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H2ACT[®]

Empowering Energy Mobility through Large
Scale Ammonia Cracking

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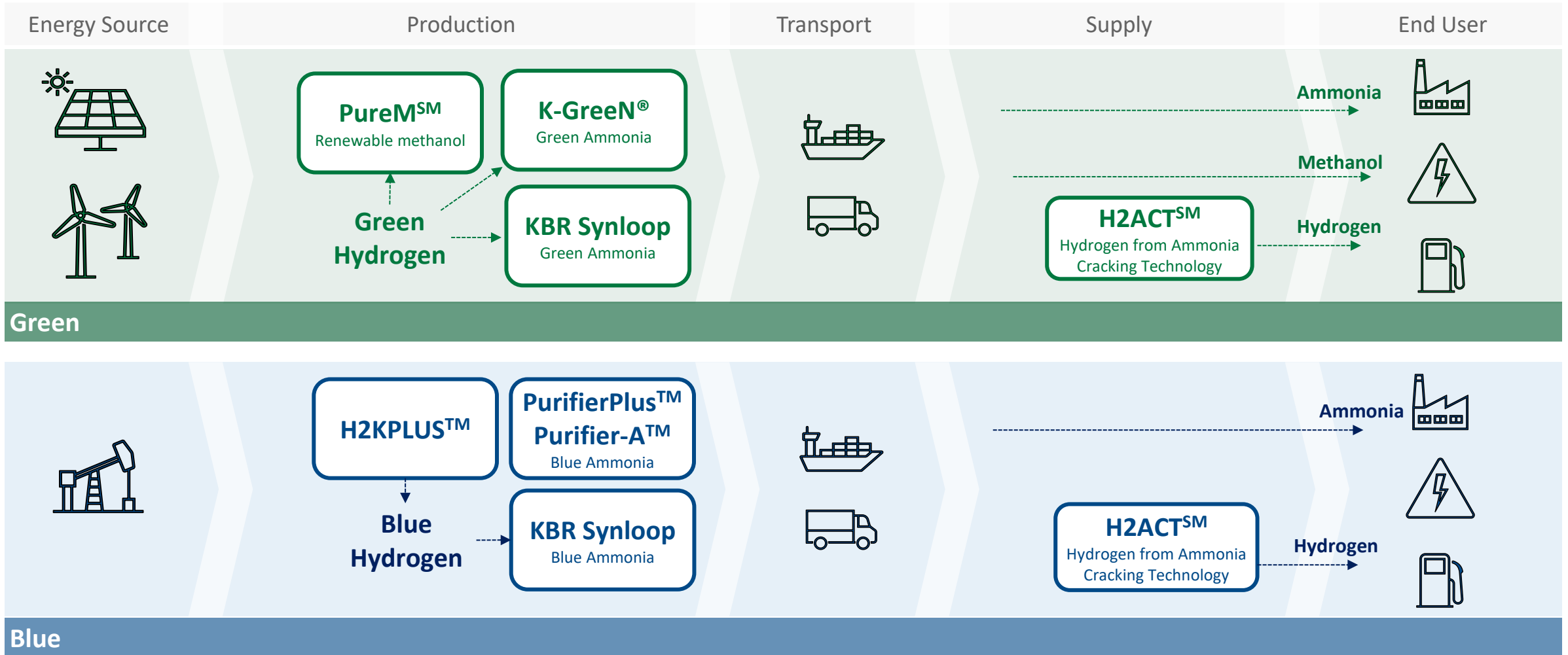


Delivering Solutions, Changing the World.SM

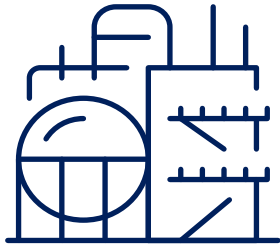


- **H2ACTSM New Market, Reliable Technology**
 - Process Overview
- Minimum Risk, Maximum Opportunity
 - Risk Mitigation by Design
- Delivering Efficiency at Scale
 - Zero Scale Up Risk

Technologies across Full Sustainable Hydrogen Value Chain



SCALE



World's **largest** ammonia plant with single converter
+3,000 TPD

EFFICIENCY



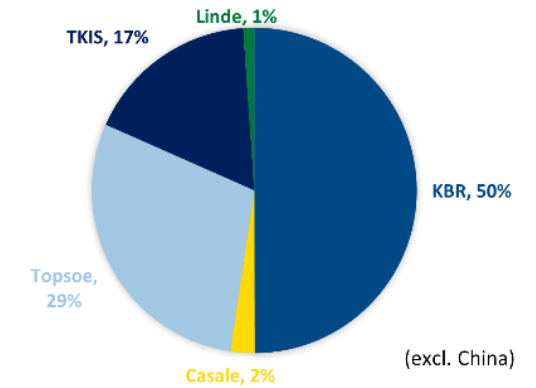
World's most **energy-efficient** ammonia plant
6.27 Gcal/MT

RELIABILITY



World's most **reliable** ammonia plant 2,162 consecutive days in operation

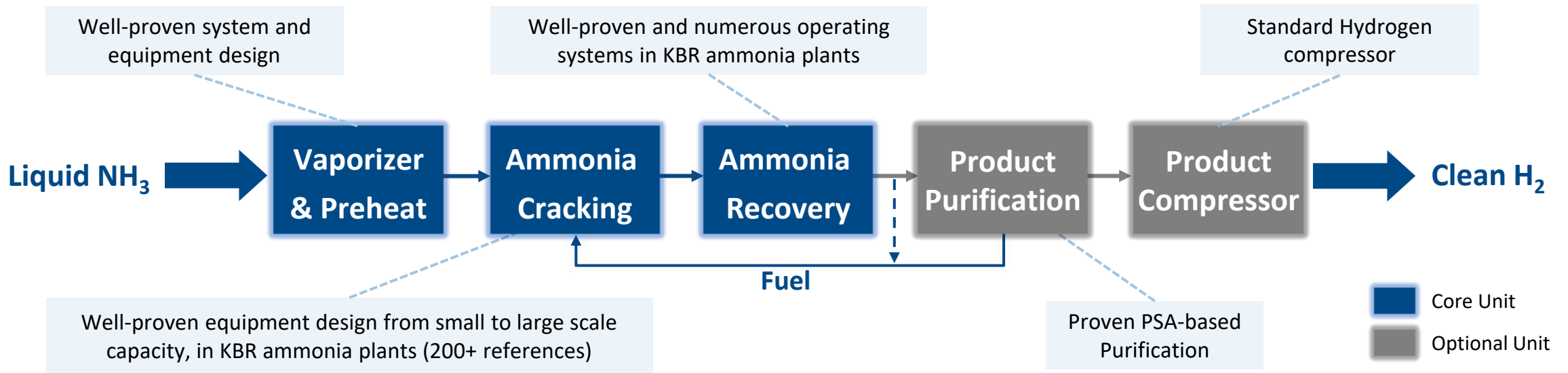
AMMONIA CAPACITY MARKET SHARE (SINCE 2010)



+50% market share all based on combined reforming

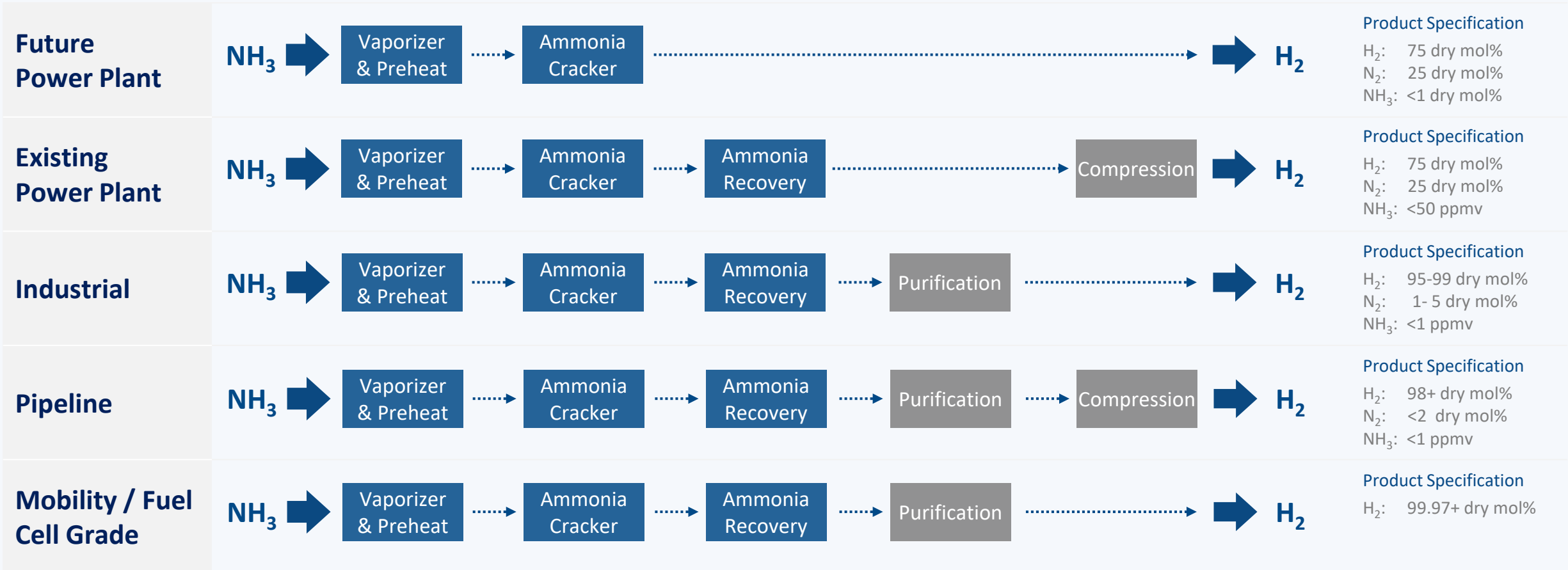
KBR can deliver **1,200 TPD H₂ (8,640 MTPD NH₃ cracked)** in one train

H2ACTSM Technology Overview



	Product Specification		Clean Fuel Mode	NG Fuel Mode
Hydrogen Purity	From 75% to 99.97%+	Capacity	10-1,200 TPD H ₂	10-1,200 TPD H ₂
Ammonia Content	As low as < 0.1 ppmv		72-8,640 TPD NH ₃	59-7,040 TPD NH ₃
Water Content	As low as < 1 ppmv	Direct Carbon Intensity [kg CO ₂ / kg H ₂]	0	1.2
Delivery Temperature	As per Client requirement	Typical Yield [H ₂ in Product / H ₂ in Feed]	78-80 wt%	96 wt%
Delivery Pressure	30-35 barg (without compression)	Typical Efficiency [Q _{H₂ out} / (Q _{NH₃ in} + Q _{NG} + Power)]	85-90 %	83-88 %

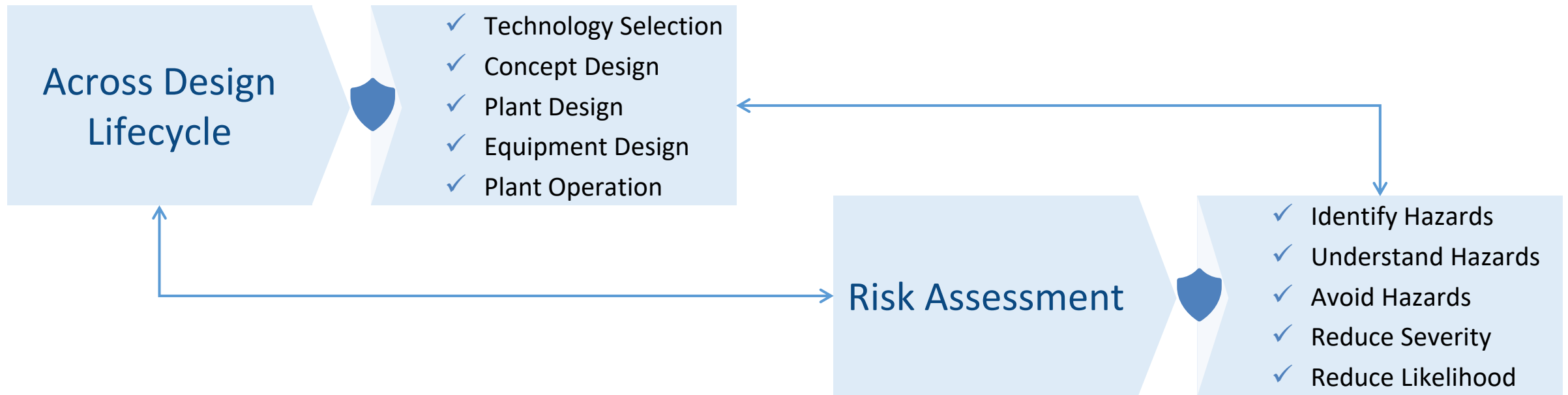
Process Flowsheet by Industry



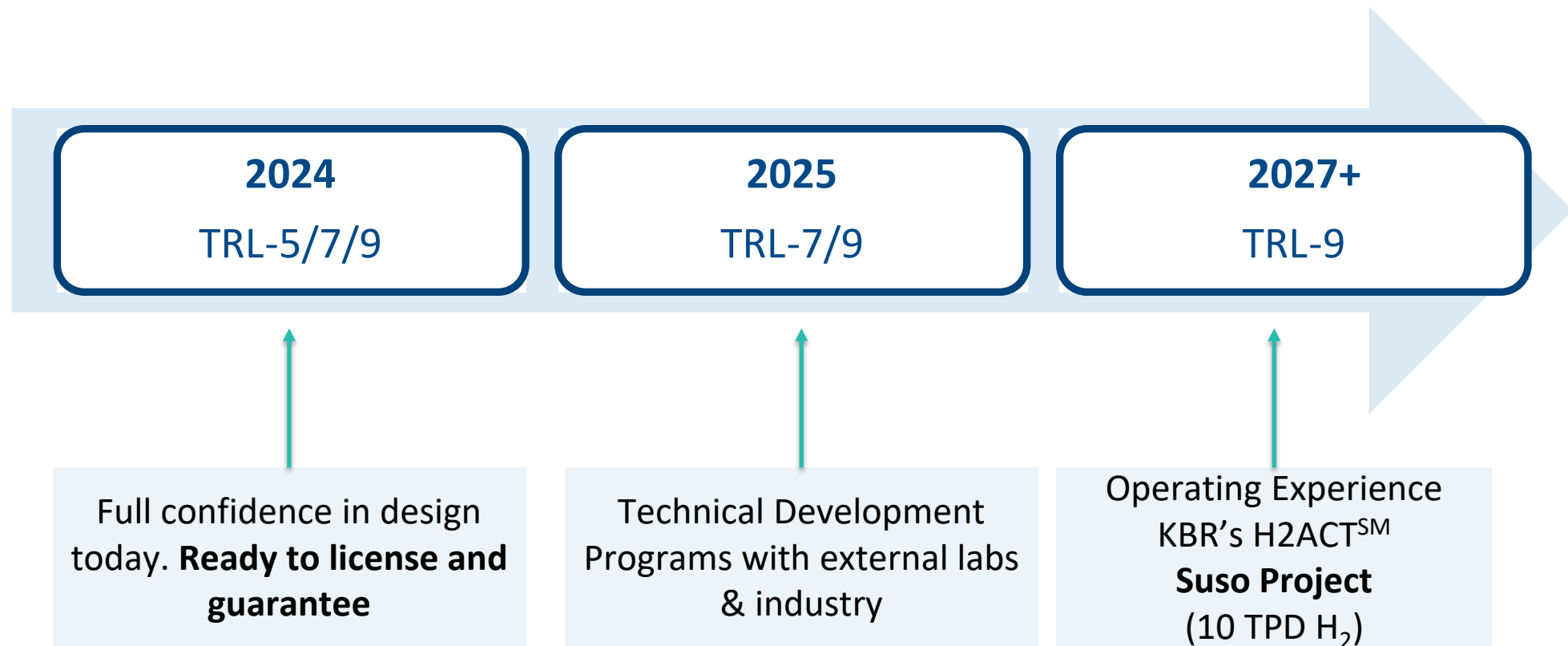


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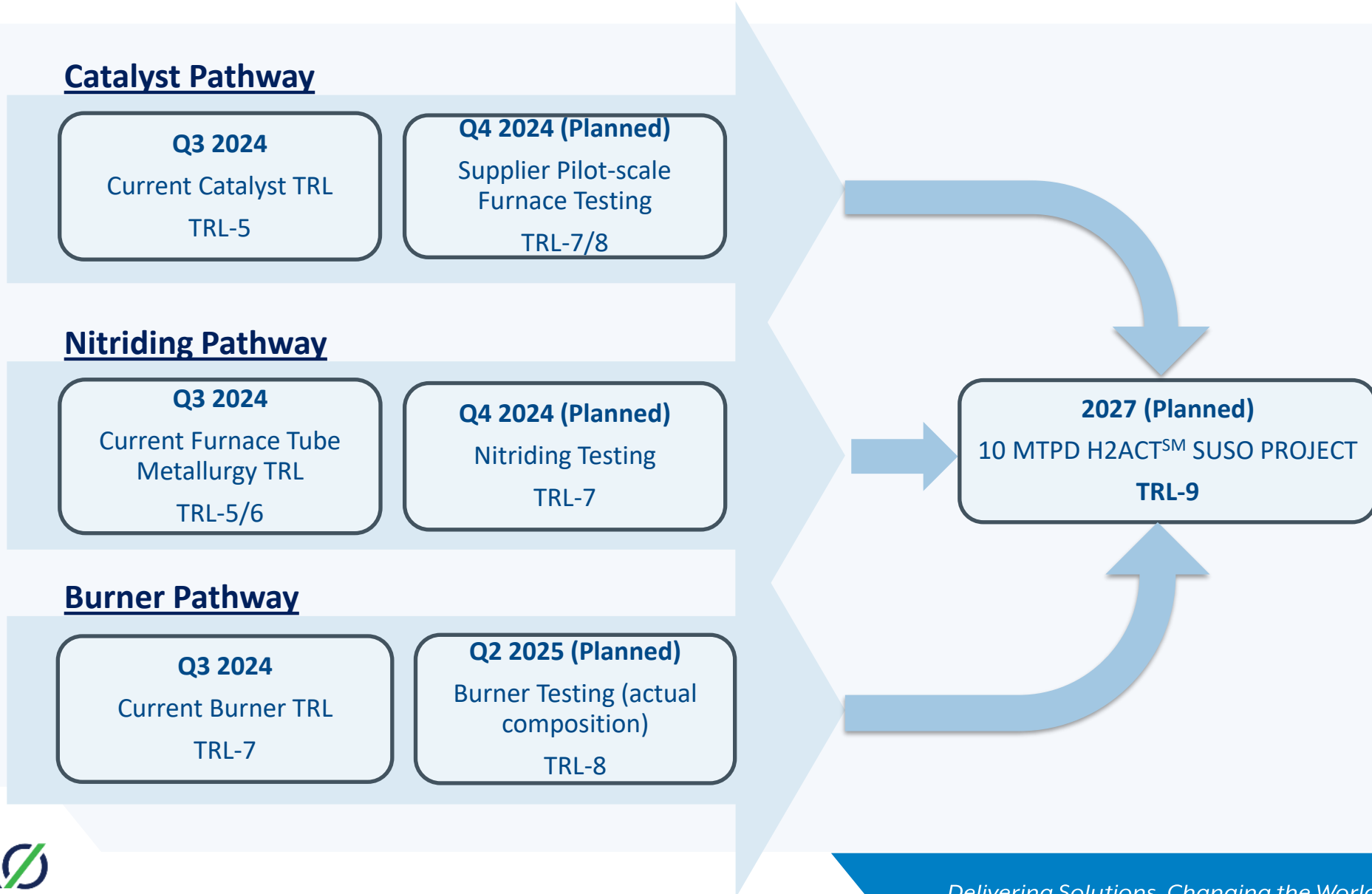
Inherently Safer Design



Minimum Risk Today, Maximum Opportunity Tomorrow

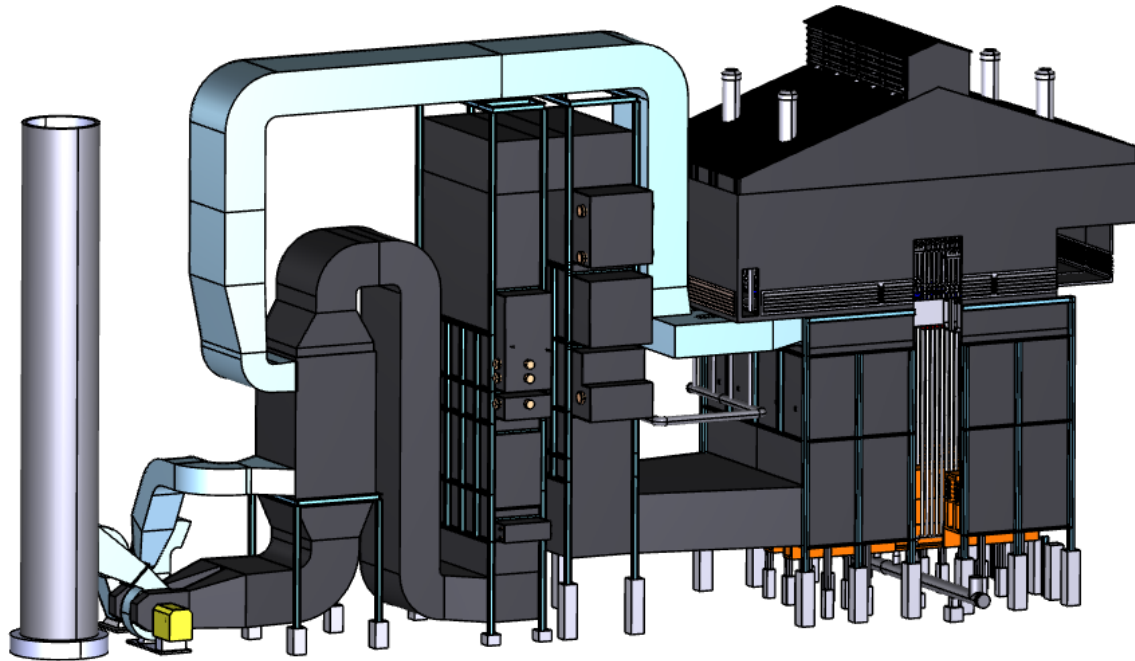


Ongoing Progression to TRL-9 by 2027

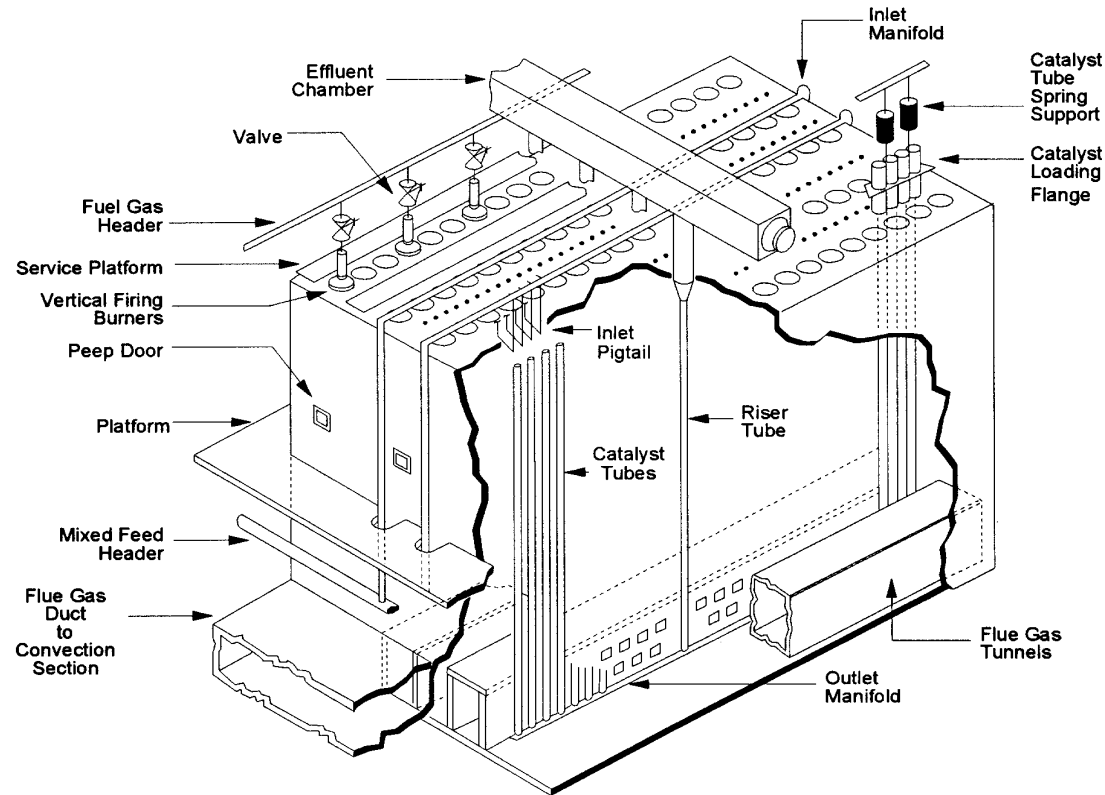




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Proven, Robust & Compact Mechanical Design of Furnace



- **KBR has recently designed an SMR for 1200 MTPD H₂ (equiv.) Blue Hydrogen Plant in the UK**
 - 18 tube rows, 56 tubes/row, 1008 tubes in total
- **KBR has an SMR in operation in methanol plant since 1988 with equivalent capacity of 1200 MTPD H₂ (equiv.)**
 - 18 tube rows, 52 tubes/row, 936 tubes in total
- **KBR has operating furnaces in steam methane reforming application from 3 to 18 tube rows with decades of design and operation experience.**
 - Mechanical design of large-scale furnaces without risk

Proven, Robust & Compact Mechanical Design of Furnace

References



80 YEARS LEADERSHIP IN SYNGAS

PRODUCTION WITH RELIABLE

EQUIPMENT DESIGNS AT SCALE

TO LEAD ENERGY TRANSITION WITH

CLEAN HYDROGEN TECHNOLOGY

SOLUTIONS

Company & Location	KBR Process	Capacity of NH3 MTPD	Equivalent Capacity of H ₂ MTPD †	KBR Scope	Year Online
Confidential	Purifier	6000	660	B+PEQ	Ongoing
EET, UK	Blue Hydrogen	1 GW H2	1200	B+PEQ	Ongoing
Confidential	Purifier	3500	385	B+PEQ	Ongoing
KazAzot, Kazakhstan	Purifier	2000	220	B+PEQ	Ongoing
Stanch Train 2, Nigeria	Purifier	2300	253	B+PEQ	Ongoing
Indorama Eleme, Train 3, Port Harcourt, Nigeria	Purifier	2300	253	B+PEQ	Ongoing
Stanch Train 1, Nigeria	Purifier	2300	253	B+PEQ	Ongoing
Confidential	Purifier	3000 x 2	330 x 2	B+PEQ	Ongoing
NPC, Canada	Methanol-Ammonia	2400	264	B+PEQ	Ongoing
Eurochem, Kingisepp-2, Russia	Purifier	3000	330	B+PEQ	Ongoing
Talcher Fertilizer Project, India	Synloop	2200	N/A	B+PEQ	Ongoing
STAVROLEN, Stavropol Krai, Russia	Purifier	3300	363	B+PEQ	Ongoing
PCL, Taloja, India	Pu+R	1500	165	B+PEQ	2023
HURL, Gorakhpur, India	Purifier	2420	266	B+PEQ	2022
Indorama Eleme, Train 2, Port Harcourt, Nigeria	Purifier	2300	253	B+PEQ	2021
Chambal Fertilizers & Chemicals Limited, Gadepan, India	Purifier	2200	242	B+PEQ	2019
PT Petrokimia, Gresik, Indonesia	Purifier	2200	242	B+PEQ	2018
Eurochem, Kingisepp-1, Russia	Purifier	2890	318	B+PEQ	2019
Dyno Nobel, Waggaman, LA, USA	Purifier	2300	253	EPC	2016
PUSRI II B, Palembang, Indonesia	Purifier	2200	242	B+PEQ	2016
Indorama Eleme, Port Harcourt, Nigeria	Purifier	2300	253	B+PEQ	2016
PAU, Sulawesi, Indonesia	Pu+R	2090	230	B+PEQ	2018
Iowa Fertilizer, USA	Purifier	2200	242	B+PEQ	2017
Matix, Panagarh, India	Purifier	2200	242	B	2017
Kima, Aswan, Egypt	Purifier	1200	132	B+PEQ	2020
Petrobras, Tres Lagoas, Brazil	Purifier	2200	242	B+PEQ	Ongoing
KALTIM 5, Bontang, Indonesia	Purifier	2700	297	B+PEQ	2015
Burrup Fertilisers PL, Australia	Purifier	2200	242	B	2006
Cape Horn Methanol, Chile	Methanol	-	1150	E, P, C, M	1988
INA Petrokemija, Croatia	Conventional	1360	624	E, P, C, a	1980
Nitrogenmuvek, Hungary	Conventional	1000	459	E, P, C	1976
Nihon Ammonia Company, Ltd., Japan	Conventional	1542	708	B	1971

† Equivalent H₂ capacity based on reforming furnace scale (e.g., number of radiant tubes).



H2ACT[®]

- ✓ **Scale**
- ✓ **Performance**
- ✓ **Reliability**
- ✓ **Ammonia Expertise**



Guaranteed performance at scale



Thank You

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