UNIDO and Selected Bioenergy Projects in ASEAN Countries

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UNIDO is the United Nations’ specialized Industrial agency, mandated to promote industrial development and international industrial cooperation.

through:

Trade Capacity Building
Poverty Reduction through Productive activities
Environment and Energy
UNIDO and Renewable Energy

Bioenergy

Small Hydropower

Solar Energy

Wind Energy
UNIDO’s Bioenergy Portfolio

UNIDO’s bioenergy programme proposes a multidisciplinary, integrated and focused approach. It focuses on the following key areas:

• Bioenergy for industry
• Biofuels and the implications for climate change
• Sustainability criteria for biofuels
• Solid biomass for heat and power: South-South technology transfer and commercialization
• Liquid biofuels: biodiesel – building the local-global bridge for SMEs
• Biogas from industrial waste
• Biorefineries: providing clearing house services
Regional Level Project

Project on Cassava to Bio-Ethanol: South-South Technology transfer from Thailand to Viet Nam, Myanmar, and Lao PDR

Selected Country Level project in ASEAN Country

Agricultural Wastes to Energy Projects in Thailand and Cambodia
“South-South Technology Transfer: The Pilot Case of Ethanol Production From Cassava”

Participating Countries: From Thailand to Viet Nam, Myanmar and Lao PDR

Scope: Technology transfer: from cassava to bioethanol

Duration: 4 years (Q4 2012 – Q4 2016)

Budget: USD 2,600,000 (GEF Allocation to Thailand)

Donor: Global Environment Facility (GEF)
GEF Agency:
• United Nations Industrial Development Organization (UNIDO)

Executing Partners:
• National Science and Technology Development Agency (NSTDA) under the Ministry of Science and Technology, Thailand
• Liquor Distillery Organization (LDO), Thailand
• Ministry of Industry and Trade (MOIT), Viet Nam
• Food Industries Research Institute (FIRI), Vietnam
• Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI), Myanmar
Project Objective

Transfer NSTDA’s new bio-ethanol technology package using cassava fresh root as the raw material to LMV countries
## NSTDA Technology Package and Advantages

<table>
<thead>
<tr>
<th>NSTDA Technology Package</th>
<th>Advantages of the package</th>
</tr>
</thead>
</table>
| 1. Improved cassava production and post-harvest know-how | • Increased productivity from the current yield of 18 t/ha to 25 t/ha with no improvement in variety  
• Adoption of new soil conservation practices  
• Higher avoided emission  
• Technology transfer at minimal incremental costs |
| 2. Improved in-factory raw material management and pre-fermentation practices | • Increased flexibility for in-factory supply management  
• Lowered average cost of bio-ethanol production  
• Reduced water and resource consumption  
• Reduced logistic cost between factory to the plant, as the farmer could take fresh roots directly to plant |
NSTDA Technology Package and Advantages

### NSTDA Technology Package

<table>
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<th>Advantages of the package</th>
</tr>
</thead>
</table>
| 3. Fermentation          | • Increased ethanol concentration  
                          | • Shortened process and fermentation time 
                          | • Increased avoided emission   
                          | • Reduced time and energy usage in distillation |
NSTDA’s bio-ethanol technology package emits

**58.76 ton CO2eq/100,000L lower**

in comparison with conventional technology of bio-ethanol production from cassava chips by Life Cycle Analysis Method.
Expected Outputs

1. **Building NSTDA to be regional hub of ethanol production from cassava.**

*Key Indicators:*

- Information hub established for dissemination and supporting the south-south technology transfer
- Ethanol technology package finalised for dissemination
- Manuals, tool kits and structured training programs developed for technology transfer
- Database on ethanol technology developed and maintained by ethanol information hub
- A demonstration plant established in Thailand with ethanol production **capacity of 200 l/d** at Liquor Distillery Organization, Chacheongsao Province
2. **South-South technology transfer: Capacity building and policy dialogue with participants from Lao PDR, Myanmar and Viet Nam (LMV).**

**Key Indicators:**

- Regional awareness created for the new technology package
- Trainings conducted in Thailand for farmers, entrepreneurs and technicians
- Trainings conducted in Thailand for engineers, scientists and researchers
- Pricing practices and policy environment improved; activities to be conducted in Viet Nam with Laos participants
Expected Outputs

3. **Demonstration and commercialization of the technology and private sector development.**

*Key Indicators:*

- Training centre established at Food Industries Research Institute (FIRI), Viet Nam to disseminate and provide trainings on the new technology package
- A demonstration plant established in FIRI with ethanol production capacity of **50 l/d (Viet Nam)**
- Financing opportunities improved to finance the new technology
- Private sector assisted in project development for replicating the projects in Viet Nam and Thailand
- Bio-ethanol production technology commercialized with the establishment of **400,000 l/d plant in Myanmar**
“Climate Change Related Technology for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solution”

Location: Cambodia
Scope: Technology transfer: from agricultural waste to energy
Duration: 4 years starting Q4: 2012
Budget: USD 1,690,000
Donor: Global Environment Facility (GEF)
GEF Agency:
• United Nations Industrial Development Organization (UNIDO)

Executing Partners:
• Ministry of Environment (MOE)
• Ministry of Industry, Mines and Energy (MIME)
• National Cleaner Production Office Cambodia (NCPO-C)
To bring about sustained transfer of efficient, cost effective and low carbon agro-waste biomass fuelled energy technologies to replace fossil-fuel powered generators and boilers for power generation and thermal energy applications.
Expected Outputs

1. Renewable energy generation technology transfer and implementation in 3 pilot plants
2. Capacity building and development of tools for technology adaptation and transfer
3. Strengthening of institutional framework for technology transfer
4. Up-scaling of biomass fuelled technologies in Cambodia
5. Policies, regulations and mechanism to promote sustainable renewable energy generation
### Global Benefit from the Project

<table>
<thead>
<tr>
<th>Output indicators</th>
<th>Indirect Fossil Fuel savings [ton of oil eq]</th>
<th>GHG emission savings [t CO2eq]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>20 users have implemented low-medium cost RE related techniques like fuel substitution by gasifiers etc.</td>
<td>10,700</td>
<td>13,088</td>
</tr>
<tr>
<td>10 companies implement high cost &amp; efficient biomass fuelled energy generation technologies with 40% success rate</td>
<td>80,025</td>
<td>106,700</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90,725</strong></td>
<td><strong>119,788</strong></td>
</tr>
</tbody>
</table>
“Promoting Small Scale Biomass Power Plants in Rural Thailand for Sustainable Renewable Energy Management and Community Involvement”

Location: Na-Poon Sub-District, Phrae Province, Thailand
Scope: Technology transfer: from agricultural waste to energy
Duration: 3 years starting Q1:2013
Budget: USD 975,000
Donor: Global Environment Facility (GEF)
GEF Agency:
- United Nations Industrial Development Organization (UNIDO)

Executing Partners:
- Ministry of Energy (MOE)
- Na-Poon Sub-District Administrative Organization (SAO)
- Phrae Provincial Administrative Organization (PAO)
- Science and Technology Research Institute, Chiang Mai University University (STRI, CMU)
Project Objective

Promote renewable energy technology from agricultural wastes, mainly, small-scale biomass gasification power plant in rural areas in Thailand.
Proposed Site: Na-Poon Sub-District, Phrae Province, Thailand

Locations of chopstick factories

Proposed power plant site and chopstick factories location
Expected Outputs

1. Demonstration of technical and financial viability
   - 250 kWe biomass gasification power plant established in Na-Poon Sub-District, Phrae Province, Thailand.
   - 1 MWe biomass gasification power plant established in Udon Thani Province, Thailand.
Expected Outputs

2. Technical and institutional capacity building

- Information and learning centre for small scale biomass gasification established at Science and Technology Research Institute, Chiang Mai University (STRI, CMU)
- Information and learning centre staff trained on development, technical aspects, operation and maintenance (O&M) of small scale biomass gasification plants.
- Training materials developed for the different trainings to be conducted at the information and learning centre.
- Information toolkit prepared for agro-processing industries on developing small scale biomass gasification power plants.
3. Support preparation of models and policy strengthening for promoting community based small-scale power plants

- Development of participatory process for the promotion and support of community owned small-scale biomass power plants of up to 1 MWe capacity.
- Policies pushed to promote small scale biomass power plants in the community through provincial energy planning mechanism.
Global Benefit from the Project

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Biomass</th>
<th>Cumulative GHG emission reduction over the plant life time (t CO2e)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Direct</td>
</tr>
<tr>
<td>Phrae Province</td>
<td>250 kWe</td>
<td>Bamboo</td>
<td>13,338</td>
</tr>
<tr>
<td>Udon Thani Province</td>
<td>1 MWe</td>
<td>Rice husk</td>
<td>53,703</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>67,041</strong></td>
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</table>
Thank You

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