



INNOVATION FUND

Driving clean innovative technologies towards the market

TFFFTP: Towards a Fossil Fuel Free Tissue Production

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



Project summary

The TFFFTP project replaces liquefied natural gas (LNG) used to dry the paper at a paper production facility with bio-syngas generated in a new on-site gasification plant using wood wastes. The direct connection of the bio-syngas production plant to paper production facilities is a first-of-a-kind integration. The project strongly contributes to the overall site's decarbonisation, covering the steam and heat needs for 69 000 tons of annual paper production.

COORDINATOR

Essity Operations Sweden

LOCATION

Lilla Edet, Sweden

SECTOR

Pulp & paper

AMOUNT OF INNOVATION FUND GRANT

EUR 4 200 000

RELEVANT COSTS

EUR 7 000 000

STARTING DATE

01 October 2021

PLANNED DATE OF ENTRY INTO OPERATION

Q4 2025

First-of-a-kind in the paper industry

The use of bio-syngas in the paper industry is innovative in several respects. Firstly, the setup whereby both a syngas production plant and a tissue paper production facility (that does not process the syngas) are operational on the same site makes it the first installation of its kind in the world to date. Secondly, a purification plant has been also developed for the bio-syngas to meet high-quality requirements of the process, avoiding odour and contamination of the final product. Thirdly, because of the fluctuation in the calorific value of syngas, flexible burner and control devices have been developed to keep the drying air capacity at the required level without affecting the sensitive process.

The new type of dual fuel burners will enable a proper combustion of syngas, given its lower heating value relative to natural gas; they will also allow LNG to be combusted in case of shut down of the gasification plant.

The multiple benefits of bio-syngas over its alternatives

The gasification plant will produce 42 500 MWh of bio-syngas, replacing the LNG used for both the 300 to 600°C steam and hot air needed in the tissue paper production process. Using locally produced bio-syngas is expected to avoid 72% of the GHG emissions associated with the current process. In line with circular economy principles, the feedstock used to produce the bio-syngas is sorted wood waste collected from local industries and municipalities.

A number of alternative fuels and/or energy sources were explored. The option of replacing LNG with hydrogen was discarded because of its limited availability and high costs, as well as because of its embrittlement tendency at high temperature. Electric heaters were also discarded due to the temperature thresholds of electric hood systems (300°C max) and related fire risks. Lastly, the use of bio-oil was deemed unacceptable because of potential residues (i.e. ash) and impurities, which directly affected the final paper product.

The scale-up potential covers multiple bio-based sources

The technology could be replicated at around 10 of the 40 production facilities of the company, particularly on sites with high local availability of biomass by-products, such as wood chips or forest residues. The bio-based gasification process could also be extended to other sources such as agricultural waste, industrial residues, animal residues, municipal solid bio-based waste, sewage, and even other non-edible low-value biomass sources such as straw, grass and algae.