

Electrical Heat Tracing Solutions for Hydrogen and Carbon Capture Industries



Shaimaa Obaid, Product Manager
Koen Verleyen, Marketing Manager
October 15th 2024

Agenda

- Introduction to heat tracing
- H2 and Carbon Capture industries
- Mission critical heat tracing solutions
- Project References

MISSION CRITICAL SOLUTIONS IN HYDROGEN



Energy Transition

We connect and protect

nVent Thermal | **who we are**

- Global leader in thermal management
- RAYCHEM = top brand in heat-tracing
- Large installed base with 600,000+ km installed heat tracing
- Leading experts with turnkey services and advanced engineering-design tools
- Strong global presence



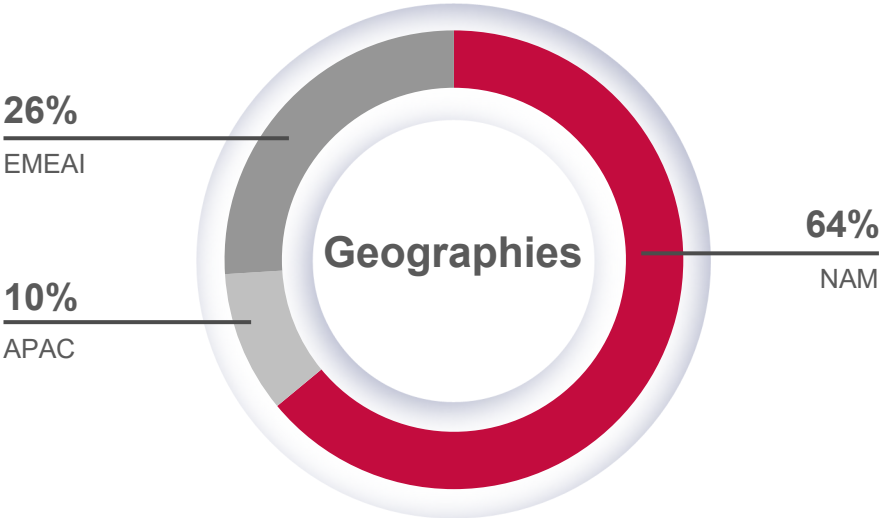
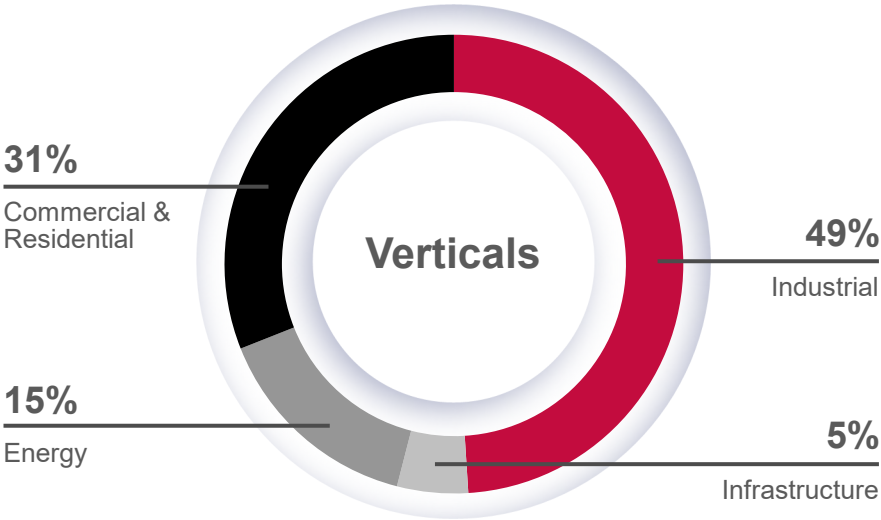
2023 NUMBERS

\$594M
Revenues

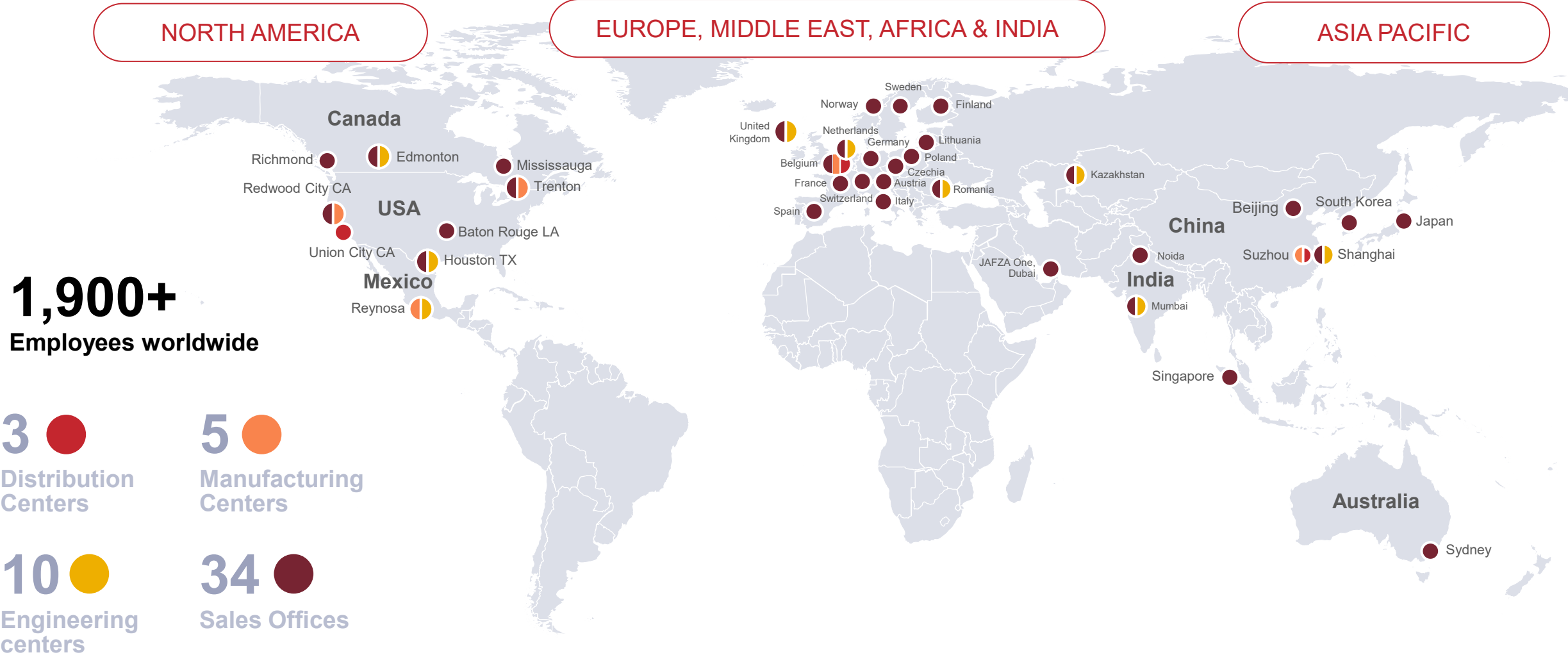
1,900+
Employees

28
Countries

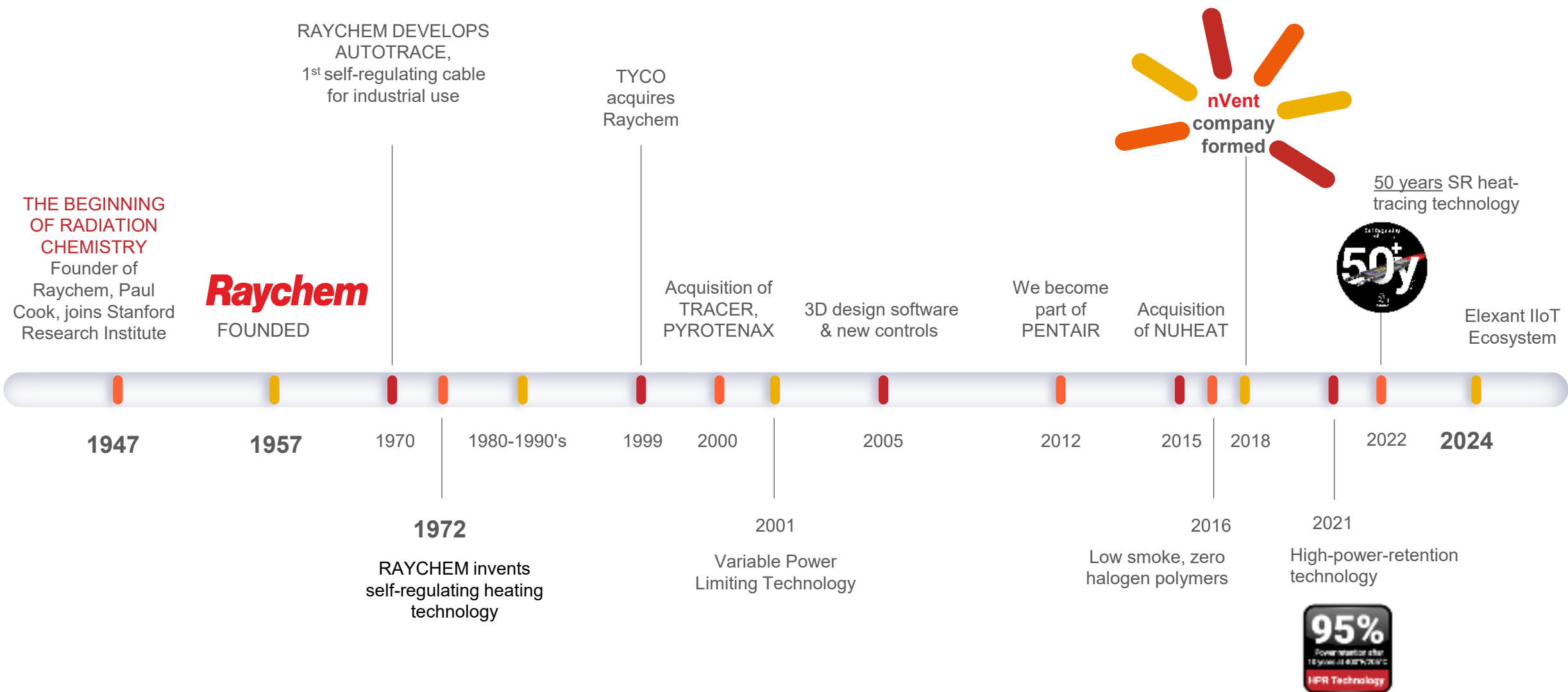
38
Locations



nVent Thermal | Global Presence



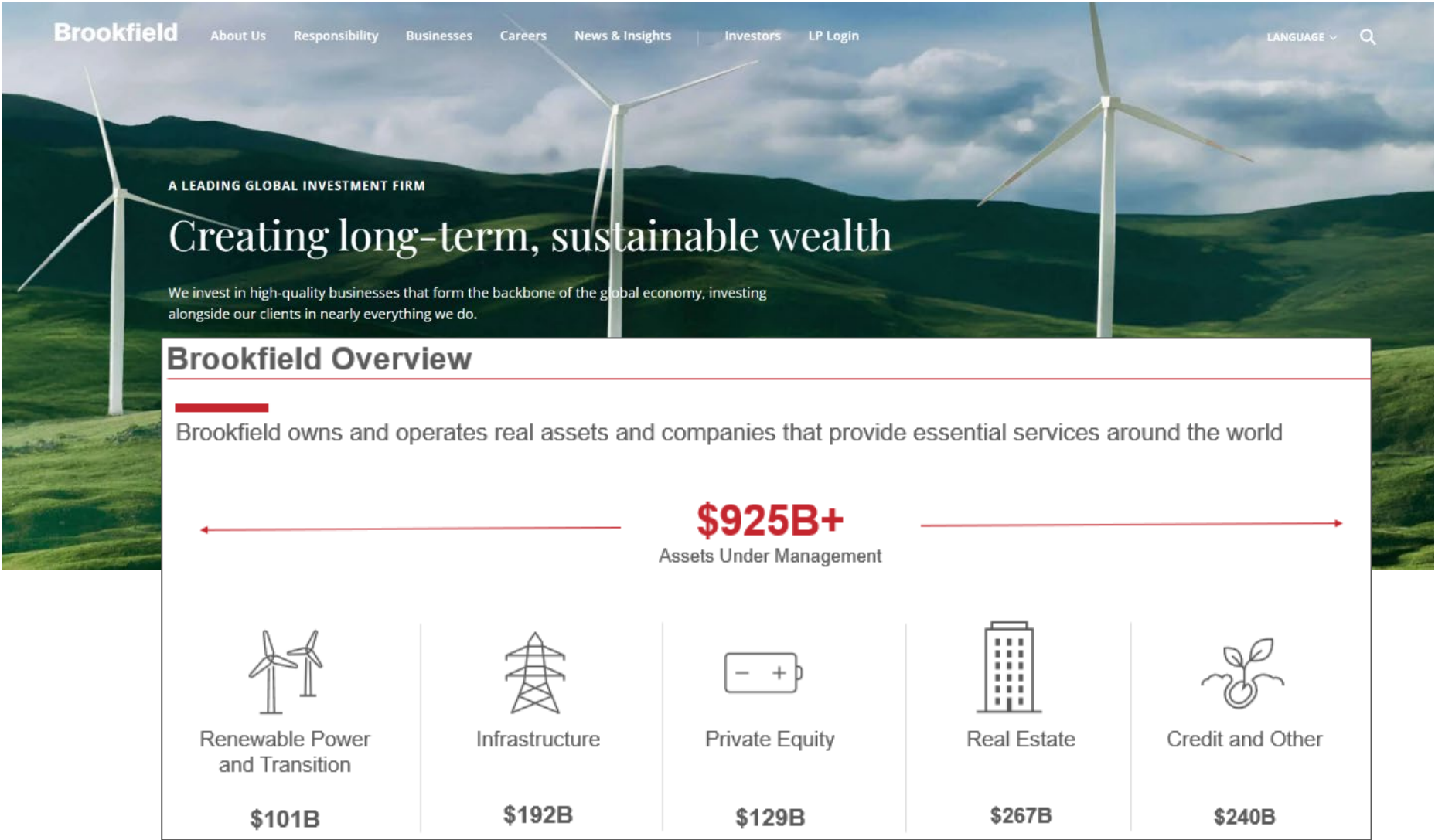
nVent Thermal | Our History



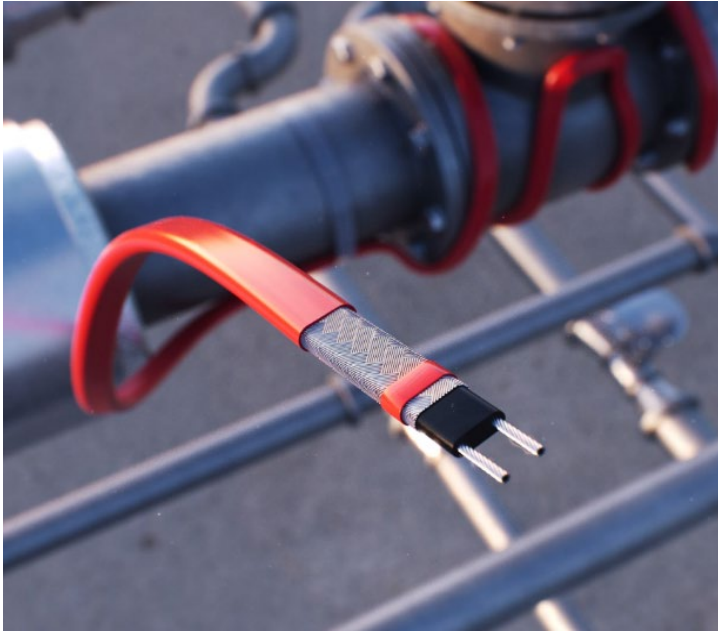
nVent Thermal | Our future (by 2025)

- Part of Brookfield Asset Management (BAM)

Brookfield

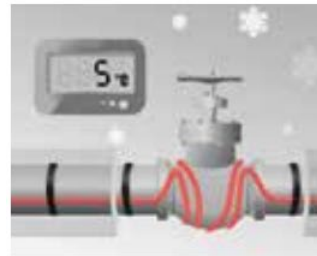


nVent Thermal | What we do

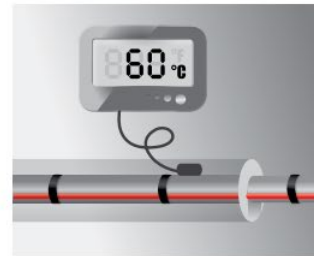


- **Electrical heat-tracing**
- Fire-rated wiring
- Leak Detection
- Tank Insulation

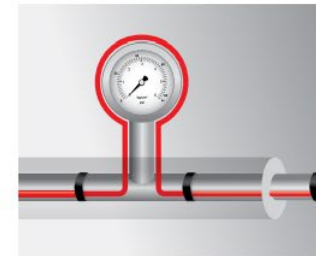
Heat Tracing = Application of heat to a pipe or equipment, to replace heat loss



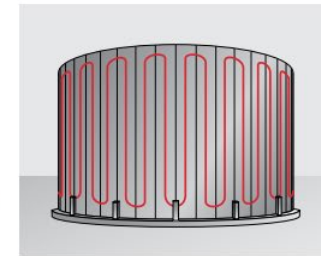
Pipe Frost Protection



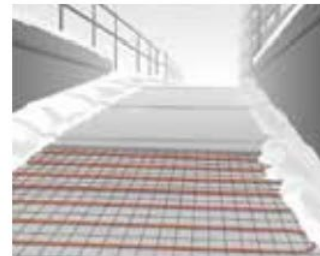
Pipe Temperature Maintenance



Instrument Heating



Tank Heating



Snowmelting of Ramps

- ✓ **Protect** critical processes,
- ✓ **Enhance** productivity,
- ✓ **Reduce** energy consumption,
- ✓ **Increase** safety and comfort of people

Wide range of heat-tracing cables & technologies



5°C TO 650°C /
40F TO 1200F

Heat-tracing examples



WATER
5°C / 40F



Heat-tracing examples



BIOFUELS
55°C / 130F



Heat-tracing examples



BITUMEN
160°C / 320F



Heat-tracing examples



SULPHUR
130°C / 265F



Heat-tracing examples



**ANTI-CONDENSATION
OF FLUE GAS
250°C / 480F**



What if heat-tracing fails ?

ICE FORMATION



ICICLES



FROZEN WATER PIPES



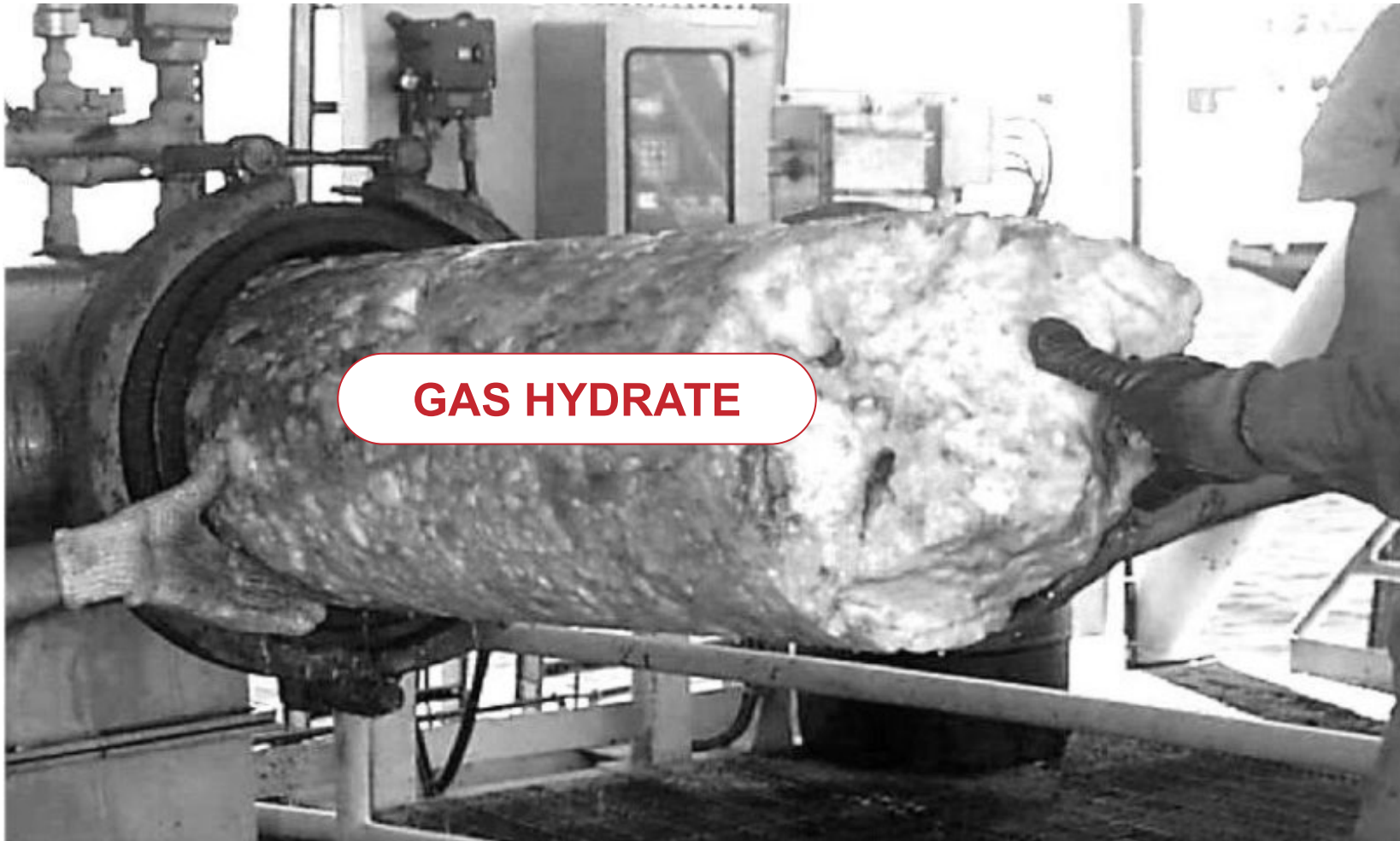
What if heat-tracing fails ?



**BROKEN PIPES &
EQUIPMENT**



What if heat-tracing fails ?



Agenda

- Introduction to heat tracing
- **H2 and Carbon Capture industries**
- Mission critical heat tracing solutions
- Project References

MISSION CRITICAL SOLUTIONS IN HYDROGEN



Energy Transition

We connect and protect

Hydrogen (H₂)

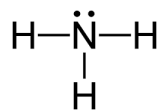
- Most abundant element in the universe (ex: 75% of the Sun)
- On Earth, H₂ mainly exists in compounds
 - Water - H₂O
 - Methane - CH₄
 - Coal, petroleum, biomass
- H-atoms are separated through chemical reactions, for industrial use



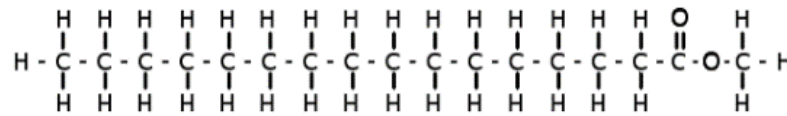
Hydrogen fuel



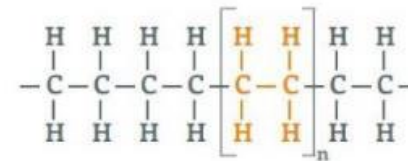
Ammonia



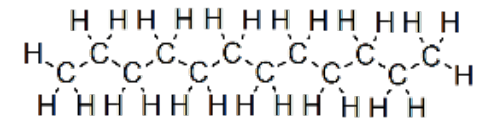
Biodiesel



Polyethylene



Jet Fuel



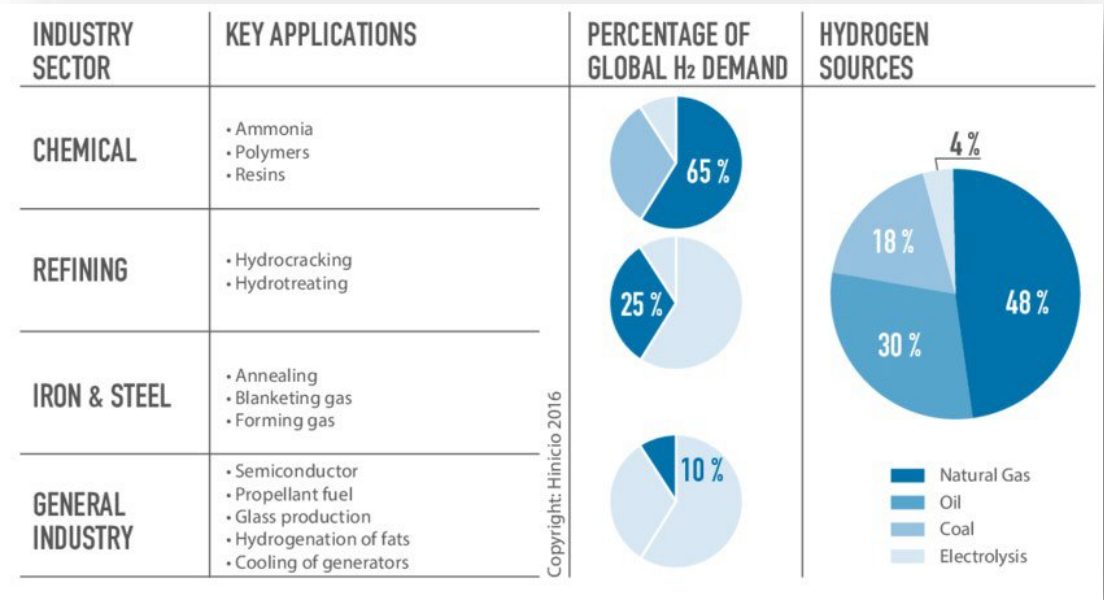
Hydrogen (H₂)

What reaction do we see here?



Why Do We Need Hydrogen?

Traditional sectors

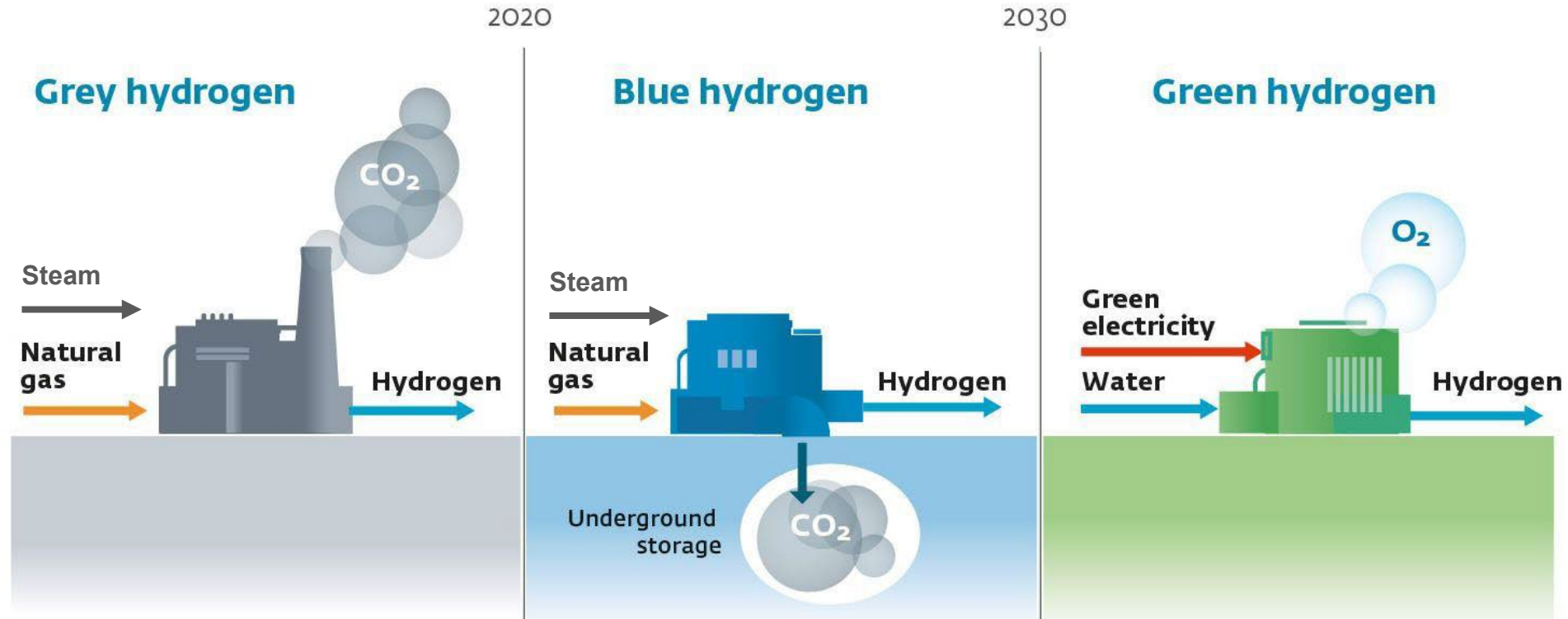


Energy Transition sectors

- Energy carrier for renewable electricity (solar, wind)
- Clean fuels
 - Fuel cell technology
 - Biofuels
 - E-fuels (e-methanol)



H2 Production / From Grey to Blue to Green



- Steam methane reforming (SMR)
- Problem: CO₂ emissions

- SMR + Carbon Capture
- Solution: Capture CO₂ for storage or use

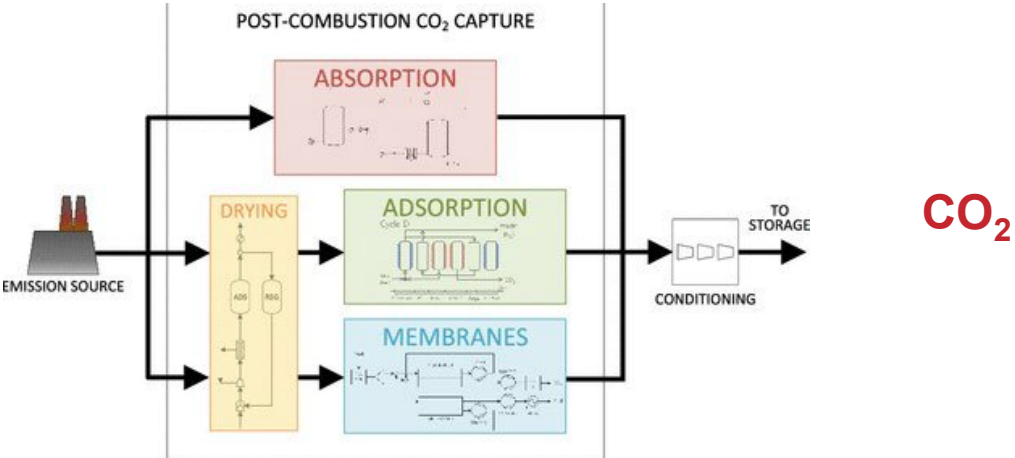
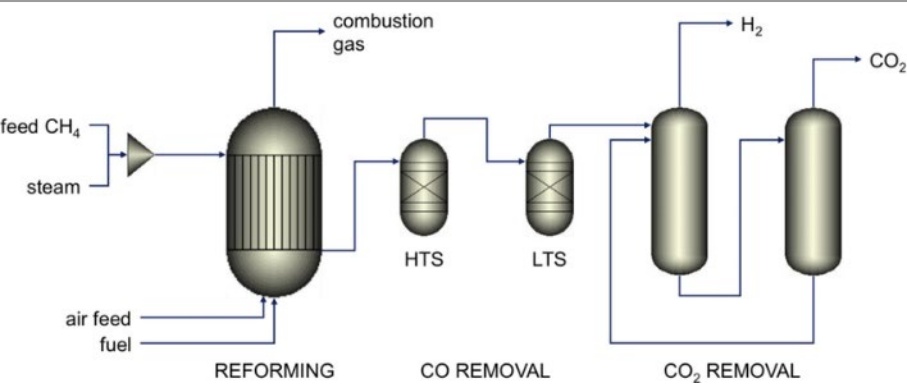
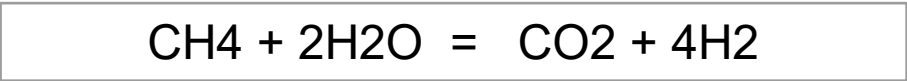
- Electrolysis with renewable electricity
- Solution: Zero CO₂ emissions

Grey H2 Production

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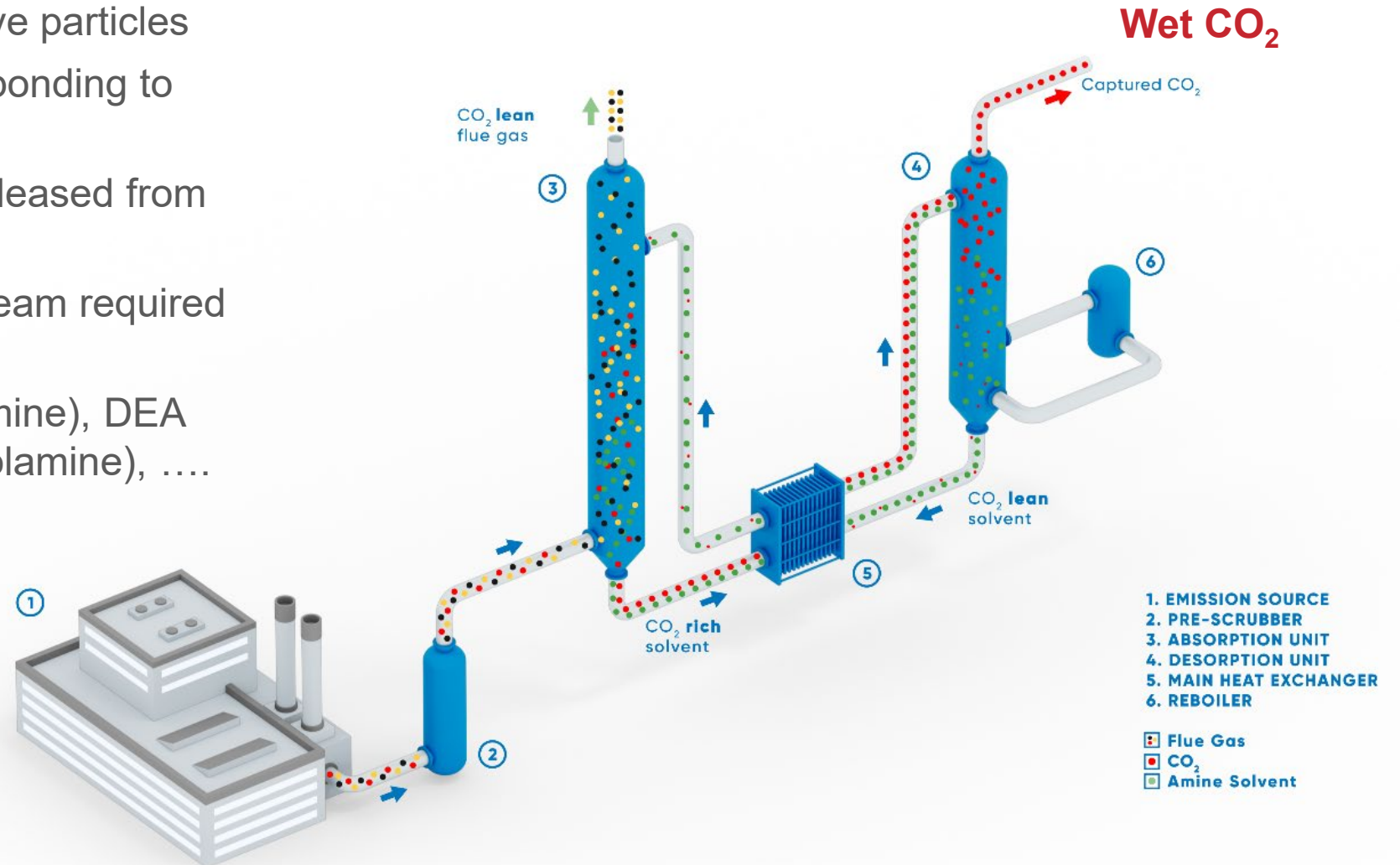
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Blue H2 Production



Carbon Capture Plant / Amine Absorption Process

- **Pre-scrubber:** cooling + remove particles
- **Absorber** (or scrubber): CO₂ bonding to Amine at **~50°C / ~120F**
- **Desorber** (or stripper): CO₂ released from Amine, at **~130°C / ~250F**
- **Reboiler:** 3-4 bar / 45-60psi steam required for desorption
- **Solvent:** MEA (monoethanolamine), DEA (diethanolamine), DGA (diglycolamine),

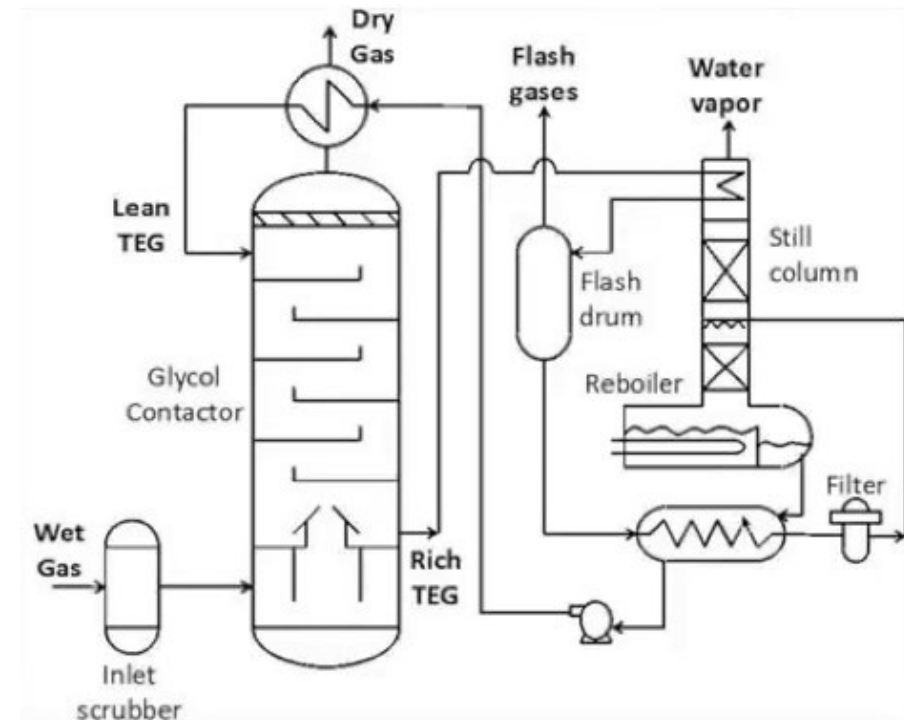


Carbon Capture Plant / TEG Dehydration Unit (Tri-Ethylene Glycol)

- CO₂ drying to eliminate acid corrosion in pipes
- Occurs during compression stage
- Similar to natural gas dehydration (= called DEHY unit)



Dry CO₂



Wet CO₂

Carbon Capture / Underground Storage

- CO₂ pressurized & stored as **supercritical fluid**, to reduce volume
- Critical point for CO₂ =
 - Temp >32°C (90°F),
 - Pressure >73 bar (1,057 psi)
- Critical depth for CO₂ storage
 - >800m (2,600 ft)

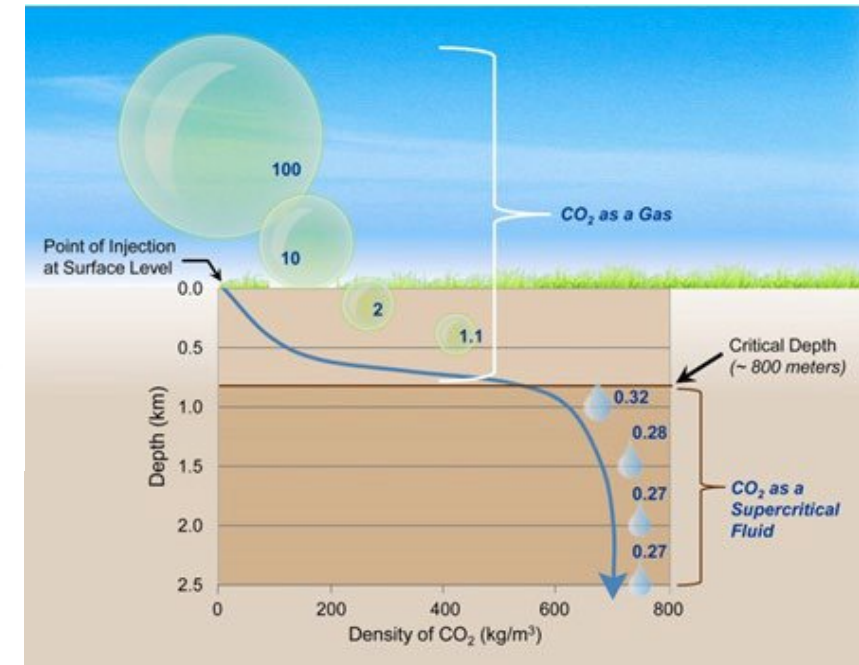
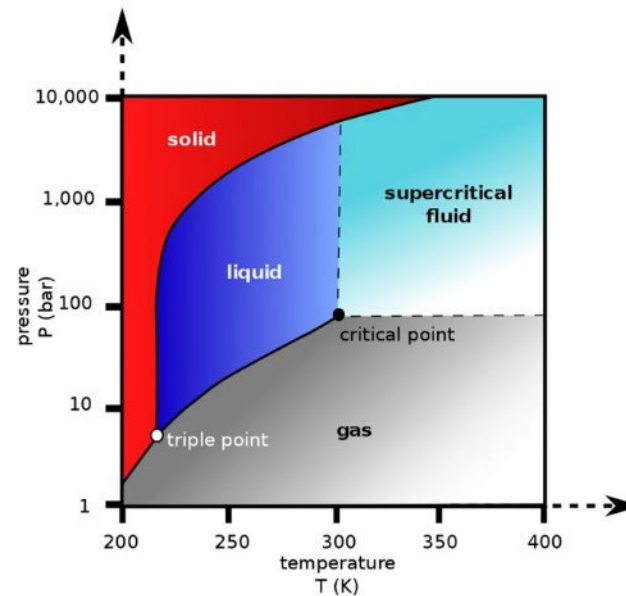
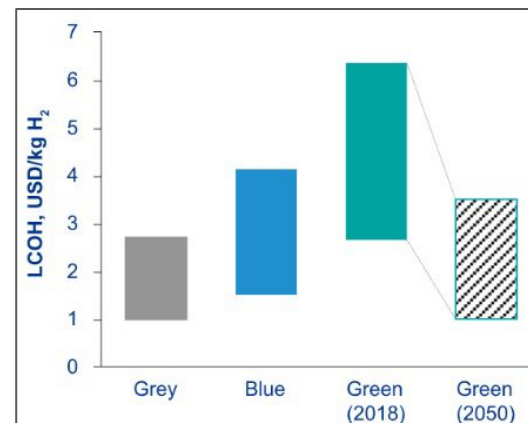
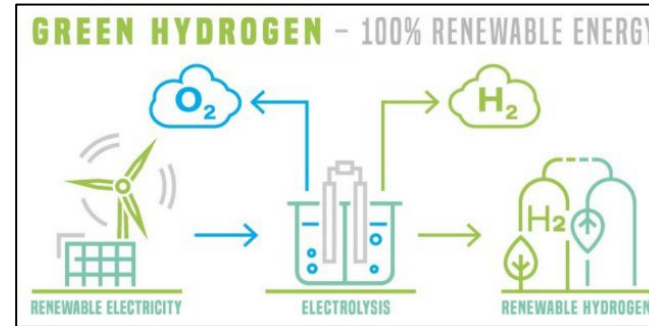


Illustration of Pressure Effects on CO₂ (based upon image from CO₂CRC). The blue numbers show the volume of CO₂ at each depth compared to a volume of 100 at the surface.

Green H2 Production / Electrolysis

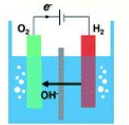
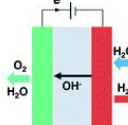
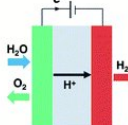
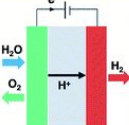
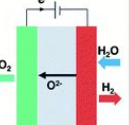
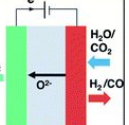
- $2\text{H}_2\text{O} + \text{renewable electricity} = 2\text{H}_2 + \text{O}_2$
- No CO2 emissions !!
- Process Infrastructure
 - Renewable electricity
 - Electrolysers
 - Water, Utilities
 - Use existing O&G infra (onshore & offshore)
- Challenges prevent faster scaling
 - Renewable electricity capacity
 - Electrolysers capacity
 - (Sweet) Water
 - Costs / Financing



Green H2 Production / Electrolysis

■ Electrolyser technologies

- Alkaline
- Proton exchange membrane (PEM)
- Solid oxide

	Low Temperature Electrolysis			High Temperature Electrolysis		
	Alkaline (OH-) electrolysis	Proton Exchange (H+) electrolysis	Oxygen ion (O ²⁻) electrolysis			
	Liquid	Polymer Electrolyte Membrane	Solid Oxide Electrolysis (SOE)			
	Commercial	Solid alkaline	H ⁺ - PEM	H ⁺ - SOE	O ²⁻ - SOE	Co-electrolysis
Operation principles						
Charge carrier	OH ⁻	OH ⁻	H ⁺	H ⁺	O ²⁻	O ²⁻
Temperature	20-80 °C	20-200 °C	20-200 °C	500-1000 °C	500-1000 °C	750-900 °C
Electrolyte	Liquid	Solid (polymeric)	Solid (polymeric)	Solid (ceramic)	Solid (ceramic)	Solid (ceramic)
Efficiency	59-70%	-	65-82%	up to 100%	Up to 100%	-
Advantages	Low cost, relatively stable, mature technology	Combination of alkaline and H ⁺ -PEM electrolysis	Compact design, fast response/start-up, high-purity H ₂	Enhanced kinetics, thermodynamics : lower energy demands, low capital cost		Direct production of syngas
Disadvantages	Corrosive electrolyte, gas permeation, slow dynamics	Low OH ⁻ conductivity in polymeric membranes	High cost polymeric membranes; acidic: noble metals	Mechanically unstable electrodes (cracking), safety issues: improper sealing		

■ H2 Purification

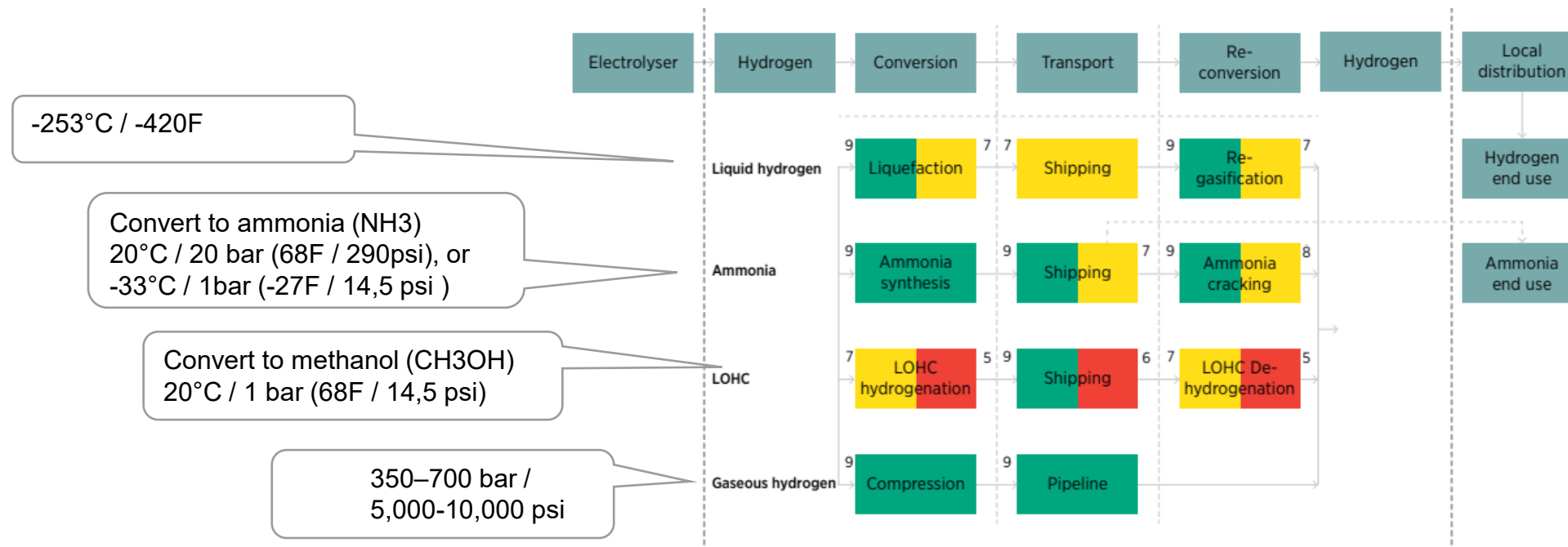
- Fuel cells (cars, trucks) require 99,999% purity
- Dryers + De-oxidizers (>200°C/390F required)



H2 Storage, Transport and Use

Can be dangerous

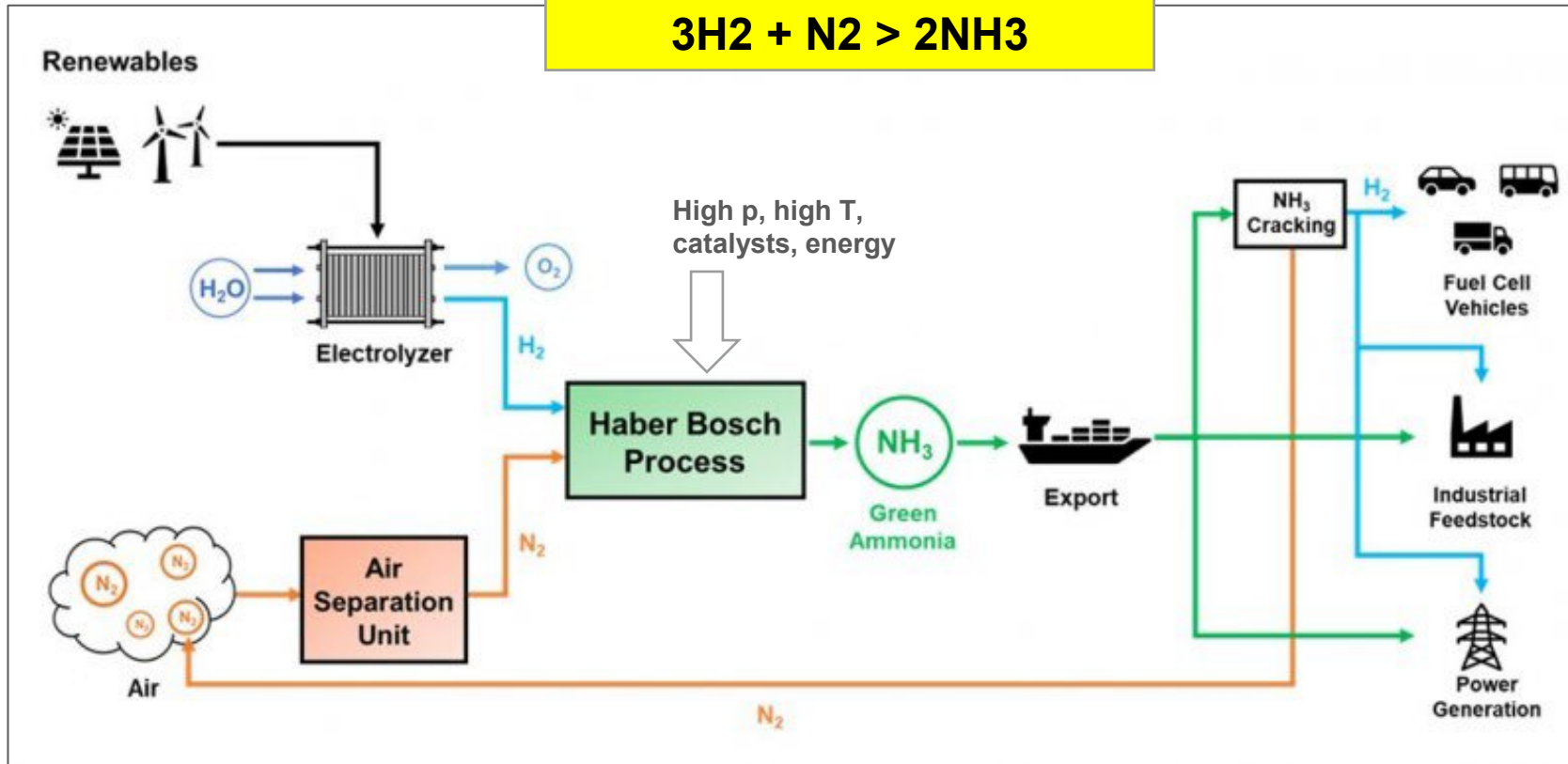
- H2 is very explosive when combined with air and small amount of energy.
- Various Transport options:



H2 Storage, Transport and Use

Ammonia (NH₃) is a promising H₂ Carrier and clean shipping fuel

Haber-Bosch Process:
 $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$



The world's first clean ammonia-powered container ship

NOVEMBER 30, 2023

Yara Clean Ammonia, North Sea Container Line, and Yara International join forces to realize the world's first container ship that will use clean ammonia as fuel. Named Yara Eyde, the vessel will be the first to sail emission-free sea route between Norway and Germany.

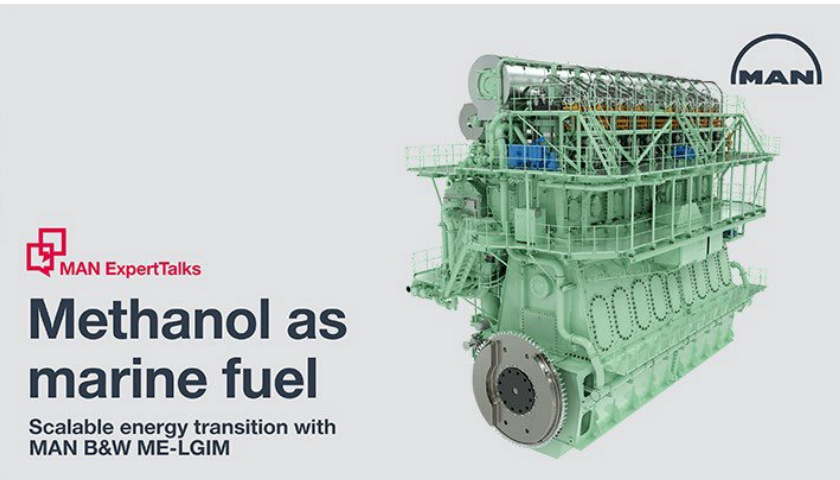
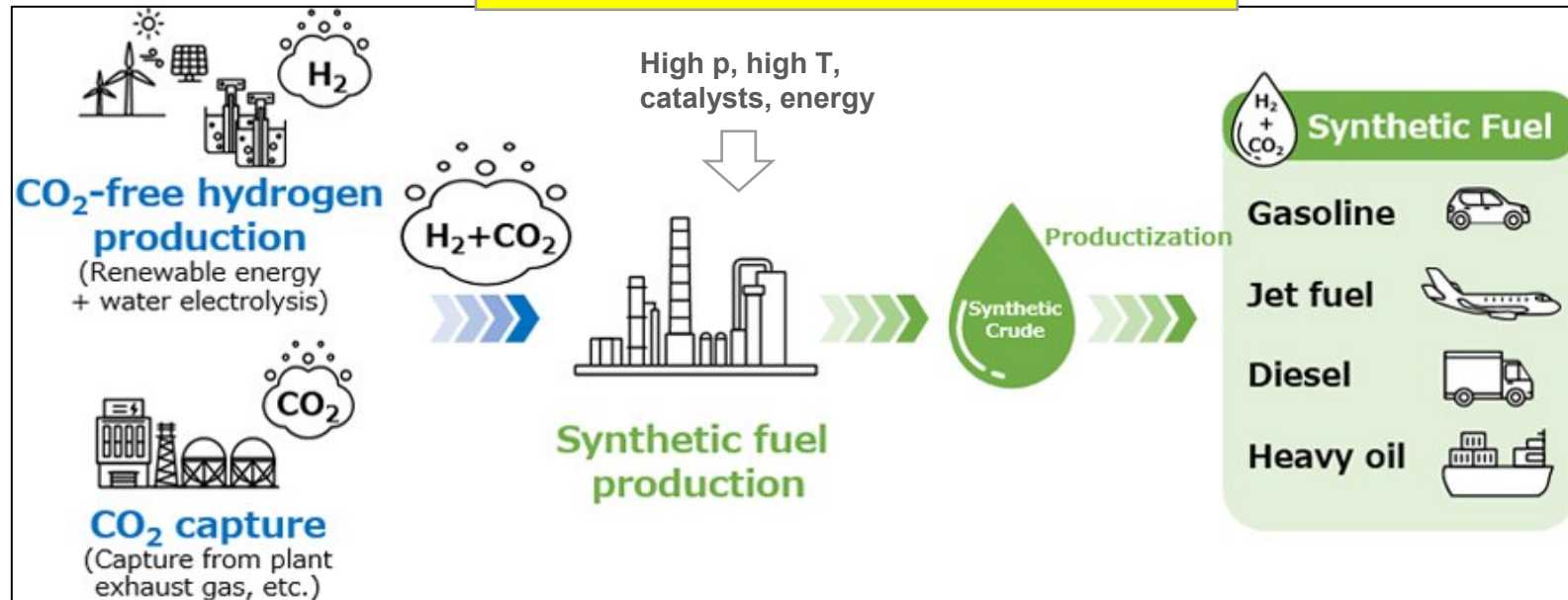
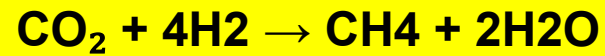
"Yara Eyde will be the world's first container ship running on clean ammonia and is a cross-sector collaboration enabling large-scale emission reductions ahead of the critical 2030 climate targets," says Svein Tore Holsether, President and CEO of Yara International.



H2 Storage, Transport and Use

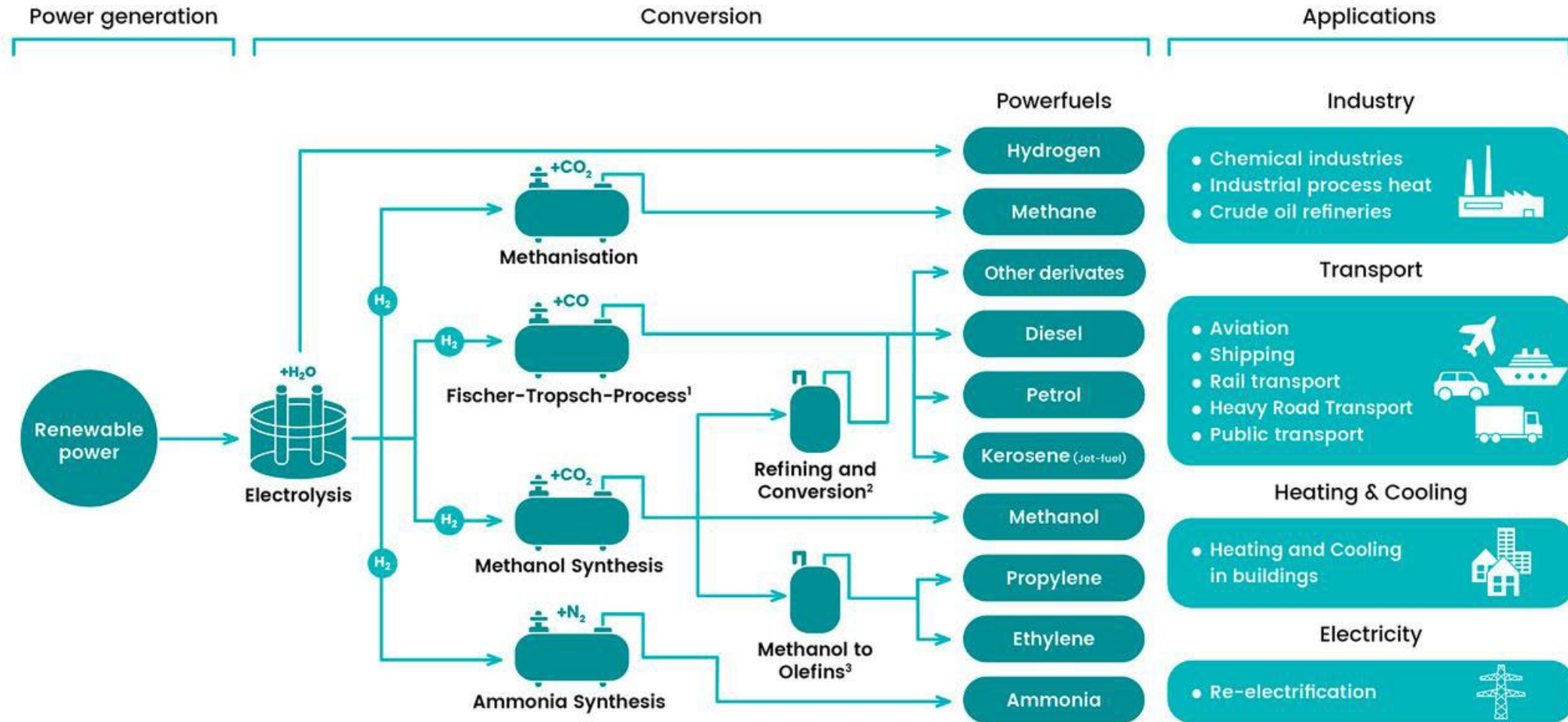
Methanol is another promising H2 derivate

Fischer-Tropsch process



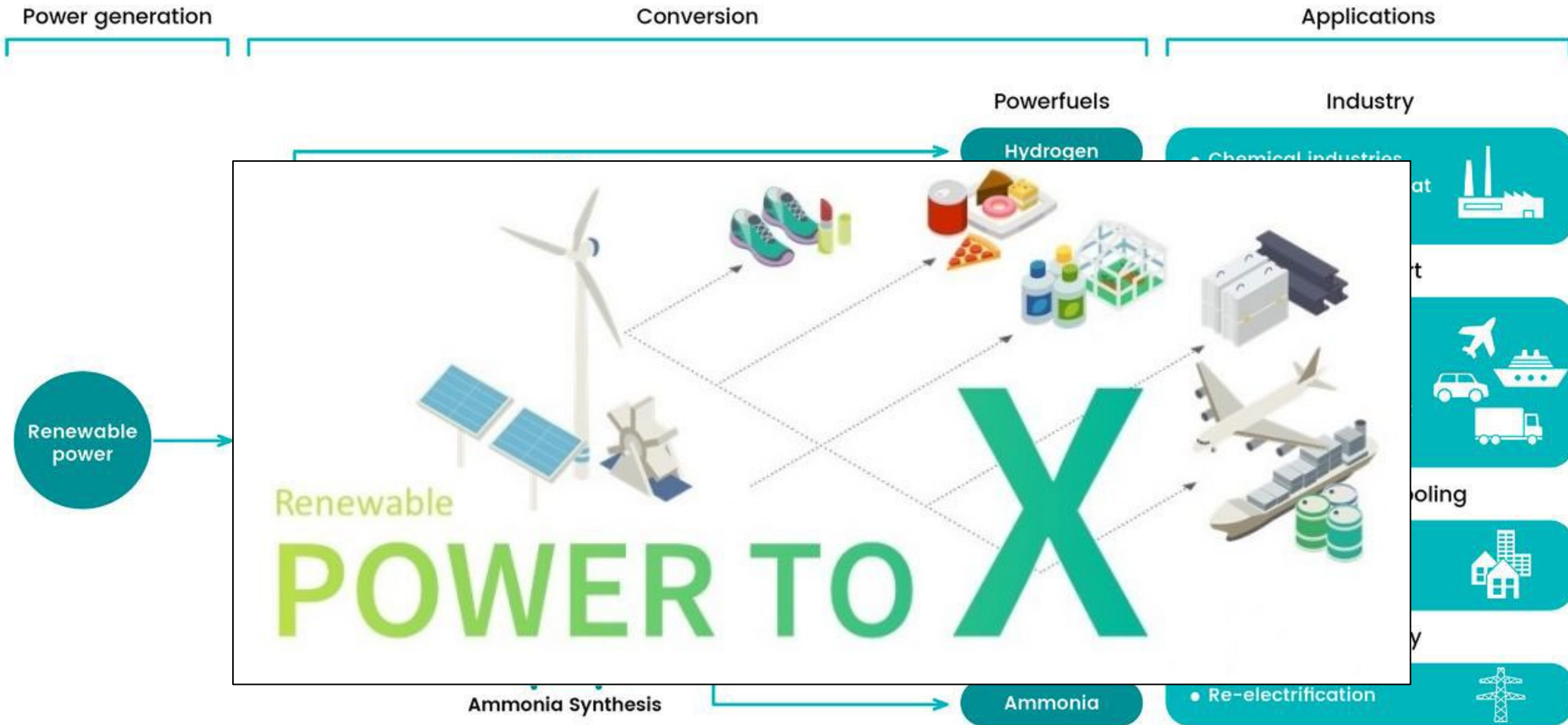
H2 Storage, Transport and Use

Various e-fuel routes in development



H2 Storage, Transport and Use

Various e-fuel routes in development



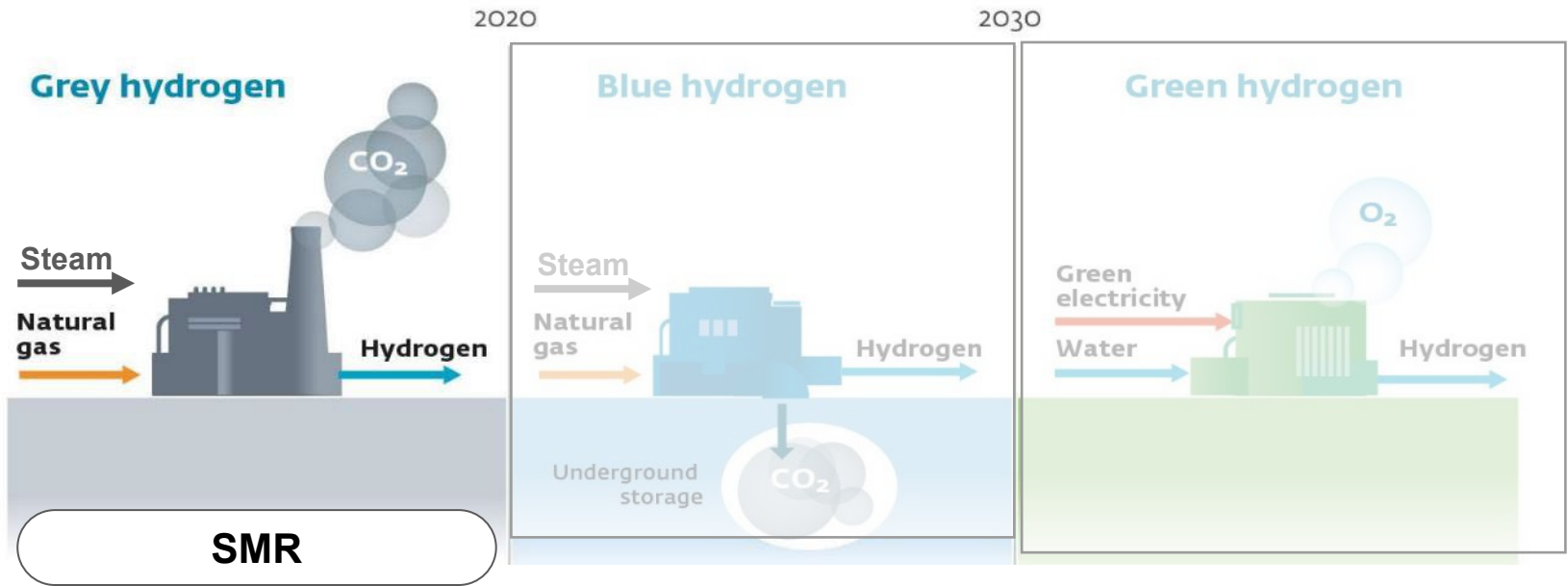
Agenda

- Introduction to heat tracing
- H2 and Carbon Capture industry
- **Mission critical heat tracing solutions**
- Project References

MISSION CRITICAL SOLUTIONS IN HYDROGEN



Heat Tracing Requirements in H2 and CCUS



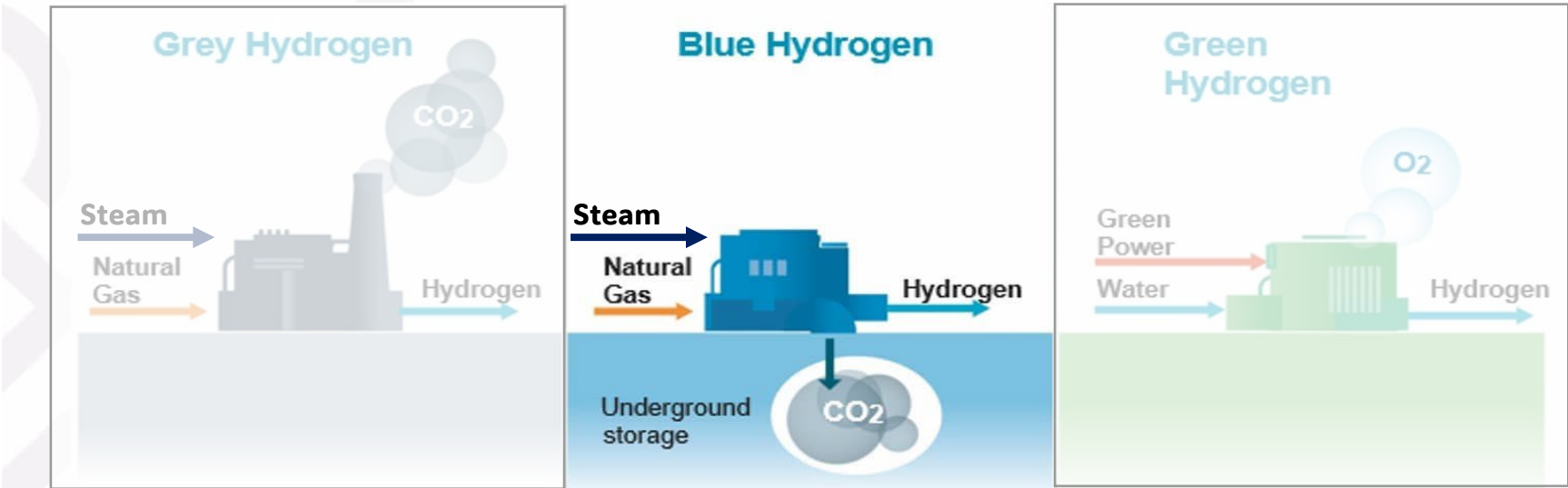
- STEAM LINES 5°C/40F
- GAS PRE-TREATMENT 30-80°C/85-175F
- FLUE GAS ANTI-CONDENSATION 200-250°C/392-482F

- Typical T(maintain)
- T(exposure) can be much higher

Heat Tracing Requirements in H2 and CCUS

2020

2030



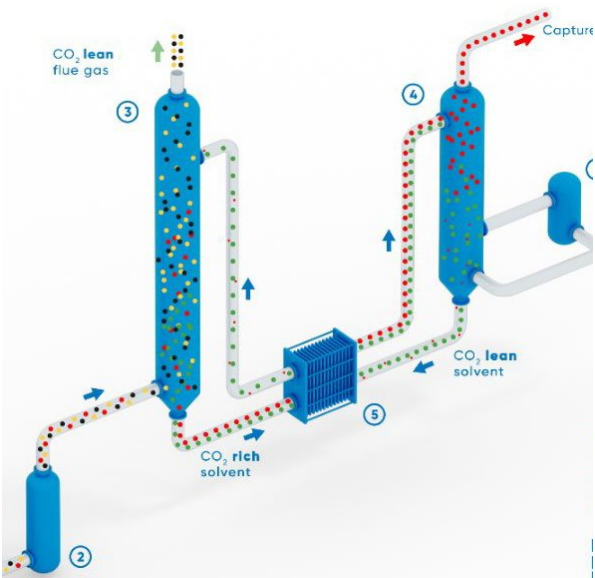
- Typical T(maintain)
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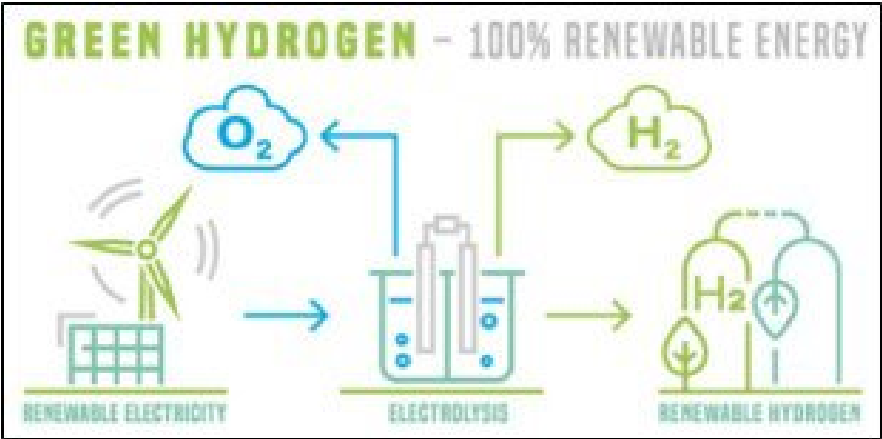
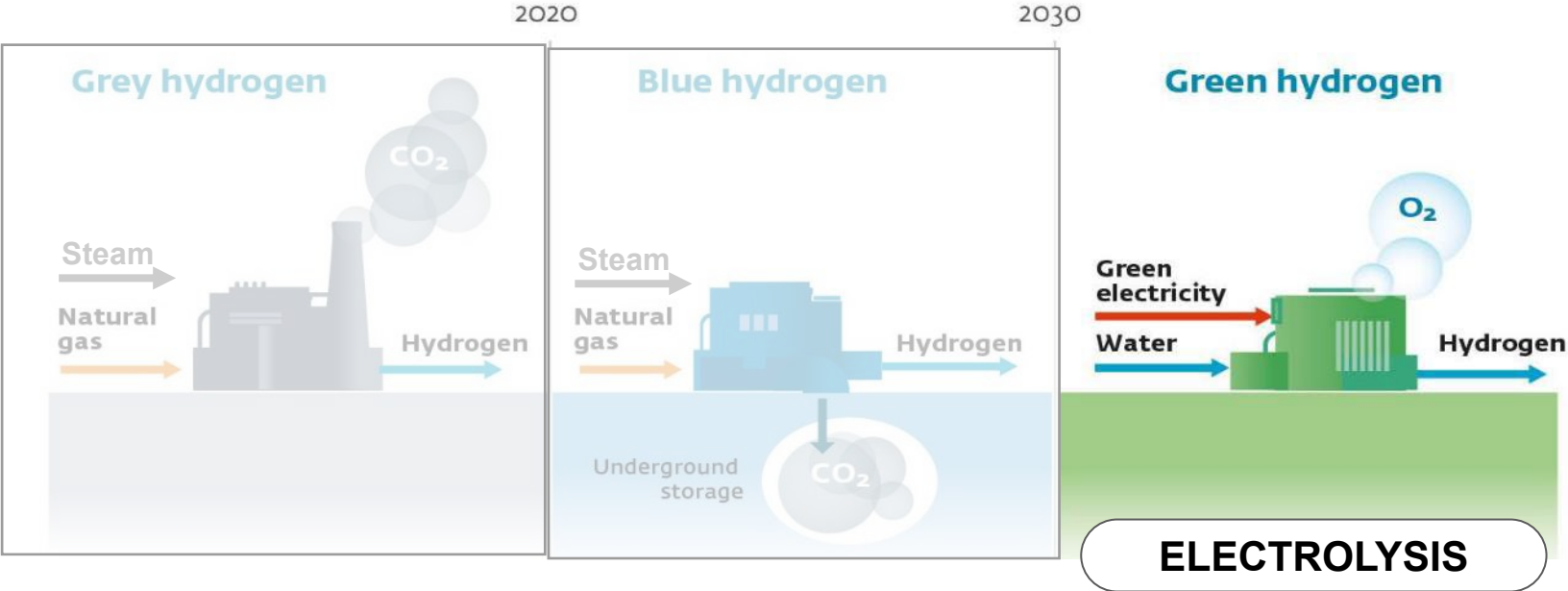
SMR + CCS

- STEAM LINES 5°C/40F**
- GAS PRE-TREATMENT 30-80°C/85-175F**
- FLUE GAS ANTI-CONDENSATION 200-250°C/392-482F**

- AMINE ABSORPTION PROCESS 50°C-130°C/120-250F**
- STEAM LINES 5°C/40F**
- DEOXO, DRYER 200-250°C/390-480F**



Heat Tracing Requirements in H2 and CCUS



- Typical T(maintain)
- T(exposure) can be much higher

- WATER LINES 5°C/40F**
- DEOXO-DRYER 200-250°C/ 390-480F**
- E-FUEL PROCESSES 5-250°C/40-480F**

RAYCHEM Heat Tracing Solutions

1. Heating Cables *superior performance & long life*

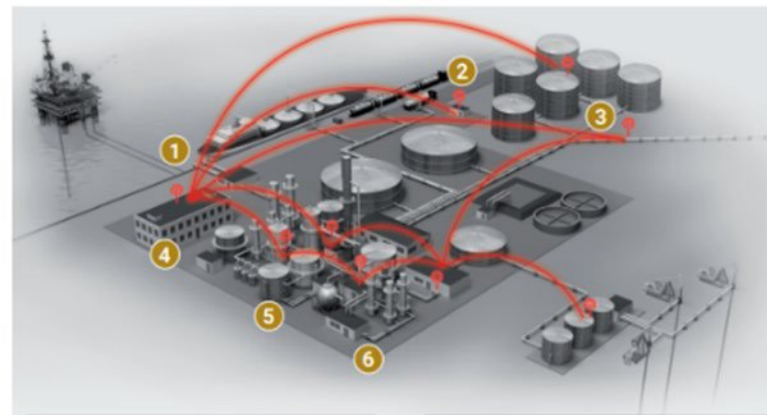


5°C TO 650°C /
40F TO 1200F



2. Advanced Control and Monitoring *Energy savings, Data Analysis, Alarm mgmt, Remote Supervision, ...*

Broad range of control & monitoring solutions



1 nVent RAYCHEM Supervisor

Remote monitoring & configuration of heat tracing circuits (alarm logging, trending, reporting, data-analysis)



2 Connectivity

Hardwired or wireless connection of all components for full heat trace visibility over entire facility



3 nVent RAYCHEM Pipeline Supervisor

Remote monitoring of long pipelines with critical fluids, utilizing Distributed Temperature Sensing data from fiber optic sensor



4 Multi-circuit safe area panels

Located in substation configuration & monitoring via local User Interface and integration to DCS, or nVent RAYCHEM Supervisor



5 Single-circuit field control

Configuration & monitoring via User Interface / Tablet



6 Multi-circuit field panels

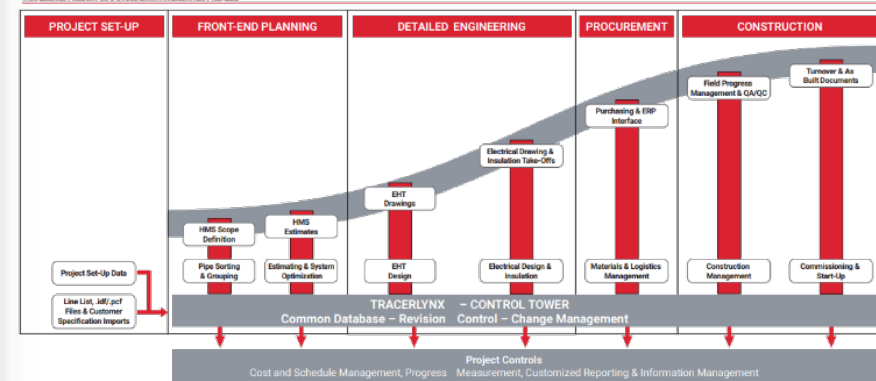
Configuration & monitoring via local User interface and integration to DCS, or nVent RAYCHEM Supervisor



3. Turnkey Project Management *EHT experts + integrated 3D software tool*



TRACERLYNX PROJECT LIFE CYCLE DATA INTEGRATION PROCESS



RAYCHEM Heat Tracing Solutions

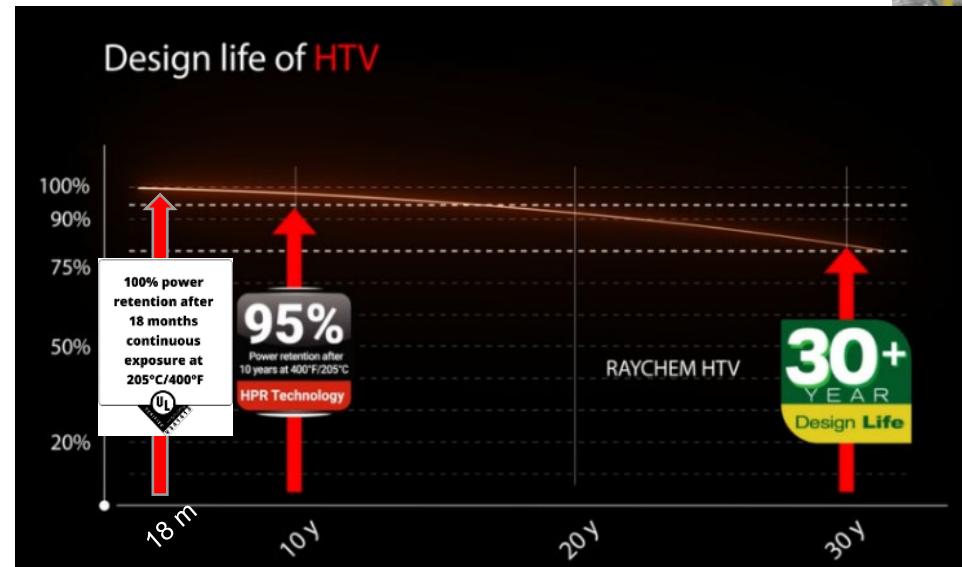
1. Heating Cables with superior performance & long life

- **Self-regulating heaters** with High Power Retention technology (HPR)
 - Based on newest polymers, manufacturing methods, and nano-technology
 - Up to 260°C / 500F

XTVR



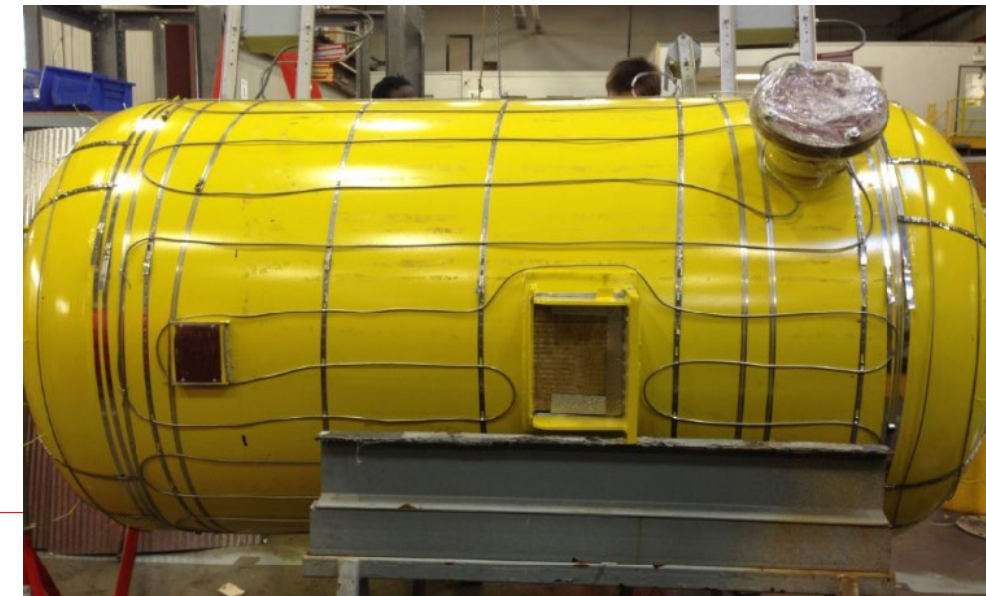
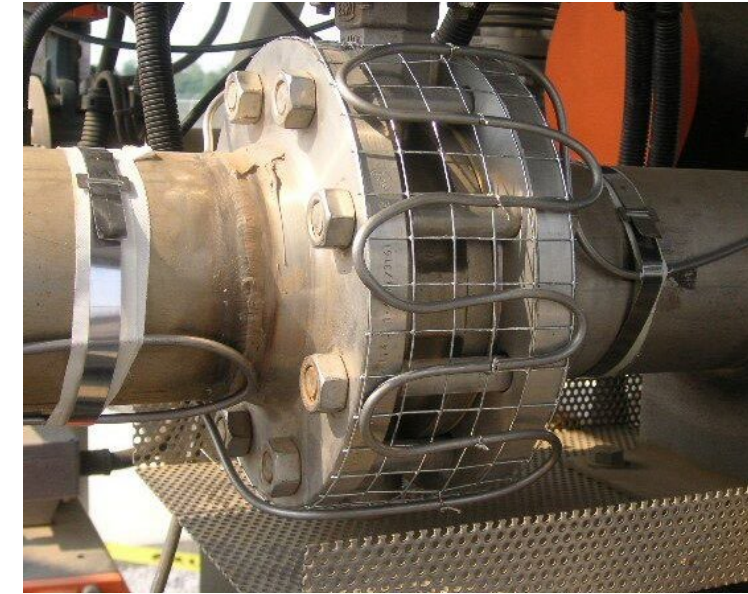
HTV



RAYCHEM Heat Tracing Solutions

1. Heating Cables with superior performance & long life

- **Mineral Insulated (MI) heaters** with robust design
 - Up to 650°C / 1200F or more



RAYCHEM Heat Tracing Solutions

1. Other Products

Instrument winterization /
tubing bundles



Fluid leak detection
(TraceTek)



Large tank insulation
(TracLoc)



RAYCHEM Heat Tracing Solutions

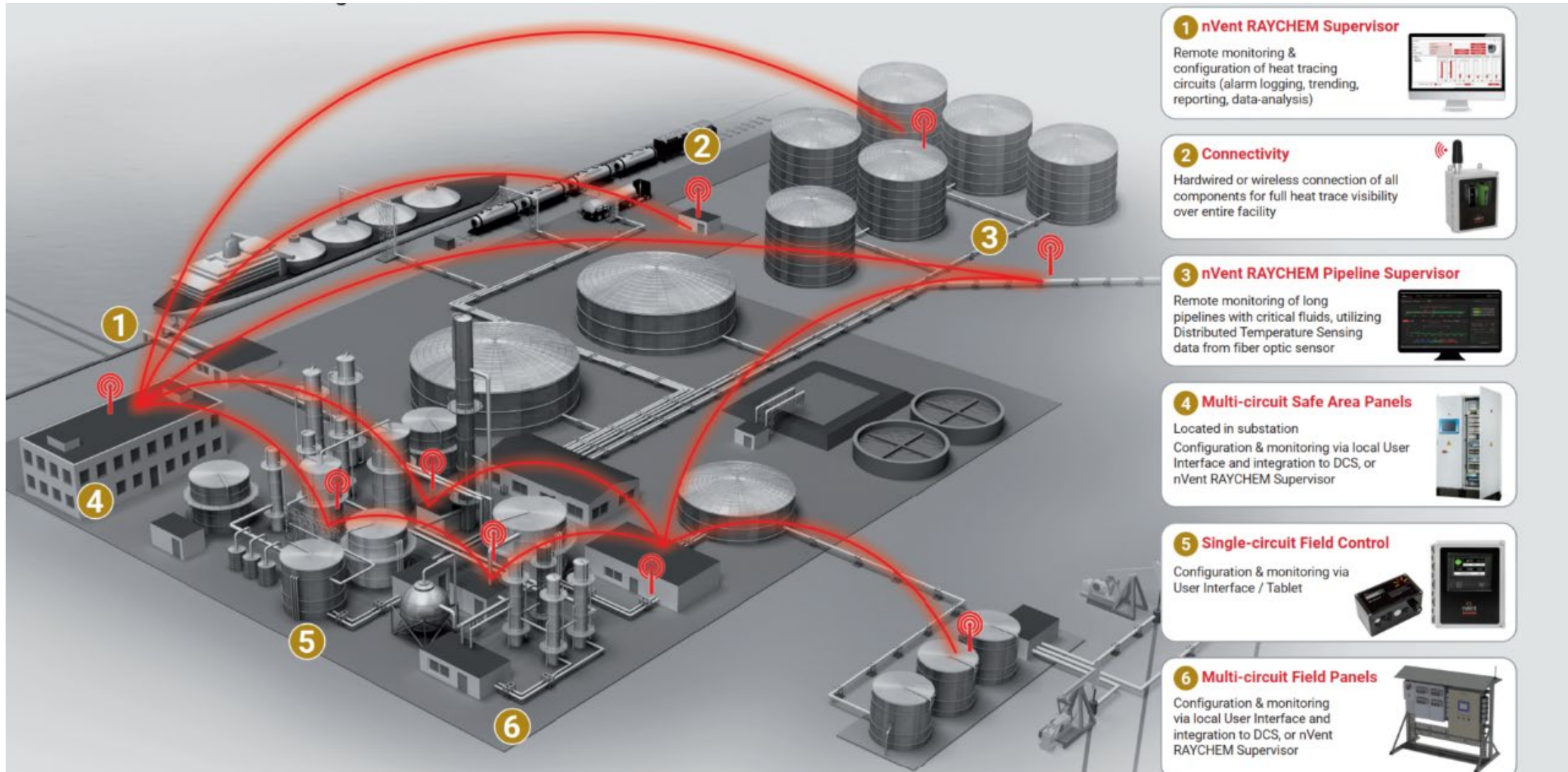
2. Advanced Control & Monitoring

- Clients focus on
 - Carbon Footprint
 - Energy Savings
 - Alarm Management
 - Data Analysis ...
- How can we help?
 - Remote supervision / Integration to DCS system
 - Data Analysis / Alarm Management / Fast Response / Reduced downtime
 - Optimized designs with TracerLynx 3D software
 - Thermal insulation recommendations



RAYCHEM Heat Tracing Solutions

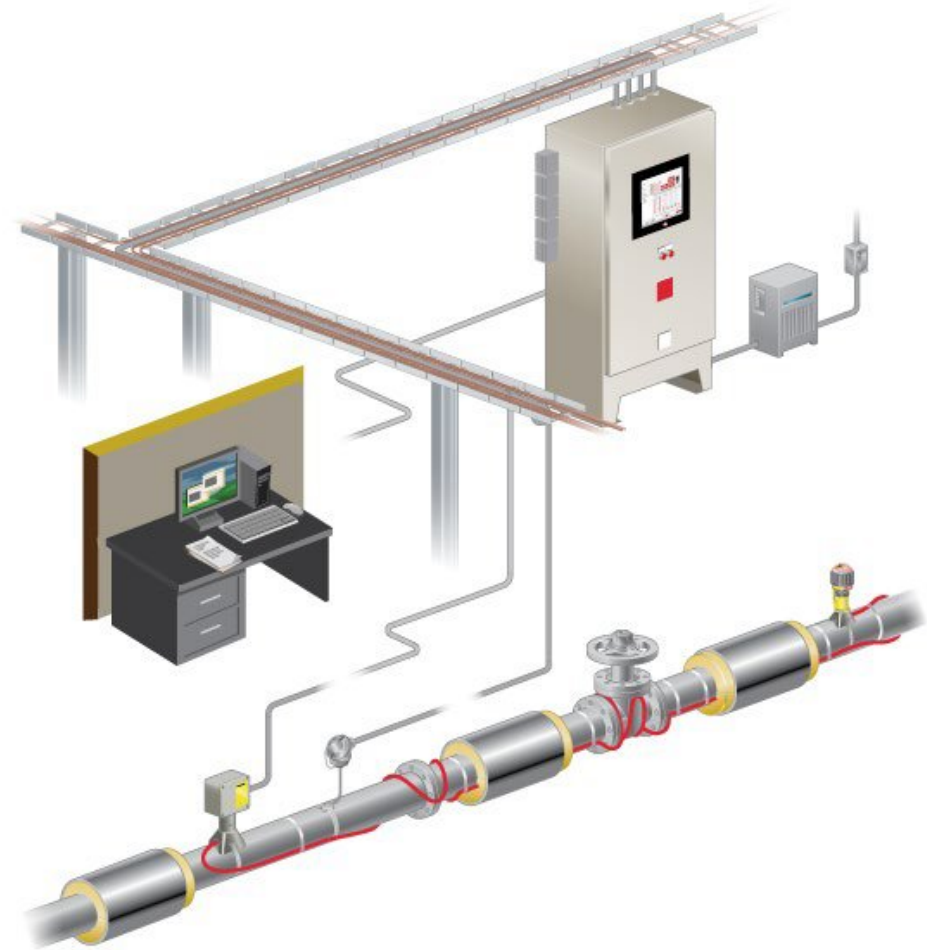
2. Advanced Control & Monitoring



RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management

- Designing a complete EHT system is **complex**, and requires knowledge on
 - mechanical
 - electrical
 - heat transfer
 - process aspects
 - and more...
- EHT systems consist of:
 - Engineering & Design
 - Heating Cables, Connection kits
 - Power Distribution
 - Control and Monitoring / Supervisory Software
 - Thermal Insulation
 - Life Cycle Services & Training
 - ...



RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management

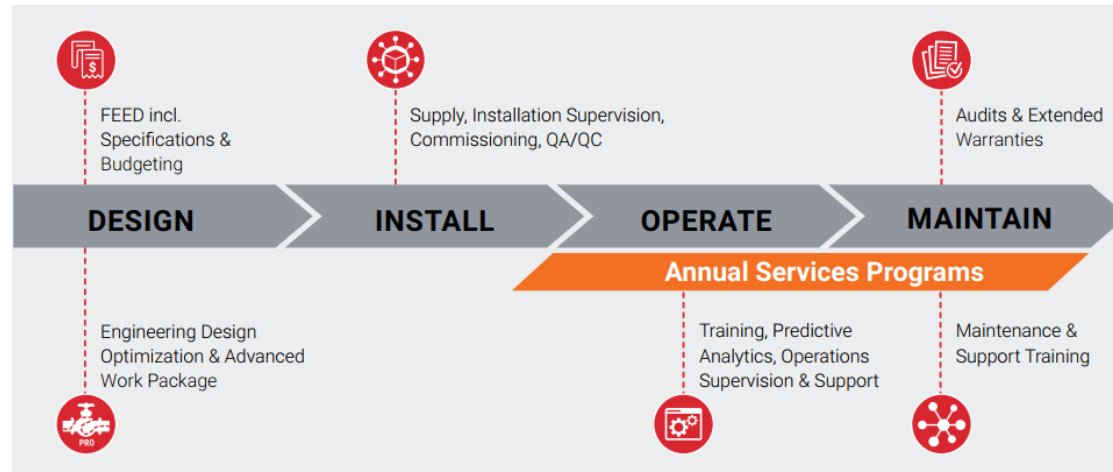
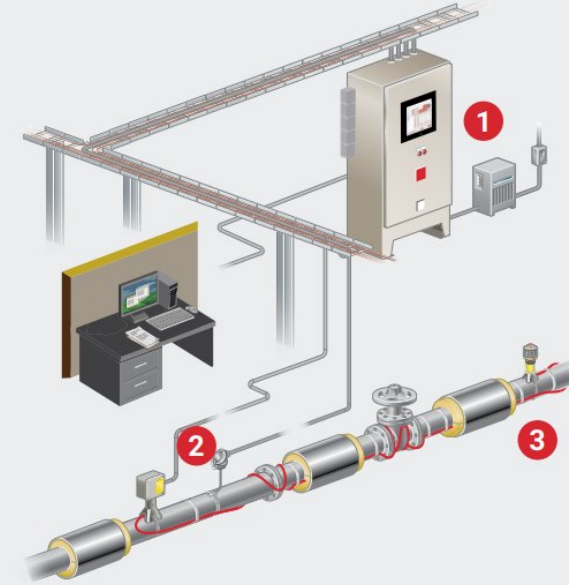
- Designing complete HMS is complex and requires knowledge on:

- Mechanical,
- Electrical,
- Heat transfer
- Process aspects, ...

- We support clients throughout the entire life cycle

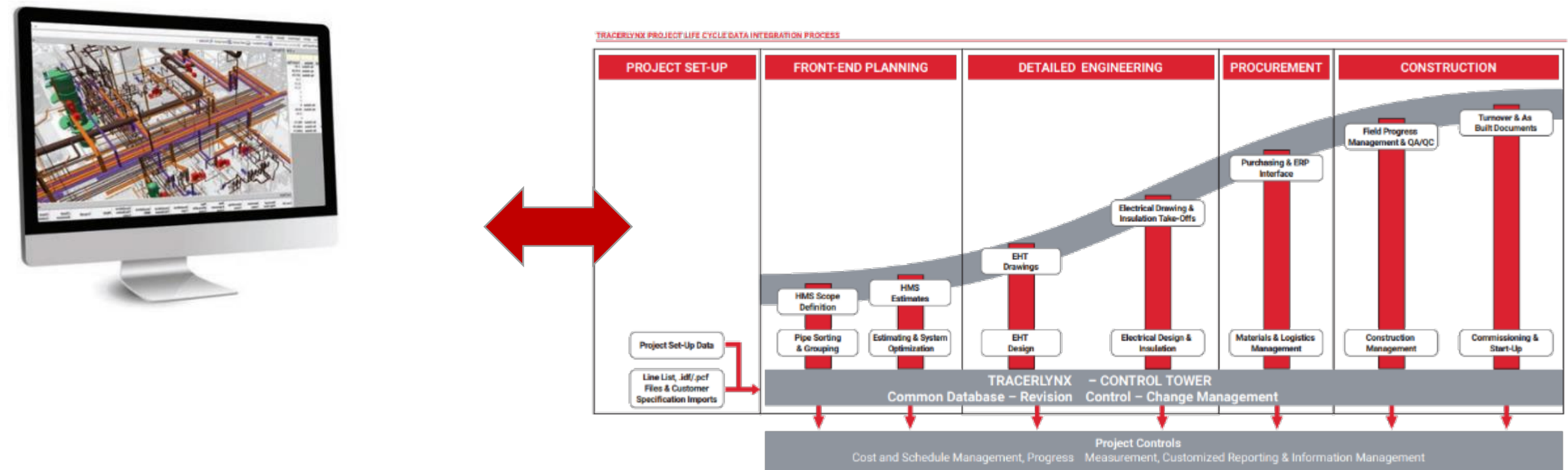
Heat Management Solutions include

- **EHT Systems**
Power Supply, Control & Distribution Panels (1), EHT Circuits (2), Thermal Insulation (3), ...
- **EHT Services**
Engineering & Design, Procurement, Construction & Commissioning, Maintenance & Audits, Training, ...
- **EHT Documents**
P&ID's, Calculations, Isometrics, Line Lists, ...



RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management with TRACERLYNX



TracerLynx in numbers...

17+
Years of 3D
Design Expertise

215+
TracerLynx
EHT Designers

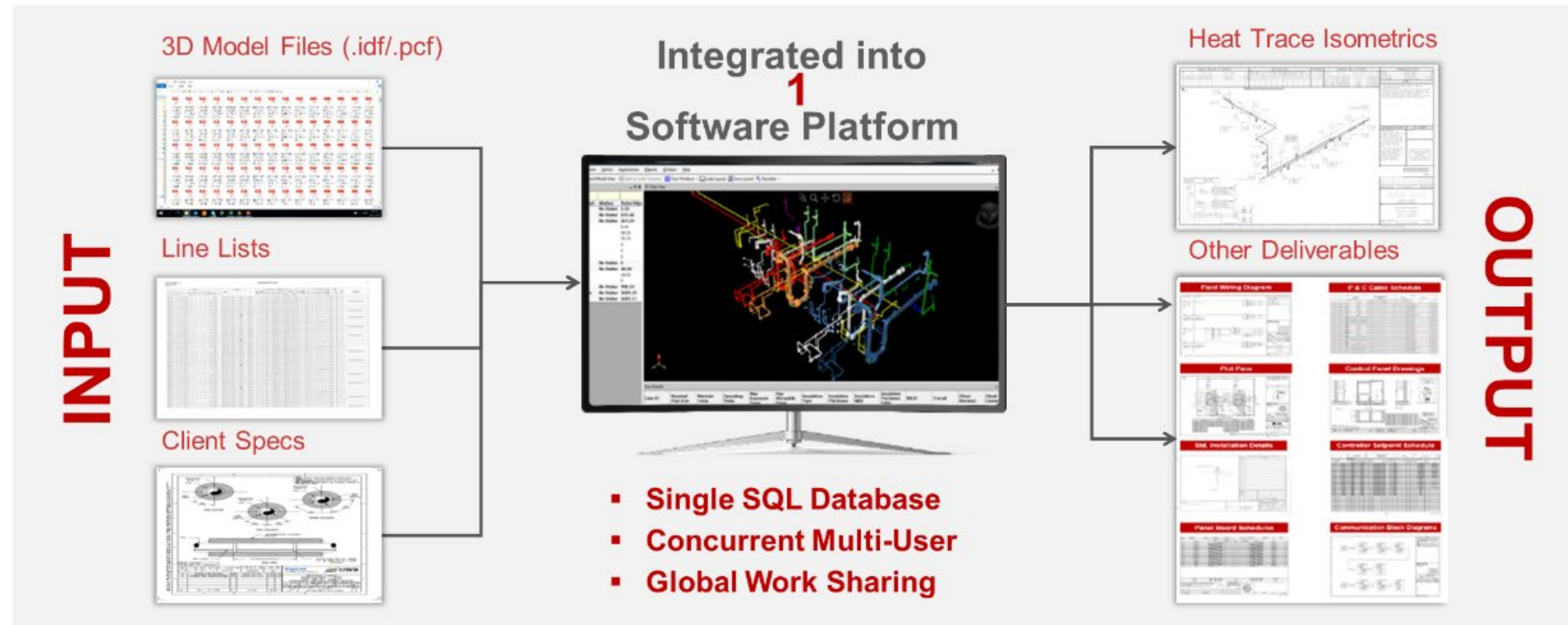
550,000+
Optimized
EHT Circuits

RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management with TRACERLYNX



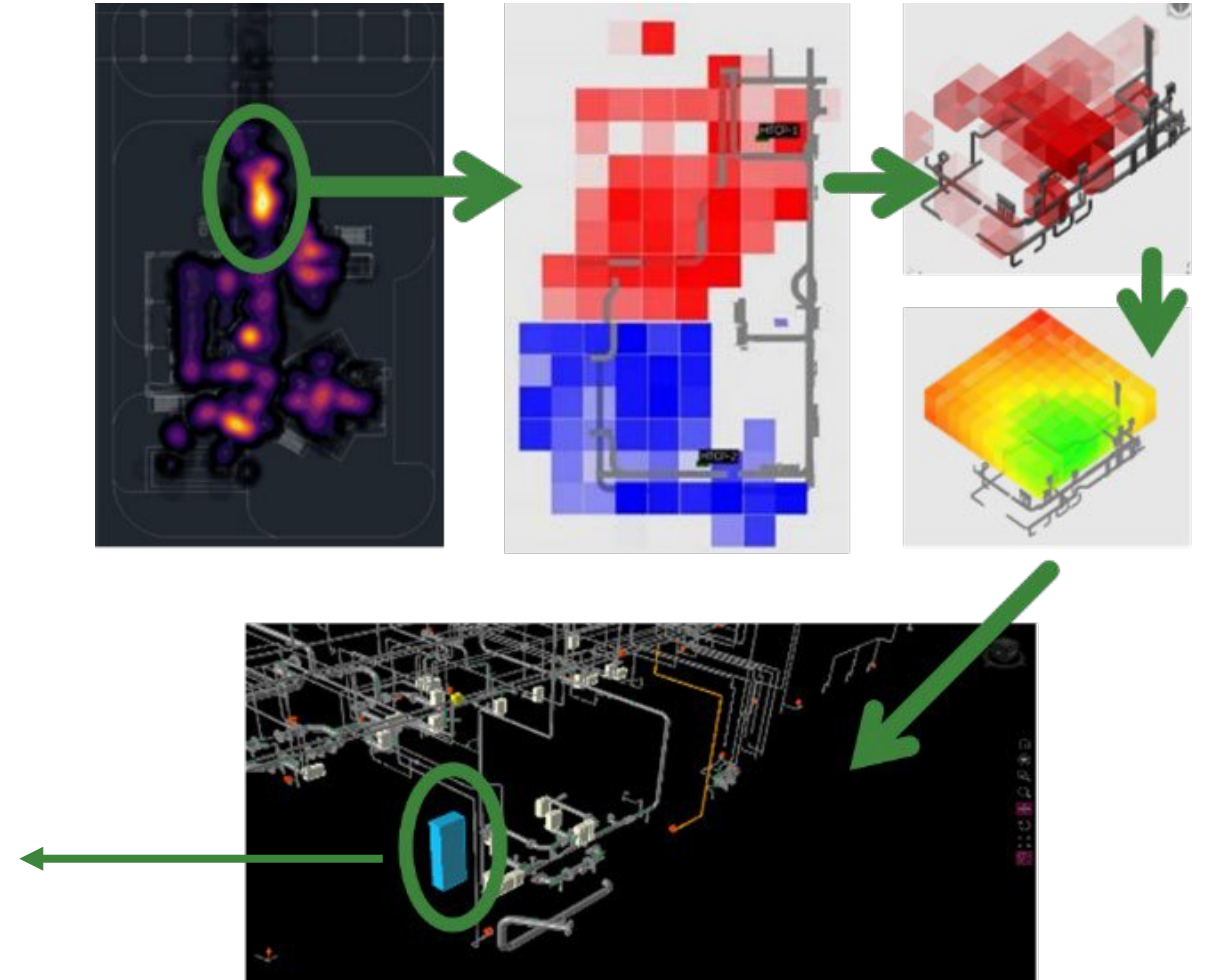
✓ Singular Platform



RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management with TRACERLYNX

✓ Heat Mapping Technology



RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management with TRACERLYNX



✓ Change Management

Model Data File Conflicts

New (blue) pipe is only found in new files. In this case, the tie-in that was part of the old file has been removed and replaced with a straight section of pipe.

Conflicting (yellow) pipe is common to both new and old files.

Existing (green) pipe is only found in old files.

Legend	New Files	Old Files In Conflict With New
New	Filename: CL-540007_PAE.IDF Created: 2/10/2008 9:01:00 PM Last Modified: 2/10/2008 9:01:00 PM	Filename: CL-540007_PAE.IDF Created: 2/10/2008 9:01:00 PM Last Modified: 2/10/2008 9:01:00 PM
Existing		
Conflicting		
Removed		

Created Date: 2/10/2008 9:01:00 PM
Last Modified: 2/10/2008 9:01:00 PM
Count of Flanges: 3
Count of Supports: 0
Count of Instruments: 0
Count of Valves: 1
Total Through Length: 1308.73 mm

Created Date: 2/10/2008 9:01:00 PM
Last Modified: 2/10/2008 9:01:00 PM
Count of Flanges: 5
Count of Supports: 0
Count of Instruments: 0
Count of Valves: 1
Total Through Length: 1503.04 mm

System	Drawing Number	Revis	Filename	Stat	Last M
TE1-Other Phases-07	CL-540007_PAE-01001-ECOOK	1A	CL-540007_PAE-01001-ECOOK_r1A.dwg	DIP	ecook

Here, Lynx lists all existing circuits that will be affected if you import the new file. The associated pipe system is also highlighted in the Pipe Systems hierarchy after your import.

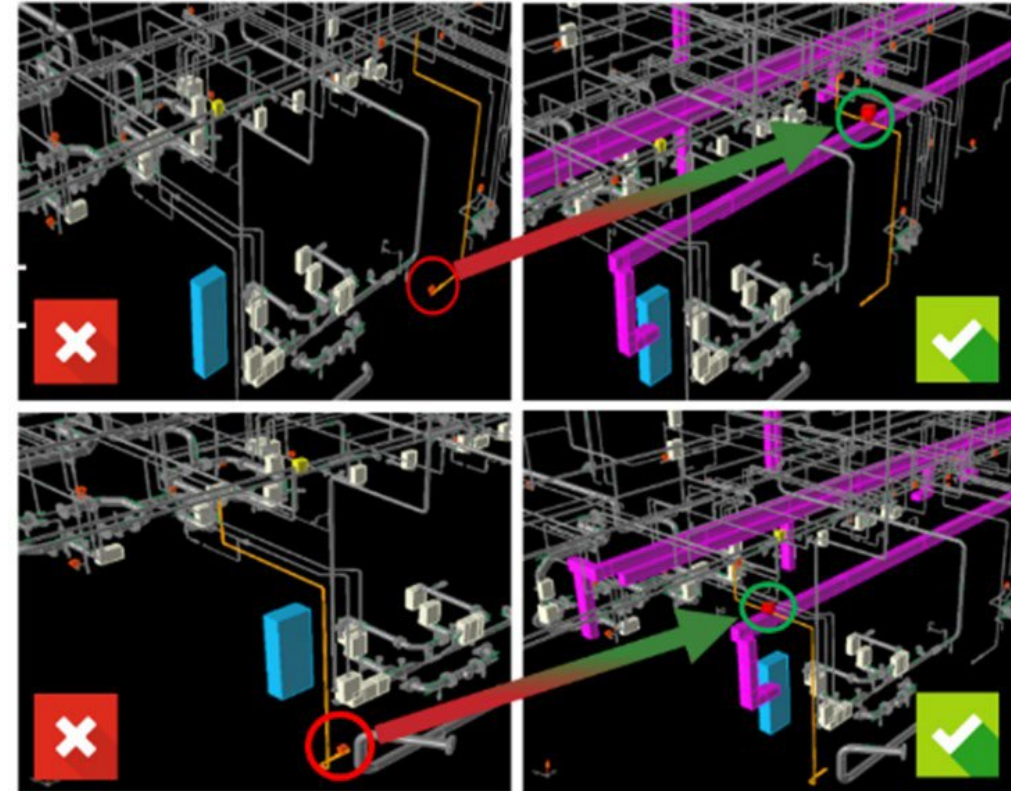
Import New Keep Old Close

RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management with TRACERLYNX



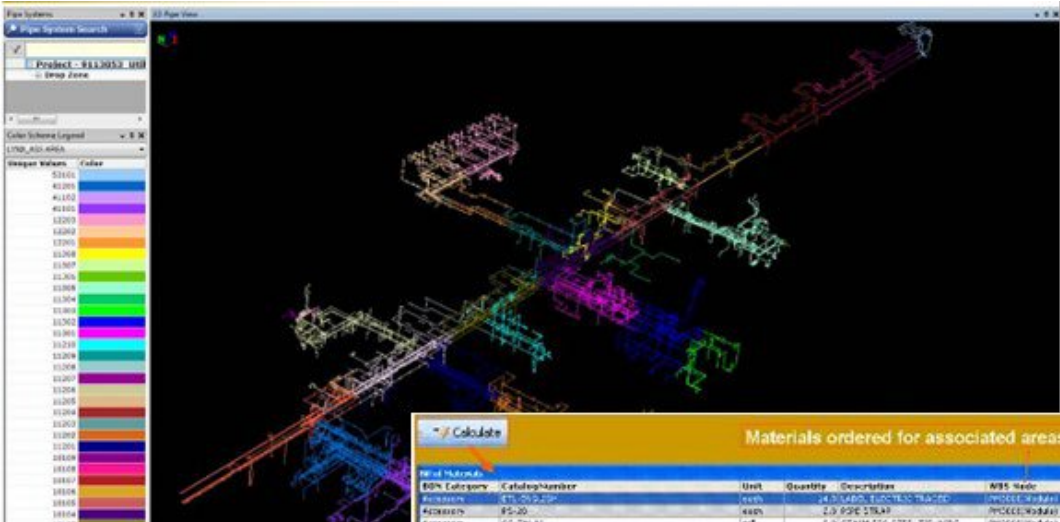
- ✓ Power Distribution Optimization



RAYCHEM Heat Tracing Solutions

3. Turnkey Project Management with TRACERLYNX

✓ Advanced Work Packaging



TRACERLYNX Benefits

Simplify

Project Management

Compress

Design Schedules

Optimize

Power Distribution

Maximize

Project Profitability

Materials ordered for associated areas/modules

Item Category	Category Number	Unit	Quantity	Description	WBS Node
Accessories	15-001-001	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-002	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-003	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-004	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-005	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-006	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-007	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-008	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-009	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-010	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-011	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-012	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-013	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-014	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-015	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-016	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-017	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-018	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-019	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)
Accessories	15-001-020	each	2.0	2.0" 304 SS. ELECTRIC TRACED	PROCESS (Module)



Agenda

- Introduction to heat tracing
- H2 and Carbon Capture industry
- Heat tracing solutions
- **Project References**

MISSION CRITICAL SOLUTIONS IN HYDROGEN



Energy Transition

We connect and protect

Grey H2 / SMR Plant at chemical park (USA)

PROJECT DETAILS



Location:
McIntosh, Alabama



Applications:
Pipe Freeze Protection, Process Temperature Maintenance, Instrument Winterization



Contract scope:
Engineering, product supply



Technology:
nVent RAYCHEM Self-Regulating w/ High Power Retention (XTVR), Power Limiting (VPL), Advanced Control & Monitoring



Completion date:
2024

- Global producer of industrial gases
- New SMR plant to support chemical industries
- **RAYCHEM EHT solutions:**
 - Keep critical applications running,
 - Prevent condensation in gas pipelines,
 - Protect / winterize instruments,
 - Provide energy efficiency and operational reliability with advanced C&M
 - Include site services



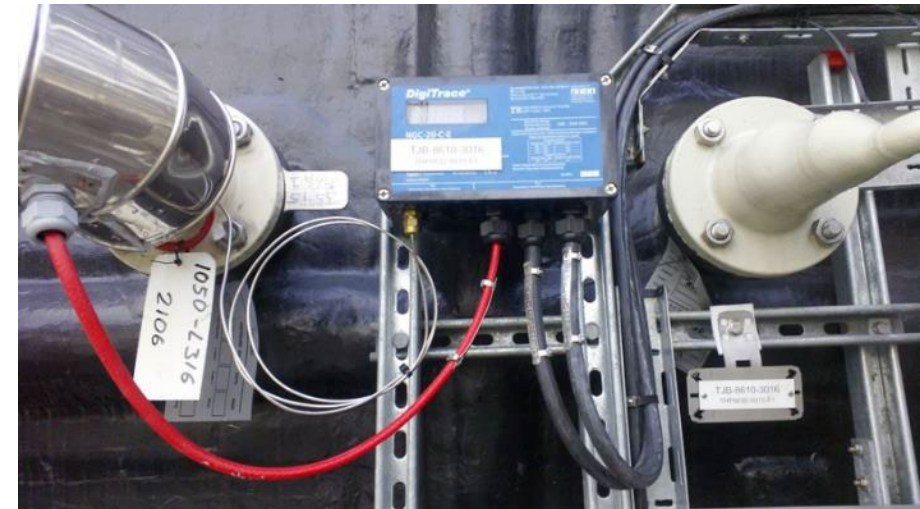
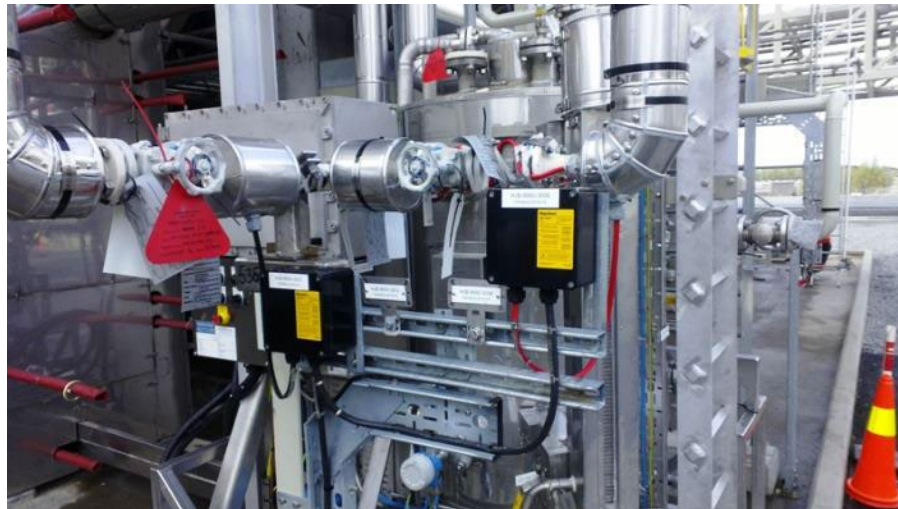
Grey H2 / SMR at Chemical Park (Hungary / 2023)

- Air Liquide technology - SMR-X hydrogen generation
 - Less Steam
 - Greater efficiencies
 - Lower CO2 emissions
- **RAYCHEM Heat Tracing on:**
 - PSA unit piping
 - Chemical feed stations
 - Steam condensate lines
 - Flare gases
 - Utility water systems
 - Cooling
 - Waste water
 - Fire water system
 - Amine system (CCS demo unit - phase 1 grey to blue H2)



Blue H2 / CCS unit in Refinery (Norway)

- **World's largest facility** for testing & development of CCS, operational since 2012.
- **RAYCHEM heat tracing**
 - On amine lines, utilities, instruments, fire fighting systems, ...
 - Prevents contamination (like wax) to clog the pipes + protects against freezing



Blue H2 / Canada's 1st world scale CCS plant in Refinery (1M T/y capacity)

PROJECT DETAILS

	Location: Scotford, Alberta Canada		Technology: nVent RAYCHEM Skin-Effect Longline Tracing (STS), Self-Regulating (BTV, XTV), Mineral Insulated (XMI), Advanced Control & Monitoring
	Applications: Pipe Freeze Protection, Process Temperature Maintenance, Longline Heating, Instrument Winterization		Completion date: 2015
	Contract scope: Product Supply and Instrument Winterization		



■ RAYCHEM Heat Tracing:

- Cables SR (52k ft / 16km), XMI (19,3k ft / 6km)
- Controllers NGC-40's (7 skids incl PD)
- STS long line (amine line)
- Instrument enclosures, tubing bundles

EHT Application	Operating T °C (°F)	Maintain T °C(°F)	Products
LP, MP, HP Steam and condensate	65-400 (150-750)	10 (50)	XTVR, HTV, XMI
Cooling Water	65 (150)	10 (50)	
Boiler feedwater	111 (232)	10 (50)	
Process water	38 – 62 (100 – 144)	10 (50)	
Utility water	10-49 (50-120)	10 (50)	
Flare System	150 (300)	10 (50)	
Process Gas Lines	65-400 (150-750)	10 (50-110)	XTVR, HTV, XMI
Process Condensate	150 (300)	10 (50)	
Natural Gas	50 (120)	10 (50)	
Domestic Water	10 (50)	10 (50)	
PSA Purge Lines	40-70 (104-160)	10 (50)	
Instrument Air	57 (135)	10 (50)	

Carbon Capture / BioFuels Industry (USA)

PROJECT DETAILS



Location:

Iowa, Minnesota, Nebraska, North Dakota, South Dakota



Applications:

Pipe Freeze Protection, Process Temperature Maintenance



Contract scope:

Engineering and product supply



Technology:

nVent RAYCHEM Self-Regulating w/ High Power Retention (XTVR), Advanced Control & Monitoring, Supervisor Software



Completion date:

Ongoing



- CO2 from fermentation of corn will be captured, dehydrated, compressed, and stored underground
 - 30+ ethanol plants included
 - 18 Million metric tons of CO2/year
 - 2000 miles (3200kms) of pipeline
- RAYCHEM EHT engineering ongoing



Carbon Capture / World's 1st CCS in Cement industry (Norway)

PROJECT DETAILS



Project:

Construction of full-scale carbon capture & storage (CCS) plant by a global cement manufacturer



Location:

Brevik, Norway



Applications:

Pipe freeze protection, process temperature maintenance (50°C/120°F)



Contract scope:

Engineering and product supply



Technology:

6000 meter (20k ft) of HTV cable + 1000 meter (3.3k ft) of BTV cable and Raystat V5 digital thermostats

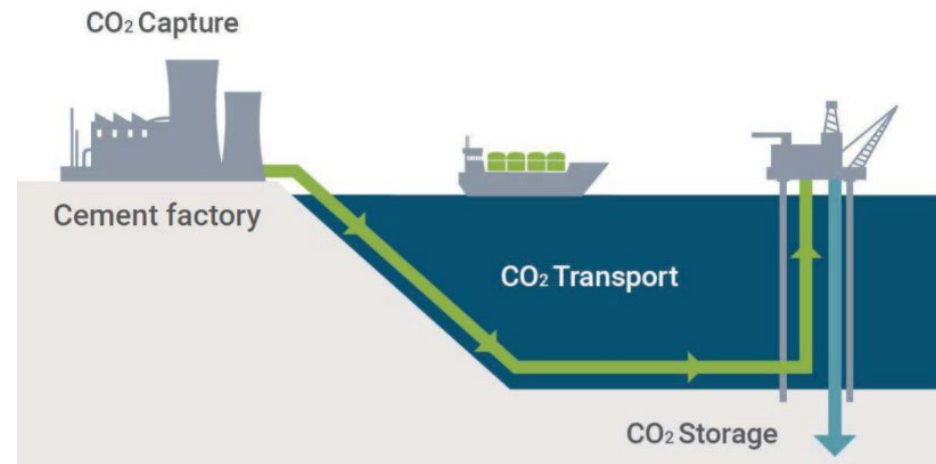


Completion date:

2024

- Hard-to-abate sector
 - Clinker (main ingredient in cement) made by heating limestone (CaCO_3) to extreme T°C.
 - CO₂ emissions unavoidable.
- RAYCHEM heat tracing maintains temperature of amine lines + freeze protect

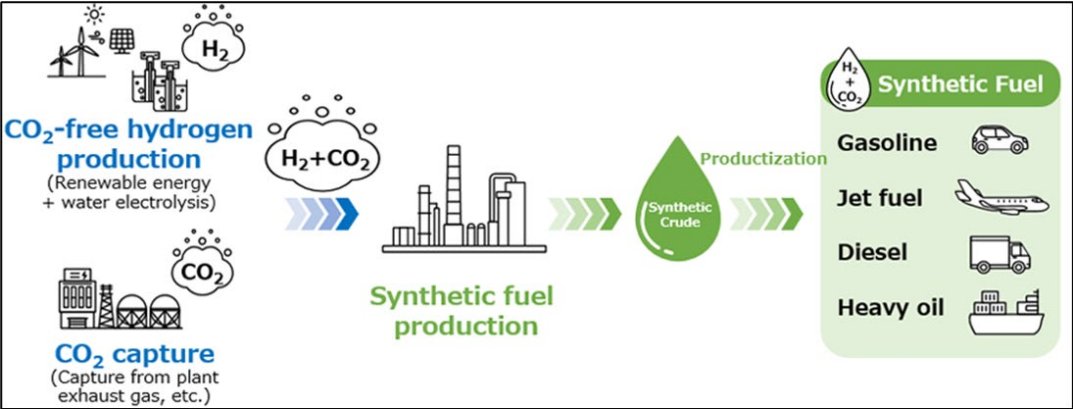
Mission Critical Solutions in the cement industry



Green H2 / e-methanol production (Bilbao, Spain)



- Synthetic e-fuels plant (Fischer-Tropsch process), for maritime and aviation fuels.
- RAYCHEM heat tracing
 - 2.5 km pipes + 160 Instruments + 16 vessels to be traced
 - 7-8 km of EHT / ~300 circuits / Temp: 60-400°C / 140-750F
 - SR technology, VPL, and MI
 - Main fluids traced:



Fluid Code	DESCRIPTION
AM	AMINE
AT	ATMOSPHERE
DC	HYDROCARBON DRAINAGE
DP	PROCESS AND CHEMICALS DRAINAGE
F	FLARE
IN	INHIBITOR OR ANTIFOAM
N	INERT GAS
OW	OILY WATER
P	PROCESS FLUID (GAS, VAPOR OR LIQUID), HYDROGEN, CAUSTIC SODA, ACID WATERS
R	CONNECTING LINE BETWEEN EQUIPMENT AND PSV
RV	DISCHARGE TO ATMOSPHERE FROM PSV
SC	COLD CONDENSATE
SL	LOEW PRESSURE STEAM
VT	VESSEL TRIM
FLO	FLUSHING OIL

Green H2 / Electrolysis Plant at Refinery (Germany)

PROJECT DETAILS



Location:
Rheinland Refinery, Wesseling, Germany



Applications:
Pipe Freeze Protection



Contract scope:
Engineering, product supply



Technology:
nVent RAYCHEM Self-Regulating



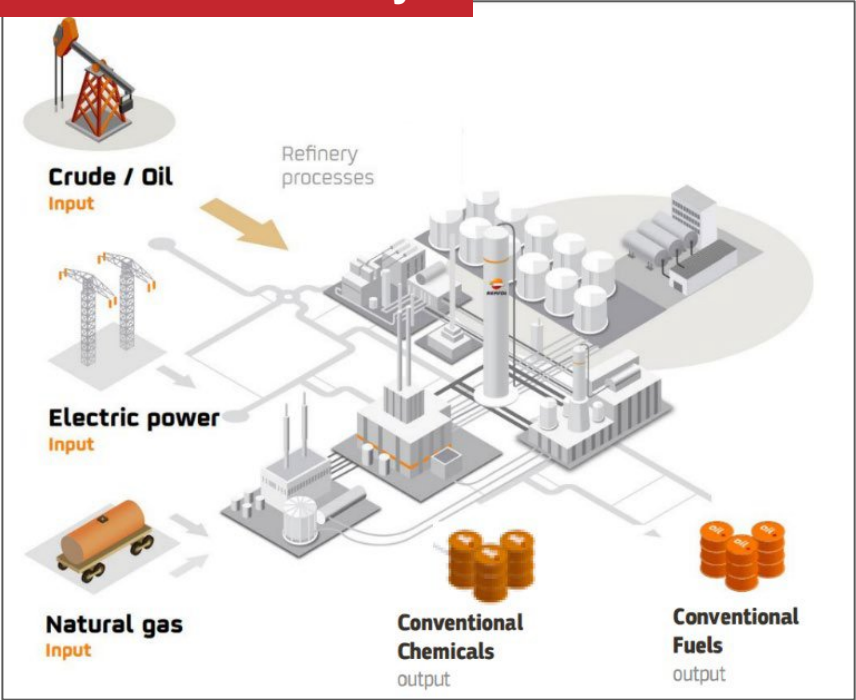
Completion date:
2021



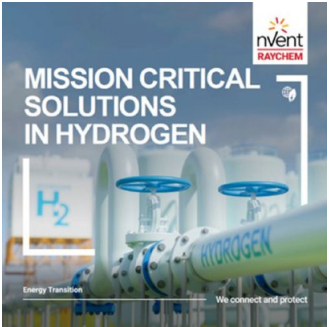
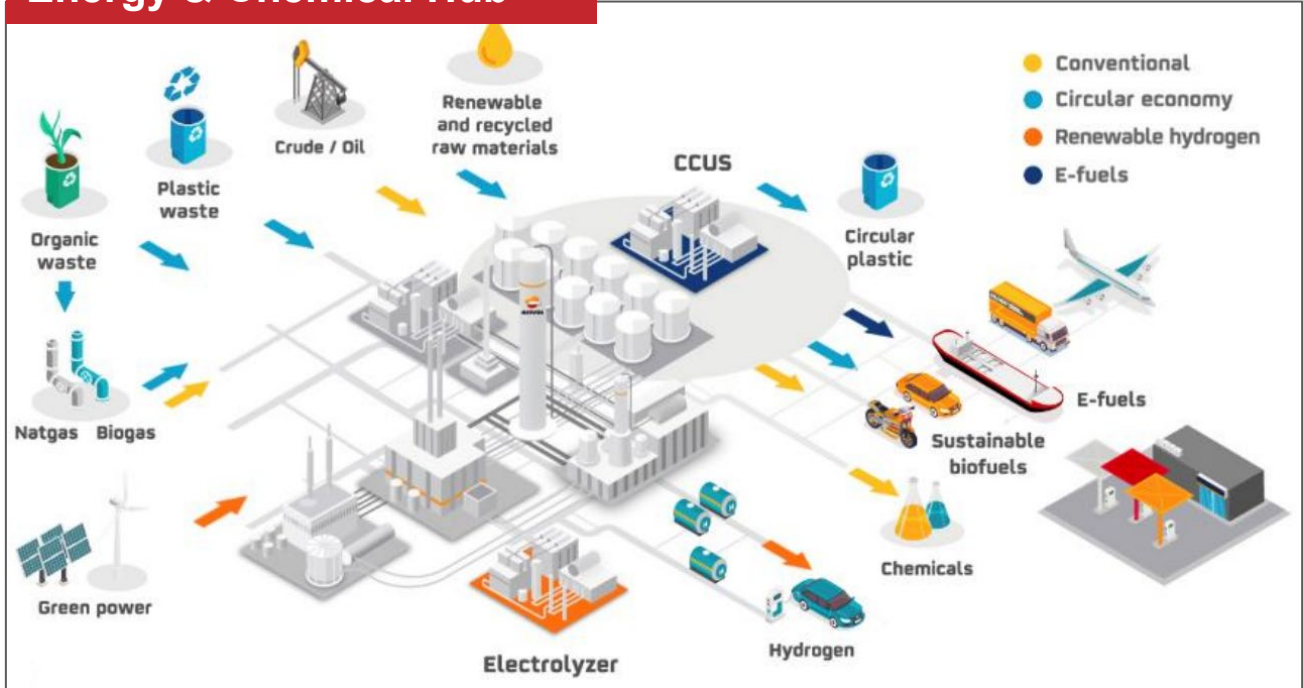
- Client plans to transform its 14 refineries into 6 global energy hubs, with green H2 and CCUS additions.
- Two pilot projects with electrolysis
- RAYCHEM freeze protect solutions + heat-up on dryers, deoxo units

Energy Transition / Move to integrated low carbon Energy & Chemical Hubs

Traditional Refinery



Energy & Chemical Hub



Any Questions ?

Contact us:

Koen.Verleyen@nvent.com

Shaimaa.Obaid@nVent.com



Thank You !



MISSION CRITICAL SOLUTIONS IN HYDROGEN



Energy Transition

We connect and protect



MISSION CRITICAL SOLUTIONS IN CARBON CAPTURE & STORAGE



Energy Transition

We connect and protect