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Growing interest in non-wood pulp for paper, hygiene products and packaging

Executive Summary

nova-Institute carried out a study on producers of non-wood pulp and the raw materials, applications and motivation involved. The study was commissioned by the Confederation of European Paper Industries (Cepi).

The aim of the study “Non-wood Fibre Use in the European Pulp and Paper Industry”, due to the growing interest in this sector, was to obtain an overview of the activities in this new field, the non-wood fibres used and, above all, the motivation and marketing arguments for the different applications. Cepi wants to support innovations that contribute to the growth of the sector in a sustainable and circular way. For effective support and advocacy, it is crucial to have an insight into the benefits and hurdles of such innovations.

At least 33 companies in Europe use non-wood fibres

The experts of the nova-Institute, who have been active in the field of non-wood fibres for many years, were able to identify more than 33 European companies which use alternative non-wood fibres in their products and product development. 16 companies were selected for the comprehensive interviews and analyses, using eight different non-wood fibres: straw (5 companies), textile waste (4), flax and hemp (3), sugar cane bagasse (3), meadow grass (3), miscanthus (2), sugar beet (1) and silphie (1). Based on these alternative raw materials, a wide range of pulp and paper products were addressed: tissue, hygiene, printing, cigarette, technical, security and speciality paper, as well as paper board and paper packaging.

Alternative fibre raw material

The non-wood fibres can be divided into two groups with specific advantages and disadvantages. Straw, textile waste, bagasse and sugar beet fibres as well as flax tow form the first group "Residues, by-products and co-flows". These raw materials are produced in large volumes, do not require their own cultivation areas as by-products, which has a positive effect on the climate balance, and can be relatively easily integrated into pulp and paper processes in certain proportions. The disadvantage, however, is that many by-products have a large number of competing applications in other sectors and the quality of the fibres is compromised. One special case is flax tow, which is a by-product of long fibres of flax for textiles. In contrast to the other fibres in this group, the volume is lower and the price is higher, but the fibre qualities are higher than wood fibres.

The second group contains dedicated feedstocks for non-wood fibres; flax and hemp in so called total fibre line (producing technical fibres), meadow grass, miscanthus and silphie. The advantages of these special crops are their high yields per hectare and new marketing options. They need their own cultivation area and there is strong competition for land with cash crops such as wheat or maize. Perennial crops such as miscanthus and silphie have this problem in particular. In addition, there are no established value chains for miscanthus, silphie and meadow grass. Flax and hemp are interesting crops, flax needs little

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fertiliser and hemp fits very well in crop rotation with cash crops. However, both are complex and expensive to grow and process, but the pulp qualities are higher than those of wood fibres.

Application fields of non-wood fibres in the pulp and paper market

The most common applications for the non-wood fibres mentioned are food paper and food packaging, paper board and paper packaging as well as technical and speciality paper. Non- wood fibre pulp is also used in tissue and sanitary products, printing and security paper and cigarette and rolling paper. Residues and by-products, meadow grass, miscanthus and silphie fibre pulp are mostly mixed with wood pulp, with 10 to 50% non-fibre pulp.

Tissue paper manufacturers need softness of their product thus specific optical and haptic fibre properties. Not all alternative raw materials can be used, or only with a great deal of effort. There is also the risk of consumer acceptance for new raw materials that are not associated with softness. Printing paper and packaging companies use alternative fibres to deliver messages such as “more environmentally friendly”, “tree-free” or grass as a symbol for “nature”.

There is a wide range of costs for alternative fibres; mostly between virgin wood fibres and paper for recycling. Flax and hemp fibres cost more than wood pulp and are mainly used in bible, cigarette and rolling paper with up to 100% non-wood pulp.

Overview of the reasons for using non-wood fibres

The table below shows the motives for using non-wood fibres that were mentioned by at least 50% of the companies analysed. Sustainability plays a major role and this should be demonstrated by regional circular economy or local supply, utilisation of biomass and by- products that would otherwise be burnt, and a lower carbon footprint. However, how much smaller the carbon footprint of non-wood pulp is compared to that of wood pulp has not yet been reliably studied. A comprehensive peer-reviewed life cycle assessment is pending and is anything but simple.
From a business perspective, motives such as innovation and raw material and product diversification are in the foreground. The declining availability and rising prices of virgin wood fibres and paper for recycling also come into play.

Motivation overview for using non-wood fibres – sustainability arguments alongside business arguments (arguments which was named by at least 50% of the companies surveyed)

Sustainability arguments	**Business arguments**
Regional circularity and local supply (81%)	Innovation marketing (100%)
Material use of biomass and side streams instead of use as bioenergy or waste generation (69%)	Declining availability and increasing prices of virgin wood fibres or paper for recycling (69%)
Lower carbon footprint than wood (50%)	Raw material diversification (69%)
	Product diversification (50%)

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Outlook

In view of the tense situation in the raw material market, especially the wood market, the fact that a wider range of alternative fibre sources is now being tapped into in order to produce pulp and paper is more than welcome. Some of the new non-wood fibres have interesting properties and their importance will continue to grow. So far, non-wood fibres in tissue, paper and packaging are still a niche business case with large hurdles to overcome both technically and commercially. The build-up of secure supply chains, better control and standardisation of qualities plays a central role in market development. Non-wood fibre pulp products can be an interesting application, particularly for by-products, side streams and waste, representing a better added value for raw materials with a low environmental footprint.

For more information:

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About Cepi:

Cepi is the European association representing the paper industry. We offer a wide range of renewable and recyclable wood-based fibre solutions to EU citizens: from packaging to textile, hygiene and tissue products, printing and graphic papers as well as speciality papers, but also bio-chemicals for food and pharmaceuticals, bio-composites and bioenergy. We are a responsible industry: 85% of our raw materials are sourced in Europe and certified as sustainable, 92% of the water we use is returned in good condition to the environment. We are the world champion in recycling at the rate of 71.4%. At the forefront of the decarbonisation and industrial transformation of our economy, we embrace digitalisation and bring 21 billion value addition to the European economy and €4.5 billion investments annually. Through its 18 national associations, Cepi gathers 490 companies operating 885 mills across Europe and directly employing more than 179,000 people.

More information about our sustainability performance here.

About nova-Institute:

nova-Institute is a private and independent research institute in Germany. nova was founded in 1994 and provides research and science- based consultancy with a focus on the transition of the chemical and material industry to renewable carbon: How to substitute fossil carbon with biomass, direct CO2 utilisation and recycling, how to defossilise the industry. Nearly 50 experts offer their unique understanding to support the transition of industries into a climate neutral future. Our subjects include feedstock, technologies and markets, economy and policy, sustainability, communication and strategy development.

More information about nova-Institute here: https://nova-institute.eu/