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News

Innovation and Industry

Climate, environment and circular economy | Plastics recycling

Repsol, Axens, and IFPEN, who are all fully committed to playing a major role in the chemical recycling industry, have joined forces to develop the pioneering and patented Rewind^{TM} Mix process.

The Rewind^{TM} Mix process purifies the plastics pyrolysis oils allowing the direct and undiluted processing in existing petrochemical plants for the production of circular plastics.

Pyrolysis is a promising solution for the chemical recycling of plastic waste.

Repsol, Axens, a worldwide technology provider and IFPEN, the renowned French research and innovation player in the field of energy, have developed a pioneering and patented process to enhance the chemical recycling of plastic waste and boost circular materials production.

The Rewind^{TM} Mix process removes impurities such as silicon, chlorine, diolefins, and metals from the plastics pyrolysis oils produced, allowing the direct and undiluted feed to petrochemical units.

Pyrolysis is one of the most promising pathways for the chemical recycling of plastic waste, which otherwise would end up incinerated or in landfills, and the production of food-grade, low-carbon footprint, recycled plastics. This new pyrolysis oil upgrading process will expand its deployment and allow the massive introduction of recycled pyrolysis oil in existing steam cracking assets.

Chemical recycling now represents a very innovative solution complementary to mechanical recycling. Polyolefins from petrochemistry represent about half of the 400 Mt/y world plastic production and a major target in terms of plastic recycling. Today, mechanical recycling faces limitations due to feedstock quality (mix of polymers and impurities content) that directly impact product quality and potential applications, in particular for food-grade use.

Leveraging the three partners' complementary skills and expertise

The Rewind$_{TM}$ Mix process has been developed at the Repsol Technology Lab and IFPEN facilities, with extensive pilot plant testing of representative pyrolysis oils, reproducing the exact conditions of the future industrial plant. It can advantageously be integrated within the existing petrochemical units.

The process relies upon Axens' proven industrial technologies and catalysts and on the long experience of the 3 partners in the field of petrochemical industry. Based on this solid basis and the extensive pilot testing, the partners will now study the first industrial application in a Repsol facility, while Axens will commercialize the technology through licensing.

Repsol has a long track record of applying circularity in its products. In 2015, Repsol was the first company to reintroduce oil from chemical recycling of plastic waste not suited for conventional mechanical recycling on an industrial scale at its Puertollano industrial complex. In 2019, Repsol started to sell circular polyolefins under the ISCC PLUS certification. The company is committed to a circular economy as one of the main pillars of the transformation of its industrial complexes into large multi-energy hubs, capable of using different kinds of waste and converting them into low carbon products. This project supports the recent announcement in the 2021-2025 Strategic Plan of the company's ambition to use four million metric tons of waste per year besides recycling the equivalent of 20% of its polyolefins production by 2030.

As a major research player, IFPEN is committed to innovation to underpin a sustainable energy mix and support the transformation of the energy sector. In the field of plastics recycling processes, IFPEN addresses society's growing expectations in terms of reducing plastic waste in line with public policies and the plastic industry commitment. IFPEN's strategic approach combines plastics waste recycling with sustainable solutions to maximize renewable bio-based chemicals in order to achieve the long-term target of GHG emissions reduction in the downstream sector. In addition, it has long-established expertise related to process development from laboratory to demonstrator.

Axens is a leading technology group committed to developing innovative solutions for the circular economy. Based upon its strong background in similar processes in the oil refining industry, Axens has designed the industrial process scheme of Rewind^{TM} Mix and will be the exclusive licensor of this process. Rewind^{TM} Mix will be the first commercial process of the Rewind^{TM} family, and it will be followed in 2022 by Rewind^{TM} PET for the recycling of all types of PET waste. Axens' ambition is to develop and propose, in the very short term an extended portfolio of advanced technologies in order to complement mechanical recycling and meet the ambitious targets of the plastic circular economy.

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