



INNOVATION FUND

Driving clean innovative technologies towards the market

AGGREGACO2: Fabrication of CO₂ negative AGGREGates based on disruptive accelerated carbonation processes fuelled by carbon capture in refineries

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



Project summary

The AGGREGACO2 project will design, implement, and validate the first commercial production plant of carbon negative aggregates (manufactured limestone) for the European construction sector. Utilising CO₂ captured in the refinery process at a nearby plant, it will also be the first in the world to integrate industrial Accelerated Carbonation Technology processes with a refinery scheme. This technology valorises residues from Energy from Waste (EfW) plants by converting them into derivative sustainable products, highly sought after by the construction sector. The project would sequester 16 times as much CO₂ emissions as emitted through a more conventional technology.

COORDINATOR

Petróleos del Norte (PETRONOR)

LOCATION

Spain

SECTOR

Glass, ceramics and construction material

AMOUNT OF INNOVATION FUND GRANT

EUR 3 168 000

RELEVANT COSTS

EUR 5 280 000

STARTING DATE

01 April 2021

PLANNED DATE OF ENTRY INTO OPERATION

Q4 2024



Picture taken in front of a statue containing ACT carbon negative aggregate.
Merchant Square, Glasgow, COP26 climate change conference

A global first-of-a-kind project for the refinery sector

AGGREGACO2 proposes a first-of-a-kind innovation through the introduction of CO₂ captured from refinery processes (Steam Methane Reformer). The project will use a patented Accelerated Carbonation Technology (ACT) process, developed by O.C.O Technology, to valorise thermal residues, such as Air Pollution Control residues (APCr) from Energy from Waste (EfW) facilities.

APCr would normally require disposal at specialist landfill facilities. Using CO₂ as a resource to treat the APCr ensures diversion from landfill and enables the creation of a carbon negative aggregate – also known as manufactured limestone (M-LS).

PETRONOR and O.C.O Technology, together with the Repsol Group, will become the first companies in the world to integrate the use of flue gas derived from a refinery in such a project. O.C.O Technology is already recognised as a world leader in the permanent capture of CO₂.

The jointly-owned facility will have the capacity to valorise 22 000 tonnes of APCr a year, cutting carbon emissions by an estimated 2 200 tonnes of CO₂ a year, while generating around 56 000 tonnes of carbon negative aggregate annually.

The project will demonstrate the industrial feasibility and cost-effectiveness of manufacturing the carbon negative aggregate, which is recognised as a much more sustainable alternative to natural aggregates. Underlining the product's sustainability credentials, it holds End of Waste (EoW) approval

from the UK Environment Agency, securing its position as a perfect example of the circular economy in action.

In addition, Repsol Group will produce low carbon hydrogen in the refinery through Carbon Capture and Use (CCU), which provides a better current alternative to Carbon Capture and Storage (CCS) for CO₂ reduction in refineries.

Furthermore, REPSOL will also produce around 400 tpa¹ of low carbon hydrogen.

A cost-effective way to sequester carbon and reduce the environmental footprint of fuels

The AGGREGACO2 project will demonstrate the industrial feasibility and cost-effectiveness of carbon negative aggregates, as well as showing that it can compete face-to-face in the market, while reducing refineries' GHG emissions and the carbon footprint of the fuels and APCr landfill disposal.

This project can sequester 16 times as much CO₂ emissions as emitted in a reference case, representing more than 28 000 tCO₂e net absolute GHG emissions avoided during the first 10 years of operation. By using the low carbon hydrogen, Repsol Group will also decrease the carbon footprint of the fuels produced on site.

Moreover, the project envisages cooperation between refineries, raw material suppliers (quarries and incineration plants) and off-takers (asphalt and concrete producers) active in the region, demonstrating significant economic benefits to the regional economy.

The project has the potential for further expansion

The AGGREGACO2 project has the potential for further expansion to other sites, at national and international level. In the region, many sites have already been identified where a refinery, a waste treatment company and a construction materials producer could successfully cooperate and implement the innovative technology.

In addition, the project technology could be transferred to the cement and ceramic sectors.

¹ Tons per annum