

Bamboo and the circular economy

A radical new concept for sustainable economic growth, the circular economy involves designing products, processes and supply chains which are regenerative, low-carbon and generate zero waste. Bamboo can play an important role in a circular economy in a number of ways.

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RENEWABLE

Bamboo is a fast-growing, versatile plant. Because it is a giant grass, bamboo's roots survive after harvesting, and shoots grow back without the need to replant. Within a few years, bamboo culms mature into a hard, woodlike, flexible material, with a diverse range of applications: perfect for use in the circular economy.

Because it can thrive on tough, marginal lands, bamboo can be planted in areas where farming is not feasible. Its long root systems bind soil and can raise the water table within a few years, regenerating land over time. If well managed, bamboo can be part of a genuinely regenerative circular system.

RESOURCE-EFFICIENT

All parts of a bamboo plant—culms, leaves, sheaths, roots and rhizomes—can be used to create products.

One bamboo furniture company in Chishui, China, shows the potential of bamboo to be a 100% waste-free enterprise: it uses bamboo poles to create furniture, and the leftover pole tips for creating incense sticks. Even sawdust from the factory floor has a purpose: it is condensed into bamboo briquettes, for burning, or used as a seedbed for bamboo fungus, a delicacy in the area. The factory's bamboo plantation is also used to raise chicken, which eat bamboo leaves for fodder, and as a source of bamboo shoots to be sold as food.

For every bamboo product, there are often numerous valuable by-products: for example, when creating bamboo charcoal it is also possible to extract alcohol, tar and vinegar. In China, a number of companies exist solely to repurpose 'waste' from one sector into value-added bamboo products in their own right.

RECYCLABLE

Bamboo cutlery, cups, straws, paper and packaging can replace single-use plastic, and are used by a growing number of companies, including several international airlines. Unlike plastic, bamboo products are biodegradable.

Even if bamboo products are not recycled, they can be burned and converted into a source of bioenergy. This is considered 'leakage' in a circular economy, but is still a relatively productive way to use bamboo.

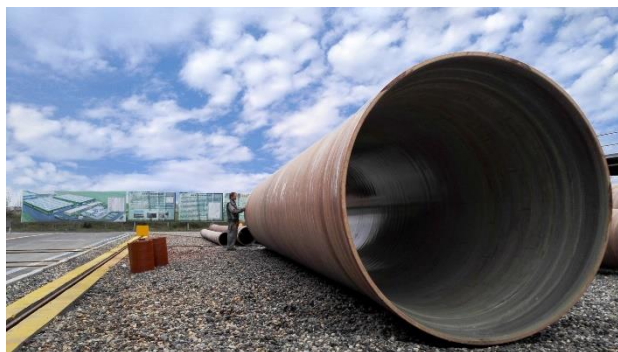


LOW-CARBON

Bamboo can act as an important carbon sink. Carbon is stored in bamboo plants, as well as in a wide range of durable products once harvested, from furniture to flooring. It is also possible to estimate the carbon 'saved' if bamboo materials are used as a substitute

for products with a higher carbon footprint, such as steel or cement. INBAR research shows that the emissions reduction potential of a managed bamboo forest, including products, can be significantly higher than for a Chinese fir tree plantation.

DURABLE



Bamboo industrial products. Photo: Engineering Research Centre for Bamboo Winding Composites

Bamboo flooring, decking, cladding, panels and beams can be a renewable, low-carbon alternative to traditional construction materials. This is particularly important in the context of a circular economy, as housing and construction constitute one of the world's fastest growing, but also most resource- and emissions-intensive, sectors.

Bamboo products can have a lower 'eco-cost' (or overall environmental impact) than timber ones. Research by TU Delft, INBAR and Dutch company MOSO BV shows that, based on use in Europe, almost all industrial bamboo products are CO₂-negative. These bamboo products' capacity to store carbon, and their use for bio-energy at the end of their lifespan,

outweigh the emissions used to create and ship them. The report concludes that industrial bamboo products could be a favourable substitute for hardwoods, both in terms of carbon footprint and eco-cost.

FUTURE RESEARCH

Although bamboo is a plant-based "green steel", a number of products require chemicals, laminate and glue to become durable and resistant to pests and rot. The search for bio-based and cost-competitive additives and chemicals, such as soy, lignin or bagasse, will make a crucial difference to making bamboo products even more compatible with the aims of a zero-waste, regenerative circular economy.

Importantly, even when chemicals and glues are taken into account, European industrial bamboo products have a lower 'eco-cost' than even FSC-certified hardwoods.

IN ACTION...

In China, the Engineering Research Centre for Bamboo Winding Composites (ERCBWC) is pioneering a new method for making bamboo products. 'Winding' bamboo can be used to create resilient products including heavy-duty, long-life drainage pipes—which are already being used in Inner Mongolia—as well as flooring, walls and train carriage fuselage. ERCBWC is one of a number of companies using bamboo as a low-carbon, often inexpensive replacement for timber, steel, cement and plastic.

ABOUT THE INTERNATIONAL BAMBOO AND RATTAN ORGANISATION

The International Bamboo and Rattan Organisation (INBAR) is an intergovernmental organisation which promotes the use of bamboo and rattan for sustainable development.