



European
Commission

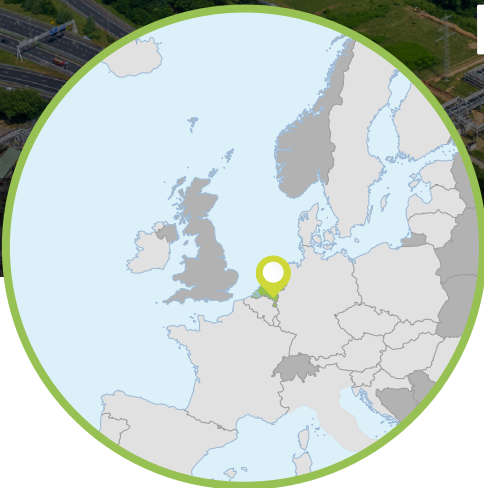
INNOVATION FUND

Driving clean innovative technologies towards the market

FUREC – FUse, REuse, ReCycle

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

All images © FUREC



Project summary

Project FUREC (FUse, REuse, ReCycle) transforms non-recyclable solid waste streams into hydrogen and provides circular feedstock to the chemicals industry.

First, the waste is converted into pellets in a waste treatment plant by sorting, drying and pelletising. The dry pellets are then sent to Chemelot, a major chemicals cluster, for conversion into hydrogen. Finally, this hydrogen is supplied to OCI N.V.'s ammonia production plants. The FUREC process uniquely combines torrefaction, milling and entrained flow gasification, followed by the transformation of the synthetic gas into CO₂ and hydrogen via shift conversion.

The FUREC plant will produce 54 000 tonnes of hydrogen per year, while avoiding 101% of greenhouse gas (GHG) emissions compared to the reference scenario during the first ten years of operation.

COORDINATOR

RWE Aktiengesellschaft

AFFILIATED ENTITY

RWE Generation NL

LOCATIONS

Buggenum & Geleen, The Netherlands

SECTOR

Hydrogen

GHG EMISSION AVOIDANCE

3.61 Mt CO₂ eq

AMOUNT OF THE INNOVATION FUND GRANT

EUR 108 000 000

RELEVANT COST

EUR 205 141 863

ESTIMATED CAPEX

EUR 685 000 000

STARTING DATE

1 January 2023

PLANNED DATE OF ENTRY INTO OPERATION

1 May 2028

A first large scale waste-to-hydrogen plant in Europe

The composition of waste is by definition heterogeneous, making it difficult to process in a commercially available large-scale gasification plant. By creating a new patented process line, FUREC is able to create a homogeneous stream from waste. The feedstock is non-recyclable municipal solid waste (MSW) that will be pre-treated and converted into Solid Recovered Fuel (SRF) pellets at a site close to where the waste is collected and sorted. Moreover, the innovative pelletisation technology used will allow for significant recovery of additional ferrous and non-ferrous metals, glass and stone that would not be obtained from conventional waste processing. The dry SRF-pellets, also supplemented by sewage sludge, will then be converted into hydrogen at a large industrial site, that is host to an ammonia plant and a refinery, securing existing hydrogen customers. The transformation carried out at this site forms the FUREC process, which combines a state-of-the-art combination of torrefaction and gasification technologies.

FUREC also produces pure CO₂, ready for future utilisation or storage without any further energy penalty for capture and makes the direct step to commercial size, while processing 700 kilotonnes per annum of waste in one single unit.

By reducing natural gas consumption, the FUREC project will avoid 3.61 Mt CO₂ equivalent of absolute greenhouse gas emissions during its first ten years of operation. In this way, FUREC will directly reduce the European chemicals industry's dependence on natural gas with an autonomous source, directly supporting the REPowerEU objectives.

Supporting circularity

FUREC will address the objectives of the EU Circular Economy Action Plan and Renewable Energy Directive (RED II), by producing recycled chemicals from existing non-recyclable MSW. On average, each European citizen generates 480 kilograms of MSW per year, and two thirds of

this waste is landfilled or incinerated. This is an unsustainable practice, diverting the potential of MSW as a significant and useful source of both energy and carbon that can be used to produce new sustainable products.

Local impact

FUREC will supply considerable volumes of both regionally and autonomously produced clean hydrogen, thus strengthening the Dutch Province of Limburg's position in the EU hydrogen market. FUREC is a crucial component in Chemelot's future strategy to become a fully renewable and circular chemicals production site. Clean hydrogen is key to achieving large CO₂ reductions. In addition, FUREC contributes substantially to achieving Chemelot's CO₂ emission targets.

FUREC will generate 125 direct jobs in the region. Moreover, the project functions as an innovation driver for the circular economy and hydrogen expertise and research at Chemelot's knowledge institutes.

The project can be replicated especially in regions with large chemicals industry clusters.

