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Operational since April 2023 on ArcelorMittal's Dunkirk site, the industrial pilot for the capture of CO₂ present in blast furnace gases has delivered promising results. The objective of this pilot is to validate the DMX™ capture process, developed by IFP Energies nouvelles (IFPEN) and marketed by Axens, to enable the decarbonization of a whole range of industrial activities, including steelworks, cement plants, glassware manufacture, refining, chemicals and petrochemicals.

The industrial pilot was built and is being operated within the framework of two projects: the European H2020 "3D" project involving 11 European partners(1) including ArcelorMittal, Axens, IFPEN and TotalEnergies, and the DinamX project, supported by ADEME and bringing together these same four partners(2).

3D pilot: success of the first "parametric" test phase

The DMX™ process demonstration pilot has been operating in stable conditions since April 2023 to capture the CO₂ present in blast furnace gases emitted during steel production at ArcelorMittal's Dunkirk site. The objectives are to show the operability of the process, validate good energy performances, confirm the stability of the solvent and demonstrate the purity of the captured CO₂.

Results obtained since April 2023 are in line with expectations for the technology and confirm, even at this early stage, the efficiency and energy performance of DMX™ technology. A comprehensive series of operational tests has been conducted with the unit operating 24/7. CO₂ capture rates exceed 90%. The pilot unit produces CO₂ with a high level of purity (> 99.5%) while energy consumption remains remarkably low. Moreover, after thousands of operational hours, no solvent degradation has been observed in spite of the high concentrations of contaminants present in the gas treated.

For Vania Santos-Moreau, 3D and DinamX project manager *"After 15 years of development of this innovative technology at IFPEN from proof of concept through to the laboratory, we're proud to have demonstrated the performance of the DMX™ process for an industrial gas flow. It's all thanks to intensive teamwork, conducted with our partners since the launch of the 3D project back in May 2019. And it represents an important step towards the decarbonization of industry in France and around the world."*

Towards the marketing of DMX decarbonization technology

Developed and patented by IFPEN, the DMX™ process, a French technology marketed by Axens, uses an amine demixing solvent to capture CO₂ contained in the flue gases produced by heavy industries. Capture will be necessary in order to reduce industrial emissions.

The significant reduction in the energy required for the process and the excellent stability of the solvent make the DMX™ process a unique, innovative, efficient and flexible solution.

The marketing of a competitive French technology like DMX™ fits squarely with the CCUS strategy launched by the French government and will contribute to the country's national industrial decarbonization objectives.

For Clément Salais, manager of the CO₂ capture team at Axens, *"The step we've taken with this demonstrator is essential to enable Axens to commit to performance guarantees, and to support our customers in their future*

decarbonization projects.”

(1) Coordinated by IFPEN, the “3D” project brings together other 10 partners from research and industry from 6 European countries: ArcelorMittal, Axens, TotalEnergies, Air Products, Brevik Engineering, John Cockerill, DTU, Gassco, ETHZ and Uetikon. The 3D project was supported by the European Union’s Horizon 2020 research and innovation program (Grant Agreement No 838031).

(2) Dinamx project partners are IFPEN, Axens, TotalEnergies and ArcelorMittal. The 3D and DinamX projects are sponsored by Lhoist and Suez. The DINAMX project is supported by the French Investments for the Future Program (PIA) operated by ADEME.

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About IFPEN

IFP Energies Nouvelles (IFPEN) is a major research and training player in the fields of energy, mobility and the environment. From scientific concepts in fundamental research to technological solutions in applied research, the Institute’s activities are focused on innovation and hinged around four key priorities: climate, the environment and the circular economy, renewable energies, sustainable mobility and responsible oil and gas.

www.ifpennergiesnouvelles.fr

About Axens

Axens group (www.axens.net) provides a broad range of solutions targeting the conversion of oil and biomass into clean fuels, the production and purification of key petrochemical intermediates, the chemical recycling of plastics and the conversion and treatment of natural gas. Its range includes technologies, equipment, furnaces, modular units, catalysts, adsorbents and services. Axens also specializes in CO2 capture. Axens is ideally positioned to cover the entire value chain, from feasibility studies to the launch and monitoring of units throughout their life. This unique positioning enables the group to perform to the highest level, while reducing its carbon footprint. Axens’ global offer hinges around highly qualified personnel, modern production sites and an extensive global network for its commercial and technical and industrial support services. Axens is an IFPEN Group company

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Successful demonstration in Dunkirk of the CO2 capture DMX™ process

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