OPPORTUNITIES AND CHALLENGES IN BIOGAS DEVELOPMENT IN INDONESIA

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South Pole Carbon Asset Management Ltd
Overview

- Introduction South Pole Carbon
- Biogas potentials in Indonesia
- Existing regulation
- Key challenges and related opportunities
- Summary
- 2006: Incorporation in Zurich / Switzerland
- 2012: present on all continents
- 2011 and 2012: Best Project Developer**
- Swiss Social Entrepreneur of the Year 2011***
- 80 carbon professionals from 22 countries
- Projects in over twenty countries
- Specialized in high-quality “Gold Standard”

*Majority stake in Climate Friendly  ** Environmental Finance’s Voluntary Carbon Market Survey 2011, and again 2012;  *** Schwab Foundation/WEF
Largest premium projects portfolio

- 200 contracted projects in over 20 countries
- Total volume: 60 million tCO$_2$e until 2012
- 50% market share of Gold Standard projects
- Projects in advanced development: 30 million tCO$_2$e until 2012

...from a broad project pipeline

...and from the most important project types

- Renewable Energy (Biomass, Hydro, Wind, Geothermal)
- Waste Treatment (liquid and solid)
- Energy Efficiency
- Reduction of Waste Gas (Oil, Gas and Chemical Industries)
- Forestry
- Programmatic Approach (PoAs)
Carbon projects & sustainable development

- Generation of co-benefits for the local communities
  - qualify projects for the Gold Standard whose credits fetch a premium in the carbon markets.

- First ever Gold Standard carbon credits
  - Biomass Malavalli / India

- Leadership Position on Gold Standard Registry
  - 45 projects listed.

- Positive social impact on hundreds of mostly rural communities
  - improving the lives of many thousands of people
• Carbon Credits: From extensive pipeline of projects to help clients reduce their carbon emissions and meet sustainability targets.

• Emission Reduction Projects: Development and management of projects in collaboration with technology providers and project developers.

• Climate Friendly Solutions: Concrete solutions to help enhance the sustainability profile of organizations such as Insetting (i.e. development of own projects) and GoldPower (i.e. a worldwide renewable energy label).

• New Carbon Markets: expertise and advisory services using its knowledge of EU-ETS, CDM and voluntary carbon markets.
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Summary
Oil palm plantation in Indonesia

Area untuk perkebunan kelapa sawit di Indonesia, 2009

Sumber: Euromonitor; Data Konsultan; AISI; Tim Analisis
Biogas potentials utilizing POME
Palm oil mills in Indonesia

<table>
<thead>
<tr>
<th>No.</th>
<th>Propinsi</th>
<th>Jumlah Pabrik Pengolahan Kelapa Sawit (unit)</th>
<th>Kapasitas Produksi (ton TBS/jam)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>NAD</td>
<td>25</td>
<td>980</td>
</tr>
<tr>
<td>2.</td>
<td>Sumatera Utara</td>
<td>92</td>
<td>3.815</td>
</tr>
<tr>
<td>3.</td>
<td>Sumatera Barat</td>
<td>26</td>
<td>1.645</td>
</tr>
<tr>
<td>4.</td>
<td>Riau</td>
<td>140</td>
<td>6.660</td>
</tr>
<tr>
<td>5.</td>
<td>Kepulauan Riau</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>6.</td>
<td>Jambi</td>
<td>42</td>
<td>2.245</td>
</tr>
<tr>
<td>7.</td>
<td>Sumatera Selatan</td>
<td>58</td>
<td>3.555</td>
</tr>
<tr>
<td>8.</td>
<td>Bangka Belitung</td>
<td>16</td>
<td>1.235</td>
</tr>
<tr>
<td>9.</td>
<td>Bengkulu</td>
<td>19</td>
<td>990</td>
</tr>
<tr>
<td>10.</td>
<td>Lampung</td>
<td>10</td>
<td>375</td>
</tr>
<tr>
<td>11.</td>
<td>Jawa Barat</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>12.</td>
<td>Banten</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>13.</td>
<td>Kalimantan Barat</td>
<td>65</td>
<td>5.475</td>
</tr>
<tr>
<td>14.</td>
<td>Kalimantan Tengah</td>
<td>43</td>
<td>3.100</td>
</tr>
<tr>
<td>15.</td>
<td>Kalimantan Selatan</td>
<td>15</td>
<td>770</td>
</tr>
<tr>
<td>16.</td>
<td>Kalimantan Timur</td>
<td>29</td>
<td>1.545</td>
</tr>
<tr>
<td>17.</td>
<td>Sulawesi Tengah</td>
<td>7</td>
<td>590</td>
</tr>
<tr>
<td>18.</td>
<td>Sulawesi Selatan</td>
<td>2</td>
<td>150</td>
</tr>
<tr>
<td>19.</td>
<td>Sulawesi Barat</td>
<td>6</td>
<td>260</td>
</tr>
<tr>
<td>20.</td>
<td>Sulawesi Tenggara</td>
<td>3</td>
<td>260</td>
</tr>
<tr>
<td>21.</td>
<td>Papua</td>
<td>3</td>
<td>140</td>
</tr>
<tr>
<td>22.</td>
<td>Papua Barat</td>
<td>4</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>608</td>
<td>34,280</td>
</tr>
</tbody>
</table>

Sumatra:
- Mills: 429
- Capacity t/h: 21,540
Energy potentials of POME

<table>
<thead>
<tr>
<th>POM capacity (tones FFB/hour)</th>
<th>60</th>
<th>45</th>
<th>30</th>
<th>21540</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation (hours/day)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Operation (days/year)</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>POME/FFB</td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
</tr>
<tr>
<td>Methane conversion (Nm3/kg COD)</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>COD removal efficiency (%)</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Methane content in biogas (%)</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Methane thermal energy (MJ/Nm3)</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Volume POME per day (m³)</td>
<td>780</td>
<td>585</td>
<td>390</td>
<td>280020</td>
</tr>
</tbody>
</table>

| COD (mg/l)                     | 50000| 50000| 50000| 50000 |
| COD Load (kg COD/day)          | 39000| 29250| 19500| 14001000|
| Gas engine efficiency (%)      | 38%  | 38%  | 38%  | 38%   |
| Methane potentials (m³)        | 10530| 7897.5| 5265| 3780270 |
| Electricity potentials (MW)    | 1.57 | 1.18 | 0.79 | 565   |

| COD (mg/l)                     | 75000| 75000| 75000| 75000 |
| COD Load (kg COD/day)          | 58500| 43875| 29250| 21001500|
| Methane potentials (m³)        | 15795| 11846.25| 7897.5| 5670405 |
| Electricity potentials (MW)    | 2.36 | 1.77 | 1.18 | 848   |

Potentially reduce GHG emission of about 10.8 mio tones of CO2/year from POME component and about 4.2 mio tones of Cos/year from electricity component
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Summary
The Main Target:

- Energy Elasticity less than 1 at 2025
- Optimizing Primary Energy Sources

**Energy Mix (2025)**

- Coal 33%
- Gas 30%
- Oil 20%
- NRE, 17%
- Biofuel 5%
- Geothermal 5%
- Biomass, Nuclear, Hydro Power, Solar, Wind Power 5%
- Liquefaction Coal 2%
• Agriculture Minister Regulation No. 19/Permentan/OT.140/3/2011
  – Oil palm plantation/palm oil mill have to be ISPO certified latest 31 December 2014
  – Conditions of ISPO-certified plantation: 3.6. GHG emission mitigation, includes:
    • Technical Guidelines/SOP for GHG mitigation available;
    • GHG emission inventory conducted;
    • Records on the process of land-use trajectory available;
    • Records on GHG emission reduction activity available;

• POME utilization to generate biogas could be part GHG emission mitigation
MEMR Regulation No. 4/2012 on FIT

<table>
<thead>
<tr>
<th>No.</th>
<th>Energy</th>
<th>Installed Capacity</th>
<th>Tariff</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Medium Voltage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Biomassa</td>
<td>Up to 10 MW</td>
<td>Rp. 975,- / kWh X F</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Biogas</td>
<td>Up to 10 MW</td>
<td>Rp. 975,- / kWh X F</td>
<td>Non MSW</td>
</tr>
<tr>
<td>3.</td>
<td>Municipality Solid Waste</td>
<td>Up to 10 MW</td>
<td>Rp. 1050,- / kWh</td>
<td>Zero waste *)</td>
</tr>
<tr>
<td>4.</td>
<td>Municipality Solid Waste</td>
<td>Up to MW</td>
<td>Rp. 850,- / kWh</td>
<td>Landfill *)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Low Voltage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Biomassa</td>
<td>s.d 10 MW</td>
<td>Rp. 1.325,- / kWh X F</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Biogas</td>
<td>s.d 10 MW</td>
<td>Rp. 1.325,- / kWh X F</td>
<td>Non sampah kota</td>
</tr>
<tr>
<td>3</td>
<td>Municipality Solid Waste</td>
<td>s.d 10 MW</td>
<td>Rp. 1.398,- / kWh</td>
<td>Zero waste *)</td>
</tr>
<tr>
<td>4</td>
<td>Municipality Solid Waste</td>
<td>s.d 10 MW</td>
<td>Rp. 1.198,- / kWh</td>
<td>Landfill *)</td>
</tr>
</tbody>
</table>

- F factor is based on the project location:
  - Jawa, Bali, Sumatera : F = 1
  - Kalimantan, Sulawesi, NTB dan NTT : F = 1,2
  - Maluku dan Papua : F = 1,3

*Notes: *) in accordance with the Law No. 18/2008 on waste management
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Challenges

• Most of palm oil mills are located in the remote area, so that it would be too costly to build transmission line to the nearest grid

• Palm oil mills are energy self-sufficient; only if you want to build other facility (e.g. KCP) then you might build biogas plant to provide additional electricity

• Performance of biogas projects in Indonesia are not so encouraging to invest in (based on benchmark study conducted in collaboration with GIZ)
Biogas CDM projects in Indonesia

- **2008:** 1
- **2009:** 1
- **2007:** 1
- **2006:** 2
- **2010:** 3
- **2011:** 5
- **2012:** 24

**Year Distribution:**
- 2008: 1
- 2009: 1
- 2007: 1
- 2006: 2
- 2010: 3
- 2011: 5
- 2012: 24

**Feedstock Distribution:**
- POME: 58%
- Starch: 32%
- Animal Manure: 4%
- Ethanol: 2%
- Others: 4%

**Status Distribution:**
- Under construction: 30%
- Started operation: 44%
- Not known: 26%
- No CER issuance: 76%
- CER issuance: 24%
Performance of CDM biogas projects

• Out of 10 issued biogas project, in term of CER issuance:
  – 3 project performed its CERs expected values in PDD
  – 2 projects performed between 75% - 100% of PDD values
  – 3 projects performed more than 50% - 75% of PDD values
  – 2 projects performed less than 50% of PDD values
Opportunities

• ISPO and FIT provide sufficient potentials for development of biogas projects

• Some investors are ready to invest money and bring technology

• Carbon market still a potential to get additional revenue
  – South Pole has registered POA on biogas to electricity in Indonesia
  – This POA can be expanded to Malaysia and other region (South Pole has already expanded 2 POAs to Malaysia: Co-composting and Renewable Energy
POA in nutshell

Activities coordinated voluntarily by private sector or government:

- Coordination and implementation of policy/standard or certain objectives that wants to be achieved;
- Activities aimed at GHG emission reduction or increase carbon sequestration by forest;
- Activities, which is additional and would not happen without PoA;
- Registering CDM project activities (CPAs) without limitation.
**Remark:**
1. White: responsibility of project owner and partner
2. Green: responsibility of DNA
3. Blue: responsibility of coordinating entity
4. Pink: responsibility of DOE
5. Yellow: responsibility of EB
Summary

• Treatment of waste in to biogas can present a good business opportunity that not only generate financial profit, but also bring environmental benefit

• FIT is already established in Indonesia, which guarantee sufficient tariff for connection with the electricity grid

• Need to use technology that can improve the efficiency of waste treatment
Terima kasih atas perhatian anda!

Look forward to helping your company materialize its carbon assets

www.southpolecarbon.com

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