How sustainable is palm wood?

Inspiring the next "material revolution" by creating sustainable and high-performance materials from oil palm waste, **Peter Fitch**, together with IOI, have set up IOI Palm Wood to commercialise this untapped potential.

Palm wood comes from various tree-like species in the palm family. However, the most abundant and sustainable supply comes from *Elaeis guineensis*, or commonly known as oil palm. Palm wood can be sustainable due to the high availability of oil palms but logging in tropical forests and deforestation causes great ecological damage. So, the question is: Just how sustainable is it to buy products that are made from palm wood?

Palm wood is sustainable because of its carbon storage and carbon sequestration. Palm trees are only cut down when they stop bearing economically valuable fruits. Thus, the production of palm wood from oil palm trunks (OPT) that are chopped and left to rot in the fields serves as an environmentally friendly way to repurpose an otherwise waste material.

To understand the sustainability of palm wood, let us assess the lifecycle of furniture and other building materials using the lifecycle assessment (LCA) to evaluate the potential environmental impacts of each stage of palm wood's lifecycle. LCA is a strategic method that has been used by companies over the years to research and create more sustainable products.

In this article, we will use the cradle-to-grave perspective to examine each stage of the lifecycle of flooring, furniture and building materials made from palm wood.

THE LIFECYCLE STAGES OF PALM WOOD

As oil palms grow, they uptake carbon dioxide, thus reducing its presence in the atmosphere. Throughout the ages, oil palms have adapted to many habitats in the world's tropical regions and have provided fruit crops such as crude palm oil. While only 5% of the world's vegetable oil farmland is used for palm plantations, palm cultivation produces 38% of the world's total vegetable oil supply. In terms of oil yield, a palm plantation is 10 times more productive than soyabean, sunflower or rapeseed cultivation because palm fruit and kernel both provide usable oil. The production of palm wood from discarded trunks adds to the usefulness and climate positive aspects of palm wood.

GROWING PALM WOOD

The palm family has 190 genera and 2,800 species, making it one of the largest in the monocotyledon, or monocot, group. Other families in this group are banana and bamboo. Palms, like all other monocots, are more closely related to grass than trees: The plants have only a single stem and no bark, branches or secondary growth. Thus, palm wood is technically neither hardwood nor softwood. Palms have been used as alternative sources of wood for hundreds of years, such as the flexible stems from climbing rattans — a large palm sub-family — which is commonly used to make furniture and household items.

Some palm species which palm wood is commonly utilised for building homes and making furniture include palmyra palm, or *Borassus flabellifer*; red palm or coconut palm; date palm, or *Phoenix dactylifera*; peach palm, or *Bactris gasipaes*; and rattans.

At IOI Palm Wood, we aim to add oil palm, or *Elaeis guineensis* to this list. Palm wood's sustainability lies in the potential for carbon sequestration due to the abundance of plantations throughout Malaysia and South East Asia, and the multiple benefits of land used for growing these palm species for vegetable oil production.

Oil palms are grown in large plantations for their fruits. Once these palms are no longer productive,

they are cut down to make room for the next generation of palms. OPT, which is the by-product of the fruit crops, provides a quantity of sustainable biomass material for the wood industry. For example, oil palms can grow up to 20m in height and 1.5m in diameter. If plantations are replanted after 25 years, the felled trunks could be used to produce palm wood. It can be estimated that a typical trunk volume of 140m^3 per hectare can sequestrate 80 tonnes of CO2. Additionally, removing the trunks prevents the release of methane during the decaying process which is 24 times as detrimental to the climate as CO2. The use of the palm wood thus reduces the pressure on endangered hardwood species located in tropical rainforests.

MANUFACTURING PALM WOOD

Turning palm wood into furniture has a relatively low carbon footprint because wood waste can be recycled fully as by-products or biomass energy to off-set the carbon emissions during harvesting and processing.

The first step of manufacturing palm furniture and building materials involves cutting down the palms and turning them into lumber in a sawmill. Electricity is needed to run sawing machines. The next step is to dry the lumber before turning it into furniture. A piece of lumber needs to be dried to the desired moisture content. Then, a kiln is used, which requires extra energy, which can be off-set by using biomass energy.

The rate of drying palm wood depends on the moisture content and the temperature. This can take many days, or even weeks. Density is another deciding factor for the drying time.

Turning palm wood into furniture has a relatively low carbon footprint

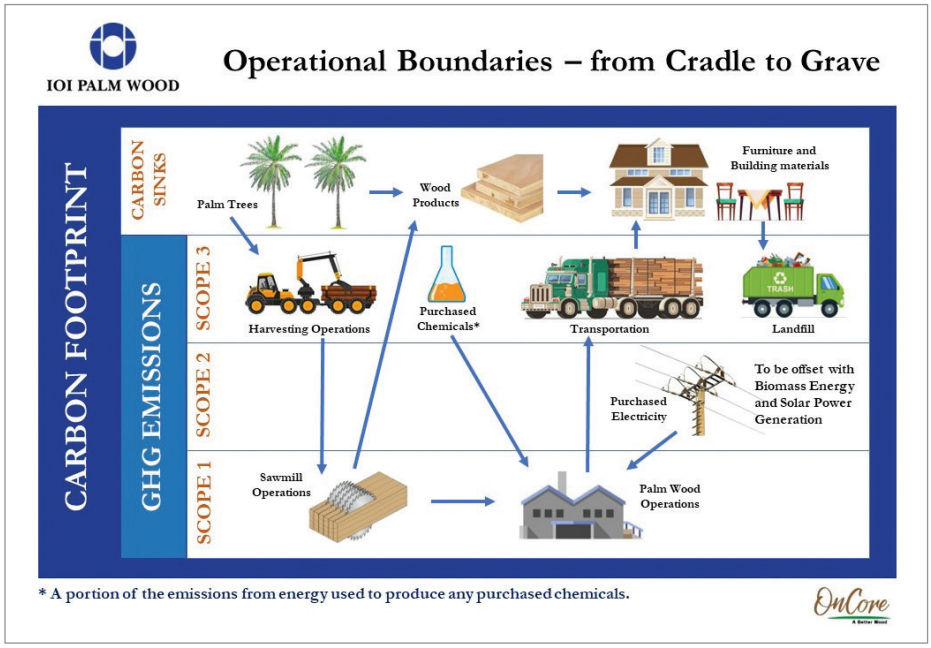
Hardwoods have annual growth rings that are similarly dense. Conversely, a typical palm stem consists of two regions with unequal density. The region around the core is larger and softer than the outer region, which is often made of densely packed fibres.

The energy needed to power sawing machines and the kilns can come from fossil-free sources to reduce carbon emissions. Burning wood waste is one way to avoid using fossil fuel in this step. At IOI Palm Wood, we intend to derive 100% of our thermal energy from biomass. Another fossil-free fuel option is solar power which will be a potential investment for us in 2023.

USING PALM WOOD

Using palm furniture and building materials is sustainable with the carbon capture during the product's lifetime. Palm wood, for example, can last for more than a decade, provided they are dry and treated properly. When wood is decayed, either naturally in the forest or

because of damage caused by usage at home, the carbon stored in the wood is released back to the atmosphere. Therefore, long-lasting furniture can be a good way of keeping carbon out of the atmosphere. If the wood is reclaimed for making another piece of furniture, its positive carbon storage environmental impact is even higher.



TRANSPORTING PALM WOOD

The transportation of palm wood is a relatively carbon-intensive stage in the palm wood's lifecycle due to the distance from its source and the emissions associated with operating the vehicles from taking the OPT at the oil palm plantations to sawmills, to factories, and lastly to stores. As palm wood typically comes from the tropics, transporting palm wood furniture would typically have a similar carbon footprint to furniture produced in other Asian regions such as Vietnam, China and Indonesia.

THE END-OF-LIFE STAGE

The end-of-life stage for palm wood products is sustainable when the wood is reused or burned as bioenergy. There are a few scenarios for wood products — furniture, building materials and household items — at the end of their lifecycle. First, they can end up in landfills and do not decompose. In this case, it keeps its role as carbon storage. Second, wood products can also be upcycled and reused, extending their role as carbon storage and reducing the fossil carbon emitted. New wood products often travel much further to their markets, compared with recovered wood products. The latter is typically made in urban centres and sold locally, which lowers the transportation environmental burdens. Third, in another end-of-life scenario, products like a palm wood cabinet can be burned for biomass energy displacing coal or natural gas in generating electricity.

BUYING PALM WOOD SUSTAINABLY

Buying sustainable wood helps to prevent illegal or unsustainable logging, which harms the forests' biosystems and accelerates climate change. Logging accounts for 26% of forest and biodiversity losses. Cutting down trees for wood has less impact on carbon storage than farming or mining. However, if logging is not sustainably managed, it can damage the biodiversity.

Sustainable use of palm wood will absorb carbon from the atmosphere and reduce the overall effect of climate change. And, to make it even more sustainable, use any palm furniture for as long as you can, upcycle the material to extend its usage, and arrange for it to be recycled fully. P

Keeping long-lasting furniture can be a good way of keeping carbon out of the atmosphere