# What is sustainable timber?


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.

Sustainable timber is defined as timber that has been harvested responsibly. This necessitates that when one tree is cut down to be used, another is planted to replace it.

When we refer to sustainable timber, we are not trying to define deforestation as this is a very emotive subject. The most contentious environmental issue facing the industry is deforestation. Large tracts of forest are being cleared for agricultural and plantation purposes. But what is often overlooked is that land clearance for agriculture far outstrips that for plantations. Deforestation results in above-ground biodiversity loss, air and water pollution, and carbon emissions, which cause physical and chemical changes to the soil.

We therefore have a dilemma, as the economy, environment, and society are all key factors in determining what constitutes sustainable development. Sustainability cannot be achieved if any of these factors are ignored. Natural resource conservation has significant direct and indirect influences on the economy and human health. Maximum services and goods can only be provided by an ecosystem when it is in a healthy condition, with ecological integrity, connectivity, and resilience. Anthropogenic and other ecological pressures, such as natural disasters, are caused or accelerated by imbalances in the ecosystem.

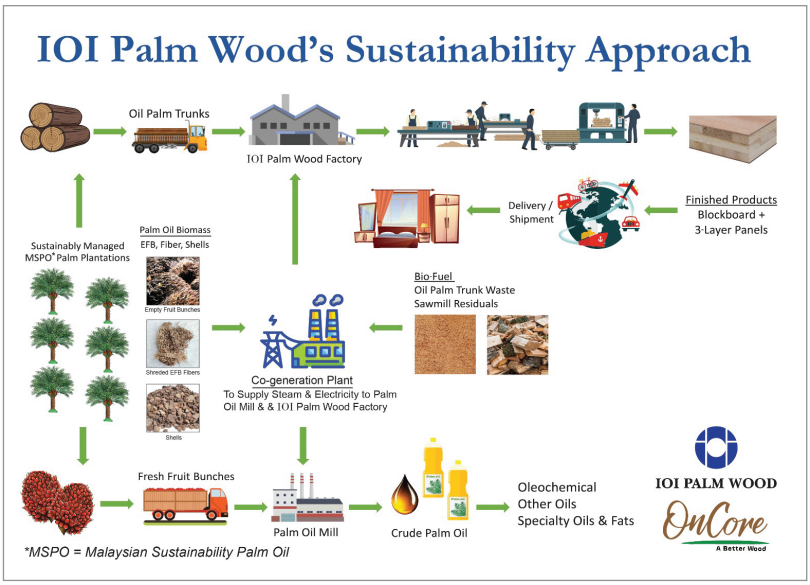
So, when we claim to be sustainable or environmentally friendly, we are entering a quagmire of controversy and conflicting opinions on what this really means. All stakeholders must understand that the global human population currently stands at 8 billion, and is set to grow to nearly 10 billion by 2050. Global poverty eradication is a key driver for the United Nations (UN), which means that the demand for food, shelter, water, energy, and 'general stuff' is set to increase almost exponentially.

How are we going to satisfy this ever-increasing demand for resources and 'general stuff'? To produce timber equivalent materials from waste biomass such as oil palm trunks (OPT) can be a good contributor to reduce deforestation and a way to promote sustainability.

This article does not try to justify the existence of oil palm plantations, whether they are 100 years old or newly created. What we are aiming to do is to create a commercially viable, high quality and sustainable material from an otherwise unutilised waste biomass generated during the normal replanting cycle. Palm oil as a crop and the associated oil palm plantations are probably the most regulated agricultural products in the world. Unlike perennial crops such as soya, maize, rapeseed, or other commercial crop, oil palm trees are replanted on average every 25 years and the OPT that are felled are normally chipped and left to rot in the field. By utilising these OPT we are essentially using this waste biomass and fixing the carbon for another extended period and reducing the need for the logging of tropical timbers.

The use of OPT is of great ecological and economic importance:

- First, the use of oil palm trunks for products and energy can reduce the pressure on tropical forests, be it primary or secondary. There are not enough forest plantations to supply the ever-increasing demand for wood necessary for the market. Therefore, there is a direct link between OPT utilisation and a reduction in the removal of trees from natural forests.
- If plantations are replanted after 25 years and the trunks remain in the plantation, they will take approximately two or three years to compost and the carbon in the trunk is then set free as CO2. It can be estimated that a trunk volume of 140m$^3$ per hectare emits some 80 tonnes of CO2. Moreover, it is likely that under wet soil conditions, part of the carbon — up to 5% — is converted to methane. Methane is 24 times as detrimental to the climate as CO2.
- If the trunks remain on site, even if chipped, there are reports that this can support the distribution of pests such as rats, beetles, and fungi. It is therefore recommended that a significant part of the


trunk be removed from the plantations.
- Wood products generally need less energy for their manufacture compared to products made from other materials like cement, plastics, metals, etc. This reduces the consumption of fossil fuels which is relevant for CO2 emissions but also from a natural resource perspective. Wood products also store carbon from the trunks throughout their product lifecycle. This carbon storage effect is already considered in the international agreements on climate change.
- During manufacture, palm wood products have a very good eco-profile as little water pollution or emissions occur.
- Palm wood is a material for utilisation in cascades: first used as a carbon sink product and later as a source of energy.

Based on a volume of 100,000m$^3$ per year of OPT input into the production plant, some 110,000 OPT per year are removed from the plantations — but oversized trunk sections, for instance, butt ends, are used for energy. Approximately 40,000m$^3$ of marketable products are manufactured from the trunks while the remaining material is used for energy.

Following the assumptions given above, the following effects can be shown for our IOI Palm Wood factory described here:
- Instant CO2 emissions are reduced by 27,500 tonnes of CO2 per year. This constitutes the removed volume of OPT minus the volume used for energy. This is the volume of the manufactured products and is considered the carbon pool.
- Substitution effects: the use of palm wood instead of other materials. Thirty-five thousand cubic metres of products, based on the given range of products, with about 0.93 tonnes of CO2 per m$^3$ results in a reduction of 32,500 metric tonnes CO2 emissions.
- The use of palm wood from processing residues and products at the end of their lifecycle instead of fossil fuels for energy reduces CO2 emissions by 33,000 tonnes.
- The effect of methane emission avoidance can be estimated at about 24,000 metric tonnes of CO2, provided if 5% of the carbon is released as methane.
- The total effect for CO2 emission reduction is about 128,500 tonnes per year, or 1 tonne of CO2 per m$^3$ of OPT, or 3.5 tonnes of CO2 per m$^3$ of product, or 80 tonnes of CO2 per hectare cleared plantation, based on the use of 80m$^3$ of trunks per hectare.
- The loss of minerals or nutrients with the removal of the trunks can be compensated by taking back the ash from the energy plant to the plantation, as opposed to the chipped trunks which are spread over the entire plantation area; the ash or minerals could be directly applied to the seedling area. Another aspect in this context is that the mineral or nutrient contents in the upper trunk parts which are not used for products and energy are higher than in the lower trunk portions.
- The use of OPT will provide additional income for plantation owners which is important, especially for smallholders.
- For obtaining 50m$^3$ of conventional wood, one hectare of the natural forest must be harvested. Consequently, when we can substitute 130,000m$^3$ of wood per year by using palm wood, this means that the equivalent of 2,600 hectares of natural forests per year can be substituted with the operation of our IOI Palm Wood factory. One might therefore argue that the use of OPT from one hectare of oil palm plantation reduces the pressure on two hectares of natural forest.

**A FINAL NOTE**

The discussion on palm wood should under no circumstances be combined with any ongoing discussions on palm oil and oil palm plantations. The advantage of oil palms is their productivity for vegetable oil as it is said to be the highest yielding oil of all crops. OPT accrue when plantations are replanted, it is an existing but to date under-utilised resource. The conversion of this wasted resource should be considered an ecological and economic imperative in the battle against deforestation and climate change. P