

Bamboo: the forgotten circular economy solution

The potential of bamboo in a zero-waste, low-carbon future

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WHAT IS THE CIRCULAR ECONOMY?

A radical new concept for sustainable growth, the circular economy involves designing products, services and supply chains which are **regenerative**: that is, based on renewable energy and resources. A regenerative system does not generate waste, and keeps products and materials in use, while building economic, natural and social capital.

Bamboo could be a critical component in the transition to a circular economy, by providing a **viable, biobased alternative** for non-renewable, carbon-intensive 'techno-cycle' materials.

A SUSTAINABLE SOURCE OF FIBRE

Several aspects make bamboo an excellent potential material for use in the circular economy.

- Bamboo is **rapidly self-regenerating**: it grows fast, and can be harvested without the need to replant.
- Bamboo also **matures quickly**, within 3 to 5 years, and its selective, annual harvesting makes bamboo plantations relatively resistant to clear-cutting and deforestation.
- Bamboo's **global spread and growing area potential** is massive: bamboo covers more than 35 million hectares of land, and can be used to restore millions more of degraded soil.

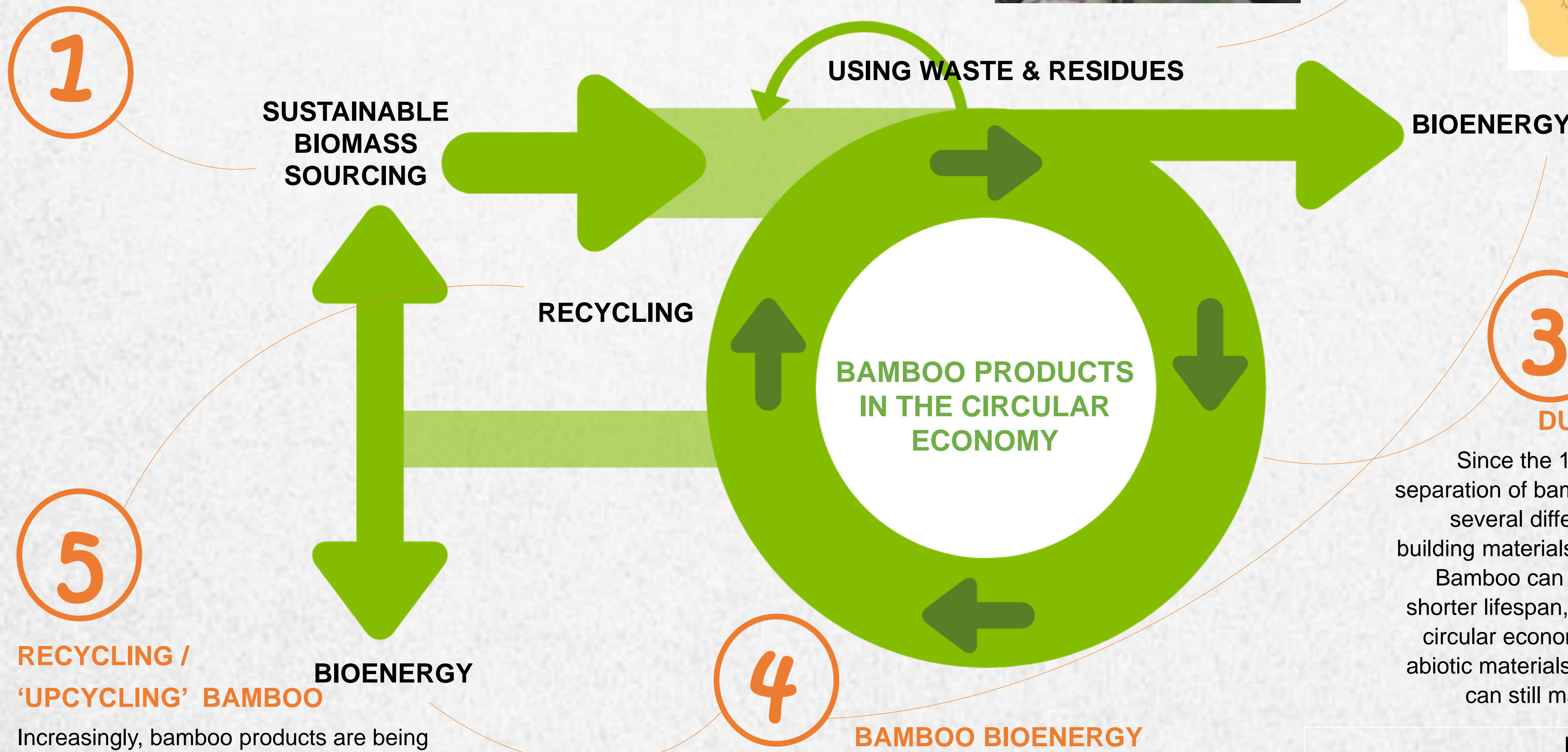
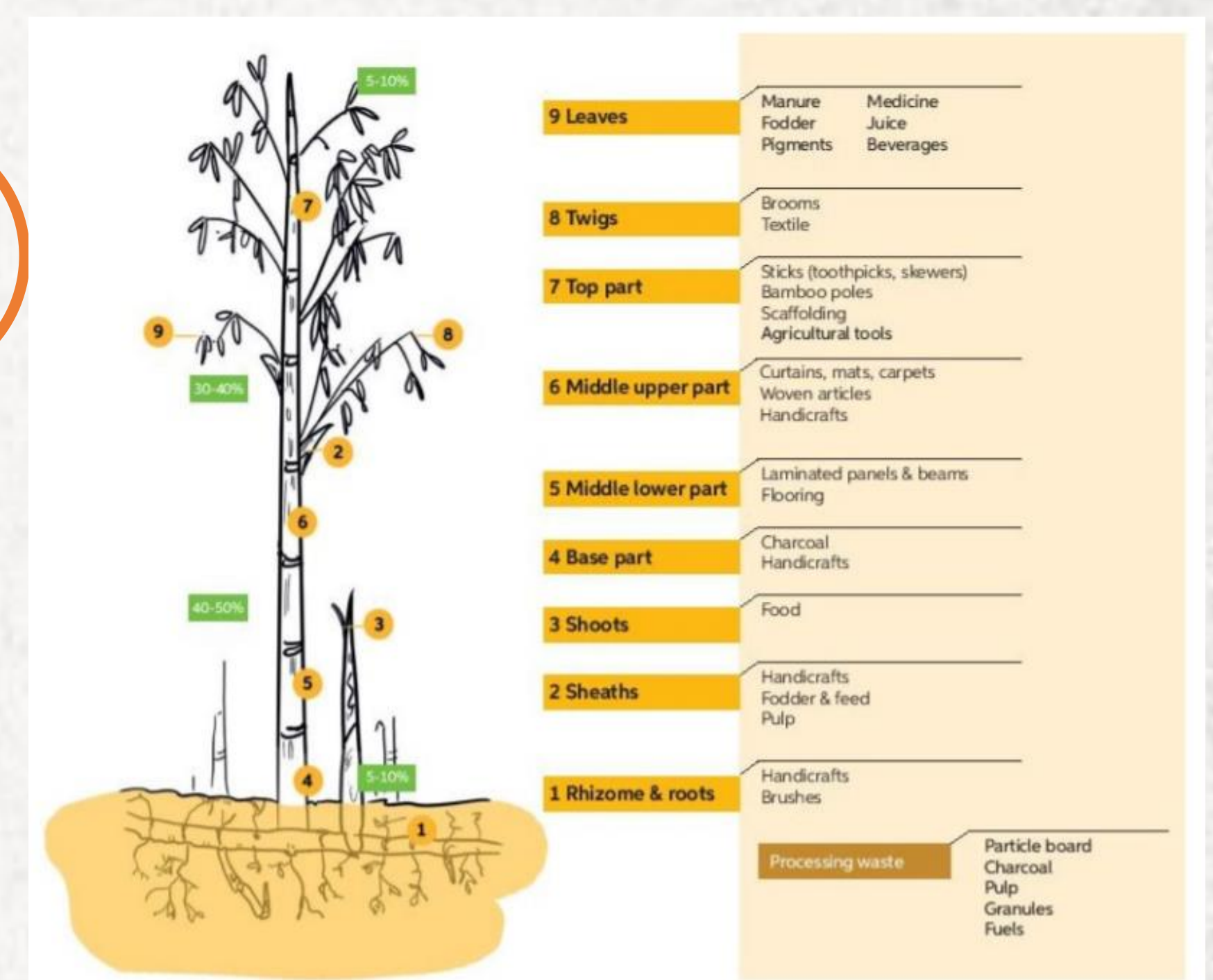


ANALYSING WHY BAMBOO FITS IN THE CIRCULAR ECONOMY

To be completely compatible with a circular, no-waste economy, a 'perfect' bamboo product should:

- have a lifespan long enough to enable the resource to grow back;
 - be able to substitute abiotic materials;
 - have 100% biobased content;
 - be reusable over multiple product cycles; and
- at the end of its use, be biodegradable or otherwise safe to burn for energy production.

A 2019 paper by the International Bamboo and Rattan Organisation (INBAR) analysed the potential of bamboo products to contribute to a circular economy.



A WASTE-FREE PLANT

100% of a bamboo plant can be used to make products. In a number of factories in the south of China, it is common to use all parts of the bamboo for making by-products or bioenergy to fuel the factory. Even bamboo 'waste' and offcuts from one process can create value-added products in their own right, such as bamboo-based MDF board.

DURABLE, BIOBASED BAMBOO PRODUCTS

Since the 1990s, new processing technologies have enabled the separation of bamboo into strips, slivers, fibres and particles, for use in several different durable products, such as flooring, furniture, and building materials... and even drainage pipes and wind turbine blades. Bamboo can also substitute plastic in a wide range of goods with a shorter lifespan, typically under five years. Although less critical to the circular economy than their durable counterparts, which can replace abiotic materials for a long period of time, a number of these products can still make an important contribution to the circular economy.

EXAMPLES OF DURABLE BAMBOO PRODUCTS

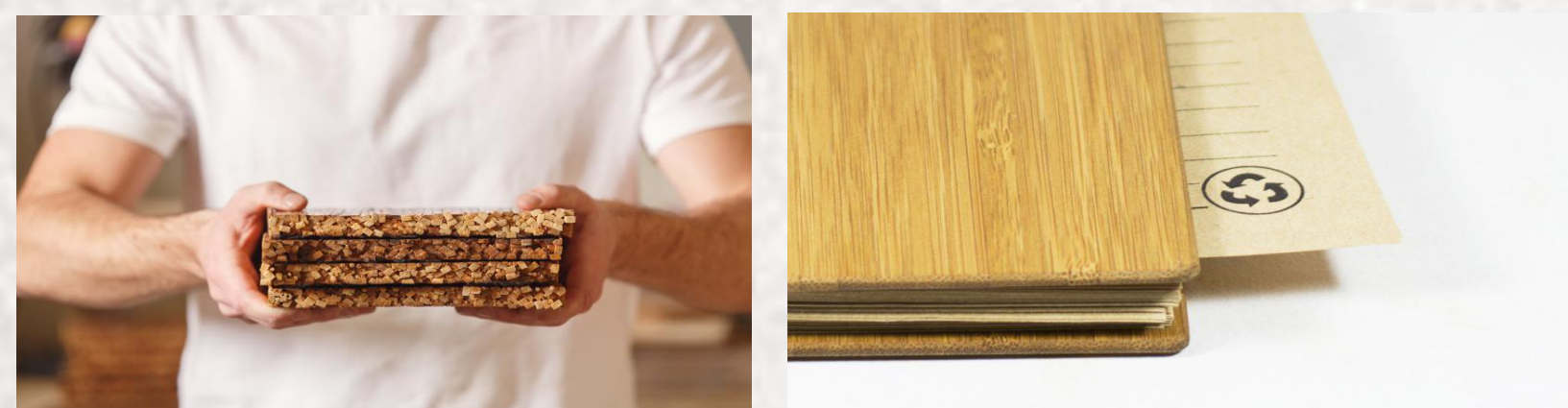


EXAMPLES OF SHORT-LIFE BAMBOO PRODUCTS



RECYCLING / 'UPCYCLING' BAMBOO

Increasingly, bamboo products are being made without synthetic parts, such as resins, glues or laminates. These products are entirely biobased, and can be recycled or upcycled into new products.



Left to right: ChopValue compresses used chopsticks for use in furniture (Credit: ChopValue); a recycled bamboo notebook.

BAMBOO BIOENERGY

Bamboo can be processed into charcoal, pellets and gas, for use in cooking, heating and electricity. If bamboo products are not fully biobased or biodegradable—for example, if adhesives are used—the best 'end-of-life' scenario for such bamboo products is incineration for energy production, provided it is burned in bioenergy facilities that can capture any harmful fumes upon incineration.

In many bamboo companies, waste from creating products is converted into pellets for electricity generation in the factory.

CHALLENGES AND RECOMMENDATIONS

A lot of durable bamboo products still use adhesives, resins, laminates, chemicals or non-biodegradable components, which means they cannot be recycled and can only be burned for energy at the end of their lifecycle. Despite this, many companies label bamboo products as 'eco-friendly', without trying to improve the circularity of their production processes. As such:

- More research is needed to **find biobased alternatives for synthetic parts** in bamboo products;
- Companies should be transparent and set **development goals to reach a 100% biobased target**;
- Companies should also try to **develop an integrated bamboo industry**, using and adding value to the full bamboo resource;
- Policymakers need to **support sector development**, and **embrace international standards** for products.

REFERENCE:

King, C., van der Lugt, P. (2019) *Bamboo in the Circular Economy*. INBAR Policy Synthesis Report #5. INBAR: Beijing, China
Find out more at: www.inbar.int