



INNOVATION FUND

Driving clean innovative technologies towards the market

PULSE - Pretreatment and Upgrading of Liquefied waste plastic to Scale up circular Economy

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



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Project summary

Project PULSE (Pretreatment and Upgrading of Liquefied waste plastic to Scale up circular Economy) implements Neste's proprietary technologies for chemical recycling of waste plastic and gradually integrates them into the company's refinery operations in Porvoo, Finland. PULSE will reach a processing capacity of 400 000 tonnes of liquefied waste plastic per year. It will contribute to EU climate neutrality objectives by avoidance of a total of 10.3 Mt CO₂ equivalent during its first ten years of operation.

COORDINATOR

Neste

BENEFICIARY

Neste

LOCATION

Porvoo, Finland

SECTOR

Chemicals

GHG EMISSION AVOIDANCE

10.3 Mt CO₂ eq

AMOUNT OF THE INNOVATION FUND GRANT

EUR 135 000 000

STARTING DATE

1 April 2022

PLANNED DATE OF ENTRY INTO OPERATION

1 January 2028

Closing the loop for plastic recycling

Chemical recycling turns plastic waste back into hydrocarbons that can be used as raw materials for the production of new plastics and other products. It can complement conventional, mechanical recycling by addressing a larger variety of plastic waste - including the mixed and contaminated streams that today end up in incineration or landfill. The PULSE project helps close the loop on the circular economy and increase the rate of plastic recycling.

Neste's chemical recycling concept starts with plastics that are thermochemically liquefied (e.g. through pyrolysis). Liquefied waste plastic resembles crude oil. However, it contains detrimental impurities and chemical compositions that limit its use, as they lead to risks of corrosion, process inefficiency and poor end-product quality. Intermediate refining is needed to bridge the quality gap between untreated liquefied waste plastic and drop-in feed for the plastics and commodity chemicals industries. PULSE addresses this need in the value chain.

The PULSE project implements proprietary technologies to pretreat and upgrade liquefied waste plastic, and gradually integrates these into Neste's Porvoo refinery. The project is innovative because:

- It demonstrates and implements first-of-a-kind technologies;
- It is a first-of-a-kind, large-scale integration of liquefied waste plastic processing technologies into an existing refinery;
- It enables a large variety of plastic waste-derived oil to be processed into a drop-in petrochemical feed; and,
- It further strengthens and increases the capacity of the European chemical recycling value chain.

Scaling up circular economy of plastics

Chemical recycling helps avoid greenhouse gas (GHG) emissions by diverting plastic waste from incineration, which would release the carbon contained in the waste into the atmosphere, and by replacing virgin fossil resources in the manufacturing of new plastics and chemicals. PULSE project targets a total GHG saving of 10.3 Mt CO₂ equivalent during its first ten years of operation.

In addition to GHG savings, chemical recycling contributes to the EU's circular economy action plan, plastics strategy and REPowerEU objectives by tackling the adverse environmental impact of plastic waste, reducing dependence on fossil resources and accelerating circularity. Through the first ten years of PULSE's operation, a total of up to 3.95 million tonnes of virgin fossil raw materials could be replaced by a circular, low-carbon alternative. In the same period, PULSE can enable the recycling of more than 5.9 million tonnes of otherwise hard-to-recycle plastics into high-quality raw material for new plastics. These circular plastics can be used even in sensitive end use applications, such as food packaging and medical devices.

The project is also expected to contribute to the creation of new jobs, as it allows for the scale-up of a novel chemical recycling industry branch. Most of these new jobs will likely be in SMEs focused on activities linked to the liquefaction and logistics operations.

