Community-Based Biomass Power Plant Project Development

Bangkok, 04.10.2012
Objective

To develop a business model for the community-based biomass power project, which shall be connected to the national grid

The project shall:

- fulfill standard, performance and safety criteria
- improve the cooperation between public-private sectors and community
- Sustainable energy supply
- Improving community/rural development
- mitigate GHG emissions
Content

- Common Practice
- Feedstock selection
- Communities
- Stakeholders: Role and Responsibilities
- Technology selection
- Financing Model
- Governmental Support needed
Conversion Routes for Biomass Feedstock to Electricity

Source: Biomass Technology for Electricity Generation in Community, Mirko Barz, Fachhochschule Stralsund
Common Practice

Agro-Factory = Investor + Operator
- Agro wastes available at factory due to agricultural process
- Gird connected or substituting boiler fuel
Energy

1. Feedstock selection
How to find and define the right feedstock?

Feedstock

▸ Type
  - energy crops (ie Giant King Glass, Eucalyptus, Acacia)
  - industrial waste (ie rice husk, rice straw, bagasse, EFB, corncobs, woodchips, wood residues, cassava root, coconut shells)

▸ Ownership of the feedstock
  - contract farming
  - Set up cooperative within community
How to find and define the right feedstock?

- Price development of biomass residue (*info from Kasetsart University*)

![Price of Agricultural Residues](chart.png)
How to find and define the right feedstock?

Price of Agricultural Residues

Cost (Baht/ton)

Year

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

Cassava Trash
Cassava Stalk
Cassava Rhizome
Empty Bunches
Fiber
Shell
Frond
How to find and define the right feedstock?

Price of Wood Residues

- Rubberwood Frond
- Eucalyptus
- Eucalyptus Bark

Cost (Baht/ton) vs. Year (2000-2010)
Energy

2. Communities
Community

Define the size of the community
- subdistrict administration level

Location of the community
- North of Thailand (i.e. Chiang Rai, Maehongson)
- Northeast of Thailand (i.e. Khonkaen, Nongkhai, Surin)
- South of Thailand (i.e. Surat Thani, Chumphon, Krabi)

Set up Small and Micro Community Enterprise
To manage feedstock and supply to power plant
Communities – How to find the right community?

Potential at the community
- existing national electricity grid
- water supply
- feedstock supply
- land use
- acceptance from community
- existing community projects
- Heat/Electricity demand
3. Stakeholders: role and responsibilities
Stakeholders

List of potential stakeholders

Biomass power pilot project

Primary stakeholders (directly affect)

MoA

Secondary stakeholders (Indirectly affect)

SAC

Villagers

DEDE

PEA

D/IW

PCD

TGO

Private

Suppliers

Manufacturers

Bank

Factory

Plantation

Public

Civil Society

DEDE = Department of Alternative Energy Development and Efficiency, MoE
PCD = Pollution Control Department, MoNRE
D/IW = Department of Industrial Work
MoA = Ministry of Agriculture
TGO = Thai Green House Gas Organization
PEA = Provincial Electricity Authority
SAC = Sub district Administration Organization
## Stakeholders

### Role and responsibilities

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role and responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public sector</strong></td>
<td>Facilitate the communication and identification of pilot project’s location; provide incentive subsidy programme from the Government; promotion and PR.</td>
</tr>
<tr>
<td>DEDE</td>
<td>Issue various permits related to operation</td>
</tr>
<tr>
<td>DIW</td>
<td>Issue PPA</td>
</tr>
<tr>
<td>PEA</td>
<td>Provide tax holiday and tax incentives</td>
</tr>
<tr>
<td>BOI</td>
<td>Provide biomass availability study report</td>
</tr>
<tr>
<td>MoAC</td>
<td></td>
</tr>
</tbody>
</table>
### Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role and responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>Feedstock supply and logistics&lt;br&gt;Co-investor (ownership)&lt;br&gt;Consumers&lt;br&gt;Project facilitator (communication to people)&lt;br&gt;Land lease</td>
</tr>
<tr>
<td>Private sector</td>
<td>Investor&lt;br&gt;Operator&lt;br&gt;Supply services and feedstock&lt;br&gt;Consumer (in case there are operating factories in the area)</td>
</tr>
<tr>
<td>Banks</td>
<td>Provide soft loans</td>
</tr>
<tr>
<td>Technology provider</td>
<td>Concept design, detail design, EPC&lt;br&gt;Co-investor&lt;br&gt;Operator&lt;br&gt;Technical trainer&lt;br&gt;ESCO services</td>
</tr>
<tr>
<td>GIZ</td>
<td>Capacity building&lt;br&gt;Facilitator- technical knowhow and technical expert&lt;br&gt;Project set up and design</td>
</tr>
</tbody>
</table>
How to involve ...stakeholders... such as farmers, community members, land owners, others?

Community-based
Community-based RE Power Project Example from Germany - Ownership

- the community of Saarbeck is the owner of the parc
- no sales of surface (except for leasing models)
- development/maintenance of the parc are managed by an own company
- the community will operate an own wind turbine
- benefits will be used for all the inhabitants
- all the other renewable installations will be operated by local and regional investors
Benefit to the Community

value added on the local level

company profits in the community

tax payments

Net income from employment

Municipal share of income tax (15%)

Trade tax
4. Technology selection
Technology selection

Technology

► Project boundary
  - size of power plant (depending on feedstock supply but normally it will be lesser than 1 MW)
  - supply electricity to the national grid
  - not limited to electricity generation (CHP)***

► Eligible criteria of selected technology
  - proven economic and sustainable business model
  - proven technology
  - high quality, standard, safety
Specific biomass technology

- Preparation of the feedstock
  - Chipping
  - Grinding
  - Briquetting
  - Pelletizing
  - Drying
- Technology
  - Gasification (small scale power plant)
  - Direct combustion (Medium up to large scale)
Technology selection

- Experiences on existing technology

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Small scale power plant advantages</td>
<td>• Technology barrier</td>
</tr>
<tr>
<td>• Increased income in the community</td>
<td>• Commercial scale?</td>
</tr>
<tr>
<td>• Easy to manage especially logistic</td>
<td>• Political issue in the community area</td>
</tr>
<tr>
<td></td>
<td>• Lack of understanding by the community</td>
</tr>
<tr>
<td></td>
<td>• Land use</td>
</tr>
</tbody>
</table>
5. Financing Model
Financing Model

Financing

- Financing model for the power plant
  - Investor together with technology provider
  - Equity financing from financial institute
  - Co-investment between community and investor

- GIZ is now developing the business model for community based biomass power project.
What to consider for loan application

- Strong sponsor (Finance, well-known)
- Experience in biomass projects/power plant
- Sufficient cash flow - ability to repay debt
- Reliable feasibility study (data collection)
- Financial status of investor
- Proven technology or guarantee from suppliers
- Independent engineer report for feasibility
- Feedstock security
- EPC and O&M
- D/E DSCR
- PPA
- Public hearing
6. Governmental support needed
Government support

- Subsidy program for small scale community based biomass project
- Special adder/feed-in tariff
- Community Competitions/Awards
Example of Support

Kommunalatlas

Interactive guide provides overview of innovative projects

www.unendlich-viel-energie.de
Example of Support

Just launched: online tool to calculate value added attained on 3 different levels:

- Planning and installation
- Operation and maintenance
- Operating company

www.amendith-kef-energie.de
Business Model – Community-based Biomass Power Project

VIELEN DANK – THANK YOU – KOP KHUN KHRAB

Dipl.-Ing. Torsten Fritsche
Director Energy Efficiency and Renewable Energies
GIZ Thailand
Torsten.Fritsche@giz.de