) is the best solution for Hydrogen and Syngas production at small/medium capacities (e.g. up to 50’000 Nm3/h H2).
- Compact design allows low capital cost and high flexibility, with low CO2 emissions.
- Catalytic Partial Oxidation Energy-efficient Reforming Technology with low CO2 emissions captured on process side (> 99%).
- Feedstock flexibility as per standard SMR.
- Hydrogen and carbon dioxide are produced with highest purity.

2.3 NX CPO

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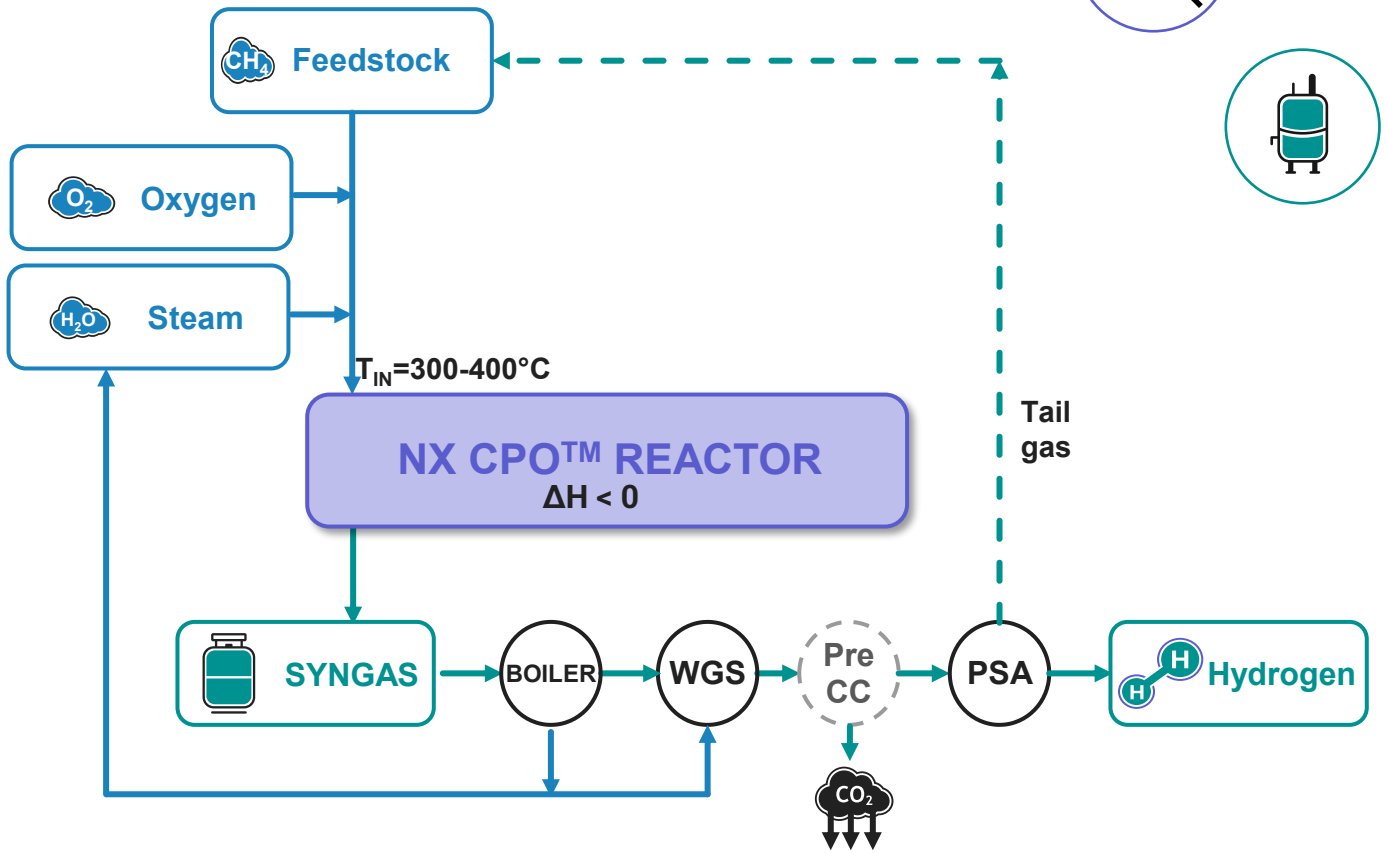
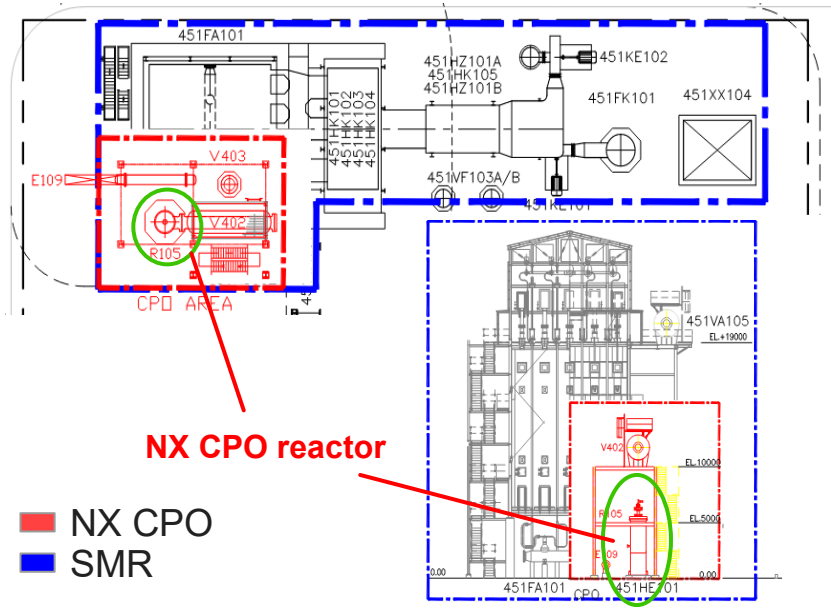


Reaction heat recovery for reactants preheating.
No need of external heat

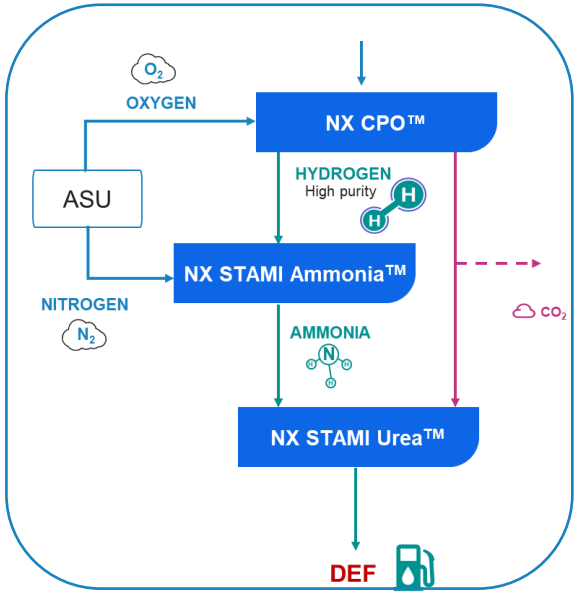
Possibility **to reuse Tail Gas** as a process gas **reducing the methane consumption**

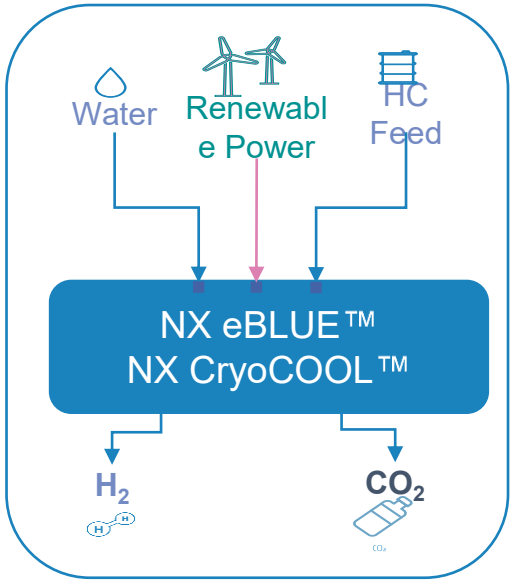
Compact design allows high flexibility both in new plant design and old plant revamping



2.3 SELECTED PROJECTS

Client	R2 Energies
Site	Canada
Production Capacity	615 MPTD of Diesel Exhaust Fluid (DEF)
Hydrogen Technology	NX CPO™
Scope	Licensing and process design package





Client	HANWHA
Site	USA
Production Capacity	15 kNm^3/hr of H_2
CO_2 Capture Capacity	7.5 tons/hr of CO_2
Technology	NX eBLUE™ & NX CryoCOOL™
Scope	Licensing, PDP, FEED

3. CO_2 CAPTURE

VARIOUS TECHNOLOGIES

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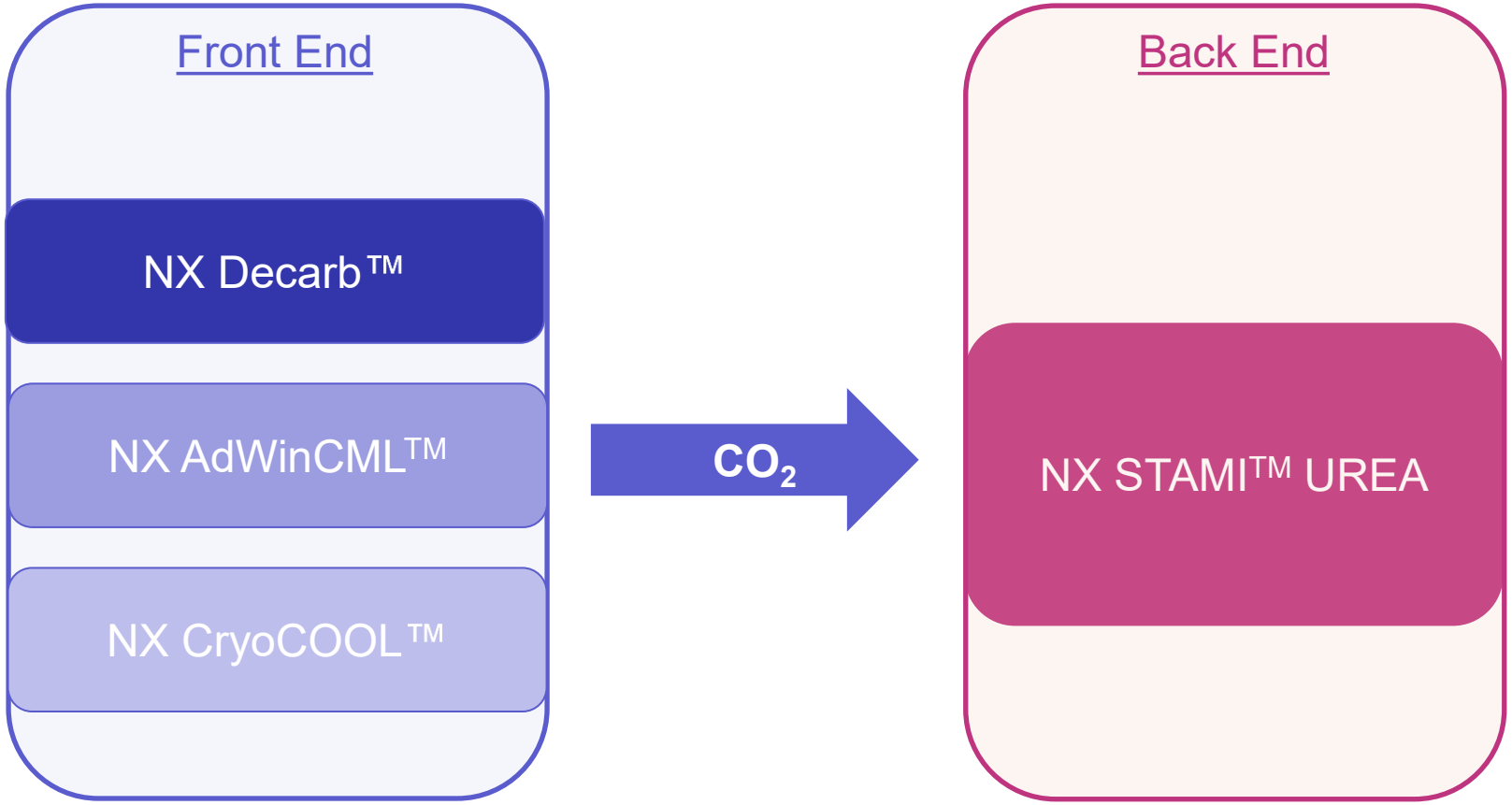

Nextchem provides a huge portfolio of technologies for CO2 capture and supply to Urea plant .

3.1 CO2 CAPTURE

NEXTCHEM PORTFOLIO

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Technology solutions

NX Decarb™
Amine Absorption solution

Post-combustion solutions integrating amine-based absorption CO_2 capture technologies empowered by our proprietary configurations and proprietary equipment to maximize process efficiency and minimize energy consumption.

NX AdWinCML™
Cold Methanol loop CC

Pre-combustion Cold Methanol Loop physical CO_2 capture.

NX CryoCOOL™

- **Flue Gas**
- **Syngas**
- **Tail Gas**

CO_2 Cryogenic Adsorption

– **Flue Gas**: innovative cryogenic Carbon capture solution tailored for high CO_2 concentration flue gas streams, such as in industries with limited steam availability.

– **Syngas**: pre-combustion Carbon capture solution specifically designed to be integrated downstream H_2 Pressure Swing Adsorption (PSA) to liquefy the CO_2 in the Syngas stream.

– **Tail Gas**: highly efficient H_2/CO_2 Recovery Unit based on the cryogenic separation of hydrogen and Carbon dioxide particularly when concentration of CO_2 is above 50% and of hydrogen is below 20% as in Sulfur Recovery Units.

NX CLIQ™
CO_2 liquefaction

Innovative **CO_2 liquefaction** process optimized for large scale applications exploiting CO_2 as refrigerant fluid: Capex optimized while ensuring operational flexibility.

4. CONCLUSIONS

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- Nextchem brings over 50 years experience of hydrogen & syngas expertise, covering the entire value chain from technology development to project execution.
- With its wide portfolio of technical solutions, Nextchem can meet industrial requirements across all contexts.
- Thanks to strong synergies among its sister companies, Nextchem benefits from shared capabilities and competencies that support both project execution and innovation.
- Nextchem provides best-in-class solutions for hydrogen production and CO_2 capture across all capacities and plant configurations.
- Through its cutting-edge technologies, Nextchem offers solutions and plant configurations that enable the virtually complete avoidance of CO_2 emissions.

NEXTCHEM
MAIRE Sustainable Technology Solutions

STAMICARBON

THANK YOU

QUESTIONS?