MALAYSIAN BIOMASS INDUSTRY ACTION PLAN 2020

Driving SMEs Towards Sustainable Future

Biomass SME Recognition Program & Knowledge Exchange Seminar

Impiana KLCC Hotel, Kuala Lumpur

12 November 2013
Develop **recommendations** and specific actions to **mobilize** the participation of **Malaysian SMEs** in the Biomass Value Chain towards creation of **high value products**

- Wealth creation and distribution
- Identify and provide opportunities
- Sustainable production
- Actions and recommendations to close the gaps
STAKEHOLDERS’ ENGAGEMENT PROCESS

MBIAP 2020

- Biomass Availability
- Transport Logistics
- Know-How & Human Capital
- Policies & Law
- Investment & Financing
- Marketing & Branding
- Local & Export Markets

- Plantation Companies
- Government Agencies
- Buyers & Traders
- Universities & Research Institutions
- Financial Institutions

Industry Organisations

Biomass SMEs
MBIAP 2020 - THRUSTS

Feedstock
- Palm Biomass
- Rice Husk & Straw
- Municipal Solid Waste
- Kenaf
- Wood Biomass

Products
- Bio-Energy
- Green Chemicals & Bio-Polymers
- Bio-Fertilisers
- Bio-Composites

Applications
- Steam
- Electricity
- Heat
- Transport Fuel
- Packaging
- Livestock
- Agriculture
- Green Building Materials

Substitution Targets
- OIL&GAS
  - Diesel
  - Petrol
  - Natural Gas
  - Chemicals
  - Polymers
- MINING
  - Minerals
- FORESTRY
  - Timber
  - Plywood
  - Fuel Pellets

Copyright of MIGHT 2012
Total Projected Annual Biomass Availability in Malaysia
(Million Metric Tonnes)
Malaysia’s Agriculture Land Use 2000-2010
(Thousand Hectares)

Biomass Potential of Oil Palm Industry in Malaysia in 2012 (Million Metric Tonnes)

Source: Malaysian Palm Oil Board (2011)
# Rubberwood Residues in Peninsular Malaysia

<table>
<thead>
<tr>
<th>Year</th>
<th>Rubberwood from field (Mm³)</th>
<th>Rubberwood from field (Mt)</th>
<th>Log production (Mt) +</th>
<th>Surplus fr. field (Mt)</th>
<th>Surplus fr. mills (Mt)</th>
<th>Total surplus (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>8.636</td>
<td>4.75</td>
<td>0.95</td>
<td>1.9</td>
<td>0.09</td>
<td>1.99</td>
</tr>
<tr>
<td>2000</td>
<td>8.745</td>
<td>4.81</td>
<td>0.96</td>
<td>1.93</td>
<td>0.09</td>
<td>2.02</td>
</tr>
<tr>
<td>2002</td>
<td>6.808</td>
<td>3.74</td>
<td>0.75</td>
<td>1.5</td>
<td>0.07</td>
<td>1.57</td>
</tr>
<tr>
<td>2004</td>
<td>4.939</td>
<td>2.72</td>
<td>0.54</td>
<td>1.09</td>
<td>0.05</td>
<td>1.14</td>
</tr>
<tr>
<td>2006</td>
<td>6.588</td>
<td>3.62</td>
<td>0.72</td>
<td>1.45</td>
<td>0.07</td>
<td>1.52</td>
</tr>
<tr>
<td>2008</td>
<td>8.981</td>
<td>4.94</td>
<td>0.99</td>
<td>1.98</td>
<td>0.1</td>
<td>2.08</td>
</tr>
<tr>
<td>2010</td>
<td>6.082</td>
<td>3.35</td>
<td>0.67</td>
<td>1.34</td>
<td>0.06</td>
<td>1.4</td>
</tr>
<tr>
<td>2012</td>
<td>3.207</td>
<td>1.76</td>
<td>0.35</td>
<td>0.71</td>
<td>0.03</td>
<td>0.74</td>
</tr>
</tbody>
</table>

*Note: + 20% of the tree is converted to logs
# 50% of the logging residues is available
~ 9.62% of processing residues is available*

Biomass Potential from Paddy and Rice Production (Metric Tonnes)

Note: *Based on latest available data from the FAO STAT*
### Table 2.6 Projected log production in Malaysia 2005-2020

<table>
<thead>
<tr>
<th>5 Year Period</th>
<th>Peninsular</th>
<th>Sabah</th>
<th>Sarawak</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log production from natural forest (Mm³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-2010</td>
<td>3.8</td>
<td>4.1</td>
<td>11.5</td>
<td>19.4</td>
</tr>
<tr>
<td>2011-2015</td>
<td>3.0</td>
<td>2.5</td>
<td>10.0</td>
<td>15.5</td>
</tr>
<tr>
<td>2016-2020</td>
<td>2.5</td>
<td>1.5</td>
<td>10.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Log production from forest plantations (Mm³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-2010</td>
<td>0.8</td>
<td>0.5</td>
<td>2.0</td>
<td>3.3</td>
</tr>
<tr>
<td>2011-2015</td>
<td>0.8</td>
<td>0.6</td>
<td>10.4</td>
<td>11.8</td>
</tr>
<tr>
<td>2016-2020</td>
<td>0.9</td>
<td>0.8</td>
<td>15.0</td>
<td>16.7</td>
</tr>
<tr>
<td>Log production from rubber plantation (Mm³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-2010</td>
<td>2.1</td>
<td>n.a</td>
<td>n.a</td>
<td>2.1</td>
</tr>
<tr>
<td>2011-2015</td>
<td>1.9</td>
<td>0.1</td>
<td>n.a</td>
<td>2.0</td>
</tr>
<tr>
<td>2016-2020</td>
<td>1.7</td>
<td>0.1</td>
<td>n.a</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Projected Mill Residue from Wood-Processing Activities in Malaysia 2012

<table>
<thead>
<tr>
<th>Processing Type</th>
<th>Production (million m3)</th>
<th>Assumed Recovery Rate (%)</th>
<th>Mill Residues (million m3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood Milling</td>
<td>3,391</td>
<td>52</td>
<td>3,684</td>
</tr>
<tr>
<td>Plywood Milling</td>
<td>4,450</td>
<td>50</td>
<td>4,450</td>
</tr>
</tbody>
</table>

Note: *Based on latest available data from the FAO STAT

Common Application of Wood Residues from Saw Mills and Plywood Factories in Sarawak

Source: According to survey conducted by T.C.Wong in Kemena Wood Industry Park in Sarawak
Percentage of waste generated in Malaysia from the various sources in 2010

<table>
<thead>
<tr>
<th>Sector</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>49</td>
</tr>
<tr>
<td>Industrial</td>
<td>24</td>
</tr>
<tr>
<td>Commercial</td>
<td>16</td>
</tr>
<tr>
<td>Construction/Institutional</td>
<td>9</td>
</tr>
<tr>
<td>Landscape</td>
<td>2</td>
</tr>
</tbody>
</table>

*Source: MIGHT (2010) Renewable Energy Technology Roadmap*

Composition of Municipal Solid Waste in Malaysia

*Source: Dr. K.H. Chua, Endang Jati M.S., Dr. Y.P. Leong (2011) Sustainable Municipal Solid Waste Management and GHG Abatement in Malaysia. 15th International Conference on ISO & TQM (15-ICIT). July 2011. UNITEN, Kajang*
Waste Projection in Malaysia 2000-2020 (Tonnes/Day)

Household and Commercial Solid Waste with Recycling Projection for Malaysia

Source: JPSPN and PEMANDU Lab
Biomass Value Chain

- Access to **long-term supply** of biomass for downstream utilization
- Access to **technologies and know-how**; as well as human capital
- Strategic new **policies that are consistent** with existing ones
- Access to **funding from banks and investors**; and
- Certification and **product labelling to meet international market** requirements and sustainability standards
The Range of Acquisition Cost of Selected Biomass in Malaysia in RM/Tonne (wet)

Source: Interview with small & medium enterprises in biomass venture
### Available Biomass-Based Products and Their Commercialisation Stage in Malaysia

<table>
<thead>
<tr>
<th></th>
<th>PELLETS</th>
<th>BIOFUELS</th>
<th>BIOGAS</th>
<th>GREEN CHEMICAL</th>
<th>BIOFERTILISERS</th>
<th>BIOCHAR</th>
<th>BIOCOMPOSITES</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFB</td>
<td>EFB Pellets</td>
<td>Bioalcohol</td>
<td>Syngas</td>
<td>Industrial Sugars/Chemical</td>
<td>Organic Compost</td>
<td>Carbon Fibers</td>
<td>Fibreboard</td>
<td>Pulp/ Fibremat</td>
</tr>
<tr>
<td>PKS</td>
<td>Coal substitute</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Activated Carbon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPT</td>
<td>OPT Pellets</td>
<td>Bioalcohols</td>
<td>Syngas</td>
<td>Industrial Sugars/Chemical</td>
<td>Organic Compost</td>
<td>Biochar</td>
<td>Engineered lumber</td>
<td></td>
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<tr>
<td>OPF</td>
<td>OPF Pellets</td>
<td>Bioalcohols</td>
<td>Syngas</td>
<td>Industrial Sugars/Chemical</td>
<td>Organic Compost</td>
<td>Biochar</td>
<td>Phytochemicals</td>
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<tr>
<td>PKC</td>
<td>PKC Pellets</td>
<td></td>
<td>Biopolymers</td>
<td></td>
<td></td>
<td></td>
<td>Animal Feed</td>
<td></td>
</tr>
<tr>
<td>POME</td>
<td></td>
<td>Bioalcohols</td>
<td>Methane</td>
<td>Biopolymers</td>
<td>Organic Compost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAW DUST</td>
<td>Wood Pellets</td>
<td>Bioalcohols</td>
<td>Syngas</td>
<td>Industrial Sugars/Chemical</td>
<td>Mushroom Cultivation</td>
<td>Biochar</td>
<td>Fiberboard</td>
<td></td>
</tr>
<tr>
<td>RICE HUSK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silica Aerogel</td>
</tr>
<tr>
<td>PADDY STRAW</td>
<td>Straw Pellets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Biocomposites</td>
</tr>
<tr>
<td>KENAF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Animal Feed</td>
</tr>
<tr>
<td>SAGO WASTE</td>
<td>Fuel Pellets</td>
<td>Bioalcohols</td>
<td>Methane</td>
<td>Biopolymers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSW</td>
<td>RDF Pellets</td>
<td></td>
<td>Methane</td>
<td></td>
<td>Organic Compost</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SEWAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Phosphate Recovery</td>
</tr>
</tbody>
</table>

**Legend:**
- 🟣 Commercialised
- 🔵 Development Stage
- 🟡 Potential
Competitive Position of Biomass Industry in Malaysia

**STRENGTHS**
- Availability of biomass
- Positive support from government
- Academic expertise in high value use

**WEAKNESS**
- Current low-value utilization
- Low commercialisation rate of local R&D output & lack of recognition of local expertise
- Certifications & standardization
- Lack of domestic market support

**OPPORTUNITIES**
- Enhancing green technology initiatives
- New sector for SMEs development
- Rural economic development
- Export potential of green products
- Malaysia as global and regional biomass hub

**THREATS**
- Uncertain pricing and supply of biomass feedstock
- Perceived high risk from financiers’ perspective
- SMEs trapped in low-value utilization
- Barriers to export (technical, green certifications etc.)
Macro Challenges Faced by Biomass Industry in Malaysia
Mapping of Key Enablers in Biomass Industry
Recommended Strategies for Biomass Industry Value Chain in Malaysia

**STRATEGY 1**
Unlocking Biomass Feedstock for Downstream Utilization

**STRATEGY 2**
Optimised Utilization of Biomass for Sustainable and High value Production

**STRATEGY 3**
Positioning Malaysia as Regional Biomass Hub

- Bio-Energy
  - Pellets
  - Biofuels
  - Biogas

- Green Chemicals & Bio-Polymers
- Biofertilisers
- Biocomposites & Bio-Materials
Recommendations of the MBIAP 2020

UNLOCKING BIOMASS FEEDSTOCK FOR DOWNSTREAM UTILISATION

- Improving the biomass-to-energy efficiency of rice and palm oil mills
- Optimizing the efficiency nutrient recycling to field
- Sustainable fuel switching in rice industry
- Diversion of organic waste from landfills
- National management and monitoring of biomass resource
Recommendations of the MBIAP 2020

OPTIMISED UTILISATION OF BIOMASS FOR SUSTAINABLE AND HIGH VALUE PRODUCTION

• Promoting commercialisation collaborations between plantation companies, biomass SMEs & research institutions via public-private partnership (PPP)

• Promoting renewable energy utilization by energy-intensive industry

• Developing the capacities of financial institutions in supporting biomass industry
Recommendations of the MBIAP 2020

POSITIONING MALAYSIA AS GLOBAL AND REGIONAL BIOMASS HUB

• Creating focal point for regional biomass stakeholders
• Development of technical specifications and sustainability standards for biomass products
Possible switch to Sustainable Production of Rice and Biomass Products
ACKNOWLEDGEMENT

We would like to thank all stakeholders who have supported us in delivering the MBIAP 2020