

Mission Critical Solutions: Hydrogen (H₂)



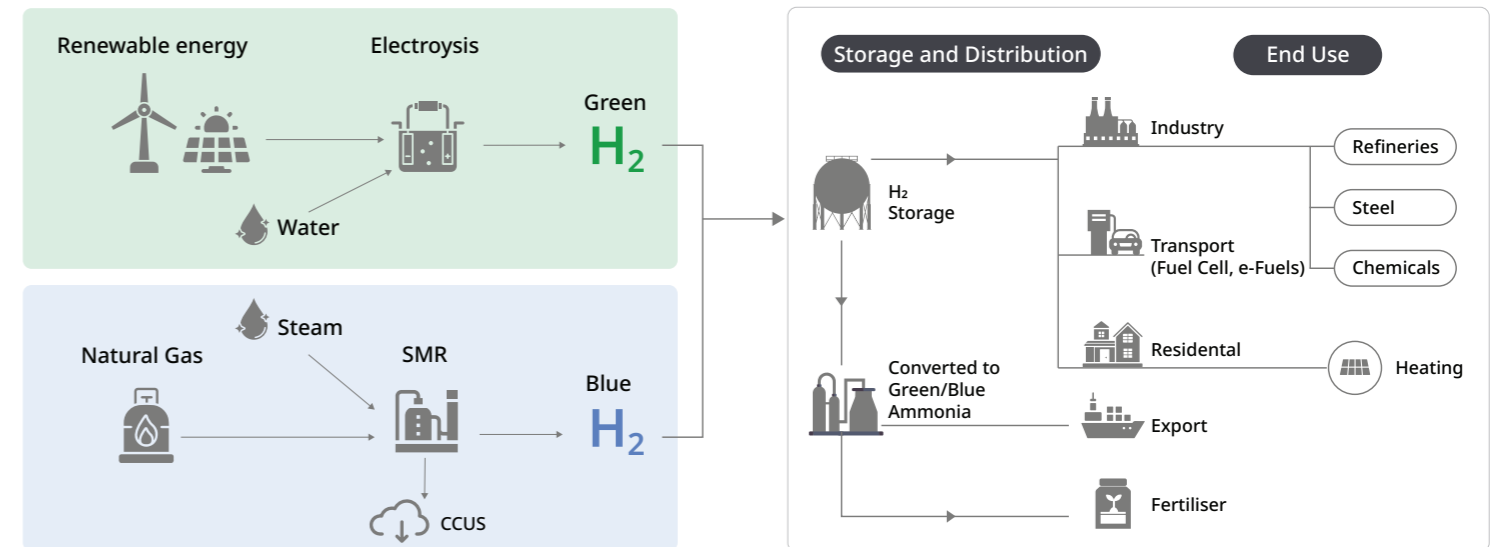
Hydrogen has been used for decades in traditional sectors such as refineries (for hydrotreatment), petrochemicals, and fertilizers (ammonia).

With the energy transition towards a carbon-neutral world, Hydrogen will also play a crucial role as a clean energy carrier and as building block for clean transport fuels.

WHAT IS HYDROGEN

Grey H₂	Grey hydrogen is commonly produced via steam methane reforming (SMR) from natural gas (CH ₄), leading to significant CO ₂ emissions in the atmosphere.	
Blue H₂	Regulations get stricter to capture the CO ₂ emissions for underground storage (CCS), or for utilization in other industrial processes (CCU). Carbon Capture, Utilization & Storage is done thru amine absorption, adsorption, membrane separation, or other emerging technologies.	$CH_4 + 2H_2O > CO_2 + 4H_2$
Green H₂	Emerging technologies utilizing renewable electricity for water electrolysis are generating H ₂ with zero CO ₂ emissions, suitable for clean energy storage and transportation fuels.	$2H_2O > 2H_2 + O_2$

TYPICAL PRODUCTION PROCESS BLUE & GREEN HYDROGEN

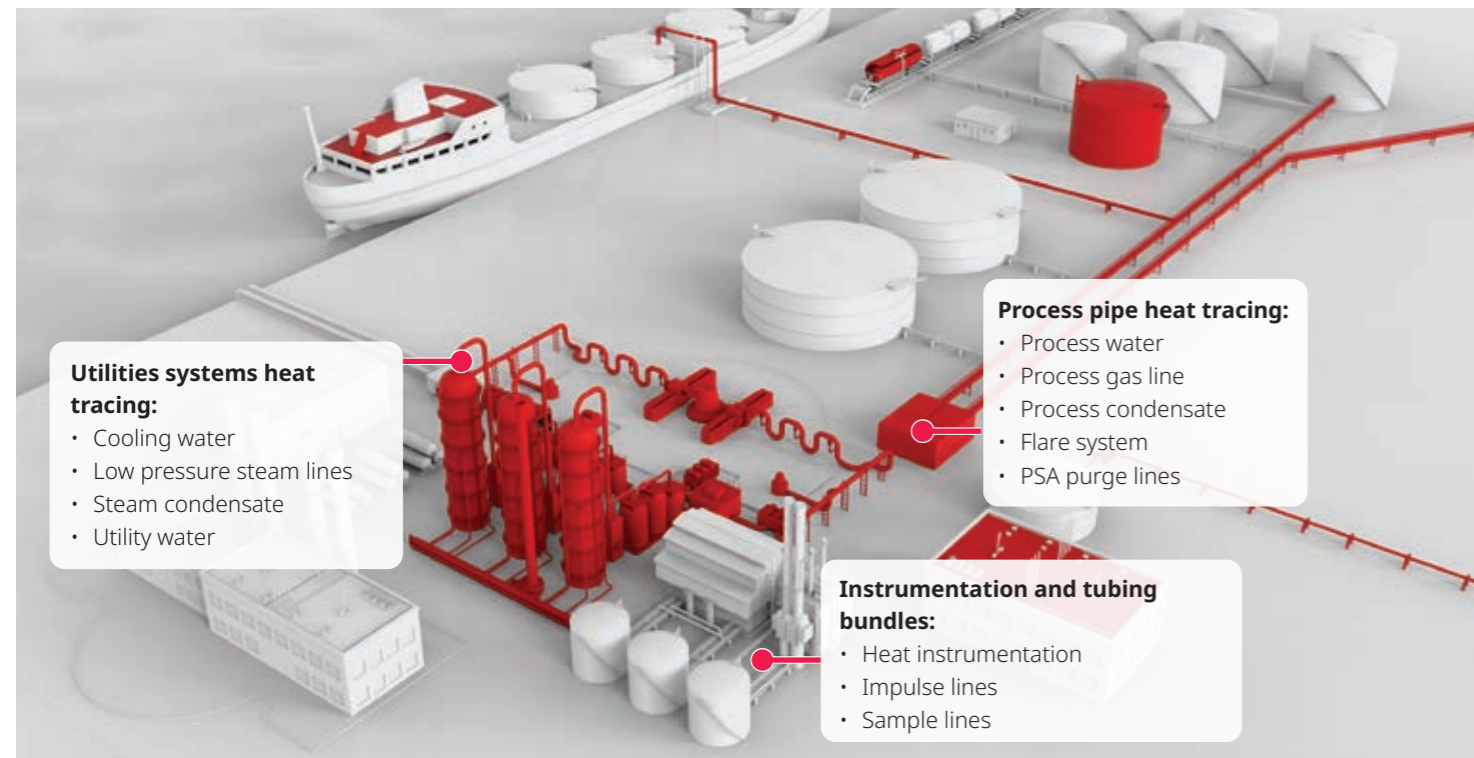


TYPICAL PRODUCTION CHALLENGES AND HEAT TRACING SOLUTIONS

	Challenges	Solutions
	Clean water supply is required for the longevity of the electrolyser. Therefore pre-treatment is crucial (water-processing, demineralization).	<ul style="list-style-type: none"> Freeze protection of water supply lines with Raychem heating cables
	Hydrogen storage is complex as it is done at -253°C (liquid) or 350–700 bar (gas). When converted into ammonia (NH ₃), it can be stored at -33°C (liquid) or 20 bar (gas). Storage tanks may require specific insulation and foundation heating, to ensure maximum safety and energy efficiency.	<ul style="list-style-type: none"> Cryogenic tank insulation with Trac-Loc Frost heave prevention of tank foundation with FHP heating cables Leak detection of ammonia with TraceTek
	Hydrogen purity when used in fuel cells for transport, high purity hydrogen is required (99,9999%) for efficient and reliable operation. Therefore, dryers and deoxidizers are integrated in the hydrogen production.	<ul style="list-style-type: none"> High temperature heat tracing with MI heating cables (200/220°C)
	For blue hydrogen in order to have an efficient Carbon Capture process, the correct temperature of the amines in the scrubber tank is important.	<ul style="list-style-type: none"> Process temperature maintenance with Raychem XTVR/HTV cables (30–50°C) Freeze protection of boiler steam lines, with exposure to 110–130°C.



TYPICAL HEAT TRACING APPLICATIONS



WHY CHOOSE RAYCHEM



Highest quality products	Expertise optimal system design & installation	Reliable performance & lower cost of ownership
<ul style="list-style-type: none"> The inventor of self-regulating heating technology and High Power Retention (HPR) Technology Up to +30 year design life 10-year product warranty 	<ul style="list-style-type: none"> 200+ expert designers 6000+ installers 600,000+ optimized EHT circuits with 3D integrated design & project management software TRACERLYNX 	<ul style="list-style-type: none"> 600,000 km installed (15x around the globe) in the most remote and harshest environments Advance control & monitoring Wide temperature ranges from -200°C to +1000°C

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CASE STUDIES

Raychem heat management solutions provide critical operational reliability for new steam methane reforming (SMR) hydrogen plant.

	Location: McIntosh, Alabama, USA	Completion date: 2024
	Applications: Pipe freeze protection, Process temperature maintenance, Instrument winterization	Technology: Raychem Self-Regulating cables with High Power Retention (XTVR), Power Limiting cables (VPL), Advanced Control & Monitoring
	Contract scope: Engineering and Product supply	

Efficient operational reliability for a major plant in Germany to produce green hydrogen.

	Location: Rheinland Refinery, Wesseling, Germany	Completion date: 2021
	Applications: Pipe freeze protection	Technology: Raychem Self-Regulating cables, electronic thermostats
	Contract scope: Engineering and Product supply	

Large chemical park expands with hydrogen production facility using latest technologies for maximum productivity and reduced carbon footprint.

	Location: Large Chemical Park, Hungary	Completion date: 2023
	Applications: <ul style="list-style-type: none"> Freeze protection of steam condensate lines, utilities, fire systems Process temperature maintenance of PSA units, amine system (CO₂ removal), chemical feed stations Anti-condensation heating of flue gases 	Technology: SMR-X Hydrogen generation <ul style="list-style-type: none"> Greater efficiencies Lower CO₂ emissions

More information: chemelex.com

Raychem Tracer Pyrotenax Nuheat