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More to oil palm than just palm oil

EVERYONE knows that oil palm is grown to produce palm oil. Some 90 per cent of oil palm plantation revenue is derived from the sale of crude palm oil and crude palm kernel oil while the other 10 per cent is derived from other parts of the palm. These figures are expected to be reversed by 2020.

A less well-known fact is that oil only forms about 10 per cent of the total biomass produced by the palm, while the remaining 90 per cent can be further utilised for commercial exploitation in a sustainable manner.

It has been estimated that for every tonne of palm oil produced from fresh fruit bunches, a farmer harvests around six tonnes of waste palm fronds, one tonne of palm trunks, five tonnes of empty fruit bunches, one tonne of press fibre (from the mesocarp of the fruit), half a tonne of palm kernel endocarp, 250kg of palm kernel press cake, and three tonnes of palm oil mill effluent.

Quoting figures from the National Biomass Strategy Blueprint, by 2020, Malaysia's palm oil industry is expected to generate about 100 million dry tonnes of solid biomass.

Currently, a large portion of the biomass from the plantations is left to rot and returned to the field as fertiliser. While this practice is necessary for the healthy growth of young oil palms, there is more than enough biomass that can be used for more lucrative purposes.

The National Biomass Strategy 2020 lays the foundation for Malaysia to capitalise on its biomass by channeling 20 per cent of the solid biomass into higher value downstream uses instead of using it as low value downstream uses like fertiliser. These uses can broadly be divided into energy generation, bio-chemicals and structural materials.

The biomass from oil palm fronds, palm kernel shells and empty fruit bunches can be used as feedstock for biomass boilers to generate electricity. The renewable energy generated may be used on site or sold to power generation companies, thereby, reducing energy costs and increasing the revenue of mill owners.

According to industry sources, a mill capable of processing 60 tonnes of fresh fruit bunches an hour can also produce 3MW of electricity an hour from the empty fruit bunches once the fruits have been removed.

Furthermore, the anaerobic treatment of palm oil mill effluent produces biogas which can be used as a substitute for natural gas for use in factories and homes.

In contrast to first generation bio-fuels and bio-based chemicals — using food crops such as sugarcane, cassava or corn as feedstock — emerging second-generation technologies are exploring the use of oil palm biomass. One oil palm trunk produces about 200 to 250 litres of sap which has a sugar content of eight per cent, up to a maximum of 18 per cent with proper

ageing. This sugar can be fermented into ethanol which is emerging as an alternative biofuel and bio based chemicals. Further research is also being done to convert the lignocellulosic materials from the oil palm fronds into bio-based chemicals.

Currently, oil palm trunks are used to produce low-grade lumber. Up to 40 per cent of the trunk wood can be peeled for making plywood and about 40 per cent of the frond material can be crushed into dust or smaller particles to make medium-density fibreboard and particleboard.

However, these processes are energy intensive and at FRIM we have found more cost effective processes to convert oil palm trunks into engineered lumber, i.e. MYScriM-OPT which is intended for use in manufacturing furniture, doors, floorboards and interior design accessories.

More intensive research is being conducted to develop the patented MYScriM-OPT technology further to enhance its properties so that the final product is strong enough to be used as building materials. This will not only create added value from by products from the palm oil industry but also reduce our dependence on our fast depleting forests for wood.

Plantation companies with sufficient capital which have invested in downstream activities have benefited from the higher returns gained from moving further up the palm oil value chain. The next step will be to explore and exploit other aspects of the oil palm. The high investment in these large commercial scale technologies will be justified with the right kind of regulatory framework, coupled with incentive packages provided by the government.

Coordination between the plantations and the mills is required to mobilise the commercial part of the oil palm biomass. Biomass utilisation centres will need to be centralised to be closer to the centre of production in order to lower the logistics and handling costs which otherwise can render unprofitable efforts.

While the technology is available, the high investment in these technologies means that only highly capitalised companies, typically, public-listed plantation entities, are able to afford them. The bigger boys with large capital bases and professional management teams like Sime Darby, Fel-da Holdings and IOI are in a better position to take on the risk and the rest will, hopefully follow.

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Industry sources