Biogas Potential in Thailand

Renewable Energy Biogas/Biomass
Made in Germany
Conrad Hotel, Bangkok
9 September 2009

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Project Manager
German Technical Cooperation (GTZ)
Sources

- **Industrial wastewater**
  - Tapioca/Palm Oil/Ethanol
  - Food canning and process
  - Frozen Seafood

- **Agriculture wastewater**
  - Pig/Chicken/Duck/Cow

- **Municipal Solid Waste (MSW)**
## Industrial Wastewater

Data: 2008

<table>
<thead>
<tr>
<th>Industry</th>
<th>Total factories</th>
<th>Biogas systems</th>
<th>No Biogas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Starch/Tapioca</td>
<td>86</td>
<td>60</td>
<td>26</td>
</tr>
<tr>
<td>2. Palm oil</td>
<td>49</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>3. Ethanol</td>
<td>24</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>4. Rubber</td>
<td>88</td>
<td>4</td>
<td>84</td>
</tr>
<tr>
<td>5. Food processing</td>
<td>66</td>
<td>26</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Chulalongkorn University, http://www.thaibiogas.com
- Starch/tapioca industry has high biogas technology penetration, nearly 70%.
- Remaining potential is in smaller factories (production capacity 100-200 Ton/day)
- Potential in tapioca wet cake

Source: Chulalongkorn University, http://www.thaibiogas.com
- 40% of Palm oil industry has biogas plants
- Potential of EFB for biogas is being studied in GTZ Sustainable Palm Oil Project (Contact: Daniel.May@gtz.de)

Source: Chulalongkorn University, http://www.thaibiogas.com
Industry - Ethanol

- Existing biogas systems are nearly 50% of total potential
- Ethanol can be produced from cane molasses/cassava

Source: Chulalongkorn University, http://www.thaibiogas.com
66 factories are identified as good potential for biogas production (gas volume > 400 m³)
Majority of potential factories are in food canning and frozen seafood

Source: Chulalongkorn University, http://www.thaibiogas.com
Industry - Rubber

- Technical barrier
- Need research cooperation
- May need enforcement of environmental regulations on wastewater

Source: Chulalongkorn University, http://www.thaibiogas.com
- Pig farm is most developed in biogas installation with 20% of potential.
- With government subsidy target, pig farms will reach 40% of potential in 2013
- Other farms still behind in biogas development due to technical, financial barriers, collection of sources, and competing use in other sectors

Source: Chulalongkorn University, http://www.thaibiogas.com
**MSW and Domestic Wastewater**

<table>
<thead>
<tr>
<th>MSW</th>
<th>No.</th>
<th>Biogas Potential (mil m3/year)</th>
<th>Biogas in operation</th>
<th>Remaining Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipality and Sub-district</td>
<td>7,948</td>
<td>1,218</td>
<td>2</td>
<td>7,946</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Good potential for CDM projects
- Many landfill biogas projects are now being developed

**STATUS OF WASTE MANAGEMENT**

- Generated 100%
- Recyclable Potential 93%
- Collected 85%

<table>
<thead>
<tr>
<th>Source: Pollution Control Department, 2004</th>
</tr>
</thead>
</table>
### Investment Cost

<table>
<thead>
<tr>
<th>Waste sources</th>
<th>Baht/m3 biogas</th>
<th>Baht/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried fruit</td>
<td>0.33</td>
<td>0.28</td>
</tr>
<tr>
<td>Tapioca</td>
<td>0.77</td>
<td>0.64</td>
</tr>
<tr>
<td>Palm Oil</td>
<td>0.84</td>
<td>0.70</td>
</tr>
<tr>
<td>Pig farm</td>
<td>0.96</td>
<td>0.80</td>
</tr>
<tr>
<td>Starch</td>
<td>1.37</td>
<td>1.14</td>
</tr>
<tr>
<td>Slaughter (pig)</td>
<td>2.65</td>
<td>2.21</td>
</tr>
<tr>
<td>Paper</td>
<td>3.11</td>
<td>2.60</td>
</tr>
<tr>
<td>Alcoholic beverage</td>
<td>3.52</td>
<td>2.93</td>
</tr>
<tr>
<td>Beer</td>
<td>5.12</td>
<td>4.26</td>
</tr>
<tr>
<td>Solid Waste</td>
<td>5.44</td>
<td>4.53</td>
</tr>
<tr>
<td>Non-alcoholic beverage</td>
<td>7.19</td>
<td>5.99</td>
</tr>
</tbody>
</table>

Cost of biogas systems depends on several factors. The above table shown average investment cost regardless of technology from field survey, interview, and secondary data from 190 systems in Thailand.

- Only Initial Investment Cost
- System life time 15 years
- Overall biogas production

Source: A Study on Biogas Potential, KMUTT, 2006
GTZ Biogas Project

- **Problems/barriers in Thai Biogas sector**
  - Human resource: under qualified operators leads to inefficient operation of systems/shut down
  - Lack of mutual agreement on standards
  - Lack of network for cooperation among several stakeholders

- **GTZ Biogas Project**
  - Identify incentives/measures for impenetrate sub-sectors
  - Quality system for operator/planner and human resource development
  - Biogas network/association

- **Project period**: 2 years (October 2009 – September 2011)
Biogas Network

- **Biogas Producers**
  - Exchange of experiences
  - Leverage framework conditions

- **Research/Academic**
  - Exchange of information and compilation of database
  - Cooperation on research and testing

- **Policy Makers**
  - Agreement on standards and regulations
    - DIW, Ministry of Industry (safety standards)
    - PCD, Ministry of Natural Resources and Environment (environmental standards),
    - DEDE, Ministry of Energy (quality/performance standards)
  - Cooperation on database of biogas systems

- **Private Companies**
  - Contact point for products information
  - Access to market
Information Sources

- **Energy Research Institute (ERI)**
  Chulalongkorn University
  Tel: 02 218 8096-8
  Website: [www.thaibiogas.com](http://www.thaibiogas.com), [www.eri.chula.ac.th](http://www.eri.chula.ac.th)

- **Waste Utilization and Management Pilot Plant Development and Training Institute (PDTI)**
  King Mongkuts University of Technology Thonburi (KMUTT)
  Tel: 02 452 3456
  Website: [www.pdti.kmutt.ac.th](http://www.pdti.kmutt.ac.th)

- **Energy Research and Development Institute (ERDI)**
  Chiang Mai University
  Tel: 053 942 007
  Website: [www.erdi.or.th](http://www.erdi.or.th)
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