Case study
CelluComp

Zero Waste Scotland is supporting the development of a circular economy by sharing the learnings of projects to stimulate ideas and collaboration in Scotland.

CelluComp is a material science company producing Curran® - a nano-fibre product made from agri-food waste streams from root crop. As a mechanical enhancer with thickening properties, this product can be used to improve properties in many different products, such as paints & coatings and concrete.

Background

Founded by material scientists Dr David Hepworth and Dr Eric Whale, CelluComp produces a product called Curran® (Gaelic for carrot), which makes use of nano-fibres contained within food processing by-products including root vegetables and sugar beet. CelluComp operates a small scale production facility in Glenrothes.

Operational since March 2015, production looks set to expand. Facilities of this size could be replicated all over the world and co-located with feedstock providers such as sugar processors or with Curran® users e.g. paint manufacturers.

Process

At present, the main feedstock is sugar beet pulp, a by-product of sugar processing commonly used for animal feeds. Curran® is produced from this renewable feedstock using green chemistry processes including water-based reactions at low temperatures and pressures which maximise the energy efficiency of the manufacturing process.

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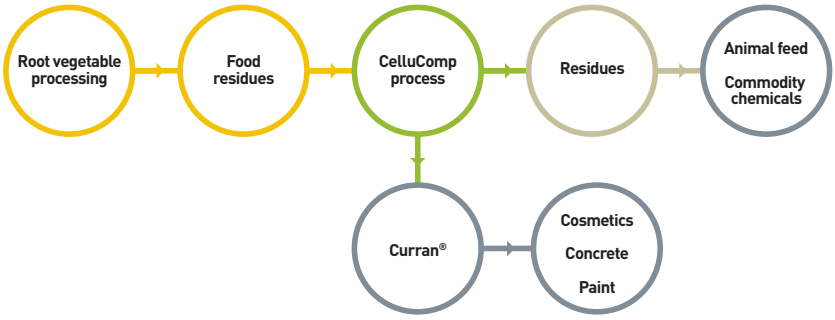
As a result, Curran® has lower unit energy consumption than that of other paint thickeners and reduces the environmental impact from food processing residues. Curran® is produced as a granulated product powder alongside residues which are high in sugars and polysaccharides. CelluComp is currently exploring options to develop further products from these residues ranging from animal feeds to commodity chemicals.

"We want to be as sustainable as possible and Curran® is produced using green chemistry processes. We only use by-products and residues from agriculture and food processing as we do not want our feedstocks to compete with land for growing food."

Dr Eric Whale, Co-Founder

Process overview



Product applications

Currently, the primary use of Curran® is as a paint additive as it prevents cracking and increases scrub resistance in painted surfaces and can replace up to 50% of the binder used in paints and coatings. It also has the potential to be used as an additive in concrete, paper and cosmetics as well as a zero calorie thickener in food products. In many of these applications, Curran® replaces petrochemical-based products.

Circular economy benefits

There are many circular economy benefits associated with Curran® in addition to its energy efficient manufacturing process. The business model used to produce Curran,® extracts value from a relatively under-used biological resource, increasing its economic value by an estimated factor of 50.

The food processing residues used by CelluComp would otherwise be sold as a supplementary feed for livestock. The production of Curran® involves extracting the nano-fibres in the root vegetable pulp and leaves behind the carbohydrates and proteins. Although currently under-utilised, CelluComp is looking into the best use of this residual material, either directly as an animal feed or indirectly by extracting further high value compounds which can be sold as commodity chemicals or processed into biofuels.

Effectively, CelluComp is introducing a new and profitable use for a bio-based material, and has the potential to offer further opportunities based on its own processing residues. By processing the residues from Curran® manufacturing into other high-value materials or animal feeds, CelluComp can further demonstrate a range of uses for bio-based resources which further enhances economic value and embeds the circular approach.

As a renewable, bio-based product with no Volatile Organic Compounds, Curran® has attracted considerable interest from companies looking for a more sustainable approach to manufacturing and a reduced reliance on petrochemical products. Given the significant level of interest and wide range of possible applications for Curran®, CelluComp is a company with high growth potential both in Scotland and internationally. They are looking to create around 15 jobs at the facility in Glenrothes.

Zero Waste Scotland supports the development of circular economy systems, models and products. For information on the support available, contact the Circular Economy team on circulareconomy@zerowastescotland.org.uk.

cellucomp.com

Contact us
Zero Waste Scotland, Ground Floor,
Moray House, Forthside Way,
Stirling FK8 1QZ

helpline@zerowastescotland.org.uk
zerowastescotland.org.uk