Reducing CO2 footprint with bio-plastics

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Credit: AI-generated image (disclaimer)

Today, the vast majority of plastics are still made using non-renewable fossil fuels, especially petroleum. With concerns about environmental impact and climate change increasing, some researchers have begun to look for alternatives.

The EU project ECOTPU ('Plastics from renewable sources applied in footwear') was aimed at developing a new family of environmentally

benign polyurethanes for the EU footwear market.

"Global warming is a big problem, so current processes have to be improved, with the aim of reducing greenhouse emissions," says project coordinator Joaquin Ferrer Palacios of Spain's Footwear Technological Institute (INESCOP).

"Thermoplastic polyurethanes (TPU) are one example of a family of plastics produced using fossil resources. These plastics are used in a vast range of products. In the footwear industry, for example, thermoplastic polyurethanes are used for stiffeners in toe puffs, counters and soles."

The project team looked for other raw materials that could be used to make plastics with similar properties to those obtained using fossil fuels. Responsibly farmed bio-resources, vegetable oils in particular, seemed like a good option because the process would be technically and economically feasible and would have less of an impact on the environment.

ECOTPU researchers believed a process for making plastics based on vegetable oils would help to reduce the consumption of non-renewable, petroleum-based materials while also reducing the CO_2 emissions associated with those materials.

Ferrer says the project succeeded in producing raw thermoplastic polyurethanes using vegetable oils, with a bio-based content between 48 and 75 percent.

Project partners set up an operational production line with an estimated capacity of 5000 tonnes per year of 'ecoTPU'. They manufactured four kinds of products, including the ecoTPU raw material itself, stiffeners and soles made of ecoTPU, and finally, shoes incorporating ecoTPU soles and stiffeners.

Over the course of the project, which ran for two years, from 2010 to 2012, the researchers managed to reduce non-renewable energy demand in the production line by about 480 tonnes per year and reduced CO2 emissions by about 1000 tonnes per year. Ferrer says in the future, under full-production conditions, the process could eliminate up to 30 000 tonnes of CO2 per year.

"The results of this project will benefit everybody," he says, "because almost everybody uses footwear."

In addition, other industries that use this family of plastics, including the automotive, furniture or clothing industries, could also benefit.

ECOTPU received about EUR 490 000 in EU funding under the Eco-Innovation Programme.

More information: www.ecotpu.eu

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