2010

# [EU-MALAYSIA BIOMASS STAKEHOLDERS REPORT]

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**Sustainable Production (SP) of the Biomass Industries in Malaysia: Optimising Economic Potential and Moving towards Higher Value Chain**

A project funded by the European Union (EU) under the SWITCH-Asia Programme and jointly promoted by the Malaysian Industry-Government Group for High Technology (MIGHT), Association of Environmental Consultants and Companies Malaysia (AECCOM), European Biomass Industry Association (EUBIA) and Danish Technological Institute (DTI), with the support of the Ministry of Science, Technology and Innovation (MOSTI) and the Ministry of Energy, Green Technology and Water (KeTTHA)

**Executive Summary**

This event is the first activity of Sustainable Production (SP) of the Biomass Industries in Malaysia: Optimising Economic Potentials and Moving towards Higher Value Chain (Biomass-SP). The forum was comprised of three sections covering the important facet of biomass industry in Malaysia;

a) Biomass industry landscape,
b) Technological advancement and future prospects, and
c) Issues, opportunities, and way forward for the development of biomass industry in Malaysia.

Following the Stakeholders Forum, another session was conducted the next day as a platform for knowledge exchange between biomass entrepreneurs and researchers. The discussion centred mainly on different utilisation of biomass in the industry, technologies used and challenges involved.

The participants came from government agencies, research institutions, industry groups, small and medium enterprises and international agencies. The two-day session was jointly graced by several eminent speakers and panellists including Y. B. Tuan Haji Fadillah Yusof, the Deputy Minister of the Ministry of Science, Technology and Innovation, Mr. Sandro Paolicchi, Head of Section – Trade and Economic Relations, Delegation of European Union to Malaysia, Tan Sri Datuk Dr. Ahmad Zaharudin Idrus, Chairman of Biomass-SP, Tan Sri Prof. Emeritus Datuk Dr. Augustine S. H Ong, President of Malaysian Innovation and Design Society, Dr. Ing. Giuliano Grassi, Secretary General to European Biomass Industry Association (EUBIA), and Mr. Mohd Yusoff Sulaiman, the President and Chief Executive Officer of MIGHT.

This report describes some of the key themes and concerns made over the two-day stakeholders forum and knowledge exchange sessions, and goes some way towards addressing the issues raised by the participants by suggesting a set of recommendations for the biomass industry in Malaysia. It does not claim complete coverage of the sessions but provides a brief summary of some key points made, themes explored and conclusions reached.

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**Summary of the Opening Remarks made at the Stakeholders Forum**

1. The EU-Malaysia Biomass Stakeholders Forum was opened the Deputy Minister of the Ministry of Science, Technology and Innovation, YB Tuan Haji Fadillah Yusof, who reviewed the key points of the New Economic Model (NEM). As announced by the Prime Minister Y.A.B Mohd Najib Tun Razak in March 2010, NEM emphasises creativity, innovation, research and development, and design as the key drivers of our country's future development growth and competitiveness. The Deputy Minister also added that the launch of the National Green Technology Policy is a testament of government's commitment to promote energy self-reliance. Despite the above-mentioned initiatives, the Deputy Minister voiced his concerns about the position of Malaysia in the Global Innovation Index and other science, technology and innovation (STI) indicators. For example, in the Global Innovation Index 2009-2010, Malaysia was ranked 28$^{th}$ out of 132 economies, far behind other Asian countries such as Korea, Taiwan and Singapore. According to the Deputy Minister, this could be due to the country's initial focus on an efficiency-driven economy as opposed to that of innovation-based economy.

2. Speaking of energy security and the effects of climate change due to greenhouse gases emission, the Deputy Minister stressed out the importance of finding alternative means of energy that is sustainable. On top of these renewable energy alternatives, biomass is given a particular attention by the government due to its abundant resources. Among the RM 158 million funds given to 185 projects related to the development of renewable energy technologies, biomass constitutes the highest percentage of research activities followed by solar and fuel cell.

3. The keynote address for the EU-Malaysia Biomass Stakeholders Forum was given by Mr. Sandro Paolicchi, Head of Section – Trade and Economic Relations, Delegation of European Union to Malaysia. Mr. Sandro Paolicchi outlined the economic environment in Europe in regards to the biomass industry. The EU 2020 Strategy and Renewable Energy Directive sets out an increase to 20% from the existing 5% of final energy consumption from bioenergy. At present, the growing production and use of biomass for energy has already given rise to international trade, and therefore the market is bound to expand in future.

4. However, Mr. Sandro Paolicchi argued that the expansion of international trade and the increasing imports of biomass have also raised concerns about unsustainable production of biomass in third countries. These concerns have been recorded in a report released by the European Commission, "Report from the Commission to the Council and the European Parliament on Sustainability Requirements for the Use of Solid and Gaseous Biomass Sources in Electricity, Heating and Cooling". The report strongly suggested that rules governing land use, land use change and forestry (LULUCF) should be dealt with under a new international climate change agreement. Meanwhile, in the absence of a mandatory EU-wide scheme, the Commission has proposed that EU member States apply the criteria on a voluntary basis. The general aim of the report was to promote the sustainable production and use of biomass, as well as a functioning internal market in biomass trade and to lift barriers to bio-energy development.

5. Finally, Mr. Sandro Paolicchi expressed his hopes for Biomass-SP to help Malaysian biomass producers to be “sustainable” and putting them ahead of the international agenda in the area. It is also in parallel to these objectives the EU has set up the “EU-Malaysia Green Tech Agenda”. The initiative aims to foster engagement with Malaysia in policy/legislation and technology transfer to boost Malaysia’s green growth. These activities reflect the matching interests of Malaysian Government and business and the EU, and they are all organised in close cooperation with KeTTHA and the EU Member States.

## PART ONE: Rapporteur's Report

### Day 1: EU-Malaysia Biomass Stakeholders Forum

6. The one-day speakers and panellists session aimed to facilitate exchange of information and stakeholders discussion pertinent to the biomass industry in Malaysia , and it goes some way towards answering the following key questions:

(i) What are the existing policy status and business opportunities for the growth of biomass industry?
(ii) What are today's trends, methods, and best practices for biomass commercialisation in Malaysia?
(iii) How will biomass industry in Malaysia continue to develop?

#### *(i) Biomass Industry Landscape*

7. The first session was opened by Dr. Ing. Giuliano Grassi who took the participants on an overview of the biomass industry in the EU. The expanding worldwide interest for biomass can be attributed to its potential to penetrate all energy sectorial markets (electricity, gas, oil for combustion engines) and its socio (rural development), economic (diversification of energy supply) and environmental benefits.

8. When referring to the potential conflicts of lands for food and bioenergy production, Dr. Ing. Giuliano Grassi argued from preliminary evaluations its seems that risk of conflicts for land use will arise in general only when the rate of contribution of bioenergy is more than 30%. At present, EU aims to produce 3.8% of biomass in its total energy consumption by the end of 2010, and increasing it to 15% by 2020. Dr. Ing. Giuliano Grassi also added the application of modern molecular biotechnology could change the present limitations by modifying the metabolism of dedicated energy crops and increasing the photosynthetic efficiency of crops. Nevertheless, Dr. Ing. Giuliano Grassi emphasised the importance of utilising most of the existing agriculture residues (representing 80% of total biomass resource in EU) as technology for its stabilization and modern use has already appeared in the market.

9. Eventually, Dr. Ing. Giuliano Grassi presented the Renewable Energy Roadmap developed by the European Commission (EC). By 2020, all EU Member States are required to meet the binding EU target of 20% renewable energy in the final energy consumption. In particular, solid biomass plays a major role in heat production, constituting up to 35% of total heat production by renewable energy sources in the EU. Other emerging economic opportunities include cogeneration, co-firing, transport biofuel, and biohydrogen. In regards to mitigation of $CO_2$ emissions, Dr. Ing. Giuliano Grassi noted an area of ~400 million ha of land cultivated by well-selected C4 crops could absorb the $CO_2$ annual increase in the atmosphere.

10. Ir. Mohamad Adan Yusof next took participants on a provocative discussion about the potential issues and challenges in biomass industry in Malaysia. In parallel to the growing international interest to develop strategies to alleviate global warming, a strong urgency has taken place to develop national economic models that incorporate climate protection and biodiversity management. Similarly, there is an imminent need to switch fast to renewable energy to mitigate the impact of rising fossil fuel cost on the economy.

11. One of Ir. Mohamad Adan Yusof's most interesting points – and one later echoed by other speakers – was the lack of national direction and incoherent government efforts in promoting renewable energy efforts and projects. For instance, when the government reinstated gas and petroleum subsidy in March 2009, renewable energy projects became less attractive and were relegated. This has undermined the overall confidence in bioenergy, where banks are still unaware of bioenergy potentials due to failed bioenergy projects and collapse of large bioenergy companies in Europe as a result of the recent economic downturn.

12. Nevertheless, Ir. Mohamad Adan Yusof concluded his presentation with a positive message. He noted how the market for certified emission reduction (CER) and greenhouse gas (GHG) emission trading is growing, for instance, through the establishment of Chicago Carbon Exchange (CCX) and Tianjin Carbon Exchange. Similarly, fundamental GHG projects are increasingly being sought after to be contracted by international funds. Additionally, market spill-over from China, Brazil and India has created opportunities for investors seeking new fields in South East Asia.

13. At the same time, new government policies on renewable energy and green technology such as National Green Technology Policy will provide strengthened institutional frameworks to support the implementation of the Green Technology policies. To this end, Ir. Mohamad Adan Yusof suggested a large scale implementation of renewable energy projects led by government-linked companies as a stimulus package to mainstream the renewable into the national energy portfolio.

14. Next, Dato' Hafsah Hashim from SME Corp Malaysia discussed the available incentives and grant schemes for biomass entrepreneurs in Malaysia. They are summarised in the following table:

| **Grant Schemes** | **Soft Loan Schemes** | **Loan Schemes** | **Incentives** |
|---|---|---|---|
| Technology Acquisition Fund | Soft Loan for SMEs | RE & EE Financing Scheme | Utilisation of Oil Palm Biomass |
| Inno Fund | Soft Loan for Factory Relocation | Biofuel Financing Scheme | Energy Efficiency |
| Science Fund | Soft Loan for ICT Adoption | High Technology Fund | Renewable Energy |

15. In addition to financial incentives, SME Corp also offers development programmes as follows:

- Skills upgrading programmes e.g. Bioreactor Operations, Maintenance & Troubleshooting, Boilermaking Development, General Laboratory Practices & Safety
- SME Experts Advisory Panel (SAP) to visit SMEs and recommend improvements in packaging and labelling, production capabilities, compliance to standards, and management and financial advisory.
- Industrial Linkage Programme (ILP) & Global Supplier Programme (GSP) to integrate SMEs into supply chain and promoting competitive and capable SMEs to become vendors to multinational companies.

16. To conclude the session, Dr. Rahim Sudin from Forest Research Institute of Malaysia (FRIM) gave the participants an overview of biomass resources and opportunities for value-added products in Malaysia. In general, biomass resources in Malaysia consists of 94% oil palm biomass, 4% wood residues, 1% rice biomass, and 1% sugarcane industry wastes. Among the existing utilisation of oil palm biomass in Malaysia includes boiler fuels, fibre mats and mulch, pulp and paper, particleboard and medium density fibreboard.

17. In regards to bio-composites, Dr. Rahim Sudin discussed FRIM's longstanding commitment to its research and development projects since the 1950s, which is proven through the recent establishment of wood composite pilot plant in 2005. The focus on bio-composites is also supported by the Industrial Master Plans (IMP) which encourages increased production of value-added products and increased export earnings from down-stream timber products such as furniture and panel products.

18. In the long term, Dr. Rahim Sudin noted how ensuring sustainable supply of raw materials is the primary challenge to the wood-based industries. Another issue to be addressed is ensuring competitiveness in productivity, production cost, and product development as well as compliance to standards of international market environment. To address these issues, we need continuous support in research and development to innovative projects in diversification of raw materials and product development. Similarly, we need increased pool of knowledge-workers to provide appropriate education and skilled manpower in a wide range of technologies as well as to ensure awareness of current issue in quality and trade barrier demands.

***(ii) Technological Advancement & Future Prospects***

19. "Session 2: Technological Advancement & Future Prospects for Biomass Industry" featured a presentation from Dr. Zainal Abidin bin Mohd Yusof from SIRIM Berhad, who discussed about recent developments in renewable technologies and other products from biomass. There are three key feedstock materials in Malaysia, palm oil biomass, municipal solid wastes (MSW) and algae and/or jatropha. The products of these key feedstock materials includes bioethanol, biodiesel fuel, biogas and electricity.

20. According to Dr. Zainal Abidin, for conversion of cellulose products into ethanol, the competing technologies currently in use are (i) steam explosion technology and (ii) mechanoenzymatic nano-grinding technology. A given advantage of the later technology is its by-product is useful as animal feed. For biogas production, Dr. Zainal Abidin later explained the methane fermentation process which converts POME into biogas. The biogas can eventually be upgraded to natural gas quality and used as vehicle fuel (NGV). The most common technologies for biogas upgrading are the water scrubber and pressure swing adsorption (PSA).

21. Finally, Dr. Zainal Abidin introduced the potential of small-scale biodiesel production line from jatropha and algae. Jatropha can be planted in small plots where it is not economical for palm oil and manual harvesting can be done by family members as source of extra family income. Overall, SIRIM has also conducted life cycle carbon footprint for production and use of biofuel in road transportation.

22. In regards to biomass commercialisation, project deployment and financing, Mr. Tang Kok Mun gave an interesting presentation on pros and cons of biomass commercialisation in Malaysia. They are summarised as follows:

| **Positive Factors** | **Negative Factors** |
|---|---|
| Abundance of biomass from agricultural sector | Gap between research and development outputs and commercialised products |
| Abundance of knowledge and expertise from research institutions and universities research and development activities | Local market still conservative towards local technologies and products |
| Low cost and easy access to research and development knowledge, expertise and linkages | Lack of high value, customer-centric focus in product design, branding and quality |

23. In commercialisation, it is crucial to design products which are able to provide solutions to the customers. In response to this, Mr. Tang Kok Mun emphasised the importance of understanding different stakeholders (funding agencies, researchers, research institutions, investors and shareholders and target customers) with different priorities and barriers (technical, industry and mental).

24. Assoc. Prof. Dr. Suraini Abd Aziz from Universiti Putra Malaysia (UPM) later demanded a paradigm shift in the way biomass resources are perceived by attributing the following features to biomass; renewable resources, sustainable, environmentally friendly, abundant and untapped energy. Dr. Suraini then outlined the long term goals of research and development projects in biomass utilisation, which are to achieve “zero emission” and “waste-to-wealth” targets, and improve biomass utilisation upward the value chain (from fuel to feed, fibre, food, and fine chemicals).

25. The majority of research and development on biomass utilisation in Malaysia are concentrated on thermal conversion of biomass resources. Today, the resulting technologies are mainly applied in power and electricity generation and they are commercially used in the industries in palm oil mills boilers and steam turbines or landfills through methane combustion technology. Overall, technologies involved in the thermal conversion of biomass are proven and high in demand. However, they may be low in efficiency because the initial application of the technology was intended for waste disposal in the mill.

26. Other potential research and development application of biomass is biological conversion of biomass to energy, organic acids, bio-plastics, bio-compost, animal feed, and fine chemicals. However, Dr. Suraini noted there is a technological shortcoming in realization of value-added products from biomass in these areas as they involve complex and sensitive biological system. Additionally, from the economic perspective these processes are still not competitive when compared to fossil fuels. However, Dr. Suraini concluded, the potential of biomass utilisation projects to generate certified emission reduction (CER) for sale or export should provide an attractive incentive for Malaysian biomass industry and entrepreneurs.

***(iii) Issues, Opportunities & Way Forward for the Development of Biomass Industry in Malaysia***

27. The panellist discussion featured insights and heated discussions between palm oil and biomass industry experts Tan Sri Prof. Emeritus Dr. Augustine S.H Ong from Malaysian Innovation and Design Society (MINDS), Dr. Astimar Abd Aziz from MPOB Biomass Technology Centre, Mr. Mohd Yusof Sulaiman, Ir. Mohamad Adan Yusof, Dr. Ing. Giuliano Grassi and Tuan Haji Khairuddin Hashim from Sime Darby Plantation.

28. In his opening remarks, Tan Sri Prof. Emeritus Dr. Augustine S.H Ong echoed Assoc. Prof. Dr. Suraini Abd Aziz's call for paradigm shift – he called the audience to look at oil palm as a source of wealth in holistic manner. Instead of looking at it as simply the primary source of crude palm oil (CPO), the utilisation of oil palm should be further optimised. In response to this, Dr. Astimar Abd Aziz spoke of shikimic acid extracted from POME as an example of valuable fine chemicals which can be found in palm oil by-products.

29. Similarly, when it comes to biomass utilisation and commercialisation, Ir. Mohamad Adan Yusof urged the audience to look at the issue from the bird's eye view. Policy measures must address various stakeholder's expectations i.e. national GHG emission reduction, rural development, increased rate of innovation and entrepreneurship, and commercialisation of R&D projects. Therefore, the establishment of a concrete national direction is crucial to determine the best way forward for biomass industry in Malaysia.

30. Dr. Ing. Giuliano Grassi added, it is also important to identify international market environment and trade barriers to ensure enabling institutional frameworks for biomass SMEs to break the global market.

31. Later, Tuan Haji Khairuddin Hashim explained about the position of Sime Darby Plantation in the utilisation of biomass in its palm oil estates. He cited the outcome of recently agreed national interpretation on Roundtable on Sustainable Palm Oil (RSPO), whereby oil palm growers and millers are required to work towards zero-waste by maximising recycling and minimising waste or by-products generation. As such, biomass resources generated in these palm oil plantations are usually recycled for reuse as bio-compost or fertilizer. Hence, Tuan Haji Khairuddin Hashim explained, Sime Darby Plantation's general unwillingness to release its biomass resources was mainly due to these institutional constraints.

**Day 2: EU-Malaysia Biomass Knowledge Exchange Session**

32. The Knowledge Exchange session begun with a presentation by Dato' Leong Kin Mun on the EU SWITCH-Asia Biomass-SP project. This was followed by partner perspectives from Dr. Ing. Giuliano Grassi from EUBIA, presentations from energy and CDM experts and case studies from different biomass entrepreneurs.

33. Dato' Leong Kin Mun took the participants through the background overview of the Biomass-SP project and outlined key activities which will be offered to biomass SMEs in the 4-year project. The projects include: Road Show Awareness Seminar, EU-Malaysia Biomass Entrepreneurs Nurturing Programme, Capacity Building Programmes, Biomass Best Practices and Business Partnering Conference, Benchmarking Study and Biomass Action Plan.

34. Dr. Ing. Giuliano Grassi presented the promising markets for bioenergy in the EU, among others:

- **Production of agro-pellets or torrified pellets**. The technologies involved are very attractive because they can directly process humid biomass and allow blending of any kind of biomass mixtures without the addition of other compound. In addition, the quality and density of agro-pellets is very high (800 kg/$m^3$), hence reducing the logistics cost.
- **Bioheating**. In the EU, 40% of energy consumption is for heating (27% residential, 19% industrial). In 2009, the market volume for biomass chips and pellets are estimated to be 20 million tonnes and 10 million tonnes respectively.
- **Electricity production by co-firing**. Biomass in co-firing can be used in the following form; chips (8%), pellet (20%), and torrefied pellets (up to 100%). To contribute to 20% of co-firing inputs, 200 million tonnes of agro-pellets will be required every year.
- **Production of biogas compost, biohydrogen, synthetic diesel, and biomethanol for rural development and industrial use.**

35. Mr. Ilango S Bharati Govindarajulu from YTL SV Carbon gave an overview of the potential and existing electricity production from biomass. They are as follows:

| | |
|---|---|
| Electricity potential from biomass | 3,700 MW |
| Electricity potential from surplus palm oil biomass | 1,100 MW |
| Installed cap connected to grid | 31.7 MW |
| Approved capacity for installation | 196.85 MW |

The primary technical challenge involved in biomass-based renewable energy (RE) projects includes the availability and quality of feedstock or raw materials. Most of "good biomass" is already consumed in the existing "low efficient" co-generation system in palm oil mills, whereas "bad biomass" – such as empty fruit bunches (EFB) have bad combustion properties, high moisture content, high silica, and high operation and maintenance cost.

For commercialisation, the challenges for biomass-based RE projects include the low power purchase tariff and no differentiation in tariff for different source of energy. The increasing competing use of biomass as well as local banks reluctance to finance the projects also act as barriers for biomass-based RE projects.

36. Dr. Badrol Ahmad from TNB Research Sdn Bhd informed the participants about the availability of different sources of biomass in Malaysia:

- Oil palm biomass: 34.05 million tonnes
- Rice husk: 23% of the paddy processed
- Bagasse: Annual production estimated at 300 million kg
- Rubber wood: 3.4 million kg/year
- Cocoa: 25 000 kg dry organic matter/10 000 $m^2$ every year

For electricity generation, even though resources are available within the plantation and mills, their availability is not guaranteed for electricity generation. This is due to the RSPO policy for biomass to be returned to soil for maintenance of natural environment and soil fertility, as well as the increasing competing use of biomass in product manufacturing.

In general, power plants are designed for a service life of more than 25 years. Therefore, biomass supply must be assured over this period of time in quantity and quality. The demand of power operators can be met through production of raw biomass or pelletised biomass.

37. Mr. Uwe Zwiefelhofer from Lurgi Sdn Bhd discussed about the major challenges involved in conversion of biomass to energy i.e. energy density and distribution of biomass resources. To this end, a system of centralised syngas and fuel production is proposed, where a regional intermediate fuel production is established to connect the raw biomass supplier to the fuel production plant. The final product of biomass pyrolysis plant is bio-oil (concentrated biomass slurry with 80% energy content), which can be applied to gasification and extraction conversion to produce fine chemicals and transport fuels, for use in turbine, engine, co-firing, and boiler for electricity and heat generation.

Again, the economic uncertainties of the deployment of biomass-to-liquid projects involve feedstock availability and the cost of biomass harvest, collection and transport. Therefore, a political framework and incentives are crucial to address these concerns.

38. Mr. Chia Lik Khai from QL Palm Pellet Sdn Bhd talked about the efficiency of pelletised or densified fuel from oil palm biomass. Normally, 1.0kg of raw EFB (with 60% moisture content) can produce up to 1100 kcal fuel energy in wet fuel burning. Through pelletisation, 0.44kg of raw EFB (with 10% moisture content) can produce up to 1800 kcal fuel energy in pelletised fuel burning.

39. In regards to transport and storage, pellets have 2.5 times the bulk density of raw EFB. Based on total availability of EFB (9 million tonnes) every year, oil palm biomass can potentially support up to 10% of Malaysia's electricity demand and reduce 13 million tonnes of greenhouse gas (GHG) emission every year.

To ensure a sustainable business model, value creation must be high to allow it to be shared between feedstock supplier, technology provider and end user and fair value sharing is the key to long-term supply assurance of biomass. Similarly, a national policy must be established to encourage the most efficient use of biomass resources and address existing trade barriers affecting the development of biomass industry.

40. Mr. Joseph Lim from Global Green Synergy Sdn Bhd discussed about the challenges for export of EFB as raw materials or value-added products. In particular, EFB has high moisture content (60-70%) and it causes problems such as inefficient transportation and contamination with fungus or insects. Another challenge with EFB is that palm oil mills are widely spread through Malaysia and Indonesia, as such collecting the raw materials can be costly. In addition, there are still no worldwide specification standards for biomass pellets or briquettes to differentiate them from wood pellets or briquettes, causing potential hindrance to both suppliers and customers at the custom clearance.

41. Mr. Hector Ingram from Ricycled Asia Pacific Sdn Bhd presented a case on how biomass utilisation contributes to biomass SME's corporate social responsibility (CSR):

- Reusing and recycling biomass residues from agricultural waste, municipal solid waste or industrial waste reduce company's carbon footprint
- The use of recycled material can qualify the company to obtain tax and other financial incentives, e.g. Green Building Index.
- Use and selection of biomass materials in product manufacturing contributes to awareness and behavioural change towards maximising value of waste products and more sustainable use of resources.

42. Closing the session, Dato' Leong Kin Mun opened the discussion to a question and answer session. Participating audience offered suggestions and feedbacks on various issues regarding the development of biomass industry in Malaysia; their feedbacks are included in the next section of the report.

## PART TWO: Findings and Recommendations

Each of the Stakeholder Forum and Knowledge Exchange session has, from its question and answer and discussion sessions catalysed by presentations and case examples, identified the emerging themes which appeared to be the key concerns of the stakeholders in the Malaysian biomass industry. They cover the following areas

a) **Ensuring an enabling environment for the growth of biomass industry in Malaysia**
b) **Developing the capacities and competitiveness of biomass SMEs and entrepreneurs in the global biomass market**
c) **Establishing a national policy framework to govern biomass industry in Malaysia**

Additionally, in line with the objectives of the Forum to put together the outcome of the Stakeholders Forum and Knowledge Exchange sessions in a report to the government, we build on these issues a set of recommendations based on our understanding of existing situation of biomass industry in Malaysia. They are relevant to all stakeholders involved in the biomass industry i.e. SMEs and entrepreneurs, public research institutions, private sectors and government agencies, and they will be of most and immediate interest to those SMEs and entrepreneurs who want to tap on biomass market locally and globally.

### A. Ensuring an enabling environment for the growth of biomass industry in Malaysia

***Issue 1: There is no guarantee of long term supply of biomass raw materials to the industry, either in energy production or value-added manufacturing.***

At present, no sufficient and comprehensive data can be found on the total supply of biomass feedstock, its types and availability at the national level. Apart from oil palm biomass (which have previously been given more attention by research institutions like MPOB and FRIM), the potentials of other biomass resources, especially those from rice production (e.g. rice husk, rice straws) and livestock and poultry farms (e.g. animal waste and manure) are still largely untapped. Biomass SMEs and entrepreneurs also face logistical challenges in accessing the biomass feedstock due to their wide distribution across the Peninsular and East Malaysia. As such, it is prerogative that the values of the end products created by the biomass are sufficiently high enough to make it economically feasible to cover the logistic and handling costs.

On the other hand, major oil palm growers and millers are also bounded by RSPO to return their oil palm biomass to the soil whereas in actual fact the majority of these biomass resources have potentials for higher value utilisation. Oil palm areas owned by independent smallholders constitute only 8.6% of total oil palm distribution in Malaysia and so far only 24 mills in Malaysia are RSPO certified; it is therefore clear that major oil palm estates hold the key resources to ensure sustainable growth of future biomass SMEs in the country.

**Based on the above perspectives, the forum recommends that…**

- A national inventory is conducted to identify the availability of biomass raw materials (their localities and producers), technologies available to utilise them and existing biomass SMEs and entrepreneurs. **[HIGH PRIORITY]**
- Major palm oil producers are given incentives to contribute 10-30% of their biomass feedstock to support the downstream manufacturing activities in Malaysia as a part of their corporate social responsibility (CSR) policy. It is proposed that a high-level CSR campaign is to be undertaken to encourage the realisation of this measure. **[HIGH PRIORITY]**

***Issue 2: More efforts is needed to accelerate the commercialisation of local technologies and R&D projects related to biomass utilisation***

Existing technologies involved in palm oil biomass utilisation may not be highly relevant and/or economical because earlier utilisation of biomass in the 1980s was largely aimed at low efficient process in the palm oil mills. At the same time, private sectors are slow in their uptake of innovative products or technologies (this may be due to R&D projects not meeting technological and market demands of biomass industry in Malaysia or overseas), causing a backlog to the commercialisation efforts undertaken by public research institutions and universities.

As a consequence of the above, research and development activities involving utilisation of biomass for higher value products did not take off until recently and the availability of skilled and trained knowledge workers to operate the processes for higher value utilisation of biomass are scarce.

**Based on the above perspectives, the forum recommends that…**

- Local technologies and solutions should be continuously promoted to the biomass SMEs and entrepreneurs and the relationship between biomass researchers and SMEs and entrepreneurs is further enhanced to ensure the research and technologies development projects meet market demands **[HIGH PRIORITY]**
- Continuous knowledge exchange, capacity building and business matching sessions is conducted with EU or international biomass industry experts to ensure local biomass SMEs and entrepreneurs is informed about the current standards and specifications for biomass products catered for export market.
- Areas of linkage gaps, shortcomings, wastage and inefficiency are identified to ensure successful rate of commercialisation in research and technologies development related to biomass utilisation. **[HIGH PRIORITY]**

***Issue 3: The implementation of small renewable energy projects (SREP) utilising biomass is yet to produce optimum results***

Apart from the problem of supply, a lot of developers of renewable energy, especially those utilising biomass, face a challenge in selling their electricity to the national utility. Since the majority of the energy production capacity of SREP is small, connecting the widely distributed palm oil mills (where energy from biomass is generated) to the main grid connection system is costly and difficult. Other issues such as capital constraints, land acquisition, and electricity theft further aggravate the situation. In addition, tariff for energy generated from biomass is only 0.5% higher than those produced from fossil fuels; the low tariff hinders the overall growth of renewable energy initiatives.

**Based on the above perspectives, the forum recommends that…**

- A policy roadmap to remove the fossil fuel subsidies is considered to accelerate the growth of renewable energy projects. **[HIGH PRIORITY]**
- Government to establish a win-win partnership between main power utility and independent power producers (IPPs) by ensuring premium price for electricity produced from RE resources and allocating high percentage for renewable energy in the national grid system.

B. **Developing the capacities and competitiveness of biomass SMEs and entrepreneurs in the global biomass market**

***Issue 4: The lack of awareness about the importance of biomass utilisation among the general public creates unconducive environment for biomass SMEs***

Overall, green consumerism is still unpopular in Malaysia. Although biomass is gaining the attention of the industry and public research institutions, the awareness about the potential of biomass for energy production and value-added products is still lacking among the general public, causing inaction or indifference when it comes to purchasing or procuring biomass products. At the same time, the core business of palm oil i.e. production of crude palm oil is still very lucrative, resulting in lack of attention given by the oil palm estates or palm oil mills owners to the awareness and importance of converting biomass waste into energy or higher value eco-friendly manufacturing products. At present, a champion or leadership for biomass utilisation at the policy/government/national level is yet to be found.

**Based on the above perspectives, the forum recommends that…**

- Government act as the first mover in the market to promote procurement of green products from biomass and other renewable resources. As far back as 1996, SIRIM has already launched the national eco-labelling program to verify products according to various environmental criteria. The Government should support this initiative developed by its own agency **[HIGH PRIORITY]**
- Public agencies and all relevant stakeholders in their respective capacities and responsibilities increase awareness on the potentials of biomass utilisation in Malaysia and continuously learn about current obstacles and success factors for the growth of biomass industry
- A general campaigning effort to promote low carbon or climate change mitigating products and the potentials of biomass utilisation is conducted nationwide i.e. through media, road shows, etc.

***Issue 5: Access of biomass SMEs and products to the local and international market is still limited***

By 2020, Europe aims to use 20% of its final energy consumption from bioenergy and biomass is expected to contribute to half of the total effort. According to a report by the European Biomass Association (AEBIOM), it is estimated that by 2020 up to 80 million tons of biomass pellets could be used in the EU. These factors contribute to the increased demand for biomass is forest-based industries which are especially prevalent in the third countries. Specifically, the biomass industry in Europe is governed by voluntary or binding agreements to ensure sustainable trade of timber or other natural resources products, creating high demands for environmentally-friendly products from the third countries. Unfortunately, many SMEs are not aware or do not have access to information about these standards and specifications.

Apart from the EU, demand for biomass is also growing in other developed countries like Japan and Korea. For example, in 2009 Itochu Corporation entered into a joint venture agreement with Felda Palm Industries (FPI) Sdn. Bhd. to form a new company for the production of solid biomass fuel in Malaysia. The plant will produce 24,000 tonnes of pellet from EFB every year, with Tokyo Electric Power agreeing to buy all of the pellets.

Similarly, many SMEs appear to be equally unaware of the existence of Malaysian Government's financial grants and assistances available for entrepreneurs who are involved in green technology, environmental management and renewable energy industry. Enabling access to these incentives is crucial to facilitate the development, growth and penetration of biomass SMEs in the global market.

Another potential market for biomass industry which has not been fully utilised is the implementation of Clean Development Mechanism (CDM) projects. In general, many perceive CDM projects as financially risky due to inconsistent supply of biomass feedstock and low purchasing tariff offered by the main utility provider. In addition, due to the high initial cost of undertaking CDM projects, difficult verification as well as slow approval process, many oil palm biomass stakeholders appear to have lost their enthusiasm.

**Based on the above perspectives, the forum recommends that…**

- A single-point access to information and knowledge on biomass utilisation is set up to collect and disseminate experiences about successful biomass utilisation projects and an active capacity building programme is conducted to develop biomass entrepreneurs and industry standards. **[HIGH PRIORITY]**
- The government strengthens its assistance for biomass SMEs through provision of incentives and grants especially catered to companies involved in production of green products and implementation of CDM projects. **[HIGH PRIORITY]**
- Biomass SMEs and entrepreneurs are developed using innovative and export-oriented business model to tap on the international demand for biomass green products and they are trained to develop their products in compliance with the international standards and specifications to prepare them for global green procurement activities
- Economic and technical cooperation between Malaysian SMEs and EU industry experts is strengthened to facilitate quality enhancement, vendor development and inclusion of SMEs into the EU biomass supply chain
- Bursa Malaysia to facilitate greater admission of qualified biomass SMEs seeking to apply for initial public offering (IPO) in the ACE Market.

## C. Establishing a national policy framework to govern biomass industry in Malaysia

***Issue 6: Absence of overarching national policy caused lack of confidence in SMEs and entrepreneurs to pursue biomass utilisation projects***

The biomass industry in Malaysia is growing, and the use of biomass as raw materials is becoming more competitive as more SMEs and corporations are joining the biomass industry boom. Presently, there are no coherent efforts or understanding between ministries and government agencies on the best way forward for biomass utilisation in the country.

In addition, government's continuous reliance on fossil fuels and their continuous provision of subsidies makes the utilisation of biomass in the industry less attractive, as technologies involved are not fully proven and consumer's acceptance is still small. Also, there is a prevalence of perceived risks among local banks and financial institutions in financing biomass projects, and these hinder the growth of biomass utilisation among SMEs.

**Based on the above perspectives, the forum recommends that…**

- A benchmarking study is conducted to identify the economic value of biomass for different utilisation process, and based on the findings of the study a strategic direction for biomass industry in Malaysia is established[1]. **[HIGH PRIORITY]**
- A comprehensive study is carried out to identify the existing and future volume and potential usage of various types of biomass (agricultural crops and residues, forestry-based and wood processing industries, and organic waste) whether for energy, food, feed or fibre; as well as the gaps in the value-creation linkages between the various players in the industry. **[HIGH PRIORITY]**
- The government identifies priority sectors in the biomass industry and establish a comprehensive policy on biomass utilisation to ensure maximum socio-economical returns in the long run **[HIGH PRIORITY]**
- The national plan for biomass utilisation is aligned to priorities of other national agenda e.g. SME development, rural development and electrification, promotion of entrepreneurship and innovation, etc.

[1] *An earlier benchmarking study by PTM in 2004 that compares the economic value of EFB for composting (mulching) and power generation indicates that the economic value of one tonne EFB as a mulch is only RM 14.40, while as fuel for power generation is RM 49.81*

**Concluding Remarks**

The above recommendations as a whole set out a way forward for the biomass industry in Malaysia. The Forum looks forward to seeing progress in the areas of these recommendations and invites all stakeholders to continuously engage themselves to contribute to this. It is hoped that the findings and recommendations of this report will be useful to relevant authorities in Malaysia in formulating policies, incentives, and action plans for the benefit of biomass industry in Malaysia.

## APPENDIX 1: Programme

### EU- MALAYSIA BIOMASS STAKEHOLDERS FORUM
### 27 APRIL 2010 - ISTANA HOTEL, KUALA LUMPUR

| 27 April 2010, Tuesday | |
|---|---|
| 8.00-9.00 | Registration |
| 9.00-9.10 | Welcoming Remarks<br>**Y.Bhg. Tan Sri Datuk Dr. Ahmad Zaharudin Idrus**<br>***Chairman, Biomass SP Project*** |
| 9.10-9.30 | Special Address<br>**Mr. Sandro Paolicchi**<br>***Charge d'affairs a.i., Delegation of the European Union to Malaysia*** |
| 9.30-10.00 | Keynote Address<br>**Y.B. Tuan Haji Fadillah bin Haji Yusof**<br>***Deputy Minister, Ministry of Science, Technology and Innovation Malaysia*** |
| 10.00-10.30 | Morning Refreshment/ Press Conference |
| **Session 1: BIOMASS INDUSTRY LANDSCAPE** | |
| **Moderator: Ms. Loo Took Gee**<br>***Deputy Secretary General , Ministry of Energy, Green Technology & Water*** | |
| 10.30-11.00 | EU Biomass Industry: Directives from the European Commission (Link to Climate Change Initiatives), Technology, Business Opportunities and Market Challenges<br>**Dr. Ing Giuliano Grassi**<br>***Secretary General, European Biomass Industry Association (EUBIA)*** |
| 11.00-11.20 | An Overview of National Policy & Action Plan: Towards Sustainable Biomass Industry<br>**Mr. Ahmad Zairin Ismail**<br>***Chief Operating Officer, National Green Technology Centre*** |
| 11.20-11.40 | Challenges in Bioenergy Project Rollout in Malaysia<br>**Ir. Mohamad Adan Yusof**<br>***Executive Director, Mensilin Holdings Sdn. Bhd.*** |
| 11.40-12.00 | Opportunities for SMEs<br>**Y. Bhg. Dato' Hafsah Hashim**<br>***Chief Executive Officer, SME Corporation Malaysia*** |
| 12.00-12.20 | Biomass Resources & Value-added Products : Opportunities & Prospects for Bio-composite Products in Malaysia<br>**Dr. Rahim Sudin**<br>***Head, Biocomposite & Wood Protection Programme***<br>***Forest Research Institute Malaysia (FRIM)*** |
| 12.20 – 12.40 | Questions & Answers |
| 12.40-2.00 | Lunch Break |

| | |
|---|---|
| **Session 2: TECHNOLOGICAL ADVANCEMENT & FUTURE PROSPECTS** | |
| **Moderator: Pn. Zaiton bt Nordin**<br>***Head, Phytochemistry & Microorganism Unit, Intellectual Property Corporation of Malaysia (MyIPO)*** | |
| 2.00-2.20 | Biomass R&D, Technology & Standards: Malaysia Experience<br>**Dr. Zainal Abidin bin Mohd Yusof**<br>***Vice President, Research & Technology Development, SIRIM Bhd*** |
| 2.20-2.40 | Government Financial Incentives for Biomass Commercialisation in Malaysia<br>**Mr. Tang Kok Mun**<br>***Technical Coach, Biomass SP Project*** |
| 2.40-3.00 | Overview of Biomass R&D Activities in Malaysia<br>**Associate Professor Dr. Suraini Abd. Aziz**<br>***Head, Department of Bioprocess Technology, Universiti Putra Malaysia (UPM)*** |
| **Panel Discussion: ISSUES, OPPORTUNITIES & WAY FORWARD FOR THE DEVELOPMENT OF BIOMASS INDUSTRY IN MALAYSIA**<br>**Moderator: Mr. Mohd Yusoff Sulaiman**<br>***President & Chief Executive Officer, Malaysian Industry-Government Group for High Technology (MIGHT)*** | |
| 3.00-5.00 | INVITED PANELISTS:<br>**Y.Bhg. Tan Sri Prof. Emeritus Datuk Dr. Augustine S.H Ong**<br>***President, Malaysian Invention and Design Society (MINDS)***<br><br>**Dr. Ing Giuliano Grassi**<br>***Secretary General, European Biomass Industry Association (EUBIA)***<br><br>**Y. Bhg. Dato' Hafsah Hashim**<br>***Chief Executive Officer, SME Corporation Malaysia***<br><br>**Mr. Ahmad Zairin Ismail**<br>***Chief Operating Officer, National Green Technology Centre***<br><br>**Dr. Zainal Abidin bin Mohd Yusof**<br>***Vice President, Research & Technology Development Division***<br>***SIRIM Berhad***<br><br>**Ir. Mohamad Adan Yusof**<br>***Executive Director, Mensilin Holdings Sdn Bhd***<br><br>**Tn. Hj. Khairudin Hashim**<br>***Head of R&D Centre, Sime Darby Plantation Sdn Bhd***<br><br>**Dr. Astimar Abdul Aziz**<br>***Head of Agro Product Unit, Biomass Technology Centre of Malaysian Palm Oil Board (MPOB)*** |
| 5.00-5.20 | Recommendations & Conclusion |

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|---|---|
| 5.20-5.30 | Closing Remarks<br>**Mr. Mohd Yusoff Sulaiman**<br>***President & Chief Executive Officer, Malaysian Industry-Government Group for High Technology (MIGHT)*** |
| 5.30 | Refreshment & Networking |

**APPENDIX 1**

## "EU- MALAYSIA BIOMASS STAKEHOLDERS KNOWLEDGE EXCHANGE SESSION"
## 28 APRIL 2010 - ISTANA HOTEL, KUALA LUMPUR

| 28 April 2010, Wednesday | |
|---|---|
| 9.00-10.00 | Introduction on EU SWITCH-Asia Biomass Sustainable Production (SP) Project<br>**Y.Bhg. Dato' Leong Kin Mun**<br>***Technical Advisor, Biomass SP Project*** |
| 10.00-10.30 | Morning Refreshment |
| 10.30-11.30 | EU Biomass Industry: Promising Markets for Modern Bioenergy<br>**Dr. Ing Giuliano Grassi**<br>***Secretary General, European Biomass Industry Association (EUBIA), Belgium*** |
| 11.30-12.00 | Practical Issues for CDM Projects Implementation in Malaysia<br>**Mr. Ilango S Bharathi Govindarajulu**<br>*Senior CDM Manager, YTL-SV Carbon Sdn Bhd* |
| 12.00–12.30 | Questions & Answers |
| 12.30-2.00 | Lunch |
| 2.00-2.20 | Potential of Biomass (Wood & Oil Palm Waste, Sugarcane, Rice Husk etc ) as Renewable Energy Fuel in Malaysia<br>**Dr. Badrol Ahmad**<br>***Chief Technology Officer, TNB Research Sdn Bhd*** |
| 2.20-2.40 | Conversion of Biomass Using Proprietary Technologies – Lurgi's Experiences<br>**Mr. Uwe Zwiefelhofer**<br>***Managing Director, Lurgi Sdn Bhd*** |
| 2.40-3.00 | Palm Biomass Pellet Industry Potential Challenges<br>**Mr. Chia Lik Khai**<br>***Executive Director, QL Green Energy Sdn Bhd*** |
| 3.00-3.20 | Processing Biomass into Valued Added Eco-Products: Entrepreneur's Experience & Challenges<br>**Mr. Joseph Lim**<br>***Managing Director, Global Green Synergy Sdn Bhd*** |
| 3.20-3.40 | Ricycled™: Biomass Product Delivers A New Dimension in Corporate Social Responsibility (CSR)<br>**Mr. Hector Ingram**<br>***Commercial Director, Ricycled Asia Pacific Sdn Bhd*** |
| 3.40-4.00 | Questions & Answers /Conclusion |
| 4.00-4.30 | Refreshment & End of Programme |

**APPENDIX 1**

## APPENDIX 2: Photographs


VIPs of EU-Malaysia Biomass Stakeholders Forum on 27 April 2010 at Istana Hotel, Kuala Lumpur. (VIPs from the left) **Y.Bhg. Tan Sri Datuk Dr. Ahmad Zaharudin Idrus**, *Chairman of Biomass-SP Project*, **Mr. Sandro Paolicchi**, *Charge d'affairs a.i., Head of Section - Trade and Economic Relations, Delegation of the European Union to Malaysia*, **Y.B. Tuan Haji Fadillah Haji Yusof**, *Deputy Minister of Science, Technology and Innovation,* **Mr. Mohd Yusoff Sulaiman**, *President and Chief Executive Officer of Malaysian Industry-Government Group of Higher Technology (MIGHT)* and **Y.Bhg. Dato' Leong Kin Mun**, *Technical Advisor of Biomass SP Project.*


**Y.B. Tuan Haji Fadillah Haji Yusof**, *Deputy Minister of Science, Technology and Innovation* presented the Keynote Address during Opening Ceremony of EU-Malaysia Biomass Stakeholders Forum.


Panellists and participants interact during the **Panel Discussion**: "*Issues, Opportunities, & Way Forward for the Development of Biomass Industry in Malaysia*".

**APPENDIX 2**