

Products for the biobased economy: an introduction

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Introduction

In an era where production of fossil oil is at a peak and policies are aimed to reduce greenhouse gas (GHG) emissions, improve security of energy supply and reduce dependency on oil imports, plant biomass has been identified as a major resource to replace fossil fuels. So far, the main focus has been on the production of biofuels. There are, however, many more products that can be replaced by biobased alternatives. This factsheet provides a short introduction to the types of products and their uses.

Biobased products

Biobased products refer to non-food use of biomass (algae, crops, trees, marine products, waste) ranging from high-value fine chemicals (pharmaceuticals, cosmetics, food/feed additives) to lower-value high volume materials (enzymes, biopolymers, biofuels, fibers). They include established products (paper, detergents, lubricants, construction materials) as well as new products (vaccines, inks, second generation biofuels). The products can be classified as: pharmaceuticals, chemicals, specialty products, industrial oils, biopolymers and fibers^{1,2,3}.

Chemicals

Many chemical building blocks – basic products in chemistry produced at high volumes – can be derived from biomass. Examples include 1,3-Propanediol (1,3 PDO), a building block for polymers applied as composites, adhesives and coatings, made from maize syrup, and succinic acid, which is made from glucose and has many applications in food, industry and pharmaceuticals.

Specialty products

Specialty chemicals serve as adhesives, solvents and surfactants (applied in detergents, cosmetics and manufacturing processes). Surfactants, still mainly petroleum-derived, are

increasingly made from biobased feedstocks. Fossil solvents, applied in the manufacturing of pharmaceuticals, paints and inks, are increasingly replaced by biobased alternatives such as ethyl lactate, a lactic acid derivative⁴.

Industrial oils

Industrial oils of plant origin include high quality lubricants, and hydraulic oils that comply with special performance requirements. Soy based color inks, another example, are known for their superior performance and dominate the ink market.

Biopolymers

Bioplastics are excellent replacements for their fossil counterparts. Amylose ethers are biodegradable alternatives for polyethylene and polystyrene. Biopolyesters like PLA (polylactic acid) and PHA (polyhydroxyalkanoate) are made from starch or sugar through a process of fermentation^{1,5}. They show equal or superior performance to fossil polymers like PET (polyethylene terephthalate).

Fibers

Plant fiber products can be used to produce high value composites applied in car parts, construction, electronics, furniture, and machinery, thus replacing fossil products such as polyester, nylon, and acryl. Composite cellulosic materials for example, are light, safe and offer good acoustic properties¹.

Conclusion

Biobased products are highly diverse in volume, added value and composition. They offer a wide range of high quality alternatives to replace fossil fuels in a large number of applications.

References

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