QUESTIONNAIRE

BUSINESSEUROPE

The sunliquid® process: Cellulosic ethanol from agricultural residues

Description

What is the circular economy example about? (max. 200 words).

The sunliquid® process developed by Clariant meets all the requirements of a technically and economically efficient, innovative process for converting agricultural residues into climate-friendly advanced biofuel. Using process-integrated enzyme production, optimized enzymes, simultaneous conversion of cellulose and hemicellulose into ethanol and an energy-efficient process design, it has been possible to overcome technological challenges and sufficiently reduce production costs in order to arrive at a commercially viable basis. Renewable lignocellulosic resources, such as agricultural residues, do not compete with food and feed crops, but are created in sufficient quantities worldwide as a by-product of current agricultural practices, as in the case of straw from cereal production.
Since 2009, Clariant has been successfully operating a first pilot plant at its research facility in Munich. In July 2012, Germany´s largest plant to date started into operation in Straubing – a demonstration project with an annual capacity of up to 1,000 tons of ethanol.

Added value

What is the added value in terms of savings, emissions reductions, etc.? (max. 150 words). Use bullets if possible.

- GHG savings of this second-generation ethanol are 95% compared to fossil fuels.
- Pre-treatment: Chemical-free pre-treatment lowers production and investment costs. At the same time, environmental, health and safety risks are minimized.
- The enzymes are highly optimized based on feedstock and process parameters, resulting in maximum yields and short reaction times under optimal conditions.
- Using optimized microorganisms, the sunliquid® process provides for efficient fermentation, giving rise to maximum ethanol yields. This highly-optimized, one-pot system simultaneously converts both C5 and C6 sugars to ethanol, delivering up to 50% more ethanol than conventional processes which convert only C6 sugars.
- The innovative and highly energy saving purification method reduces energy demand by up to 50% compared with conventional distillation. It is based on thorough process planning and energy integration, resulting in an entirely energy self-sufficient process.
- Finally, the sunliquid technology enables the use of lignocellulosic biomass, a 100% renewable feedstock found in wheat straw, corn stover and sugarcane bagasse that is available globally in large quantities.
- In addition to the application in the transport sector, the technology offers a platform for conversion of agricultural residues into a range of chemicals for different industries and applications.

Challenges

What are the main challenges/success factors (preferably regulatory)?

- Feedstocks with low indirect land use change impacts when used for biofuels are inadequately promoted for their contribution to the decarbonisation of the economy.
- Low levels of support to feedstocks for advanced biofuels, for which technology is more innovative and less mature.
- Targeted research and innovation programs, public-funding for research-oriented pilot plants and demonstration activities, and public support to minimize financial risks are lacking.
- Low market demand for bio-based products through tax reduction or bio-based product categories, deduction of bio-based carbon footprint in the calculation of the product's total CO2 emissions, improved EU and international standards.
- Legal uncertainty.

Other information

Sector	Chemicals
Country	Switzerland
Company name:	Clariant AG

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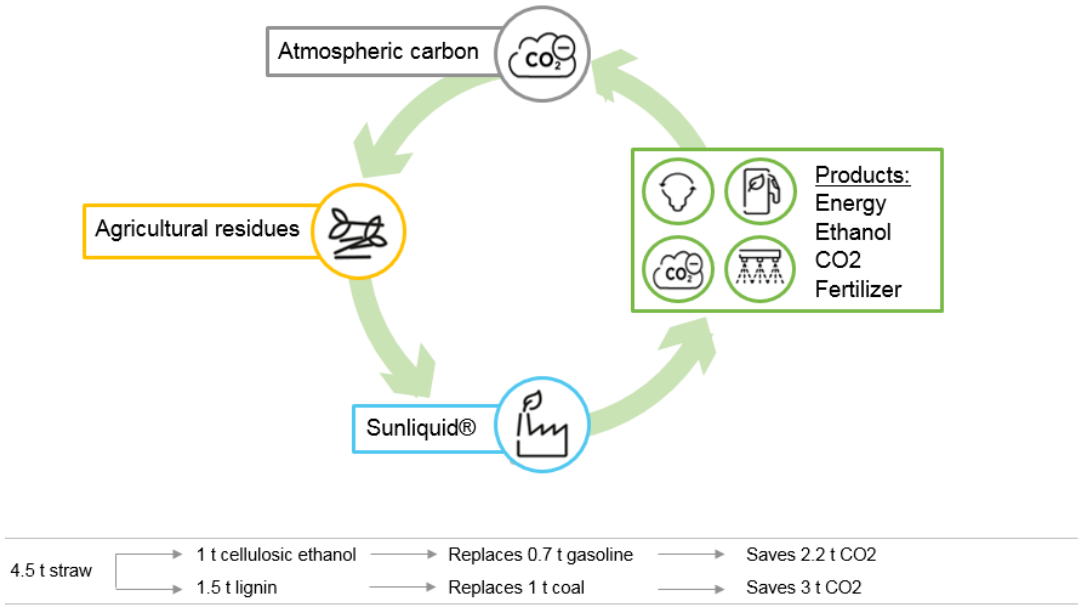
Cellulosic ethanol: Sunliquid® closes the loop



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