European Commission

REFINERIES

INNOVATION FUND

Deploying innovative net-zero technologies for climate neutrality

ARCaDe: Antwerp Refinery Carbon capture and DeNOx

The Innovation Fund is 100% funded by the EU Emissions Trading System

| Project Factsheet

ARCaDe addresses the environmental challenges of the refining sector by developing innovative solutions for SOx, NOx, and process CO2 emissions. As the EU aims to reach near net zero emissions by 2050, refineries must adopt Green House Gas mitigation pathways early on. This will help reach the net zero targets within the required timeframe for Energy Intensive Industries (EII). At the TotalEnergies Refinery Antwerp (TERA), the CO2 from the Fluid Catalytic Cracking (FCC) unit will be captured and transported from Antwerp to Rotterdam using newly built hybrid LNG barges, reducing emissions from transportation compared to the conventional barges. By achieving 95% relative GHG emission avoidance compared to the reference scenario, the project demonstrates significant potential to drastically reduce climate impacts of the EU FCC units.

The project integrates the full value chain from capture to efficient transport to permanent offshore CO2 Storage in the North Sea by TotalEnergies. In particular, a unique combination of cutting-edge

COORDINATOR
TOTALENERGIES REFINERY ANTWERP

LOCATION
Belgium

CATEGORY
Energy intensive industries (EII)

SECTOR
Refineries

AMOUNT OF INNOVATION FUND GRANT
EUR 228,240,262

EXPECTED GHG EMISSIONS AVOIDANCE
7,853,719 tonnes CO2 equivalent

STARTING DATE
01 July, 2025

FINANCIAL CLOSE DATE
31 December, 2027

ENTRY INTO OPERATION DATE
31 May, 2031

CALL NAME
InnovFund-2023-NZT

** Calculated vs. the 2021-2025 ETS benchmark of 6.84 tCO2e/tH2, not taking into account additional carbon abatement due to substitution effects in the H2 end use application, i.e. conservative estimate.*

technologies, including advanced flue gas treatment and purification processes as well as a cryogenic CO2 capture unit will be implemented. These technologies work together to maximize environmental benefits and optimizes the Carbon Capture Storage (CCS) business model for "hard to abate" process emissions. The project includes also avoiding as much as possible emissions of the FCC, in particular by means of electrification for main air blower, as well as several other key functionalities, such as Selective Catalytic Reforming (SCR, removing NOx emitted by the process combustion) and specific pre-treatments for the complex flue gas stream. The project ensures that the captured CO2 stream meets stringent transport and storage specifications, i.e. NOx below 1.5ppm and CO2 purity above 99.8wt%. The project aims to avoid absolute emissions for approximately 7.8 million tonnes of CO2 equivalent over its first 10 years, which is about 20% of the total Antwerp refinery emissions—a key contributor to TotalEnergies' goal of a 58% CO2 reduction by 2035 in Antwerp. Furthermore, TotalEnergies is also developing dedicated renewable energy production to supply the capture process units with renewable electricity, ensuring low indirect emissions.

ARCaDe supports the climate neutrality objectives of the European Union by 2050, it will contribute the Industrial Carbon Management Strategy by supporting the development of innovative carbon capturing technologies and the "Clean Industrial Deal," by helping in the roll out of clean energy and electrification solutions. The project fully aligns with the EU plan to develop a market for CCS and contributes to the deployment of carbon storage objectives by scaling up carbon capture and storage solutions for the Refinery sector.

ARCaDe project execution is expected to generate approximately 400 direct jobs and 65 indirect jobs, as such contributing to local economies and societies. The ARCaDe project is a strong contributor to TotalEnergies' climate ambition and commitment to reducing its direct and indirect emissions. As a model for cross-border CCS value chains, it sets a precedent for future initiatives. This pioneering project is replicable and can be implemented not only in the refining industry but also in other industries with hard-to-abate process emissions.

| Participants

TOTALENERGIES REFINERY ANTWERP	Belgium
TOTALENERGIES PETROCHEMICALS & REFINING	Belgium

Additional information on the [EU Funding and Tenders Portal](#)**.**