Update April 2022

INNOVATION FUND

Driving clean innovative technologies towards the market

ECOPLANTA: Reduction of CO_2 emissions from municipal non-recyclable waste to produce methanol

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

Project summary

The ECOPLANTA project will revolutionise municipal solid waste (MSW) management by using non-recyclable materials rejected by sorting centers to produce circular chemicals and advanced biofuels. The project will deliver a first-of-a-kind commercial plant for the European market, using waste that would otherwise end up in landfills. Ecoplanta will thus become a benchmark for material recovery, obtaining new materials and reducing the use of virgin raw materials. Located in a petrochemical complex in El Morell, near the port of Tarragona in Spain, the plant will produce 237 kt/y of methanol, and thereby recover 70% of the carbon present in the non-recyclable materials. Based on the Innovation Fund methodology, the project will achieve 3.4 Mt CO_2eq of greenhouse gas (GHG) emissions reductions over the first ten years of operation.

COORDINATOR

ECOPLANTA MOLECULAR RECYCLING SOLUTIONS S.L.

LOCATION

El Morell, Tarragona, Catalonia, Spain

SECTOR

Chemicals

AMOUNT OF INNOVATION FUND GRANT

EUR 106 379 783

RELEVANT COSTS

EUR 185 164 706

CAPEX

EUR 749 729 639

TOTAL PROJECT COSTS

EUR 2 496 472 661

GHG EMISSIONS AVOIDANCE

3.4 Mt CO_2eq

STARTING DATE

01 November 2021

PLANNED DATE OF ENTRY INTO OPERATION

Q3 2026

Climate Action

A first waste-to-fuel plant in Europe to implement molecular carbon recycling

By scaling up an existing plant which successfully demonstrated the same technology in Canada[1], ECOPLANTA will implement the first large-scale gasification plant to convert MSW streams into circular methanol in Europe. Changing the technology will double the output-to-feedstock ratio, and 70% of the carbon in the feedstock material will be recirculated. The feedstock the plant will use is the non-recyclable rejected fraction of MSW that is often derived from multiple sources and is far from homogeneous in composition, rendering it difficult to recover or recycle. Therefore, ECOPLANTA addresses one of the challenges in producing chemicals and biofuels from waste streams, which are usually mixed, comprised of composite materials (e.g. drinks cartons), and contaminated.

The key advantage of the gasification technology that ECOPLANTA will deploy at El Morell is that it is capable of handling such poor quality, mixed and contaminated waste streams. The plant can therefore accept a wide range of feedstock compositions, because it can process and convert them all into a synthetic gas (syngas), which can then be cleaned and used as the feedstock to produce many chemical products (e.g. biomethanol, bioethanol) independent of the type, origin or use of the waste feedstock processed.

The project consortium has selected methanol as its initial product because it can be fed into an onsite refining process, enabling the company to react to market demands for specific refined products, which are alternatives to conventional fossil counterparts.

Supporting the development of circularity and renewable energy

The project will address the objectives of the EU Circular Economy Action Plan and Renewable Energy Directive (RED II), by producing recycled chemicals and biofuels from MSW that would otherwise end up in either landfills or waste incinerators. On average, each European citizen generates 482 kg of MSW per year; and two thirds of the waste is either dumped in landfills or incinerated. This is a wasteful practice as MSW is a significant and useful source of both energy and carbon that can be used to produce new sustainable products. ECOPLANTA will recover and recycle the energy and carbon that MSW contains to produce sustainable chemicals and biofuels.

In line with the EU target to reduce the share of municipal waste landfilled to 10% by 2035, ECOPLANTA will reduce the volume of waste sent to landfill (24% in 2018). The ECOPLANTA project will avoid the emissions of 3.4 Mt CO_2eq of absolute GHG emissions during its first ten years of operation. This is equivalent to more than 1/3 of the 2019 GHG emissions from the entire solid waste disposal sector in Spain[2].

As MSW is abundant locally in urban areas, the ECOPLANTA process will also save energy required to ship feedstocks to the biofuels site. Thus, there is potential to achieve more localised self-sufficiency in waste treatment across Europe. The production of fuels from locally sourced materials will increase the energy security of countries dependent on imported, raw petroleum products. The waste-derived methanol produced by ECOPLANTA will be sold mainly into the Spanish transportation fuel market. The pricing of the circular methanol will be driven by the RED II requirements which set a biofuels obligation to reduce GHG emissions from the transportation sector.

Using MSW to produce biofuels has multiple advantages aligned with the EU Bioeconomy Strategy: it does not compete with the food supply; it has a positive impact on land use by reducing the space needed for landfills; and it is complementary to the waste management industry's existing collection and waste recycling infrastructure. Most biofuels are currently produced from feedstocks that are also used for human and animal food (e.g. grains, animal feed grains, oilseeds, and vegetable oils) and are associated with land exploitation; switching to MSW will ease up the demand for more farmland and therefore help preserve biodiversity.

High scalability potential based on a strategic location

ECOPLANTA's strategic location within the petrochemical complex of Camp de Tarragona gives it easy access to the large waste catchment zone across the region and a large methanol market. This also creates high potential for further expansion at the production site, with direct access to high quality industrial infrastructure and the nearby port of Tarragona, a major industrial logistics hub. Indeed, the location gives the project direct access to a larger pool of potential chemical and fuel off takers.

The ECOPLANTA technology is also highly scalable at other European sites because it can be adapted to the composition of the local MSW feedstock or to other waste streams. ECOPLANTA offers a clear pathway for the industry to drastically cut emissions in overland transportation, shipping and chemical industries, and power generation. The project will develop and consolidate secondary raw materials market in Europe through the production and sale of a recycled alternative to fossil-based production.

1 The first commercial scale waste-to-methanol facility in the world was built and is currently operated by ENERKEM, one of the consortium partners, in Alberta, Canada.

2 The solid waste disposal sector in Spain produced 9.8 Mt CO_2eq in 2019. https://climate-energy.eea.europa.eu/topics/climate-change-mitigation/greenhouse-gas-emissions-inventory/intro