



DMX™ : Axens Technology for Post-Combustion CO₂

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Vice-President Decarbonization & Consulting

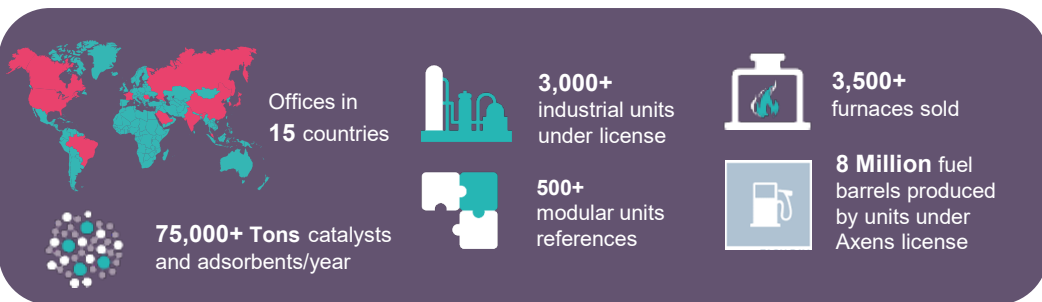
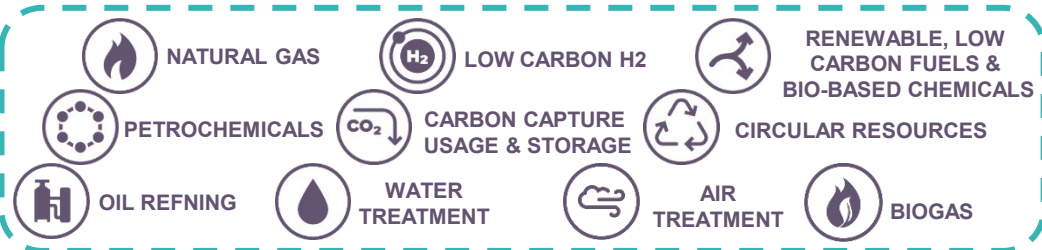
Axens
Powering integrated solutions

Axens in Brief

Company Profile

- Technology provider for natural gas, carbon capture, renewable fuels, bio-based chemicals, refining, and petrochemical industries
- Catalyst & absorbent manufacturer
- Ownership structure: 100% IFPEN

Business Areas



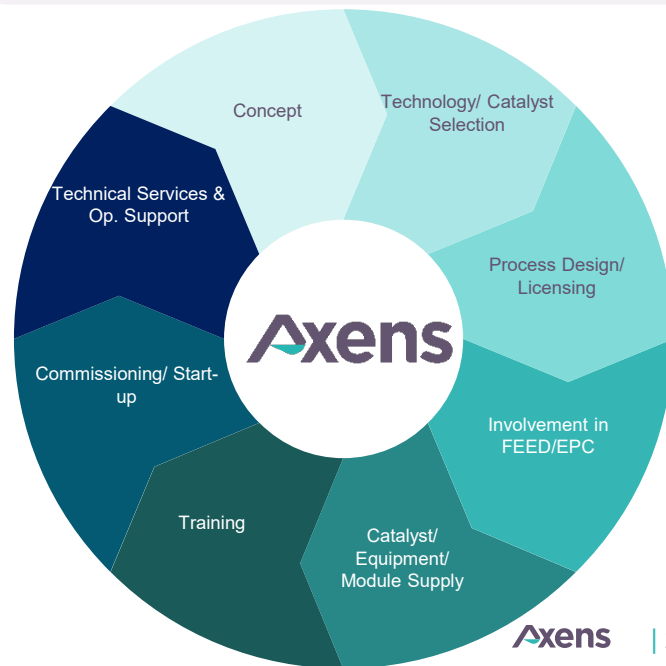
Axens Offer

Integrated solution
Covers entire value chain

Axens
HORIZON

Axens
SOLUTIONS

Heurtey
Petrochem
SOLUTIONS



Transition to a Lower Carbon Economy: a Large Range of Solutions

ENERGY TRANSITION/CLIMATE CHANGE



Energy Efficiency

- Energy Efficiency & Low-Carbon Site Audit
- Consulting Offer for Decarbonization
- High Efficiency Equipment
- Electrical Heaters
- Optimized Heater Efficiency
- Digitalization
- CEED, Custom & Efficiency Early Design



Renewable, Low Carbon Fuels & Bio-Based Chemicals

Low Carbon Fuels

- Co-Processing
- Vegan® (HEFA)
- BioTfuel® (gasification & FT)
- Jetanol™ (ATJ)

Petrochemicals Intermediates

- Futurol® (Advanced Ethanol)
- Atol® (bio-ethylene)
- BioButterfly™ (bio-butadiene)
- Bio-TCat™ (bio-aromatics)
- 2G Sugars



Low Carbon Hydrogen

- Blue Hydrogen: Grey Hydrogen & CO2 Capture
- Hydrogen Purification
- Hydrogen Transportation (LOHC)



Carbon Capture & Storage

- Pre-Combustion: Advamine™
- Post-Combustion: DMX™
- e-Fuels



Joining Forces to Develop Innovative Solutions & Together Contribute to a Lower Carbon Economy

DURABILITY OF RESOURCES



Circular Resources

- Plastic Recycling
 - TAC | PLASTIC ENERGY
- Tire Recycling
- Metal Recycling
- Battery
- Catalyst Pool Management
- Spent lube-oil reprocessing

POLLUTION



Air Treatment

- Air Pollution Control

FLOWVISION
An Axens Group company

- Water Purification with a Large Portfolio of Adsorbents
- Industrial Waste Water Treatment

HydroThane
An Axens Group company

- Sulfur recovery
SulShine

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 Revivoil™

POLLUTION



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- Industrial Waste Water Treatment



- Sulfur recovery
 SulShine

CO₂ Capture Technologies

AdvAmine™

for Pre-Combustion Carbon Capture



Natural Gas/Syngas (High Pressure)

(incl. Blue H₂ production)

■ References



- ▶ Equinor - Sleipner
- ▶ Oxochimie / BioTfuel® – France – Syngas
- ▶ More than 250 references since late 50s

DMX™

for Post-Combustion Carbon Capture



All types of Flue Gas (Atm Pressure)

■ References



- ▶ IFPEN : European Projects (Octavius & Valorco)
- ▶ ArcelorMittal - 3D Project - Dunkirk
- ▶ Unmatched experience & commitment since 2010

1. DMX™ Technology Description

Introducing Axens' DMX™ process

- **Solvent development** for gas treatment and CO₂ capture is in the **IFPEN group DNA**
- Advamine™ process – Acid Gas / CO₂
Over 250 references since late 50s
Large AGR Units running worldwide



DMX™ Mini-pilot unit
IFPEN, Solaize
0.5 kg/h CO₂ capture

DMX™:
One technology, end to end support

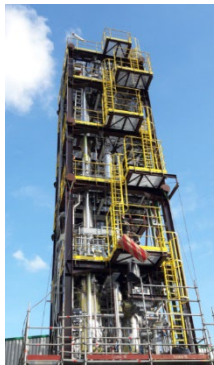
- IFP Group expertise
- Mobile pilote
- Tailor-made carbon capture - Large-scale units
- Modular Solutions
- Tech Services

1960

2010

2021 - 2024

2025



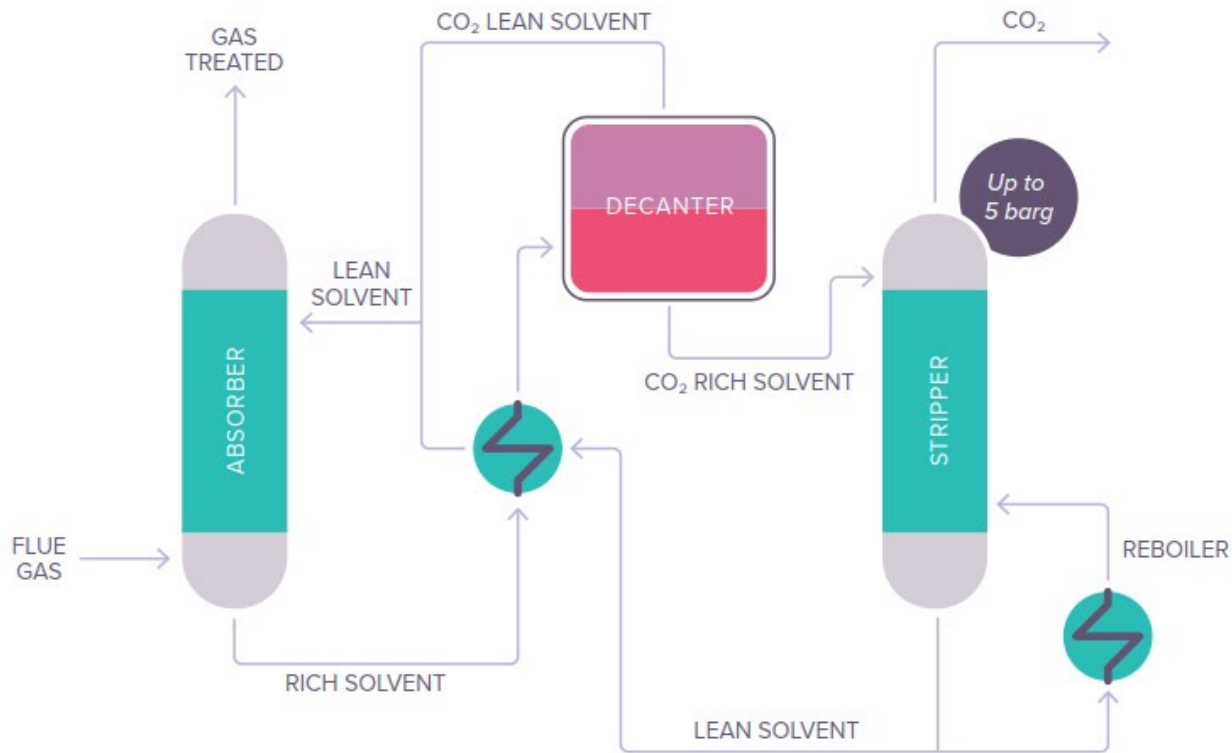
DMX™ demonstration plant
Arcelor Mittal, Dunkerque
0.5 t/h CO₂ capture



Successful demonstration of the technology

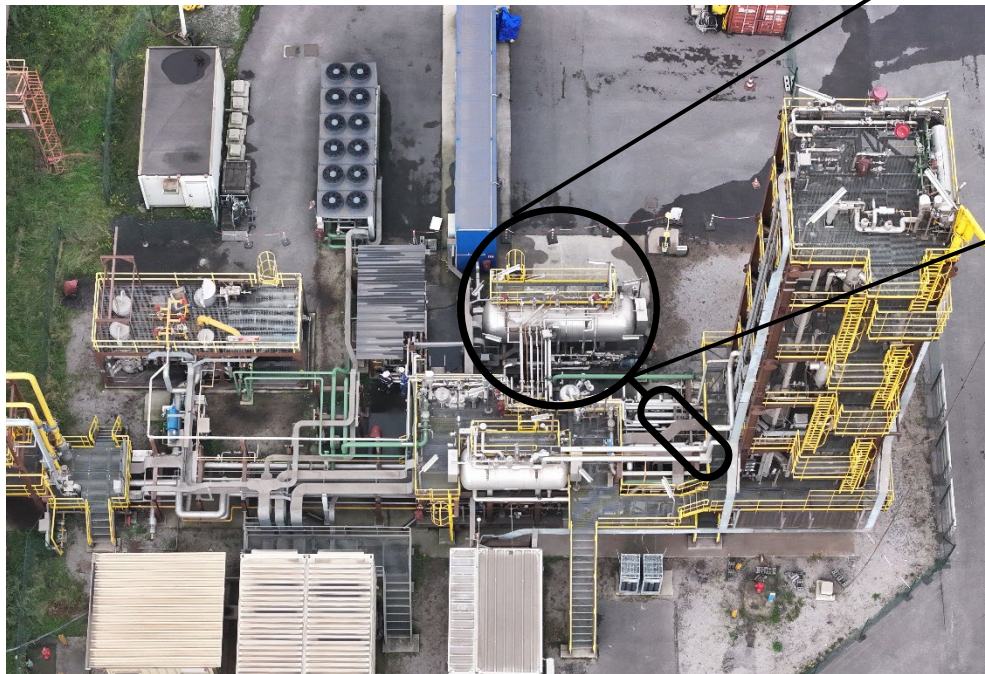
DMX™ from Flue Gases to CO₂

DMX™ demonstration plant
Arcelor Mittal, Dunkerque
0.5 t/h CO₂ capture



Flue Gas CO₂ Capture - DMX™ Process, a demonstrated technology

A new **demixing** solvent



Industrial Demonstration unit
2 Years of Operation
(September 2022 – December 2024)

Successful demonstration of the technology

- ✓ **Performances**
- ✓ **Operability**
- ✓ **Robust simulation tool**

DMX™ from Flue Gases to CO₂

■ Commercially available

■ References

- ▶ ArcelorMittal - 3D Project - Dunkirk
- ▶ IFPEN Pilot - Solaize

■ Technology key features

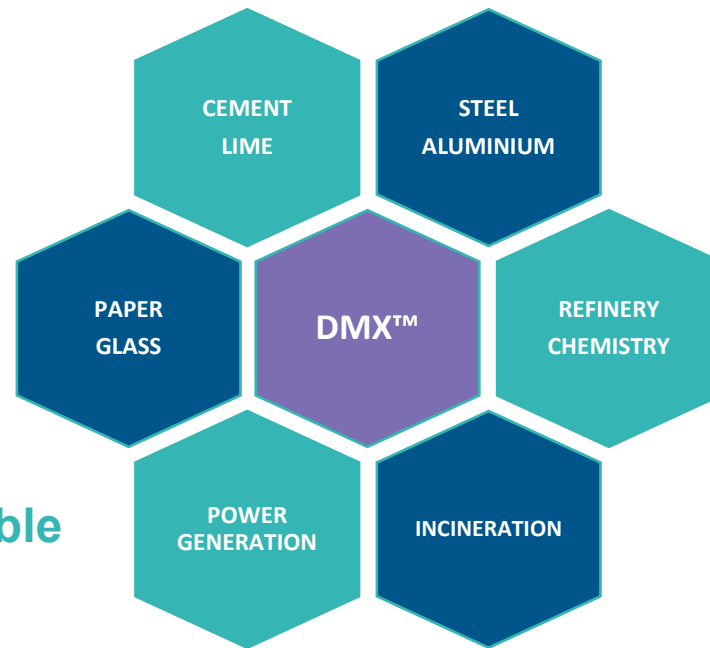
- ▶ CO₂ up to 5 bar g recovery
- ▶ Low energy consumption
- ▶ Proprietary solvent
 - ▶ with Demixing capability
 - ▶ Thermally stable
 - ▶ Low sensitive to oxygen
- ▶ High capture rate achievable
- ▶ High purity of produced CO₂



DMX™ Process: a versatile process

With its wide field of application

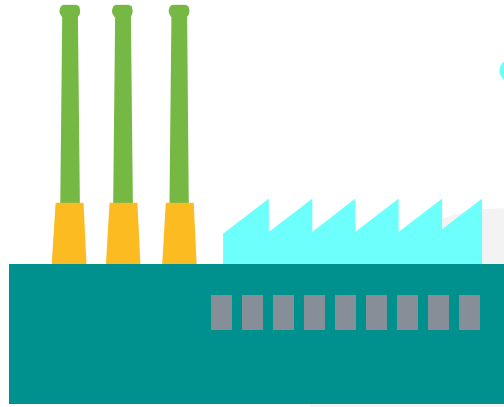
- Flue gases of varying qualities
- CO₂ concentration
- Wide range of flow rates



DMX™ CO₂ capture technology is applicable to many industries

2. Axens presence on the CCUS Chain

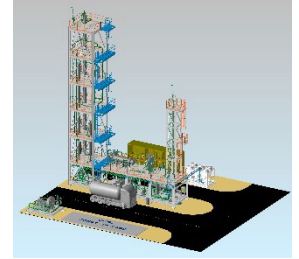
DMX™ - Carbon capture solutions available



Applicable for
a wide range of
flue gases

01

Mobile Pilot Unit



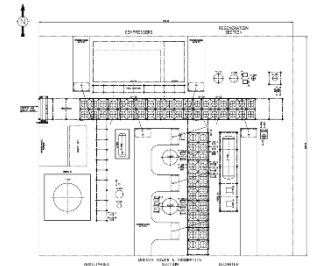
02

Modular Solutions for
small / medium emitters

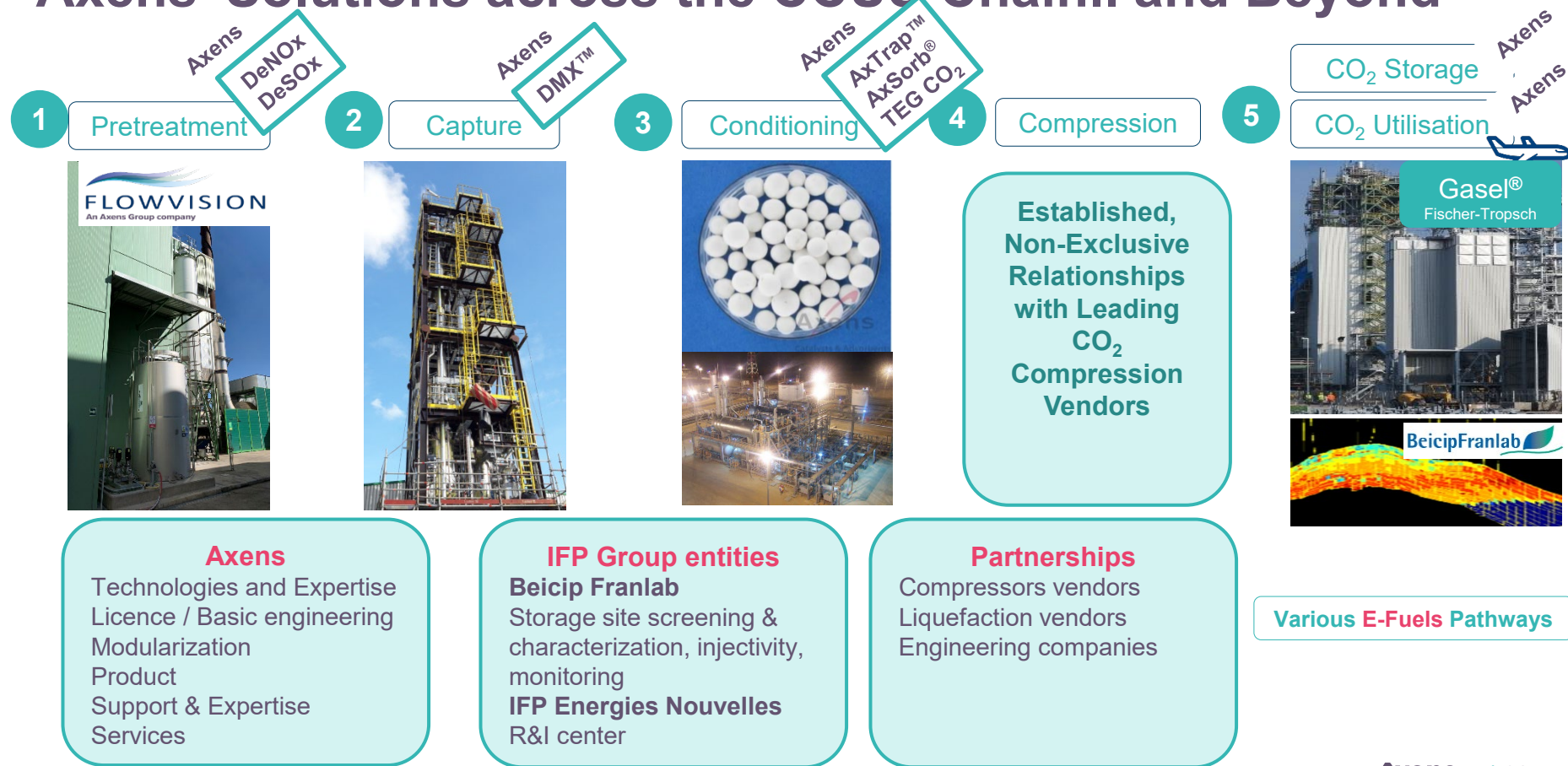


03

Tailor Made Large scale
carbon capture units

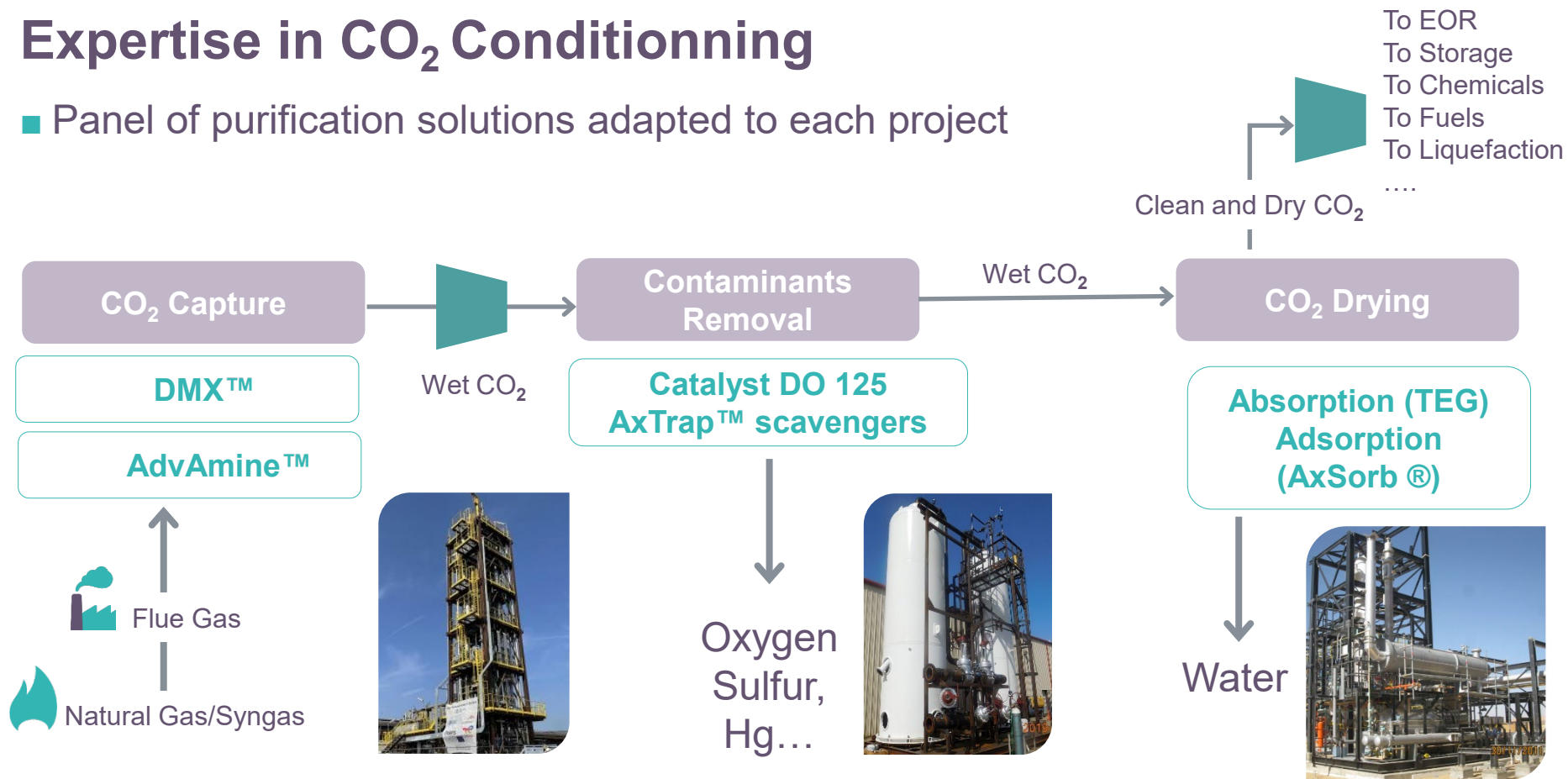


Axens' Solutions across the CCUS Chain.. and Beyond



Expertise in CO₂ Conditionning

- Panel of purification solutions adapted to each project



Conclusion

- Industrial demonstration unit (0.5 t/h) has been successfully operated from September 2022 – December 2024 in Arcelor Mittal plant
- DMX™ Carbon Capture is applicable to many industries
- 3 DMX™ Carbon Capture Solutions are available:
 - ▶ Mobile Pilot Unit
 - ▶ Modular Solution for small / medium emitters
 - ▶ Tailor Made Large Scale Carbon Capture Unit
- Axens is delivering a fully integrated customized solution across CCUS value chain... and Beyond

Axens
Powering integrated solutions



www.axens.net



Thank
you!