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## **Tapping biomass to the max** Oil palm by-products can generate lucrative income

## By HANIM ADNAN

nem@thestar.com.my

**S**OME 10 years ago, the oil palm biomass is widely considered as a bane to many oil palm industry players, from plantations right down to the mills and refineries.

Operators are constantly facing rising costs just to dispose and transport the biomass such as the empty fruit bunches (EFB), shells, mesocarp fibre, felled tree fronds and trunk as well as palm oil mill effluent (Pome) after the process of crushing and extraction of palm oil and palm kernel oil from the fresh fruit bunches.

Now, the situation has changed dramatically. What was previously perceived as oil palm waste, is turning into a lucrative income generator for the industry players.

This has resulted in many local industry players, particularly big oil palm plantation groups to actively venture into renewable energy (RE) projects using oil palm biomass as feedstock for electricity power generation, biogas and industrial steam projects.

These projects augur well for Malaysia's palm oil in the eye of the Western green activists and consumers given the increasing worldwide call for green RE to replace fossil fuel to preserve the environment.

Malaysia is currently the world's second largest producer of crude palm oil, but the world's largest exporter of palm oil products.

Given such an abundant source of oil palm biomass nationwide, the Government is quick to acknowledge the potential of power generation, industry players' participation in selling carbon credit under the the Kyoto Protocol's Clean Development Mechanism (CDM) as well as the creation of more downstream businesses for palm oil millers and refiners.

Therefore, various incentives are now available for local players involved in the RE projects utilising palm oil biomass.

It is projected that oil palm bio-

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mass-based downstream activities could generate about RM14bil additional revenue to the country's palm oil industry. This is estimated to be a 20% boost to the current palm and palm products revenue of RM80bil.

Depending on whether the eletricity is sold or utilised in the plants, mills can enjoy incentives such as tax exemption of 100% of statutory income for 10 years, and investment tax allowance of 100% for five years to be offset against 100% of statutory income.

In addition, there is an RE Fund which will be utilised to formulate feed-in-tariff rates sufficient to create justification for companies and or individuals to invest in the RE electricity production.

National palm oil custodian, the Malaysian Palm Oil Board (MPOB) is also urging more local palm oil mills to set up more biogas plants as a mean to boost their revenue and reduce greenhouse gas (GHG) emissions.

At a recent briefing on the update of the palm oil National Key Economic Area (NKEA), MPOB engineering and processing research

division director Dr Lim Weng Soon says there is significant revenue to be generated from selling electricity, palm shell displacement, the carbon credit programme and creation of more downstream business for palm oil millers.

"Biogas plants connected to the national grid can potentially be looking at a net profit of RM3.4mil per plant per year based on the maximum electricity tariff of 35 sen per kwh," says Lim when citing an economic analysis on Pome biogas from the energy production of a typical 60 tonnes fresh fruit bunches (FFB) per hour mill.

To further accelerate the growth in biogas plants, Lim says the electricity tariff for RE power purchasing agreement has been increased from the current 21 sen to 35 sen per kwh.

Palm shell displacement can also generate revenue.

He says if biogas is used in the boiler, the shell which was orginally burnt in the boiler to produce energy can now be sold.

"The current market price for palm shell ranges between RM160 to RM200 per tonne," adds Lim.

He also encourages palm oil millers to participate in the CDM programme under the Kyoto Protocol which is involved in the trading of certified emission reductions (CERs) or carbon credit to developed countries.

"The proceed from the sale of CERs will enable them (millers) to invest in more GHG reductionrelated projects," says Lim.

CDM is a United Nations-sponsored agreement under the Kyoto Protocol whereby industrialised countries finance the reduction of global GHG emissions in developing nations and can also purchase carbon credit.

Based on a 60-tonne per hour FFB mill, MPOB has estimated that 30,000 tonnes to 40,000 tonnes of CERs can be generated. Accordingly, based on Euros 10/CO2e (per tonne CO2 equivalent), each mill can earn about RM1.5mil per annum for 21 years.

As of April this year, 90 projects comprising 53 involving palmbased biomass projects have been registered under the CDM.

Lim is also of view that the creation of downstream business in palm oil mills such as kernel crushing plant, EFB processing plant including EFB fibre plant, briquette and pellet plant, composting plant and palm oil refinery may also accelerate the development of biogas plants in palm oil mills.

Lim estimates that Malaysia can mitigate more than 17 million tonnes of CO2 equivalent per annum if the biogas is channelled into energy.

This is based on 54 million tonnes of Pome generated in 2010. "This is equivalent to the annual emissions of 3 million passenger cars and light trucks. This will protect the environment and make our palm oil products more acceptable," adds Lim.

Under the palm oil NKEA of the Government's Economic Transformation Programme (ETP), Malaysia is targeting 500 biogas plants to be built in 2020.

The biogas plants project under the ETP is expected to generate an estimated RM2.9bil in Gross National Income and create 2,000 jobs by 2020.

The MPOB has set up a Biomass Technology Centre (BTC) in Bangi, Selangor, which is a one-stop centre for R&D on and commercialisation of bio-composites from oil palm biomass, especially medium density fibreboard (MDF).

The BTC is equipped with a MDF

pilot plant, material processing plants, material-testing and fibreanalysis laboratories, and a few analytical and bio-composite laboratories.

Many can benefit from the facilities and technologies offered by BTC particularly the MDF pilot plant which is able to produce a variety of wood-based panels and other products similar to industry-manufactured panels.

In fact, local wood-based industries can benefit from the facilities and technologies offered by the BTC as the centre allows the industry to carry out R&D, process optimisation and feasibility studies prior to commercialisation.

Meanwhile, Forest Research Institute Malaysia (FRIM) head of bioenergy programme, forest products division Dr Wan Asma Ibrahim says the basic research carried out by FRIM on oil palm biomass started in the 1980s.

"The aim was mainly on utilising the oil palm biomass abundantly generated from the palm mills and plantations as an alternative resource to ease the pressure on tropical timbers for local woodbased industries.

"This is in line with the attack by the global community on the environment issues of depleting tropical forests," adds Asma.

Furthermore, the pre-processing machines and systems to process the oil palm biomass are also developed with local industries to cater for the raw material supply to suit end-users.

The current FRIM projects on oil palm biomass include:

• Conversion of waste palm trees funded by United Nations Environmental Programme. The one-year project reports on the baseline study of the availability, characterisation and utilisation of waste palm tree biomass in Malaysia;

Development of an efficient

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## Good potential from oil palm biomass industry can have new wealth creation via efficient utilisation of oil palm waste material and also

system for the production of oil palm trunk sap for bioethanol production; and

 Development of palm wood products such as for plywood, decorative flooring and panel products and furniture by technology transfer to the local industries and stand-

ard testing of products to prepare for global market needs.

Wan Asma also acknowledges that the utilisation of oil palm biomass has very good potential.

"Oil palm biomass is one of Malaysia's resource material. By fully utilising the oil palm biomass, local industry players such as palm oil millers can capture the carbon

and help reduce global warming as opposed to letting it biodegrade and releasing the greenhouse gases," says Wan Asma.

In addition, she says the oil palm



oil palm waste material and also reduce the heavy dependency on fossil fuels.

## **Renewable energy projects** under SREP\* Installed Approved Capacity Type of RE Projects (MW) Palm biomass 17 168 Palm biogas\*\* 15.85 6 Other biomass 3 20 Gas landfill 3 3.16 10 **Biogas** (tapioca) 1 Mini hydro 13 87.7 TOTAL 43 304.71 \* Small Renewable Energy Power Programme \*\* Two biogas projects have been connected to the national grid a) Achi Jaya Plantations Sdn Bhd (1.25MW) b) Bell Eco Power Sdn Bhd (1.7MW) STARGRAPHIC©2012

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Wan Asma showing some jatropha fruits which can produce high-quality biodiesel.

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CDM* projects in Malaysia		
Status of CER issued	Total project (Total CERs + CO2 equivalent)	
Projects with CER issued	8 (814,617)	
Palm based projects with CER issued 7	(772,615)	
Project	Total CERs + CO2 equivalent	
Biomass Energy Plant, Lumut	96,239	
Sahabat EFB Biomass Project	37,914	
LDEO Biomass Steam & Power	ENTERNA PROVIDENCE	
Plant, Malaysia	111,818	
SEO Biomass Steam and		
Power Plant, Malaysia	130,079	
Replacement Fossil Fuel	A CONTRACT AND AND A CONTRACT OF	
by Palm Kernel Shell Biomass		
Portland Cement production)	366,260	
Jenderata Steam & Power Plant	15,888	
Methane recovery in wastewater		
treatment, Project AMA07-W-01		
(Foong Lee Sawit Minyak Sdn Bhd)	14,417	
Landfill gas recovery &		
Utilisation at Bukit Tagar		
Sanitary Landfill, Hulu Selangor	42,002	
*Clean Development Mechanism		
Source: Pemandu	STADGDADHIC (2011	