



HORIZON-CL4-2021-TWIN-
TRANSITION-01-17

ELECTRO

Full Title: Electrified conversion of plastic waste into olefins & downstream integration

Aim:

ELECTRO will demonstrate new technology that connects the waste and petrochemical industries to provide a sustainable and scalable circular solution with a low carbon footprint for olefin and polyolefin production.

Concept:

The overall objective of ELECTRO is to demonstrate a revolutionary technology concept that links the waste and petrochemical industry and provides them with a sustainable, low GHG footprint and scalable circular solution for olefin and polyolefin production. The priority for ELECTRO is the plastic waste streams that are currently not recycled but rather either incinerated or dumped to landfill: examples are multilayer plastics, mixed PE/PP/PS, and waste PS. An innovative modular extruder for optimal pre-treatment of plastic waste will be combined with an electrically heated reactor for the catalytic pyrolysis of plastic waste at TRL 7. The main product, plastic waste pyrolysis oil, will be used as a feed for steam crackers. Steam cracking will be electrified in the roto-dynamic reactor (RDR), a second novel reactor technology to be demonstrated at TRL 7 in ELECTRO. In the RDR heat transfer is accelerated by an order of magnitude compared to heat transfer rates achieved in the fired heaters used in conventional crackers. And so the RDR has a substantially higher selectivity towards light olefins and improved process efficiency. The light olefins will be further processed into PE and PP, demonstrating the technical feasibility of chemical recycling and the use of plastic waste as a circular carbon feed. This scalable concept will enable strong industrial symbiosis, with the initial LCA showing an 90% GHG reduction compared

to today's best available technology (BAT). Given the amount of plastic waste that can be converted, and the market demand for the compounds produced, the impact of ELECTRO will be profound. To further extend the impact of ELECTRO, the global replicability and economic viability of the proposed concept will be demonstrated using waste streams from the Republic of Korea and Indonesia, and a thorough programme will be implemented to train the next generation of waste management engineers and workers.

Start date:

01/09/2022

End date:

31/08/2026