UNIDO and Selected Bioenergy Projects in ASEAN Countries

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UNIDO Regional Office in Thailand

United Nations Industrial Development Organization

UNIDO is the United Nations' **specialized**

Industrial agency, mandated to promote **industrial development** and international **industrial cooperation.**

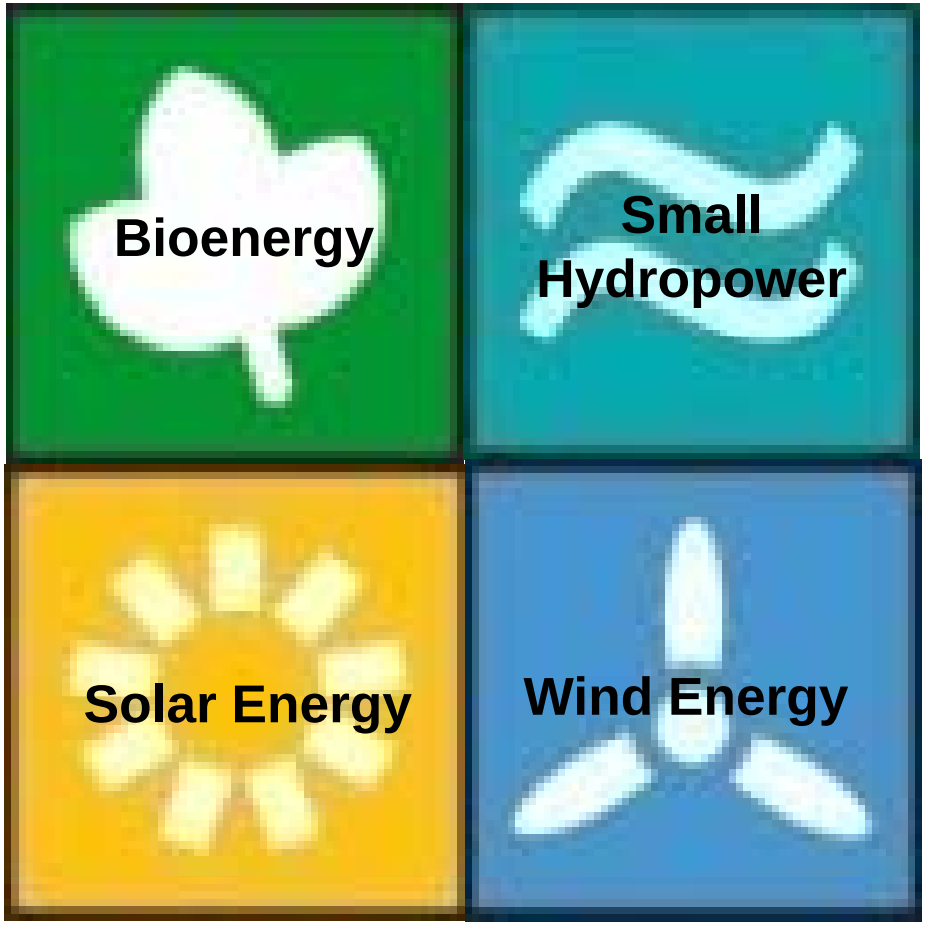
through :

Trade Capacity Building

Poverty Reduction through Productive activities

Environment and Energy

UNIDO and Renewable Energy



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



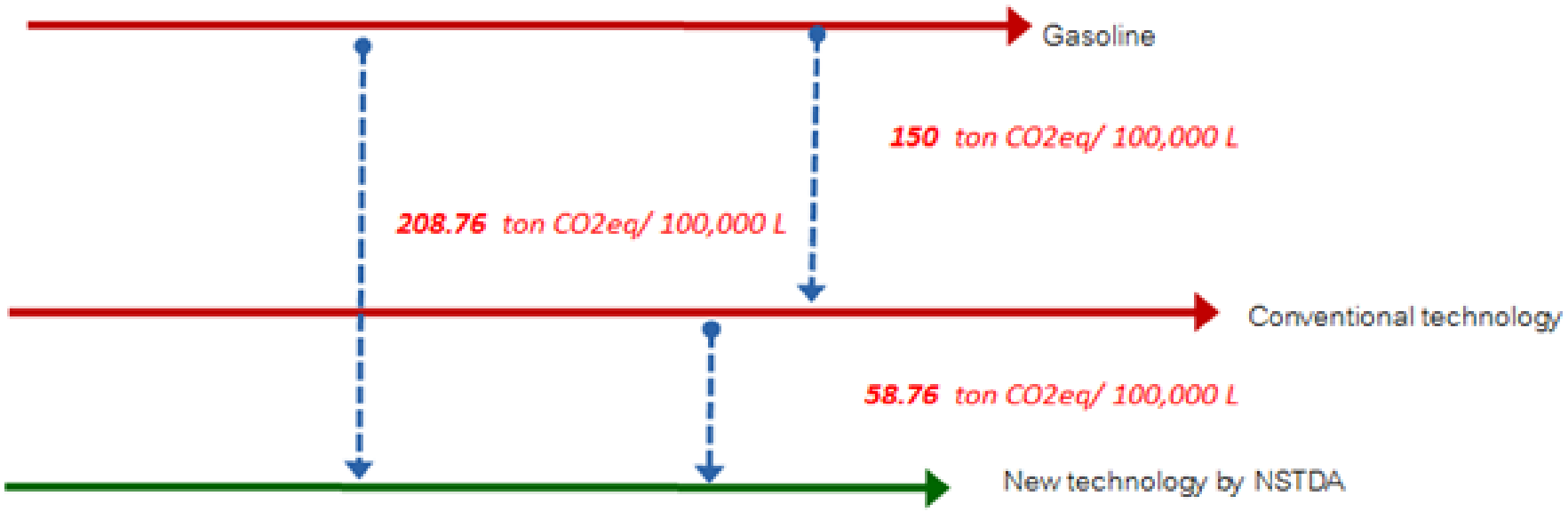
Transfer NSTDA's new bio-ethanol technology package using cassava fresh root as the raw material to LMV countries

NSTDA Technology Package and Advantages

NSTDA Technology Package	Advantages of the package
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	Advantages of the package
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

Expected Outputs

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)

Project Objective



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

Output indicatos	Indirect Fossil Fuel savings [ton of oil eq]		GHG emission savings [t CO2eq]	
	Min	Max	Min	Max
20 users has implemented low-medium cost RE related techniques like fuel substitution by gasifiers etc.	10,700	13,088	34,130	41,080
10 companies implement high cost & efficient biomass fuelled energy generation technologies with 40% success rate	80,025	106,700	254,961	339,948
Total	**90,725**	**119,788**	**289,091**	**381,028**

"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 staring 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)

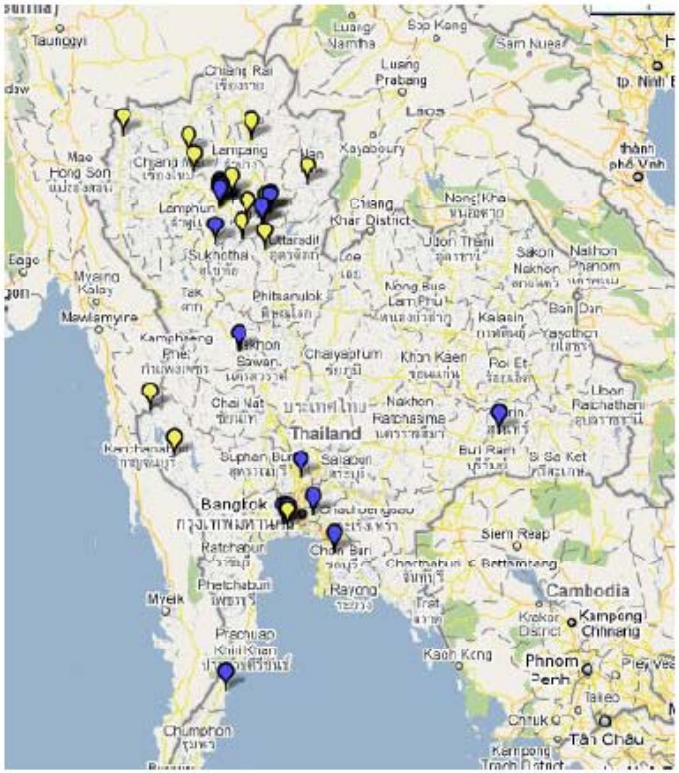
Project Objective



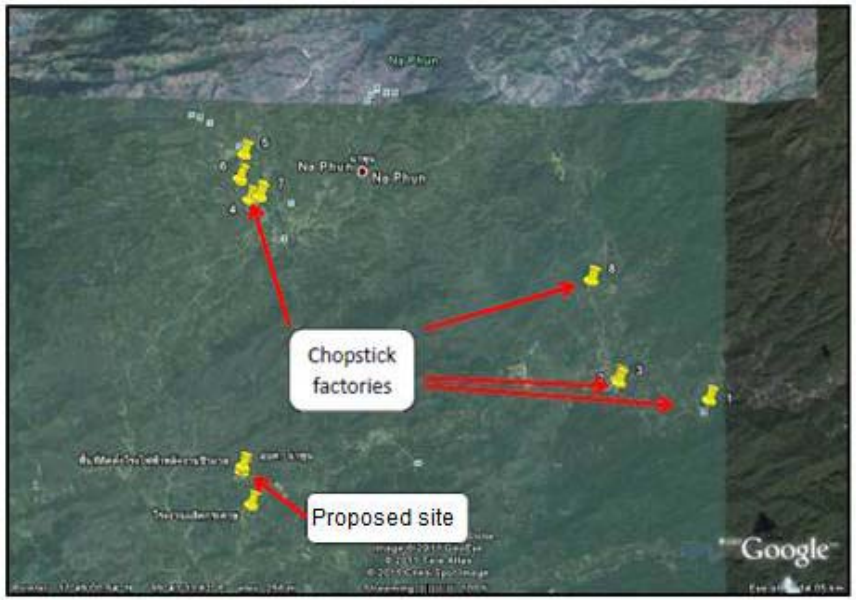
Promote renewable energy technology from agricultural wastes, mainly, small-scale biomass gasification power plant

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.

Expected Outputs

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

Location	Size	Biomass	Cumulative GHG emission reduction over the plant life time (t CO2e)	
			Direct	Indirect
Phrae Province	250 kWe	Bamboo	13,338	266,770
Udon Thani Province	1 MWe	Rice husk	53,703	1,074,058
Total			**67,041**	**1,340,828**

Thank You

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