

Bamboo as a plastic alternative

Bamboo can provide a low-carbon, biobased solution to everything from single-use plastics to durable PVC.

September 2021

A BIOBASED, WASTE-FREE MATERIAL

Fast-growing and versatile, bamboo can help to reduce plastic pollution as a source of both disposable and durable products, which are low-carbon to produce and can be biodegradable.

In recent years, bamboo technologies and processing techniques have matured, expanding the range of bamboo products and ensuring that they are safe, high-quality and competitive with plastics on the market. Whereas plastics require fossil fuels to make and produce, bamboo products can be 100% biobased, meaning they can be recycled, and have a much lower carbon footprint and overall environmental impact.

Because bamboo matures quickly and grows back after harvesting without the need to plant, its products can easily last longer than the amount of time needed for bamboo to regrow (around three to five years), making them a good fit in the circular



economy. Bamboo also thrives on degraded and sloping soils, and does not need to compete with agriculturally productive land.

As well as this, bamboo value chains can be 100% waste-free. This is because the entirety of a bamboo plant—from the culm to the roots, shoots, sheaths and leaves—can be used to make products, or as a source of fodder and fuel.

If they do not use synthetic parts, such as resins, glues or laminates, bamboo products can be recycled at the end of their lifespan, making them perfect materials for the circular economy. However, even if bamboo products include these elements, they still have a lower carbon footprint and ecocost than steel, PVC, aluminium and steel.

SINGLE-USE PLASTICS

The pollution and health issues caused by single-use plastics have become an area of global concern. Single-use plastics are produced almost exclusively from fossil fuels, making them a key contributor to climate change. Because they are among the hardest items to recycle, only a small amount of single-use plastic is recycled globally each year; the rest ends up creating global waste mountains, or leaching particles and chemicals that harm humans and wildlife. In total, more than 120 countries have ratified bans on single-use plastics.

Bamboo can provide a non-fossil-fuel-based, and potentially recyclable, alternative to many single-use

plastic items, including straws, cutlery, chopsticks, cups, bowls and food packaging.

Some of these items, such as bamboo cutlery, can be made from a single piece of raw material without using adhesives. Others, such as bamboo plates, bowls and cups, are often made by pressing and bonding the bamboo together with adhesive. Some companies are experimenting with creating biobased adhesives, or with alternative methods to make bamboo plates, such as heat pressing technology, which will make products recyclable.

A number of airlines, including Singapore Air, Hi Fly and British Airways, are now replacing plastic cutlery, stirrers or food containers with bamboo. Other major companies, like KFC, are testing compostable cutlery made of bamboo, corn and sugar cane. Once used, the cutlery will eliminate 40 million pieces of plastic waste from its operations in Canada alone.

DURABLE PRODUCTS

As well as single-use items, bamboo can also be used to create durable products, from keyboards and skateboards to flooring, furniture, construction materials, wind turbine blades and drainage pipes.

Bamboo strips can be made into laminated, compressed and composite products, for use as base materials in walls, flooring, ceilings, and outdoor decking. Smaller bamboo parts can be used to make fibre board and particle board, to replace MDF in flooring and semi-structural panels. Bamboo fibres can also be used as fillers in granules suitable for 3D printing or compression molding, especially when combined with biobased resins.

These new applications mean bamboo could be an important part of future construction and infrastructure initiatives, replacing plastics and other emissions-intensive, non-recyclable materials.

IN ACTION...

Dongfeng Motor Thermal Power Plant, in China, previously used PVC fills in its cooling towers. However, the PVC began to collapse after four years of service, and so in 2013 the company transitioned to using bamboo grille materials (pictured).

Dongfeng's experience showed that bamboo grid packing performs well over a longer period of time than PVC. Bamboo grille fills posted more consistent temperatures over time, saving 529 tons coal compared to PVC fills between the months of March and August. The environmental impact index for 1 metre cubed of bamboo grille was 26,000 grams CO₂-equivalent: more than six times lower than for PVC packing.

Dongfeng is one of 80 companies in China so far to switch from using PVC to bamboo fills.



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.